Universitat Autònoma de Barcelona

TECHNICAL NOTE 94.33

Waste Preparation Unit, Assembly and Validation

Prepared by/Préparé par Vila, E. (CIFA), Moyano, R. and Peiro, E.
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CHANGE LOG

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Brigitte LAMAZE	ESA	2 hardcopies + electronic version
Enric Vila	CIFA	Electronic version

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8. Hydraulic vtest procedure
9. Hydraulic test certificate
10. Slope certificate
11. Maintenance and spares
12. Chemical treatment of pipelines
13. Report on chemical treatment of pipelines
14. Electrical documentation

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MELISSA PROJECT

Escuela Técnica Superior de Ingeniería

Campus Universidad Autónoma de Bellaterra

08193-Bellaterra (Barcelona)

Montcada i Reixac , 13 de Abril de 2010

ASUNTO: Documentación del sistema de trituración.

Muy señores nuestros:

Adjuntamos documentación del sistema de trituración para la realización de un caldo de cultivo para digestores, realizado para ustedes en Bellaterra.

Sin otro particular, y a la espera de sus noticias, aprovechamos la ocasión para saludarles atentamente.

C.I.F.A. S.L

Fdo. José Fernández

Director Técnico

INDICE

1.- MEMORIA

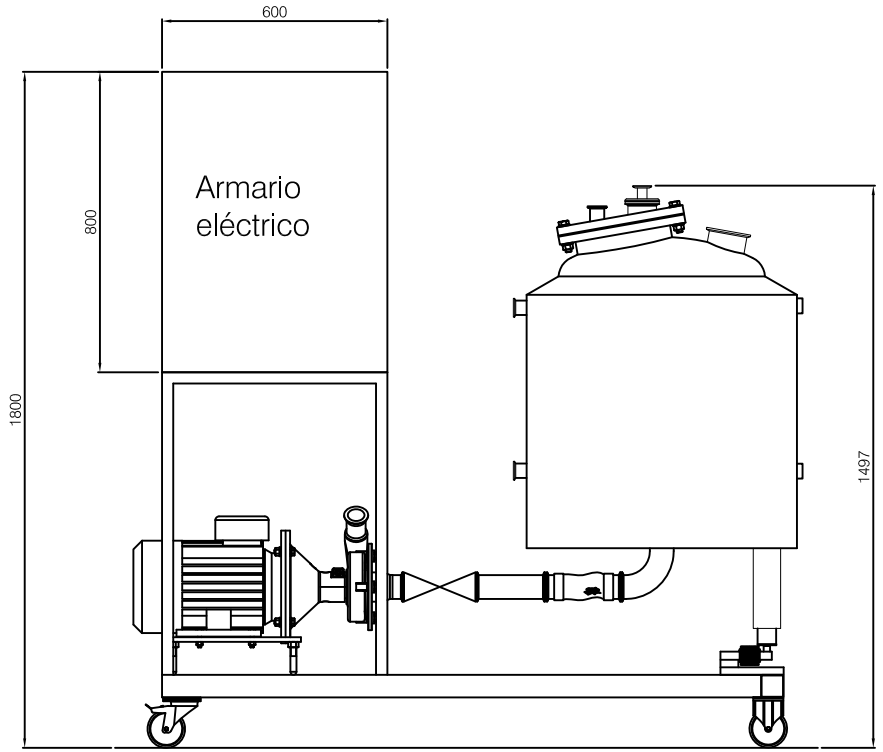
La presente memoria hace referencia al sistema de trituración para la realización de un caldo de cultivo para digestores.

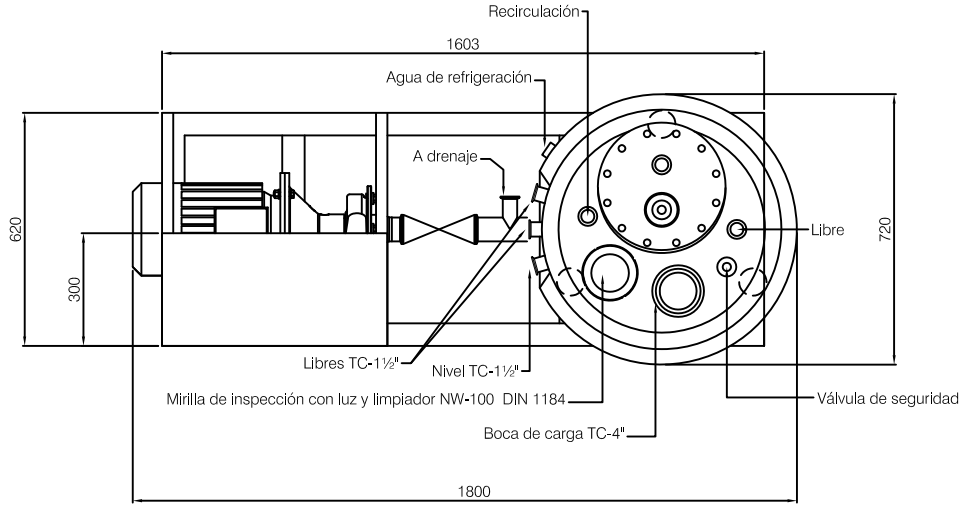
El equipo suministrado se describe en el plano adjunto ESA-001-A3 en revisión 03 y consiste, básicamente en:

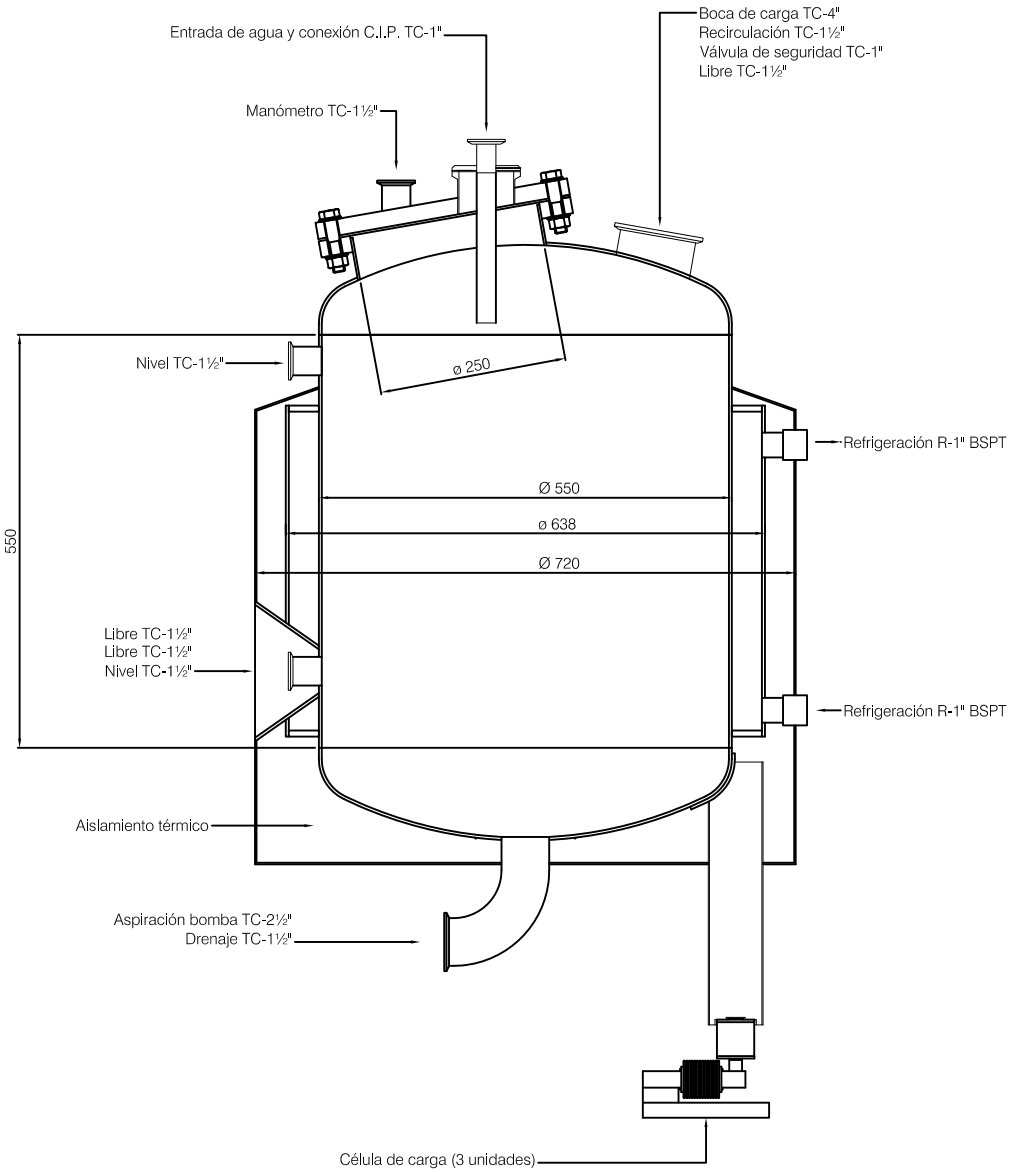
- Sistema buffer compuesto por un depósito en acero inoxidable AISI-316L de 100 litros de capacidad útil, con niveles vibratorios, bola para limpieza y tolva de llenado. El depósito estará preparado para operaciones de CIP/SIP y está equipado con una camisa de enfriamiento y mirilla con luz.
- Sistema de refrigeración por camisa incorporada y con control de temperatura mediante válvula de tres vías y sonda de temperatura.
- Sistema de tuberías de recirculación y descarga, realizadas en acero inoxidable AISI-316 y soldadura orbital. Conexionado mediante clamps.
- Sistema de pesaje compuesto por tres células para el depósito, caja sumadora de señales, pantalla indicadora y flexibles de conexionado a reactor para no falsear el pesaje todo ello montado en un skid de acero inoxidable con ruedas para facilitar su movilidad y posicionamiento en la sala contigua a C-1.
- Tubo buzo para evitar espumas en la recirculación del producto y tolva para el vertido de sólidos.

2.- PLANOS

Adjuntamos diagrama de flujo y layout del sistema de trituración.







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4	29.04.09	J.F.R.	
3	28.04.09	J.F.R.	
2	28.04.09	J.F.R.	
1	24.04.09	J.F.R.	
0	22.04.09	J.F.R.	

V. B.

TITULO: Layout

PROYECTO: Trituradora

CLIENTE: Melissa

CAD ref.: Clientes

substituye:

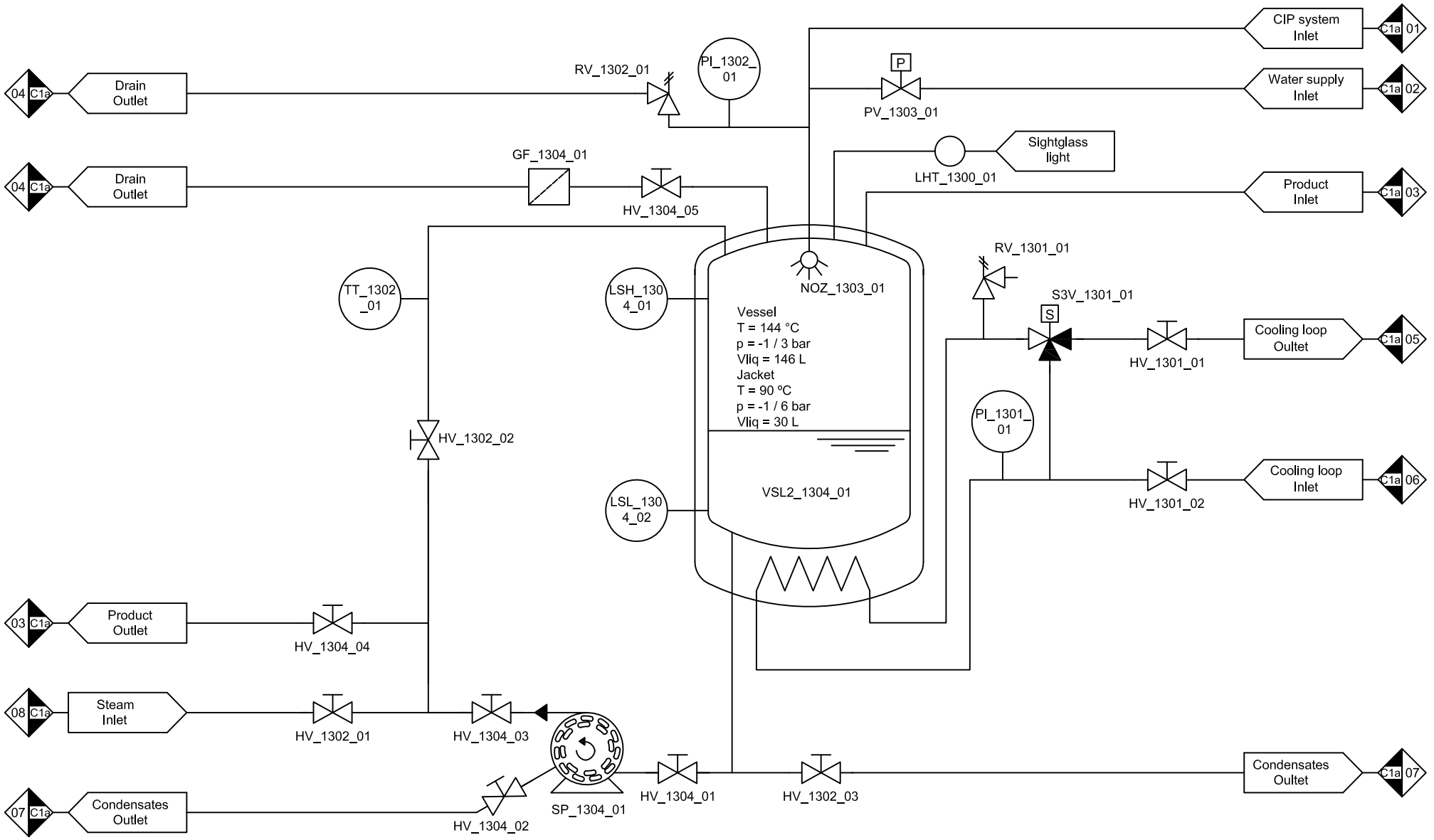
ESCALA:	COTAS	Proyección	ITEM:	UNIDADES:	CODIGO:
1:5 / 1:10	EN mm.				

plano: MEL-008-A2

hoja: 1 de: 1

CIFA

Consultoría e Instalaciones Farmacéuticas y Alimentarias, S.L.



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3	04.05.09	J.F.R.	J.F.G.	
2	14.04.09	J.F.R.	J.F.G.	
1	16.03.09	J.F.R.	J.F.G.	
0	03.06.08	J.F.R.	J.F.G.	
rev	fecha	dibujado	V. B.	

TITULO: P & ID

PROYECTO: MELISSA – Trituradora

CLIENTE: ESA

CAD ref.:	substituye:	ESCALA:	COTAS	Proyeccion	ITEM:	UNIDADES:	CODIGO:
Clientes		---	EN mm.				

plano: ESA–001–A3 | hoja: 1 de: 1

NeoPure

TAGS SISTEMA DE TRITURACIÓN MELISSA

FECHA EMISIÓN:13-04-10
REVISION: 04
PLANO: ESA-001-A3 REV.04

ITEM	TAG_ID	DESCRIPTION	MARK	REFERENCE
LOOP :	**ILLUMINATION**			
1	LHT_1300_01	SIGHTGLASS LIGHT	MÜLLER	BKVLR
LOOP :	**JACKET EXCHANGER**			
2	HV_1301-01	HAND VALVE R. 3/4"	GENEBRE	2014 05
3	HV_1301_02	HAND VALVE R. 3/4"	GENEBRE	2014 05
4	S3V_1301_01	THREE WAYS TWO STATES SOLENOID VALVE R.3/4"	ESBE	VRG131 + ARA652
5	RV_1301_01	RELIEF VALVE R. 3/4" 6 BAR	SALVADOR ESCODA	AA 11 013
6	PI_1301_01	PRESSURE INDICATOR R. 1/4 " 0- 6 BAR DN-63	MEI	HT STD63
LOOP :	**STERILIZATION**			
7	HV_1302_01	DIAPHRAGM HAND VALVE DN-15 TC-½" 0,8 µ AISI-316L/EPDM	ITT	0.5-8-419-2-0-0-17-18-MET
8	HV_1302_02	DIAPHRAGM HAND VALVEE DN-40 TC-1½" 0,8 µ AISI-316L/EPDM	ITT	1,5-C-419-2-0-0-17-970-MET
9	TT_1302_01	TEMPERATURE SENSOR	KOSMON	SPT1/36502
10	HV_1302_03	DIAPHRAGM HAND VALVE DN-40 TC-1½" 0,8 µ AISI-316L/EPDM	ITT	1,5-C-419-2-0-0-17-970-MET
11	PI_1302_01	PRESSURE INDICATOR R. 1/2 " 0- 6 BAR DN-80	MEI	HT STD80
12	RV_1302_01	RELIEF VALVE TC 1" 2,5 BAR	TOSACA	1216 C
LOOP :	**CLEANING**			
13	PV_1303_01	DIAPHRAGM PNEUMATIC VALVE DN-25 TC-1" 0,8 µ AISI-316L/EPDM	ITT	1-C-419-2-0-0-17-AP1009-MET
14	NOZ_1303_01	SPRAY BALL	NEUMO	TANKO S40 360º
LOOP :	**PROCESS**			
15	HV_1304_01	DIAPHRAGM HAND VALVE DN-65 TC-2½" 0,8 µ AISI-316L/EPDM	ITT	2.5-F-419-8-0-0-17-963-M2-MET
16	HV_1304_02	DIAPHRAGM HAND VALVEDN-15 TC-½" 0,8 µ AISI-316L/EPDM	ITT	0.5-8-419-2-0-0-17-18-MET
17	HV_1304_03	DIAPHRAGM HAND VALVE DN-40 TC-1½" 0,8 µ AISI-316L/EPDM	ITT	1,5-C-419-2-0-0-17-970-MET
18	HV_1304_04	DIAPHRAGM HAND VALVE DN-40 TC-1½" 0,8 µ AISI-316L/EPDM	ITT	1,5-C-419-2-0-0-17-970-MET
19	HV_1304_05	HAND VALVE TC 1"	ANDERSON	ST 195
20	GF_1304_01	FILTER	MILLIPORE	KTGR04TC3
21	LSH_1304_01	INTERRUPTOR DE NIVEL HORQUILLA VIBRATORIA CLAMP 11/2"	VEGA	VEGASWING S 52
22	LSL_1304_02	INTERRUPTOR DE NIVEL HORQUILLA VIBRATORIA CLAMP 11/2"	VEGA	VEGASWING S 52
23	SP_1304_01	SHEAR PUMP 11 KW 400/690V 50 HZ 2900 RPM	FRISTAM	FSPE 3522/145B **(CLIENTE)**
24	VSL2_1304_01	VESSEL 100 LITROS PRESION -1 / + 3 BAR RELATIVOS	CIFA	MEL-009-A2

3.- PROCEDIMIENTO DE SOLDADURA

Incluimos fotocopia del procedimiento de soldadura utilizado para la realización de las soldaduras.

ESPECIFICACION PROCEDIMIENTO DE SOLDADURA

WELDING PROCEDURE SPECIFICATION

WPS

ASME IX

Rfa.: *072/02*

Fecha: 28.06.02

Nombre de la Empresa: *CIFA* Por *Sr. ESPUGA*
Company Name *By*

Especificación de Procedimiento de Soldadura (WPS) Nº: *PS-001* Rev.: *0* Fecha: *08.08.02*
Welding Procedure Specification (WPS) Nº *Rev.* *Date*

Soportado PQR(s) Nº(s): *PS-001*
Supporting PQR nº(s)

Proceso(s) de Soldadura: *GTAW* Tipo(s)(Manual, Automático, Semiautomático): *AUTOMATICO*
Welding Process(es) *Types(Manual,Automatc,semiatomatic)*

UNIONES (QW-402)
JOINTS

Diseño Junta: *A TOPE EN TUBO SIN PREPARACION DE BORDES*
Joint Design

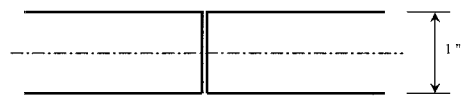
Respaldo: Si [ ] No [X]
Backing Yes NO

Material de Respaldo - Tipo:
Backing Material - Type (incluido respaldo y retenedores)
(Refer to both backing and retainers)

[ ] Metalico *Metal* [ ] Metal no Fundible *Nonfusing metal*

[ ] No Metalico *Nonmetallic* [ ] Otros *Other*

Diseño Junta de la Probeta
Groove Design of test Coupon



METALES BASE (QW-403)
BASE METALS

P Nº *8* Grupo Nº — A A — P Nº *8* Grupo Nº
P Nº *Group Nº* *P Nº* *Group Nº*

O OR

Especificación- Tipo y Grado: *A-312 Tp. 316L* A A Especificación- Tipo y Grado: *A-312 Tp. 316L*
Specification - Type and Grade *Specification - Type and Grade*

O OR

Análisis Químico y Propiedades Mecánicas:
Chemical Analysis and Mechanical Prop.

A A

Análisis Químico y Propiedades Mecánicas:
Chemical Analysis and Mechanical Prop.

Rango de espesores:
Thickness Range

Material base *Base Material* A tope *Groove* Angulo *Fillet*

Rango Diámetro Tubería: *Pipe Diameter Range* A tope *Groove* Angulo *Fillet*

Otros
Other

METALES APORTACION (QW-404)
FILLER METALS

SIN METAL DE APORTACIÓN

Especificación SFA: *SFA Specification*			
Clasificación AWS: *AWS Clasification*			
F- Nº: *F-Nº*			
A Nº *A Nº*			
Dim. metal aporte ø (mm) *Size of Filler Metal*			
Metal soldadura *Weld metal*			
Rango Espesores: *Thickness Range*			
A tope *Groove*			
Angulo *Fillet*			
Electrodo-Flux(Clasif.) *Electrode-Flux(Class)*			
Marca Comercial Flux *Trade Name Flux*			
Inserto Consumible *Consumable Insert*			
Otros *Other*			

ESPECIFICACION PROCEDIMIENTO DE SOLDADURA
WELDING PROCEDURE SPECIFICATION

WPS
ASME IX

Hoja 2 de 2
Rfa.: *072/02*
Fecha: 08.08.02

POSICION (QW-405)
POSITION

Posición de la Ranura: *6G*
Position of Groove

Progresión Soldadura (Asc.;Desc.): *ASCENDENTE*
Weld Progression(Uphill;Downhill)

Posición(es) Sold. Angulo: *TODAS*
Position(s) of Fillet

TRATAMIENTO TERMICO POST-SOLDADURA (QW-407)
POSTWELD HEAT TREATMENT

Rango Temperatura: *N.A.*
Temperatura Range

Rango Tiempo: *N.A.*
Time Range

PRECALENTAMIENTO (QW-406)
PREHEAT

Temp. Precalentamiento: *10 °C*
Preheat Temp.

Temp. entre Pasadas: *< 250 °C*
Interpass Temp.

Mantenimiento Precalentamiento: *N.A.*
Preheat Maintenance

GAS (QW-408)
GAS

	Gas(es) *Gas(es)*	Rango Flujo *Flow rate*	(Mezcla) *(Mixture)*
Protección *Shielding*	*Ar*	*12-16 L/min*	*99,9*
Arrastre *Trailing*			
Respaldo *Backing*	*Ar*	*12-16 L/min*	*99,9*

CARACTERISTICAS ELECTRICAS (QW-409)
ELECTRICAL CHARACTERISTICS

Corriente Alterna o Continua: *C.C.*
Current AC or DC

Polaridad: *N.A.*
Polarity

Rango Amperios: *48-60*
Amps Range

Rango Voltaje: *12-25*
Volts Range

(Los Rangos de Amp. y Volt., se registrarán, para cada ø de electrodo, posición y/o espesor, etc., en la tabla mostrada abajo).
(Amps. and Volt range, should be recorded, for each electrode size, position, and thickness, etc., in the chart shown below)

Electrodo de Tungsteno-Diámetro y Tipo: *DN 2,4 EWTh-2 2% Th SFA 5.12*
Tungsten Electrode-Size and Type

(Tungsteno puro; 2% Toriado, etc.)
(Pure Tungsten; 2% Thoried; etc)

Modo de Transferencia para Proceso GMAW: *N.A.*
Mode of Metal Transfer for GMAW

(Spray; Corto-circuito, etc.)
(Spray;Short-circuiting; etc)

Rango velocidad alimentación Varilla-eléctrodo: *N.A.*
Electrode wire feed speed range

TECNICA (QW-410)
TECHNIQUE

Avance Recto u Oscilante: *RECTO*
String or Weave Bead

Tamaño orificio ó tapón Gas: *N.A.*
Orifice or Gas Cup Size

Limpieza Inicial y Entre Pasadas(Cepillado;Amolado;...): *DESENGRASANTE LIQUIDO (Acetona)*
Initial and Interpass Cleaning (Brushing; Grinding;etc)

Método de Saneado lado raiz: *N.A.*
Method of Back Gouging

Oscilación: *N.A.*
Oscillation

Distancia de Tubo de Contacto a Pieza: *1,80 mm*
Contact Tube to Work Distance

Pasada Simple o Múltiple (Por Lado): *SIMPLE*
Multiple or Single Pass (per side)

Electrodo Simple o Múltiple: *SIMPLE*
Nultiple or Single Electrodes

Velocidad Avance(Rango):
Travel Speed (Range)

Martilleado: *N.A.*
Peening

Otros
Other

Nº Pasada *Weld Layer*	Proceso Sol. *Process*	Metal Aportación *Filler Metal* Clasificación *Clasification*	ϕ *(mm)*	Corriente *Current* Tipo *Type*	I *(Amp)*	V *(Volt)*	v *(cm/min)*	Input *(KJ/cm)*	Otros *Other*
1	GTAW	N.A.	N.A.	CC--	48-60	12-25	---	---	

SGS Tecnos, S.A.

REGISTRO CUALIFICACION PROCEDIMIENTO
PROCEDURE QUALIFICATION RECORD

PQR
ASME IX

Rfa.: 073/02

Fecha: 08.08.02

Nombre de la Empresa: *CIFA*
Company Name

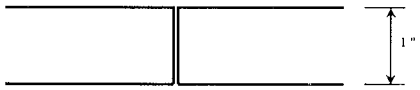
Registro de Cualificación de Procedimiento (PQR) Nº: *PS-001*
Procedure Qualification Record (PQR) Nº

WPS Nº: *PS-001*
WPS Nº

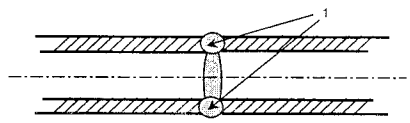
Proceso(s) de Soldadura: *GTAW*
Welding Process(es)

Tipo(s)(Manual, Automático, Semiautomático): *MANUAL*
Types(Manual,Automatc,semiatomatic)

UNIONES (QW-402)
JOINTS



Diseño Junta de la Probeta
Groove Design of test Coupon



Secuencia Pasadas
Bead Sequence

METALES BASE (QW-403)
BASE METALS

Especificación material(es) *Material Spec.*	*A-312*	a	*A-312*
Tipo o Grado *Type or Grade*	*Tp. 316L*	a	*Tp. 316L*
P Nº *P Nº*	*8*	a	*8*
Espesor de la Probeta: *Thickness of Test Coupon*	*3,38*	*mm*	
Diametro de la Probeta: *Diameter of Test Coupon*	*1"*	*mm*	
Otros *Other*			

TRATAMIENTO TERMICO POST-SOLDADURA (QW-407)
POSTWELD HEAT TREATMENT

Temperatura: *N.A.*
Temperatura

Tiempo: *N.A.*
Time

SubidaTª:libre hasta: ..... *ºC* ;Resto: V cal: ..... *ºC/h*
Increase Tª: free up to: *Rest: rate of heating*

Bajada Tª: hasta: ..... *ºC* :V enf.: ..... *ºC/h* ;Resto: A.C.
get down Tª: up to: *Rate of cooling* *;Rest:*

OTROS:
OTHERS

METALES APORTACION (QW-404)
FILLER METALS **SIN METAL DE APORTACIÓN**

Especificación SFA: *SFA Specification*		
Clasificación AWS: *AWS Clasification*		
Metal Aporte F- Nº: *Filler Metal F-Nº*		
Metal soldadura-A Nº *Weld Metal Analysis A Nº*		
Dim. metal aporte ø (mm) *Size of Filler Metal*		
Metal Solda. Depositado: *Weld Metal deposited*		
Marca Comercial: *Trade Mark*		

Otros
Other

GAS (QW-408)
GAS

	Gas(es) *Gas(es)*	Rango Flujo *Flow rate*	(Mezcla) *(Mixture)*
Protección *Shielding*	*ARGÓN*	*14 L/min*	*99,9*
Arrastre *Trailing*			
Respaldo *Backing*	*ARGÓN*	*14 L/min*	*99,9*

CARACTERISTICAS ELECTRICAS (QW-409)
ELECTRICAL CHARACTERISTICS

Pasada *Layer*	Proceso Sol. *Process*	Metal Aport. *Filler Metal* Tipo *Type*	ϕ *(mm)*	Corriente *Current* Tipo *Type*	I *(Amp)*	V *(Volt)*	v *cm/min*	Input *KJ/cm*
1	*GTAW*	*N.A.*	*N.A.*	*CC*	*55*	*18*		

Electrodo Tungsten: *EWTh-2 2% Th* Dimensión: *2,4*
Tungsten Electrode *Size*

POSICION (QW-405)
POSITION

Posición de la Ranura: *6G*
Position of Groove

Progresión Soldadura (Asc.;Desc.): *ASCENDENTE*
Weld Progression(Uphill;Downhill)

Otros
Other

PRECALENTAMIENTO (QW-406)
PREHEAT

Temp. Precalentamiento: *SIN*
Preheat Temp.

Temp. entre Pasadas: *< 250 ºC*
Interpass Temp.

Mantenimiento Precalentamiento:
Preheat Maintenance

TECNICA (QW-410)
TECHNIQUE

Avance Recto u Oscilante: *RECTO*
String or Weave Bead

Oscilación: *SIN OSCILACION*
Oscillation

Pasada Simple o Múltiple (Por Cara): *SIMPLE*
Mulipass or Single Pass (per side)

Electrodo Simple o Múltiple: *SIMPLE*
Single or Multiple Electrodes

Metodo Limpieza *MECANIZADO*
Cleaning Method

Otros
Other

SGS Tecnos, S.A.	**REGISTRO CUALIFICACION PROCEDIMIENTO** ***PROCEDURE QUALIFICATION RECORD*** **PQR** *ASME IX*	Hoja 2 de 2 Rfa.: *073/02* Fecha: 08.08.02

ENSAYOS DE TRACCION (QW-150)
TENSILE TEST

PROBETA Nº *Specimen Nº*	DIMENSIONES *Dimensions*		SECCION (mm2) *Area*	RESISTENCIA A LA ROTURA (MPa) *Tensile Strength*	POSICIÓN ROTURA *Break location*	Observaciones ASPECTO ROTURA *Remarks (Break appearance)*	Temp. °C
	Ancho (mm) *Width*	Espesor (mm) *Thickness*					
1	*19*	*3*		*52,9*	*METAL BASE*	*DUCTIL*	*+20*
2	*19*	*3*		*53,7*	*METAL BASE*	*DUCTIL*	*+20*

ENSAYOS DE DOBLADO GUIADO (QW-160)
GUIDED-BEND TESTS

PROBETA Nº *Specimen Nº*	DIMENSIONES *dimensions*		Posición *Location*	Diámetro Mandrino (mm) *Plunger Diameter*	Distancia Rodillos *(mm) Rollers distance*	Ángulo de doblado *Bending angle*	Resultado *Result*
	Ancho (mm) *Width*	Espesor (mm) *Thickness*					
1-C	*38*	*3*	*CARA*			*180º*	*SATISFACTORIO*
1-R	*38*	*3*	*RAIZ*			*180º*	*SATISFACTORIO*
2-C	*38*	*3*	*CARA*			*180º*	*SATISFACTORIO*
2-R	*38*	*3*	*RAIZ*			*180º*	*SATISFACTORIO*

ENSAYOS DE RESILIENCIA (QW-170)
TOUGHNESS TESTS

PRO. Nº	DIM. PROBETA *Specimen Dim.*	ENTALLA *Notch*		TEMP. ENSAYO °C *Test temper.*	ENERGIA ABSORVIDA *J*	EXPANSION LATERAL *Lateral Expansion*	PROMEDIO *AVERAGE J*	ENERGIA DE ROTURA *J/cm2*	ENERGIA NOMINAL *ENERGY NOMINAL*	SECCIÓN *mm2*
		Localización *Location*	Tipo *Type*							

ENSAYOS DE SOLDADURA EN ANGULO (QW-180)
FILLET WELD TESTS

Resultado Satisfactorio: *Result Satisfactory* ☐ SI *Yes* ☐ NO *No*

Penetración en las Paredes Metálicas: *Penetration into Parent Metal* ☐ SI *Yes* ☐ NO *No*

Resultado Macrografía: *SATISFACTORIO*
Macro Results

OTROS ENSAYOS
OTHER TESTS

Dureza:
Hardness

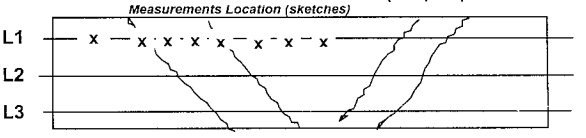
Tipo/Carga: *Type/Load* .....

Metal Base: *Base metal* .....

Z.A.I.: *H.A.Z.* .....

Metal Soldadura: *weld metal* .....

Localización de las mediciones(croquis*)
Measurements Location (sketches)



Análisis Metal Depositado
Deposit Analysis .....

Otros:
Other .....

Nombre del Soldador: *Welder's name* *DAVID TARRASO VAQUERO* Marca Nº: *Stamp N* *DTV*

Ensayo dirigido por: *Tests conducted by* *SGS Tecnos S.A.* Ensayo Laboratorio Nº: *Laboratory Test N°* .....

Certificamos que los datos de este registro son correctos, y que las probetas de soldadura fueron preparadas, soldadas y ensayadas, de acuerdo con los requisitos de la Seccion IX del Codigo ASME.

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requeriments of Section XI of the ASME Code.

Por SGS TECNOS
By SGS TECNOS

Por el Fabricante
By the Manufacturer

SGS Tecnos, S.A.

Fdo: *ANDRÉS GARCÍA* Fecha: *08.08.02* Fdo: *Sr. ESPUGA*
Date

4.- HOMOLOGACIÓN DE SOLDADORES

Adjuntamos homologación de nuestros soldadores respecto al procedimiento de soldadura utilizado.

SGS

REGISTRO CUALIFICACION DE OPERADORES DE SOLDADURA

WELDING OPERATOR PERFORMANCE QUALIFICATION

WOPQ

ASME IX

Hoja 1 de 1

Rfa.: 105/03

Fecha: 09.06.03

Nombre del Soldador: *Welder's Name* — **MANUEL MARTIN ABAZOLO, DNI: 37677510** — Refer. Nº: *Stamp Nº* — **S-MM**

Proceso/s Soldadura utilizado/s: *Welding Process/es used* — **GTAW** — Tipo(Man., Semiaut.,Aut.) *Type* — **AUTOMÁTICO**

Identificación del WPS seguido por el soldador durante la Prueba: *Identification of WPS followed by welder during welding of test coupon* — **PS-001** — Tipo de máquina *Machine* — **POLYSOUDE PS 164**

Material(es) Base soldados: *Base material(s) welded* — **A-312 Tp. 316 L** — Espesor: *Thickness* — **1,5 mm**

Variables en Soldadura Automática para el Proceso utilizado *Machine welding Variables for the process used*	(QW-361.2)	Datos Prueba *Actual Values*	Rango Cualificado *Range Qualified*
[X] Cupón de prueba *tTst coupon/production Weld* [ ] Testigo de producción			
Respaldo (Metal, soldadura, soldado por ambos lados, flux,etc) *Backing(metal,weld metal,welded from both sides, flux, etc.)*		SIN RESPALDO	SIN Y CON
ASME P Nº 8 *ASME P Nº* a ASME P Nº 8 *to ASME P Nº*		P8 a P8	P1 a P11, P34 y P4X
[ ] Chapa *Plate* [X] Tubo(indicar diámetro si es tubo) *Pipe (enter diameter, if pipe)*		1 1/4 "	1 1/4 "
Espec. Metal Aportación (SFA): *Filler Metal Specification(SFA)* — Clasificación (AWS): *Classification (AWS)*		SIN APORTE	SIN APORTE
Nº F Metal Aportación *Filler metal F-Nº*		SIN APORTE	SIN APORTE
Inserto consumible para GTAW o PAW *Consumable Insert for GTAW or PAW*		N.A.	N.A.
Control Visual Directo/Remoto *Directe/remote visual control*		DIRECTO	DIRECTO
Control Automático del Voltaie (GTAW) *Automatic voltage control (GTAW)*		AUTOMATICO	AUTOMATICO
Arrastre automático de la junta *Automátic joint tracking*		AUTOMÁTICO	AUTOMÁTICO
Posición de soldadura (1G, 5G, etc) *Welding Position*		1G	PLANO

Resultado de los Ensayos de Doblado Guiado

Guided Bend Test Results

Tipo Probeta Doblado Guiado *Guide Bend Test Type*	QW193.2 Resultado *(Side) Result*	QW-462.3(a)(Transv. R y C) *(Transv. R&F) Type*	QW-462.3(b)(Long. R y C) Resultado *(Long. R&F) Result*

Resultados Examen Visual Completo (QW-302.4) *Visual Examination of completed weld* — **ACEPTABLE**

Resultados Examen Radiográfico (QW-304/QW-305) *Radigraphic test results* — **ACEPTABLE** — Informe Nº: *Recor Nº* — **0282/04**

(Para Cualificación alternativa de juntas a tope por radiografia)

(For alternative qualification of groove test by radiography)

Sold. en Angulo-Ensayo de Fractura: *Fillet weld-Fractura test* — Longitud y Porcentaje de defectos: *Length and percent of defects* ..... mm ..... %

Examen Macro. zona fusión *Macro tests fusion* ..... Dim.Lados sold. *Fillet leg size* ..... mm Concavidad/Convexidad: *Concavity/Convexity* ..... mm

Ensayos dirigidos por: *Welding tests conducted by* — **SGS TECNOS S.A.** — **Ensayo Laboratorio Nº** *Laboratory test Nº* .....

Certificamos que os datos de este registro son correctos, y que las probetas han sido preparadas, soldadas y ensayadas, de acuerdo con los requisitos de la Sección IX del Código ASME.

We certify that the statements in this record are correct and that the test welds were prepared, welded and testedin accordance with the requeriments of Section IX of the ASME Code.

SGS Tecnos, S.A.

Organización: *Organization* — **CIFA**

Por *By* — **ANGEL MARTINEZ** — Fecha: *Date* — **09.06.03**

Por *By* — **J. FERNÁNDEZ** — Fecha: *Date* — **09.06.03**

REGISTRO CUALIFICACION DE OPERADORES DE SOLDADURA

WELDING OPERATOR PERFORMANCE QUALIFICATION

WOPQ

ASME IX

Hoja 1 de 1

Rfa.: 105/03

Fecha: 09.06.03

Nombre del Soldador: *Welder's Name*	DAVID FEITO DIEZ, DNI: 46453747	Refer. Nº: *Stamp Nº*	S-DFD
Proceso/s Soldadura utilizado/s: *Welding Process/es used*	GTAW	Tipo(Man., Semiaut.,Aut.) *Type*	AUTOMÁTICO
Identificación del WPS seguido por el soldador durante la Prueba: *Identification of WPS followed by welder during welding of test coupon*	PS-001	Tipo de máquina *Machine*	POLYSOUDE PS 164
Material(es) Base soldados: *Base material(s) welded*	A-312 Tp. 316 L	Espesor: *Thickness*	2 mm

Variables en Soldadura Automática para el Proceso utilizado *Machine welding Variables for the process used*	(QW-361.2)	Datos Prueba *Actual Values*	Rango Cualificado *Range Qualified*
[X] Cupón de prueba [ ] Testigo de producción *tTst coupon/production Weld*			
Respaldo (Metal, soldadura, soldado por ambos lados, flux,etc) *Backing(metal,weld metal,welded from both sides, flux, etc.)*		SIN RESPALDO	SIN Y CON
ASME P Nº 8 a ASME P Nº 8 *ASME P Nº* *to ASME P Nº*		P8 a P8	P1aP11, P34 y P4X
[ ] Chapa [X] Tubo(indicar diámetro si es tubo) *Plate* *Pipe (enter diameter, if pipe)*		3/4 "	3/4 "
Espec. Metal Aportación (SFA): Clasificación (AWS): *Filler Metal Specification(SFA)* *Classification (AWS)*		SIN APORTE	SIN APORTE
Nº F Metal Aportación *Filler metal F-Nº*		SIN APORTE	SIN APORTE
Inserto consumible para GTAW o PAW *Consumable Insert for GTAW or PAW*		N.A.	N.A.
Control Visual Directo/Remoto *Directe/remote visual control*		DIRECTO	DIRECTO
Control Automático del Voltaje (GTAW) *Automatic voltage control (GTAW)*		AUTOMATICO	AUTOMATICO
Arrastre automático de la junta *Automátic joint tracking*		AUTOMÁTICO	AUTOMÁTICO
Posición de soldadura (1G, 5G, etc) *Welding Position*		1G	1G y 1F

Resultado de los Ensayos de Doblado Guiado

Guided Bend Test Results

Tipo Probeta Doblado Guiado *Guide Bend Test Type*	QW193.2 Resultado *(Side) Result*	QW-462.3(a)(Transv. R y C) *(Transv. R&F) Type*	QW-462.3(b)(Long. R y C) Resultado *(Long. R&F) Result*

Resultados Examen Visual Completo (QW-302.4) ACEPTABLE
Visual Examination of completed weld

Resultados Examen Radiográfico (QW-304/QW-305) ACEPTABLE Informe Nº: 02806/03
Radigraphic test results *Recor Nº*

(Para Cualificación alternativa de juntas a tope por radiografia)
(For alternative qualification of groove test by radiography)

Sold. en Angulo-Ensayo de Fractura: Longitud y Porcentaje de defectos: mm %
Fillet weld-Fractura test *Length and percent of defects*

Examen Macro. zona fusión Dim.Lados sold. mm Concavidad/Convexidad: mm
Macro tests fusion *Fillet leg size* *Concavity/Convexity*

Ensayos dirigidos por: SGS TECNOS S.A. **Ensayo Laboratorio Nº**
Welding tests conducted by ***Laboratory test Nº***

Certificamos que os datos de este registro son correctos, y que las probetas han sido preparadas, soldadas y ensayadas, de acuerdo con los requisitos de la Sección IX del Código ASME.

We certify that the statements in this record are correct and that the test welds were prepared, welded and testedin accordance with the requeriments of Section IX of the ASME Code.

SGS Tecnos, S.A.

Organización: CIFA
Organization

Por ANGEL MARTINEZ Por
By *By*

Fecha: 09.06.03 Fecha: 09.06.03
Date *Date*

SGS Tecnos, S.A.

REGISTRO CUALIFICACION SOLDADORES Y OPERADORES

WELDER / WELDING OPERATOR PERFORMANCE QUALIFICATION

WPQ

ASME IX

Hoja 1 de 1

Rfa.: 332/02

Fecha: 08.08.02

Nombre del Soldador: *Welder's Name* — DAVID TARRASÓ VAQUERO — Refer. Nº: *Stamp Nº* — DTV

Proceso/s Soldadura utilizado/s: *Welding Process/es used* — GTAW — Tipo(Man., Semiaut.,Aut.) *Type* — AUTOMÁTICO

Identificación del WPS seguido por el soldador durante la Prueba: *Identification of WPS followed by welder during welding of test coupon* — PS-001

Material(es) Base soldados: *Base material(s) welded* — A-312 Tp. 316L — Espesor: *Thickness* — 3,38 mm

Variables para cada Proceso Manual o Semiautomático *Manual or Semiautomatic Variables for each process*	(QW-350)	**Datos Prueba** *Actual Values*	**Rango Cualificado** *Range Qualified*
Respaldo (Metal, soldadura, soldado por ambos lados, flux,etc) *Backing(metal,weld metal,welded from both sides, flux, etc.)*	(QW-402)		
ASME P Nº ... a ASME P Nº ... *ASME P Nº / to ASME P Nº*	(QW-403)		
☐ Chapa *Plate* ☐ Tubo(indicar diámetro si es tubo) *Pipe (enter diameter, if pipe)*			
Espec. Metal Aportación (SFA): *Filler Metal Specification(SFA)* ... Clasificación (AWS): *Classification (AWS)*	(QW-404)		
Nº F Metal Aportación *Filler metal F-Nº*			
Inserto consumible para GTAW o PAW *Consumable Insert for GTAW or PAW*			
Espesor de soldadura depositada para cada Proceso *Weld deposit thickness for each welding process*			
Posición de soldadura (1G, 5G, etc) *Welding Position*	(QW-405)		
Progresión (Ascendente/Descendente) *Progression (Uphill/downhill)*			
Gas de Respaldo para GTAW,PAW o GMAW;Gas calentamiento para OFW *Backing Gas for GTAW,PAW or GMAW;fuel gas for OFW*	(QW-408)		
GMAW Método de transferencia *GMAW transfer mode*	(QW-409)		
GTAW Tipo/Polaridad de Corriente *GTAW welding current type/polarity*			
Variables en Soldadura Automática para el Proceso utilizado *Machine welding Variables for the process used*	(QW-360)	**Datos Prueba** *Actual Values*	**Rango Cualificado** *Range Qualified*
Control Visual Directo/Remoto *Directe/remote visual control*		DIRECTO	DIRECTO
Control Automático del Voltaje (GTAW) *Automatic voltage control (GTAW)*		AUTO	AUTO
Arrastre automático de la junta *Automátic joint tracking*		SIN	SIN
Posición de soldadura (1G, 5G, etc) *Welding Position*		6G	TODAS
Inserto consumible *Consumable Insert*		N.A.	N.A.
Respaldo (Metal, soldadura, soldado por ambos lados, flux,etc) *Backing(metal,weld metal,welded from both sides, flux, etc.)*		N.A.	N.A.

Resultado de los Ensayos de Doblado Guiado

Guided Bend Test Results

Tipo Probeta Doblado Guiado *Guide Bend Test Type*	QW193.2 Resultado *(Side) Result*	QW-462.3(a)(Transv. R y C) *(Transv. R&F) Type*	QW-462.3(b)(Long. R y C) Resultado *(Long. R&F) Result*

Resultados Examen Radiográfico (QW-304/QW-305) *Radigraphic test results* — ACEPTABLE — Informe Nº: *Recor Nº* — 04409/02

(Para Cualificación alternativa de juntas a tope por radiografia)

(For alternative qualification of groove test by radiography)

Sold. en Angulo-Ensayo de Fractura: *Fillet weld-Fractura test* ... Longitud y Porcentaje de defectos: *Length and percent of defects* ... mm ... %

Examen Macro. zona fusión *Macro tests fusion* ... Dim.Lados sold. *Fillet leg size* ... mm — Concavidad/Convexidad: *Concavity/Convexity* ... mm

Ensayos dirigidos por: *Welding tests conducted by* — SGS TECNOS S.A. — **Ensayo Laboratorio Nº** *Laboratory test Nº* ...

Certificamos que os datos de este registro son correctos, y que las probetas han sido preparadas, soldadas y ensayadas, de acuerdo con los requisitos de la Sección IX del Código ASME.

We certify that the statements in this record are correct and that the test welds were prepared, welded and testedin accordance with the requeriments of Section IX of the ASME Code.

Organización: *Organization* — CIFA

SGS Tecnos, S.A.

Por *By* — ANDRÉS GARCÍA — Fecha: *Date* — 08.08.02

Por *By* — Sr. ESPUGA — Fecha: *Date* — 08.08.02

5.- MAQUINARIA DE SOLDADURA ORBITAL

Les incluimos fotocopia de las características técnicas de la maquinaria de soldadura orbital utilizada para la realización de las soldaduras.

PS 164 POWER SOURCE

for orbital welding with or without filler wire

Ideal for use on site or in workshop

Easy connection with quick self scaling connectors

Integrated printer Ideal for monitoring welding cycles and for traceability

Control panel for operator / PS 164

CHARACTERISTICS

- 16 program "user" memory directly accessible by remote control
- Library with 60 pre-defined programs covering various common material types, tube diameters and wall thickness
- Storage of programs by internal memory and/or memo chip card
- Practical display screen with 4 lines of 20 characters
- Data acquisition of actual parameters, with control ticket print out via integrated printer
- Option: recording of welding parameters on a compact flash card

USE

User friendly due to high performance, intuitive programming

TECHNICAL DATA

- Current ranges:
  4 to 160 A (230 V) + 4 to 50 A (at 230 / 115 V)
  4 to 100 A (at 100 / 115 V)
- Duty cycle: 160 A / 40% 110 A / 100% (230 / 200 V)
- Screen display during welding:
  - of welding current
  - of voltage
  - of torch position in degrees
- Remote control pendant with:
  - program selector switch
  - cycle start and cycle stop
  - emergency stop
  - manual movement control torch and wire feeder motions
  - real time modification of parameters
  - gas and water circulation control / test
  - manual slope down

APPLICATION SECTORS

- Food industry
- Aeronautics / Aerospace
- Microelectronics
- Pharmaceutical / Biochemistry
- Heating and ventilation

PROCESS

- DC TIG welding with or without wire

ACCESSORIES

- PC programming kit
- 16 program memory card
- 15 m extension cable
- Gas hose
- Pressure regulator and flow meter Argon/Argon- Hydrogen

ADVANTAGES

- Integrated torch cooling system by water circulation in closed circuit
- Compact and easy to transport
- Possibility to connect heads with tachometer, as option
- Possibility of connection to manual TIG torch

TECHNICAL DATA PS 164

Power input	Single phase + earth 100 V / 115 V / 200 V / 230 V +/- 10% 50 or 60 Hz
Current rating	16
Open circuit voltage	60 V
Power	3.6 kW
Insulation class	F
Protection class	IP 23
Welding current range	Range 160 A: 4 to 160 A (200 V / 230 V) 4 to 100 A (100 V / 115 V) Range 50 A : 4 to 50 A
Regulation of intensity	± 1% when I<100A and ± 1A when I>100A
Duty cycle	160 A / 40% at 230 V 100 A / 50% at 115 V 110 A / 100% at 230 V 80 A / 100 % at 115 V
Pulse time	from 10 to 9999 ms
Movement controls	Torch rotation Wire feeder
Precision on movements	+/- 1% for Vp >= 250 (Vp = programmed travel speed) +/- 4 for Vp < 250
LCD-Display	4 × 20 characters
Gas controls	Gas torch, backing gas (option)
Power source cooling	Forced ventilation
Torch cooling	By cooling liquid in closed circuit with flow safety valve
Display of real values during cycle	Arc voltage, welding current, torch position in degrees
Programs in "user" memory	16 maximum
Program library	60
Program sectors	10 maximum
Program storage	Memo chip card
Dimensions L x W x H	560 x 295 x 370 mm
Weight	30 kg
Standard	EN 60974-1 and EN 50199

The PS 164 power source for orbital welding allows the use of closed welding heads, open welding heads without AVC/OSC

POLYSOUDE S.A.S. Z.I. du Bois Briand 2, rue Paul Beaupère BP 41606 F-44316 NANTES Cedex 3
Tel.: + 33 2 40 68 11 00 Fax.: + 33 2 40 68 11 88 www.polysoude.com e-mail: info@polysoude.com

MW - CLOSED CHAMBER WELD HEADS

For applications demanding critical precision joining and exceptional weld quality

MW 40 *MW 65* *MW 115*

MW 170 mounted on 6" tube

Solid Flex Titanium TCIs

Integrated Remote Control

FEATURES

- Closed chamber design for excellent gas shielding
- Compact design for limited access welding in areas with restricted radial and axial clearances
- Integrated remote control on weldhead handle
- Ergonomic, compact and rugged design
- Welding of elbows, flanges, fittings, tee's etc.

APPLICATIONS

- Fusion (autogenous) GTAW
- Tube and pipe welding
- Diameter range of 1/4" to 6 5/8" OD

MATERIAL

- Stainless Steel
- Titanium
- Inconel
- Ferrous and Non-Ferrous

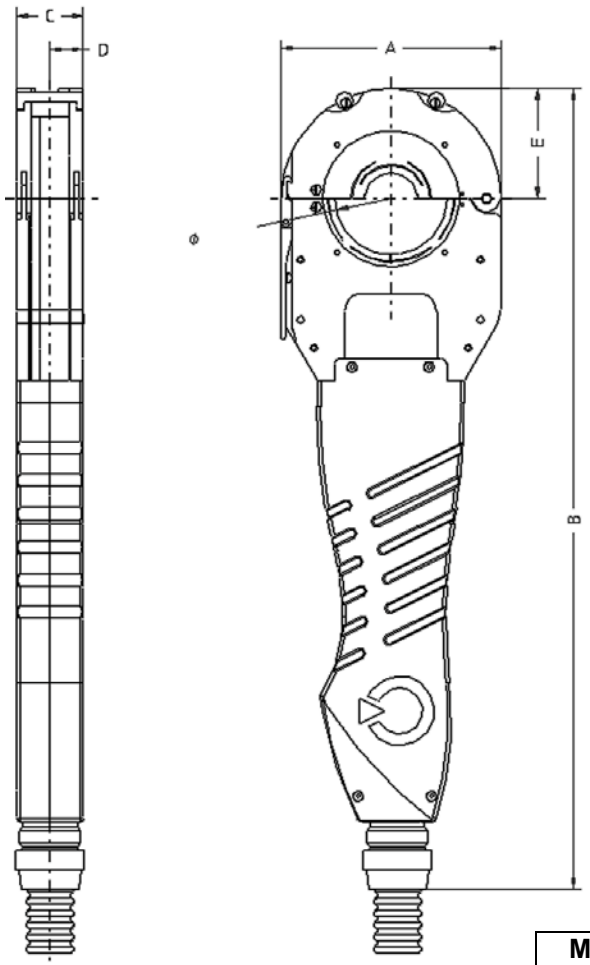
INDUSTRY SECTORS

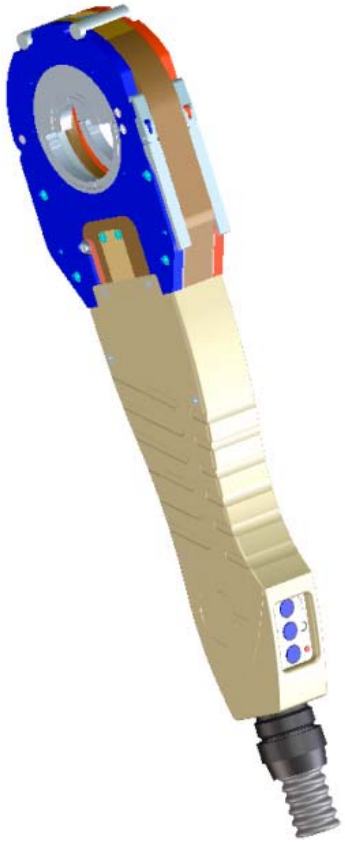
- Chemical, Food & Beverage
- Aeronautics & Aerospace
- Microelectronics
- Pharmaceutical / Biochemical

ACCESSORIES & OPTIONS

- Tube Clamp Inserts (TCI's) manufactured from high quality Titanium
- Elbow, Flange Kit and Offset Electrode Holder
- Digital or Anolog Technology
- Tool kit
- Tungsten electrodes pre-cut and sharpened
- Rugged container for packing and transport

Technical Data:





MW	Tube – OD. Min. – Max.	A	B	C	C*	D	E
MW-40	1/4" – 1 1/2"	3.937	16.929	1.496	1.496	0.748	1.969
	6,00-40,00	*100*	*430*	*38*	*38*	*19*	*50*
MW-65	1/2" – 2 1/2"	4.961	18.031	1.496	2.264	0.748	2.480
	12,00-65,00	*126*	*458*	*38*	*57.5*	*19*	*63*
MW-115	1" - 4 1/2"	7.874	21.535	1.811	2.677	0.906	3.937
	25,00-115,00	*200*	*547*	*46*	*68*	*23*	*100*
MW-170	3 1/8" - 6 5/8"	11.417	22.835	2.480	2.480	1.240	5.709
	80,00-170,00	*290*	*580*	*63*	*63*	*31.5*	*145*

C = with adapter for using TCI's from MW 1250, 2500 & 4500*

Inch - *mm*

Astro Arc Polysoude-Corporate Headquarters
W133 N5138 Campbell Drive
Menomonee Falls, WI 53051

Astro Arc Polysoude-Sales & Service
24856 Avenue Rockefeller, Valencia CA. 91355
Tel.: (661) 702-0141; Fax.: (661) 702-0632
www.astroarc.com e-mail: salesaap@astroarc.com

6.- CERTIFICADOS CALIDAD MATERIAL INSTALACIÓN

Les entregamos fotocopias de los certificados de calidad de los materiales montados, así como descripción de sus características. Además, por el presente escrito, certificamos que los materiales (y sus propiedades y características) a continuación descritos, son los que se han utilizado para la realización de la instalación que nos ocupa.

Y para que conste firmo el presente documento.

José Fernández.

Director Técnico de CIFA, S.L.

Fittings Specifications

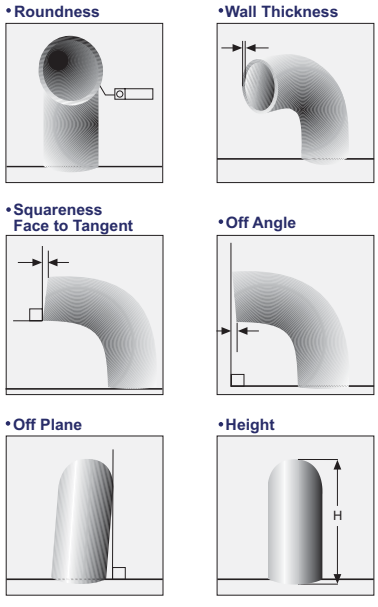
Product:
Stainless Steel fittings comply with ASME BPE standards.
Gaskets are made from compounds which are
FDA approved and USP24 Pharmaceutical Class VI certified.

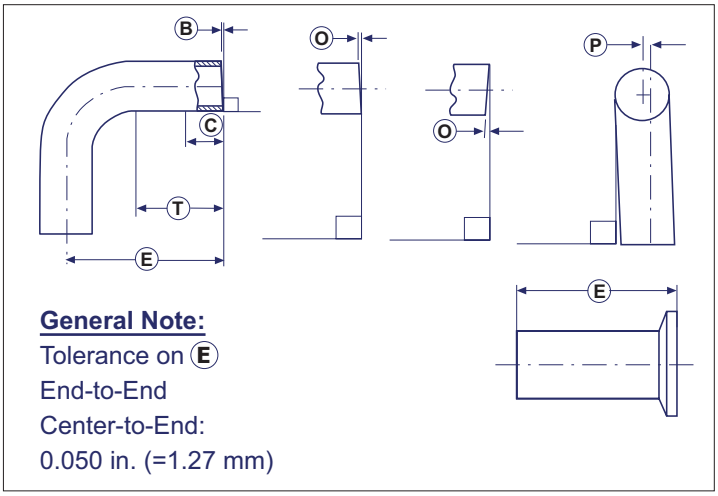
Sizes:
Stainless Steel fittings are available in sizes ½" - 6" O.D.
tube size.

Material:
Fittings are fabricated in AISI 316L Stainless Steel with sulfur content of 0.005-0.017% achieving superior repeatability for automatic orbital welding process.

Dimensions & Tolerances:
Dimensions as specified in ASME BPE Part DT.

Nominal OD Size	½"	¾"	1"	1½"	2"	2½"	3"	4"	6"
O.D. Tolerance	±.005	±.005	±.005	±.008	±.008	±.010	±.010	±.015	±.030
Nominal Wall Thickness	.065	.065	.065	.065	.065	.065	.065	.083	.109
Wall Thickness Tolerance before EP	+.005 - .008	+.005 - .008	+.005 - .008	+.005 - .008	+.005 - .008	+.005 - .008	+.005 - .008	+.008 - .010	+.015 - .015
Wall Thickness Tolerance after EP	+.005 - .010	+.005 - .010	+.005 - .010	+.005 - .010	+.005 - .010	+.005 - .010	+.005 - .010	+.008 - .012	+.015 - .017
Control Length (C)	.750	.750	.750	.750	.750	.750	.750	.750	.750
Tangent Length (T)	1.500	1.500	1.500	1.500	1.500	1.500	1.750	2.000	2.500
Squareness Face to Tangent (B)	.005	.005	.008	.008	.008	.010	.016	.016	.030
Off Angle (O)	.014	.018	.025	.034	.043	.054	.068	.086	.135
Off Plane (P)	±.030	±.030	±.030	±.050	±.050	±.050	±.050	±.060	±.060





General Note:
Tolerance on (E)
End-to-End
Center-to-End:
0.050 in. (=1.27 mm)

Fittings Specifications

Surface Finish:

Reference: ASME BPE Part SF, table SF-4.

Surface Finish Code	ASME BPE Surface Designation	Inside Surface			Outside Surface
		Ra Maximum		Surface Treatment	Surface Treatment
		µ-in.	µm		
PC	SFF1	20	0.5	Mechanically Polished	Unpolished
PL	SFF1	20	0.5	Mechanically Polished	Mechanically polished to 32 Ra µ-in.
PF	SFF3	30	0.75	Mechanically Polished	Unpolished
PT	SFF3	30	0.75	Mechanically Polished	Mechanically polished to 32 Ra µ-in.
PD	SFF4	15	0.375	Mechanically Polished & Electropolished	Unpolished
PR		10	0.25	Mechanically Polished & Electropolished	Mechanically polished to 32 Ra µ-in.
PM	SFF4	15	0.375	Mechanically Polished & Electropolished	Mechanically polished to 32 Ra µ-in.
PO	SFF5	20	0.5	Mechanically Polished & Electropolished	Mechanically polished to 32 Ra µ-in.

General Notes: **1.** All Ra readings are taken across the lay, wherever possible.
2. Other customized finishes are available on request.

Cleaning:

A seven step cleaning cycle is conducted to ensure that components are free of contaminants such as stains, oil, loose particles etc. In the final stage, the fittings are double-rinsed using hot DI water.

Inspection Procedures:

All fittings produced by EGMO production are 100% visually inspected for any surface finish imperfections, as mentioned in Table SF-3 in the ASME BPE specification. All dimensional characteristics are inspected 100% for tolerances listed in Table DT-5 in the ASME BPE specification.

Marking:

Each BPE fitting is marked with the following:

- Heat number
- Job number
- Material grade
- Standard
- Surface finish (SFF), as specified in ASME BPE, Part DT.
- Brand name

Packaging:

Each fitting is capped, bagged and labeled in full compliance with the ASME BPE standard.

Documentation:

Full Material Test Reports are supplied with the finished prodocts and via an interactive internet website, using a special private code.

Tube Specifications

Standards:

- ASTM A-269/270
- ASME BPE

Table SF-2 Ra Readings for Tubing in accordance with ASME Standards

Surface Designation	As Drawn and/or Mechanically Polished		Surface Designation	Mechanically Polished & Electropolished	
	Ra Maximum			Ra Maximum	
	µ-in.	µm		µ-in.	µm
SFT1	20	0.5	SFT4	15	0.375
SFT2	25	0.625	SFT5	20	0.5
SFT3	30	0.75	SFT6	25	0.625

General Note: All Ra readings are taken across the lay, wherever possible.

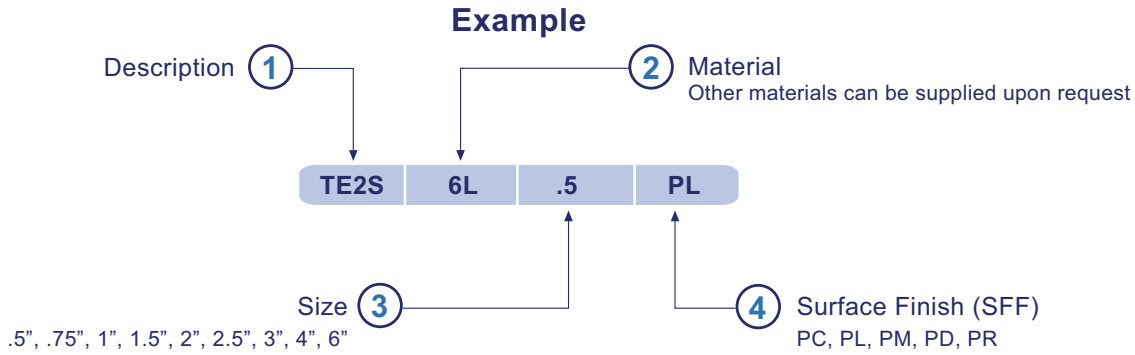
Tubing Dimensional Tolerances: Tubing specifications, ASTM A-269/270

Tubing Diameter	Gauge (wall- thickness)	OD dimensional specification	Length	Wall
		ASTM Spec.	ASTM Spec.	ASTM Spec.
1/2"	16g (.065" wall)	+.002/-.008	-0+1/8	+/-10%
3/4"	16g (.065" wall)	+.002/-.008	-0+1/8	+/-10%
1"	16g (.065" wall)	+.002/-.008	-0+1/8	+/-10%
1 1/2"	16g (.065" wall)	+.002/-.008	-0+1/8	+/-10%
2"	16g (.065" wall)	+.002/-.011	-0+1/8	+/-10%
2 1/2"	16g (.065" wall)	+.002/-.011	-0+1/8	+/-10%
3"	16g (.065" wall)	+.002/-.012	-0+1/8	+/-10%
4"	14g (.083" wall)	+.002/-.015	-0+1/8	+/-10%

Ordering Information

To specify the part completely, start with the product description and select the additional options as shown below:

Example



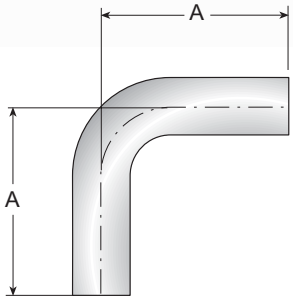
90° weld ends elbow, ½" size, PL surface finish.

MaxPure

Elbows

TE2S - 90° ELBOW

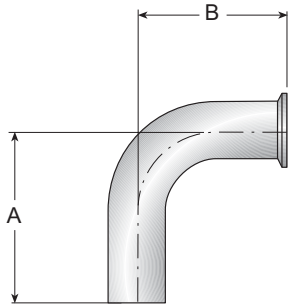
Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
½	3.00	76.2	TE2S6L.5-..
¾	3.00	76.2	TE2S6L.75-..
1	3.00	76.2	TE2S6L1.0-..
1½	3.75	95.3	TE2S6L1.5-..
2	4.75	120.7	TE2S6L2.0-..
2½	5.50	139.7	TE2S6L2.5-..
3	6.25	158.8	TE2S6L3.0-..
4	8.00	203.2	TE2S6L4.0-..
6	11.50	292.1	TE2S6L6.0-..



BPE TABLE # DT-7

TE2C - 90° ELBOW CLAMP ONE END

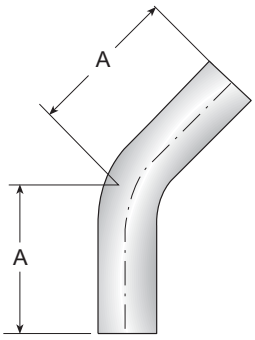
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½	3.00	76.2	1.625	41.3	TE2C6L.5-..
¾	3.00	76.2	1.625	41.3	TE2C6L.75-..
1	3.00	76.2	2.000	50.8	TE2C6L1.0-..
1½	3.75	95.3	2.750	69.9	TE2C6L1.5-..
2	4.75	120.7	3.500	88.9	TE2C6L2.0-..
2½	5.50	139.7	4.250	108.0	TE2C6L2.5-..
3	6.25	158.8	5.000	127.0	TE2C6L3.0-..
4	8.00	203.2	6.625	168.3	TE2C6L4.0-..
6	11.50	292.1	10.500	266.7	TE2C6L6.0-..



BPE TABLE # DT-12

TE2KS - 45° ELBOW

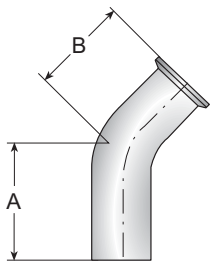
Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
½	2.250	57.2	TE2KS6L.5-..
¾	2.250	57.2	TE2KS6L.75-..
1	2.250	57.2	TE2KS6L1.0-..
1½	2.500	63.5	TE2KS6L1.5-..
2	3.000	76.2	TE2KS6L2.0-..
2½	3.375	85.7	TE2KS6L2.5-..
3	3.625	92.1	TE2KS6L3.0-..
4	4.500	114.3	TE2KS6L4.0-..
6	6.250	158.8	TE2KS6L6.0-..



BPE TABLE # DT-8

TE2KC - 45° ELBOW CLAMP ONE END

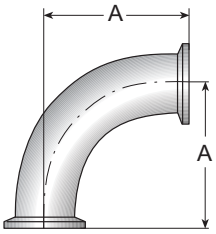
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½	2.250	57.2	1.000	25.4	TE2KC6L.5-..
¾	2.250	57.2	1.000	25.4	TE2KC6L.75-..
1	2.250	57.2	1.125	28.6	TE2KC6L1.0-..
1½	2.500	63.5	1.438	36.5	TE2KC6L1.5-..
2	3.000	76.2	1.750	44.5	TE2KC6L2.0-..
2½	3.375	85.7	2.063	52.4	TE2KC6L2.5-..
3	3.625	92.1	2.380	60.3	TE2KC6L3.0-..
4	4.500	114.3	3.125	79.4	TE2KC6L4.0-..
6	6.250	158.8	5.250	133.4	TE2KC6L6.0-..



BPE TABLE # DT-13

Elbows

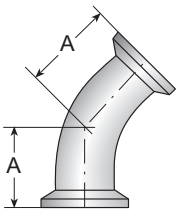
TEG2C - 90° ELBOW



BPE TABLE # DT-16

Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
½	1.625	41.3	TEG2C6L.5-..
¾	1.625	41.3	TEG2C6L.75-..
1	2.00	50.8	TEG2C6L1.0-..
1½	2.75	69.9	TEG2C6L1.5-..
2	3.50	88.9	TEG2C6L2.0-..
2½	4.25	108.0	TEG2C6L2.5-..
3	5.00	127.0	TEG2C6L3.0-..
4	6.625	168.3	TEG2C6L4.0-..
6	10.50	266.7	TEG2C6L6.0-..

TEG2K - 45° ELBOW



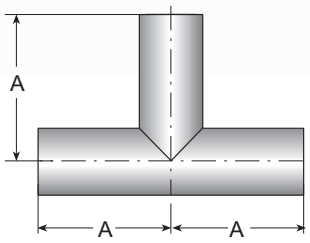
BPE TABLE # DT-17

Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
½	1.000	25.4	TEG2K6L.5-..
¾	1.000	25.4	TEG2K6L.75-..
1	1.125	28.6	TEG2K6L1.0-..
1½	1.483	37.67	TEG2K6L1.5-..
2	1.750	44.5	TEG2K6L2.0-..
2½	2.063	52.4	TEG2K6L2.5-..
3	2.375	60.3	TEG2K6L3.0-..
4	3.125	79.4	TEG2K6L4.0-..
6	5.250	133.4	TEG2K6L6.0-..

Tees

TE7WWW - TEE

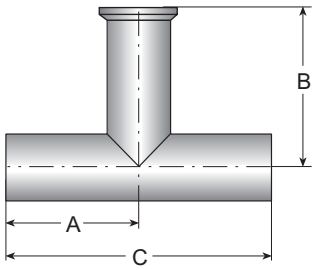
Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
½	1.875	47.6	TE7WWW6L.5-..
¾	2.000	50.8	TE7WWW6L.75-..
1	2.125	54.0	TE7WWW6L1.0-..
1½	2.375	60.3	TE7WWW6L1.5-..
2	2.875	73.0	TE7WWW6L2.0-..
2½	3.125	79.4	TE7WWW6L2.5-..
3	3.375	85.7	TE7WWW6L3.0-..
4	4.125	104.8	TE7WWW6L4.0-..
6	5.625	142.9	TE7WWW6L6.0-..



BPE TABLE # DT-9

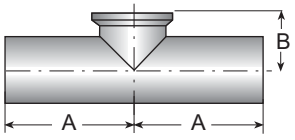
TE7WWC - TEE

Nominal Size in.	Dimensions						Ordering Code
	A in.	A mm	B in.	B mm	C in.	C mm	
½	1.875	47.6	2.250	57.2	3.75	95.2	TE7WWC6L.5-..
¾	2.000	50.8	2.375	60.3	4.00	101.6	TE7WWC6L.75-..
1	2.125	54.0	2.625	66.68	4.25	108.0	TE7WWC6L1.0-..
1½	2.375	60.3	2.875	73.03	4.75	120.6	TE7WWC6L1.5-..
2	2.875	73.0	3.375	85.70	5.75	146.0	TE7WWC6L2.0-..
2½	3.125	79.4	3.625	92.08	6.25	158.8	TE7WWC6L2.5-..
3	3.375	85.7	3.875	98.43	6.75	171.4	TE7WWC6L3.0-..
4	4.125	104.8	4.750	120.65	8.25	209.6	TE7WWC6L4.0-..
6	5.625	142.9	7.125	181.0	11.25	285.8	TE7WWC6L6.0-..



TE7WWCS - SHORT OUTLET TEE

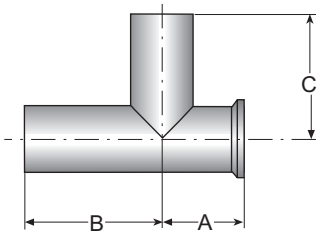
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½	1.875	47.6	1.000	25.4	TE7WWCS6L.5-..
¾	2.000	50.8	1.125	28.6	TE7WWCS6L.75-..
1	2.125	54.0	1.125	28.6	TE7WWCS6L1.0-..
1½	2.375	60.3	1.375	34.9	TE7WWCS6L1.5-..
2	2.875	73.0	1.625	41.3	TE7WWCS6L2.0-..
2½	3.125	79.4	1.875	47.6	TE7WWCS6L2.5-..
3	3.375	85.7	2.125	54.0	TE7WWCS6L3.0-..
4	4.125	104.8	2.750	69.9	TE7WWCS6L4.0-..
6	5.625	142.9	4.625	117.5	TE7WWCS6L6.0-..



BPE TABLE # DT-15

TE7WCSW - SHORT OUTLET RUN TEE

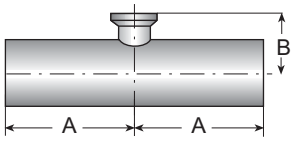
Nominal Size in.	Dimensions						Ordering Code
	A in.	A mm	B in.	B mm	C in.	C mm	
½	0.875	22.2	1.879	47.7	1.875	47.6	TE7WCSW6L.5-..
¾	1.00	25.4	2.00	50.8	2.00	50.8	TE7WCSW6L.75-..
1	1.125	28.6	2.125	54.0	2.125	54.0	TE7WCSW6L1.0-..
1½	1.375	34.9	2.375	60.3	2.375	60.3	TE7WCSW6L1.5-..
2	1.625	41.5	2.875	73.0	2.875	73.0	TE7WCSW6L2.0-..
2½	1.875	47.6	3.125	79.4	3.125	79.4	TE7WCSW6L2.5-..
3	2.125	54.0	3.375	85.7	3.375	85.7	TE7WCSW6L3.0-..
4	2.75	69.9	4.125	104.8	4.125	104.8	TE7WCSW6L4.0-..
6	4.625	117.5	5.625	142.9	5.625	142.9	TE7WCSW6L6.0-..



BPE TABLE # DT-25

Tees

TE7RWWCS - SHORT OUTLET REDUCING TEE



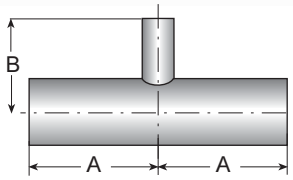
BPE TABLE # DT-14

Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
¾ × ½	2.000	50.8	1.000	25.4	TE7RWWCS6L.75-.5-..
1 × ½	2.125	54.0	1.125	28.6	TE7RWWCS6L1.0-.5-..
1 × ¾	2.125	54.0	1.125	28.6	TE7RWWCS6L1.0-.75-..
1½ × ½	2.375	60.3	1.375	34.9	TE7RWWCS6L1.5-.5-..
1½ × ¾	2.375	60.3	1.375	34.9	TE7RWWCS6L1.5-.75-..
1½ × 1	2.375	60.3	1.375	34.9	TE7RWWCS6L1.5-1.0-..
2 × ½	2.875	73.0	1.625	41.3	TE7RWWCS6L2.0-.5-..
2 × ¾	2.875	73.0	1.625	41.3	TE7RWWCS6L2.0-.75-..
2 × 1	2.875	73.0	1.625	41.3	TE7RWWCS6L2.0-1.0-..
2 × 1½	2.875	73.0	1.625	41.3	TE7RWWCS6L2.0-1.5-..
2½ × ½	3.125	79.4	1.875	47.6	TE7RWWCS6L2.5-.5-..
2½ × ¾	3.125	79.4	1.875	47.6	TE7RWWCS6L2.5-.75-..
2½ × 1	3.125	79.4	1.875	47.6	TE7RWWCS6L2.5-1.0-..
2½ × 1½	3.125	79.4	1.875	47.6	TE7RWWCS6L2.5-1.5-..
2½ × 2	3.125	79.4	1.875	47.6	TE7RWWCS6L2.5-2.0-..
3 × ½	3.375	85.7	2.125	54.0	TE7RWWCS6L3.0-.5-..
3 × ¾	3.375	85.7	2.125	54.0	TE7RWWCS6L3.0-.75-..
3 × 1	3.375	85.7	2.125	54.0	TE7RWWCS6L3.0-1.0-..
3 × 1½	3.375	85.7	2.125	54.0	TE7RWWCS6L3.0-1.5-..
3 × 2	3.375	85.7	2.125	54.0	TE7RWWCS6L3.0-2.0-..
3 × 2½	3.375	85.7	2.125	54.0	TE7RWWCS6L3.0-2.5-..
4 × ½	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-.5-..
4 × ¾	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-.75-..
4 × 1	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-1.0-..
4 × 1½	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-1.5-..
4 × 2	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-2.0-..
4 × 2½	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-2.5-..
4 × 3	4.125	104.8	2.625	66.7	TE7RWWCS6L4.0-3.0-..
6 × 4	5.625	142.9	3.750	95.3	TE7RWWCS6L6.0-4.0-..

Tees

TE7RWWW - REDUCING TEE

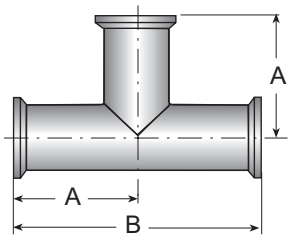
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
¾ × ½	2.000	50.8	2.000	50.8	TE7RWWW6L.75-.5-..
1 × ½	2.125	54.0	2.125	54.0	TE7RWWW6L1.0-.5-..
1 × ¾	2.125	54.0	2.125	54.0	TE7RWWW6L1.0-.75-..
1½ × ½	2.375	60.3	2.375	60.3	TE7RWWW6L1.5-.5-..
1½ × ¾	2.375	60.3	2.375	60.3	TE7RWWW6L1.5-.75-..
1½ × 1	2.375	60.3	2.375	60.3	TE7RWWW6L1.5-1.0-..
2 × ½	2.875	73.0	2.625	66.7	TE7RWWW6L2.0-.5-..
2 × ¾	2.875	73.0	2.625	66.7	TE7RWWW6L2.0-.75-..
2 × 1	2.875	73.0	2.625	66.7	TE7RWWW6L2.0-1.0-..
2 × 1½	2.875	73.0	2.625	66.7	TE7RWWW6L2.0-1.5-..
2½ × ½	3.125	79.4	2.875	73.0	TE7RWWW6L2.5-.5-..
2½ × ¾	3.125	79.4	2.875	73.0	TE7RWWW6L2.5-.75-..
2½ × 1	3.125	79.4	2.875	73.0	TE7RWWW6L.2.5-1.0..
2½ × 1½	3.125	79.4	2.875	73.0	TE7RWWW6L2.5-1.5-..
2½ × 2	3.125	79.4	2.875	73.0	TE7RWWW6L2.5-2.0-..
3 × ½	3.375	85.7	3.125	79.4	TE7RWWW6L3.0-.5-..
3 × ¾	3.375	85.7	3.125	79.4	TE7RWWW6L3.0-.75-..
3 × 1	3.375	85.7	3.125	79.4	TE7RWWW6L3.0-1.0-..
3 × 1½	3.375	85.7	3.125	79.4	TE7RWWW6L3.0-1.5-..
3 × 2	3.375	85.7	3.125	79.4	TE7RWWW6L3.0-2.0-..
3 × 2½	3.375	85.7	3.125	79.4	TE7RWWW6L3.0-2.5-..
4 × ½	4.125	104.8	3.625	92.1	TE7RWWW6L4.0-.5-..
4 × ¾	4.125	104.8	3.625	92.1	TE7RWWW6L4.0-.75-..
4 × 1	4.125	104.8	3.625	92.1	TE7RWWW6L4.0-1.0-..
4 × 1½	4.125	104.8	3.625	92.1	TE7RWWW6L4.0-1.5-..
4 × 2	4.125	104.8	3.875	98.4	TE7RWWW6L4.0-2.0-..
4 × 2½	4.125	104.8	3.875	98.4	TE7RWWW6L4.0-2.5-..
4 × 3	4.125	104.8	3.875	98.4	TE7RWWW6L4.0-3.0-..
6 × 4	5.625	142.9	5.125	130.2	TE7RWWW6L6.0-4.0-..



BPE TABLE # DT-10

TEG7 - TEE

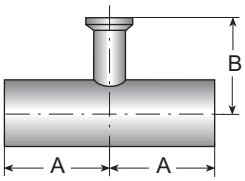
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½	2.250	57.2	4.50	114.4	TEG7 6L.5-..
¾	2.375	60.3	4.75	120.6	TEG7 6L.75-..
1	2.625	66.7	5.25	133.4	TEG7 6L1.0-..
1½	2.875	73.0	5.75	146.0	TEG7 6L1.5-..
2	3.375	85.7	6.75	175.4	TEG7 6L2.0-..
2½	3.625	92.1	7.25	184.2	TEG7 6L2.5-..
3	3.875	98.4	7.75	196.8	TEG7 6L3.0-..
4	4.750	120.7	9.50	241.4	TEG7 6L4.0-..
6	7.125	181.0	14.25	362.0	TEG7 6L6.0-..



BPE TABLE # DT-18

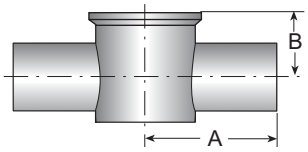
Tees

TE7RWWC - REDUCING TEE



Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
¾ × ½	2.000	50.8	2.500	63.5	TE7RWWC6L.75-.5-..
1 × ½	2.125	53.9	2.625	66.7	TE7RWWC6L1.0-.5-..
1 × ¾	2.125	53.9	2.625	66.7	TE7RWWC6L1.0-.75-..
1½ × ½	2.375	60.3	2.875	73.0	TE7RWWC6L1.5-.5-..
1½ × ¾	2.375	60.3	2.875	73.0	TE7RWWC6L1.5-.75-..
1½ × 1	2.375	60.3	2.875	73.0	TE7RWWC6L1.5-1.0-..
2 × ½	2.875	73.0	3.125	79.4	TE7RWWC6L2.0-.5-..
2 × ¾	2.875	73.0	3.125	79.4	TE7RWWC6L2.0-.75-..
2 × 1	2.875	73.0	3.125	79.4	TE7RWWC6L2.0-1.0-..
2 × 1½	2.875	73.0	3.125	79.4	TE7RWWC6L2.0-1.5-..
2½ × ½	3.125	79.4	3.375	85.7	TE7RWWC6L2.5-.5-..
2½ × 1½	3.125	79.4	3.375	85.7	TE7RWWC6L2.5-1.5-..
2½ × 2	3.125	79.4	3.375	85.7	TE7RWWC6L2.5-2.0-..
3 × 1	3.375	85.7	3.625	92.1	TE7RWWC6L3.0-1.0-..
3 × 1½	3.375	85.7	3.625	92.1	TE7RWWC6L3.0-1.5-..
3 × 2	3.375	85.7	3.625	92.1	TE7RWWC6L3.0-2.0-..
3 × 2½	3.375	85.7	3.625	92.1	TE7RWWC6L3.0-2.5-..
4 × 1	4.125	104.8	4.125	104.8	TE7RWWC6L4.0-1.0-..
4 × 1½	4.125	104.8	4.125	104.8	TE7RWWC6L4.0-1.5-..
4 × 2	4.125	104.8	4.375	111.1	TE7RWWC6L4.0-2.0-..
4 × 2½	4.125	104.8	4.375	111.1	TE7RWWC6L4.0-2.5-..
4 × 3	4.125	104.8	4.375	111.1	TE7RWWC6L4.0-3.0-..
6 × 4	5.625	142.9	5.750	146.1	TE7RWWC6L6.0-4.0-..

TE7IWWCS - INSTRUMENT TEE



BPE TABLE # DT-28

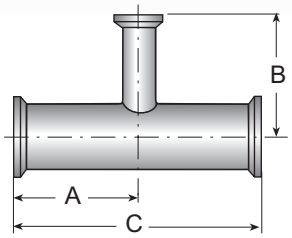
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½ × 1½	2.500	63.5	0.875	22.2	TE7IWWCS6L.5-1.5-..
¾ × 1½	2.500	63.5	1.000	25.4	TE7IWWCS6L.75-1.5-..
1 × 1½	2.500	63.5	1.125	28.6	TE7IWWCS6L1.0-1.5-..
½ × 2	2.750	69.9	1.000	25.4	TE7IWWCS6L.5-2.0-..
¾ × 2	2.750	69.9	1.125	28.6	TE7IWWCS6L.75-2.0-..
1 × 2	2.750	69.9	1.250	31.8	TE7IWWCS6L1.0-2.0-..
1½ × 2	2.750	69.9	1.500	38.1	TE7IWWCS6L1.5-2.0-..

MaxPure

Tees

TEG7R - REDUCING TEE

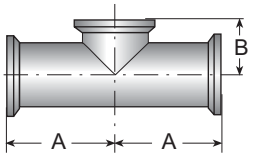
Nominal Size in.		Dimensions						Ordering Code
		A in.	A mm	B in.	B mm	Ref C in.	Ref C mm	
¾	× ½	2.500	63.5	2.500	63.5	5.00	127.0	TEG7R6L.75-.5...
1	× ½	2.625	66.7	2.625	66.7	5.25	133.4	TEG7R6L1.0-.5...
1	× ¾	2.625	66.7	2.625	66.7	5.25	133.4	TEG7R6L1.0-.75...
1½	× ½	2.875	73.0	2.875	73.0	5.75	146.0	TEG7R6L1.5-.5...
1½	× ¾	2.875	73.0	2.875	73.0	5.75	146.0	TEG7R6L1.5-.75...
1½	× 1	2.875	73.0	2.875	73.0	5.75	146.0	TEG7R6L1.5-1.0...
2	× ½	3.375	85.7	3.125	79.4	6.75	171.4	TEG7R6L2.0-.5...
2	× ¾	3.375	85.7	3.125	79.4	6.75	171.4	TEG7R6L2.0-.75...
2	× 1	3.375	85.7	3.125	79.4	6.75	171.4	TEG7R6L2.0-1.0...
2	× 1½	3.375	85.7	3.125	79.4	6.75	171.4	TEG7R6L2.0-1.5...
2½	× ½	3.625	92.1	3.375	85.7	7.25	184.2	TEG7R6L2.5-.5...
2½	× ¾	3.625	92.1	3.375	85.7	7.25	184.2	TEG7R6L2.5-.75...
2½	× 1	3.625	92.1	3.375	85.7	7.25	184.2	TEG7R6L2.5-1.0...
2½	× 1½	3.625	92.1	3.375	85.7	7.25	184.2	TEG7R6L2.5-1.5...
2½	× 2	3.625	92.1	3.375	85.7	7.25	184.2	TEG7R6L2.5-2.0...
3	× ½	3.875	98.4	3.625	92.1	7.75	196.8	TEG7R6L3.0-.5...
3	× ¾	3.875	98.4	3.625	92.1	7.75	196.8	TEG7R6L3.0-.75...
3	× 1	3.875	98.4	3.625	92.1	7.75	196.8	TEG7R6L3.0-1.0...
3	× 1½	3.875	98.4	3.625	92.1	7.75	196.8	TEG7R6L3.0-1.5...
3	× 2	3.875	98.4	3.875	98.4	7.75	196.8	TEG7R6L3.0-2.0...
3	× 2½	3.875	98.4	3.875	98.4	7.75	196.8	TEG7R6L3.0-2.5...
4	× ½	4.750	120.7	4.125	104.8	9.50	241.4	TEG7R6L4.0-.5...
4	× ¾	4.750	120.7	4.125	104.8	9.50	241.4	TEG7R6L4.0-.75...
4	× 1	4.750	120.7	4.125	104.8	9.50	241.4	TEG7R6L4.0-1.0...
4	× 1½	4.750	120.7	4.125	104.8	9.50	241.4	TEG7R6L4.0-1.5...
4	× 2	4.750	120.7	4.375	111.1	9.50	241.4	TEG7R6L4.0-2.0...
4	× 2½	4.750	120.7	4.375	111.1	9.50	241.4	TEG7R6L4.0-2.5...
4	× 3	4.750	120.7	4.375	111.1	9.50	241.4	TEG7R6L4.0-3.0...
6	× 4	7.125	181.0	5.750	146.1	14.25	362.0	TEG7R6L6.0-4.0...



BPE TABLE # DT-19

TEG7S - SHORT OUTLET TEE

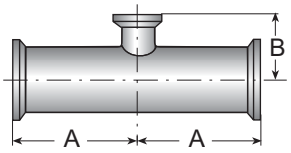
Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½	2.250	57.2	1.000	25.4	TEG7S6L.5-..
¾	2.375	60.3	1.125	28.6	TEG7S6L.75-..
1	2.625	66.7	1.125	28.6	TEG7S6L1.0-..
1½	2.875	73.0	1.375	34.9	TEG7S6L1.5-..
2	3.375	85.7	1.625	41.3	TEG7S6L2.0-..
2½	3.625	92.1	1.875	47.6	TEG7S6L2.5-..
3	3.875	98.4	2.125	54.0	TEG7S6L3.0-..
4	4.750	120.7	2.750	69.9	TEG7S6L4.0-..
6	7.125	181.0	4.625	117.5	TEG7S6L6.0-..



BPE TABLE # DT-27

Tees

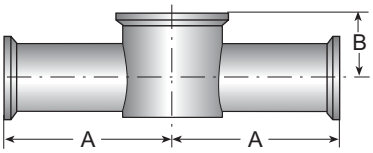
TEG7RS - SHORT OUTLET REDUCING TEE



BPE TABLE # DT-20

Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
¾ × ½	2.500	63.5	1.000	25.4	TEG7RS6L.75-.5-..
1 × ½	2.625	66.7	1.125	28.6	TEG7RS6L1.0-.5-..
1 × ¾	2.625	66.7	1.125	28.6	TEG7RS6L1.0-.75-..
1½ × ½	2.875	73	1.375	34.9	TEG7RS6L1.5-.5-..
1½ × ¾	2.875	73	1.375	34.9	TEG7RS6L1.5-.75-..
1½ × 1	2.875	73	1.375	34.9	TEG7RS6L1.5-1.0-..
2 × ½	3.375	85.7	1.625	41.3	TEG7RS6L2.0-.5-..
2 × ¾	3.375	85.7	1.625	41.3	TEG7RS6L2.0-.75-..
2 × 1	3.375	85.7	1.625	41.3	TEG7RS6L2.0-1.0-..
2 × 1½	3.375	85.7	1.625	41.3	TEG7RS6L2.0-1.5-..
2½ × ½	3.625	92.1	1.875	47.6	TEG7RS6L2.5-.5-..
2½ × ¾	3.625	92.1	1.875	47.6	TEG7RS6L2.5-.75-..
2½ × 1	3.625	92.1	1.875	47.6	TEG7RS6L2.5-1.0-..
2½ × 1½	3.625	92.1	1.875	47.6	TEG7RS6L2.5-1.5-..
2½ × 2	3.625	92.1	1.875	47.6	TEG7RS6L2.5-2.0-..
3 ×½	3.875	98.4	2.125	54	TEG7RS6L3.0-.5-..
3 × ¾	3.875	98.4	2.125	54	TEG7RS6L3.0-.75-..
3 × 1	3.875	98.4	2.125	54	TEG7RS6L3.0-1.0-..
3 × 1½	3.875	98.4	2.125	54	TEG7RS6L3.0-1.5-..
3 × 2	3.875	98.4	2.125	54	TEG7RS6L3.0-2.0-..
3 × 2½	3.875	98.4	2.125	54	TEG7RS6L3.0-2.5-..
4 × ½	4.75	120.7	2.625	66.7	TEG7RS6L4.0-.5-..
4 × ¾	4.75	120.7	2.625	66.7	TEG7RS6L4.0-.75-..
4 × 1	4.75	120.7	2.625	66.7	TEG7RS6L4.0-1.0-..
4 × 1½	4.75	120.7	2.625	66.7	TEG7RS6L4.0-1.5-..
4 × 2	4.75	120.7	2.625	66.7	TEG7RS6L4.0-2.0-..
4 × 2½	4.75	120.7	2.625	66.7	TEG7RS6L4.0-2.5-..
4 × 3	4.75	120.7	2.625	66.7	TEG7RS6L4.0-3.0-..
6 × 4	7.13	181.0	3.750	95.3	TEG7RS6L6.0-4.0-..

TEG7IS - INSTRUMENT TEE



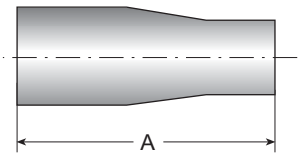
BPE TABLE # DT-29

Nominal Size in.	Dimensions				Ordering Code
	A in.	A mm	B in.	B mm	
½ × 1½	3.000	76.2	0.875	22.2	TEG7IS6L.5-1.5-..
¾ × 1½	3.000	76.2	1.000	25.4	TEG7IS6L.75-1.5-..
1 × 1½	3.000	76.2	1.125	28.6	TEG7IS6L1.0-1.5-..
½ × 2	3.250	82.6	1.000	25.4	TEG7IS6L.5-2.0-..
¾ × 2	3.250	82.6	1.125	28.6	TEG7IS6L.75-2.0-..
1 × 2	3.250	82.6	1.250	31.8	TEG7IS6L1.0-2.0-..
1½ × 2	3.250	82.6	1.500	38.1	TEG7IS6L1.5-2.0-..

Reducers

TE31WW - CONCENTRIC REDUCER

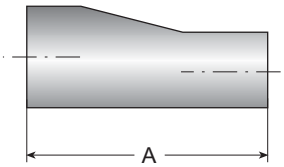
Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
¾ × ½	4.000	101.6	TE31WW6L.75-.5-..
1 × ½	4.500	114.3	TE31WW6L1.0-.5-..
1 × ¾	4.000	101.6	TE31WW6L1.0-.75-..
1½ × ½	5.500	139.7	TE31WW6L1.5-.5-..
1½ × ¾	5.000	127.0	TE31WW6L1.5-.75-..
1½ × 1	5.000	127.0	TE31WW6L1.5-1.0-..
2 × ½	7.750	196.9	TE31WW6L2.0-.5-..
2 × ¾	7.250	184.2	TE31WW6L2.0-.75-..
2 × 1	7.250	184.2	TE31WW6L2.0-1.0-..
2 × 1½	5.250	133.4	TE31WW6L2.0-1.5-..
2½ × ½	9.750	247.7	TE31WW6L2.5-.5-..
2½ × ¾	9.250	235.0	TE31WW6L2.5-.75-..
2½ × 1	9.250	235.0	TE31WW6L2.5-1.0-..
2½ × 1½	7.250	184.2	TE31WW6L2.5-1.5-..
2½ × 2	5.500	139.7	TE31WW6L2.5-2.0-..
3 × 1	11.250	285.8	TE31WW6L3.0-1.0-..
3 × 1½	9.250	235.0	TE31WW6L3.0-1.5-..
3 × 2	7.500	190.5	TE31WW6L3.0-2.0-..
3 × 2½	5.500	139.7	TE31WW6L3.0-2.5-..
4 × 1	15.500	393.7	TE31WW6L4.0-1.0-..
4 × 1½	13.500	342.9	TE31WW6L4.0-1.5-..
4 × 2	11.750	298.5	TE31WW6L4.0-2.0-..
4 × 2½	9.750	247.7	TE31WW6L4.0-2.5-..
4 × 3	7.750	196.9	TE31WW6L4.0-3.0-..
6 × 4	10.000	254.0	TE31WW6L6.0-4.0-..



BPE TABLE # DT-11

Reducers

TE32WW - ECCENTRIC REDUCER



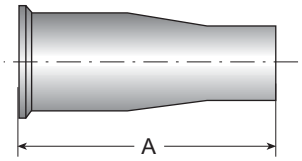
BPE TABLE # DT-11

Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
¾ × ½	4.000	101.6	TE32WW6L.75-.5-..
1 × ½	4.500	114.3	TE32WW6L1.0-.5-..
1 × ¾	4.000	101.6	TE32WW6L1.0-.75-..
1½ × ½	5.500	139.7	TE32WW6L1.5-.5-..
1½ × ¾	5.000	127.0	TE32WW6L1.5-.75-..
1½ × 1	5.000	127.0	TE32WW6L1.5-1.0-..
2 × ½	7.750	196.9	TE32WW6L2.0-.5-..
2 × ¾	7.250	184.2	TE32WW6L2.0-.75-..
2 × 1	7.250	184.2	TE32WW6L2.0-1.0-..
2 × 1½	5.250	133.4	TE32WW6L2.0-1.5-..
2½ × ½	9.750	247.7	TE32WW6L2.5-.5-..
2½ × ¾	9.250	235.0	TE32WW6L2.5-.75-..
2½ × 1	9.250	235.0	TE32WW6L2.5-1.0-..
2½ × 1½	7.250	184.2	TE32WW6L2.5-1.5-..
2½ × 2	5.500	139.7	TE32WW6L2.5-2.0-..
3 × 1	11.250	285.8	TE32WW6L3.0-1.0-..
3 × 1½	9.250	235.0	TE32WW6L3.0-1.5-..
3 × 2	7.500	190.5	TE32WW6L3.0-2.0-..
3 × 2½	5.500	139.7	TE32WW6L3.0-2.5-..
4 × 1	15.500	393.7	TE32WW6L4.0-1.0-..
4 × 1½	13.500	342.9	TE32WW6L4.0-1.5-..
4 × 2	11.750	298.5	TE32WW6L4.0-2.0-..
4 × 2½	9.750	247.7	TE32WW6L4.0-2.5-..
4 × 3	7.750	196.9	TE32WW6L4.0-3.0-..
6 × 4	10.000	254.0	TE32WW6L6.0-4.0-..

Reducers

TE31CW - CONCENTRIC REDUCER

Nominal Size in.	Dimensions		Ordering Code
	A in.	A mm	
¾ × ½	3.000	76.2	TE31CW6L.75-.5-..
1 × ½	3.500	88.9	TE31CW6L1.0-.5-..
1 × ¾	3.000	76.2	TE31CW6L1.0-.75-..
1½ × ½	4.500	114.3	TE31CW6L1.5-.5-..
1½ × ¾	4.000	101.6	TE31CW6L1.5-.75-..
1½ × 1	4.000	101.6	TE31CW6L1.5-1.0-..
2 × ½	6.500	165.1	TE31CW6L2.0-.5-..
2 × ¾	6.000	152.4	TE31CW6L2.0-.75-..
2 × 1	6.000	152.4	TE31CW6L2.0-1.0-..
2 × 1½	4.000	101.6	TE31CW6L2.0-1.5-..
2½ × ½	8.500	215.9	TE31CW6L2.5-.5-..
2½ × ¾	8.000	203.2	TE31CW6L2.5-.75-..
2½ × 1	8.000	203.2	TE31CW6L2.5-1.0-..
2½ × 1½	6.000	152.4	TE31CW6L2.5-1.5-..
2½ × 2	4.250	107.9	TE31CW6L2.5-2.0-..
3 × 1	10.000	254.0	TE31CW6L3.0-1.0-..
3 × 1½	8.000	203.2	TE31CW6L3.0-1.5-..
3 × 2	6.250	158.8	TE31CW6L3.0-2.0-..
3 × 2½	4.250	108.0	TE31CW6L3.0-2.5-..
4 × 1	14.125	358.8	TE31CW6L4.0-1.0-..
4 × 1½	12.125	308.0	TE31CW6L4.0-1.5-..
4 × 2	10.375	263.5	TE31CW6L4.0-2.0-..
4 × 2½	8.375	212.7	TE31CW6L4.0-2.5-..
4 × 3	6.375	161.9	TE31CW6L4.0-3.0-..
6 × 4	9.000	228.6	TE31CW6L6.0-4.0-..



BPE TABLE # DT-26

CertificateNo
C64118/09

Date
2009-06-09

Customer Reference

Customer Address

Customer Article No.

Order Number

Sandvik Reference

Catalogue Code
TS-SFT1-316L-19.05-1.65

Lot
38781

Heat
520055

Delivered Quantity

Customer Order No.

Customer Order Line

Pack Note No.

Calamo
TUBES · FITTINGS · SURFACES

CERTIFICATE

No. C64118/09 Page 1
Date 09-04-22
Rev Date 09-04-23

INSPECTION CERTIFICATE acc to
EN 10 204 3.1

SANDVIK ESPANOLA S.A.
POLIGONO INDUSTRIAL ROCA
VERNEDA S/N
08107-MARTORELLES
BARCELONA, SPANIEN

Inspectionstamp
QA-TUBE

Customer references		**Calamo References**	
Att	*XAVIER ESPI*	Manufacturing no	*49024*
Order no	*806301*	Delivery note	*1*
Package mark	*806301*	Order no	*0121880*

Product description	**Steel grade**
CALAMO TUBE BPE SF1 *19.05X1.65 mm 3/4"X0.065"*	*W.NR 1.4435 TP316L EN 1.4435 SS2353*

Technical requirements
INTERIOR SURFACE FINISH ACC. TO ASME BPE-2007 SF1
RA MAX 0.4 µm (15 µinch) FERRITE CONTENT <0,2%
ASTM A270 S1-S2 WALL THICKNESS: ASME BPE 2007 TAB. DT-5

Extent of delivery			**Steel making process/Melt source**
Position	**Quantity**	**Size of incoming material**	Electric furnace
1	*1000,40 M*	*19,05X1,65*	

Incoming material: Specification, heat treatment

SEAMLESS TUBES ACC.TO ASTM A269/A270/ASME SA213 AW/
EN 10216-5 TC1/DIN 17458 PK1 /AD-2000-W2 EINBAUROHRE/BN2/
EN ISO 1127 D4/T3 BRIGHT ANNEALED COLD FINISH.

Test results

Chemical composition, heat analysis (weight %)

Heat	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Ni**	**Mo**
520055	*0,018*	*0,38*	*1,57*	*0,029*	*0,008*	*17,33*	*13,12*	*2,52*

Chemical composition, product analysis (weight %)

Heat	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Ni**	**Mo**
520055	*0,018*	*0,39*	*1,57*	*0,029*	*0,007*	*17,41*	*13,16*	*2,51*

Tensile test at room temperature

	Yield strenght		**Tensile strength**	**Elongation**		**Reduction of area**
	N/mm2	**N/mm2**	**N/mm2**	**%**	**%**	**(bar material)**
Lot	Rp 0.2	Rp 1.0	Rm	A	A2	%
38781	*317*	*357*	*585*		*50*	
	320	*360*	*595*		*48*	

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No. C64118/09 Page 2
Date 09-04-22
Rev Date 09-04-23

Lot	Grain size (Bar material)	Hardness HRB
38781		80
		80
		80
		80
		79

The following controls/test have been satisfactory performed

Dimensional control	
Intergranular corrosion test	*ASTM A 262 Practice E*
Intergranular corrosion test	*EN ISO 3651-2/Method A*
Leak test:Eddy current test	*ASME SA450*
Leak test:Eddy current test	*EN 10246-2*
Flattening test	
Surface roughness	
Positive Material Identification (PMI)	
Visual inspection	
Flaring test	

This material has not come in contact with mercury or/and low melting point elements
No weld repair has been performed on this material

Calamo AB maintains a Quality System certified in accordance with PED 97/23/EC. Certification body: LRQA (Certificate No GBG0000513). The material complies with PED 97/23/EC.
For material not included in a European harmonized standard, scope and limitations are specified in a Particular Material Appraisal performed by ÅF-Kontroll AB (Notified Body No.0640). The delivered products comply fully with the acknowledgement of order.
The test results are transferred from original cert no *4428*

The material is manufactured according to a Quality system, approved and registered to ISO 9001:2000
Quality assurance - Torbjörn Svanberg/QA-manager
Anna Stjernlöf/QA-EHS coordinator

The certificate is produced with EDP and valid without signature.

06. AUG. 2009 gescannt

RathGibson, Inc.
2505 FOSTER AVENUE
JANESVILLE, WISCONSIN 53547-0389 U.S.A.
PHONE 608-754-2222, FAX 608-754-0889

CERTIFIED REPORTS OF TESTS

per EN 10204:3.1

Notified Body TUV Rheinland NA. ISO 9001:2008 Cert. No. 74 100 2835 [DAR], 74 300 2835 [ANAB].
PED 01 202 USA/Q-02 0591, AD-W0 01 202 USA/A-06 8473

CUSTOMER ORDER #	C224549/1	SOLD TO	NEUMO GmbH + CO KG
PURCHASE ORDER #	19042RA		HENRY-EHRENBERG-PLATZ
CERTIFICATION DATE	7/29/2009 8:32:33AM		D-75438 KNITTINGEN
SHIP VIA	CUSTOMER PICK UP		GERMANY

SHIP TO	CP RAIL - SCHILLER PARK
	9665 WEST LAWRENCE AVE
	SCHILLER PARK, IL 60176

DESCRIPTION	1.000"X0.065"AVG TP316/316L SA249/S6/S7/A269/A270/S2 BPE SF1 ID/OD 20/30u-inRa
PRODUCT TYPE	WELDED TUBE, BEAD REDUCED, BRIGHT SOLUTION ANNEALED & ID & OD POLISHED
HEAT TREATMENT	1900F (1040C) MIN, QUENCHED IN INERT GAS ATM
SURFACE FINISH	ID=20u-INCH RA MAX, OD=30u-in Ra MAX
REVISION DATE	ASME SA249-E07, A08 BPE-07, ASTM A269-08, A270-03a
COMMENTS	THERMOCOUPLE CLEANED AND CAPPED

ITEM NUMBER	JT1000050S31603790000
QUANTITY	5,720 FT
NUMBER OF PIECES	286
MELT ORIGIN	USA
MELT PRACTICE	EAM / AOD / ESR
	MADE IN USA

CHEMICAL ANALYSIS (WT%)

Heat #	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Co	N	CbTa	Ti	V	POSITIVE MATERIAL ID
828254	0.018	1.44	0.029	0.0130	0.44	16.5	10.1	2.08	0.45	0.14	0.04	0.02	0.003	0.09	OK (ASTM E1476)
828254															

MECHANICAL TEST(S)

YIELD STRENGTH (0.2% OFFSET)	TENSILE STRENGTH	ELONGATION (% IN 2")	HARDNESS
52300 PSI (361 MPA)	87000 PSI (600 MPA)	57	HRB 84
51600 PSI (356 MPA)	88000 PSI (607 MPA)	57	HRB 84
FLANGE TEST - PASS	REVERSE BEND - PASS	REVERSE FLATTENING - PASS	DIMENSIONS - PASS
FLATTENING TEST - PASS	FLARE TEST - PASS	EDDY CURRENT - PASS	

ADDITIONAL TEST(S)

ASTM A262E PASS/ ASTM A249 S7 1.07 CORROSION RATIO, ASTM A249 S7 1.07 CORROSION RATIO

ATTEST:

RathGibson, Inc. does not use mercury, lead, sulfur or any special metal alloy which is liquid at ambient temperature in its product or facility. There are no known detrimental materials in the line marking ink. Weld repair was not used to manufacture this product. RathGibson's stainless steel tubing manufacturing process does not use any of the products targeted in the U.S. Clean Air Act of 1990, and is compliant with the European Community RoHS Directive 2002/95/EC.
We hereby testify that the material described herein has been inspected and tested to be in accordance with the applicable specifications as stated in the "ORDER DATA" portion of this report. Technical inquiries regarding this form should be directed to the Technical Services Group. All other assistance concerning this certification should be directed to the preparer (see below).

Cert ID: 233094-2009-7-29

MTR8-01 Rev. 5 Rev. Date 3/24/2009

Michael Aston, Quality Assurance Manager, CQE, MR

Peggy Truesdill

Peggy Truesdill, MILL CERTIFICATION

NEUMO VNE EGMO
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2005149
Part Number: TE2KS 3/4 PL SF1
Part Description: ELBOW 45° WW 3/4" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: May 27, 2008

Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
821147	633969	TUBE 19.0	0.75	ASTM A270 S2 03A/ASME SA249-S6,S7

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
821147	0.015	16.430	1.520	2.070	0.030	10.050	0.027	0.009	0.510

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
821147	303	43925	N/A	N/A	606	87851	74	54.00	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
821147	OK	OK	N/A	OK	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
Our company working with quality system ISO 9001:2000 Certified by The Standards Institution of ISRAEL Licence No. 26880
This certificate was made by use of a computer system and is valid without signature.

Approved By:
RONEN COHEN
Q.A. MANAGER
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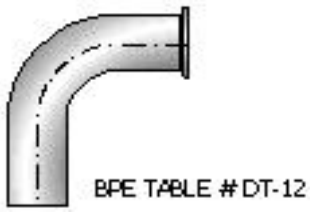
NEUMO VNE EGMO
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

Job\Certificate Number: 2013043
Part Number: TE2C 3/4 PL SF1
Part Description: ELBOW 90° WC 3/4" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: November 11, 2009

ISO 9001:2008 Certified
EN 10204:2004 3.1



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
F110A	636344	FER 3/4		ASTM A240 (FORGING)
A15962	6383355001	TUBE 19.05	0.75	ASTM A270,269

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
F110A	0.024	16.444	0.991	2.041	N/A	10.541	0.027	0.006	0.472
A15962	0.023	16.649	1.574	2.026	0.015	10.219	0.031	0.007	0.460

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
F110A	257	37265	N/A	N/A	559	81055	N/A	64.00	N/A
A15962	254	36830	N/A	N/A	578	83810	80	N/A	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
F110A	N/A	OK	N/A	N/A	N/A	OK
A15962	N/A	OK	OK	N/A	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
Our company working with quality system ISO 9001:2000 Certified by The Standards Institution of ISRAEL License No. 26880
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Approved By:
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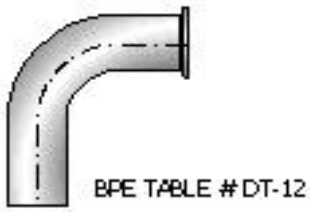
NEUMO VNE EGMO
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

Job\Certificate Number: 2013441
Part Number: TE2C 1/2 PL SF1
Part Description: ELBOW 90° WC 1/2" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: March 24, 2009

ISO 9001:2000 Certified
EN 10204:2004 3.1



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
F112A	637043	FER 0.5		ASTM A276 (FORGING)
825161	6381428001	TUBE 12.7	0.5	ASTM A270 S2 03A ASME SA249 04 ED

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
F112A	0.026	17.200	1.600	2.050	N/A	10.550	0.028	0.023	0.410
825161	0.014	16.410	1.440	2.130	0.040	10.090	0.030	0.012	0.550

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
F112A	262	37990	N/A	N/A	586	84970	N/A	56.00	N/A
825161	280	40600	N/A	N/A	620	89900	74	54.00	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
F112A	N/A	OK	N/A	N/A	N/A	OK
825161	OK	OK	OK	OK	N/A	OK

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Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
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NEUMO VNE EGMO

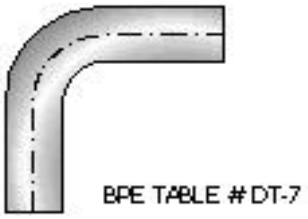
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2015175
Part Number: TE2S 3/4 PL SF1
Part Description: ELBOW 90° WW 3/4" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: June 18, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
A15962	6383355001	TUBE 19.05	0.75	ASTM A270,269

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
A15962	0.023	16.649	1.574	2.026	0.015	10.219	0.031	0.007	0.460

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
A15962	254	36830	N/A	N/A	578	83810	80	N/A	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
A15962	N/A	OK	OK	N/A	OK	OK

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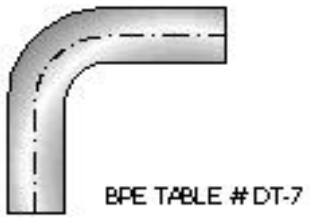
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2015872
Part Number: TE2S 3/4 PL SF1
Part Description: ELBOW 90° WW 3/4" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: June 8, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
A15962	6383355001	TUBE 19.05	0.75	ASTM A270,269

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
A15962	0.023	16.649	1.574	2.026	0.015	10.219	0.031	0.007	0.460

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
A15962	254	36830	N/A	N/A	578	83810	80	N/A	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
A15962	N/A	OK	OK	N/A	OK	OK

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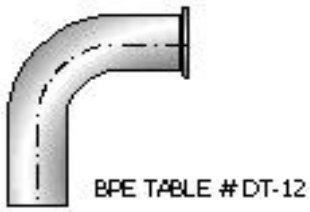
NEUMO Ehrenberg Group

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2015968
Part Number: TE2C 1.0 PL SF1
Part Description: ELBOW 90° WC 1.0" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: June 17, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
F012113A	635542	FER 1.0		ASTM A240 (FORGING)
822778	636245	TUBE 25.4	1.0	ASTM A270 S2 03A/ASME SA249-S6,S7

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
F012113A	0.029	16.611	0.652	2.178	N/A	10.117	0.029	0.003	0.567
822778	0.017	16.320	1.420	2.040	0.040	10.140	0.030	0.014	0.370

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
F012113A	260	37700	N/A	N/A	535	77575	N/A	55.00	N/A
822778	306	44370	N/A	N/A	598	86710	73	60.00	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
F012113A	N/A	OK	N/A	N/A	N/A	OK
822778	OK	OK	OK	OK	N/A	OK

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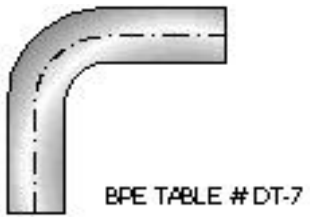
MaxPure

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2016586
Part Number: TE2S 3/4 PL SF1
Part Description: ELBOW 90° WW 3/4" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: July 16, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
821531	636243	TUBE 19.0	0.75	ASTM A270 S2 03A/ASME SA249-S6,S7

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
821531	0.016	16.490	1.460	2.050	0.040	10.040	0.028	0.013	0.490

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
821531	306	44370	N/A	N/A	613	88885	78	54.00	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
821531	OK	OK	OK	OK	N/A	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
Our company working with quality system ISO 9001:2000 Certified by The Standards Institution of ISRAEL License No. 26880
This certificate was made by use of a computer system and is valid without signature.

Approved By:
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Ronen Cohen

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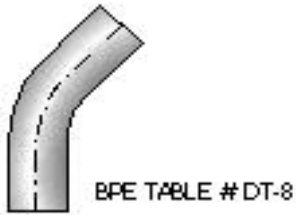
NEUMO VNE EGMO
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

ISO 9001:2008 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2016629
Part Number: TE2KS 3/4 PL SF1
Part Description: ELBOW 45° WW 3/4" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: August 17, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
A15962	6383355001	TUBE 19.05	0.75	ASTM A270,269

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
A15962	0.023	16.649	1.574	2.026	0.015	10.219	0.031	0.007	0.460

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
A15962	254	36830	N/A	N/A	578	83810	80	N/A	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
A15962	N/A	OK	OK	N/A	OK	OK

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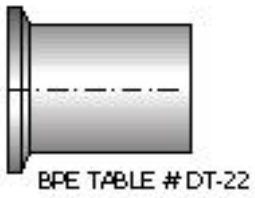
Material Test Certificate

ISO 9001:2008 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2017185
Part Number: TEG14AM7 1.0 PL SF1
Part Description: CLAMP FERRULE 1.0" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: November 9, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
773102	6381961005	R.BAR 52.0		ASTM A276-06,A479

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
773102	0.018	16.780	1.820	2.000	0.074	10.100	0.029	0.007	0.330

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
773102	274	39730	N/A	N/A	605	87725	89	60.00	77.90

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
773102	N/A	OK	N/A	N/A	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
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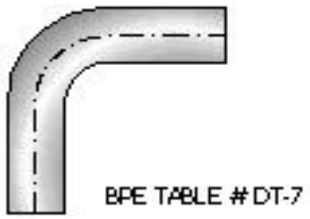
Material Test Certificate

ISO 9001:2008 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2018266
Part Number: TE2S 1.0 PL SF1
Part Description: ELBOW 90° WW 1.0" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: November 23, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
R367	636595	TUBE 25.4	1.0	ASTM A270-03A S2-BPE

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
R367	0.023	16.746	1.362	2.120	0.051	10.254	0.028	0.012	0.355

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
R367	387	56115	N/A	N/A	650	94250	87	45.00	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
R367	OK	OK	OK	OK	N/A	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

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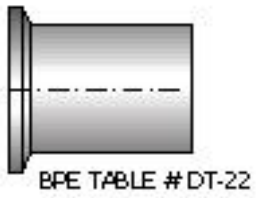
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

Job\Certificate Number: 2019008
Part Number: TEG14AM7 1.0 PL SF1
Part Description: CLAMP FERRULE 1.0" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: November 16, 2009

ISO 9001:2008 Certified
EN 10204:2004 3.1



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
773102	6381961005	R.BAR 52.0		ASTM A276-06,A479

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
773102	0.018	16.780	1.820	2.000	0.074	10.100	0.029	0.007	0.330

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
773102	274	39730	N/A	N/A	605	87725	89	60.00	77.90

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
773102	N/A	OK	N/A	N/A	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
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NEUMO Ehrenberg Group

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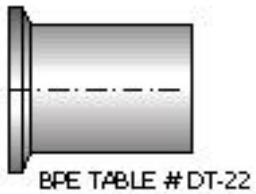
Material Test Certificate

ISO 9001:2008 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2019050
Part Number: TEG14AM7 2.0 PL SF1
Part Description: CLAMP FERRULE 2.0" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: October 1, 2009


BPE TABLE # DT-22

Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
773442	6382462001	R.BAR 66.0		ASTM A276-06, A479-A479M-05

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
773442	0.016	16.730	1.800	2.010	0.075	10.050	0.030	0.010	0.350

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
773442	318	46110	N/A	N/A	592	85840	76	59.00	73.80

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
773442	N/A	OK	N/A	N/A	N/A	OK

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Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
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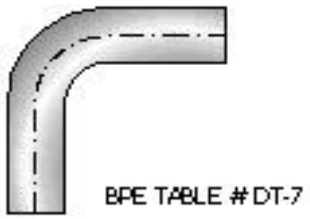
Material Test Certificate

ISO 9001:2008 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2019639
Part Number: TE2S 1/2 PL SF1
Part Description: ELBOW 90° WW 1/2" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: December 2, 2009



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
A12923	6382321007	TUBE 12.7	0.5	ASTM A269,A270

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
A12923	0.015	17.550	1.612	2.034	0.008	12.165	0.031	0.008	0.255

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
A12923	262	37990	N/A	N/A	572	82940	70	N/A	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
A12923	OK	OK	N/A	OK	N/A	OK

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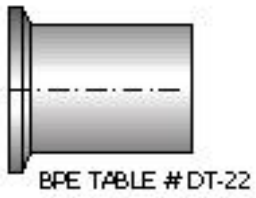
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

Job\Certificate Number: 2020339
Part Number: TEG14AM7 1/2 PL SF1
Part Description: CLAMP FERRULE 1/2" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: November 25, 2009

ISO 9001:2008 Certified
EN 10204:2004 3.1



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
773442	6381959004	R.BAR 26.0		ASTM A276-06, A479-A479M-05

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
773442	0.016	16.730	1.800	2.010	0.075	10.050	0.030	0.010	0.350

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
773442	314	45530	N/A	N/A	599	86855	78	59.00	73.80

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
773442	N/A	OK	N/A	N/A	N/A	OK

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CERTICADO DE INSPECCIÓN
INSPECTION CERTIFICATE

EN 10204/3.1

ENVIADO A / SENT TO **FLUIDOS ALIMENTARIOS, S.L**

REFERENCIA / REFERENCE:

FECHA CERT./ CERT. DATE **05/08/2008**

DESCRIPCIÓN / DESCRIPTION	CÓDIGO / ITEM		OF / SN
90WELD BEND EXTRA LONG 1'	Antiguo / old	220800100SF32	PH00314
	Nuevo / New	T1224-0007025S	

MATERIAL / MATERIAL	316L (14404)
RUGOSIDAD INTERIOR / INT. SURFACE ROUGHNESS	20 µ-in R.a max
TEST DIMENSIONAL Y VISUAL / VISUAL and DIMENSIONAL TEST	OK
STANDARD	ASME BPE

ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS

COLADA/HEAT N.	% C	% Mn	% Si	% S	% P	% Ni	% Cr	% Mo	% N
825835	0,016	1,47	0,48	0,01	0,025	10,09	16,76	2,08	0

CARACTERÍSTICAS MECÁNICAS / MECHANICAL TEST

COLADA	Tensile Test in Nmm2			Test			
HEAT NUMBER	Tensile	Yield 0,2	Yield 1,0	Flattening	Flaring	Hardness	Elongation %
825835	628	377	N/A	OK	OK	1162 HRB	53,10

INOXPA S.A. certifica que la información aqui detallada es copia verdadera de los resultados suministrados por nuestros proveedores. Homologación según código ASME IX, según norma UNE-EN-288-3 para procedimientos de soldaduras y según UNE-EN-287-1 para soldadores. INOXPA, S.A certificada según ISO9001:2000
Los materiales aquí detallados cumplen con las exigencias del pedido.

INOXPA, S.A certifies that the information here detailed is a real copy of the results given by our suppliers. Certificate according to code ASME IX and UNE-EN-288-3 normative for welding procedures and according to UNE-EN-287-1 for welders. INOXPA, S.A cerified acording to ISO 9001:2000
The delivered products comply with the requeriments of the purchasing order.

Atentamente,

Sonia Villegas

Dpt. de Calidad / Quality Department
INOXPA S.A.

Doc:rev 2

CERTICADO DE INSPECCIÓN
INSPECTION CERTIFICATE

EN 10204/3.1

CANDIGRA y CIA, S.A
C/ Telers 54
17820 BANYOLES. GIRONA (SPAIN)

ENVIADO A / SENT TO **FLUIDOS ALIMENTARIOS, S.L.**

REFERENCIA / REFERENCE: **266929** FECHA / DATE **19/07/2006**

DESCRIPCIÓN / DESCRIPTION	CÓDIGO / ITEM	OF / SN
REDUC.SHORT TEE W/CL/W 3/4-1/2	235807007SF32	

MATERIAL / MATERIAL	316L (1.4404)
RUGOSIDAD INTERIOR MEDIA / INT.SURFACE FINISHED	
TEST DIMENSIONAL Y VISUAL / VISUAL and DIMENSIONAL TEST	OK
STANDARD	ASME BPE

ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS

COLADA/HEAT N.	% C	% Mn	% Si	% S	% P	% Ni	% Cr	% Mo	% N
V21148	0,015	0,34	0,53	0,011	0,011	13,52	17,43	2,38	0,01
U-8612	0,026	1,26	0,37	0,015	0,037	10,15	16,55	2,12	0

CARACTERÍSTICAS MECÁNICAS / MECHANICAL TEST

COLADA	Tensile Test in Nmm2			Test			
HEAT NUMBER	Tensile	Yield 0,2	Yield 1,0	Flattening	Flaring	Hardness	Elongation %
V21148	564	268	N/A	N/A	N/A	76 B	50
U-8612	592	268	N/A	N/A	N/A	181 BHN	61

CANDIGRA y Cia. certifica que la información aqui detallada es copia verdadera de los resultados suministrados por nuestros proveedores. Homologación según código ASME IX, según norma UNE-EN-288-3 para procedimientos de soldaduras y según UNE-EN-287-1 para soldadores. Candigra y Cia, S.A certificada según ISO9001:2000
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CANDIGRA y Cia certifies that the information here detailed is a real copy of the results given by our suppliers. Certificate according to code ASME IX and UNE-EN-288-3 normative for welding procedures and according to UNE-EN-287-1 for welders. Candigra y cia, S.A cerified acording to ISO 9001:2000
The delivered products comply with the requeriments of the purchasing order.

Atentamente,

Sonia Villegas

Dpt. de Calidad / Quality Department

Doc:rev 2

INOXPA S.A.
C/ Telers 54
17820 BANYOLES. GIRONA (SPAIN)

CERTICADO DE INSPECCIÓN
INSPECTION CERTIFICATE

EN 10204/3.1

ENVIADO A / SENT TO **ASES. TEC. INDL DE BARCELONA**

REFERENCIA / REFERENCE: **--**

FECHA CERT./ CERT. DATE **22/04/2009**

DESCRIPCIÓN / DESCRIPTION	CÓDIGO / ITEM		OF / SN
LONG.EXC.REDUCER.W.1'-3/4'	Antiguo / old	213870009SF32	PH00026
	Nuevo / New	T1561-0007025S	

MATERIAL / MATERIAL	316L (14404)
RUGOSIDAD INTERIOR / INT. SURFACE ROUGHNESS	20 µ-in R.a max
TEST DIMENSIONAL Y VISUAL / VISUAL and DIMENSIONAL TEST	OK
STANDARD	ASME BPE

ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS

COLADA/HEAT N.	% C	% Mn	% Si	% S	% P	% Ni	% Cr	% Mo	% N
40532-03J	0,014	1,26	0,63	0,008	0,034	10,8	16,8	2,07	0
116050	0,018	1,3	0,39	0,005	0,027	12,61	17,35	2,51	0

CARACTERÍSTICAS MECÁNICAS / MECHANICAL TEST

COLADA	Tensile Test in Nmm2			Test			
HEAT NUMBER	Tensile	Yield 0,2	Yield 1,0	Flattening	Flaring	Hardness	Elongation %
40532-03J	597	308	N/A	N/A	N/A	75 HRB	60
116050	583	262	N/A	OK	OK	149 HB	54,10

INOXPA S.A. certifica que la información aqui detallada es copia verdadera de los resultados suministrados por nuestros proveedores. Homologación según código ASME IX, según norma UNE-EN-288-3 para procedimientos de soldaduras y según UNE-EN-287-1 para soldadores. INOXPA, S.A certificada según ISO9001:2000
Los materiales aquí detallados cumplen con las exigencias del pedido.

INOXPA, S.A certifies that the information here detailed is a real copy of the results given by our suppliers. Certificate according to code ASME IX and UNE-EN-288-3 normative for welding procedures and according to UNE-EN-287-1 for welders. INOXPA, S.A cerified acording to ISO 9001:2000
The delivered products comply with the requeriments of the purchasing order.

Atentamente,

Sonia Villegas

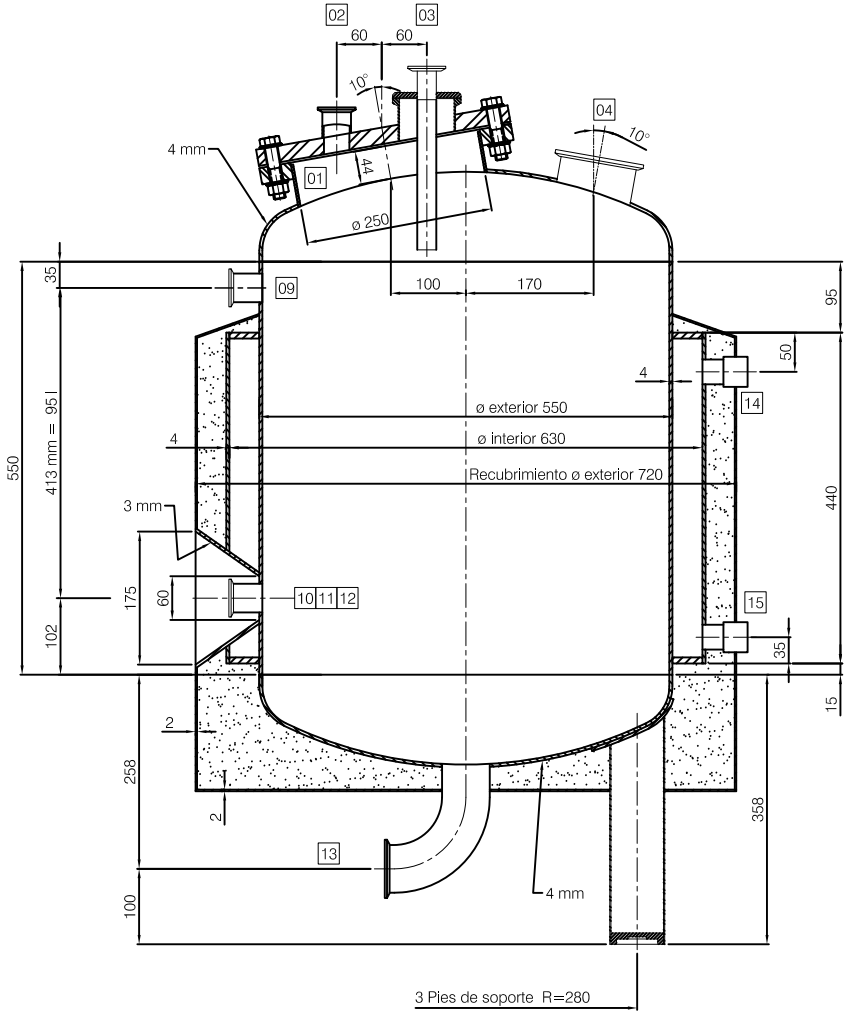
Dpt. de Calidad / Quality Department
INOXPA S.A.

Doc:rev 2

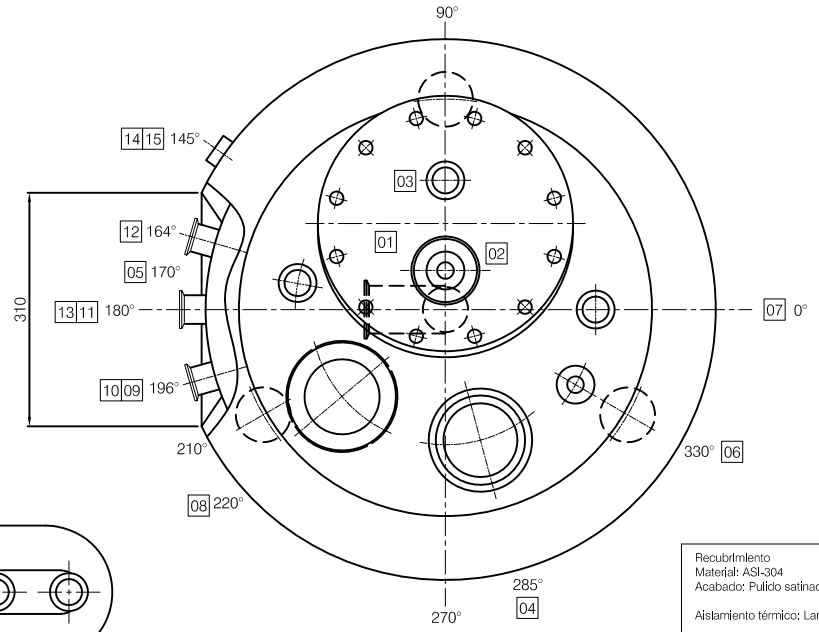
7.- CERTIFICADOS CALIDAD COMPONENTES SISTEMA

Les entregamos fotocopias y documentación de los componentes instalados.

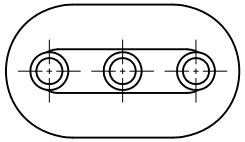
TANQUE 100 LITROS



Alzado seccionado (convencional)



Planta : Situación de elementos



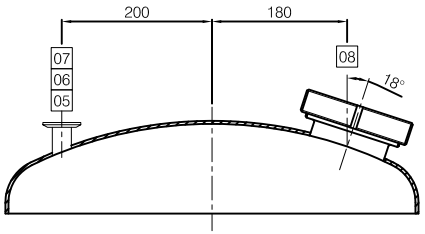
Detalle cono

Recubrimiento
Material: AISI-304
Acabado: Pulido satinado

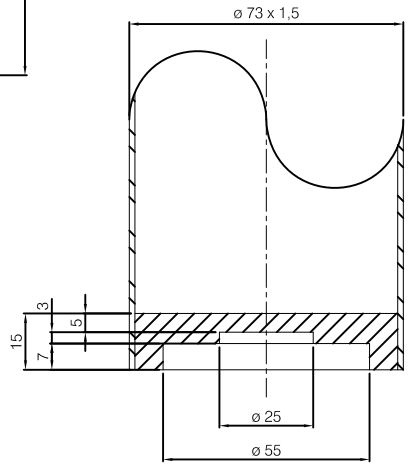
Aislamiento térmico: Lana de roca

Depósito
Fluido: Agua
Temperatura de diseño: 144°C
Presión de diseño: -1 / 3 bar
Taraje válvula de seguridad: 3 bar
Temperatura de prueba: 20°C
Presión de prueba: – bar
Capacidad útil/total: 146/165 l
Material: AISI-316 L
Acabado: Ra<0,65 μ

Doble camisa
Fluido: Agua
Temperatura de diseño: 90°C
Presión de diseño: -1 / 6 bar
Taraje válvula de seguridad: 6 bar
Temperatura de prueba: 20°C
Presión de prueba: – bar
Capacidad: 30 l
Material: AISI-304
Acabado: Decapado y pasivado



Resto tubuladuras fondo superior



Pie: Detalle alojamiento célula de carga

POS	CANT	DN	NORMA	SERVICIO	Ø tubo
15	1	1"	BSPT	Entrada recámara	Fig. 270
14	1	1"	BSPT	Salida recámara	Fig. 270
13	1	2½"	Clamp	Salida inferior	ø 63,5 x 1,65
12	1	1½"	Clamp	Libre	ø 38,1 x 1,65
11	1	1½"	Clamp	Libre	ø 38,1 x 1,65
10	1	1½"	Clamp	Nivel inferior	ø 38,1 x 1,65
09	1	1½"	Clamp	Nivel superior	ø 38,1 x 1,65
08	1	100	DIN 11851	Mirilla con luz	ø 104 x 2
07	1	1½"	Clamp	Libre	ø 38,1 x 1,65
06	1	1"	Clamp	Válvula de seguridad	ø 25,4 x 1,65
05	1	1½"	Clamp	Recirculación	ø 38,1 x 1,65
04	1	4"	Clamp	Boca de carga	ø 101,6 x 2,1
03	1	3" / 1"	Clamp	Entrada de agua	ø 76,2 x 1,65
02	1	1½"	Clamp	Manómetro	ø 38,1 x 1,65
01	1	250	---	Boca de inspección	ø 258 X 4

rev	fecha	dibujado	V. B.
4			
3			
2			
1			
0	29.04.09	J.F.R.	

TITULO: Depósito - Dimensiones principales

PROYECTO: Trituradora

CLIENTE: Melissa

CAD ref.: Clientes

substituye:

ESCALA: 1:5 | COTAS EN mm. | Proyección | ITEM: | UNIDADES: | CODIGO:

plano: MEL-009-A2

hoja: 1 de: 1

CIFA Consultoría e Instalaciones Farmacéuticas y Alimentarias, S.L.

CIFA

TRAZABILIDAD DE MATERIALES

CLIENTE	ESSA – Proyecto MELISSA
EQUIPO	Trituradora
REFERÉNCIA	---

DENOMINACIÓN	Nº DE COLADA	MATERIAL	IMAGEN	FECHA
Depósito				
Fondo klöpper inferior	L7L9	AISI-316L	IMG_1544	08.05.09
Fondo klöpper superior	L7L9	AISI-316L	IMG_1545	08.05.09
Chapa cuerpo	L7L9	AISI-316L	IMG_1548	08.05.09
Chapa cono	L7L9	AISI-316L	IMG_1549	08.05.09
Boca de inspección				
Chapa cuello	L7L9	AISI-316L	IMG-1550	08.05.09
Brida ciega (Tapa)	261524	AISI-316L	IMG_1556	21.05.09
Brida	261524	AISI-316L	IMG_1552	21.05.09
Doble camisa				
Chapa cuerpo	L7L9	AISI-316L	IMG_1550	08.05.09
Pletina de cerramiento	L7L9	AISI-316L	IMG_1546	08.05.09

...OX, S.A.
...EL CAMPO DE...
...AR
...NES (LOS BARRIOS)
...NO. (34) - 956 62 93 00
FAX. (34) - 956 62 93 11
P.O. BOX 83
11370 LOS BARRIOS (CADIZ)

TÜV CERT ISO 9001 ISO 14001 Certified systems of management in environment and quality

INSPECTION CERTIFICATE

CERTIFICADO DE INSPECCION 3.1

ACCORDING TO / SEGUN: EN 10204

CERTIFICATE N° / CERTIFICADO N°: F0 2008 709533 190001 *

CUSTOMER / CLIENTE	OUR ORDER N° / N/PEDIDO	YOUR ORDER N° / S/PEDIDO
INOXCENTER (STOCK-FABRICA) PALMONES LOS BARRIOS (CADIZ) CADIZ ESPAÑA	AN 45816	I08037526

TRADE MARK / SELLO DEL FABRICANTE	INSPECTOR'S STAMP / SELLO DEL INSPECTOR	STEELMAKING PROCESS / PROCESO DE ACERIA
ACERINOX		A.O.D.

REQUIREMENTS / NORMAS APLICABLES	INTERGRANULAR CORROSION / CORROSION INTERGRANULAR	GRADE / MATERIAL		FINISH / ACABADO
ASTM-A240Ed04;A480Ed04	ASTM-A-262 PRACTICA E	Acx 150	TP-304	N°1
ASTM-A240Ed06;A480Ed06	ASTM-A-262 PRACTICA E	Acx 150	TP-304L	N°1

COIL / BOX / BOBINA/CAJA	CONTENT / CONTENIDO	DIMENSIONS / DIMENSIONES			MARKS / MARCA	QUANTITY / CANTIDAD	TEST N° / PROBETA
		THICKNESS / ESPESOR	WIDTH / ANCHO	LENGTH / LARGO			
T56192	06L7L9	4,000	1000,00	2000,00	64	32	06L7L9 C

CHEMICAL ANALYSIS / COMPOSICION QUIMICA (%)

HEAT N° / COLADA	C	CR	MN	N	NI	P	S	SI
L7L9	0,014	17,584	1,789	0,071	8,057	0,028	0,003	0,356

MECHANICAL PROPERTIES / CARACTERISTICAS MECANICAS

TEST N° / PROBETA	PROBE SIT	PROBE TYPE	Rm N/mm2	Rp 0.2 N/mm2	A50 %	HRB
06L7L9	C	T	641,39	344,69	53,40	85,00

INOXCENTER, S.A.
C.I.F. A 08 332092
Calle F Nº 20 Sector C Zona Franca
08040 BARCELONA

REMARKS / OBSERVACIONES

Temperatura de hipertemple entre 1050 y 1100 ° C.
The delivery is in accordance with the order

ES COPIA FIEL DEL CERTIFICADO ORIGINAL

HELISSA - TRITURADORA
CHAPA — Fondos superior e inferior
Cuerpo + Cono
Doble camisa
Cuello boca de inspección
Cierres doble camisa

SURFACE AND DIMENSIONAL CONTROL / INSPECCION SUPERFICIAL Y DIMENSIONAL

SATISFACTORY
Satisfactoria

WORK INSPECTOR / INSPECTOR

T. Micó

Palmones, 2 DICIEMBRE 2008

FDT0009

ACRONI

TEHNIČNA KONTROLA
Telefon: +386 4 584 10 40
Telefax: +386 4 584 10 68
http://www.acroni.si
E-mail: askube@acroni.si

Potrdilo o prevzemu 3.1/ Abnahmeprufzeugnis 3.1/ Inspection certificate 3.1

Stran/Seite/Page 1 / 2 — EN 10 204 3.1

St. / Nr. / No. 31085497-1 — Datum / Datum / Date 29.01.2008

Narocnik / Kunde / Customer
OXITER GIRONA, S.L.
C/RIERA GARRAP, 21
17080 GIRONA
SPAIN

Narocilo / Bestellung Nr. / Order No. 2841 disp.27241

Dobavni list / Lieferschein / Despatch note 31085497 z/vom/from 29.01.2008

Izdelek / Erzeugnis / Product: BLECH

Vrsta peci / Erschmelzunsart / Melting furnace: E+VOD

Znak izvedenca TK / Zeichen des sachverstandigen / Inspectors' stamp: KK 4

Znak proizvajalca / Zeichen des Herstellewerks / Mark of the Manufacturer

Specifikacije / Vorschriften / Specifications	Tip / W.nr. / Type	Pov./ Flache / Finish	Koroz. test / Int.krist.korr. / Corrosion test
ASTM A240/A240M/ED.04	316L/316	No.:1	ASTM A262 PRACTICE E:OK
ASME SA 240 SECT.II PART A/ED.04 Add 06	316L/316	No.:1	
DIN 17440/ED.96 EN10088-2/ED.95	X2CrNiMo17/12/2	2C-IIa, 1D	
EN 10028-7/ED.2000	W.Nr.1.4404/1.4401		EN ISO 3651-2: OK
PED/97/23/EC			

Obseg dobave / Umfang der Lieferung / Extent of material delivery

Poz. Pos. Item	St. sarze Schmelzen Nr. Heat No.	St. plosce Waltztafel Plate No.	Teza neto Gewicht Weight kg	Dimenzije Abmessungen Dimensions mm	St. kom. Stuckzahl Quantity	St. vzorca Probe Nr. Sample No.
1	257219	87721	1120	70 / 1000 / 2000	1	87721 T
2	261236	57213	1824	19 / 2000 / 6000	1	57213 T
2	261236	57213	1824	19 / 2000 / 6000	1	57213 T
3	261678	57210	2016	21 / 2000 / 6000	1	57210 T
4	261524	55499	2090	22 / 2000 / 6000	1	55499 T

Mehanske lastnosti / Mechanische Eigenschaften / Mechanical properties

St.vzorca Probe Nr. Sample No.	Smer vzorca Proben lage Position	Nap.tecenja Dehn grenze Yield 0,2% N/mm2	Nap.tecenja Dehn grenze Yield 1% N/mm2	Nat.trdnost Zugfestigkeit Tensile str. N/mm2	Raztezek / Bruchdehnung / Elongation A5 %	A50 %	A80 %	Kontrakc. Einschnurung Red. of area %	Trdota Harte Hardness HB	Zilavost / Kerbschlag / Impact pri /smer bei /lage J		at/posit. °C
Zahteve Anforderung. Requirem.	MIN	220	260	520	45	40				60		20
	MAX			670					217			
87721 T	P	281	326	555	53.8	72.7			156	317	308	323	20
57213 T	P	250	301	560	53.4	81.5			159	334	325	363	20
55499 T	P	252	293	548	52.2	80.5			152	363	351	344	20
57210 T	P	267	282	592	54.3	65.7			168	342	318	329	20

G - Glava / Kopf / Top N - Noga / Fuss / Bottom V - Vzdolzno / Langs / Longitudinal P - Precno / Quer / Transverse Upogib / Biege / Bend :

Zig in podpis
Firmenstempel und Unterschrift
Stamp and signature

Cesta Borisa Kidriča 44, 4270 Jesenice
Član družbe SIJ
Member of Slovenian Steel Group

ACRONI

TEHNIČNA KONTROLA
Telefon: +386 4 584 10 40
Telefax: +386 4 584 10 68
http://www.acroni.si
E-mail: askube@acroni.si

Potrdilo o prevzemu 3.1/ Abnahmeprufzeugnis 3.1/ Inspection certificate 3.1

St./Nr./No. 31085497-1

Kemicna analiza / Chemische Zusammensetzung / Chemical Composition

Sarza/Schmelzen Nr./ Heat No.	%C	%Si	%Mn	%P	%S	%Cr	%Ni	%Mo	%N	Ferrite
257219	0.012	0.33	1.49	0.037	0.001	17.09	10.19	2.02	0.0379	
261236	0.011	0.26	1.49	0.039	0.001	16.52	10.00	2.02	0.0326	
261524	0.017	0.30	1.48	0.034	0.001	16.66	10.08	2.04	0.0175	
261678	0.017	0.27	1.54	0.034	0.002	16.50	10.10	2.08	0.0500	

Opombe

HEAT TREATMENT : QUENCHED AT 1050°C, WATER QUENCHED
- VISUAL AND DIMENSIONAL CHECK : OK
- SPECTROMETER SORTING TEST : OK
- INTERGRANULAR CORROSION TEST ACCORDING TO
ASTM A - 262 PRACTICE E : OK!

WARMBEHANDLUNG . LoSUNGSGLUHEN BEI 1050 °C, WASSER ABGESCHRECHT!
_ OBERFLACHEN UND MASSPRuFUNG : OHNE BEANSTANDUNG
_ PRuFUNG AUF WERKSTOFFVERWECHSLUNG : OHNE BEANSTANDUNG
_ PRuFUNG AUF BESTANDIGKEIT GEGEN INTERKRISTALLINE KORROSION
NACH EN ISO 3651-2 OHNE BEANSTANDUNG.

Certified acc. Pressure Equipment Directive (97/23/EC)
by TÜV-CERT-Certification body for pressure equipment of the
TÜV Industrie Service G.m.b.H TÜV Süd Gruppe.

Zig in podpis
Firmenstempel und Unterschrift
Stamp and signature

19/1

...ča 44, 4270 Jesenice

SUBMINISTRES INDUSTRIALS
SUTEIN®

CIFA, SL
VICTOR FONT GUAL, 25
8329 TEIA

Barcelona, 12 de Mayo de 2009

Muy Sres. Nuestro:

Tal como nos han solicitado. CERTIFICAMOS que el material servido cumple los siguientes requisitos:

*Cristal de cal Sódica según DIN 8902	Medida de 114 x 15
*Temperatura máxima de Trabajo:	140ºc (en servicio continuo)
* Temperatura mínima de trabajo:	No hay limite
* Presión nominal (Bar):	5 Bar

Sin otro particular, aprovechamos la ocasión para saludarles muy atentamente

SUTEIN,SL

SUBMINISTRES INDUSTRIALS SUTEIN, S.L.
SUTEIN

Pol. Ind. Can Bernades-Subirá • c/ Berguedà, 4-6, Nave 12
08130 Sta. Perpètua de Mogoda (Barcelona)
Tel. 902 401 410 • Fax 93 574 14 64
sutein@sutein.com • www.sutein.com

Gebr. Nagel GmbH
-Warmpresswerk-
58091 Hagen – Rummenohl Bührener Weg 1

Abnahmeprüfzeugnis nach DIN EN 10204 3.1
Test report according to

Prüf-Nr. D 2461
Test.-No.:

Besteller:
Purchaser:

Bestell-Nr. ST GS-MM 1.4404/04-2006
Order-No.:

Hersteller: Gebr. Nagel GmbH
Manufacturer:

Probe-Nr.: 448
Sample-No.:

Gegenstand: 1.016 Stück Gew.-St. NW 100 L Rohlinge
Object:

Lieferzustand: lösungsgeglüht und abgeschreckt
State of delivery:

Werkstoff: 1.4404 (316L)
Quality:

Erschmelzungsart: E
Steelmaking process:

Schmelzen-Nr.: 188846 EWS
Cast-No.:

Kennzeichnung: „RGN4K13"
Marking:

Anforderungen: : EN 10222-5 /EN 10272, AD2000/W2/W10
ASME-Code Sec.II,E04,SA 336
Requirements:

Zeichen Werksachverständiger: R
Sign of Works-Surveyor:

Besichtigung und Maßkontrolle:
Inspection and measuring:

Keine Beanstandung: X
Without objection:

Prüfung auf Werkstoffverwechselung (Spectrotest):
Spectroscopic check for mix-up of material:

Keine Beanstandung: X
Without objection:

Wärmebehandlung: lösungsgeglüht und abgeschreckt
Heat treatment:

Sonstige Prüfwerte:
Other test results:

Schmelzen-Nr. / Cast-No.: Chemische Zusammensetzung (vom Vormaterial) / Chemical Composition

	C	Si	Mn	P	S	Cr	Mo	Ni	N
188846	0,017	0,57	1,34	0,023	0,025	16,61	2,02	11,11	0,0322

Mechanische Eigenschaften / Result of mechanical test

Zugversuch EN 10002-1 / Tensile test

Kerbschlagversuch EN 10045-1 / Impact test

Probe-Nr. Test-No.	Prüftemp. Test temp.	Dehngrenze Proof stress $R_{p\,0,2}$	Dehngrenze Proof stress $R_{p\,1,0}$	Zugfestigkeit Tensile strenght R_m	Bruchdehnung Elongation A_5	Einschnürung Reduction Z	Prüftemp. Test temp.	Kerbschlagarbeit Impact value J		
	°C	N/mm²	N/mm²	N/mm²	%	%	°C	1	2	3
448	Rt	288	324	554	47,5	61,9	Rt	72	103	182

Anforderungen/ Requirement: EN 10222-5

Probenlage		min.	min.		min.	min.		min.
quer	Rt	190	225	490-690	30	--	Rt	55

Probenform: Type of sample	Zugprobe EN 10002-1 – 7,96 mm	KV-Probe
Probenlage Pos. of sample:	quer	quer

Folgende Unterlagen sind beigefügt:
Following vouchers are enclosed:

Gebr. Nagel GmbH
-Qualitätssicherung-
Der Werkssachverständige
Works Surveyor

Datum: 13.06.2006
Date:

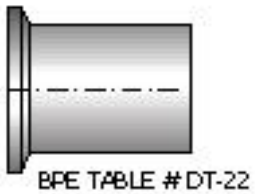
NEUMO VNE EGMO
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2013350
Part Number: TEG14AM7 1.5 PL SF1
Part Description: CLAMP FERRULE 1.5" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: March 17, 2009


BPE TABLE # DT-22

Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
780262	6381961007	R.BAR 52.0		ASTM A276 -06,A479

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
780262	0.019	16.850	1.820	2.020	0.086	10.060	0.030	0.014	0.330

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
780262	284	41180	N/A	N/A	614	89030	N/A	N/A	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
780262	N/A	OK	N/A	N/A	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
Our company working with quality system ISO 9001:2000 Certified by The Standards Institution of ISRAEL License No. 26880
This certificate was made by use of a computer system and is valid without signature.

Approved By:
RONEN COHEN
Q.A. MANAGER
Ronen Cohen

NEUMO GmbH
info@neumo.de
Tel: +49(0)7043360
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VNE Corporation
stainless@vnecorp.com
Tel: +1 800 356 1111
Fax:+1 608 756 3643/1

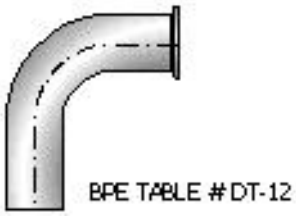
EGMO Ltd.
sales@egmo.co.il
Tel: 972 4 9855130
Fax:972 4 9855175

NEUMO VNE EGMO
Neumo Ehrenberg Group

MaxPure

Material Test Certificate

Job\Certificate Number: 858550
Part Number: TE2C 2.5 PL SFF1
Part Description: ELBOW 90° WC 2.5" 316L 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: May 12, 2009



ISO 9001:2000 Certified
EN 10204:2004 3.1

Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
240633	627839	R.BAR 80.0		ASTM A276 2005 S31600 A/ASME SA479-01
5101335	624737	TUBE 63.5	2.5	ASTM A270,269,A450-E426,A262:E/EN10028-7

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
240633	0.012	16.920	1.52	2.140	0.070	10.19	0.033	0.025	0.790
5101335	0.018	17.300	1.54	2.070		11	0.030	0.006	0.470

Mechanical Test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
240633	304	44080	337	48865	618	89610	180	60	
5101335	328	47560			584	84680	81	47	N/A

Mechanical Test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
240633	N/A	OK	N/A	N/A	OK	OK
5101335	OK	OK	N/A	OK	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Approved By:

Ronen Cohen

RONEN COHEN
Q.A. MANAGER

TÜV CERT

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction
with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
Our company working with quality system ISO 9001:2000
Certified by The Standards Institution of ISRAEL Licence No. 26880
This certificate was made by use of a computer system and is valid without signature.

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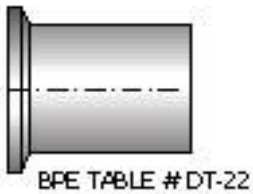
NEUMO VNE EGMO
NEUMO Ehrenberg Group

MaxPure

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 869398
Part Number: TEG14AM7 1.0 PL SF1
Part Description: CLAMP FERRULE 1.0" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: July 17, 2008


BPE TABLE # DT-22

Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
773101	637284	R.BAR 55.0		ASTM A276-06,A479

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
773101	0.017	16.900	1.820	2.010	0.076	10.020	0.029	0.014	0.390

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
773101	207	30015	N/A	N/A	517	74965	185	55.00	73.00

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
773101	N/A	OK	N/A	N/A	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613
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Approved By:
RONEN COHEN
Q.A MANAGER
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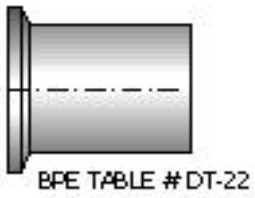
NEUMO Ehrenberg Group

Material Test Certificate

ISO 9001:2000 Certified
EN 10204:2004 3.1

Job\Certificate Number: 2009965
Part Number: TEG14AM7 4.0 PL SF1
Part Description: CLAMP FERRULE 4.0" 20Ra
Material Specification: 316/316L
Standard: ASME BPE
Date Of Certification: December 18, 2008



Raw Material Specifications

Heat Number	Inspection Number	Raw Material & Size		Material Standards
		(mm)	(Inch)	
514565	638042	H.BAR 121X95		ASTM SA-479

Component Chemical Composition

Heat Number	%C	%CR	%MN	%MO	%N	%NI	%P	%S	%SI
514565	0.020	17.310	1.680	2.520	N/A	13.150	0.031	0.011	0.410

Mechanical test

Heat Number	Yield 0.2		Yield 1.0		Tensile		Hardness	Elongation	Reduction
	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(N/mm²)	(PSI)	(HRB)	(%)	(%)
514565	235	34075	N/A	N/A	542	78590	N/A	53.00	N/A

Mechanical test (cont)

Heat Number	Eddy Current Test	Visual & Dimensional Test	Flaring Test	Flattening Test	Intergranular Corrosion Test	Material Identification Test
514565	N/A	OK	N/A	N/A	OK	OK

We certify that this information is a true representation of the data that has been furnished by our raw material suppliers. We have no knowledge of any mercury of low melting contamination.

Examined according to AD 2000-Merkblatt HP 0 and TRD 201 in conjunction with EN 729-2 , by TUV CERT. Certification number: BB-DDB-MAN-P-03-1613

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BOLA DE LIMPIEZA

La gama de productos TANKO® S

Limpiador de chorro, ahora todavía ¡más seguro!

Desde hace muchas décadas que en el proceso de lavado de tanques y recipientes se utilizan diferentes tecnologías de limpieza. Los resultados obtenidos han todavía podido ser mejorados mediante el desarrollo de nuevos aparatos. Gracias al trabajo de investigación y perfeccionamiento de los limpiadores de chorro (TANKO® S), que son actualmente los más rentables, fue criada una situación con enormes potenciales de productividad y economía, en la que se combinan los mejores resultados de limpieza con una elevada seguridad.

S20 - especial

Seguros resultados de limpieza gracias a la alta potencia del lavado

Por motivos de reducción de costes, se utilizan muchas veces limpiadoras de chorro simple en sustitución de aparatos limpiadores de chorro direccionado mucho más dispendioso. Esta opción está entretanto disponible en el cuadro de amplias aplicaciones. La razón de ser reside en la fuerza de limpieza mejorada, i. e. con un impacto más fuerte en las paredes del depósito, que se puede encontrar en los modernos limpiadores de chorro amplio. Las actuales técnicas de producción, como las concernientes a la soldadura orbital e a los centros de mecanizado CNC de metales de alta precisión, ofrecen un sinnúmero de posibilidades hacia la optimización de procesos. En estos casos, la anchura del intervalo y la calidad de fabricación de los "rasgues rociadores" desempeñan un papel determinante. Comentándolo de forma más simples: Cuanto más ancho y exacto sea el agujero oblongo tanto más potente será la fuerza de lavado del chorro. Se podrá observar también la asequible grande dimensión del diámetro de las gotas en la pared del depósito. Este es obviamente más grande desde los agujeros oblongos con más de ancho, que otros que resulten de orificios más estrechos, aportando al final un impacto más fuerte. En este caso, las gotas cuando entran en contacto con la pared del depósito tienen una forma aproximadamente redonda, para decirlo de modo simplificado. El ángulo de incidencia de la gota sobre la pared del depósito (la que, a su vez, depende también de la velocidad de rotación de la cabeza del TANKO®-S) asume un papel que puede considerarse secundario. En lo que concierne a la fuerza de disolución de los residuos, solamente el tamaño de la gota y su velocidad de impacto es verdaderamente determinante. No se trata tan sólo del procurado tamaño de mayor eficiencia de la gota sino que también hay que lograr un determinado rayo de alcance. Esa combinación importante hace necesario considerar distintos aspectos estructurales en el mecanismo de accionamiento. Gracias a la moderna geometría de construcción de las cabezas difusoras (orientación de los agujeros oblongos) y a los centros de operaciones de mando CNC, existe la posibilidad de reproducción maquinada del 100% de las referidas cabezas difusoras. Los designados "métodos de agujeros hechos a mano"pertenecen al pasado. Un proceso de limpieza que haya sido objeto de optimización no tien que ser optimizado de nuevo tras haber sido remplazadas las cabezas difusoras.

Construcción higiénica y segura

Antiguas construcciones usan modelos de roscas entre la cabeza difusora y el cuerpo de base (rodamientos de bolas). Según los modelos, se pueden encontrar varios puntos débiles. Por un lado, es posible que la cabeza difusora realice un movimiento de giro, alejándose del cuerpo de base. Esto acontece muy raramente, pero el movimiento de giro de la cabeza difusora junto con las vibraciones del depósito (debido a los mecanismos mezcladores incorporados, o otros similares) va generar momentos de fuerzas de destornillamiento, actuando sobre la rosca. La aplicación de una espiga en la rosca impedirá que ocurra tal movimiento de giro. No hay que olvidar que la calidad de las espigas (material y modelo) bien como la inserción de la referida espiga son definitivamente responsables en lo concierne a los criterios de higiene de la totalidad del equipo limpiador de chorro. Por lo que hemos comentado, no se podrá considerar la aplicación de la espiga en la cabeza difusora como siendo realmente una solución apropiada.

En las nuevas construcciones, AWH prescinde completamente de la rosca.

En el modelo de la "versión de soldeo", el cliente recibirá un aparato sin rosca. La cabeza difusora se encuentra fijada al cuerpo de base y es soldada en su conjunto con la downpipe. Con este modelo, la optimización de los criterios de higiene del TANKO-S ha sido llevada al máximo posible. Para un montaje perfecto en el depósito, TANKO-S puede ser muy bien complementado por el concepto AWH-Downpipe.

S20 -360° clip on

S30 -180° hacia arriba

S40 -360° clip on

La gama de productos TANKO® S

S30 -360° clip on

S30 -360° weld on

S40 -360° weld on

S40 -180° thread

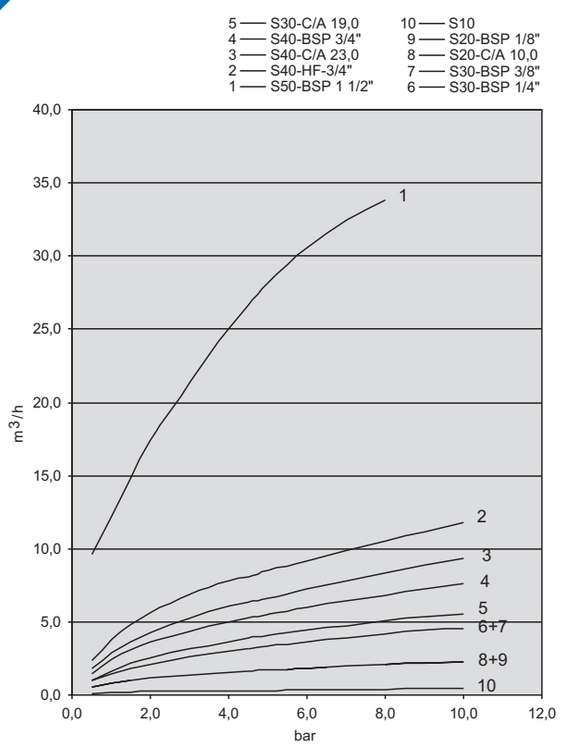
S40 -180° thread

Tablas de consumo TANKO® S- comparación según los ángulos de chorreo

Temperatura de medición: 25-30°C · medio de medición: Agua

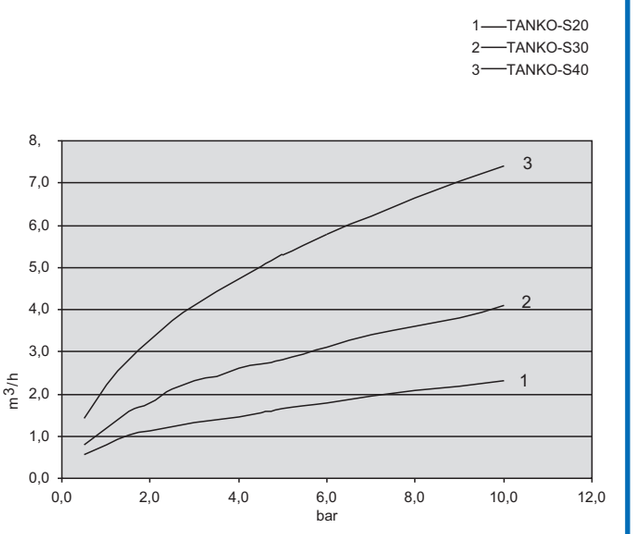
360°

TANKO®-S10 hasta S50



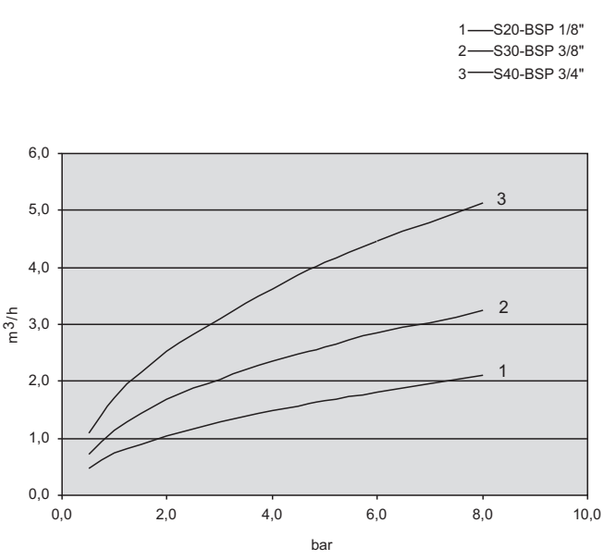
180° n.u.

TANKO®-S20 hasta S50



90°

TANKO®-S20 hasta S40



Por favor, no olvide el consumo suplementar en los **Limpiadores para bidones TANKO®-S** que indicamos a continuación:

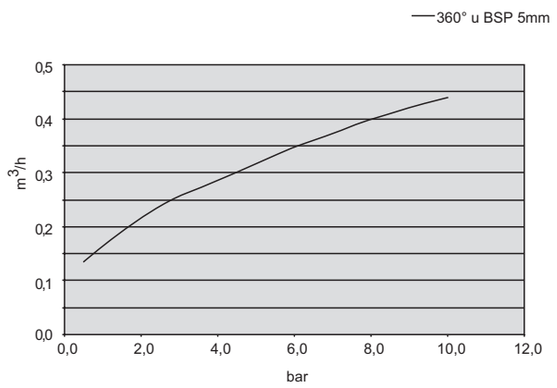
TANKO®-S-90° Limpiador para bidones
= más un 15 % que el simple TANKO®-S-90°

TANKO®-S-180° Limpiador para bidones
= más un 10 % que el simple TANKO®-S-90°

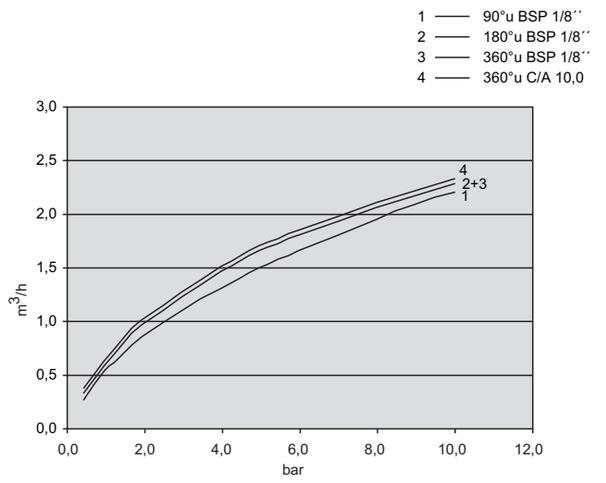
Tablas de consumo TANKO® S

Temperatura de medición: 25-30°C · medio de medición: Agua

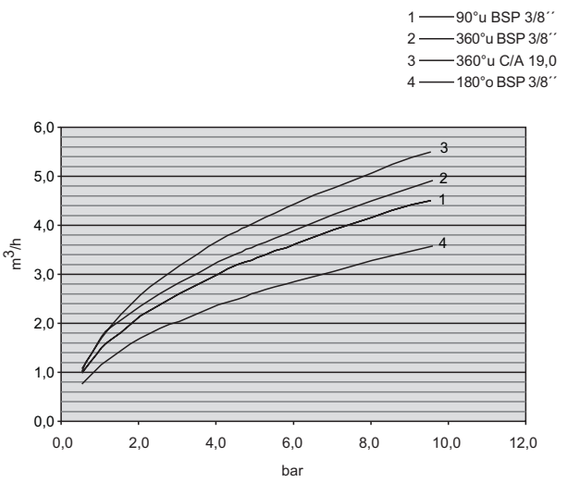
TANKO® S10



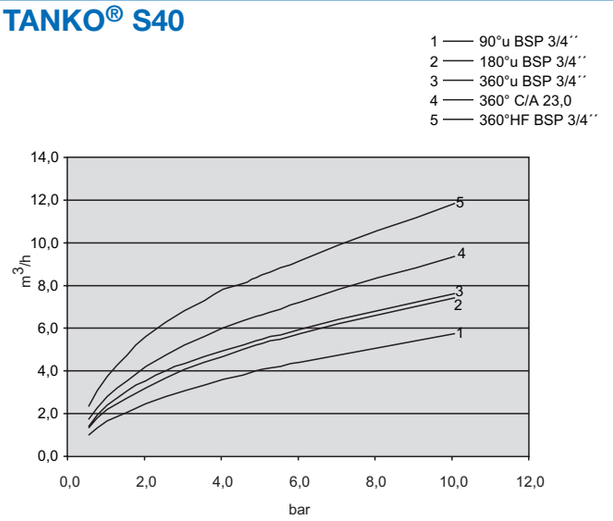
TANKO® S20



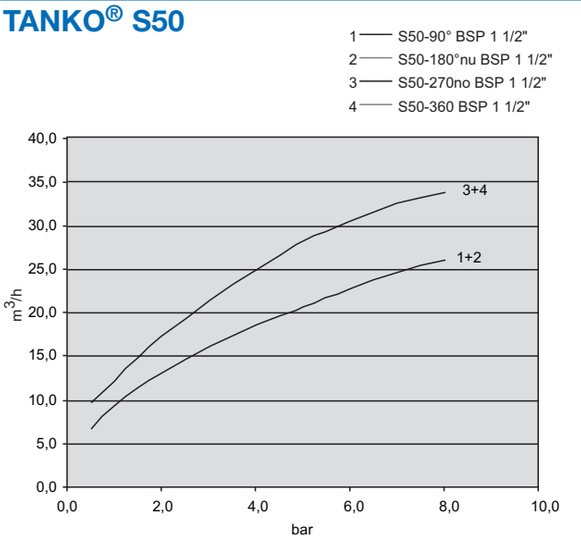
TANKO® S30



TANKO® S40

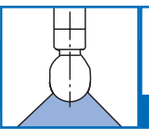


TANKO® S50



ATEX
Solicítenos más información sobre versión + detalles

TANKO® S40



S40
90°

TANKO® S40 90° hacia abajo

	1.4571		1.4435		1.4404	
DN	Precio/EUR	N° art.	Precio/EUR	N° art.	Precio/EUR	N° art.
20	245,00	6 6 5 04 42 00 3 2 5 0	273,00	6 6 5 04 42 00 3 2 3 0	195,00	6 6 5 04 42 00 3 2 2 0
25	245,00	6 6 5 04 43 00 3 2 5 0	273,00	6 6 5 04 43 00 3 2 3 0	195,00	6 6 5 04 43 00 3 2 2 0
20	245,00	6 6 5 04 78 00 3 2 5 0	273,00	6 6 5 04 78 00 3 2 3 0	195,00	6 6 5 04 78 00 3 2 2 0
25	245,00	6 6 5 04 79 00 3 2 5 0	273,00	6 6 5 04 79 00 3 2 3 0	195,00	6 6 5 04 79 00 3 2 2 0
20	245,00	6 6 5 04 91 00 3 2 5 0	273,00	6 6 5 04 91 00 3 2 3 0	195,00	6 6 5 04 91 00 3 2 2 0
20	245,00	6 6 5 04 A3 00 3 2 5 0	273,00	6 6 5 04 A3 00 3 2 3 0	195,00	6 6 5 04 A3 00 3 2 2 0
20	245,00	6 6 5 04 B2 00 3 2 5 0	273,00	6 6 5 04 B2 00 3 2 3 0	195,00	6 6 5 04 B2 00 3 2 2 0
20	245,00	6 6 5 04 41 00 3 6 5 0	273,00	6 6 5 04 41 00 3 6 3 0	195,00	6 6 5 04 41 00 3 6 2 0
20	245,00	6 6 5 04 42 00 3 6 5 0	273,00	6 6 5 04 42 00 3 6 3 0	195,00	6 6 5 04 42 00 3 6 2 0
25	245,00	6 6 5 04 43 00 3 6 5 0	273,00	6 6 5 04 43 00 3 6 3 0	195,00	6 6 5 04 43 00 3 6 2 0
20	245,00	6 6 5 04 78 00 3 6 5 0	273,00	6 6 5 04 78 00 3 6 3 0	195,00	6 6 5 04 78 00 3 6 2 0
25	245,00	6 6 5 04 79 00 3 6 5 0	273,00	6 6 5 04 79 00 3 6 3 0	195,00	6 6 5 04 79 00 3 6 2 0
20	245,00	6 6 5 04 91 00 3 6 5 0	273,00	6 6 5 04 91 00 3 6 3 0	195,00	6 6 5 04 91 00 3 6 2 0
15	245,00	6 6 5 04 77 00 3 3 5 0	273,00	6 6 5 04 77 00 3 3 3 0	195,00	6 6 5 04 77 00 3 3 2 0
20	245,00	6 6 5 04 78 00 3 3 5 0	273,00	6 6 5 04 78 00 3 3 3 0	195,00	6 6 5 04 78 00 3 3 2 0
15	245,00	6 6 5 04 77 00 3 4 5 0	273,00	6 6 5 04 77 00 3 4 3 0	195,00	6 6 5 04 77 00 3 4 2 0
20	245,00	6 6 5 04 78 00 3 4 5 0	273,00	6 6 5 04 78 00 3 4 3 0	195,00	6 6 5 04 78 00 3 4 2 0

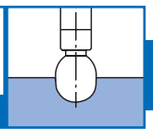
TANKO® S40 90° hacia abajo

	2.4602 (HC22)		2.4610 (HC4)	
DN	Precio/EUR	N° art.	Precio/EUR	N° art.
20	s.r.c.	6 6 5 04 48 00 3 2 8 0	s.r.c.	6 6 5 04 47 00 3 2 7 0
25	s.r.c.	6 6 5 04 43 00 3 2 8 0	s.r.c.	6 6 5 04 43 00 3 2 7 0
20	s.r.c.	6 6 5 04 78 00 3 2 8 0	s.r.c.	6 6 5 04 78 00 3 2 7 0
25	s.r.c.	6 6 5 04 79 00 3 2 8 0	s.r.c.	6 6 5 04 79 00 3 2 7 0
20	s.r.c.	6 6 5 04 91 00 3 2 8 0	s.r.c.	6 6 5 04 91 00 3 2 7 0
20	s.r.c.	6 6 5 04 A3 00 3 2 8 0	s.r.c.	6 6 5 04 A3 00 3 2 7 0
20	s.r.c.	6 6 5 04 B2 00 3 2 8 0	s.r.c.	6 6 5 04 B2 00 3 2 7 0
20	s.r.c.	6 6 5 04 41 00 3 6 8 0	s.r.c.	6 6 5 04 41 00 3 6 7 0
20	s.r.c.	6 6 5 04 48 00 3 6 8 0	s.r.c.	6 6 5 04 47 00 3 6 7 0
25	s.r.c.	6 6 5 04 43 00 3 6 8 0	s.r.c.	6 6 5 04 43 00 3 6 7 0
20	s.r.c.	6 6 5 04 78 00 3 6 8 0	s.r.c.	6 6 5 04 78 00 3 6 7 0
25	s.r.c.	6 6 5 04 79 00 3 6 8 0	s.r.c.	6 6 5 04 79 00 3 6 7 0
20	s.r.c.	6 6 5 04 91 00 3 6 8 0	s.r.c.	6 6 5 04 91 00 3 6 7 0
15	s.r.c.	6 6 5 04 77 00 3 3 8 0	s.r.c.	6 6 5 04 77 00 3 3 7 0
20	s.r.c.	6 6 5 04 78 00 3 3 8 0	s.r.c.	6 6 5 04 78 00 3 3 7 0
15	s.r.c.	6 6 5 04 77 00 3 4 8 0	s.r.c.	6 6 5 04 77 00 3 4 7 0
20	s.r.c.	6 6 5 04 78 00 3 4 8 0	s.r.c.	6 6 5 04 78 00 3 4 7 0

Indicación de material para TANKO® S como 1.4571, 1.4435 ó 1.4404 son válidos para el cuerpo de base y la cabeza difusora. A causa de su mayor duración útil, los rodamientos de bolas son confeccionados de 1.4401. EN el TANKO® S de HC 4 o HC 22 el cuerpo de base, la cabeza difusora y los rodamientos de bolas son respectivamente de HC 4 o HC 22a.

S40

180° ⬇

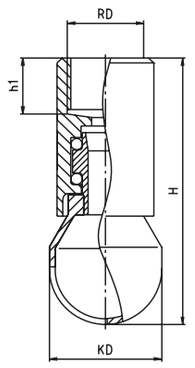


TANKO® S40

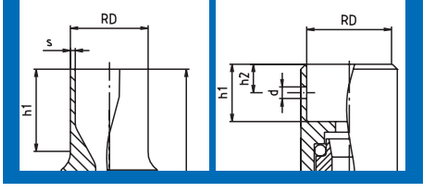
ATEX
Solicítenos más información sobre versión + detalles

TANKO® S40 180° hacia abajo

thread



weld on clip on

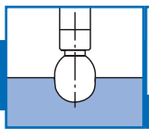


Conexión	Norma DIN 11866	DN mm	RD Ø mm	s mm	KD Ø mm	H mm	h1 mm	h2 mm	d Ø mm
Clip on	serie A (DIN)	20	23,5	---	39,0	93	19	9	4,0
Clip on	serie A (DIN)	25	29,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	20	27,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	25	34,2	---	39,0	98	19	9	4,0
Clip on	serie C (ASME)	20	26,0	---	39,0	93	19	9	4,0
Clip on	serie 1 DIN11850	20	22,6		39,0	93	19	10	4,0
Clip on	SMS - Tubo	20	25,3		39,0	93	19	10	4,0
weld on	serie A (DIN)	15	19,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	20	23,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	25	29,0	1,5	39,0	108	29	---	---
weld on	serie B (ISO)	20	26,9	1,6	39,0	108	28	---	---
weld on	serie B (ISO)	25	33,7	2,0	39,0	108	34	---	---
weld on	serie C (ASME)	20	25,4	1,65	39,0	108	28	---	---
thread	BSP	15	G 1/2"	---	39,0	93	19	---	---
thread	BSP	20	G 3/4"	---	39,0	93	19	---	---
thread	NPT	15	1/2"	---	39,0	93	19	---	---
thread	NPT	20	3/4"	---	39,0	93	19	---	---

Conexión	Norma DIN 11866	DN mm	RD Ø mm	s mm	KD Ø mm	H mm	h1 mm	h2 mm	d Ø mm
Clip on	serie A (DIN)	20	23,5	---	39,0	93	19	9	4,0
Clip on	serie A (DIN)	25	29,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	20	27,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	25	34,2	---	39,0	98	19	9	4,0
Clip on	serie C (ASME)	20	26,0	---	39,0	93	19	9	4,0
Clip on	serie 1 DIN11850	20	22,6		39,0	93	19	10	4,0
Clip on	SMS - Tubo	20	25,3		39,0	93	19	10	4,0
weld on	serie A (DIN)	15	19,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	20	23,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	25	29,0	1,5	39,0	108	29	---	---
weld on	serie B (ISO)	20	26,9	1,6	39,0	108	28	---	---
weld on	serie B (ISO)	25	33,7	2,0	39,0	108	34	---	---
weld on	serie C (ASME)	20	25,4	1,65	39,0	108	28	---	---
thread	BSP	15	G 1/2"	---	39,0	93	19	---	---
thread	BSP	20	G 3/4"	---	39,0	93	19	---	---
thread	NPT	15	1/2"	---	39,0	93	19	---	---
thread	NPT	20	3/4"	---	39,0	93	19	---	---

ATEX
Solicítenos más información sobre versión + detalles

TANKO® S40



S40
180° ⬇

TANKO® S40 180° hacia abajo

1.4571			1.4435		1.4404			
DN	Precio/EUR	N° art.	Precio/EUR	N° art.	Precio/EUR	N° art.		
20	245,00	6 6 5 04 42 00 2 2 5 0	273,00	6 6 5 04 42 00 2 2 3 0	195,00	6 6 5 04 42 00 2 2 2 0		
25	245,00	6 6 5 04 43 00 2 2 5 0	273,00	6 6 5 04 43 00 2 2 3 0	195,00	6 6 5 04 43 00 2 2 2 0		
20	245,00	6 6 5 04 78 00 2 2 5 0	273,00	6 6 5 04 78 00 2 2 3 0	195,00	6 6 5 04 78 00 2 2 2 0		
25	245,00	6 6 5 04 79 00 2 2 5 0	273,00	6 6 5 04 79 00 2 2 3 0	195,00	6 6 5 04 79 00 2 2 2 0		
20	245,00	6 6 5 04 91 00 2 2 5 0	273,00	6 6 5 04 91 00 2 2 3 0	195,00	6 6 5 04 91 00 2 2 2 0		
20	245,00	6 6 5 04 A3 00 2 2 5 0	273,00	6 6 5 04 A3 00 2 2 3 0	195,00	6 6 5 04 A3 00 2 2 2 0		
20	245,00	6 6 5 04 B2 00 2 2 5 0	273,00	6 6 5 04 B2 00 2 2 3 0	195,00	6 6 5 04 B2 00 2 2 2 0		
20	245,00	6 6 5 04 41 00 2 6 5 0	273,00	6 6 5 04 41 00 2 6 3 0	195,00	6 6 5 04 41 00 2 6 2 0		
20	245,00	6 6 5 04 42 00 2 6 5 0	273,00	6 6 5 04 42 00 2 6 3 0	195,00	6 6 5 04 42 00 2 6 2 0		
25	245,00	6 6 5 04 43 00 2 6 5 0	273,00	6 6 5 04 43 00 2 6 3 0	195,00	6 6 5 04 43 00 2 6 2 0		
20	245,00	6 6 5 04 78 00 2 6 5 0	273,00	6 6 5 04 78 00 2 6 3 0	195,00	6 6 5 04 78 00 2 6 2 0		
25	245,00	6 6 5 04 79 00 2 6 5 0	273,00	6 6 5 04 79 00 2 6 3 0	195,00	6 6 5 04 79 00 2 6 2 0		
20	245,00	6 6 5 04 91 00 2 6 5 0	273,00	6 6 5 04 91 00 2 6 3 0	195,00	6 6 5 04 91 00 2 6 2 0		
15	245,00	6 6 5 04 77 00 2 3 5 0	273,00	6 6 5 04 77 00 2 3 3 0	195,00	6 6 5 04 77 00 2 3 2 0		
20	245,00	6 6 5 04 78 00 2 3 5 0	273,00	6 6 5 04 78 00 2 3 3 0	195,00	6 6 5 04 78 00 2 3 2 0		
15	245,00	6 6 5 04 77 00 2 4 5 0	273,00	6 6 5 04 77 00 2 4 3 0	195,00	6 6 5 04 77 00 2 4 2 0		
20	245,00	6 6 5 04 78 00 2 4 5 0	273,00	6 6 5 04 78 00 2 4 3 0	195,00	6 6 5 04 78 00 2 4 2 0		

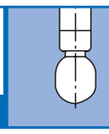
TANKO® S40 180° hacia abajo

2.4602 (HC22)			2.4610 (HC4)					
DN	Precio/EUR	N° art.	Precio/EUR	N° art.				
20	s.r.c.	6 6 5 04 48 00 2 2 8 0	s.r.c.	6 6 5 04 47 00 2 2 7 0				
25	s.r.c.	6 6 5 04 43 00 2 2 8 0	s.r.c.	6 6 5 04 43 00 2 2 7 0				
20	s.r.c.	6 6 5 04 78 00 2 2 8 0	s.r.c.	6 6 5 04 78 00 2 2 7 0				
25	s.r.c.	6 6 5 04 79 00 2 2 8 0	s.r.c.	6 6 5 04 79 00 2 2 7 0				
20	s.r.c.	6 6 5 04 91 00 2 2 8 0	s.r.c.	6 6 5 04 91 00 2 2 7 0				
20	s.r.c.	6 6 5 04 A3 00 2 2 8 0	s.r.c.	6 6 5 04 A3 00 2 2 7 0				
20	s.r.c.	6 6 5 04 B2 00 2 2 8 0	s.r.c.	6 6 5 04 B2 00 2 2 7 0				
20	s.r.c.	6 6 5 04 41 00 2 6 8 0	s.r.c.	6 6 5 04 41 00 2 6 7 0				
20	s.r.c.	6 6 5 04 48 00 2 6 8 0	s.r.c.	6 6 5 04 47 00 2 6 7 0				
25	s.r.c.	6 6 5 04 43 00 2 6 8 0	s.r.c.	6 6 5 04 43 00 2 6 7 0				
20	s.r.c.	6 6 5 04 78 00 2 6 8 0	s.r.c.	6 6 5 04 78 00 2 6 7 0				
25	s.r.c.	6 6 5 04 79 00 2 6 8 0	s.r.c.	6 6 5 04 79 00 2 6 7 0				
20	s.r.c.	6 6 5 04 91 00 2 6 8 0	s.r.c.	6 6 5 04 91 00 2 6 7 0				
15	s.r.c.	6 6 5 04 77 00 2 3 8 0	s.r.c.	6 6 5 04 77 00 2 3 7 0				
20	s.r.c.	6 6 5 04 78 00 2 3 8 0	s.r.c.	6 6 5 04 78 00 2 3 7 0				
15	s.r.c.	6 6 5 04 77 00 2 4 8 0	s.r.c.	6 6 5 04 77 00 2 4 7 0				
20	s.r.c.	6 6 5 04 78 00 2 4 8 0	s.r.c.	6 6 5 04 78 00 2 4 7 0				

Indicación de material para TANKO® S como 1.4571, 1.4435 ó 1.4404 son válidos para el cuerpo de base y la cabeza difusora. A causa de su mayor duración útil, los rodamientos de bolas son confeccionados de 1.4401. EN el TANKO® S de HC 4 o HC 22 el cuerpo de base, la cabeza difusora y los rodamientos de bolas son respectivamente de HC 4 o HC 22a.

S40

360°

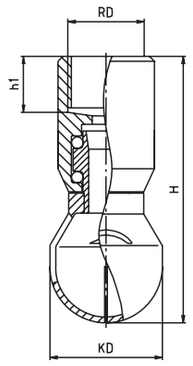


TANKO® S40

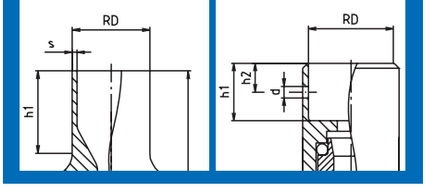
ATEX
Solicítenos más información sobre versión + detalles

TANKO® S40 360°

thread



weld on clip on

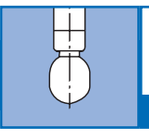


Conexión	Norma DIN 11866	DN mm	RD Ø mm	s mm	KD Ø mm	H mm	h1 mm	h2 mm	d Ø mm
Clip on	serie A (DIN)	20	23,5	---	39,0	93	19	10	4,0
Clip on	serie A (DIN)	25	29,5	---	39,0	93	19	10	4,0
Clip on	serie B (ISO)	20	27,5	---	39,0	93	19	10	4,0
Clip on	serie B (ISO)	25	34,2	---	39,0	98	19	10	4,0
Clip on	serie C (ASME)	20	26,0	---	39,0	93	19	10	4,0
Clip on	serie 1 DIN11850	20	22,6		39,0	93	19	10	4,0
Clip on	SMS - Tubo	20	25,3		39,0	93	19	10	4,0
weld on	serie A (DIN)	15	19,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	20	23,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	25	29,0	1,5	39,0	108	29	---	---
weld on	serie B (ISO)	20	26,9	1,6	39,0	108	28	---	---
weld on	serie B (ISO)	25	33,7	2,0	39,0	108	34	---	---
weld on	serie C (ASME)	20	25,4	1,65	39,0	108	28	---	---
thread	BSP	15	G 1/2"	---	39,0	93	19	---	---
thread	BSP	20	G 3/4"	---	39,0	93	19	---	---
thread	NPT	15	1/2"	---	39,0	93	19	---	---
thread	NPT	20	3/4"	---	39,0	93	19	---	---

Conexión	Norma DIN 11866	DN mm	RD Ø mm	s mm	KD Ø mm	H mm	h1 mm	h2 mm	d Ø mm
Clip on	serie A (DIN)	20	23,5	---	39,0	93	19	10	4,0
Clip on	serie A (DIN)	25	29,5	---	39,0	93	19	10	4,0
Clip on	serie B (ISO)	20	27,5	---	39,0	93	19	10	4,0
Clip on	serie B (ISO)	25	34,2	---	39,0	98	19	10	4,0
Clip on	serie C (ASME)	20	26,0	---	39,0	93	19	10	4,0
Clip on	serie 1 DIN11850	20	22,6		39,0	93	19	10	4,0
Clip on	SMS - Tubo	20	25,3		39,0	93	19	10	4,0
weld on	serie A (DIN)	15	19,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	20	23,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	25	29,0	1,5	39,0	108	29	---	---
weld on	serie B (ISO)	20	26,9	1,6	39,0	108	28	---	---
weld on	serie B (ISO)	25	33,7	2,0	39,0	108	34	---	---
weld on	serie C (ASME)	20	25,4	1,65	39,0	108	28	---	---
thread	BSP	15	G 1/2"	---	39,0	93	19	---	---
thread	BSP	20	G 3/4"	---	39,0	93	19	---	---
thread	NPT	15	1/2"	---	39,0	93	19	---	---
thread	NPT	20	3/4"	---	39,0	93	19	---	---

ATEX
Solicítenos más información sobre versión + detalles

TANKO® S40



S40
360°

TANKO® S40 360°

	1.4571		1.4435		1.4404	
DN	Precio/EUR	N° art.	Precio/EUR	N° art.	Precio/EUR	N° art.
20	245,00	6 6 5 04 42 00 1 2 5 0	273,00	6 6 5 04 42 00 1 2 3 0	195,00	6 6 5 04 42 00 1 2 2 0
25	245,00	6 6 5 04 43 00 1 2 5 0	273,00	6 6 5 04 43 00 1 2 3 0	195,00	6 6 5 04 43 00 1 2 2 0
20	245,00	6 6 5 04 78 00 1 2 5 0	273,00	6 6 5 04 78 00 1 2 3 0	195,00	6 6 5 04 78 00 1 2 2 0
25	245,00	6 6 5 04 79 00 1 2 5 0	273,00	6 6 5 04 79 00 1 2 3 0	195,00	6 6 5 04 79 00 1 2 2 0
20	245,00	6 6 5 04 91 00 1 2 5 0	273,00	6 6 5 04 91 00 1 2 3 0	195,00	6 6 5 04 91 00 1 2 2 0
20	245,00	6 6 5 04 A3 00 1 2 5 0	273,00	6 6 5 04 A3 00 1 2 3 0	195,00	6 6 5 04 A3 00 1 2 2 0
20	245,00	6 6 5 04 B2 00 1 2 5 0	273,00	6 6 5 04 B2 00 1 2 3 0	195,00	6 6 5 04 B2 00 1 2 2 0
20	245,00	6 6 5 04 41 00 1 6 5 0	273,00	6 6 5 04 41 00 1 6 3 0	195,00	6 6 5 04 41 00 1 6 2 0
20	245,00	6 6 5 04 42 00 1 6 5 0	273,00	6 6 5 04 42 00 1 6 3 0	195,00	6 6 5 04 42 00 1 6 2 0
25	245,00	6 6 5 04 43 00 1 6 5 0	273,00	6 6 5 04 43 00 1 6 3 0	195,00	6 6 5 04 43 00 1 6 2 0
20	245,00	6 6 5 04 78 00 1 6 5 0	273,00	6 6 5 04 78 00 1 6 3 0	195,00	6 6 5 04 78 00 1 6 2 0
25	245,00	6 6 5 04 79 00 1 6 5 0	273,00	6 6 5 04 79 00 1 6 3 0	195,00	6 6 5 04 79 00 1 6 2 0
20	245,00	6 6 5 04 91 00 1 6 5 0	273,00	6 6 5 04 91 00 1 6 3 0	195,00	6 6 5 04 91 00 1 6 2 0
15	245,00	6 6 5 04 77 00 1 3 5 0	273,00	6 6 5 04 77 00 1 3 3 0	195,00	6 6 5 04 77 00 1 3 2 0
20	245,00	6 6 5 04 78 00 1 3 5 0	273,00	6 6 5 04 78 00 1 3 3 0	195,00	6 6 5 04 78 00 1 3 2 0
15	245,00	6 6 5 04 77 00 1 4 5 0	273,00	6 6 5 04 77 00 1 4 3 0	195,00	6 6 5 04 77 00 1 4 2 0
20	245,00	6 6 5 04 78 00 1 4 5 0	273,00	6 6 5 04 78 00 1 4 3 0	195,00	6 6 5 04 78 00 1 4 2 0

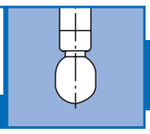
TANKO® S40 360°

	2.4602 (HC22)		2.4610 (HC4)					
DN	Precio/EUR	N° art.	Precio/EUR	N° art.				
20	s.r.c.	6 6 5 04 48 00 1 2 8 0	s.r.c.	6 6 5 04 47 00 1 2 7 0				
25	s.r.c.	6 6 5 04 43 00 1 2 8 0	s.r.c.	6 6 5 04 43 00 1 2 7 0				
20	s.r.c.	6 6 5 04 78 00 1 2 8 0	s.r.c.	6 6 5 04 78 00 1 2 7 0				
25	s.r.c.	6 6 5 04 79 00 1 2 8 0	s.r.c.	6 6 5 04 79 00 1 2 7 0				
20	s.r.c.	6 6 5 04 91 00 1 2 8 0	s.r.c.	6 6 5 04 91 00 1 2 7 0				
20	s.r.c.	6 6 5 04 A3 00 1 2 8 0	s.r.c.	6 6 5 04 A3 00 1 2 7 0				
20	s.r.c.	6 6 5 04 B2 00 1 2 8 0	s.r.c.	6 6 5 04 B2 00 1 2 7 0				
20	s.r.c.	6 6 5 04 41 00 1 6 8 0	s.r.c.	6 6 5 04 41 00 1 6 7 0				
20	s.r.c.	6 6 5 04 48 00 1 6 8 0	s.r.c.	6 6 5 04 47 00 1 6 7 0				
25	s.r.c.	6 6 5 04 43 00 1 6 8 0	s.r.c.	6 6 5 04 43 00 1 6 7 0				
20	s.r.c.	6 6 5 04 78 00 1 6 8 0	s.r.c.	6 6 5 04 78 00 1 6 7 0				
25	s.r.c.	6 6 5 04 79 00 1 6 8 0	s.r.c.	6 6 5 04 79 00 1 6 7 0				
20	s.r.c.	6 6 5 04 91 00 1 6 8 0	s.r.c.	6 6 5 04 91 00 1 6 7 0				
15	s.r.c.	6 6 5 04 77 00 1 3 8 0	s.r.c.	6 6 5 04 77 00 1 3 7 0				
20	s.r.c.	6 6 5 04 78 00 1 3 8 0	s.r.c.	6 6 5 04 78 00 1 3 7 0				
15	s.r.c.	6 6 5 04 77 00 1 4 8 0	s.r.c.	6 6 5 04 77 00 1 4 7 0				
20	s.r.c.	6 6 5 04 78 00 1 4 8 0	s.r.c.	6 6 5 04 78 00 1 4 7 0				

Indicación de material para TANKO® S como 1.4571, 1.4435 ó 1.4404 son válidos para el cuerpo de base y la cabeza difusora. A causa de su mayor duración útil, los rodamientos de bolas son confeccionados de 1.4401. EN el TANKO® S de HC 4 o HC 22 el cuerpo de base, la cabeza difusora y los rodamientos de bolas son respectivamente de HC 4 o HC 22a.

S40

360°

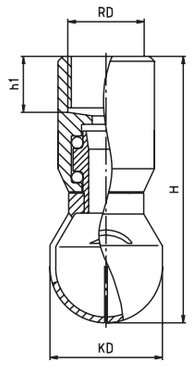


TANKO® S40 HF anchura especial del agujero oblongo

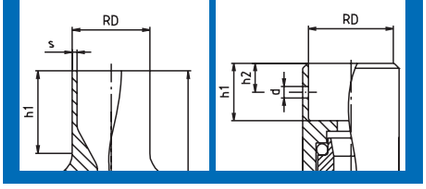
ATEX
Solicitenos más información sobre versión + detalles

TANKO® S40 360° HF anchura especial del agujero oblongo

thread



weld on clip on

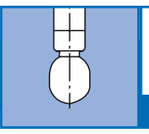


Conexión	Norma DIN 11866	DN mm	RD Ø mm	s mm	KD Ø mm	H mm	h1 mm	h2 mm	d Ø mm
Clip on	serie A (DIN)	20	23,5	---	39,0	93	19	9	4,0
Clip on	serie A (DIN)	25	29,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	20	27,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	25	34,2	---	39,0	98	19	9	4,0
Clip on	serie C (ASME)	20	26,0	---	39,0	93	19	9	4,0
Clip on	serie 1 DIN11850	20	22,6		39,0	93	19	10	4,0
Clip on	SMS - Tubo	20	25,3		39,0	93	19	10	4,0
weld on	serie A (DIN)	15	19,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	20	23,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	25	29,0	1,5	39,0	108	29	---	---
weld on	serie B (ISO)	20	26,9	1,6	39,0	108	28	---	---
weld on	serie B (ISO)	25	33,7	2,0	39,0	108	34	---	---
weld on	serie C (ASME)	20	25,4	1,65	39,0	108	28	---	---
thread	BSP	15	G 1/2"	---	39,0	93	19	---	---
thread	BSP	20	G 3/4"	---	39,0	93	19	---	---
thread	NPT	15	1/2"	---	39,0	93	19	---	---
thread	NPT	20	3/4"	---	39,0	93	19	---	---

Conexión	Norma DIN 11866	DN mm	RD Ø mm	s mm	KD Ø mm	H mm	h1 mm	h2 mm	d Ø mm
Clip on	serie A (DIN)	20	23,5	---	39,0	93	19	9	4,0
Clip on	serie A (DIN)	25	29,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	20	27,5	---	39,0	93	19	9	4,0
Clip on	serie B (ISO)	25	34,2	---	39,0	98	19	9	4,0
Clip on	serie C (ASME)	20	26,0	---	39,0	93	19	9	4,0
Clip on	serie 1 DIN11850	20	22,6		39,0	93	19	10	4,0
Clip on	SMS - Tubo	20	25,3		39,0	93	19	10	4,0
weld on	serie A (DIN)	15	19,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	20	23,0	1,5	39,0	108	27	---	---
weld on	serie A (DIN)	25	29,0	1,5	39,0	108	29	---	---
weld on	serie B (ISO)	20	26,9	1,6	39,0	108	28	---	---
weld on	serie B (ISO)	25	33,7	2,0	39,0	108	34	---	---
weld on	serie C (ASME)	20	25,4	1,65	39,0	108	28	---	---
thread	BSP	15	G 1/2"	---	39,0	93	19	---	---
thread	BSP	20	G 3/4"	---	39,0	93	19	---	---
thread	NPT	15	1/2"	---	39,0	93	19	---	---
thread	NPT	20	3/4"	---	39,0	93	19	---	---

ATEX
Solicítenos más información sobre versión + detalles

TANKO® S40 HF anchura especial del agujero oblongo



S40
360°

TANKO® S40 360° HF anchura especial del agujero oblongo

1.4571			1.4435		1.4404			
DN	Precio/EUR	N° art.	Precio/EUR	N° art.	Precio/EUR	N° art.		
20	245,00	6 6 5 14 42 00 1 2 5 0	273,00	6 6 5 14 42 00 1 2 3 0	195,00	6 6 5 14 42 00 1 2 2 0		
25	245,00	6 6 5 14 43 00 1 2 5 0	273,00	6 6 5 14 43 00 1 2 3 0	195,00	6 6 5 14 43 00 1 2 2 0		
20	245,00	6 6 5 14 78 00 1 2 5 0	273,00	6 6 5 14 78 00 1 2 3 0	195,00	6 6 5 14 78 00 1 2 2 0		
25	245,00	6 6 5 14 79 00 1 2 5 0	273,00	6 6 5 14 79 00 1 2 3 0	195,00	6 6 5 14 79 00 1 2 2 0		
20	245,00	6 6 5 14 91 00 1 2 5 0	273,00	6 6 5 14 91 00 1 2 3 0	195,00	6 6 5 14 91 00 1 2 2 0		
20	245,00	6 6 5 14 A3 00 1 2 5 0	273,00	6 6 5 14 A3 00 1 2 3 0	195,00	6 6 5 14 A3 00 1 2 2 0		
20	245,00	6 6 5 14 B2 00 1 2 5 0	273,00	6 6 5 14 B2 00 1 2 3 0	195,00	6 6 5 14 B2 00 1 2 2 0		
20	245,00	6 6 5 14 41 00 1 6 5 0	273,00	6 6 5 14 41 00 1 6 3 0	195,00	6 6 5 14 41 00 1 6 2 0		
20	245,00	6 6 5 14 42 00 1 6 5 0	273,00	6 6 5 14 42 00 1 6 3 0	195,00	6 6 5 14 42 00 1 6 2 0		
25	245,00	6 6 5 14 43 00 1 6 5 0	273,00	6 6 5 14 43 00 1 6 3 0	195,00	6 6 5 14 43 00 1 6 2 0		
20	245,00	6 6 5 14 78 00 1 6 5 0	273,00	6 6 5 14 78 00 1 6 3 0	195,00	6 6 5 14 78 00 1 6 2 0		
25	245,00	6 6 5 14 79 00 1 6 5 0	273,00	6 6 5 14 79 00 1 6 3 0	195,00	6 6 5 14 79 00 1 6 2 0		
20	245,00	6 6 5 14 91 00 1 6 5 0	273,00	6 6 5 14 91 00 1 6 3 0	195,00	6 6 5 14 91 00 1 6 2 0		
15	245,00	6 6 5 14 77 00 1 3 5 0	273,00	6 6 5 14 77 00 1 3 3 0	195,00	6 6 5 14 77 00 1 3 2 0		
20	245,00	6 6 5 14 78 00 1 3 5 0	273,00	6 6 5 14 78 00 1 3 3 0	195,00	6 6 5 14 78 00 1 3 2 0		
15	245,00	6 6 5 14 77 00 1 4 5 0	273,00	6 6 5 14 77 00 1 4 3 0	195,00	6 6 5 14 77 00 1 4 2 0		
20	245,00	6 6 5 14 78 00 1 4 5 0	273,00	6 6 5 14 78 00 1 4 3 0	195,00	6 6 5 14 78 00 1 4 2 0		

TANKO® S40 360° HF anchura especial del agujero oblongo

2.4602 (HC22)			2.4610 (HC4)					
DN	Precio/EUR	N° art.	Precio/EUR	N° art.				
20	s.r.c.	6 6 5 14 48 00 1 2 8 0	s.r.c.	6 6 5 14 47 00 1 2 7 0				
25	s.r.c.	6 6 5 14 43 00 1 2 8 0	s.r.c.	6 6 5 14 43 00 1 2 7 0				
20	s.r.c.	6 6 5 14 78 00 1 2 8 0	s.r.c.	6 6 5 14 78 00 1 2 7 0				
25	s.r.c.	6 6 5 14 79 00 1 2 8 0	s.r.c.	6 6 5 14 79 00 1 2 7 0				
20	s.r.c.	6 6 5 14 91 00 1 2 8 0	s.r.c.	6 6 5 14 91 00 1 2 7 0				
20	s.r.c.	6 6 5 14 A3 00 1 2 8 0	s.r.c.	6 6 5 14 A3 00 1 2 7 0				
20	s.r.c.	6 6 5 14 B2 00 1 2 8 0	s.r.c.	6 6 5 14 B2 00 1 2 7 0				
20	s.r.c.	6 6 5 14 41 00 1 6 8 0	s.r.c.	6 6 5 14 41 00 1 6 7 0				
20	s.r.c.	6 6 5 14 48 00 1 6 8 0	s.r.c.	6 6 5 14 47 00 1 6 7 0				
25	s.r.c.	6 6 5 14 43 00 1 6 8 0	s.r.c.	6 6 5 14 43 00 1 6 7 0				
20	s.r.c.	6 6 5 14 78 00 1 6 8 0	s.r.c.	6 6 5 14 78 00 1 6 7 0				
25	s.r.c.	6 6 5 14 79 00 1 6 8 0	s.r.c.	6 6 5 14 79 00 1 6 7 0				
20	s.r.c.	6 6 5 14 91 00 1 6 8 0	s.r.c.	6 6 5 14 91 00 1 6 7 0				
15	s.r.c.	6 6 5 14 77 00 1 3 8 0	s.r.c.	6 6 5 14 77 00 1 3 7 0				
20	s.r.c.	6 6 5 14 78 00 1 3 8 0	s.r.c.	6 6 5 14 78 00 1 3 7 0				
15	s.r.c.	6 6 5 14 77 00 1 4 8 0	s.r.c.	6 6 5 14 77 00 1 4 7 0				
20	s.r.c.	6 6 5 14 78 00 1 4 8 0	s.r.c.	6 6 5 14 78 00 1 4 7 0				

Indicación de material para TANKO® S como 1.4571, 1.4435 ó 1.4404 son válidos para el cuerpo de base y la cabeza difusora. A causa de su mayor duración útil, los rodamientos de bolas son confeccionados de 1.4401. EN el TANKO® S de HC 4 o HC 22 el cuerpo de base, la cabeza difusora y los rodamientos de bolas son respectivamente de HC 4 o HC 22a.

COGNE ACCIAI SPECIALI S.p.A.
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CAP. SOC. 80.000.000 EUR INT. VERS.
VAT: IT00571320076 C.F. 02187360967
REG. IMP. AO003 - 7234 REA 50474

ABNAHMEPRUEFZEUGNIS 3.1 (EN 10204:2004)
(A03) BESCHEINIGUNGS-NR 2007046379

(A06) BESTELLER .: COGNE EDELSTAHL GmbH
(A07) KUNDENBESTELLNR: OdA: DE01 4900006115
(A01) HERSTELLERWERK : AOSTA, VIA PARAVERA 16 - ITALIA
(A01) HERSTELLERWERK : QUALITATSTELLE
(A05) AUSSTELLER : (A08) WERKSAUFTRAGSNR .: 4001540 /10 (A04) ZEICHEN DES HERSTELLERWERKES.: **COGNE**

NORMBEZEICHNUNG : CAS-D.ADW2/ADW10 ANFORDERUNGEN : AD 2000
(B01) ERZEUGNIS : 2240 PEL WARMGEWALZT GESCHAELT-2B RUND ISOK11
(B04) LIEFERZUSTAND : RS LOESUNGSGEGLUEHT (B12) LANGE (MM): 06000 /06200
(B11) MASSE (MM): 40,000 MARKENBEZEICHNUNG : F316L 1.4404
(B02) STAHLSORTE .: WN.1.4401/4404 IMCO316L (B07) LOS-NR. : 233860
(B08) SCHMELZE-NR.: 772589 KURZZEICH. F. SCHMELZE-NR 386
(B06) KENNZEICHNUNG : IMCO 316/316L

GEMAESS NACE MR 01.75 (05)/ISO 15156/NACE MR 01.03
GEMAESS EN 10272 -2000/ DIN 17440 ADW2
CHEMISCHE ZUSAMMENSETZUNG NACH ASTM A182/A182M-05, A479/A479M-05, ASME SA479/SA479M-05
GEMAESS RICHTLINIEN PED 97/23/CE
GEMAESS SPECIFIKATION NF A35-574/90, NUANCE Z3 CND 17-11-02
QUALITAETSSCHMELZE GEMAESS EN10088-3 (05)
GEMAESS EN10272/00
GEMAESS EN 10222/5 2000

(C71) CHEMISCHE ZUSAMMENSETZUNG - SCHMELZE ANALYSE NACH ASTME1019-E1086-E415

Ref.	020000265592	84.000,000									
ELEMENTE		C	Si	Mn	P	S	N	Cr	Mo	Ni	Cu
ERREICHT		0,023	0,340	1,880	0,029	0,026	0,083	16,660	2,010	10,090	0,320
ELEMENTE		Co									
ERREICHT		0,090									

HARTEPRUFUNG IM LIEFERZUSTAND

Ref.	020000268016	24.360,000		
VORSCHRIFT		ENISO6506	HARTEPRUFUNG	HB
ERREICHT	184,0			

KERBSCHAGZAEHIGKEIT IM LIEFERZUSTAND

Ref.	020000268016	24.360,000					(C02) PROBENRICHTUNG: L				
VORSCHRIFT		EN 10045									
(C40) PROBENFORM		KV									
(C03) PRUFTEMPERATUR °C		20,0000									
MASSEINHEIT		J									
ERREICHT	291,00	297,00	300,00	292,00	295,00	289,00	300,00	293,00	300,00	300,00	
	294,00	290,00									

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CAP. SOC. 80.000.000 EUR INT. VERS.
VAT: IT00571320076 C.F. 02187360967
REG. IMP. AO003 - 7234 REA 50474

ZUGVERSUCH IM LIEFERZUSTAND
Ref. 020000268016 24.360,000
VORSCHRIFT EN 10002 (C02) PROBENRICHTUNG: L

	RM MPA	RP02 MPA	A % 5.0 D	Z %	RP1 MPA
MASSEINHEIT					
ERREICHT	615,00	339,00	51,00	75,00	382,00
	611,00	340,00	51,00	74,00	376,00
	623,00	338,00	53,00	74,00	380,00
	609,00	342,00	50,00	73,00	385,00

GEMAESS SS 14 23 48
ERSCHMELZUNG IM ELEKTROOFEN + AOD + STRANGGUS
KORROSIONSVERSUCK:
(ASTM A262/02a PRACT. E / EN ISO 3651-2 (00)): GEMAESS
100% VERWECHSLUNGSPRUEFUNG DURCHGEFUEHRT
OBERFLAECHEN UND MASSKONTROLLE: OHNE BEANSTANDUNG.
DAS MATERIAL WURDE NICHT DURCH QUECKSILBER VERUNREINIGT
ES IST KEINE BESSERUNG DES MATERIALS DURCH DEN SCHWEISSFORGANG ERFOLGT.
100%IGE US-PRUEFUNG: BESTANDEN
MATERIAL LOESUNGSGEGLUET 1050^C/AUFRECHTERHALTUNG 1 MIN /1 MM. WASSER
DAS MATERIAL ENTSPRICHT DEN TECNISCHEN ABNAHMMEBEDINGUNGEN
KENNZEICHNUNG: HERSTELLERZEICHEN, WERKSTOFF-NR, SCHELZEN-NR, PROBE/LOS-NR,STEMPEL DES WERKSSACHVERSTAENDIGEN.
(Z02) ZEICHEN DES SACHVERSTAENDINGEN LF
Ausgesstellt im einvernehmen mit dem TUV Bayern (11.1972)
Gemaess Richtlinien:
2000/53/EC - 2002/95/EC - 2003/11/EC - 2005/618/EC
Auf eine gegenzeichnung durch die uberwachungs-organisation (schreiben
TUV-Bayern vom 17.01.80) kann verzichtet werden
CIRCOGRAPH GEPRUEFT NACH EN 10277-1 KLASSE 2.
MATERIAL HERGESTELLT GEMAESS EINEM SYSTEM DAS DIE QUALITAET NACH UNI
EN ISO 9001:2000 - ISO/TS 16949:2002 GARANTIERT (DIE LETZTGENANNTE
NORM GILT NUR FUER GEWALZT-GESCHAELT-GESCHLIFFEN STABSTAHL UND FUER
TOMISIERTE METALLISCHE PULVER) MIT IGQ BESCHEINIGUNG.

NEUMO-EGMO SPAIN, S...

(Z01) DATUM 27.08.2007

POLLASTRELLI ANDREA FC (WERKSSACHVERSTAENDIGE) - ATTEST ELEKTRONISCH ERSTELLT

COGNE ACCIAI SPECIALI S.p.a.
"Socio Unico"
11100 AOSTA - VIA PARAVERA, 16
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CAP. SOC. 80.000.000 EUR INT. VERS.
VAT: IT00571320076 C.F. 02187360967
REG. IMP. AO003 - 7234 REA 50474

ABNAHMEPRUEFZEUGNIS 3.1 (EN 10204:2004)
(A03) BESCHEINIGUNGS-NR 2007010998

(A06) BESTELLER .: COGNE EDELSTAHL GmbH
(A07) KUNDENBESTELLNR: OdA: DE01 4900002385
(A01) HERSTELLERWERK : COGNE ACCIAI SPECIALI - AOSTA, VIA PARAVERA 16
(A01) HERSTELLERWERK :
(A05) AUSSTELLER : QUALITATSTELLE
(A08) WERKSAUFTRAGSNR .: 4000551 /10 (A04) ZEICHEN DES HERSTELLERWERKES.: **COGNE**

NORMBEZEICHNUNG :	CAS-D.ADW2/ADW10	ANFORDERUNGEN :	AD 2000
(B01) ERZEUGNIS :	2240 PEL WARMGEWALZT GESCHAELT-2B RUND ISOK11		
(B04) LIEFERZUSTAND :	RS ABGESCHRECKT		
(B11) MASSE (MM):	40,000	(B12) LANGE (MM):	06000 /06200
(B02) STAHLSORTE .:	WN.1.4401/4404 IMCO316L	MARKENBEZEICHNUNG :	F316L 1.4404
(B08) SCHMELZE-NR.:	772058	(B07) LOS-NR. :	040990
(B06) KENNZEICHNUNG :	IMCO 316/316L	KURZZEICH. F. SCHMELZE-NR	099

GEMAESS NACE MR 01.75 (05)/ISO 15156
GEMAESS EN 10272 -2000/ DIN 17440 ADW2
CHEMISCHE ZUSAMMENSETZUNG NACH ASTM A182/A182M-05, A479/A479M-05, ASME SA479/SA479M-05
GEMAESS RICHTLINIEN PED 97/23/CE
GEMAESS SPECIFIKATION NF A35-574/90, NUANCE Z3 CND 17-11-02
QUALITAETSSCHMELZE GEMAESS EN10088-3 (05)
GEMAESS EN10272/00
GEMAESS EN 10222/5 2000

(C71) CHEMISCHE ZUSAMMENSETZUNG - SCHMELZE ANALYSE NACH ASTME1019-E1086-E415

Ref.	020000253841	95.000,000								
ELEMENTE	C	Si	Mn	P	S	N	Cr	Mo	Ni	Cu
ERREICHT	0,019	0,360	1,900	0,032	0,030	0,079	16,630	2,020	10,000	0,360
ELEMENTE	Co									
ERREICHT	0,130									

HARTEPRUFUNG IM LIEFERZUSTAND

Ref.	020000254683	17.685,000		
VORSCHRIFT		ENISO6506	HARTEPRUFUNG	HB
ERREICHT	182,0			

KERBSCHAGZAEHIGKEIT IM LIEFERZUSTAND

Ref.	020000254683	17.685,000								
VORSCHRIFT		EN 10045				(C02) PROBENRICHTUNG: L				
(C40) PROBENFORM		KV								
(C03) PRUFTEMPERATUR °C		20,0000								
MASSEINHEIT		J								
ERREICHT	274,00	277,00	277,00	279,00	282,00	284,00	282,00	278,00	272,00	276,00
	273,00	271,00								

0533338

NEUMO-EGMO SPAIN, S.L.

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CAP. SOC. 80.000.000 EUR INT. VERS.
VAT: IT00571320076 C.F. 02187360967
REG. IMP. AO003 - 7234 REA 50474

ZUGVERSUCH IM LIEFERZUSTAND
Ref. 020000254683 17.685,000
VORSCHRIFT EN 10002 (C02) PROBENRICHTUNG: L

MASSEINHEIT	RM MPA	RP02 MPA	A % 5.0 D	Z %	RP1 MPA
ERREICHT	611,00	331,00	51,00	75,00	382,00
	624,00	331,00	49,40	74,00	382,00
	598,00	318,00	52,80	75,00	369,00
	618,00	325,00	49,20	74,00	376,00

GEMAESS SS 14 23 48
ERSCHMELZUNG IM ELEKTROOFEN + AOD + STRANGGUS
KORROSIONSVERSUCK:
(ASTM A262/02a PRACT. E / EN ISO 3651-2 (00)): GEMAESS
100% VERWECHSLUNGSPRUEFUNG DURCHGEFUEHRT
OBERFLAECHEN UND MASSKONTROLLE: OHNE BEANSTANDUNG.
DAS MATERIAL WURDE NICHT DURCH QUECKSILBER VERUNREINIGT
ES IST KEINE BESSERUNG DES MATERIALS DURCH DEN SCHWEISSFORGANG ERFOLGT.
100%IGE US-PRUEFUNG: BESTANDEN
MATERIAL LOESUNGSGEGLUET 1050^C/1 MM/1MIN. WASSER
DAS MATERIAL ENTSPRICHT DEN TECNISCHEN ABNAHMMEBEDINGUNGEN
KENNZEICHNUNG: HERSTELLERZEICHEN, WERKSTOFF-NR, SCHELZEN-NR, PROBE/LOS-NR,STEMPEL DES WERKSSACHVERSTAENDIGEN.
(Z02) ZEICHEN DES SACHVERSTAENDINGEN LF
Ausgesstellt im einvernehmen mit dem TUV Bayern (11.1972)
Gemaess Richtlinien:
2000/53/EC - 2002/95/EC - 2003/11/EC - 2005/618/EC
Auf eine gegenzeichnung durch die uberwachungs-organisation (schreiben
TUV-Bayern vom 17.01.80) kann verzichtet werden
CIRCOGRAPH GEPRUEFT NACH EN 10277-1 KLASSE 2.
MATERIAL HERGESTELLT GEMAESS EINEM SYSTEM DAS DIE QUALITAET NACH UNI
EN ISO 9001:2000 - ISO/TS 16949:2002 GARANTIERT (DIE LETZTGENANNTE
NORM GILT NUR FUER GEWALZT-GESCHAELT-GESCHLIFFEN STABSTAHL UND FUER
TOMISIERTE METALLISCHE PULVER) MIT IGQ BESCHEINIGUNG.

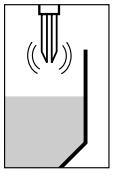
NEUMO-EGMO SPAIN, S.L.

(Z01) DATUM 27.02.2007 POLLASTRELLI ANDREA FC (WERKSSACHVERSTAENDIGE) - ATTEST ELEKTRONISCH ERSTELLT

NIVEL

DE Betriebsanleitung
EN Operating instructions
FR Manuel de mise en service
ES Instrucción de servicio

VEGASWING S 52



Instrucción de servicio

Índice

32948-01-080917

Instrucción de servicio

1 Para su seguridad

1.1 Personal autorizado

Todas las manipulaciones descritas en esta instrucción de servicio pueden ser realizadas solamente por especialistas capacitados, autorizados por el operador del equipo.

Durante los trabajos en y con el equipo siempre es necesario el uso del equipo de protección necesario.

1.2 Empleo acorde con las prescripciones

El VEGASWING S 52 es un sensor para la detección de nivel.

Informaciones detalladas sobre el campo de aplicación del VEGASWING S 52 se encuentran en el capítulo "*Descripción del producto*".

1.3 Advertencia contra uso erróneo

En caso de empleo inadecuado o contrario a las prescripciones pueden aparecer riesgos de aplicación específicos de este equipo, como por ejemplo, un sobrellenado de depósito o daños en las partes del equipo a causa de montaje o ajuste erróneo.

1.4 Instrucciones generales de seguridad

El equipo corresponde con el estado tecnológico, considerando las prescripciones y recomendaciones normales. El usuario tiene que respetar las instrucciones de seguridad de esta instrucción de servicio, las normas de instalación específicas del país y las normas validas de seguridad y de prevención de accidentes.

El equipo solamente puede emplearse en estado técnico perfecto y con seguridad funcional. El operador es responsable por el funcionamiento sin interrupciones del equipo.

Además, el operador está en la obligación de determinar durante el tiempo completo de empleo la conformidad de las medidas de seguridad del trabajo necesarias con el estado actual de las regulaciones validas en cada caso y las nuevas prescripciones.

1.5 Conformidad CE

Se cumplen los objetivos de protección de la norma CEM 2004/108/CE (EMC) y de la norma de bajo voltaje 2006/95/CE (LVD).

La conformidad ha sido valorada según las normas:

EMC: EN 61326-1: 2006
(Medios de producción eléctricos para técnica de control y uso de laboratorio – requisitos CEM)

- Emisión: Clase B
- Inmisión: Zonas industriales

LVD: EN 61010-1: 2001
(Determinaciones de seguridad para equipos eléctricos de medición, control, regulación y de laboratorio 1ª parte: Requisitos generales)

2 Descripción del producto

2.1 Construcción

Alcance de suministros
El alcance de suministros se compone de:

- Sensor de nivel VEGASWING S 52
- Imán de verificación
- Documentación
  - Esta instrucción de servicio
  - Certificación de la ley alemana sobre el régimen de aguas

2.2 Modo de trabajo

Campo de empleo
El VEGASWING S 52 es un sensor de nivel con horquilla vibratoria para la detección de nivel.

Está concebido para el empleo en líquidos en los campos de alimentos y farmacéutico

32948-01-080917

Control de funcionamiento
La pieza electrónica recambiable VEGASWING S 52 controla continuamente mediante el análisis de frecuencia los criterios siguientes:

- Corrosión o deterioro fuerte de la horquilla vibratoria
- Falta de vibraciones
- Rotura de la línea hacia el piezoaccionamiento

Si se detecta una interrupción de funcionamiento o falla de suministro de tensión, entonces el sistema electrónico asume un estado de conexión definido, equivalente al bloqueo del transistor de salida o el interruptor sin contacto está abierto (Estado seguro).

Principio de funcionamiento
La horquilla vibratoria es accionada de forma piezoeléctrica y oscila a su frecuencia mecánica de resonancia de aproximadamente 1200 Hz. Los elementos piezoeléctricos se encuentra fijados mecánicamente y por eso no están sometidos a ninguna limitación por choque de temperatura. Si la horquilla vibratoria se cubre de producto almacenado, cambia la frecuencia. Este cambio es captado por la pieza electrónica integrada y convertida en una instrucción.

2.3 Almacenaje y transporte

Embalaje
Su equipo está protegido por un embalaje durante el transporte hasta el lugar de empleo. Aquí las solicitaciones normales a causa del transporte se encuentran aseguradas mediante un control según la norma DIN EN 24180.

El envase es de cartón, compatible con el medio ambiente y reciclable. Elimine los desperdicios de material de embalaje producido a través de empresas especializadas en reciclaje.

3 Montaje

3.1 Instrucciones generales

Punto de conmutación
Básicamente el VEGASWING S 52 se puede montar en cualquier posición. Solamente hay que montar el equipo de forma tal que la horquilla vibratoria se encuentre a la altura del punto de conexión deseado.

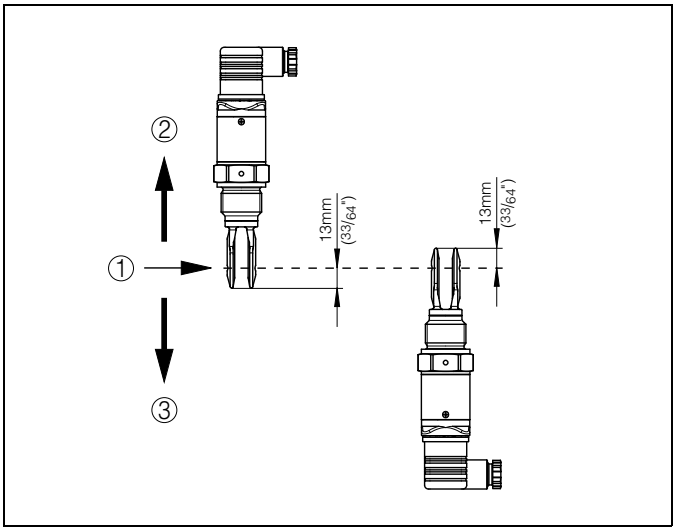


Fig. 31: Montaje vertical
1 Punto de conexión aprox. 13 mm en agua
2 Punto de conexión en caso de densidad reducida
3 Punto de conexión en caso de densidad elevada

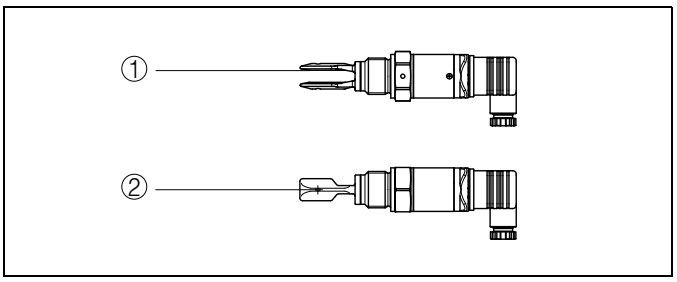


Fig. 32: Montaje horizontal
1 Punto de conmutación
2 Punto de conexión (Posición de montaje recomendada sobre todo para productos almacenados adhesivos)

Humedad

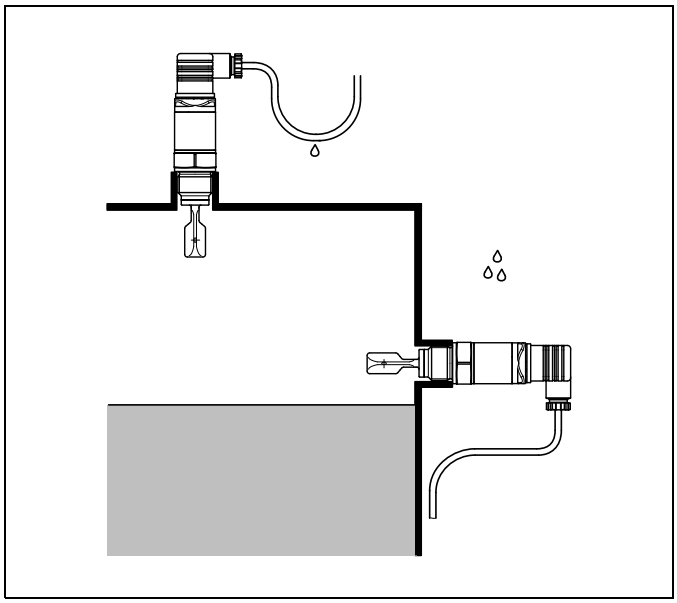


Fig. 33: Medidas contra la entrada de humedad

Manipulación
No fijar el VEGASWING S 52 a la horquilla vibratoria. Una deformación del elemento vibratorio conduce a la destrucción del instrumento.

3.2 Instrucciones de montaje

Racor soldado
El VEGASWING S 52 tiene una salida de rosca definida. Ello significa, que cada VEGASWING S 52 se encuentra siempre en la misma posición después del atornillado. Por eso, quitar la junta suministrada de la rosca del VEGASWING S 52. Dicha junta plana no hace falta durante el empleo del racor soldado con junta rasante.

El racor soldado ya se encuentra provisto con una muesca de marca. Soldar los racores soldados con las marcas hacia arriba o hacia abajo en caso de montaje horizontal y en sentido de la corriente en las tuberías.

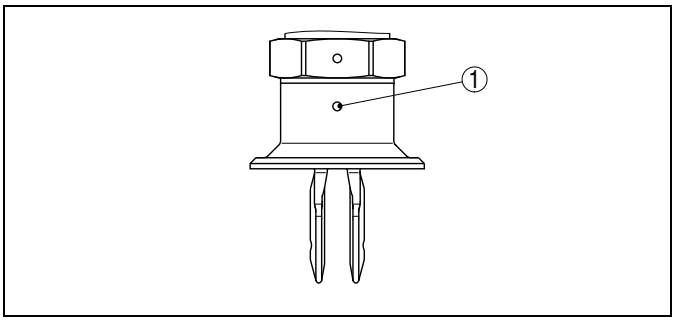


Fig. 34: Marcas en los racores soldados
1 Marca

Productos almacenados adhesivos
En caso de montaje horizontal en líquidos adhesivos y viscosos las superficies de la horquilla vibratoria deben estar lo más perpendiculares posibles. La posición de la horquilla vibratoria se encuentra señalada por una marca en el hexágono del VEGASWING S 52. Con ello puede controlarse la posición de la horquilla vibratoria durante el atornillado.

En caso de productos adhesivos y viscosos la horquilla vibratoria debe sobresalir lo más libre posible del deposito para evitar incrustaciones.

Corrientes
Para que la horquilla vibratoria del VEGASWING S 52 ofrezca la menor resistencia posible durante los movimientos del producto almacenado, las superficies de la horquilla vibratoria tienen que estar paralelas al movimiento del producto almacenado.

4 Conectar a la alimentación de tensión

4.1 Preparación de la conexión

Prestar atención a las indicaciones de seguridad
Prestar atención fundamentalmente a las instrucciones de seguridad siguientes:

- Conectar solamente en estado libre de tensión

4.2 Esquema de conexión

Interruptor sin contactos
Para el control directo de relés, protecciones, válvulas magnéticas, luces de señalización y de aviso, bocinas, etc., no se puede operar el equipo sin una carga interconectada (conexión en serie), ya que la pieza electrónica recambiable se destruye si se conecta directamente a la red. Inadecuada para la conexión a las entradas de bajo voltaje del PLC. La corriente independiente se reduce momentáneamente por debajo de 1 mA después de la desconexión de la carga, de forma tal que los protectores, cuya corriente de retención es menor que la corriente independiente circulante del sistema electrónico (3 mA), puedan ser desconectados con seguridad a pesar de ello.

Para la variante de enchufe enchufe de válvula DIN 43650 se puede utilizar un cable comercial de sección redonda. Diámetro del cable 4,5 … 7 mm, tipo de protección IP 65.

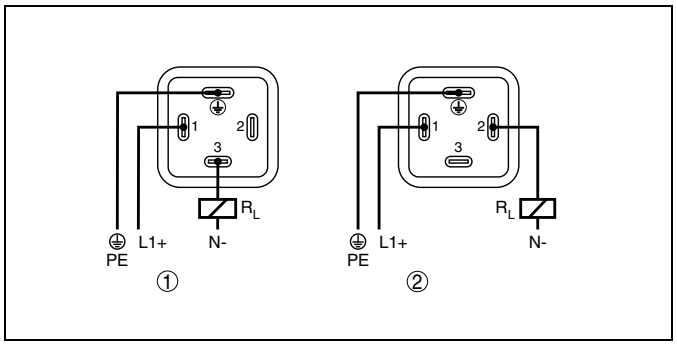


Fig. 35: Esquemas de conexión, interruptor sin contacto del enchufe de válvula DIN 43650
1 Detección de nivel máximo
2 Detección de nivel mínimo
P_E Tierra de protección
R_L Resistencia de carga (Protección, relé, etc.)

Salida del transistor
Para la conexión a las entradas binarias de un PLC con una resistencia de entrada < 100 kΩ.

Si la entrada del SPS es de alta resistencia, hay que conectar una resistencia de carga (R_L) con 100 kΩ paralela a la entrada del SPS según las ilustraciones siguientes.

Para la variante de enchufe enchufe de válvula DIN 43650 se puede utilizar un cable comercial de sección redonda. Diámetro del cable 4,5 … 7 mm, tipo de protección IP 65.

El enchufe M12 x 1 requiere de un cable con enchufe confeccionado completamente.

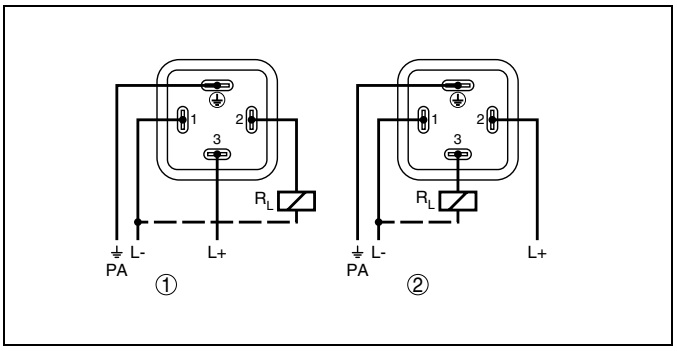


Fig. 36: Esquema de conexión, salida de transistor para enchufe de válvula DIN 43650
1 Detección de nivel máximo
2 Detección de nivel mínimo
P_A Conexión equipotencial
R_L Resistencia de carga (Protección, Relé etc. o resistencia externa 100 kΩ)

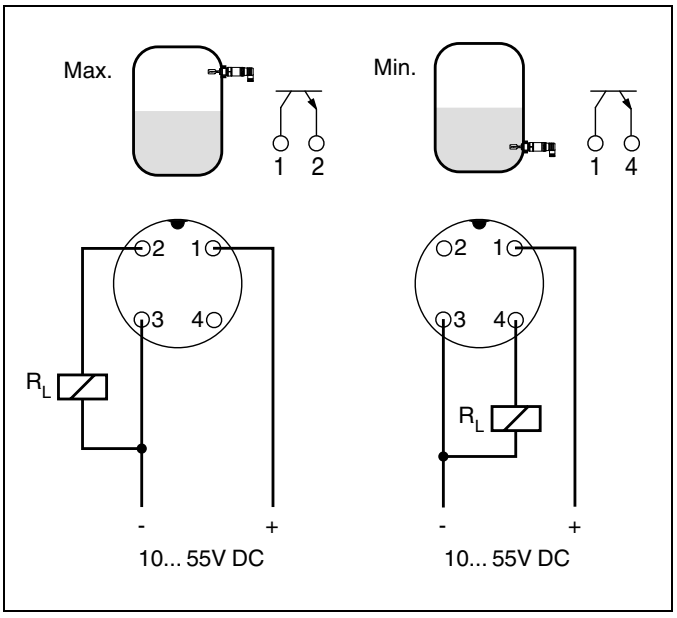


Fig. 37: Esquema de conexión (carcasa), salida de transistores de la conexión de enchufe M12 x 1
1 Pardo
2 Blanco
3 azul
4 negro
R_L Resistencia de carga (Protección, Relé etc. o resistencia externa 100 kΩ)

5 Puesta en servicio

5.1 Indicación estado de conexión

El estado de conexión de la electrónica puede controlarse con la lámpara de control integrada en la parte superior de la carcasa.

5.2 Prueba de funcionamiento

El sensor VEGASWING S 52 tiene un conmutador de prueba integrado que puede activarse magnéticamente. Proceder de la forma siguiente para la comprobación del equipo:

→ Sostener el imán de verificación (accesorio) frente al símbolo del imán situado en la caja de alojamiento del equipo.

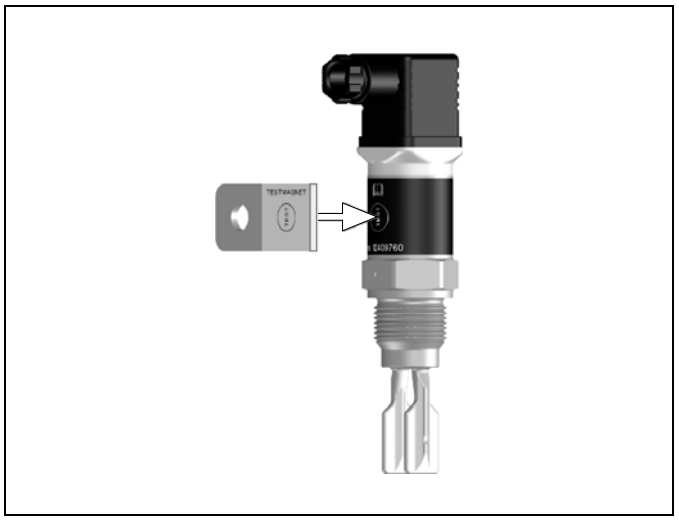


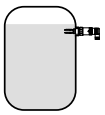
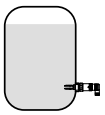
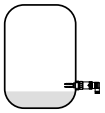
Fig. 38: Prueba de funcionamiento

El imán de verificación modifica el estado de conexión actual del equipo. Las variaciones se pueden controlar en el LED. Tener en cuenta que los aparatos conectados a continuación se activan durante la comprobación de funcionamiento.

Cuidado:
Después del control, quitar el imán prueba del equipo obligatoriamente.

5.3 Tabla de funciones

La tabla siguiente ofrece un resumen acerca de los estados de conexión en dependencia del modo de operación ajustado y el nivel.

	Nivel	**Estado de conexión**	**Lámparas de control**
Modo de operación máx.		Transistor conduce 0 Interruptor cerrado	verde
Modo de operación máx.		Transistor bloquea 0 Interruptor abierto	rojo
Modo de operación min.		Transistor conduce 0 Interruptor cerrado	verde
Modo de operación min.		Transistor bloquea 0 Interruptor abierto	rojo
Interrupción	a voluntad	Transistor bloquea 0 Interruptor abierto	rojo intermitente

6 Conservar

6.1 Mantenimiento

En caso de empleo acorde con las prescripciones no se requiere mantenimiento alguno durante el régimen normal de funcionamiento.

6.2 Línea directa de servicio de 24 horas

Si estas medidas no conducen a ningún resultado, llamar la línea directa de servicio VEGA en casos urgentes al Tel. **+49 1805 858550**.

La línea directa esta disponible durante las 24 horas incluso fuera de los horarios normales de trabajo 7 días a la semana. El soporte se realiza en idioma inglés porque el servicio se ofrece a escala mundial. El servicio es gratuito, solamente se carga la tarifa telefónica local.

6.3 Reparación del equipo

Proceder de la forma siguiente si es necesaria una reparación:

En Internet puede descargarse de nuestra página principal www.vega.com en: "*Descargas - Formularios y Certificados - Formulario de reparación*" " un formulario de retorno (23 KB).

De esta forma nos ayudan a realizar la reparación de forma rápida y sin necesidad de aclaraciones.

- Llenar y enviar un formulario para cada equipo
- Limpiar el equipo, empacándolo a prueba de rotura
- Colocar el formulario lleno y una hoja de datos de seguridad eventualmente en la parte externa del equipo
- Favor de solicitar la dirección para la devolución a su representación correspondiente. Usted encontrará su representación correspondiente en nuestra página principal www.vega.com en: "*Empresas - VEGA internacional*"

7 Desmontaje

7.1 Secuencia de desmontaje

Advertencia:
Antes del desmontaje, prestar atención a condiciones de proceso peligrosas tales como p. Ej., presión en el depósito, altas temperaturas, productos agresivos o tóxicos, etc.

Atender los capítulos "*Montaje*" y "*Conexión a la alimentación de tensión*" siguiendo los pasos descritos allí análogamente en secuencia inversa.

7.2 Eliminación

El equipo se compone de materiales recuperables por establecimiento especializados de reciclaje. Para ello, hemos diseñado la electrónica de fácil desconexión, empleando materiales recuperables.

Directiva WEEE 2002/96/CE
El presente módulo de visualización y configuración no responde a la directiva WEEE 2002/96/CE y las leyes nacionales correspondientes. Llevar el equipo directamente a una empresa especializada de reciclaje, sin emplear para esto los puntos comunales de recogida. Los mismos pueden emplearse solamente para productos de uso privado según la directiva WEEE.

Una eliminación especializada evita consecuencias negativas sobre el hombre y el medio ambiente, posibilitando la recuperación de materias primas valiosas.

Materiales: ver "*Datos técnicos*"

Si no tiene posibilidades de eliminar el equipo viejo de forma especializada, consulte con nosotros acerca de las posibilidades de eliminación o devolución.

32948-01-080917

8 Anexo

8.1 Datos técnicos

Datos generales

Material 316L equivalente con 1.4404 o 1.4435

Materiales, en contacto con el medio

– Horquilla vibratoria	316L
– Ra	< 0,8 µm
– Conexiones a proceso	316L

Materiales, sin contacto con el medio

– Carcasa	316L y plástico PEI
Peso	apróx. 250 g

Exactitud de medición

Histéresis	apróx. 2 mm en caso de montaje vertical
Retardo de conexión	conexión: apróx. 0,5 s/ desconexión: apróx. 1 s
Frecuencia de medición	apróx. 1200 Hz

Condiciones ambientales

Temperatura ambiente	-40 … +70 °C
Temperatura de almacenaje y transporte	-40 … +80 °C

Condiciones de proceso

Presión de proceso	-1 … 64 bar
Temperatura de proceso	-40 … +150 °C
Viscosidad - dinámica	0,1 … 10000 mPa s
Densidad	0,7 … 2,5 g/cm^3

Indicación

Lámparas de control (LED)

– verde	Transistor conduce o interruptor cerrado
– rojo	Transistor bloquea o interruptor abierto
– rojo (intermitente)	Interrupción, transistor bloquea o interruptor abierto

Magnitud de salida

Salida del transistor

Corriente bajo carga	max. 250 mA
Caída de tensión	máx. 3 V
Tensión de activación	max. 55 V DC
Corriente en estado de no conducción	< 10 µA

Interruptor sin contactos

Corriente bajo carga	mín. 10 mA/máx. 250 mA
Necesidad independiente de corriente	apróx. 4,2 mA
Modo de funcionamiento	
– Mín./Máx.	Conmutación por conexión electrónica
– Máx.	Protección contra sobrellenado
– Mín.	Protección contra marcha en seco

Alimentación de tensión

Salida del transistor

Tensión de alimentación	10 … 55 V DC
Consumo de potencia	máx. 0,5 W

Interruptor sin contactos

Tensión de alimentación	20 … 253 V AC/DC
Consumo de potencia	máx. 0,5 W

Datos electromecánicos

Enchufe de válvula DIN 43650

– Sección de conductor	1,5 mm^2
– Diámetro exterior del cable	4,5 … 7 mm

Medidas de protección eléctrica

Tipo de protección

– Enchufe de válvula DIN 43650	IP 65
– Conexión de enchufe M12 x 1	IP 66/IP 67

Categoría de sobretensión	III
Tipo de protección - Salida de transistor	II
Clase de protección - interruptor sin contacto	I

Homologaciones

Seguro contra sobrecarga según la ley del régimen hidráulico (WHG)

8.2 Medidas

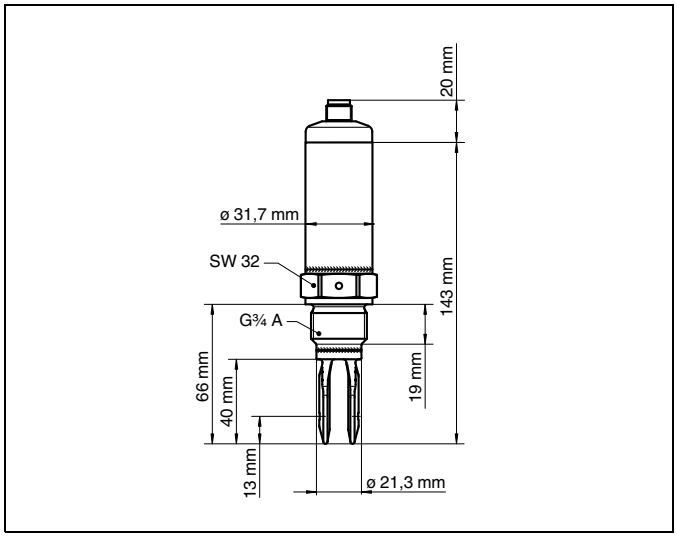


Fig. 39: VEGASWING S 52 - versión de alta temperatura con conexión de enchufe M12 x 1

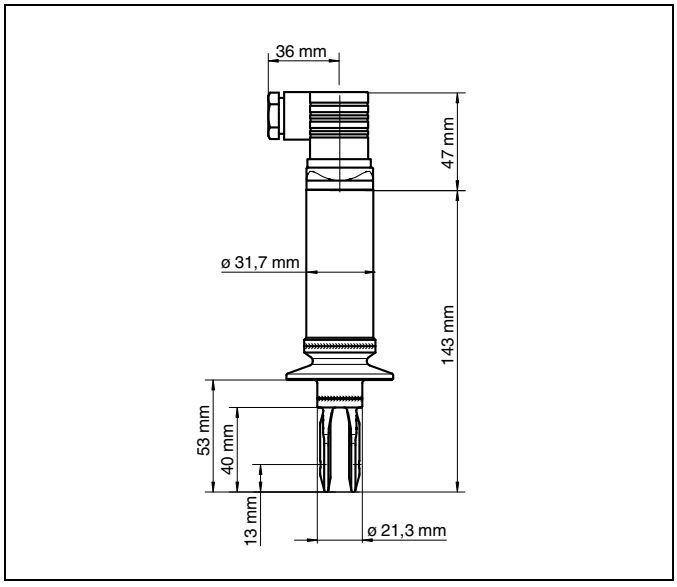


Fig. 40: VEGASWING S 52 - versión de alta temperatura con enchufe de válvula DIN 43650

8.3 Derechos de protección industrial

VEGA product lines are global protected by industrial property rights. Further information see http://www.vega.com.
Only in U.S.A.: Further information see patent label at the sensor housing.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.
Nähere Informationen unter http://www.vega.com.

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VEGA系列产品在全球享有知识产权保护。
进一步信息请参见网站<http://www.vega.com>。

8.4 Marca registrada

Todas las marcas y nombres comerciales o empresariales empleados pertenecen al propietario/autor legal.

32585-DE-070928

DEUTSCHES INSTITUT FÜR BAUTECHNIK

Anstalt des öffentlichen Rechts

10829 Berlin, 20. August 2007
Kolonnenstraße 30 L
Telefon: 030 78730-370
Telefax: 030 78730-320
GeschZ.: I 53-1.65.11-41/07

Bescheid

über
die Änderung
der allgemeinen bauaufsichtlichen Zulassung vom 13. November 2006

Zulassungsnummer: Z-65.11-430

Antragsteller: VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach

Zulassungsgegenstand: Standaufnehmer mit eingebautem Messumformer (Schwinggabel-Grenzschalter) als Anlageteil von Überfüllsicherungen
Bezeichnung "VEGASWING S 52"

Geltungsdauer bis: 30. November 2011

Dieser Bescheid ändert die allgemeine bauaufsichtliche Zulassung Nr. Z-65.11-430 vom 13. November 2006. Dieser Bescheid umfasst zwei Seiten und eine Anlage. Er gilt nur in Verbindung mit der oben genannten allgemeinen bauaufsichtlichen Zulassung und darf nur zusammen mit dieser verwendet werden.

Bemerkung: Die Änderung betrifft die Typenbezeichnung.

Deutsches Institut für Bautechnik

Z35088.07

ZU II. BESONDERE BESTIMMUNGEN

Die Besonderen Bestimmungen der allgemeinen bauaufsichtlichen Zulassung werden wie folgt geändert.

Abschnitt 2.1, Eigenschaften und Zusammensetzung, Absatz (1) erhält folgende Fassung:

(1) Der Zulassungsgegenstand besteht aus dem Standaufnehmer (Schwinggabel-Grenzschalter) mit eingebautem Messumformer:

VEGASWING S 52

Typ SWINGS52.EEA*C* kontaktloser Schalter,

Typ SWINGS52.EEA*T* Transistorausgang.

Die vollständige Typenbezeichnung ist dem Typenschlüssel gemäß der Technischen Beschreibung[1] zu entnehmen. Sie enthält Angaben zu den Prozessanschlüssen, zur Elektronik und zu den elektrischen Anschlüssen.

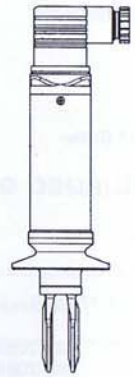
Die Anlage 2 der allgemeinen bauaufsichtlichen Zulassung wird ersetzt durch die geänderte Anlage 2 dieses Bescheids.

Leichsenring

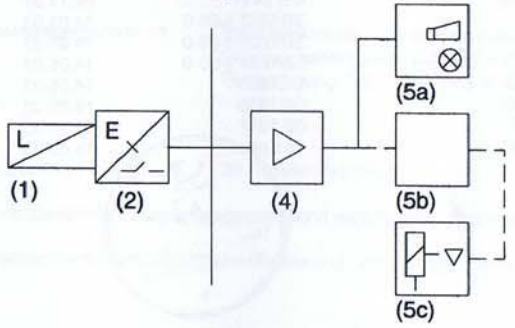
Beglaubigt
Deutsches Institut für Bautechnik

[1] vom TÜV Hannover/Sachsen-Anhalt e.V. geprüfte Technische Beschreibung des Antragstellers vom 18.05.2007 für den Füllstandgrenzschalter VEGASWING S 52

VEGASWING S 52



Schema der Überfüllsicherung



(1) Standaufnehmer (Schwinggabel-Grenzschalter)
(2) Messumformer mit Binärausgang
(4) Signalverstärker
(5a) Meldeeinrichtung mit Hupe und Lampe
(5b) Steuerungseinrichtung
(5c) Stellglied

Antragsteller:	Zulassungsgegenstand:	Anlage: 1
VEGA VEGA Grieshaber KG 77757 Schiltach	Vibrationsgrenzschalter VEGASWING S 52	Allgemeine bauaufsichtliche Zulassung Z-65. vom

Anlage 1 zu 03-0627-01 Stand 18.05.07

Anlage 2 des Bescheids vom 20. August 2007 über die Änderung der allgemeinen bauaufsichtlichen Zulassung Nr. Z-65.11-430 vom 13. November 2006

Prüfungsunterlagen

1. Technische Beschreibung Nr. 03-0627-01, 11 Blätter — Stand 18.05.07

2. Schaltpläne und Zeichnungen:

Bezeichnung	Zeichnungs Nr.	Datum
VEGASWING 52	MB 2083	14.05.03
VEGASWING 52	MB 2084	14.05.03
VEGASWING 52	MB 2085	14.05.03
VEGASWING 52	MB 2086	14.05.03
VEGASWING 52	MB 2323	08.04.05
VEGASWING 52 Rohrverschraubung	MB 2359	09.11.04
VEGASWING 52 Tri-Clamp	MB 2364	09.11.04
VEGASWING 52 Hochtemp.	MB 2411	09.11.04
SWING 50 – NT- C	SB1202 1-00-0	14.05.03
SWING 50 – NT- T	SB1203 1-00-0	14.05.03
SWING 50 – OSZ	SB1204 1-00-0	14.05.03
Stückliste SWING 50-NT-T	GE1955	14.05.03
Stückliste SWING 50-NT-C	GE1956	14.05.03
Stückliste SWING 50-OSZ	GE1957	14.05.03
Layouts, Bestückungspläne	15 Seiten	14.05.03

DEUTSCHES INSTITUT FÜR BAUTECHNIK
Anstalt des öffentlichen Rechts

10829 Berlin, 13. November 2006
Kolonnenstraße 30 L
Telefon: 030 78730-370
Telefax: 030 78730-320
GeschZ.: I 53-1.65.11-62/06

Allgemeine bauaufsichtliche Zulassung

Zulassungsnummer: Z-65.11-430

Antragsteller: VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach

Zulassungsgegenstand: Standaufnehmer mit eingebautem Messumformer (Schwinggabel-Grenzschalter) als Anlageteil von Überfüllsicherungen Bezeichnung "VEGASWING S 52"

Geltungsdauer bis: 30. November 2011

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.

Diese allgemeine bauaufsichtliche Zulassung umfasst fünf Seiten und zwei Anlagen.

SONDA DE TEMPERATURA

ºkosmon, s.a.
CONTROL DE TEMPERATURA

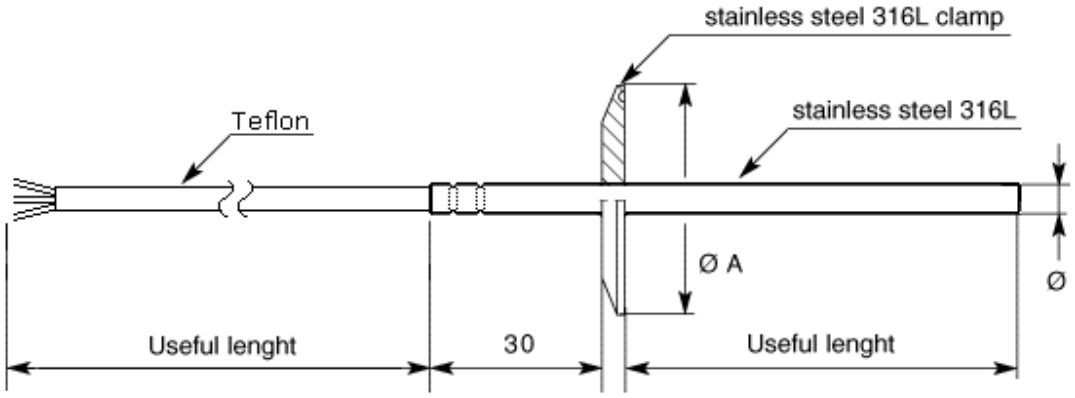
Esplugues, 14-12-2009

INFORME DE CARACTERÍSTICAS TÉCNICAS

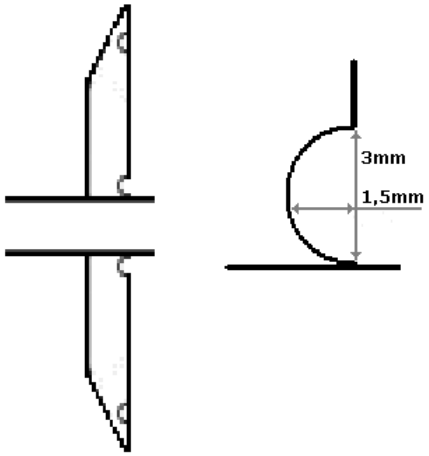
Componentes:
Sonda Pt-100 1/3 DIN Heraeus, D.6X60mm clamp 1" Inox 316, cuello 30mm Inox 316 con 6 mts cable de teflón, 3 hilos.

Código: SPT1/36502

Esquema:



Detalle soldadura:



ºKOSMON S.A.
Dpto. Técnico
Guillén C. C.

C/ Gall 47 - 3ª Planta P.I. el Gall
Tel: 93 470 64 20 08950 - Esplugues - BARCELONA Fax: 93 480 21 11

VÁLVULAS DE SERVICIO

ROTARY MOTORIZED VALVES

MIXING VALVE
SERIES VRG130

The compact rotary 3-way mixing valve series VRG130 is available in DN 15–50, and is made of DZR brass, PN10. Three types of connections are available; internal thread, external thread and compression fittings.

OPERATION

The ESBE series VRG130 is a range of compact low leakage mixing valves made of a special brass alloy (DZR) allowing use in both heating, cooling and tap water installations.

For easy manual operation the valves are equipped with non-slip knobs and end stops for an operation angle of 90°. The valve position scale can be turned over and rotated, allowing a wide choice of mounting positions. Together with actuator series ESBE ARA600 the VRG130 valves are also easily automated and have extraordinary regulating accuracy thanks to the unique valve-to-actuator interface. For more advanced control functions, the ESBE series 90 controllers allows even more applications.

ESBE VRG130 valves are available in dimensions DN 15 – 50 with internal thread, in DN 15 – 50 with external thread and with compression fittings for pipe O.D. 22 and 28 mm.

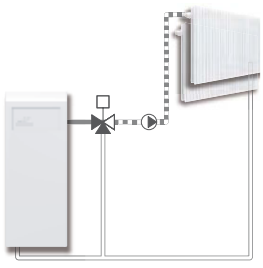
SERVICE AND MAINTENANCE

The slender and compact design of the valve allows for easy tool access when assembling and disassembling the valve.

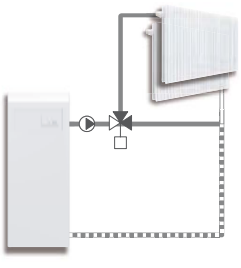
Repair kits are available for key components. An extra O-ring can also be installed as additional shaft seal without any need for draining the system or dismantling the valve, as long as the system is depressurized.

INSTALLATION EXAMPLES

All the examples of installations can be mirrored. The valve position scale can be turned over and rotated to fit a number of installation layouts and should at the installation be fitted in the correct position as shown in the instruction for installation. The symbol markings of the valve ports (■●▲) minimize the risk of incorrect installation.



Mixing



Diverting

VALVE VRG130 DESIGNED FOR

- ● Heating
- ● Comfort cooling
- ● Potable water
- ● Floor heating
- ● Solar heating
- ● Ventilation
- ● Zone
- ○ District hot water
- ○ District heating
- ○ District cooling

SUITABLE ACTUATORS

The valve series VRG130 may most easily be fitted with ESBE actuators:

- ● Series ARA600
- ● Series 90*
- ● Series 90C
- ● Series 90K

*Adaptor kit necessary, see product page

TECHNICAL DATA

Pressure class:	PN 10
Media temperature:	max. (continuously) +110°C
	max. (temporarily) +130°C
	min. -10°C
Torque (at nominal pressure):	< 5 Nm
Leakrate in % of flow*:	Mixing < 0.05%
	Diverting < 0.02%
Working pressure:	1 MPa (10 bar)
Max. differential pressure drop:	Mixing, 100 kPa (1 bar)
	Diverting, 200 kPa (2 bar)
Close off pressure:	200 kPa (2 bar)
Rangeability Kv/Kv^{min}, A-AB:	100
Connections:	Internal thread, ISO 7/1
	External thread, ISO 228/1

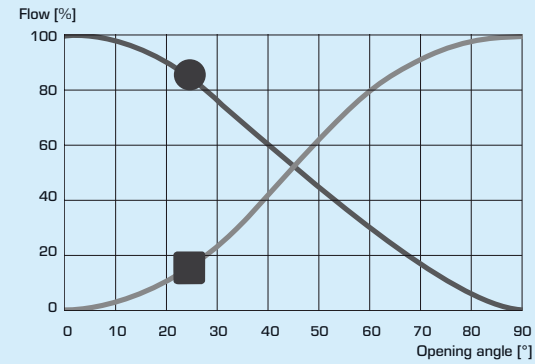
* Differential pressure 100kPa (1 bar)

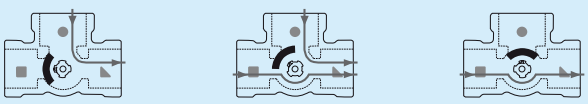
Material

Valve body and slide:	Brass DZR, CW 602N
Shaft and bushing:	PPS composite
O-rings:	EPDM

PED 97/23/EC, article 3.3

VALVE CHARACTERISTICS

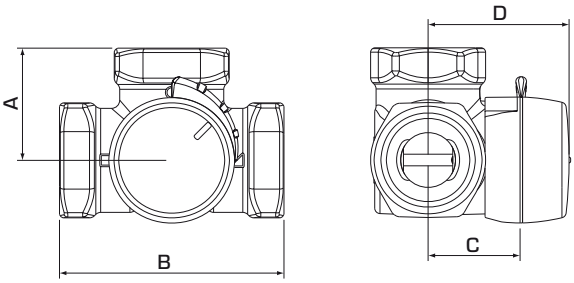


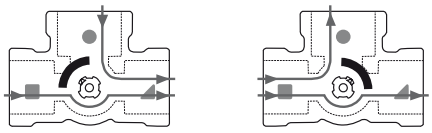


ESBE

NO.1 IN HYDRONIC SYSTEM CONTROL

MIXING VALVE
SERIES VRG130





Mixing *Diverting*

The flat-sided spindle top points towards the sleeve position.

3-WAY MIXING VALVE SERIES VRG131, INTERNAL THREAD

Art. No.	Reference	DN	Kvs*	Connection	A	B	C	D	Weight [kg]	Replaces	Note
1160 01 00	VRG131	15	0.4	Rp 1/2"	36	72	32	50	0.40	–	
1160 02 00	VRG131	15	0.63	Rp 1/2"	36	72	32	50	0.40	3 MG 15-0.6	
1160 03 00	VRG131	15	1	Rp 1/2"	36	72	32	50	0.40	3 MG 15-1.0	
1160 04 00	VRG131	15	1.6	Rp 1/2"	36	72	32	50	0.40	3 MG 15-1.6	
1160 05 00	VRG131	15	2.5	Rp 1/2"	36	72	32	50	0.40	3 MG 15-2.5	
1160 06 00	VRG131	15	4	Rp 1/2"	36	72	32	50	0.40	–	
1160 07 00	VRG131	20	2.5	Rp 3/4"	36	72	32	50	0.43	–	
1160 08 00	VRG131	20	4	Rp 3/4"	36	72	32	50	0.43	3 MG 20-4	
1160 09 00	VRG131	20	6.3	Rp 3/4"	36	72	32	50	0.43	3 MG 20-6.3	
1160 10 00	VRG131	25	6.3	Rp 1"	41	82	34	52	0.70	3 MG 25-8	
1160 11 00	VRG131	25	10	Rp 1"	41	82	34	52	0.70	3 MG 25-12	
1160 12 00	VRG131	32	16	Rp 1 1/4"	47	94	37	55	0.95	3 MG 32-18	
1160 34 00	VRG131	40	25	Rp 1 1/2"	53	106	44	60	1.68	3 G 40-28	2)
1160 13 00	VRG131	40	25	Rp 1 1/2"	58	116	44	62	1.75	–	1)
1160 36 00	VRG131	50	40	Rp 2"	60	120	46	64	2.30	3 G 50-44	3)
1160 14 00	VRG131	50	40	Rp 2"	62	125	44	62	2.05	–	1)

3-WAY MIXING VALVE SERIES VRG132, EXTERNAL THREAD

Art. No.	Reference	DN	Kvs*	Connection	A	B	C	D	Weight [kg]	Replaces	Note
1160 15 00	VRG132	15	0.4	G 3/4"	36	72	32	50	0.40	–	
1160 16 00	VRG132	15	0.63	G 3/4"	36	72	32	50	0.40	–	
1160 17 00	VRG132	15	1	G 3/4"	36	72	32	50	0.40	–	
1160 18 00	VRG132	15	1.6	G 3/4"	36	72	32	50	0.40	–	
1160 19 00	VRG132	15	2.5	G 3/4"	36	72	32	50	0.40	–	
1160 20 00	VRG132	15	4	G 3/4"	36	72	32	50	0.40	–	
1160 21 00	VRG132	20	2.5	G 1"	36	72	32	50	0.43	–	
1160 22 00	VRG132	20	4	G 1"	36	72	32	50	0.43	–	
1160 23 00	VRG132	20	6.3	G 1"	36	72	32	50	0.43	3 MGA 20-6.3	
1160 24 00	VRG132	25	6.3	G 1 1/4"	41	82	34	52	0.70	–	
1160 25 00	VRG132	25	10	G 1 1/4"	41	82	34	52	0.70	3 MGA 25-12	
1160 26 00	VRG132	32	16	G 1 1/2"	47	94	37	55	0.95	3 MGA 32-18	
1160 35 00	VRG132	40	25	G 2"	53	106	44	60	1.69	–	4)
1160 27 00	VRG132	40	25	G 2"	58	116	44	62	1.75	–	1)
1160 37 00	VRG132	50	40	G 2 1/4"	60	120	46	64	2.30	–	5)
1160 28 00	VRG132	50	40	G 2 1/4"	62	125	44	62	2.05	–	1)

3-WAY MIXING VALVE SERIES VRG133, COMPRESSION FITTING

Art. No.	Reference	DN	Kvs*	Connection	A	B	C	D	Weight [kg]	Replaces	Note
1160 29 00	VRG133	20	4	CPF 22 mm	36	72	32	50	0.40	–	
1160 30 00	VRG133	20	6.3	CPF 22 mm	36	72	32	50	0.40	3 MG 22-6.3	
1160 31 00	VRG133	25	10	CPF 28 mm	41	82	34	52	0.45	3 MG 28-8	

* Kvs-value in m^3/h at a pressure drop of 1 bar. See also flow chart on page 34. CPF = compression fitting
Note 1) Cancellation 2009-09 2) Replaces 1160 13 00 3) Replaces 1160 14 00 4) Replaces 1160 27 00 5) Replaces 1160 28 00

ROTARY MOTORIZED VALVES

ACTUATOR
SERIES ARA600 3-POINT

ESBE Actuator Series ARA600 for operating ESBE mixing valves DN 15–50. The actuators have an operating range of 90° and can easily be manually operated.

OPERATION
The ESBE series ARA600 is a compact actuator designed for operating rotary mixing valves DN 15-50. The actuators ARA6X1, ARA6X2, ARA6X3 and ARA6X4 are controlled by 3-point signal, and are recommended for mixing applications. The actuator has an operating range of 90° and the valve can easily be manually operated by the pull-and-turn knob on the front of the actuator.

VERSIONS
The ESBE actuators with 3-point signal control are available for 24 or 230 VAC, 50 Hz and it is supplied with an attached 1.5 m connection cable. A wide range of different running times is also available, from 30 to 1200 seconds.

An auxiliary switch, which can be set in any position, is available either as a pre-mounted component fitted to the actuator (ARA6X2 and ARA6X4) or as an optional kit to be ordered separately. The auxiliary switch is easily set by a unique solution, by just lifting off the turning knob the switch cam is accessible, no tools or disassembly required.

SUITABLE MIXING VALVES
Thanks to the special interface between the actuator series ARA600 and the ESBE valve series VRG100, VRG200 and VRB100, the unit as a whole has a unique stability and precision when regulating. The actuator series ARA600 is also easily mounted on the ESBE valve series MG, G, F, BIV, H and HG.

- Series VRG100
- Series VRG200
- Series VRG300
- Series VRB100
- Series MG
- Series G
- Series F ≤ DN50
- Series BIV
- Series H and HG

LINKAGE KITS
The actuator is supplied complete with an adaptor kit for easily fitting onto an ESBE rotary mixing valve. Adaptor kits can also be ordered separately.

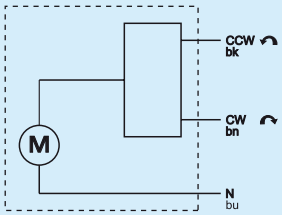
Art. No.
1600 04 00 _____ ESBE valve series G, MG
1600 05 00 (= supplied with actuator)
_____ESBE valve series VRG, VRB, G, MG

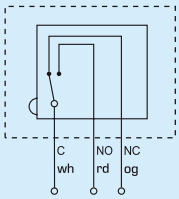
OPTION
Auxiliary switch kit_____ Art. No. 1620 07 00
Cable hatch _____ Art. No. 1620 08 00

TECHNICAL DATA
Ambient temperature: _____ max. +55°C
_____min. -5°C
Enclosure rating:_____ IP41
Protection class:_____ II
Power supply: _____ 24 ± 10% VAC, 50 Hz
_____ 230 ± 10% VAC, 50 Hz
Power consumption: 24 V_____ 2 VA
230 V _____ 5 VA
Rating auxiliary switch: _____ 6(3)A 250 VAC
Weight: _____ 0.4 kg

CE LVD 2006/95/EC
EMC 2004/108/EC
RoHS 2002/95/EC

WIRING
The actuator should be preceded by a multi-pole contact breaker in the fixed installation.



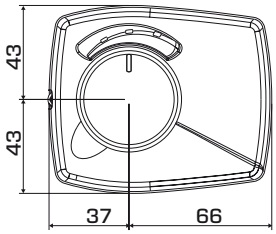


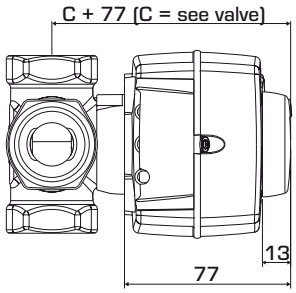
Actuator, series:
ARA641 — ARA644,
ARA651 — ARA654,
ARA661 — ARA664,
ARA671 — ARA674

Actuator with premounted auxiliary switch, series:
ARA642, ARA644, ARA652, ARA654, ARA662, ARA664,
ARA672, ARA674, ARA692, ARA694
The actuators are fitted with two separate cables, one cable for actuator regulation and one for the auxiliary switch.

To set the switch position, remove the actuator knob and turn the green cam sleeve to the desired position.

ACTUATOR
SERIES ARA600 3-POINT





Installation dimensions for Actuator Series ARA600 with ESBE VRG100, VRG200, VRG300 and VRB100 mixing valves

ACTUATOR SERIES ARA600, 3-POINT 24 VAC

Art. No.	Reference	Voltage [VAC]	Running time 90° [s]	Control signal*	Torque [Nm]	Replaces	Note
1210 01 00	ARA643	24	30	3-point SPDT	6	–	
1210 02 00	ARA653	24	60	3-point SPDT	6	–	
1210 03 00	ARA663	24	120	3-point SPDT	6	62	
1210 04 00	ARA673	24	240	3-point SPDT	6	63	
1210 05 00	ARA693	24	120/240/480/1200	3-point SPDT	6	–	
1210 06 00	ARA644	24	30	3-point SPDT	6	–	1)
1210 07 00	ARA654	24	60	3-point SPDT	6	–	1)
1210 08 00	ARA664	24	120	3-point SPDT	6	62M	1)
1210 09 00	ARA674	24	240	3-point SPDT	6	63M	1)
1210 10 00	ARA694	24	120/240/480/1200	3-point SPDT	6	–	1)

ACTUATOR SERIES ARA600, 3-POINT 230 VAC

Art. No.	Reference	Voltage [VAC]	Running time 90° [s]	Control signal*	Torque [Nm]	Replaces	Note
1210 11 00	ARA641	230	30	3-point SPDT	6	–	
1210 12 00	ARA651	230	60	3-point SPDT	6	65	
1210 13 00	ARA661	230	120	3-point SPDT	6	66	
1210 14 00	ARA671	230	240	3-point SPDT	6	67	
1210 15 00	ARA691	230	120/240/480/1200	3-point SPDT	6	67-20	
1210 16 00	ARA642	230	30	3-point SPDT	6	–	1)
1210 17 00	ARA652	230	60	3-point SPDT	6	65M	1)
1210 18 00	ARA662	230	120	3-point SPDT	6	66M	1)
1210 19 00	ARA672	230	240	3-point SPDT	6	67M	1)
1210 20 00	ARA692	230	120/240/480/1200	3-point SPDT	6	67-20M	1)

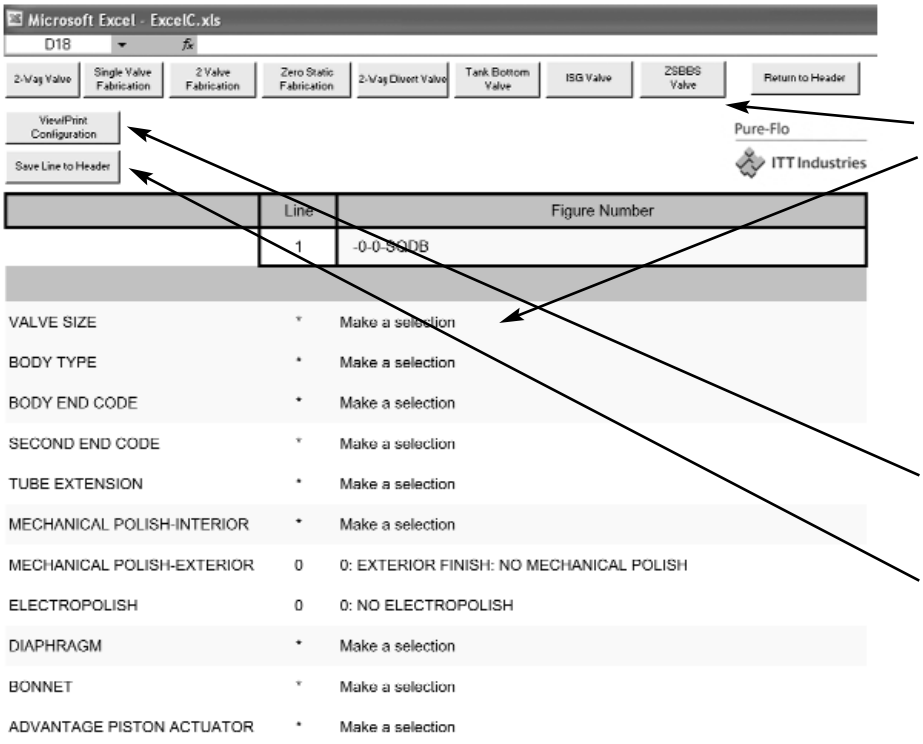
* 3-point SPDT = Single Pole Double Throw Note 1) With premounted auxiliary switch

VÁLVULAS SANITARIAS

Pure-Flo Valve Figure Numbers
Pure-Flo® Microsoft Excel Valve Configurator Tool

To assist you in the specification develoment and ordering process we have a Microsoft Excel tool available at www.ittpureflo.com that will help you:
- select compatible valve features
- create correct figure numbers

To access the tool:
1. Hold your mouse over the Tools button and click on "Valve Configurator" from the dropdown list
2. Request a username and password if you do not already have one
3. Once registered, login with your username and password
4. After you have logged in, download the valve configurator tool



To create figure numbers follow these steps:

1. Select valve type
2. Make feature selections
3. Continue making selections until no sections remain in yellow
4. Cells highlighted in red will explain cases where the selection of one feature requires the selection of another feature (ex. "963" bonnet requires "M2" bonnet internals)
5. Click "View/Print" to see the resulting figure number with descriptions
6. Click "Save Line to Header" to save the figure number configuration
7. Repeat steps 1-6 until you have all the figure numbers required

Line	Figure Number
0	1-F-419-2-0-0-TM17-913-SQDB
	SIZE:1"(DN25) F: FORGED 316L SS 419: TRICLAMP TUBE 2: INTERIOR FINISH: RA 35 MICROINCH MAX 0: EXTERIOR FINISH: NO MECHANICAL POLISH 0: NO ELECTROPOLISH TM17: DIAPHRAGM:MODIFIED PTFE(FDA)/GRADE 17 B.C. 913: BONNET:SS/HWO/TRAVEL STOP SQDB: C OF C BODY CMTR FIG_NO-1-F-419-2-0-0-TM17-913-SQDB

Resulting figure number with description

Please contact your local Pure-Flo sales representative or Distributor for a demonstration or for assistance using the Microsoft Excel Valve Configuration tool.

Pure-Flo Valve Figure Numbers

How to Construct a Standard Valve Figure Number

Valve Size Page 4	+	Bodies and Polishes Page 5	+	Diaphragm Page 6	+	
Manual Bonnets, Actuated Bonnets, and Options Page 7	+	Actuator Options Page 8	+	Switches and Actuator Accessories Pages 9-10	+	
Service Preparation and Quality Documents Page 11						

Constructing Figure Numbers

Below are examples for constructing a manual and actuated valve figure number. The actuated valve example will be used to build a figure number on pages 4-11.

Manual Valve Example

Figure Number: 1-F-419-6-0-0-TM17-963-M2-SQDB

Detailed description:
1: 1 inch size (DN25)
F: Forged 316L SS
419: Triclamp Tube
6: Interior Finish: Ra 25 Microinch Max
0: Exterior Finish: No Mechanical Polish
0: No Electropolish
TM17: Modified PTFE Diaphragm (FDA)/ Grade 17 B.C.
963: Plastic PAS Rising Handwheel with Travel Stop
M2: Sanitary Internals
SQDB: C of C Body CMTR

Actuated Valve Example

Figure Number: 1-F-428L-6-0-0-TM17-36-M7-A209-VSPS48-SQDB

Detailed description:
1: 1 inch size (DN25)
F: Forged 316L SS
428L: 16 Gauge Extended Tangent Buttweld
6: Interior Finish: Ra 25 Microinch Max
0: Exterior Finish: No Mechanical Polish
0: No Electropolish
TM17: Modified PTFE Diaphragm (FDA)/ Grade 17 B.C.
36: Plastic/PAS Actuated Bonnet
M7: Bronze Compressor
A209: Advantage Actuator, #209 Rev/ 90# Spring
VSPS48: Value Switch Package, Silver Contacts 48V
SQDB: C of C Body CMTR

Valve Size

Size

Code	Description
.25	.25 Inch (DN6)
.38	.38 Inch (DN10)
.50	.50 Inch (DN15)
.75	.75 Inch (DN20)
1	1 Inch (DN25)
1.5	1.5 Inch (DN40)
2	2 Inch (DN50)
2.5	2.5 Inch (DN65)
3	3 Inch (DN80)
4	4 Inch (DN100)

Figure Numer: 1-

Configuration Example	1
Size (in)	1

Pure-Flo Valve Figure Numbers
Bodies and Polishes

Body Type

Code	Description
2	Industrial Valve Body - Cast CF3M Stainless Steel
8	Bio-Tek® Forged 316L Stainless Steel
C	Cast CF3M Stainless Steel
F	Forged 316L Stainless Steel
N	Body Not Supplied
S	Swickle Body Cast CF3M Stn. Stl.
TBV	Tank Bottom Valve
TBVCR	Tank Bottom Valve 316L BN2
W	Wrought 316L Stainless Steel
Spec	Special Material Body

Body Ends

Code	Description
CLAMP	
409	Swagelok TS Fitting
410	Tri-Clamp Sch. 5 Pipe
411	Min. Valine
412	S Clamp
413	Q Clamp
414	I Line-Male
415	I Line-Female
416	Swivel Nut
417	Male Thread
418	ISO 1.6mm Wall Tri-Clamp End
419	Tri-Clamp Tube
419S	Tri-Clamp Tube 18 Gauge
419S1	Tri-Clamp Tube 20 Gauge
420	Superior
BUTTWELD	
422	Sch. 5 Pipe (ISO Body)
423	18 Gauge
424	20 Gauge
425	Sch. 5 Pipe (ANSI Body)
426	Sch. 10 Pipe
427	Sch. 40 Pipe
428	16 Gauge
428L	16 Gauge Extended Tangent BW
429	14 Gauge
429L	14 Gauge Extended Tangent BW
430	12 Gauge BW
433	ANSI Flanged
475	6X1 Mini Fitting BW
476	8X1 Mini Fitting BW
477	10X1 Mini Fitting BW
478	12X1 Mini Fitting BW
479	18X1 Mini Fitting BW
480	14X1 Mini Fitting BW
481	DIN Series 1
482	DIN Series 2
483	DIN Series 3
484	SMS
485	TBV, 45 Degree 14 GA BW
486	TBV, 45 Degree 16 GA BW
487	TBV, 45 Degree 18 GA BW
488	TBV, 45 Degree Tri-Clamp
493	ISO 2.9mm wall
494	ISO 1.2mm wall

Body Ends (cont.)

Code	Description
495	ISO 1.0mm wall
496	ISO 1.6mm wall
497	ISO 2.0mm wall
498	ISO 2.3mm wall
499	ISO 2.6mm wall
Spec	Special End
SCREWED	
403	NPT Screwed
FLANGED	
433R	ANSI Flanged w/ Raised Face

Second End Code

Code	Description
CLAMP	
X07	By Male Thread w/ Gasket Seat
X09	Swagelok TS Fitting
X10	By Tri-Clamp Sch. 5 Pipe
X11	By Min. Valine
X12	By S Clamp
X13	By Q Clamp
X14	By I Line - Male
X15	By I line - Female
X17	By Male Thread
X19	By Tri-Clamp Tube
X19S	By Tri-Clamp Tube 18 Gauge
X19S1	By Tri-Clamp Tube 20 Gauge
X20	By Superior
BUTTWELD	
X22	By Sch. 5 Pipe (ISO Body)
X23	By 18 Gauge
X24	By 20 Gauge
X25	By Sch. 5 Pipe (ANSI Body)
X26	By Sch. 10 Pipe
X27	By Sch. 40 Pipe
X28	By 16 Gauge
X28L	By 16 Gauge Extended Tangent BW
X29	By 14 Gauge
X29L	By 14 Guage Extended Tangent BW
X30	By 12 Gauge BW
X75	By 6X1 Mini Fitting BW
X76	By 8X1 Mini Fitting BW
X77	By 10X1 Mini Fitting BW
X78	By 12X1 Mini Fitting BW
X79	By 18X1 Mini Fitting BW
X80	By 14X1 Mini Fitting BW
X81	By DIN Series 1
X82	By DIN Series 2
X83	By DIN Series 3
X84	By SMS
X85	By ISO
X93	By ISO 2.9mm Wall
X94	By ISO 1.2mm Wall
X95	By ISO 1.0mm Wall
X96	By ISO 1.6mm Wall
X97	By ISO 2.0mm Wall
X98	By ISO 2.3mm Wall
X99	By ISO 2.6mm Wall
Spec	Special End

Tube Extension

Code	Description
TE1	Valve End 1
TE2	Valve End 2
TEA	Both Valve Ends & Purge End
TEB	Both Valve Ends
TEP	Purge End
TE1P	Valve End (P1) & Purge (P3)
TE2P	Valve End (P2) & Purge (P3)

Mechanical Polish - Interior

Code	Description
0	As Cast
2	35 µin Ra (.8 µm) max
6	25 µin Ra (.6 µm) max
7	15 µin Ra (.38 µm) max
8	20 µin Ra (.5 µm) max
9	11 µin Ra (.28 µm) max
10	10 µin Ra (.25 µm) max
SFV1	BPE SFV1 Ra 20 Max
SFV2	BPE SFV1 Ra 25 Max
SFV3	BPE SFV1 Ra 30 Max
SFV4	BPE SFV1 Ra 15 Max, EP
SFV5	BPE SFV1 Ra 20 Max, EP
SFV6	BPE SFV1 Ra 25 Max, EP

Mechanical Polish -Exterior

Code	Description
0	As Cast
1	Scotch Brite
2	25 µin Ra (.6 µm) max, Welds Scotch Brite
3	35 µin Ra (.8 µm) max, Welds Scotch Brite
4	25 µin Ra (.6 µm) max, Welds Removed
6	35 µin Ra (.8 µm) max, Welds Removed
7	Special Polish Requirement
8	No Ext Body Polish, Weld Beads Removed

Electropolish

Code	Description
0	No Electropolish
2	Exterior Only
3	Interior and Exterior
4	Interior Only

Body Only

Code	Description
Y	Body Only Supplied

Figure Numer: 1-F-428L-6-0-0-

Configuration Example		F	428L			6	0	0	
Bodies and Polishes	Body Type	F							
	Body Ends		428L						
	Second End Code								
	Tube Extension								
	Mechanical Polish - Interior					6			
	Mechanical Polish - Exterior						0		
	Electropolish							0	
	Body Only								

Diaphragms

Code	Material
B	Black Butyl (FDA)
17	EPDM Compound 17 (FDA)
B17	Biotek EPDM Compound 17
EN	Elastomer Not Supplied
M	EPDM (non-FDA)
P	BUNA - N (FDA)
PN	PTFE Not Supplied
R2	PTFE (FDA)
TM17	PTFE (FDA)/Grade 17 BC
V	Viton
W1	White Butyl (FDA)

Figure Numer: 1-F-428L-6-0-0-TM17-

Configuration Example	TM17
Diaphragms	TM17

Pure-Flo Valve Figure Numbers
Manual Bonnets, Actuator Bonnets and Options

Manual Bonnets

Code	Bonnet Description
BIO-TEK®	
18	Standard Bonnet, Non-Sealed
18S	Standard Bonnet, Sealed
CAST IRON	
903	Rising Stem with Travel Stop
903S	Rising Stem with Travel Stop - Sealed
STAINLESS STEEL (316)	
913	Rising Stem with Travel Stop
913S	Rising Stem with Travel Stop - Sealed
915	CH WHL with Travel Stop
915S	CH WHL with Travel Stop - Sealed
970	Rising Handwheel with Travel Stop
PLASTIC PAS*	
963	Rising Handwheel with Travel Stop (1/2" - 4")
963S	Rising Handwheel with Travel Stop - Sealed (1/2" - 4")

**NA-2.5" Casting*

Actuated Bonnets

Code	Description
CAST IRON	
40	Direct Load
STAINLESS STEEL	
31	Actuated
31S	Actuated - Sealed
DUCTILE IRON	
34	Actuated
34S	Actuated - Sealed
84	Dualrange
84S	Dualrange Sealed
PLASTIC PAS*	
36	Actuated
36S	Actuated - Sealed

**NA-2.5" Casting*

Weep Holes

Code	Description
W2	Two Weep Holes in Bonnet
W4	Four Weep Holes in Bonnet (3A Internals Only)

Electropolish Topworks

Code	Description
1	Topworks
1S	Advantage Spool

Optional Coatings

Code	Description
C1	PVDF Coated Topworks
C4	White Epoxy Coated Topworks
C7	Nylon Coated Topworks
CSpec	Coating Specified

Bonnet Seal Materials

Code	Description
S1	EPDM
S2	Viton

Optional Bonnet Internals

Code	Description
M2	Sanitary Internals
M3	3A Sanitary Internals
M5	Stainless Steel Stem
M6	Cast Iron Compressor
M7	Bronze Compressor
M8	PVDF Coated Cast Iron Compressor
M9	Stainless Steel Bushing
M10	Stainless Steel Tube Nut
M17	PPS Cap
M18	Heat Shrink Tubing on Handwheel

Optional Body/Bonnet Bolting

Code	Description
B8	Stainless Steel ASTM A193 B8
BLTS	MNT HDWR, Except STDS, Supplied w/o Body
BSpec	Special Bonnet Flange Bolting
MET	Metric Bonnet Flange Fasteners

Yoke

Code	Description
Y	Yoke Supplied

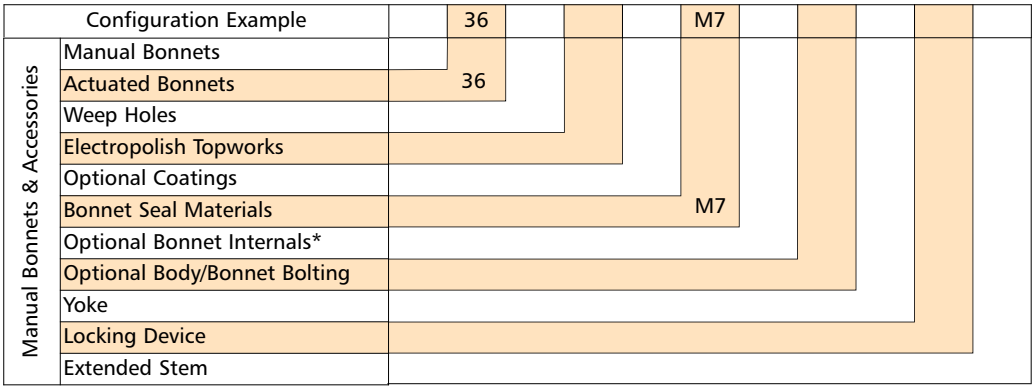
Locking Device

Code	Description
LD	Locking Device

Extended Stem

Code	Description
EXTSTEM	Extended Stem
EXTSTEMR	Extended Stem from Valve CL to Top of Rim
EXTSTEMC	Extended Stem from Valve CL to Indicator Cap
LCAP	Stem Ext. from Center of Valve to Top of Cap
LRIM	Stem Ext from Center of Valve to Top of Rim

Figure Numer: 1-F-428L-6-0-0-TM17-36-M7-



*Multiple selections allowed

Pure-Flo Valve Figure Numbers
Actuator Options

Advantage Actuators

Code	Actuator
DIRECT ACTING	
A103	# 3 (Bio-Tek®)
A105	# 5
A108	# 8
A116	# 16
A133	# 33
A147	# 47
REVERSE ACTING	
A203	# 3 with 60# Spring (Bio-Tek®)
A204	# 3 with 90# Spring (Bio-Tek®)
A205	# 5 with 60# Spring
A206	# 5 with 90# Spring
A208	# 8 with 60# Spring
A209	# 8 with 90# Spring
A216	# 16 with 60# Spring
A217	# 16 with 90# Spring
A233	# 33 with 60# Spring
A234	# 34 with 90# Spring
A247	# 47 with 60# Spring
A248	# 47 with 80# Spring
DOUBLE ACTING	
A303	# 3 (Bio-Tek®)
A305	# 5
A308	# 8
A316	# 16
A333	# 33
A347	# 47

APA Advantage Piston Actuator

Code	Description
APBT6	Bio-Tek® with 60# spring
APTB9	Bio-Tek® with 90# spring
AP0506	0.50" with 60# spring
AP0509	0.50" with 90# spring
AP0756	0.75" with 60# spring
AP0759	0.75" with 90# spring
AP1006	1.0" with 60# spring
AP1009	1.0" with 90# spring
AP1506	1.5" with 60# spring
AP1509	1.5" with 90# spring
AP2006	2.0" with 60# spring
AP2009	2.0" with 90# spring

Dia-Flo Actuators

Code	Actuator Size
DIRECT ACTING ACTUATORS, NORMALLY OPEN (SPRING TO OPEN-AIR TO CLOSE)	
3112	#12
3125	#25
3126	#25 for Vacuum Service
3150	#50
31101	#101
31130	#130
31250	#250
REVERSE ACTING ACTUATORS, NORMALLY CLOSED (AIR TO OPEN-SPRING TO CLOSE)	
SIZE #12	
3213	88 Spring
3214	88 & 89 Springs
3215	88 & Raymond Springs
3216	89 Spring
SIZE #25	
3226	101 Spring
3227	101 & 102A Springs
3228	102A Spring
SIZE #50	
3251	101 Spring
3252	101 & 102A Springs
3253	97 Spring
3254	96 Spring
3255	96 & 97 Springs
3256	102A Spring
SIZE #75	
3274	96 Spring
3276	96 & 97 Springs
3277	97 & 98 Springs
3278	96 & 98 Springs
3279	96, 97 & 98 Springs
SIZE #101	
32102	96 Spring
32103	98 Spring
32104	96 & 97 Springs
32105	96 & 98 Springs
32106	97& 98 Springs
32107	96, 97, & 98 Springs
32108	130 Spring
32109	97 Spring

Dia-Flo Actuators

Code	Actuator Size
DOUBLE ACTING ACTUATORS (AIR TO OPEN-AIR TO CLOSE)	
SIZE #130	
32131	97 Spring
32132	96 Spring
32133	98 Spring
32134	96 & 97 Springs
32135	96 & 98 Springs
32136	97 & 98 Springs
32137	96, 97, & 98 Springs
32138	130 Spring
SIZE #250	
32251	129 & 130 Springs
32252	129 Spring
32253	130 Spring
3312	#12 Double Acting
3325	#25 Double Acting
3350	#50 Double Acting
3375	#75 Double Acting
33101	#101 Double Acting
33130	#130 Double Acting
33250	#250 Double Acting

Non ITT Actuation

Code	Description
POF	Customer Supplied Actuator
POM	With Non-ITT Actuator

Figure Numer: 1-F-428L-6-0-0-TM17-36-M7-A209-

Configuration Example		A209
Actuator Options	Actuator Options (select 1):	A209
	Advantage Actuator	
	APA Advantage Piston Actuator	
	Dia-Flo Actuators	
	Non ITT Actuation	

Pure-Flo Valve Figure Numbers
Switches and Actuator Accessories

Adv. Switch Pack SP-2

Code	Description
SP2S	Silver Contacts - Mechanical
SP2SEU	Silver De-Rate to 70VDC/48VAC Max for EU Service - Mechanical
SP2G	Gold Contacts - Mechanical
SP2GEU	Gold De-Rated to 70VDC/48VAC Max for EU Service - Mechanical
SP2Z	2-Wire Proximity
SP2N	NAMUR Proximity
SP2P	3-Wire PNP Proximity
SP2NP	3 Wire NPN Proximity
SP2B	Effector IS-2002-AROA Proximity

Adv. Switch Pack SP-3

Code	Description
SP3S48	Silver Contacts 48V - Mechanical
SP3S48CL	Silver Contacts 48V w/ Clipped Resistor - Mechanical
SP3S110	Silver Contacts 110V - Mechanical
SP3S110CL	Silver Contacts 110V w/ Clipped Resistor - Mechanical
SP3S240	Silver Contacts 230V - Mechanical
SP3S240CL	Silver Contacts 230V w/ Clipped Resistor - Mechanical
SP3G30	Gold Contacts 30V - Mechanical
SP3G30CL	Gold Contacts 30V w/ Clipped Resistor - Mechanical
SP3GSA	Gold Contacts 30V, Simple Apparatus - No LEDS - Mechanical
SP3Z	2-Wire Proximity
SP3N	NAMUR Proximity
SP3P	3-Wire PNP Proximity
SP3NP	3 Wire NPN Proximity

Value Switch Package

Code	Description
VSPG30	Gold Contacts 30V
VSPN	NAMUR Proximity
VSPP	3-Wire PNP Proximity
VSPS48	Silver Contacts 48V
VSPZ	2-Wire Proximity

Actuator Accessories Position Indicator (Dia-Flo Only)

Code	Description
P1	Position Indicator

Limit Switches

Code	Description
LS1	Microswitch BZE6 - 2RN
LS2	Microswitch BAF1 - 2RN
LS3	Microswitch DTE6 - 2RN
LS4	Microswitch DTF2 - 2RN
LS5	Microswitch EXQ
LS6	Microswitch EXDQ
LS7	Microswitch LSA1A
LS8	Westlock 3479 Model 3
LS9	GO 74-13528-A1
LS9C	GO 73-13528-A2
LS11	Westlock E3479 MOD3
LS13	Westlock 9880
LS14	Westlock E9880
LS15	Westlock 99920-AB
LS16	Westlock 9881
LS17	Westlock E9881
LS18	Westlock 9920
LS19	Westlock E9920
LSSpec	Special

Limit Switches, Yoke Mounted

Code	Description
YOKE MOUNTED	
LS1Y	Microswitch BZE6 - 2RN
LS2Y	Microswitch BAF1 - 2RN
LS3Y	Microswitch DTE6 - 2RN
LS4Y	Microswitch DTF2 - 2RN
LS5Y	Microswitch EXQ
LS6Y	Microswitch EXDQ
LS7Y	Microswitch LSA1A
LS8Y	Westlock 3479 Model 3
LS9Y	GO 74-13528-A1
LS10Y	Namco EA700-80100
LS12Y	Namco EA170-34100/35100
LSSpecY	Special

Mechanical Accessories

Code	Description
AO	Adjustable Opening Stop
AOH	Adjustable Opening Stop w/ Handwheel
AHODUP	Special Adjustable Opening Stop w/ Handwheel for Dupont
ATS	Adjustable Travel Stop
HWC	Hand Wheel Closing Device
HWO	Hand Wheel Opening Device
JO	Jack Opening Device (#32250)
THC	Adjustable Travel Stop, Handwheel Closing Device
TO	Adjustable Travel Stop, Adjustable Opening Stop
TOHC	Adjustable Travel Stop, Adjustable Opening Device, Handwheel Closing Device
TOHO	Adjustable Travel Stop, Adjustable Opening Stop, Handwheel Opening Device
TOWO	Adjustable Travel Stop, Adjustable Opening Device, Wrench Opening Device
WO	Wrench Opening Device

Manual Bonnet Switch

Code	Description
MBSWMG	Mechanical Gold (Close only)
MBSWMS	Mechanical Silver (Close only)

Actuator Hardware Options

Code	Description
HW1	SS Airmotor Bolts
HW2	SS Accessory Brackets
HW3	SS Tubing and Fittings
HW4	Plastic Tubing /Brass Fittings
HW5	PVC Coated Tubing /Brass Fittings
HW6	PVC Coated Tubing /SS Fittings
HW9	PTFE Tubing and Stainless Steel Fittings
HW10	Breather Vent Filter Stainless Steel
HW11	Breather Vent Filter BRS
HW12	Nylon Actuator Vent Plug

Figure Numer: 1-F-428L-6-0-0-TM17-36-M7-A209-VSPS48-

Configuration Example	VSPS48
Switches and Actuator Accessories: Switch Packages (select 1):	
SP2	
SP3	
VSP	VSPS48
Limit Switches - Special	
Mechanical Accessories	
Manual Bonnet Switch	
Actuator Hardware Options	
Solenoid Valve	
Solenoid Voltage	
Speed Controllers	
Filter Regulators	
Transducer	
Positioners	
Signal Range	
Junction Box	

Pure-Flo Valve Figure Numbers
Switches and Actuator Accessories (cont.)

Solenoid Valve

Code	Description
SV1	Asco 8320G184
SV2	Asco EF8320G184
SV3	Asco 8345G1
SV4	Asco EF8345G1
SV8	Asco EF8320G202
SV14	Burkert Series 6014
SV15	Burkert Series 6015

Solenoid Voltage

Code	Description
V1	120V / 60HZ
V2	24VDC
V3	240V / 60HZ
VSpec	Special

Speed Controllers

Code	Description
SC	Schrader 337-1001
SC2	Whitey needle valve SS-1RMA
SCSpec	Special

Filter Regulators

Code	Description
FR1	Conoflow GFH60XTKEG3G
FR1X2	Two Conoflow GFH60XTKEG3G
FR2	Fisher 67FR
FR2X2	Two Fisher 67FR
FRSpec	Special

Transducer

Code	Description
TR1	Conoflow GT2108ED
TR1630	Conoflow GT6108ED
TRIPH	Moore IPH/4-20MA/3-15PSIG/20PSI/FR1/WDNS
TRWS	Watson Smith S3-4904-3XR
TRSpec	Special

Positioners

Code	Description
PR1	Conoflow Model 31
PR2	Conoflow Model 33
PR3	Moore 73NF
PR4	Moore 73 NB
PR5	Moore 73 NR
PR6	Conoflow P50
PR7	Conoflow P51
PR8	Conoflow P52
PRSpec	Special

Signal Ranges

Code	Description
SR1	3-15 PSI
SR2	6-30 PSI
SR3	3-9 PSI
SR4	9-15 PSI

Junction Box

Code	Description
JB	Junction Box: Standard
JBSpec	Special

Figure Numer: 1-F-428L-6-0-0-TM17-36-M7-A209-VSPS48-

Configuration Example	VSPS48
Switches and Actuator Accessories: Switch Packages (select 1):	
SP2	
SP3	
VSP	VSPS48
Limit Switches - Special	
Mechanical Accessories	
Manual Bonnet Switch	
Actuator Hardware Options	
Solenoid Valve	
Solenoid Voltage	
Speed Controllers	
Filter Regulators	
Transducer	
Positioners	
Signal Range	
Junction Box	

Pure-Flo Valve Figure Numbers
Service Preparation and Quality Documents

Special Service Preparation

Code	Description
BAG	Cleaned and Bagged
DS	Dual Scale (PSI/BAR) Gauges
EU_SERVICE	European Union Service
NPC	No Polishing Compound
OXY	Oxygen
SIFREE	Silicone Free Preparation
SPEC	Customer Special
TOB	Tobacco
VAC	Vacuum

Special Quality Documents

Code	Description
SQDB	CMTR (Body)
SQD1	CMTR (body, tube, weld, weld rod)
SQD2	C of C (seat & shell pressures)
SQD3	C of C Profilometer Tape for each body
SQDBIO	C of C Diaphragm USP XXVIII Class VI Biological Reactivity
SQD5	C of C Body/Stud/Nut CMTR and C of C to ASME Section VIII
SQD6	C of C Tube CMTR, Tank Bottom Valve
SQD7	C of C Weld Rod CMTR, Tank Bottom Valve

Figure Numer: 1-F-428L-6-0-0-TM17-36-M7-A209-VSPS48-SQDB

Configuration Example		SQDB
Special Service Preparation		
Special Quality Documents		SQDB

Obsolete Figure Codes

Code	Description
BODY TYPE	
RTBV	Radial Tank Bottom Valve
8D	Bio-Tek® Forged 1.4435 SS
FD	Forged 1.4435 SS
BODY ENDS (BUTTWELD)	
423X	18 GA BT, Max Cutback , STD Length
423XL	18 GA BT, Max Cutback , Non-STD LG.
428X	16 GA Max Cut Standard Length
428XL	16 GA Max Cut Nonstandard Length
429X	14 GA Max Cut Standard Length
433	ANSI Flanged
489	RTBV, 90 Degree 16 GA Butt Weld
490	RTBV, 90 Degree Tri-Clamp
SECOND END CODE (CLAMP)	
X23X	18 GA BT, Max Cutback STD Length
X23XL	18 GA BT, Max Cutback Non-STD LG
X28X	16 GA BT, Max Cutback STD Length
X28L	By 16 Gauge Extended Tangent BW
X28XL	16 GA BT, Max Cutback Non-STD LG
X29L	By 14 Guage Extended Tangent BW
XX29X	14 GA BT, Max Cutback STD Length
BONNETS, HANDWHEEL	
16	Standard Bio-Tek® Bonnet
17	Sealed Bio-Tek® Bonnet
902	Cast Iron Indicating
902S	Cast Iron Indicating - Sealed
912	Stainless Steel (316) Indicating
912S	Stainless Steel (316) Indicating - Sealed
932	Bronze Indicating
932S	Bronze Indicating - Sealed
933	Bronze Indicating with Travel Stop (1/2" - 4")
933S	Bronze Indicating with Travel Stop - Sealed (1/2" - 4")
942	Double Iron Indicating
942S	Double IronIndicating - Sealed
943	Double Iron Indicating with Travel Stop
943S	Double Iron Indicating with Travel Stop - Sealed
950	Rising Handwheel with Travel Stop
961	Plastic PAS Non-Indicating with Travel Stop
WFI HOT LOCKOUT BONNET	
LBA	115VAC/60HZ
LBD	24VDC
LBD1	24VDC with Position feedback
LBM	24VDC with Mech Switch Output
LBP	24VDC with Solid State Switch Output
ACTUATED BONNETS (BRONZE)	
33	Actuated
33S	Actuated - Sealed
OPTIONAL BONNET INTERNALS	
M11	316 Stainless Steel Stem
M12	PSU Cap
M13	Stainless Steel Compressor (Bio-Tek®)
M14	Clear Cap
DIAPHRAGMS	
A	Soft Natural Rubber (FDA)
16	EPDM Compound 16 (FDA)
B16	Biotek EPDM Compound 16
C	Hypalon
H	EPDM (FDA)
NB	NB
TM	PTEE (FDA)/Grade 16 BC
TFM1700	TFM1700 PTFE (FDA)
WB	White Butyl (FDA)
ADV. SWITCH PACK SP-2.5	
SP5B	Effector IS-2002-AROA Proximity
SP5G	Gold Contacts - Mechanical
SP5GEU	Gold De-Rated to 70VDC/48VAC Max for EU Service - Mechanical
SP5N	NAMUR Proximity
SP5NP	3 Wire NPN Proximity
SP5P	3-Wire PNP Proximity
SP5S	Silver Contacts - Mechanical
SP5SEU	Silver De-Rated to 70VDC/48VAC Max for EU Service - Mechanical
SP5Z	2-Wire Proximity
SOLENOID VALVE	
SV5	Burkert 300-C-1/16 -F-R-1/8-VOL (Advantage)
SV6	Burkert 311-C-5/64 -F-BR-1/8-VOL (Advantage)
SPECIAL SERVICE PREPARATION	
CS	Controlled Sulfur Body (0.005-0.017%)

Pure-Flo Valve Figure Numbers
Sterile Access & GMP Fabrications

Fabrication Type

Code	Description
GMP	GMP
HSA	Horizontal Sterile Access
SA	Sterile Access
SPEC	Special

Purge Location

Code	Description
P1	Purge located closest to main valve end 1
P2	Purge located closest to main valve end 2
PB	Purge located at both valve ends (P1 and P2)

Purge Valve Orientation

Code	Description
B	Back
F	Front
L	Left
LL	Left Special
LR	Left/Right Special
R	Right
RL	Right/Left Special
RR	Right Special

Valve Number for Fabrication

Code	Description
M	Main Valve
2	Second Valve
3	Third Valve
4	Fourth Valve
5	Fifth Valve
6	Sixth Valve
7	Seventh Valve
8	Eighth Valve
9	Ninth Valve
10	Tenth Valve

Note: See pages 5-11 for additional figure numbers.

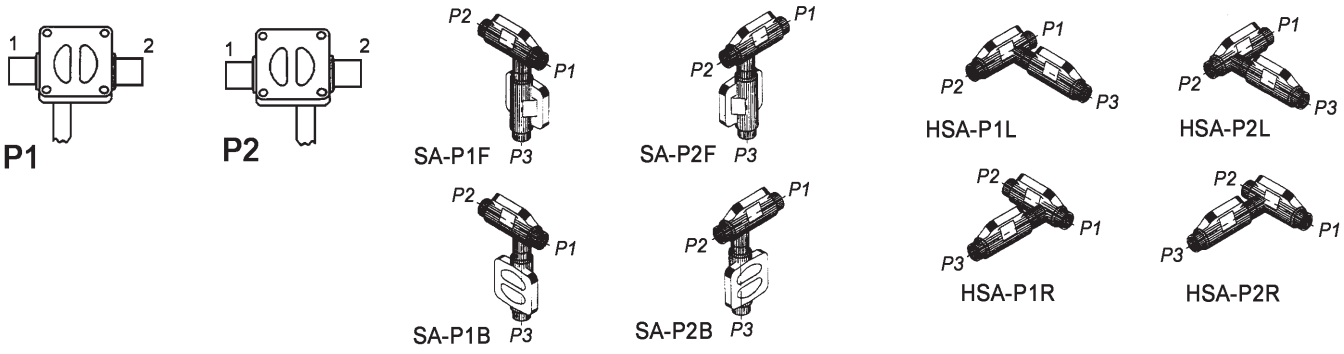
Sterile Access Example

Sterile Access single valve fabrication with a 1.5" forged stainless steel main valve and a 0.5" forged purge tube closest to the second end. The main valve has buttweld ends, 25 Ra polished interior, a 950 PBT manual bonnet and a modified PTFE diaphragm. The purge tube has a tri-clamp end.

Single Valve Fabrication Figure Number: SA-1.5-F-428L-.5-X19-P2-6-0-0-TM17-950-SQD1

	Configuration Example	SA	1.5	F	428L		.5	X19	P2	6-0-0	TM17	950			SQD1
Single Valve Fabrication	Fabrication Type	SA													
	Valve Size		1.5												
	Body Type			F											
	Body End Code				428L										
	Second End Code														
	Purge Tube Size						.5								
	Purge Tube End Code							X19							
	Purge Location								P2						
	Polish Selections (pg 5)									6-0-0					
	Diaphragm Selection (pg 6)										TM17				
	Bonnets & Bonnet Options (pg 7)											950			
	Actuator Options (pg 8)														
	Switches & Actuator Accessories (pg 9-10)														
	Service Preparation & Quality Doc. (pg 11)														SQD1

Sterile Access Orientations



Pure-Flo Valve Figure Numbers
Sterile Access & GMP Fabrications (cont.)

GMP Example

GMP two valve fabrication with a 2" forged stainless steel main valve and a 0.5" forged purge valve closest to the second end and facing to the right. The main valve has Tri-Clamp ends, 25 Ra polished interior, a reverse acting advantage actuator with a 60lb spring, an SP-2 switch pack with silver mechanical contacts and a modified PTFE diaphragm. The secondary valve has 16 gauge ends, 25-inch polished interior, a PAS hand-wheel operated bonnet with sanitary internals and a modified PTFE diaphragm.

Fabrication Figure Number: GMP-2-2-.5

	Configuration Example	GMP	2	2	.5
Fabrication	Fabrication Type	GMP			
	Two Valve Fabrication		2		
	Main Valve Size			2	
	Second Valve Size				.5

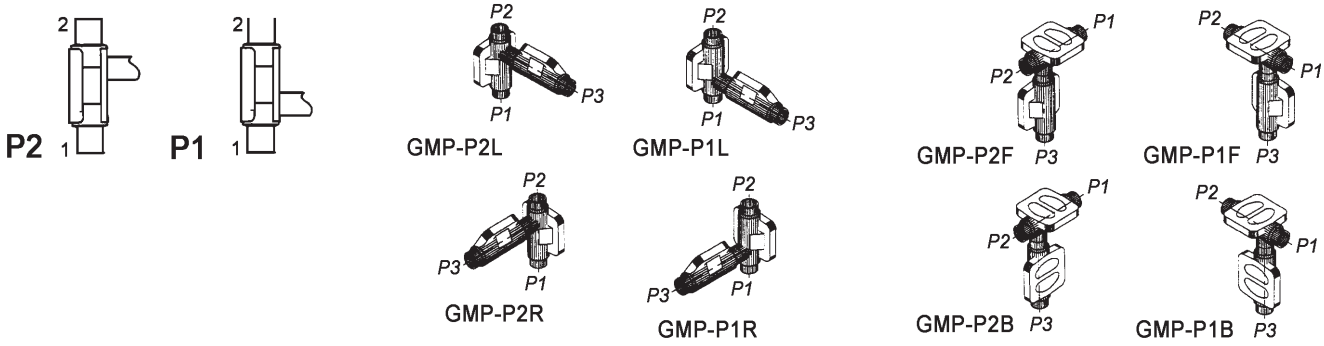
Main Valve Figure Number: GMP-M-2-F-419-P2-R-6-0-0-TM17-36-M7-A216-SP2S-SQD1

	Configuration Example	GMP	M	2	F	419		P2	R		6-0-0	TM17	36-M7	A216	SP2S	SQD1
Main Valve	Fabrication Type	GMP														
	Valve Number		M													
	Valve Size			2												
	Body Type				F											
	Body End Code					419										
	Second End Code							P2								
	Purge Location								R							
	Purge Valve Orientation															
	Tube Extension										6-0-0					
	Polish Selections (pg 5)											TM17				
	Diaphragm Selection (pg 6)												36-M7			
	Bonnets & Bonnet Options (pg 7)													A216		
	Actuator Options (pg 8)														SP2S	
	Switches & Actuator Accessories (pg 9-10)															SQD1
	Service Preparation & Quality Doc. (pg 11)															

Second Valve Figure Number: GMP-2-.5-F-428L-R-6-0-0-TM17-963-M2-SQD1

	Configuration Example	GMP	2	.5	F	428L	R		6-0-0	TM17	963-M2			SQD1
Second Valve	Fabrication Type	GMP												
	Valve Number		2											
	Valve Size			.5										
	Body Type				F									
	Body End Code					428L								
	Purge Valve Orientation						R							
	Tube Extension								6-0-0					
	Polish Selections (pg 5)									TM17				
	Diaphragm Selection (pg 6)										963-M2			
	Bonnets & Bonnet Options (pg 7)													
	Actuator Options (pg 8)													
	Switches & Actuator Accessories (pg 9-10)													SQD1
	Service Preparation & Quality Doc. (pg 11)													

GMP Orientations



Pure-Flo Valve Figure Numbers
Zero Static Fabrications

Fabrication Type

Code	Description
ZSBBT	Zero static Block Body Tee
ZSBBHV	Zero static Block Body U-Bend: Horizontal Tube - Vertical Valve
ZSBBVV	Zero static Block Body U-Bend: Vertical Tube - Vertical Valve
ZSBBS	Zero static Back to Back Sample Valve
ZSHH	Zero static Horizontal Tube - Horizontal Valve
ZSVH	Zero static Vertical Tube - Horizontal Valve

Body Type

Code	Description
SVBT	Sample Valve Bio-Tek® (R)
SVPF	Sample Valve Pure-Flo

Sample Valve Outlet Side

Code	Description
R	Ported on Right Side of Valve (Standard)
L	Ported on Left Side of Valve

U Bend Tube Orientation (Optional)

Option	Option Description
HV	Horizontal U-Bend Tube with Vertical Valve Orientation
VV	Vertical U-Bend Tube with Vertical Valve Orientation
USPEC	Special U-Bend Orientation

Body Ends

Code	Description
419R	.75" Tri-Clamp

Note: See pages 5-11 for additional figure numbers.

Zero Static Back-to-Back Sample Example

Zerostatic Block Body with a .75" wrought stainless steel main valve and a 1.5" tube. All three outlets are buttweld. Interior finish: RA 25, PBT hand-wheel operated bonnet and a modified PTFE diaphragm. Bio-Tek sample valve with .75" Tri-clamp connection.

Main Valve Figure Number: ZSBBS-.75-428-1.5-428-.5-SVBT-419R-R-W-6-1-0-SQD1

	Configuration Example	ZSBBS	.75	428	1.5		428	.5	SVBT	419R	R		W	6-1-0		SQD1
Main Valve	Fabrication Type	ZSBBS														
	Valve Size		.75													
	Body End Code			428												
	Zerostatic Tube Size				1.5											
	U-Bend Tube Orientation*															
	Zerostatic Tube End Code						428									
	Secondary Valve Size							.5								
	Secondary Valve Type								SVBT							
	Secondary Valve End Type									419R						
	Secondary Outlet Orientation										R					
	Sample Outlet Side															
	Body Material												W			
	Polish Selections (pg 5)													6-1-0		
	Diaphragm Selection (pg 6)															
	Service Preparation & Quality Doc. (pg 11)															SQD1

* For a U-Bend Vertical Tube, enter VV. For Horizontal Tube, enter HV. All other figure numbers remain the same.

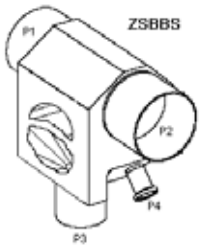
Main Multiport Valve Topworks Figure Number: .75-N-TM17-950

	Configuration Example	.75	N	TM17	950	
Topworks	Valve Size	.75				
	Body (Not Supplied)		N			
	Diaphragm (pg 6)			TM17		
	Bonnet (pg 7)				950	
	Options (pg 8-10)					

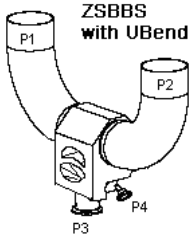
Sample Multiport Valve Topworks Figure Number: .5-N-TM17-18

	Configuration Example	.5	N	TM17	18	
Topworks	Valve Size	.5				
	Body (Not Supplied)		N			
	Diaphragm (pg 6)			TM17		
	Bonnet (pg 7)				18	
	Options (pg 8-10)					

Zero Static Back-to-Back Sample Valve



Zero Static Back-to-Back Sample Valve with U-Bend

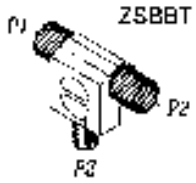


Zero Static Block Body Tee Example

ZSBBT with a 0.5" wrought stainless steel main valve and a 2" tube. All three outlets have tri-clamp ends. RA 25 ID, both interior and exterior electropolish, PAS hand-wheel operated bonnet, sanitary internals and EPDM diaphragm.

Valve Figure Number: ZSBBT-.5-W-419-2-X19-6-1-3-17-963-M2-SQD1

	Configuration Example	ZSBBT	.5	W	419	2	X19		6-1-3	17	963-M2	SQD1
Main Valve	Fabrication Type	ZSBBT										
	Valve Size		.5									
	Body Type			W								
	Body End Code				419							
	Zerostatic Tube Size					2						
	Zerostatic Tube End Code						X19					
	Zerostatic Tube Second End Code											
	Polish Selections (pg 5)								6-1-3			
	Diaphragm Selection (pg 6)									17		
	Bonnets & Bonnet Options (pg 7-10)										963-M2	
	Service Preparation & Quality Doc. (pg 11)											SQD1

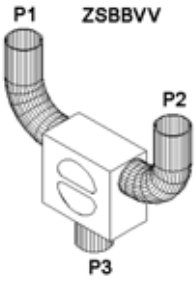


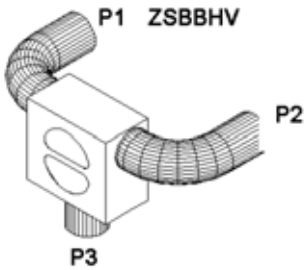
Zero Static Block Body U-Bend Example

Zerostatic Block Body Tee U-bend (Vertical Tube, Vertical Valve) with a 1" wrought stainless steel main valve and a 1.5" tube. The outlet of the valve body has Tri-Clamp ends. The tube has 1.5" buttweld 16 gauge ends. Interior finish: RA 25, PAS hand-wheel operated bonnet-sealed, sanitary internals and a PTFE diaphragm.

Valve Figure Number: ZSBBVV-1-W-419-1.5-X28-6-1-0-TM17-963S-M2-SQD1

	Configuration Example	ZSBBVV	1	W	419	1.5	X28		6-1-0	TM17	963S-M2	SQD1
Main Valve	Fabrication Type	ZSBBVV										
	Valve Size		1									
	Body Type			W								
	Body End Code				419							
	Zerostatic Tube Size					1.5						
	Zerostatic Tube End Code						X28					
	Zerostatic Tube Second End Code											
	Polish Selections (pg 5)								6-1-0			
	Diaphragm Selection (pg 6)									TM17		
	Bonnets & Bonnet Options (pg 7-10)										963S-M2	
	Service Preparation & Quality Doc. (pg 11)											SQD1





Pure-Flo Valve Figure Numbers
Zero Static Fabrications (cont.)

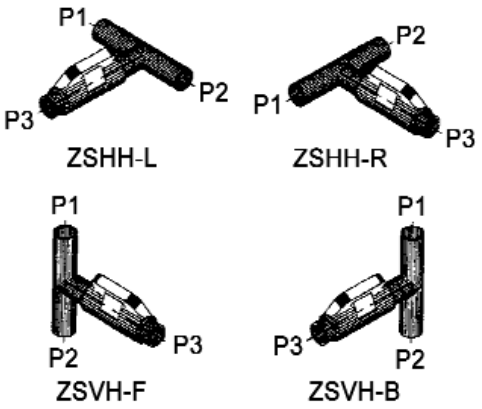
Zero Static - Forged Bodies Example

Zerostatic with 1" forged triclamp main valve and 1.5" buttweld tube. Interior finish is 20 Ra with Electropolish ID and OD. PTFE diaphragm with EPDM backing cushion. PAS handwheel operated bonnet. Purge valve oriented on right side.

Valve Figure Number: ZSHH-1-F-419-1.5-X28-R-8-0-3-TM17-963-M2-SQD1

	Configuration Example	ZSHH	1	F	419	1.5	X28		R	8-0-3	TM17	963-M2	SQD1
Main Valve	Fabrication Type	ZSHH											
	Valve Size		1										
	Body Type			F									
	Body End Code				419								
	Zerostatic Tube Size					1.5							
	Zerostatic Tube End Code						X28						
	Zerostatic Tube Second End Code												
	Purge Valve Orientation								R				
	Polish Selections (pg 5)									8-0-3			
	Diaphragm Selection (pg 6)										TM17		
	Bonnets & Bonnet Options (pg 7-10)											963-M2	
	Service Preparation & Quality Doc. (pg 11)												SQD1

Zero-Static Orientations



Pure-Flo Valve Figure Numbers
Multiport Valves

Type of Valve

Option	Description
DV2W	Divert Valve 2-way
DV3W	Divert Valve 3-way
DV4W	Divert Valve 4-way
DV5W	Divert Valve 5-way
DV6W	Divert Valve 6-way
CHRO	Chromatography
CHRONBP	Chromatography Valve without Bypass
CRO	Cross over Valve
CROD	Cross over Valve with Drain Angle
SB1	Sterile Barrier Valve Option 1
SB2	Sterile Barrier Valve Option 2
DIDO	Double Inlet Double Outlet Diverter Valve
BP	Pure-Flo Valve with Bypass Option
ISG	Integral Sterile Access GMP Valve
VSPEC	Special Valve Type

Type

Option	Description
BT	Bio-Tek®
PF	Pure-Flo

Outlet Option

Option	Description
Refer to the drawing that corresponds to the type chosen	
1	Outlet Configuration 1
2	Outlet Configuration 2
3	Outlet Configuration 3
4	Outlet Configuration 4
5	Outlet Configuration 5
6	Outlet Configuration 6
7	Outlet Configuration 7
8	Outlet Configuration 8
OSPEC	Special Outlet Configuration

Material

Option	Description
W	Wrought 316L
WA	Wrought AL6XN
WC2	Wrought C-22
WC6	Wrought C-276
WT	Wrought Titanium
BSPEC	Special Material

Flow Through (Optional)

Option	Description
DVFT	Divert Flow-Through

Note: See pages 5-11 for additional figure numbers.

Divert Example

2-Way Divert Valve with a 1.5" wrought stainless steel body. The inlet and outlets have Tri-Clamp ends. The outlet is Option 2. The Interior finish: RA 25. Fail close Advantage® Actuator 60# spring. Modified PTFE diaphragm.

Valve Figure Number: DV2W-1.5-2-419-W-6-1-0-SQD1

	Configuration Example	DV2W	1.5		2	419	W	6-1-0	SQD1
Main Valve	Fabrication Type	DV2W							
	Valve Size		1.5						
	Body Type (.5" only)								
	Divert Outlet Option				2				
	Divert End Connections					419			
	Body Material						W		
	Polish Selections (pg 5)							6-1-0	
	Service Preparation & Quality Doc. (pg 11)								SQD1

Topworks

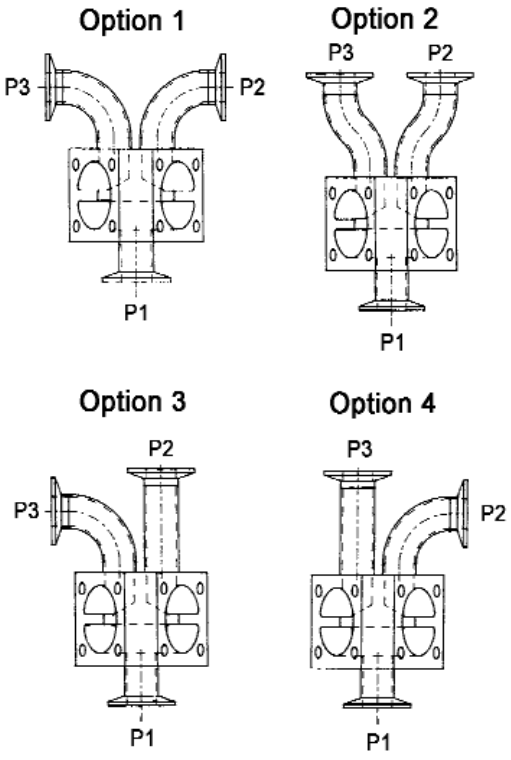
Topworks for Multiport and Specialty Valves are configured separately from the bodies; they do not appear in the valve figure number but are listed after the body configuration. Once the Multiport Valve has been described, the Topworks configuration will appear.

Main Valve Topworks Figure Number: 1.5-N-TM17-31-M7-A216

	Configuration Example	1.5	N	TM17	31-M7	A216
Topworks	Valve Size	1.5				
	Body (Not Supplied)		N			
	Diaphragm (pg 6)			TM17		
	Bonnet (pg 7)				950	
	Options (pg 8-10)					A216

Secondary Valve Topworks Figure Number: 1.5-N-TM17-31-M7-A216

	Configuration Example	1.5	N	TM17	31-M7	A216
Topworks	Valve Size	1.5				
	Body (Not Supplied)		N			
	Diaphragm (pg 6)			TM17		
	Bonnet (pg 7)				950	
	Options (pg 8-10)					A216



Integral Sterile Access GMP Example

ISG Valve with a 2" wrought stainless steel body. Secondary valve is 1.5", ported on right side of valve. The outlet is Option 5. The Interior finish: RA 20. Fail close Advantage® Actuator 60# spring. Modified PTFE diaphragm.

Main Valve Figure Number: ISG-2-5-1.5-R-W-8-1-4-SQD1

	Configuration Example	ISG	2		5	1.5		R	W	8-1-0	SQD1
Main Valve	Fabrication Type	ISG									
	Valve Size		2								
	Body Type (.5" only)										
	Outlet Option				5						
	Second Valve Size					1.5					
	Valve Type (.5" only)										
	Sample Outlet Side							R			
	Body Material								W		
	Polish Selections (pg 5)									8-1-0	
	Service Preparation & Quality Doc. (pg 11)										SQD1

Topworks

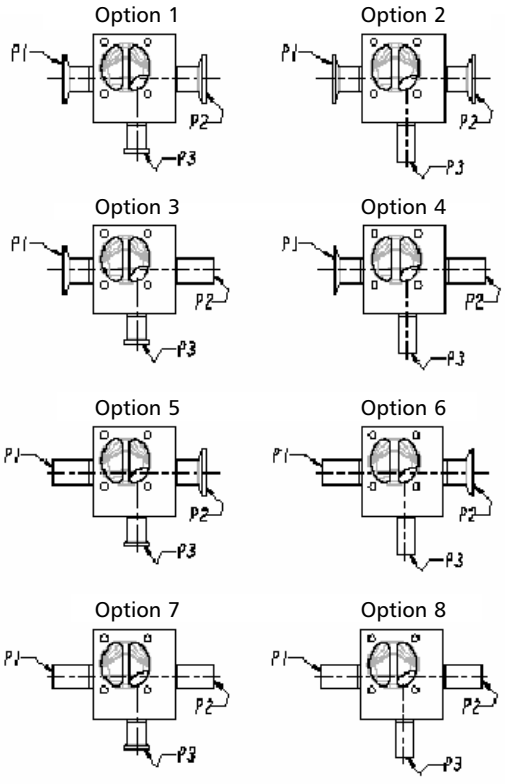
Topworks for Multiport and Specialty Valves are configured separately from the bodies; they do not appear in the valve figure number but are listed after the body configuration. Once the Multiport Valve has been described, the Topworks configuration will appear.

Main Valve Topworks Figure Number: 2-N-TM17-31-M7-A216

	Configuration Example	2	N	TM17	31-M7	A216
Topworks	Valve Size	2				
	Body (Not Supplied)		N			
	Diaphragm (pg 6)			TM17		
	Bonnet (pg 7)				31-M7	
	Options (pg 8-10)					A216

Secondary Valve Topworks Figure Number: 1.5-N-TM17-31-M7-A216

	Configuration Example	1.5	N	TM17	31-M7	A216
Topworks	Valve Size	1.5				
	Body (Not Supplied)		N			
	Diaphragm (pg 6)			TM17		
	Bonnet (pg 7)				31-M7	
	Options (pg 8-10)					A216



End Connection Options

ITT

Pure-Flo®

Topworks

Engineered for life

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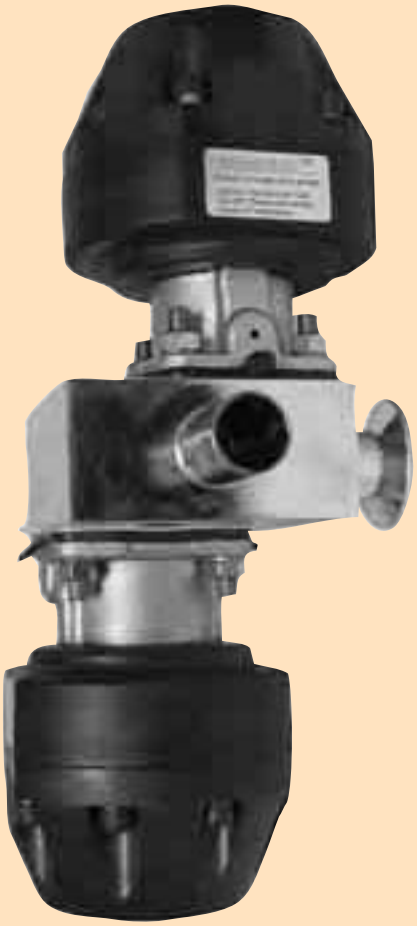
Índice



Introducción

Disponible en una amplia variedad de estilos manuales y neumáticos para cumplir con la mayoría de los requisitos, la línea de productos accionadores Pure-Flo® está diseñada y construida para adaptarse a las aplicaciones más exigentes en la industria farmacéutica y de bioprocesamiento.

Todos los estilos se construyen con materiales aprobados por la FDA y tienen las siguientes características:

- Diseños compactos que ahorran espacio
- Resistencia
- Durabilidad
- Confiabilidad
- Resistencia a la mayoría de los lavados
- Facilidad de limpieza

Casquete manual 963 de PAS

Capaz de tolerar los medios típicos de lavado, el casquete 963 tiene un diseño plenamente funcional, compacto y liviano, y resistente. El casquete 963 tiene muchas características que cumplen con los requisitos más exigentes de los sistemas de bioprocesamiento esenciales de la actualidad.

Tipo: 963 y 963S

Rango de tamaño: ½"-4" (DN15-DN100)

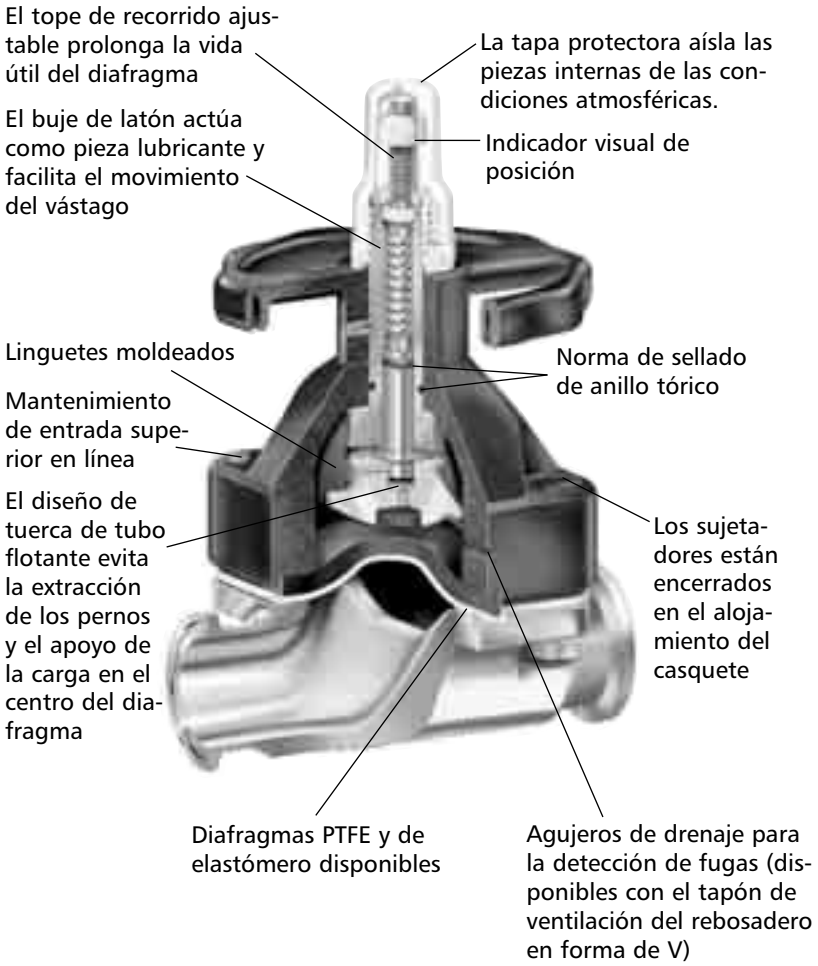
Presión/Temperatura de servicio:
Presión de servicio máxima:
150 psig (10,34 bar)
Temperatura de servicio máxima:
300 °F (149 °C)

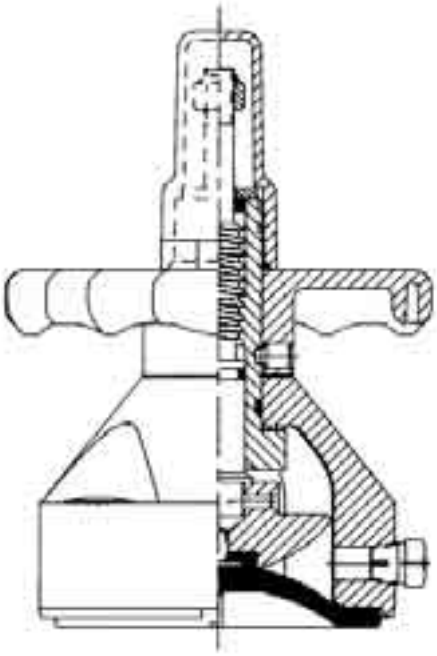
Limitaciones de temperatura externa:
300 °F (149 °C) para los modelos 963-S2-M2-M17
S2 = sello de Viton
M2 = piezas sanitarias internas
M17 = tapa de PPS
175 °F (79 °C) para los modelos 963

Material del casquete y de la rueda de mano:
Poliarisulfona (PAS) reforzada con vidrio conforme a la norma 21CFR 177.1660 de la FDA

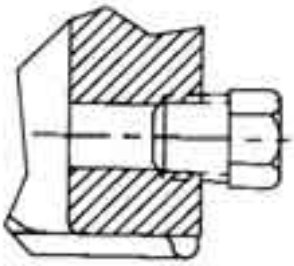
Resistencia a la corrosión:
Es resistente al lavado con alcohol, con cloruros y con la mayoría de los componentes cáusticos.
Para obtener información específica de la resistencia química, consulte a la fábrica.

Características estándar:
- Vástago ascendente
- Tope de recorrido ajustable
- Tapa protectora
- Buje de latón del vástago
- Indicador visual de posición
- Lubricación permanente
- Sellos de anillo tórico
- Compresor de bronce
- Sujetadores encerrados ½"-3" (DN15-DN80)
- Piezas internas higiénicas: ½"-2"





Casquete sellado: tapón de ventilación de rebosadero en forma de V



Vista detallada del tapón de ventilación de rebosadero en forma de V

Casquete manual 963 de PAS

Características opcionales:
- Casquetes sellados: 963S
- Piezas internas higiénicas (M2): 3-4”
- Con traba: de 0,5; 0,75 y 1”

Opción autoclavable:
- 963S-S2-M2-M17

S2 = sello de Viton
M2 = piezas sanitarias internas
M17 = tapa de PPS

Un casquete sellado proporciona un área de contención secundaria para los fluidos de proceso si el diafragma no falla. Se proporciona un tapón de ventilación de rebosadero en forma de V para la detección de fugas y para evitar la eliminación de líquidos de proceso hacia el ambiente. Los casquetes sellados son una opción disponible entre los casquetes manuales 963.

Nota: Vea las páginas 23 y 27 para obtener las dimensiones y la lista de materiales

Casquete manual 970 de acero inoxidable

Con resistencia a los protocolos estándar de lavado, el casquete 970 de acero inoxidable constituye una solución compacta y autoclavable para aplicaciones farmacéuticas y de bioprocesamiento.

Tipo: 970

Rango de tamaño: ½"-2" (DN15-DN50)

Presión de servicio máxima:
½-1": 200 psig (13,8 bar)
1½-2": 175 psig (12,1 bar)

Temperatura de servicio máxima:
Vea la página 27

Material del casquete:
Acero inoxidable 316

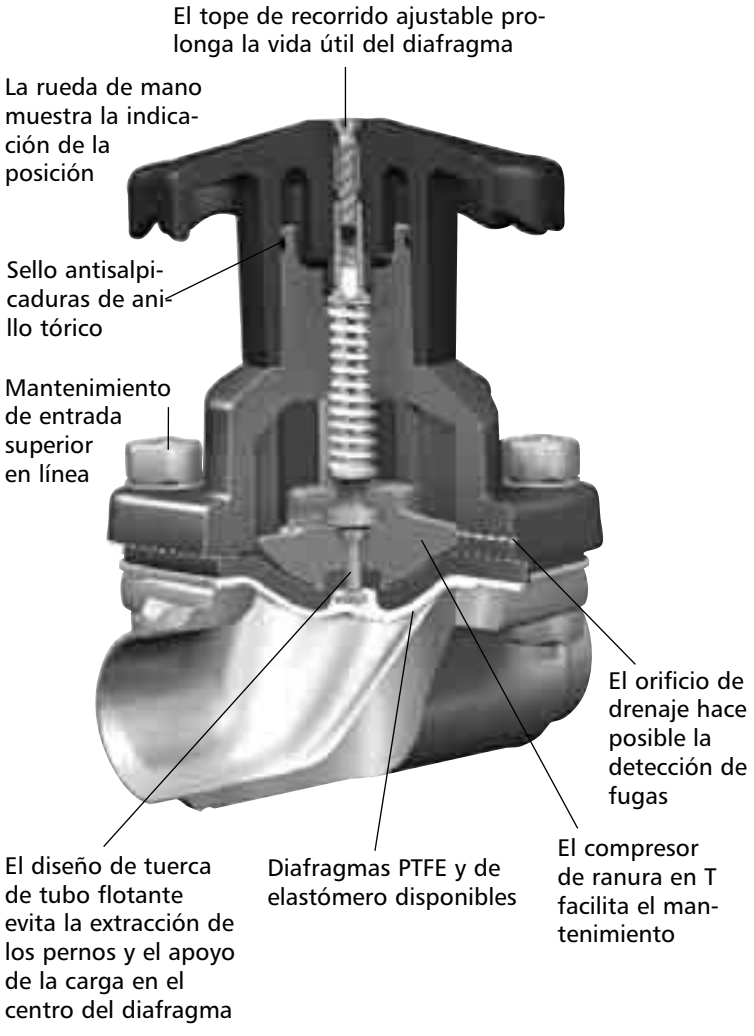
Material de la rueda de mano:
Poliarisulfona (PAS) reforzada con vidrio conforme a la norma 21CFR 177.1660 de la FDA

Resistencia a la corrosión:
Es resistente al lavado con alcohol, con cloruros y con la mayoría de los componentes cáusticos. Para obtener información específica de la resistencia química, consulte a la fábrica.

Características estándar:
- Montaje y desmontaje sencillo
- Rueda de mano ascendente
- Tope de recorrido ajustable*
- Indicador visual de posición
- Sello antisalpicaduras de anillo tórico
- Vástago de acero inoxidable
- Compresor de bronce

Nota: Vea las páginas 23 y 26 para obtener las dimensiones y la lista de materiales

* Patente N.° 6.241.213



Casquete manual 913 de acero inoxidable

El casquete 913 garantiza el cumplimiento de los requisitos de procesamiento biofarmacéutico más exigentes y está disponible con muchas características estándar y opcionales. La construcción de acero inoxidable y la disponibilidad de la opción sellada hacen del casquete 913 una excelente opción para aplicaciones esenciales que exijan confiabilidad, resistencia a la corrosión y contención secundaria de productos.

Tipo: 913 y 913S

Rango de tamaño: ½"-4" (DN15-DN100)

Presión de servicio máxima:
½-1": 200 psig (13,8 bar)
1½-2": 175 psig (12,1 bar)
3-4": 150 psig (10,3 bar)

Temperatura de servicio máxima:
Vea la página 27

Material del casquete y de la rueda de mano:
Acero inoxidable serie 300

Resistencia a la corrosión:
Es resistente al lavado con alcohol y con la mayoría de los componentes cáusticos.
Para obtener información específica de la resistencia química, consulte a la fábrica.

Características estándar:
- Tope de recorrido ajustable
- Tapa protectora
- Buje de latón del vástago
- Indicador visual de posición
- Lubricación permanente
- Sellos de anillo tórico
- Compresor de bronce
- Piezas internas higiénicas: ½"-4"

Características opcionales:
- Casquetes sellados: 913S
- Tope de abertura ajustable
- Piezas internas del casquete 3A
- Con traba
- Rueda manual ampliada

Opciones autoclavables:
- 913-S2-M2-M17 (no sellado)
- 913S-S2-M2-M17 (sellado)

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Casquete 903 de hierro fundido

El casquete 903 es una opción económica para aplicaciones que no exigen autoclavabilidad. Una selección de recubrimientos hace que el casquete 903 sea adecuado para varios servicios sanitarios, entre los que se incluyen los requisitos 3A de la USDA.

Tipo: 903 y 903S

Rango de tamaño: ½"-4" (DN15-DN100)

Presión de servicio máxima:
½-1": 200 psig (13,8 bar)
1½-2": 175 psig (12,1 bar)
3-4": 150 psig (10,3 bar)

Temperatura de servicio máxima:
Vea la página 27

Material del casquete:
Hierro fundido con recubrimiento
Recubrimientos disponibles: Epoxi blanco atmosférico y PVDF

Material de la rueda de mano:
Poliarisulfona (PAS) reforzada con vidrio recubierta para coincidir con el casquete ½"-1" (DN15-DN25)
Hierro fundido con recubrimiento de 1½" a 4" (DN40-DN100)

Resistencia a la corrosión:
Es resistente al lavado con alcohol y con la mayoría de los componentes semicáusticos.
Para obtener información específica acerca de la resistencia química, consulte a la fábrica.

Características estándar:
- Tope de recorrido ajustable
- Tapa protectora
- Buje de latón del vástago
- Indicador visual de posición
- Lubricación permanente
- Sellos de anillo tórico
- Compresor de hierro o cinc fundido

Características opcionales:
- Casquetes sellados: 903S
- Piezas internas higiénicas: ½"-4"
- Tope de abertura ajustable
- Compresor de bronce
- Rueda manual ampliada
- Con traba

Casquete manual Bio-Tek®

El casquete Bio-Tek® es una solución compacta y liviana ideal para aplicaciones de bioprocesamiento, y se utiliza con frecuencia como puerto de muestreo o de drenaje en los sistemas de proceso farmacéutico y en fabricaciones Pure-Flo.

Tipo: 18 y 18S

Rango de tamaño: ¼", ⅜", ½" (DN6-DN15)

Presión/Temperatura de servicio:
150 psi a 220 °F (10,34 bar, 104 °C)
Temperatura externa máxima: 300 °F (149 °C)

Materiales del casquete:
Modelo 18
- Casquete: Acero inoxidable 316
- Eje: Acero inoxidable
- Compresor: Acero inoxidable

Modelo 18S
- Casquete: Acero inoxidable 316
- Eje: Acero inoxidable
- Compresor: Acero inoxidable
- Anillos tóricos: Fluoropolímero, conforme a la FDA

Características estándar:
- Tope de recorrido ajustable
- Autoclavable

Nota: Este casquete está disponible para cuerpos de tipo Bio-Tek únicamente.

Accionador de pistones Advantage – APA®

El APA ha sido diseñado para proporcionar una envoltura dimensional menor que aquélla de la línea de los productos accionadores Advantage y, al mismo tiempo, satisfacer las necesidades básicas de la industria farmacéutica y de bioprocesamiento.

Tipo: Accionador de pistones Advantage (APA)

Rango de tamaño: ½"-2" (DN8-DN50)

Modo de funcionamiento: Accionador neumático de pistones de acción inversa (falla de cierre).

Presión de servicio máxima: 150 psig (10,34 bar)

Temperatura de servicio máxima: 292 °F (145 °C)

Material del casquete: Acero inoxidable 316

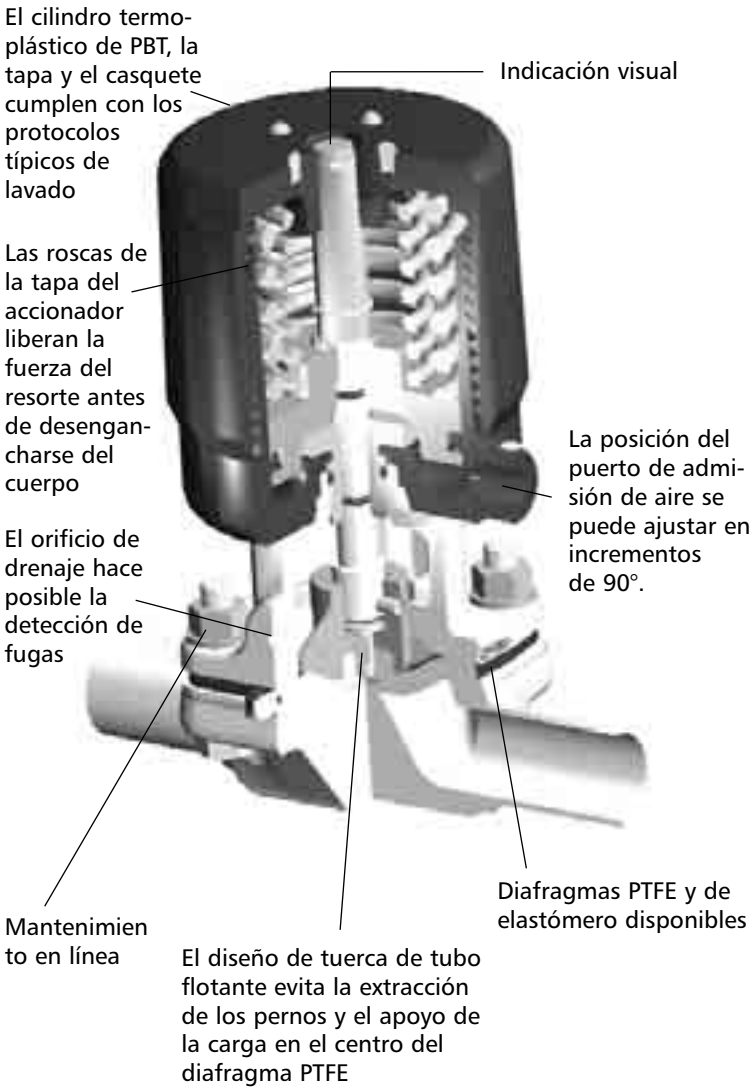
Material del cilindro o de la tapa: Teraftalato de polibutileno (PBT) conforme a la norma 21CFR 177.1660 de la FDA

Resistencia a la corrosión: Es resistente al lavado con alcohol, con cloruros y con la mayoría de los componentes cáusticos. Para obtener información específica acerca de la resistencia química, consulte a la fábrica.

Características estándar:
- Indicador visual de posición
- Lubricación permanente
- Sellos de anillo tórico
- Patrón de pernos de montaje del interruptor

Características opcionales:
- Tope de abertura ajustable
- Piezas internas higiénicas
- Paquetes de interruptores

Nota: Vea las páginas 22 y 24 para obtener las dimensiones y la lista de materiales.
Vea la página 16 para obtener la información de dimensionamiento de los accionadores.



Casquete de acero inoxidable (31)

Accionador Advantage®

El accionador Advantage® funciona mediante un diafragma, es compacto y liviano, y está diseñado para adaptarse a las exigentes restricciones de espacio de la industria farmacéutica y de bioprocesamiento. La unidad tiene un diseño de accionador neumático de encendido/apagado con tres modos de cierre.

Tipo: Advantage®

Rango de tamaño: ¼"-2" (DN6-DN50)

Modos de funcionamiento: Falla de cierre, falla de abertura y doble acción

Presión/Temperatura de servicio:
Presión de servicio máxima:
150 psig (10,34 bar)
Temperatura de servicio máxima:
300 °F (149 °C)
Limitaciones de temperatura externa:
300 °F (149 °C)

Material del casquete (código de casquete N.° 36):
Poliarisulfona (PAS) reforzada con vidrio conforme a la norma 21CFR 177.1660 de la FDA

Resistencia a la corrosión:
Es resistente al lavado con alcohol, con cloruros y con la mayoría de los componentes cáusticos. Para obtener información específica de la resistencia química, consulte a la fábrica.

Características estándar:
- Indicador visual de posición
- Sellos de anillo tórico
- Piezas internas higiénicas
- Autoclavable, ¼-2"
- Patrón de pernos de montaje del interruptor

Características opcionales:
- Tope de abertura ajustable
- Casquete de acero inoxidable (código de casquete N.° 31)
- Tope de recorrido ajustable

Nota: Vea las páginas 20 y 25 para obtener las dimensiones y la lista de materiales. Vea las páginas 17 a 19 para obtener la información de dimensionamiento de los accionadores.

Accionador Advantage® series 33 y 47

Los accionadores Advantage 33 y 47 hacen extensible el rango de tamaño de la línea de productos accionadores Advantage a las válvulas de 3" y 4".

Tipo: Advantage® 33 y 47

Rango de tamaño: 3"-4" (DN80-DN100)

Modos de funcionamiento:
Falla de cierre*, falla de abertura y doble acción

Presión/Temperatura máxima de servicio:
150 psig (10,34 bar)
300 °F (149 °C)

Limitaciones de temperatura externa:
150 °F (66 °C)

Material de la tapa del accionador:
Viniléster termoestable (conforme a la FDA)

Material del casquete:
Hierro dúctil recubierto con nailon

Resistencia a la corrosión:
Es resistente al lavado con alcohol, con cloruros y con la mayoría de los componentes cáusticos. Para obtener información específica acerca de la resistencia química, consulte a la fábrica.

Características estándar:
- Indicador visual de posición
- Sellos de anillo tórico
- Tope de abertura ajustable
- Tope de recorrido ajustable (serie 47 únicamente)
- Patrón de pernos de montaje del interruptor

Características opcionales:
- Piezas internas higiénicas

* Resortes autocontenidos (falla de cierre únicamente)
Nota: Vea las páginas 21 y 22 para obtener las dimensiones y la lista de materiales.
Vea las páginas 17 a 19 para obtener la información de dimensionamiento de los accionadores.

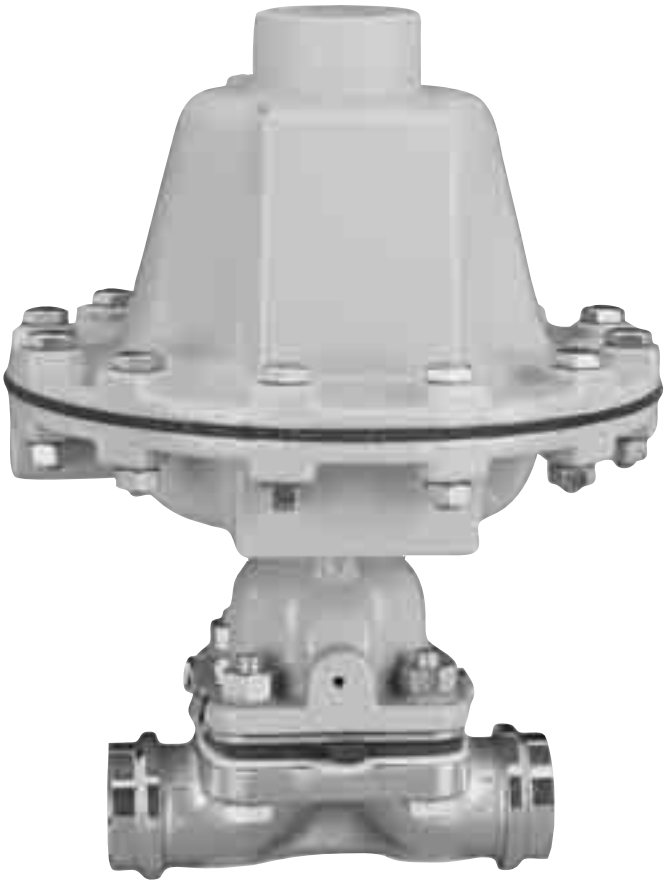
www.ittpureflo.com

Serie 47

Al igual que los accionadores Advantage con válvulas de menor tamaño, el accionador serie 47 de 3"-4" (DN80-DN100) también funciona mediante un diafragma, viene con anillos tóricos y tiene tres modos de funcionamiento. El diseño del accionador incorpora la misma envoltura dimensional independientemente del modo de funcionamiento.

Serie 33

Los accionadores Pure-Flo Advantage serie 33 de 3"-4" se han introducido para reducir aún más la envoltura dimensional y el peso para las instalaciones de la industria farmacéutica y de bioprocesamiento. El resorte de cierre de 4" del accionador serie 33 tiene un diámetro inferior en un 25% la altura reducida en un 22%, y proporciona una reducción de peso del 32% respecto de un accionador equiparable serie 47 de 4".



Accionador Dia-Flo®

El accionador Dia-Flo, impulsado mediante un diafragma y operado por medios neumáticos, tiene un rendimiento de proceso comprobado y se adecua a las líneas de productos Pure-Flo y Dia-Flo. El accionador Dia-Flo se recomienda como alternativa al accionador Advantage para aplicaciones en las que la presión de la línea o la presión de aire disponible en la central no estén dentro de los parámetros del accionador Advantage.

Tipo: Dia-Flo

Rango de tamaño:
El accionador Dia-Flo está disponible en siete tamaños intercambiables y se puede montar en válvulas de cualquier tamaño con un casquete de tamaño adecuado. Vea el catálogo DV-01 de Dia-Flo para obtener la información de dimensionamiento de los accionadores

Materiales del accionador:
Aluminio
Hierro dúctil (opcional)

Recubrimientos resistentes a la corrosión:
Epoxi blanco
PVDF
Nailon

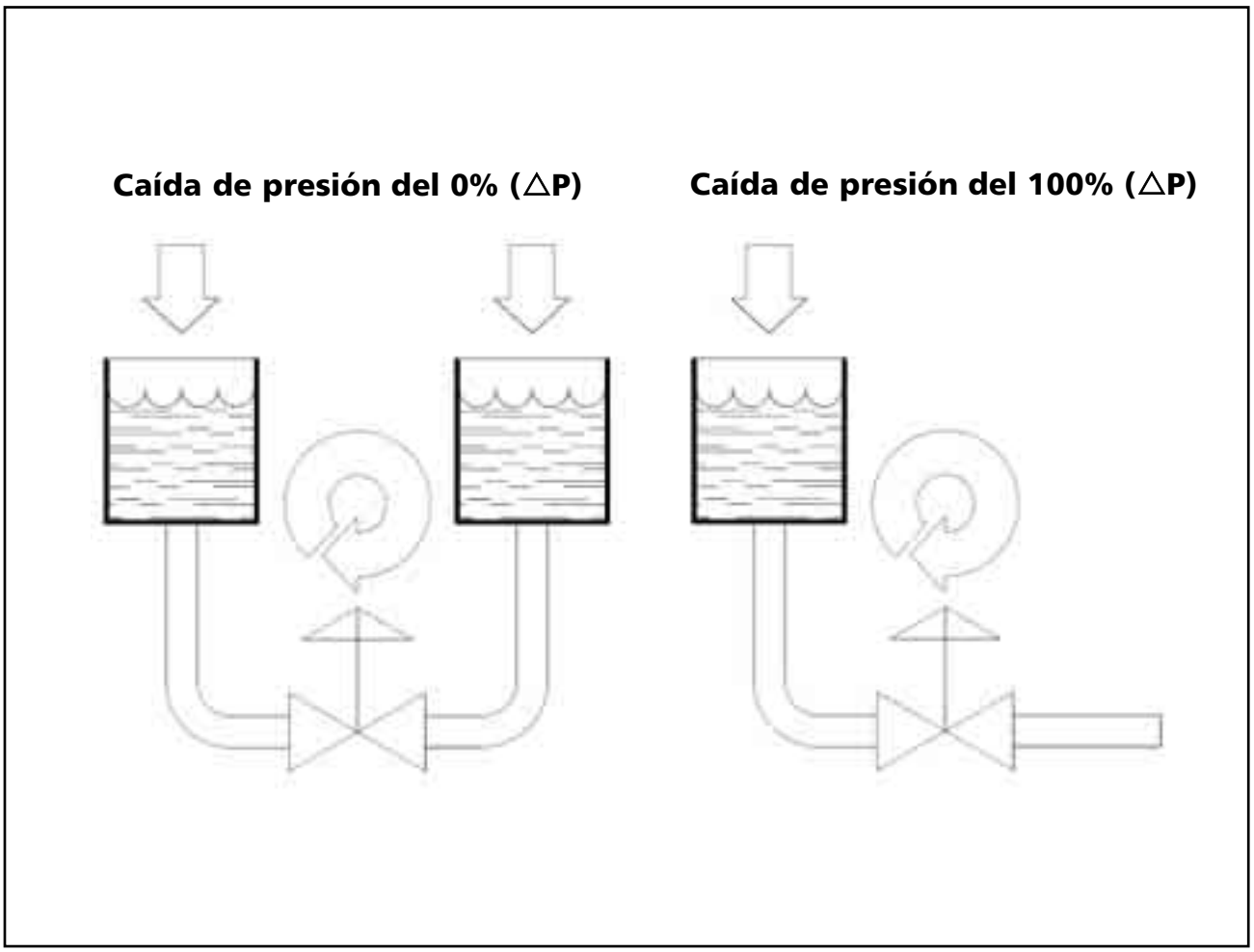
Materiales del casquete:
Hierro dúctil
Acero inoxidable (opcional)

Presión de aire del accionador:
85 psi (5,9 bar) como máx.

Opciones:
- Tope de abertura ajustable
- Tope de recorrido ajustable*
- Piezas internas higiénicas
- Indicador visual de posición
- Funcionamiento mediante llave o rueda manual
- Apagado manual

* El tope de recorrido ajustable es parte del equipo estándar de todos los accionadores de falla de cierre (a excepción del 3212)

Definición de la caída de presión



Volumen máximo aproximado de las cámaras

Tamaño de la válvula		Accionador Advantage				APA	
		Cámara superior		Cámara inferior		Cámara inferior	
in	DN	in^3	cm^3	in^3	cm^3	in^3	cm^3
0,25, 0,375, 0,50*	6, 10, 15*	2,62	43	2,26	37		
0,50	15	5,49	90	4,27	70	3,22	52,8
0,75	20	12,51	205	7,63	125	3,72	61,0
1,00	25	12,08	198	9,15	150	4,06	66,5
1,50	40	71,00	1163	34,78	570	14,6	239
2,00	50	71,00	1163	38,75	635	18,3	300
3,00 (47)	80	463,80	7600	250,20	4100	no disponible	no disponible
4,00 (47)	100	463,80	7600	250,20	4100	no disponible	no disponible

** Tamaños de Bio-Tek*

Dimensionamiento de los accionadores de pistones Advantage (APA)

Accionadores de acción inversa – aire para abrir, resorte para cerrar (APA únicamente)

DIAFRAGMA	Modelo del accionador	Presión máxima de la línea – Tamaño de la válvula – 100% de △P						0% de △P						Se requiere presión de aire para la abertura y para alcanzar el final de la carrera con una presión de línea de 0 psi
		Bio-Tek**	0,50	0,75	1,00	1,50	2,00	Bio-Tek**	0,50	0,75	1,00	1,50	2,00	
		Bio-Tek**	15	20	25	40	50	Bio-Tek**	15	20	25	40	50	
ELASTÓMERO	AP0506		80						60					60
			5,52						4,14					4,14
	AP0509		150						100					85
			10,34						6,89					5,86
	AP0756			100						50				60
				6,89						3,45				4,14
	AP0759			150						100				85
				10,34						6,89				5,86
	AP1006				130						70			60
					8,96						4,83			4,14
	AP1009				150						110			88
					10,34						7,58			6,07
	AP1506					100						50		54
						6,89						3,45		3,72
	AP1509					150						120		82
						10,34						8,27		5,65
	AP2006						70						30	58
							4,83						2,07	4,00
	AP2009						140						75	90
							9,65						5,17	6,21
PTFE*	AP0506		50						30					60
			3,45						2,07					4,14
	AP0509		150						70					85
			10,34						4,83					5,86
	AP0756			60						60				60
				4,14						4,14				4,14
	AP0759			105						80				85
				7,24						5,52				5,86
	AP1006				40						35			60
					2,76						2,41			4,14
	AP1009				110						75			88
					7,58						5,17			6,07
	AP1506					40						40		54
						2,76						2,76		3,72
	AP1509					150						90		82
						10,34						6,21		5,65
	AP2006						40						20	58
							2,76						1,38	4,00
	AP2009						90						35	90
							6,21						2,41	6,21

Referencias: psig / bar

Nota: Vea la página 14 para obtener la definición de la caída de presión de △P.

* La exposición del diafragma al vapor puede aumentar en hasta un 30% los requisitos de aire para cerrar.

** Bio-Tek incluye los tamaños de 0,25" (DN8), 0,38" (DN10) y 0,50" (DN15).

Dimensionamiento de los accionadores Advantage®

Accionadores de acción directa - aire para abrir, resorte para cerrar y falla de abertura

DIAFRAGMA		Presión de aire requerida para el cierre (psig, bar)																			
	Tamaño de	Bio-Tek**		0,50		0,75		1,00		1,50		2,00		3,00		4,00		3,00		4,00	
	la válvula	Bio-Tek**		15		20		25		32-40		50		80		100		80		100	
	Modelo de accionador	A103		A105		A108		A108		A116		A116		A133		A133		A147		A147	
	Presión de la línea	% de △P																			
		100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0
ELASTÓMERO	20	38	40	38	45	38	55	28	40	36	40	40	45	44	46	48	55	32	37	30	40
	1,38	2,62	2,76	2,62	3,10	2,62	3,79	1,93	2,76	2,48	2,76	2,76	3,10	3,03	3,17	3,31	3,79	2,21	2,55	2,07	2,76
	40	40	42	40	50	42	60	32	45	38	44	45	50	50	58	55	69	41	44	36	47
	2,76	2,76	2,90	2,21	3,45	2,70	4,14	2,21	3,10	2,62	3,03	3,10	3,45	3,45	4,00	3,79	4,76	2,83	3,03	2,48	3,24
	60	42	44	44	55	46	65	36	55	42	48	50	60	55	66	64	85	42	49	42	56
	4,14	2,90	3,03	3,03	3,79	3,17	4,48	2,48	3,79	2,90	3,31	3,45	4,14	3,79	4,55	4,41	5,86	2,90	3,38	2,90	3,86
	80	46	48	48	60	50	70	40	60	44	52	56	70	61	76	72	90	44	56	48	66
	5,52	3,17	3,31	3,31	4,14	3,45	4,83	2,76	4,14	3,03	3,59	3,86	4,83	4,21	5,24	4,97	6,21	3,03	3,86	3,31	4,55
	100	48	52	50	65	52	75	45	70	48	56	60	75	66	90	80	—	52	65	53	79
	6,90	3,31	3,59	3,45	4,48	3,59	5,17	3,10	4,83	3,31	3,86	4,14	5,17	4,55	6,21	5,52	—	3,59	4,48	3,65	5,45
	125	52	56	54	70	60	85	50	75	50	60	64	80	78	—	90	—	63	73	59	90
	8,62	3,59	3,86	3,72	4,83	4,14	5,86	3,45	5,17	3,45	4,13	4,41	5,52	5,38	—	6,21	—	4,34	5,03	4,07	6,21
	150	56	60	58	75	68	—	55	85	52	65	68	—	81	—	—	—	71	83	65	—
	10,34	3,86	4,14	4,00	5,17	4,70	—	3,79	5,86	3,59	4,48	4,69	—	5,59	—	—	—	4,90	5,72	4,48	—
PTFE*	20	42	50	46	66	55	55	50	55	45	52	48	50	64	60	78	80	36	53	46	48
	1,38	2,90	3,45	3,17	4,55	3,79	3,79	3,45	3,79	3,10	3,59	3,31	3,45	4,41	4,14	5,38	5,52	2,48	3,65	3,17	3,31
	40	44	52	50	68	58	60	55	60	50	56	50	60	68	78	84	90	44	60	52	66
	2,76	3,03	3,59	3,45	4,70	4,00	4,14	3,79	4,14	3,45	3,86	3,45	4,14	4,69	5,38	5,79	6,21	3,03	4,14	3,59	4,55
	60	48	56	52	72	60	65	60	65	55	60	56	70	74	88	90	—	51	75	56	74
	4,14	3,31	3,86	3,59	4,97	4,14	4,48	4,14	4,48	3,79	4,14	3,86	4,83	5,10	6,07	6,21	—	3,52	5,17	3,86	5,10
	80	52	60	56	76	65	70	65	70	60	64	64	80	78	—	—	—	55	85	62	81
	5,52	3,59	4,14	3,86	5,24	4,48	4,83	4,48	4,83	4,14	4,41	4,41	5,52	5,38	—	—	—	3,79	5,86	4,27	5,58
	100	54	65	60	82	68	75	70	80	64	68	70	90	84	—	—	—	57	—	70	90
	6,90	3,72	4,48	4,14	5,65	4,69	5,17	4,83	5,52	4,41	4,69	4,83	6,21	5,79	—	—	—	3,93	—	4,83	6,21
	125	58	70	64	86	74	80	75	—	68	72	76	—	90	—	—	—	59	—	79	—
	8,62	4,00	4,83	4,41	5,93	5,10	5,52	5,17	—	4,69	4,69	5,24	—	6,21	—	—	—	4,07	—	5,45	—
	150	62	75	68	—	80	85	80	—	72	76	82	—	—	—	—	—	63	—	83	—
	10,34	4,27	5,17	4,70	—	5,52	5,86	5,52	—	4,96	5,24	5,65	—	—	—	—	—	4,34	—	5,72	—

Referencias

psig
bar

Nota: Vea la página 14 para obtener la definición de la caída de presión de △P

* La exposición del diafragma al vapor puede aumentar en hasta un 30% los requisitos de aire para cerrar.

** Bio-Tek incluye los tamaños de 0,25" (DN8), 0,38" (DN10) y 0,50" (DN15).

Dimensionamiento de los accionadores Advantage®

Accionadores de acción inversa - aire para abrir, resorte para cerrar y falla de cierre

DIAFRAGMA	Accionador Modelo	Presión máxima de la línea – Tamaño de la válvula – 100% de △P								0% de △P								Se requiere presión de aire para la abertura y para alcanzar el final de la carrera con una presión de línea de 0 PSI
		Bio-Tek**	0,50	0,75	1,00	1,50	2,00	3,00	4,00	Bio-Tek**	0,50	0,75	1,00	1,50	2,00	3,00	4,00	
		Bio-Tek**	15	20	25	32-40	50	80	100	Bio-Tek**	15	20	25	32-40	50	80	100	
ELASTÓMERO	A203	150								150								55
		10,34								10,34								3,79
	A204	150								150								75
		10,34								10,34								5,17
	A205		110								90							50
			7,58								6,21							3,45
	A206		150								150							90
			10,34								10,34							6,21
	A208			100								60						45
				6,89								4,14						3,10
	A208				150								80					60
					10,34								5,52					4,14
	A209			150	150							120	130					90
				10,34	10,34							8,27	8,96					6,21
	A216					100								65				50
						6,89								4,48				3,45
	A216						70								30			60
							4,83								2,07			4,14
	A217					150	150							130	75			90
						10,34	10,34							8,96	5,17			6,21
	A233							95	70							60	35	62
								6,55	4,83							4,14	2,41	4,28
	A234							150	110							92	50	85
								10,34	7,59							6,34	3,45	5,86
	A247							150								92		57
								10,34								6,34		3,93
	A247								119								59	60
									8,20								4,07	4,14
	A248							150								150		76
								10,34								10,34		5,24
	A248								150								93	82
									10,34								6,41	5,65
PTFE*	A203	70								55								55
		10,34								3,79								3,79
	A204	150								125								75
		10,34								8,62								5,17
	A206		150								150							90
			10,34								10,34							6,21
	A208		150	140							100	70						60
			10,34	9,65							6,89	4,83						4,14
	A208				100								35					70
					6,89								2,41					4,83
	A209			150	150							80	80					90
				10,34	10,34							5,52	5,52					6,21
	A216					125								70				50
						8,62								4,83				3,45
	A216						60								45			60
							4,14								3,10			4,14
	A217					150	150							125	70			90
						10,34	10,34							8,82	4,83			6,21
	A233							50	30							20	15	62
								3,45	2,07							1,38	1,03	4,28
	A234							105	60							45	30	85
								7,24	4,14							3,10	2,07	5,86
	A247							133	70							68		61
								9,17	4,83							4,69		4,21
	A247																41	62
																	2,83	4,27
	A248							150	126							114		82
								10,34	8,69							7,86		5,65
	A248																70	90
																	4,83	6,21

Referencias: psig / bar

Nota: Vea la página 14 para obtener la definición de la caída de presión de △P

* La exposición del diafragma al vapor puede disminuir en un 30% la presión de la línea de cierre.

** Bio-Tek incluye los tamaños de 0,25" (DN8), 0,38" (DN10) y 0,50" (DN15).

Dimensionamiento de los accionadores Advantage®

Accionadores de acción doble – Aire para cerrar, aire para abrir

Presión de aire requerida para el cierre (psig, bar)

DIAFRAGMA																				
Tamaño de la válvula	Bio-Tek**	0,50		0,75		1,00		1,50		2,00		3,00		4,00		3,00		4,00		
	Bio-Tek**	15		20		25		32-40		50		80		100		80		100		
Modelo de accionador		A303		A305		A308		A308		A316		A316		A333		A333		A347		A347	
Presión de la línea		% de △P																		
100		0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	
ELASTÓMERO	20	22	26	24	30	18	25	12	20	16	20	22	40	18	24	16	25	11	14	9	25
	1,38	1,51	1,79	1,65	2,07	1,24	1,72	0,83	1,38	1,10	1,38	1,52	2,76	1,24	1,66	1,10	1,72	0,76	0,79	0,62	1,72
	40	24	28	26	35	20	30	16	25	20	25	26	45	26	29	24	38	17	21	15	30
	2,76	1,65	1,93	1,79	2,41	1,38	2,07	1,10	1,72	1,38	1,72	1,79	3,10	1,79	2,00	1,66	2,62	1,17	1,45	1,03	2,07
	60	26	30	28	40	24	35	20	35	24	30	30	50	32	38	30	55	22	28	22	46
	4,14	1,79	2,07	1,93	2,75	1,65	2,41	1,38	2,41	1,65	2,07	2,07	3,45	2,21	2,62	2,07	3,79	1,52	1,93	1,52	3,17
	80	28	32	32	45	26	40	24	40	28	35	35	55	38	48	38	68	23	35	27	60
	5,52	1,93	2,21	2,21	3,10	1,79	2,76	1,65	2,76	1,93	2,41	2,41	3,79	2,62	3,31	2,62	4,69	1,59	2,41	1,86	4,14
	100	30	34	34	50	30	50	28	50	32	40	40	60	42	58	48	84	26	43	32	68
	6,90	2,07	2,34	2,34	3,45	2,07	3,45	1,93	3,45	2,21	2,76	2,76	4,14	2,90	4,00	3,31	5,79	1,79	2,96	2,21	4,69
	125	32	38	38	55	34	55	36	55	36	45	45	70	52	68	58	—	34	53	40	76
	8,62	2,21	2,62	2,62	3,79	2,34	3,79	2,48	3,79	2,48	3,10	3,10	4,83	3,59	4,69	4,00	—	2,34	3,65	2,76	5,24
	150	34	44	42	60	38	60	44	65	40	50	50	80	57	80	68	—	37	61	49	88
	10,34	2,34	3,03	2,90	4,14	2,62	4,14	3,03	4,48	2,76	3,45	3,45	5,52	3,93	5,52	4,69	—	2,55	4,21	3,38	6,07
PTFE*	20	34	36	34	36	28	30	25	35	25	34	35	40	38	38	42	44	19	33	31	37
	1,38	2,34	2,48	2,34	2,48	1,93	2,07	1,72	2,41	1,72	2,34	2,41	2,76	2,62	2,62	2,90	3,03	1,31	2,28	2,14	2,55
	40	36	40	36	40	34	35	35	40	30	38	40	50	41	49	50	60	21	40	35	53
	2,76	2,48	2,76	2,48	2,76	2,34	2,41	2,41	2,76	2,07	2,62	2,76	3,45	2,83	3,38	3,45	4,14	1,45	2,76	2,41	3,66
	60	40	44	40	46	38	40	45	50	35	42	50	60	47	58	56	74	29	46	44	59
	4,14	2,76	3,03	2,76	3,17	2,62	2,76	3,10	3,45	2,41	2,90	3,45	4,14	3,24	4,00	3,86	5,10	2,00	3,17	3,03	4,07
	80	42	46	42	50	40	45	50	55	40	46	55	70	53	67	65	90	32	51	49	65
	5,52	2,90	3,17	2,90	3,45	2,76	3,10	3,45	3,79	2,76	3,17	3,79	4,83	3,66	4,62	4,48	6,21	2,21	3,52	3,38	4,48
	100	44	52	44	54	42	50	55	60	45	50	60	80	58	78	73	—	35	58	54	77
	6,90	3,03	3,57	3,03	3,72	2,90	3,45	3,79	4,14	3,10	3,45	4,14	5,52	4,00	5,38	5,03	—	2,41	4,00	3,72	5,31
	125	46	56	46	58	44	55	60	70	50	55	64	90	64	90	82	—	42	68	62	—
	8,62	3,17	3,86	3,17	4,00	3,03	3,79	4,14	4,83	3,45	3,79	4,41	6,21	4,41	6,21	5,66	—	2,90	4,69	4,28	—
	150	48	62	48	62	46	60	65	80	55	62	68	—	69	—	90	—	45	78	68	—
	10,34	3,31	4,27	3,31	4,28	3,17	4,14	4,48	5,52	3,79	4,28	4,69	—	4,76	—	6,21	—	3,10	5,38	4,69	—

Referencias | psig | bar

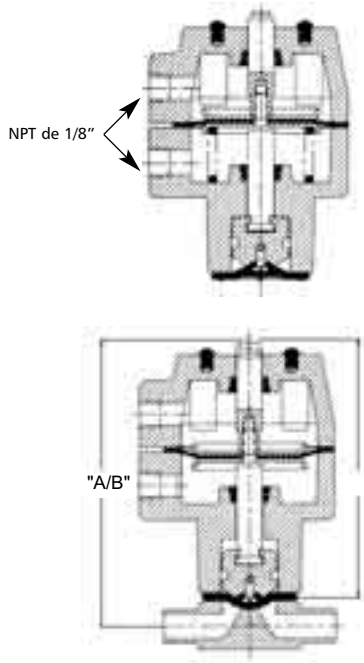
Nota: Vea la página 14 para obtener la definición de la caída de presión de △P

* La exposición del diafragma al vapor puede aumentar en hasta un 30% los requisitos de aire para cerrar.

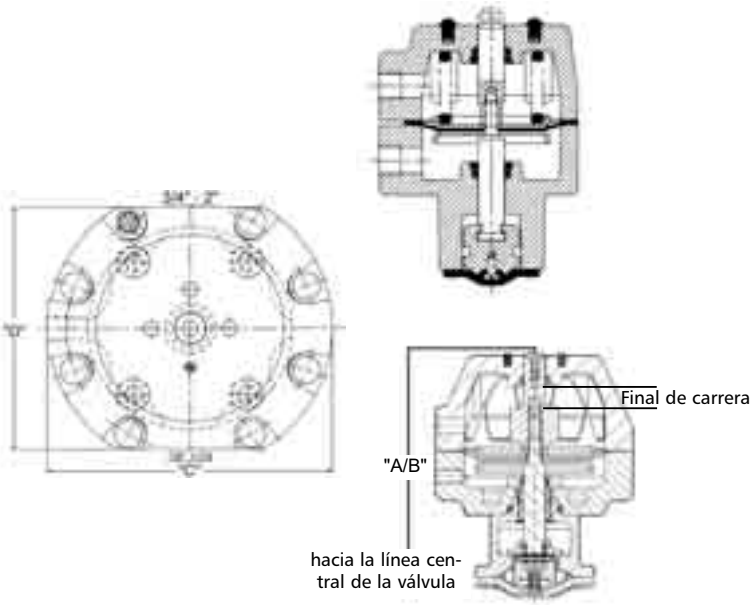
** Bio-Tek incluye los tamaños de 0,25" (DN8), 0,38" (DN10) y 0,50" (DN15).

Tablas dimensionales
Accionador Advantage de 1/4”-2”

Resorte para abrir – Aire para cerrar, falla de abertura



Aire para abrir – Resorte para cerrar, falla de cierre



Se muestra un casquete de bajo perfil (31) con un tope de abertura ajustable opcional

Datos dimensionales del cuerpo forjado									
Tamaño de la válvula		A Válvula Abierta		B con interruptor limitador, SP 2		C		D	
in	DN	in	mm	in	mm	in	mm	in	mm
TC 25; 0,375; 0,5[2]	8,10,15[2]	4,33	110	9,23	234	2,84	72	2,5	63
BW 25; 0,375; 0,5[1]	8,10,15[1]	4,40	112	9,30	236	2,84	72	2,50	63
0,50	15	4,90	124	9,77	248	3,34	85	3,00	76
0,75	20	5,99	152	10,78	274	4,56	116	3,88	98
1,00	25	6,60	168	11,19	284	4,56	116	3,88	98
1,50	40	10,55	268	14,89	378	6,41	163	5,94	151
2,00	50	11,31	287	15,37	390	6,41	163	5,94	151

[1]Extremos de válvulas Bio-Tek serie BW
[1]Extremos de válvulas Bio-Tek serie TC

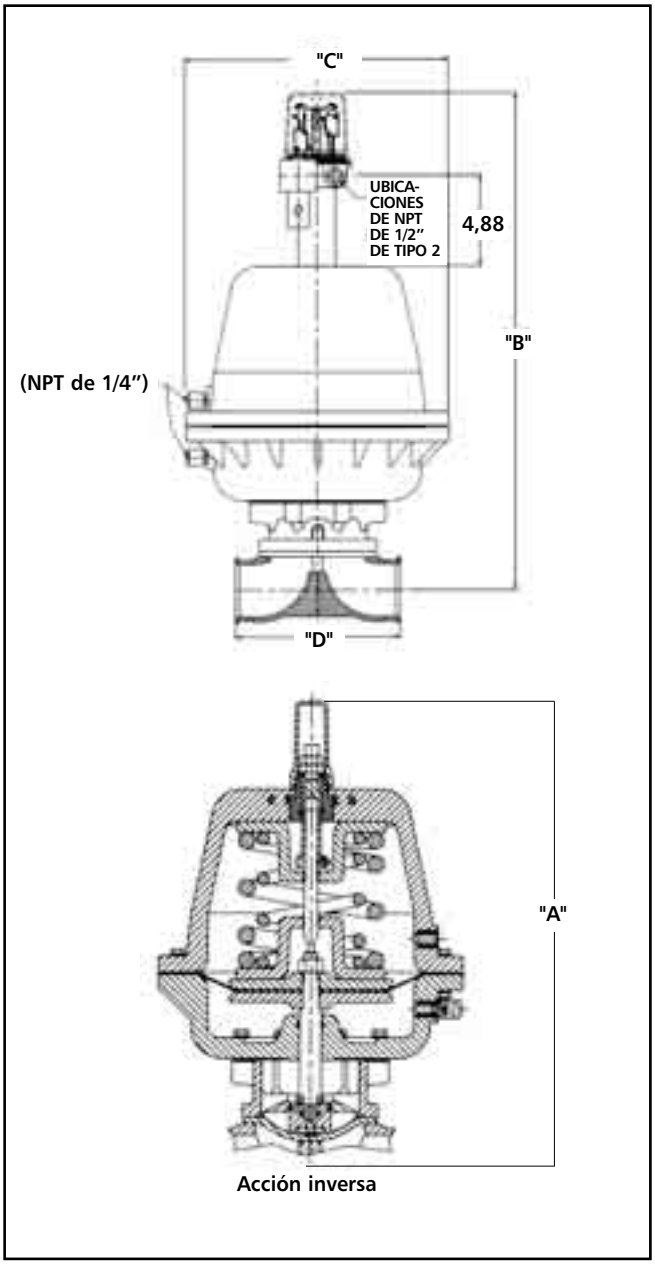
Pesos de los accionadores

Los pesos incluyen el accionador y el cuerpo forjado							
Tamaño de la válvula		Acción doble		Resorte para abrir		Resorte para cerrar	
in	DN	Lb	Kg	Lb	Kg	Lb	Kg
0,25, 0,375, 0,50*	8, 10, 15	1,25	0,57	1,31	0,59	1,37	0,62
0,50	15	2,00	0,91	2,09	0,95	2,34	1,06
0,75	20	3,69	1,67	3,78	1,71	4,34	1,97
1,00	25	4,47	2,03	4,59	2,08	5,16	2,34
1,50	40	12,10	5,49	12,60	5,71	16,44	7,46
2,00	50	15,16	6,88	15,66	7,10	19,50	8,84

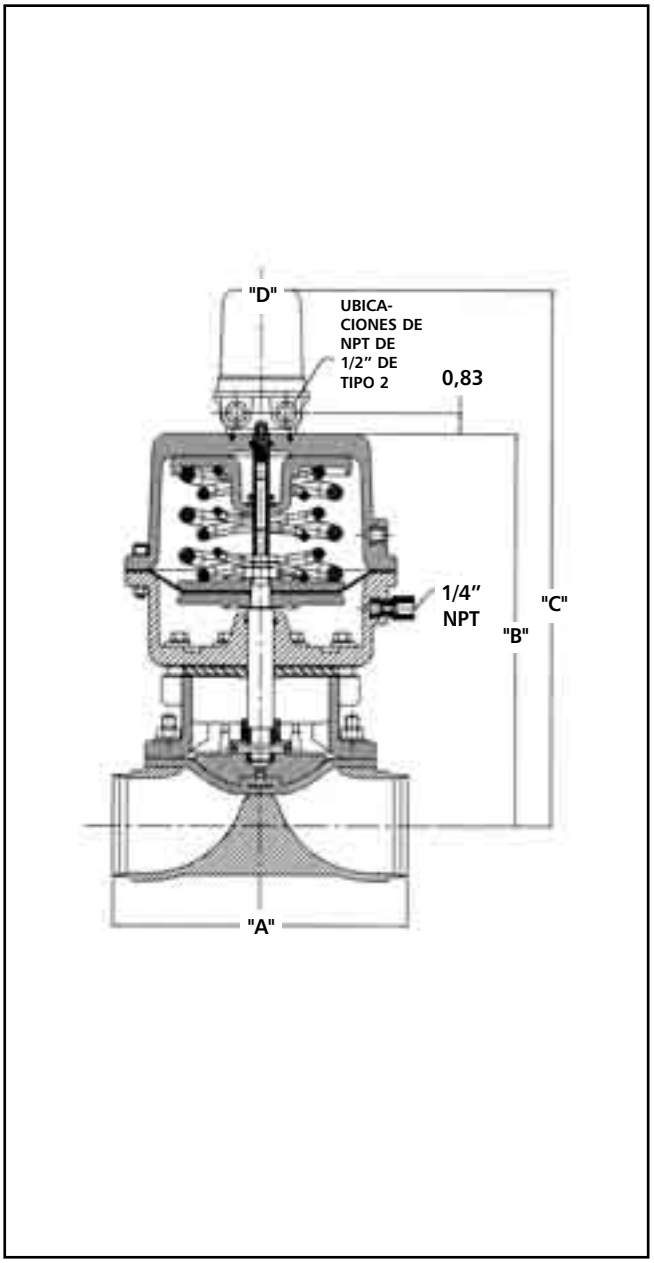
** Tamaños de Bio-Tek*

Tablas dimensionales
Accionadores Advantage de 3” y 4”

Serie 47



Serie 33



Datos dimensionales de la serie 47

Tamaño de la válvula		A		B Con interruptor limitador, SP 2		C		D	
in	DN	in	mm	in	mm	in	mm	in	mm
3,00	80	21,51	546	27,08	688	14,00	356	8,75	222
4,00	100	22,90	582	28,47	723	14,00	356	11,50	292

Datos dimensionales de la serie 33

Tamaño de la válvula		A		B		C*		D	
in	DN	in	mm	in	mm	in	mm	in	mm
3,00	80	10,00	254,0	14,44	366,7	19,64	498,8	10,57	268,5
4,00	100	13,00	230,2	15,82	401,7	21,02	533,8	10,57	268,5

* Con interruptor limitador SP 2

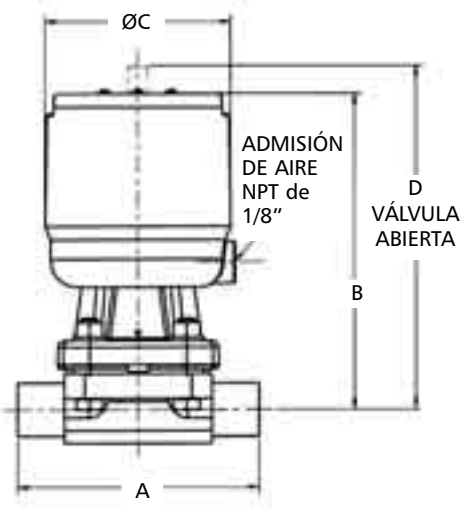
Pesos de los accionadores Advantage 33 & Serie 33 y 47

Pesos de los accionadores Advantage (accionador y cuerpo forjado* incluidos)							
Tamaño de la válvula		**Acción doble**		**Resorte para abrir**		**Resorte para cerrar**	
in	**DN**	**Lb**	**Kg**	**Lb**	**Kg**	**Lb**	**Kg**
3,00 (47)	80	72,09	32,70	75,39	34,20	107,49	48,76
4,00 (47)	100	82,50	37,42	85,80	38,92	117,50	53,30

** Para las válvulas de 3" y 4" (DN 80–100) se incluye el peso del cuerpo fundido*

Pesos de los accionadores Advantage (menos cuerpo y diafragma)									
						Inversa			
Tamaño		**Acción doble**		**Directa**		**60**		**90**	
	DN	**Lb**	**Kg**	**Lb**	**Kg**	**Lb**	**Kg**	**Lb**	**Kg**
3,00 (33)	80	39,00	17,69	42,30	19,19	54,20	24,59	58,00	26,31
4,00 (33)	100	44,00	19,96	47,30	21,46	59,20	26,85	63,00	28,58

Tablas dimensionales Accionadores de pistones Advantage

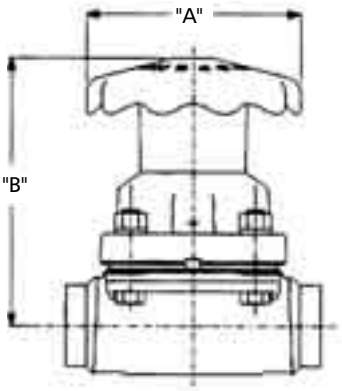


Tamaño de la válvula		**A**		**B**		**C**		**D**		**Peso de los accionadores***	
in	**DN**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**lb**	**kg**
0,50	15	3,50	89,8	4,53	115,0	2,75	69,9	4,90	124,4	1,80	0,81
0,75	20	4,00	101,6	5,34	135,6	3,38	85,9	5,80	147,3	3,23	1,46
1,00	25	4,50	114,3	5,90	149,8	3,38	85,9	6,42	163,0	3,62	1,64
1,50	40	5,50	139,7	9,53	242,0	5,00	127,0	10,34	262,7	11,75	5,32
2,00	50	6,25	158,7	10,07	255,8	5,00	127,0	11,18	284,1	13,3	6,03

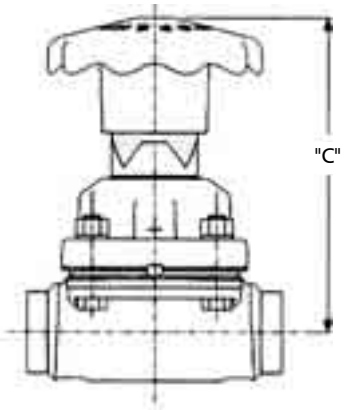
* Menos cuerpo

Tablas dimensionales
Casquetes manuales 970

CERRADO



ABIERTO

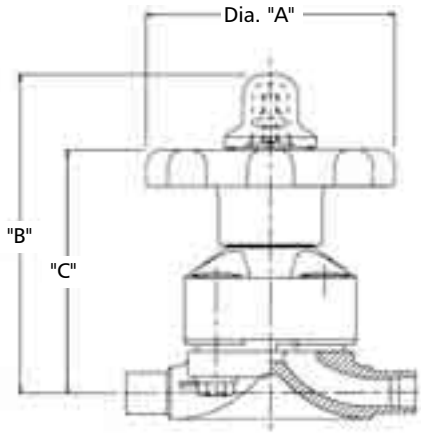


En la siguiente tabla, se proporcionan el diámetro de la rueda manual y las alturas del conjunto desde la línea central del cuerpo hasta la parte superior del conjunto del casquete.

Tamaño de la válvula		A		B		C		Peso del casquete*	
in	DN	in	mm	in	mm	in	mm	lb	kg
0,50	15	2,75	69,9	3,65	92,7	3,93	99,7	0,97	0,44
0,75	20	2,75	69,9	3,89	98,8	4,26	108,3	1,23	0,56
1,00	25	2,75	69,9	4,54	115,3	4,99	126,7	1,67	0,76
1,50	40	5,25	133,3	5,86	148,8	6,67	169,4	5,00	2,27
2,00	50	5,25	133,3	6,49	164,8	7,61	193,3	6,50	2,95

* Menos cuerpo

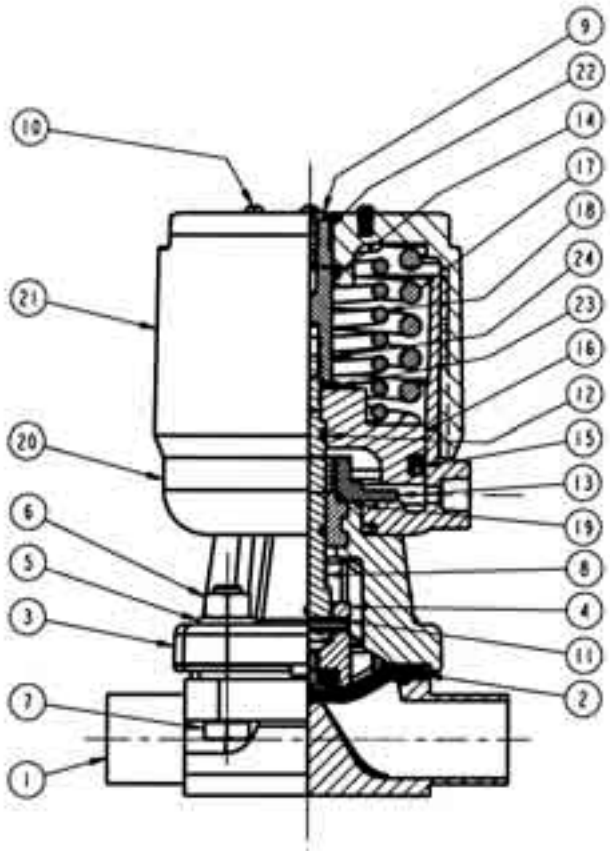
Casquetes manuales 963/903/913

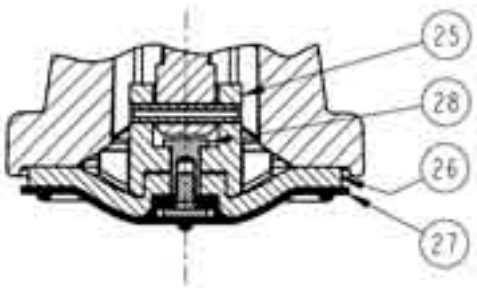


En la siguiente tabla, se proporcionan el diámetro de la rueda manual y las alturas del conjunto desde la línea central del cuerpo hasta la parte superior del conjunto del casquete.

TAMAÑO DE LA VÁLVULA		A		B		C	
in	DN	in	mm	in	mm	in	mm
0,50	15	3,00	76,2	3,65	92,7	2,78	70,6
0,75	20	3,00	76,2	4,57	116,0	3,44	87,2
1,00	25	3,00	76,2	5,54	140,8	4,21	107,0
1,50	40	5,50	139,7	8,44	214,2	5,34	135,5
2,00	50	5,50	139,7	9,06	230,0	5,96	151,3
2,50	65	7,75	196,8	11,85	300,9	7,77	197,4
3,00	80	7,75	196,8	11,85	300,9	7,77	197,4
4,00	100	10,00	254,0	14,90	378,6	10,24	260,2

Lista de materiales
Accionador de pistones Advantage (APA)



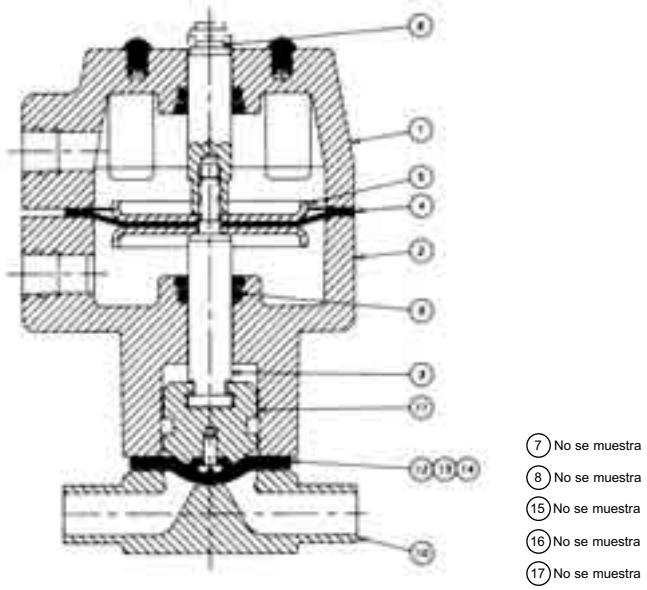


Materiales de construcción			
Artículo	**Descripción**	**Material**	**Cantidad**
1	Cuerpo ITT estándar	Estaño, acero 316L	1
2	Diafragmas de elastómero ITT estándar	EPDM, BUNA-N	1
3	Casquete	Estaño, acero	1
4	Compresor	Cinc	1
5	Arandela, simple	Estaño, acero, 18-8	4
6	Tuerca, hexagonal	Estaño, acero, 18-8	4
7	Tornillo, cabeza hexagonal, tapa	Estaño, acero, 18-8	4
8	Eje, válvula	Estaño, acero	1
9	Tapón	Plástico	1
10	Tornillo, mecánico de cabeza redonda	Estaño, acero	4
11	Pasador, compresor	Estaño, acero	1
*12	Anillo tórico	BUNA-N	2
13	Buje	Latón	1
*14	Anillo tórico	BUNA-N	1

Materiales de construcción			
Artículo	**Descripción**	**Material**	**Cantidad**
*15	Sello, pistón	BUNA-N	1
16	Pistón	Cinc	1
17	Resorte, externo	Acero	1
18	Resorte, interno	Acero	1
19	Anillo tórico	BUNA-N	2
20	Cilindro	PBT reforzado con vidrio	1
21	Tapa, cilindro	PBT reforzado con vidrio	1
22	Eje, indicador	Estaño, acero	1
23	Arandela	Estaño, acero	1
24	Anillo, de retención	Estaño, acero	1
25	Compresor	Cinc	1
26	Cojín de respaldo	EPDM	1
27	Diafragmas plásticos ITT estándar	PTFE, Grado TM	1
28	Tuerca de tubo	Latón	1

* Piezas de recambio aconsejadas

Lista de materiales
Accionador Advantage

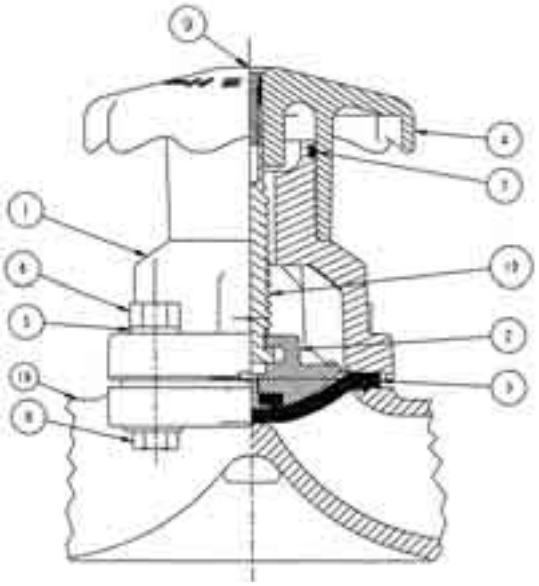


Aire para abrir – aire para cerrar indicados

Materiales de construcción de 1/4”-2”, DN 6–50			
Artículo	**Descripción**	**Material**	**Cantidad**
1	Tapa, accionador superior	PAS, conforme al Cód. de Reglamentos Federales N.° 21 de la FDA	1
2	Tapa, accionador inferior	PAS, conforme al Cód. de Reglamentos Federales N.° 21 de la FDA	1
3	Eje	Estaño, acero	1
4	Diafragma, accionador	Buna N	1
5	Plancha, accionador	Estaño, acero o acero automotor chapado en níquel	2
6	Eje, indicador	Estaño, acero	1
7	Resorte	acero chapado en níquel	1
8	Resorte	acero chapado en níquel	1
*9	Anillo tórico	Viton, conforme al Cód. de Reglamentos Federales N.° 21 de la FDA	2
10	Cuerpo, rebosadero de 1/4”-2”	Estaño, acero, forjadura o fundición moldeada por inversión	1
11	Compresor	Estaño, Acero, hierro fundido, cinc o bronce	1
*12	Diafragma, de elastómero	EPDM	1
*13	Diafragma, plástico	PTFE de Grado TM	1
*14	Cojín, de respaldo	EPDM	1
15	Arandela, simple	Estaño, acero, 18-8	4
16	Tuerca, hexagonal	Estaño, acero, 18-8	4
17	Tornillo, de cabeza hexagonal	Estaño, acero, 18-8	4

** Piezas de repuesto aconsejadas*

Lista de materiales
Casquete 970 de acero inoxidable



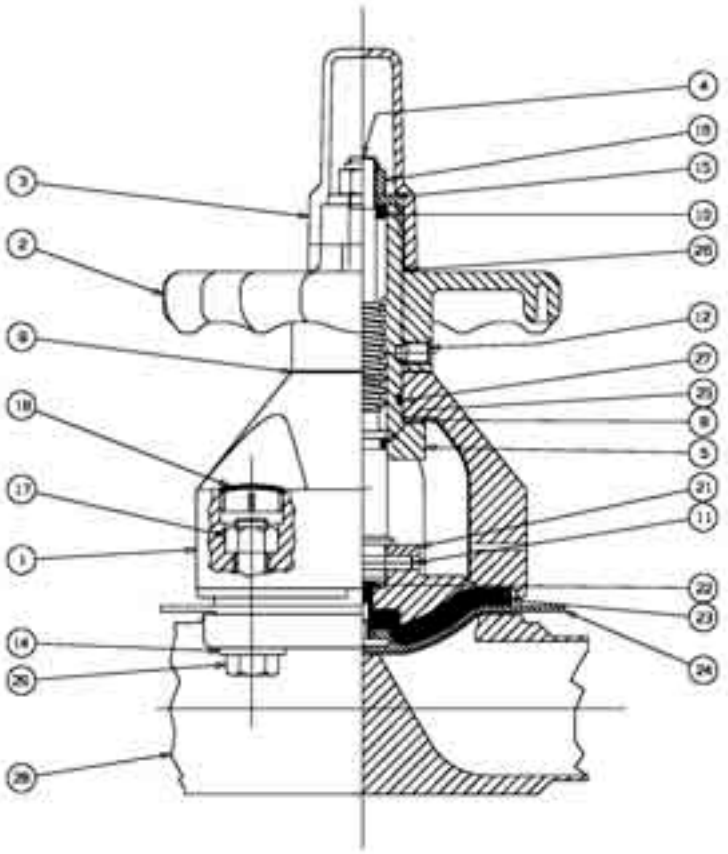
Vista detallada del Casquete y de los pernos

Cuerpo del fondo del tanque, cuerpo del bloque y fabricaciones

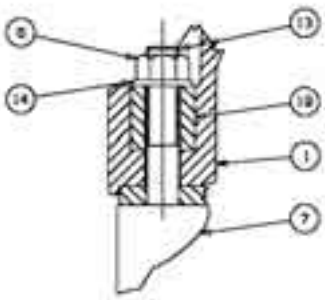
Materiales de construcción			
Artículo	**Descripción**	**Material**	**Cantidad**
1	Casquete	Acero inoxidable 316	1
2	Compresor	Bronce	1
3	Diafragmas ITT estándar de elastómero	EPDM	1
4	Rueda de mano	PAS	1
5	Arandela, simple	Estaño, acero, 18-8	4
6	Tuerca, hexagonal	Estaño, acero, 18-8	4
7	Anillo tórico	FKM (FDA)	1
8	Tornillo, de cabeza hexagonal	Estaño, acero, 18-8	4
9	Tornillo de tope de recorrido	Estaño, acero, 18-8	1
10	Eje	Estaño, acero	1
11	Cojín de respaldo	EPDM	1
12	Diafragmas plásticos ITT estándar	PTFE, Grado TM	1
13	Tuerca de tubo	Latón	1
14	Compresor	Bronce	1
15	Pasador	Estaño, acero, 18-8 o SA-193-B8*	AR
16	Estructura ITT estándar	Estaño, acero, 316L	1

Sujetadores de grado *ASME disponibles en la válvula del fondo del tanque

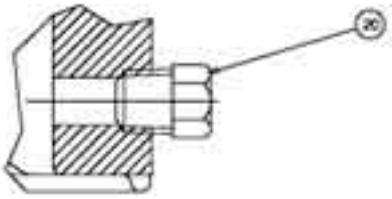
Lista de materiales
963 Casquete



Vista en detalle del casquete y de los pernos para fabricaciones con pernos



Ventilación de rebosadero en forma de V para casquete sellado



Materiales de construcción

Artículo	Descripción	Material	Cantidad
1	Casquete	Poliarilsulfona	1
2	Rueda de mano	Poliarilsulfona	1
3	Tapa Tapa	Acrílico, transparente Polifenilsulfona, transparente	1 1
4[1]	Eje Eje	Estaño, acero (1/2"-2") Acero al carbono (3" y 4")	1 1
5	Buje	Latón	1
6[2]	Tuerca, hexagonal	Estaño, acero, SA-194-8	4
7	Cuerpo	Estaño, acero 316L	1
8	Cojinete, de empuje	Estaño, acero	1
9	Arandela, separador	Polietileno	AR
10	Sello, restregador Sello, restregador	Viton Espuma de poiliolefina	1 1
11	Pasador, espiral	Estaño, acero tipo 302	1
12	Tornillo, de fijación de cabeza hexagonal	Estaño, acero	1 ó 2
13[2]	Perno	Estaño, acero, SA-193-B8	4
14	Arandela, simple	Estaño, acero, 18-8	4

Materiales de construcción

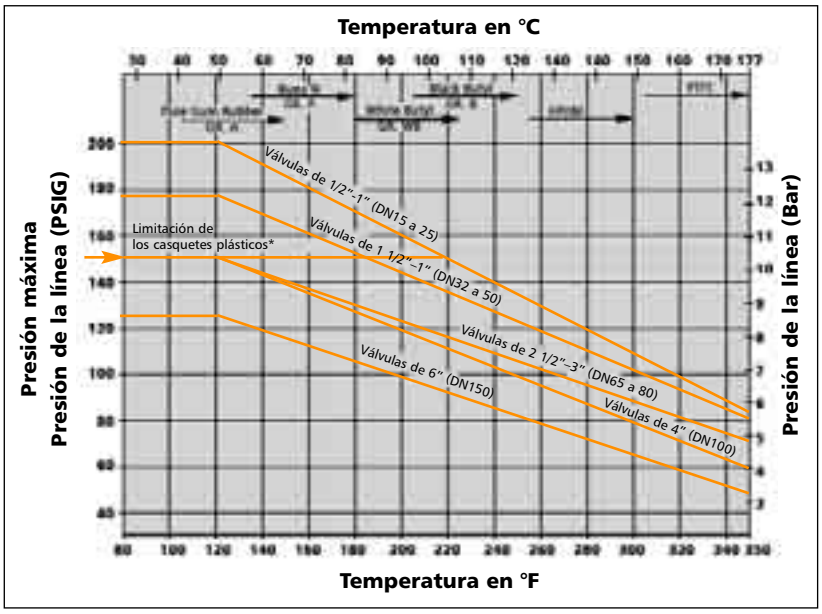
Artículo	Descripción	Material	Cantidad
15	Arandela	Estaño, acero	1
16	Contratuerca, hexagonal, LT	Estaño, acero, 18-8	4
17	Tuerca, hexagonal	Estaño, acero 18-8	4
18	Tapa, cubierta de tuerca	Poliarilsulfona	4
19	Espaciador	Acero inoxidable	4
20	Tapón, rebosadero con ventilación en forma de V	Estaño, acero	1
21	Compresor	Cinc o hierro fundido	1
22	Tuerca, de tubo	Latón, B-16	1
23	Cojín, de respaldo	EPDM	1
24	Diafragma, PTFE	PTFE, GR	1
25	Anillo tórico	Buna N o Viton	1
26	Anillo tórico	Buna N o Viton	1
27	Anillo tórico	Buna N o Viton	1
28	Cuerpo, metal	Estaño, acero 316L	1
29	Tornillo, de cabeza hexagonal	Estaño, acero, 18-8	4

Piezas sanitarias internas

Artículo	Descripción	Material	Cantidad
4	Eje	Estaño, acero	1
21	Compresor	Bronce	1

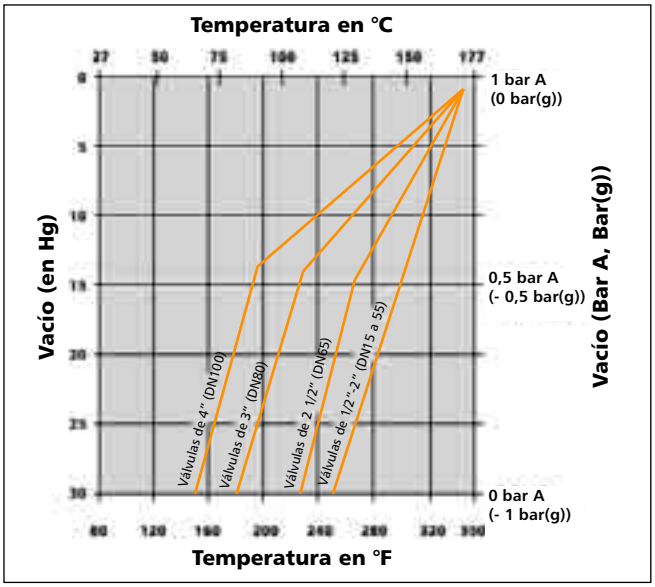
Notas:
1, Las piezas sanitarias internas de 3" y 4" son opcionales.
2, Sujetadores de grado ASME disponibles en la válvula del fondo del tanque.

Recomendaciones de presión/temperatura



* En esta línea, se muestra la limitación de los casquetes de PAS y Advantage con casquetes 36.
Nota: La tabla anterior no se aplica a servicios de vapor ni a servicios corrosivos. Para los servicios que excedan estas recomendaciones de presión/temperatura, consulte a la fábrica.

Diafragmas PTFE de servicio de vacío



Notas:
1. En condiciones de servicio que caigan hacia la derecha de estas líneas, será necesaria la evacuación del casquete.
2. Los diafragmas PTFE de 6" (DN 150) y más no soportarán el vacío absoluto a ninguna temperatura a menos que se evacuen los casquetes.
3. Con los casquetes evacuados, se pueden utilizar diafragmas PTFE de cualquier tamaño hasta los 350 °F (176 °C).

ITT Corporation, Pure-Flo (UK) Ltd.
Richards Street
Kirkham, Lancashire
PR4 2HU, England
Phone: +44 (0) 1772 682696
Fax: +44 (0) 1772 686006

CERTIFICATE OF COMPLIANCE

Date Issued: June 6, 2009

Customer:	VALVULAS Y PROCESOS 2007	**Quantity:**	002
Customer Order Number:	090505-2	**Int. Surface Finish:**	RA 0.8 MICRON MAX
ITT Order Number:	21246	**Ext. Surface Finish:**	
ITT Line Number:	001	**Electropolish Finish:**	NO ELECTROPOLISH
ITT Part Number:	%UK400H02930400		

Figure Number (Description): **(A)** .5-8-419-2-0-0-B17-18-MET-ASME

Customer Tag Information:

Serial Number	(A)
21246-001-001	
21246-001-002	

Heat Number Information:

Heat / Code (Number)	Description	Material	Size
UC / 417983	Forging	316L / 1.4435 / BN2	Biotek

A copy of the Certified Material Test Report or the Certificate of Compliance is attached for the item(s) listed above.

Applicable Test Data:

Shell Test: 232 PSI — Tested: 03/06/2009
Seat Test: 150 PSI — Tested: 03/06/2009

Additional Information:

EPDM DIAPHRAGM: Grade 17: Grade 17 and B17 (EPDM) diaphragms have a LIMITED SHELF LIFE of 6 years.
Grade 17 and B17 (EPDM) diaphragms comply with the FDA Code of Federal Regulations Title 21 Section 177.2600 and have been tested in accordance with and successfully passed the U.S. Pharmacopeia XXXI Class VI (121C for 60 mins & 70C for 24 hrs) Biological Reactivity test, Section 87 and Section 88.
The maximum temperature rating for Grade 17 and B17 (EPDM) diaphragms is 300° F/ 149 oC.
Grade 17 and B17 (EPDM) diaphragms are in compliance to:
10993-5: "Tests for Cytotoxicity—In Vitro Methods"
10993-10: "Tests for Irritation and Sensitization."
10993-11: "Tests for Systemic Toxicity."
Grade 17 EPDM complies with 21CFR 177.2600 (e) "Rubber articles intended for repeated use in contact with aqueous food." Exception: Grade 17 EPDM does not comply with 177.2600 (f) "Rubber articles intended for repeated use in contact with fatty food ".
Grade 17 EPDM is processed with a small amount of Stearic Acid F-1000. Stearic Acid is a common fatty acid derived from Bovine Tallow. Stearic Acid F-1000 is confirmed to be manufactured by rigorous processes exceeding 200°C for greater than 20 mins. This complies with Section 6.4 Tallow Derivatives of EMEA/410/01 Rev. 2, October 2003.
Grade 17 EPDM meets ASME BPE Part SG, Section 3.3 & 3.4

Comments:

We certify that the components on the above referenced purchase order meet the requirements of the purchase order, applicable drawing(s), and our ISO 9001:2000 manufacturing, testing, and inspection procedures to assure an acceptable quality level applicable to the product.

//S// Keith Thorpe

Keith Thorpe
Manager, Quality Assurance (or representative)

(This certificate was created electronically and is valid without signature.)

This certificate is correct at the time of issue and no changes shall be made to it without the authorization of the issuing ITT Manager. If any unauthorized changes are made, the certificate is void.

CERTIFICATE ID (23369)

FEAT INDUSTRIALE
divisione della Feat Group S.p.A.
Feat Group S.p.A.
SEDE LEGALE:
I - 20122 MILANO (MI) - Viale Majno, 17
Capitale Sociale € 8.000.000,00.interamente versato
Codice fiscale, Partita IVA e numero di iscrizione Registro
delle Imprese di Milano: 08203090157
Codice Identif. IVA CEE IT 08203090157 - R.E.A. Milano 1211374
UFFICI AMMINISTRATIVI:
I - 23842 BOSISIO PARINI (LC) - Via del Livelli, snc
tel. 031 3581411 - fax 031 876176 - Cod. Mecc. MI240750
STABILIMENTO E UFFICI COMMERCIALI DELLA DIVISIONE:
I - 23861 CESANA BRIANZA (LC) - Via G. Parini, 30 e Via Ariosto, 1/3/5/7
tel. 031 6591 - Fax 031 659219 -http://www.featgroup.com

Test Certificate 2008/3006256
Date 20/10/2008
Page 1

ITT PURE-FLO (UK) LTD

SELBY IND EST,RICHARDS STREET
KIRKHAM PR4 2HU
LANCASHIRE

Customer Order	Delivery Note	Invoice	Delivered Q.ty
21851	2008/000/0032192	O 0032370	11,00

Code Article	Piece Description
815002163106	BODY BIO TEK 113208 P/N 42409

Material - Type Specification
F316LS9/1.4435 ASTM A182+DIN 17440-A ND BASEL STD BN2

Heat Number	Steel Mill	Trade Mark	Forging Code
417983	ACCIAIERIE VALBRUNA S.P.A.	F-	UC

CHEMICAL ANALYSIS

Elem.	Al	C	Cr	Cu	Mn	Mo	N	Ni	P	S	Si	Ti			
Min			17,000			2,500		12,500		0,007					
Max	0,010	0,030	18,000	0,500	2,000	3,000	0,100	14,000	0,045	0,017	1,000	0,050			
Heat C.A.	0,006	0,020	17,090	0,500	1,620	2,500	0,070	12,640	0,032	0,014	0,430	0,008			

MECHANICAL PROPERTIES

Laboratory Order	N.	Description	UM1	Min	Max	Value	UM2	Value
20844EN	01	YS Rp1% Amb T	N/mm2	235,000		309,000	PSI	44805,000
20844EN	01	Rs0.2% offset Amb T	N/mm2	200,000		261,000	PSI	37845,000
20844EN	01	Tens.Str. Rm Amb T	N/mm2	520,000	670,000	560,000	PSI	81200,000
20844EN	01	Lo=4Do A4 A% T Amb	%	30,000		58,400		
20844EN	01	Lo=5 Do A5 A% Amb T	%	45,000		52,600		
20844EN	01	Red.area Amb T Z%	%	50,000		74,000		
20844EN	01	Impact ISO V Amb T	J	60,000		211,000		
20844EN	02		J	60,000		244,000		
20844EN	03		J	60,000		200,000		

Heat Treatment
SOLUTION ANNEALED:
ALL PIECES WERE HEATED TO 1060 C./ 1940 F.
HELD AT THIS TEMPERATURE FOR 1 HOUR FOR
EACH 1" OF THICKNESS AND QUENCHED IN WATER.-

Remarks
DELTA FERRITE CONTENT =
FERRITE AS TO BN2 =
MATERIAL PRODUCED ACCORDING TO ITT SPEC. ESA-0143 AND ESA-0027
3.1 CERTIFICATE ACCORDING TO EN 10204

Resp. Assicurazione Qualita'
E.MANZONI

FEAT INDUSTRIALE division of FEAT Group S.p.A. states that material hereby certified is in compliance with the quality and technical requirements as described in the customer's order, or FEAT order acknowledgement.

1 - The results of chemicals analysis ia a true and correct copy of the mill certificate issued by the manufacturer of the steel employed or by the laboratory which has determined it.
2 - The material or components shipped under the above order number did not come in direct contact with mercury or any of its components; or with any mercury containing devices employing a single boundary of containment, during the manufacturing process inspection or storage.

Pure-Flo

Richards Street, Kirkham
Lancashire PR4 2HU
United Kingdom
tel 44 1772 682 696
fax 44 1772 686 006

Pressure Equipment Directive 97/23/EC

Sound Engineering Practice

Authorised Representative within the European Union

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England
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Manufacturing Site

ITT Pure-Flo® (UK) Ltd.
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Tel: +44 (0)1772-682696

This Statement of SEP Compliance is expressly reserved for product that by definition of the Pressure Equipment Directive may not be CE Marked. Product supplied with this certificate has been manufactured to "Sound Engineering Practice" (Article 3 Para. 3).

VALVE SIZES UP TO AND INCLUDING DN25 ARE COVERED BY THE ABOVE STATEMENT

Authorised representative:

S. D. Wilson
Managing Director

Date: 6th July 2006

ITT Corporation, Pure-Flo (UK) Ltd.
Richards Street
Kirkham, Lancashire
PR4 2HU, England
Phone: +44 (0) 1772 682696
Fax: +44 (0) 1772 686006

CERTIFICATE OF COMPLIANCE

Date Issued: June 15, 2009

Customer:	VALVULAS Y PROCESOS 2007	**Quantity:**	001
Customer Order Number:	090505-2	**Int. Surface Finish:**	RA 0.8 MICRON MAX
ITT Order Number:	21246	**Ext. Surface Finish:**	
ITT Line Number:	002	**Electropolish Finish:**	NO ELECTROPOLISH
ITT Part Number:	%UK400A02700800		

Figure Number (Description): **(A)** 1-C-419-2-0-0-17-AP1009-M7-MET-ASME

Customer Tag Information:

Serial Number	**(A)**
21246-002-001	

Heat Number Information:

Heat / Code (Number)	Description	Material	Size
6491 6751 7231 7791	Cast valve	CF3M	1"

A copy of the Certified Material Test Report or the Certificate of Compliance is attached for the item(s) listed above.

Applicable Test Data:

Shell Test: 232 PSI — Tested: 15/06/2009
Seat Test: 150 PSI — Tested: 15/06/2009

Additional Information:

EPDM DIAPHRAGM: Grade 17: Grade 17 and B17 (EPDM) diaphragms have a LIMITED SHELF LIFE of 6 years.
Grade 17 and B17 (EPDM) diaphragms comply with the FDA Code of Federal Regulations Title 21 Section 177.2600 and have been tested in accordance with and successfully passed the U.S. Pharmacopeia XXXI Class VI (121C for 60 mins & 70C for 24 hrs) Biological Reactivity test, Section 87 and Section 88.
The maximum temperature rating for Grade 17 and B17 (EPDM) diaphragms is 300° F/ 149 oC.
Grade 17 and B17 (EPDM) diaphragms are in compliance to:
10993-5: "Tests for Cytotoxicity—In Vitro Methods"
10993-10: "Tests for Irritation and Sensitization."
10993-11: "Tests for Systemic Toxicity."
Grade 17 EPDM complies with 21CFR 177.2600 (e) "Rubber articles intended for repeated use in contact with aqueous food." Exception: Grade 17 EPDM does not comply with 177.2600 (f) "Rubber articles intended for repeated use in contact with fatty food ".
Grade 17 EPDM is processed with a small amount of Stearic Acid F-1000. Stearic Acid is a common fatty acid derived from Bovine Tallow. Stearic Acid F-1000 is confirmed to be manufactured by rigorous processes exceeding 200°C for greater than 20 mins. This complies with Section 6.4 Tallow Derivatives of EMEA/410/01 Rev. 2, October 2003.
Grade 17 EPDM meets ASME BPE Part SG, Section 3.3 & 3.4

Comments:

We certify that the components on the above referenced purchase order meet the requirements of the purchase order, applicable drawing(s), and our ISO 9001:2000 manufacturing, testing, and inspection procedures to assure an acceptable quality level applicable to the product.

//S// Keith Thorpe

Keith Thorpe
Manager, Quality Assurance (or representative)

(This certificate was created electronically and is valid without signature.)

This certificate is correct at the time of issue and no changes shall be made to it without the authorization of the issuing ITT Manager. If any unauthorized changes are made, the certificate is void.

CERTIFICATE ID (23603)

PREVAIL CASTING PVT. LTD.

MFRS.: INVESTMENT CASTINGS

REGD. OFFICE :
306, Ashish Comm. Complex, Sardar Nagar Main Road,
RAJKOT - 360 001. (INDIA) Phone : 91- 281-2480025

FACTORY :
Survey No. 282, Village: SHAPAR. Taluka: Kotada Sangani, Dist. Rajkot-360 024. (INDIA)
Phone No. : 91-2827-252272/252871/252872 Fax No : 91-2827-252271
e-mail : prevail_ad1@bsnl.in Web Site : http://www.prevailcasting.com

TEST CERTIFICATE

Customer's Name & Address :
ITT PURE - FLO (UK) LTD.
RICHARDS ST,KIRKHAM, LANCASHIRE,
UNITED KINGDOM - PR4 2HU

T.C. Number : 000039 Dt. 27/11/2008 **Invoice Number** : 000039 Dt. 27/11/2008

P.O. Number 21762 Rev.3 - 08/10/2008

O.A. Number 000151 - 10/07/2008

Heat No.	Item	CHEMICAL ANALYSIS																	MECHANICAL PROPERTIES					POURING DETAILS		
		C %	Si %	Mn %	S %	P %	Cr %	Ni %	Mo %	Cu %	V %	W %	Ti %	Co %	Al %	Nb %	Fe %	N %	TS_2 kgf/mm	YS_2 kgf/mm	Elongation %	%Redn. InArea	Hardness BHN	Metal & Product Description	Pour Qty.	Desp. Qty.
Min		0.000	0.000	0.000	0.000	0.000	17.000	9.000	2.000										49.440	20.900	30.000	0.000	0			
Max		0.030	1.500	1.500	0.040	0.040	21.000	13.000	3.000										0.000	0.000	0.000	0.000	0	CF3M		
074I.		0.025	0.693	0.556	0.034	0.018	17.658	9.549	2.181										55.700	32.100	35.300	0.000	147 150	BODY CASTING 0.5"[DRG.NO.120221 Rev.D]	18	2
702I.		0.024	0.790	0.688	0.011	0.019	18.493	10.666	2.369										55.700	33.200	42.700	0.000	153 156	BODY CASTING 0.5"[DRG.NO.120221 Rev.D]	128	117
723I.		0.025	0.749	0.594	0.012	0.021	18.819	10.277	2.223										55.900	35.300	40.000	0.000	147 150	BODY CASTING 0.5"[DRG.NO.120221 Rev.D]	8	8
702I.		0.024	0.790	0.688	0.011	0.019	18.493	10.666	2.369										55.700	33.200	42.700	0.000	153 156	BODY CASTING 0.75"[DRG.NO.120222 Rev.C]	262	200
649I.		0.024	0.601	0.767	0.009	0.019	17.781	9.645	2.216										55.400	31.500	39.700	0.000	147 150	BODY CASTING1"[DRG.NO.120223 Rev.D]	80	77
675I.		0.025	0.777	0.930	0.009	0.023	18.191	10.344	2.326										54.500	33.200	32.500	0.000	153 156	BODY CASTING1"[DRG.NO.120223 Rev.D]	148	135
723I.		0.025	0.749	0.594	0.012	0.021	18.819	10.277	2.223										55.900	35.300	40.000	0.000	147 150	BODY CASTING1"[DRG.NO.120223 Rev.D]	72	69
779I.		0.021	0.879	0.558	0.011	0.018	17.930	10.201	2.185										56.000	33.600	37.400	0.000	147 150	BODY CASTING1"[DRG.NO.120223 Rev.D]	44	19

Specification : ASTM A 351 Gr.CF3M (BS EN 10204 3.1 B) [Ed.-'04]

Condition of supply : HEATED TO 1060°C SOAKED FOR 1 HOUR THEN WATER QUENCHED

We hereby certify that the items mentioned above confirm to : ASTM A 351 Gr.CF3M (BS EN 10204 3.1 B) [Ed.-'04]

Tested By

AN ISO 9001 : 2000 COMPANY

For, PREVAIL CASTING PVT. LTD.

Authorised Signatory [Quality Control Dept.]

Pure-Flo

Richards Street, Kirkham
Lancashire PR4 2HU
United Kingdom
tel 44 1772 682 696
fax 44 1772 686 006

Pressure Equipment Directive 97/23/EC

Sound Engineering Practice

Authorised Representative within the European Union

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This Statement of SEP Compliance is expressly reserved for product that by definition of the Pressure Equipment Directive may not be CE Marked. Product supplied with this certificate has been manufactured to "Sound Engineering Practice" (Article 3 Para. 3).

VALVE SIZES UP TO AND INCLUDING DN25 ARE COVERED BY THE ABOVE STATEMENT

Authorised representative:

S. D. Wilson
Managing Director

Date: 6th July 2006

Pure-Flo

Richards Street, Kirkham
Lancashire PR4 2HU
United Kingdom
tel 44 1772 682 696
fax 44 1772 686 006

Declaration of Incorporation
Machinery Directive 98/37/EC

Authorised Representative within the European Union

ITT Pure-Flo® (UK) Ltd.
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Manufacturing Site

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Lancashire
England
PR4 2HU
Tel: +44 (0)1772-682696

Description of the machinery or parts:

Manufacturer's Name	ITT Industries – Engineered Valves
Valve Type	Diaphragm valve
Model	Pure-Flo
End connections	All
Materials of Construction	Body – A182 F316L /SA479 316L/DIN 17440 1.4435 Topworks – Actuated

The machinery (valve or valve assembly) to which this Declaration of Incorporation relates must not be put in service until the relevant machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 98/37/EC.

Authorised representative:

S. D. Wilson
Managing Director

Date: 6th July 2006

ITT Corporation, Pure-Flo (UK) Ltd.
Richards Street
Kirkham, Lancashire
PR4 2HU, England
Phone: +44 (0) 1772 682696
Fax: +44 (0) 1772 686006

CERTIFICATE OF COMPLIANCE

Date Issued: June 11, 2009

Customer:	VALVULAS Y PROCESOS 2007	**Quantity:**	004
Customer Order Number:	090505-2	**Int. Surface Finish:**	RA 0.8 MICRON MAX
ITT Order Number:	21246	**Ext. Surface Finish:**	
ITT Line Number:	003	**Electropolish Finish:**	NO ELECTROPOLISH
ITT Part Number:	%UK400H02930500		

Figure Number (Description): **(A)** 1.5-C-419-2-0-0-17-970-MET-ASME

Customer Tag Information:

Serial Number	(A)
21246-003-001	
21246-003-002	
21246-003-003	
21246-003-004	

Heat Number Information:

Heat / Code (Number)	Description	Material	Size
UMZ UNA VCP VDB VE	Cast valve	CF3M	1 1/2"

A copy of the Certified Material Test Report or the Certificate of Compliance is attached for the item(s) listed above.

Applicable Test Data:

Shell Test: 232 PSI	Tested: 11/06/2009
Seat Test: 175 PSI	Tested: 11/06/2009

Additional Information:

EPDM DIAPHRAGM: Grade 17: Grade 17 and B17 (EPDM) diaphragms have a LIMITED SHELF LIFE of 6 years.
Grade 17 and B17 (EPDM) diaphragms comply with the FDA Code of Federal Regulations Title 21 Section 177.2600 and have been tested in accordance with and successfully passed the U.S. Pharmacopeia XXXI Class VI (121C for 60 mins & 70C for 24 hrs) Biological Reactivity test, Section 87 and Section 88.
The maximum temperature rating for Grade 17 and B17 (EPDM) diaphragms is 300° F/ 149 oC.
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10993-5: "Tests for Cytotoxicity—In Vitro Methods"
10993-10: "Tests for Irritation and Sensitization."
10993-11: "Tests for Systemic Toxicity."
Grade 17 EPDM complies with 21CFR 177.2600 (e) "Rubber articles intended for repeated use in contact with aqueous food." Exception: Grade 17 EPDM does not comply with 177.2600 (f) "Rubber articles intended for repeated use in contact with fatty food ".
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Grade 17 EPDM meets ASME BPE Part SG, Section 3.3 & 3.4

Comments:

This certificate is correct at the time of issue and no changes shall be made to it without the authorization of the issuing ITT Manager. If any unauthorized changes are made, the certificate is void.

CERTIFICATE ID (23564)

Certificate of Compliance - continued

Customer:	VALVULAS Y PROCESOS 2007	**Quantity:**	004
Customer Order Number:	090505-2	**Int. Surface Finish:**	RA 0.8 MICRON MAX
ITT Order Number:	21246	**Ext. Surface Finish:**	
ITT Line Number:	003	**Electropolish Finish:**	NO ELECTROPOLISH
ITT Part Number:	%UK400H02930500		

We certify that the components on the above referenced purchase order meet the requirements of the purchase order, applicable drawing(s), and our ISO 9001:2000 manufacturing, testing, and inspection procedures to assure an acceptable quality level applicable to the product.

//**S**// **Keith Thorpe**

Keith Thorpe
Manager, Quality Assurance (or representative)
(This certificate was created electronically and is valid without signature.)

This certificate is correct at the time of issue and no changes shall be made to it without the authorization of the issuing ITT Manager. If any unauthorized changes are made, the certificate is void.

CERTIFICATE ID (23564)

SUMANGAL CASTINGS PVT LTD

Works : survey No: 154 , Gondal N/H 8 - B , Veraval (Shapar), Ta: Kotda Sangani,Dist:Rajkot.Ph:(02827) 252843 , 253180

TEST CERTIFICATE OF MATERIAL

THE CERTIFICATE HAS BEEN PREPARED AS PER EN 10204 : 3.1

T.C. NUMBER	00502	QC F 12 / 01 / 20.02.2006		PAGE	1 OF 1
NAME OF CUSTOMER	ITT PURE - FLO SOLUTIONS GROUP (ENGLAND)			INVOICE NO.	EXP:043/08-09
MATERIAL SPECIFICATION	ASTM A 351/A351M-06			INVOICE DATE	25.09.08
MATERIAL GRADE	CF3M			D.C. NO.	-
PURCHASE ORDER NO.	21763 REV NO.1	P.O.DATE	15.07.08	D.C. DATE	-

CHEMICAL ANALYSIS BY SPECTROMETER

Heat No	Date of Pouring	C %	Mn %	Si %	S %	P %	Cr %	Ni %	Mo %			
Min.		0.000	0.000	0.000	0.000	0.000	17.00	9.00	2.00			
Max.		0.030	1.500	1.500	0.040	0.040	21.00	13.00	3.00			
UMZ	31.08.08	0.023	1.080	0.855	0.022	0.024	17.69	11.26	2.07			
UNA	31.08.08	0.025	1.030	0.674	0.022	0.021	17.55	10.17	2.08			
VCP	11.09.08	0.026	1.030	0.713	0.020	0.024	17.44	11.49	2.08			
VDB	12.09.08	0.027	0.994	0.614	0.021	0.024	17.50	10.48	2.04			
VEM	14.09.08	0.027	0.908	0.745	0.014	0.011	17.38	10.00	2.09			
VEL	14.09.08	0.027	0.915	0.671	0.005	0.019	17.52	10.82	2.10			
VEK	14.09.08	0.028	0.956	0.623	0.003	0.010	17.35	11.02	2.12			
VFE	17.09.08	0.027	0.909	0.613	0.025	0.028	18.15	10.84	2.11			

CASTING PROCESS	INVESTMENT CASTING.
DIMENTION INSPECTION	ACCEPTED.
VISUAL INSPECTION	100% CHECKED AND FOUND SATISFACTORY AS PER MSS - SP - 55 : 2003
HEAT TREATMENT	SOLUTION ANNEALING : Heated to 1040°c , soaked for 2 hrs and Water Quench.
SURFACE CONDITION	SAND BLASTED
OTHERS	——

MECHANICAL PROPERTY

Heat No.	Y.S Mpa	U.T.S. Mpa	EL%	R.A.%	HARDNESS BHN	IMPACT JOULES				DRG. NUMBER	DESCRIPTION	QTY Dia.
						1	2	3	AVG			
MIN.	205	485	35	-	-							
MAX.	-	-	-	-	237							
UMZ	267	523	49.40	-	155-165	-	-	-	-	120224 REV. 'D'	1.50" (DN40) BODIES	29
UNA	270	526	49.18	-	155-165	-	-	-	-	120224 REV. 'D'	1.50" (DN40) BODIES	30
VCP	270	520	43.90	-	155-165	-	-	-	-	120224 REV. 'D'	1.50" (DN40) BODIES	88
VDB	280	511	46.42	-	155-160	-	-	-	-	120224 REV. 'D'	1.50" (DN40) BODIES	44
VEM	286	542	46.00	-	155-165	-	-	-	-	120225 REV. 'D'	2.00" (DN50) BODIES	52
VEL	271	519	46.36	-	155-165	-	-	-	-	120225 REV. 'D'	2.00" (DN50) BODIES	32
VEK	276	527	46.30	-	155-165	-	-	-	-	120225 REV. 'D'	2.00" (DN50) BODIES	32
VFE	281	521	48.80	-	155-165	-	-	-	-	120225 REV. 'D'	2.00" (DN50) BODIES	27
UMZ	267	523	49.40	-	155-165	-	-	-	-	120225 REV. 'D'	2.00" (DN50) BODIES	45
UNA	270	526	49.18	-	155-165	-	-	-	-	120225 REV. 'D'	2.00" (DN50) BODIES	19

WE CONFIRM THAT THE MATERIAL WAS MANUFACTURED , SAMPLED , TESTED & INSPECTED IN ACCORDANCE WITH DRAWING , MATERIAL SPECIFICATION AND PURCHASE ORDER REQUIREMENTS.

	SPECIAL REQUIREMENTS
1	TDC 01 REV. 07
2	
3	
4	

PREPARED BY	VERIFIED BY	APPROVED BY
	HOD CHEMICAL LAB	MANAGER Q.A.

Pure-Flo

Richards Street, Kirkham
Lancashire PR4 2HU
United Kingdom
tel 44 1772 682 696
fax 44 1772 686 006

Pressure Equipment Directive 97/23/EC

Authorised Representative within the European Union

ITT Pure-Flo® (UK) Ltd.
Richard Street
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Lancashire
England
PR4 2HU
Tel: +44 (0)1772-682696

Manufacturing Site

ITT Pure-Flo® (UK) Ltd.
Richard Street
Kirkham,
Lancashire
England
PR4 2HU
Tel: +44 (0)1772-682696

Valve or valve Assembly
All ITT Pure-Flo® Diaphragm valves

This document is expressly reserved for the declaration of EU Directive compliance of ITT Pure-Flo diaphragm valves, valve assemblies and valve fabrications manufactures to Category I of the Pressure Equipment Directive 97/23/EC.

Assessment Category:
Module A

The following Harmonized or other technical standards have been utilized in the design of ITT Pure-Flo® diaphragm valves:

Authorised representative:

S. D. Wilson
Managing Director

Date: 6th July 2006

ITT

Keith Thorpe
Quality Assurance Manager,

Pure-Flo (UK)
Richards Street, Kirkham
Lancashire PR4 2HU
United Kingdom
tel 44 1772 682 696
fax 44 1772 686 006

LETTER OF CONFORMITY

(EN10204 TYPE 2.1)

ITEM: A4 STAINLESS STEEL SKT CAPS

STANDARD: DIN 912 ISO4762

THIS IS TO CONFIRM THAT THE SOCKET CAP HEAD SCREWS USED FOR FASTENING THE TOPWORKS TO THE VALVE BODY CONFORM TO OUR MATERIAL AND DIMENSIONAL REQUIREMENTS

Signed by: Keith Thorpe
QA Department

//S// Keith Thorpe
5th November 2007

ITT

ITT Corporation, Pure-Flo (UK) Ltd.
Richards Street
Kirkham, Lancashire
PR4 2HU, England
Phone: +44 (0) 1772 682696
Fax: +44 (0) 1772 686006

CERTIFICATE OF COMPLIANCE

Date Issued: May 19, 2009

Customer:	VALVULAS Y PROCESOS 2007	**Quantity:**	001
Customer Order Number:	090505-3	**Int. Surface Finish:**	RA 0.5 MICRON MAX
ITT Order Number:	21245	**Ext. Surface Finish:**	
ITT Line Number:	001	**Electropolish Finish:**	NO ELECTROPOLISH
ITT Part Number:	%UK400H02930300		

Figure Number (Description): (A) 2.5-F-419-8-0-0-17-963-M2-MET-ASME

Customer Tag Information:

Serial Number	(A)
21245-001-001	

Heat Number Information:

Heat / Code (Number)	Description	Material	Size
SK / 418970	Forging	316L / 1.4435 / BN2	3"

A copy of the Certified Material Test Report or the Certificate of Compliance is attached for the item(s) listed above.

Applicable Test Data:

Shell Test: 232 PSI Tested: 19/05/2009
Seat Test: 150 PSI Tested: 19/05/2009

Additional Information:

EPDM DIAPHRAGM: Grade 17: Grade 17 and B17 (EPDM) diaphragms have a LIMITED SHELF LIFE of 6 years.
Grade 17 and B17 (EPDM) diaphragms comply with the FDA Code of Federal Regulations Title 21 Section 177.2600 and have been tested in accordance with and successfully passed the U.S. Pharmacopeia XXXI Class VI (121C for 60 mins & 70C for 24 hrs) Biological Reactivity test, Section 87 and Section 88.
The maximum temperature rating for Grade 17 and B17 (EPDM) diaphragms is 300° F/ 149 oC.
Grade 17 and B17 (EPDM) diaphragms are in compliance to:
10993-5: "Tests for Cytotoxicity—In Vitro Methods"
10993-10: "Tests for Irritation and Sensitization."
10993-11: "Tests for Systemic Toxicity."
Grade 17 EPDM complies with 21CFR 177.2600 (e) "Rubber articles intended for repeated use in contact with aqueous food." Exception: Grade 17 EPDM does not comply with 177.2600 (f) "Rubber articles intended for repeated use in contact with fatty food ".
Grade 17 EPDM is processed with a small amount of Stearic Acid F-1000. Stearic Acid is a common fatty acid derived from Bovine Tallow. Stearic Acid F-1000 is confirmed to be manufactured by rigorous processes exceeding 200°C for greater than 20 mins. This complies with Section 6.4 Tallow Derivatives of EMEA/410/01 Rev. 2, October 2003.
Grade 17 EPDM meets ASME BPE Part SG, Section 3.3 & 3.4

Comments:

We certify that the components on the above referenced purchase order meet the requirements of the purchase order, applicable drawing(s), and our ISO 9001:2000 manufacturing, testing, and inspection procedures to assure an acceptable quality level applicable to the product.

Keith Thorpe
Manager, Quality Assurance (or representative)

This certificate is correct at the time of issue and no changes shall be made to it without the authorization of the issuing ITT Manager. If any unauthorized changes are made, the certificate is void.

CERTIFICATE ID (23212)

FEAT INDUSTRIALE
divisione della Feat Group S.p.A.

Feat Group S.p.A.
SEDE LEGALE:
I - 20122 MILANO (MI) - Viale Majno, 17
Capitale Sociale € 8.000.000,00.interamente versato
Codice fiscale, Partita IVA e numero di iscrizione Registro
delle Imprese di Milano: 08203090157
Codice Identif. IVA CEE IT 08203090157 - R.E.A. Milano 1211374
UFFICI AMMINISTRATIVI:
I - 23842 BOSISIO PARINI (LC) - Via del Livelli, snc
tel. 031 3581411 - fax 031 876176 - Cod. Mecc. MI240750
STABILIMENTO E UFFICI COMMERCIALI DELLA DIVISIONE:
I - 23861 CESANA BRIANZA (LC) - Via G. Parini, 30 e Via Ariosto, 1/3/5/7
tel. 031 6591 - Fax 031 659219 -http://www.featgroup.com

Test Certificate 2008/3003024

Date 08/05/2008

ITT PURE-FLO (UK) LTD

SELBY IND EST,RICHARDS STREET
KIRKHAM PR4 2HU
LANCASHIRE

Customer Order	Delivery Note	Invoice	Delivered Q.ty
21247	2008/000/0031071	O 0031166	15,00

Code Article	Piece Description
815002163108	BODY 2-1/2"-3" DWG.119472 P/N 43992

Material - Type Specification
F316LS9/1.4435 ASTM A182+DIN 17440-A ND BASEL STD BN2

Heat Number	Steel Mill	Trade Mark	Forging Code
418970	ACCIAIERIE VALBRUNA S.P.A.	F-	SK

CHEMICAL ANALYSIS

Elem.	Al	C	Cr	Cu	Mn	Mo	N	Ni	P	S	Si	Ti			
Min			17,000			2,500		12,500		0,007					
Max	0,010	0,030	18,000	0,500	2,000	3,000	0,100	14,000	0,045	0,017	1,000	0,050			
Heat C.A.	0,006	0,020	17,480	0,470	1,640	2,710	0,073	12,800	0,025	0,017	0,320	0,006			

MECHANICAL PROPERTIES

Laboratory Order	N.	Description	UM1	Min	Max	Value	UM2	Value
10601/PM/08	01	YS Rp1% Amb T	N/mm2	235,000		329,000	PSI	47705,000
10601/PM/08	01	Rs0.2% offset Amb T	N/mm2	200,000		288,000	PSI	41760,000
10601/PM/08	01	Tens.Str. Rm Amb T	N/mm2	520,000	670,000	596,000	PSI	86420,000
10601/PM/08	01	Lo=4Do A4 A% T Amb	%	30,000		52,200		
10601/PM/08	01	Lo=5 Do A5 A% Amb T	%	45,000		48,700		
10601/PM/08	01	Red.area Amb T Z%	%	50,000		69,000		
10601/PM/08	01	Impact ISO V Amb T	J	60,000		215,000		
10601/PM/08	02		J	60,000		255,000		
10601/PM/08	03		J	60,000		228,000		

Heat Treatment
SOLUTION ANNEALED:
ALL PIECES WERE HEATED TO 1060 C./ 1940 F.
HELD AT THIS TEMPERATURE FOR 1 HOUR FOR
EACH 1" OF THICKNESS AND QUENCHED IN WATER.-

Remarks
DELTA FERRITE CONTENT = 0.2
FERRITE AS TO BN2 = 6.29
MATERIAL PRODUCED ACCORDING TO ITT SPEC. ESA-0143 AND ESA-0027
3.1B CERTIFICATE ACCORDING TO EN 10204

Resp Assicurazione Qualita'
E.MARCONI

FEAT INDUSTRIALE division of FEAT Group S.p.A. states that material hereby certified is in compliance with the quality and technical requirements as described in the customer's order, or FEAT order acknowledgement.

1 - The results of chemicals analysis ia a true and correct copy of the mill certificate issued by the manufacturer of the steel employed or by the laboratory which has determined it.
2 - The material or components shipped under the above order number did not come in direct contact with mercury or any of its components; or with any mercury containing devices employing a single boundary of containment, during the manufacturing process inspection or storage.

Pure-Flo

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Pressure Equipment Directive 97/23/EC

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Valve or valve Assembly
All ITT Pure-Flo® Diaphragm valves

This document is expressly reserved for the declaration of EU Directive compliance of ITT Pure-Flo diaphragm valves, valve assemblies and valve fabrications manufactures to Category I of the Pressure Equipment Directive 97/23/EC.

Assessment Category:
Module A

The following Harmonized or other technical standards have been utilized in the design of ITT Pure-Flo® diaphragm valves:

Authorised representative:

S. D. Wilson
Managing Director

Date: 6th July 2006

ITT

Keith Thorpe
Quality Assurance Manager,

Pure-Flo (UK)
Richards Street, Kirkham
Lancashire PR4 2HU
United Kingdom
tel 44 1772 682 696
fax 44 1772 686 006

LETTER OF CONFORMITY

(EN10204 TYPE 2.1)

ITEM: A4 STAINLESS STEEL SKT CAPS

STANDARD: DIN 912 ISO4762

THIS IS TO CONFIRM THAT THE SOCKET CAP HEAD SCREWS USED FOR FASTENING THE TOPWORKS TO THE VALVE BODY CONFORM TO OUR MATERIAL AND DIMENSIONAL REQUIREMENTS

Signed by: Keith Thorpe
QA Department

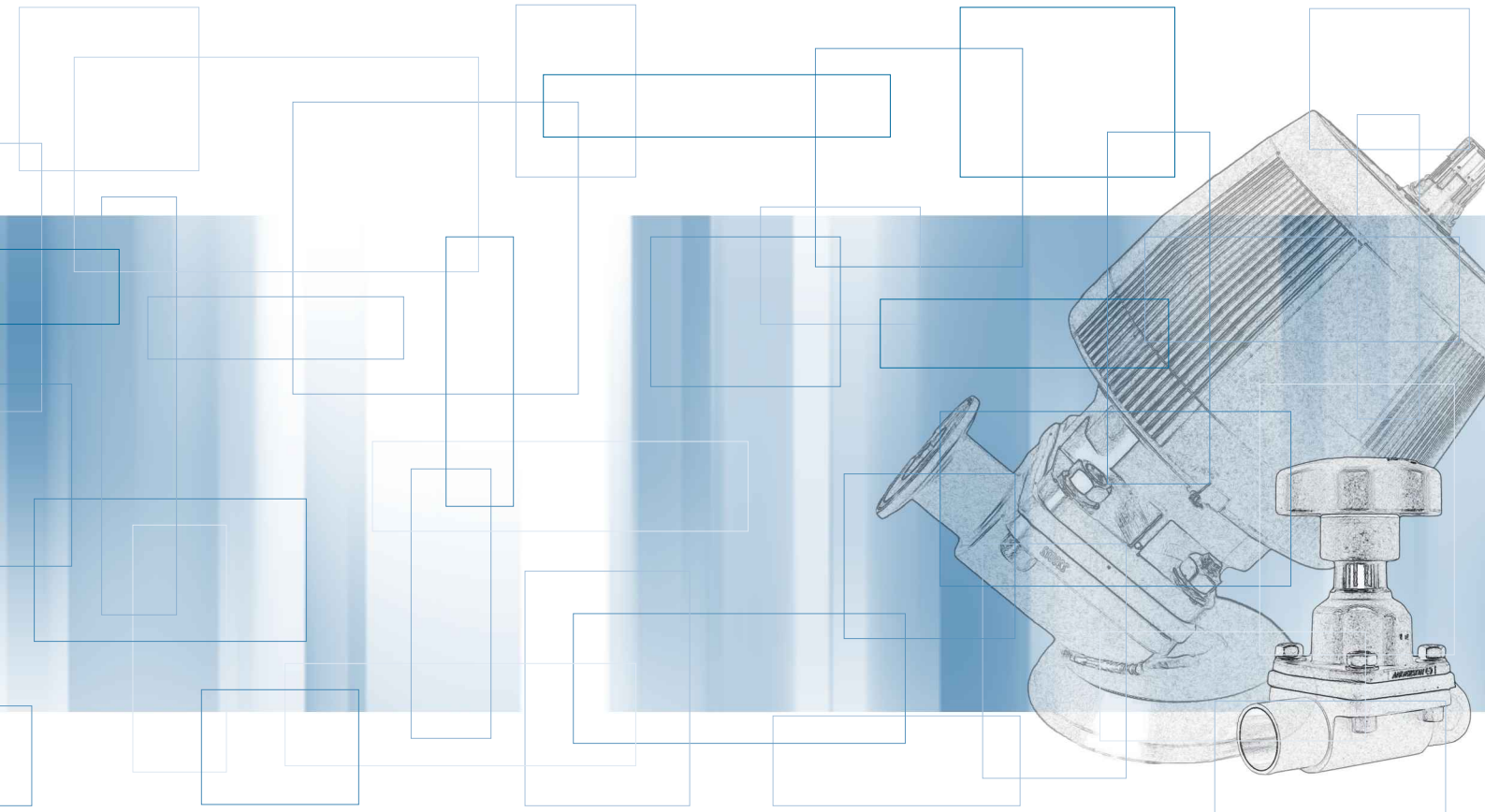
//S// Keith Thorpe
5th November 2007

F:\Groups\QA\CofC's\CofC database statements\Caps.doc

DIASEPTIC

Stainless Steel Diaphragm Valves

The innovative line of products for future-oriented technologies in the life science, biotechnology, cosmetics and food industries.



G. S. ANDERSON

Valves and Fittings for your application

Stainless steel diaphragm valve, ST 195-G

Description

The ST 195-G stainless steel diaphragm valve is a manually operated diaphragm valve with a cast iron bonnet, epoxy-coated, hue white fine texture, other shades on request.

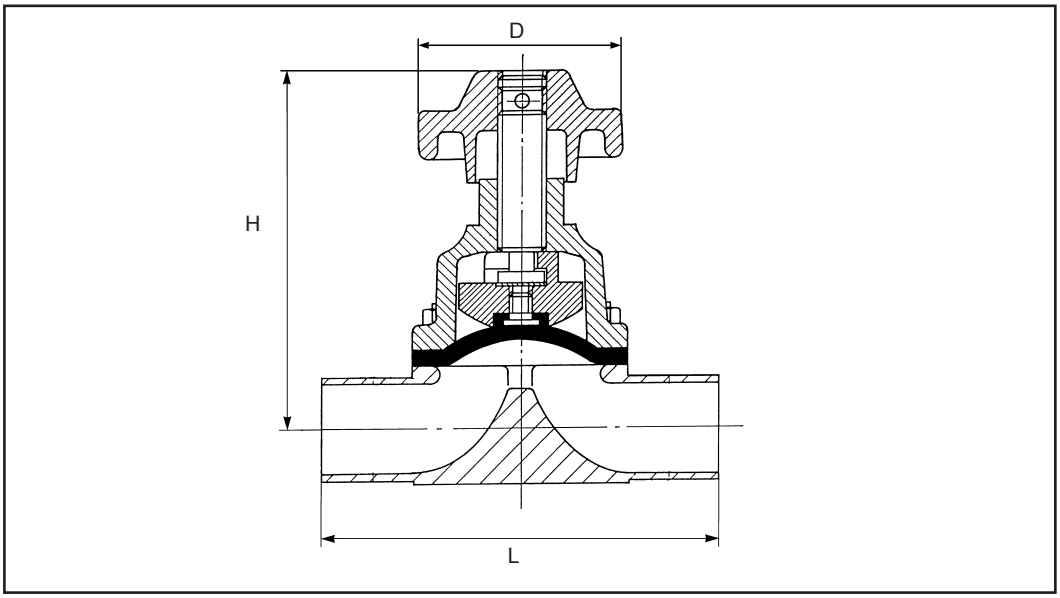
All available valve body versions are listed on pages 19-27.

Product features

- **Compact manually operated bonnet and handwheel in cast iron, expoxy-coated**
- **Robust design**
- **Adjustable overclosure stop**
- **Optical position indicator**
- **Autoclavable**
- **Low torque for easy operation**
- **Variable flow direction and installation position**

Technical data

Nominal diameter:	DN15 - DN250
Valve body:	Forged stainless steel 1.4435/316L or precision casting CF3M/316 (special materials up to DN250)
Surface finish:	see page 18
Diaphragm:	Elastomers or PTFE (see page 28)
Bonnet:	Cast iron, white epoxy-coated
Handwheel:	Cast iron, white epoxy-coated
Working pressure:	max. 10 bar
Working temperature:	max. 175°C (depending on diaphragm material)



Dimensions and Weights

DN mm	D	H	Weight kg	L
15	66	95	0.7	110
20	66	113	1.1	119
25	88	125	1.7	129
32				on request
40	124	160	3.8	161
50	124	180	5.4	192
65	170	223	9.3	218
80	240	255	15.8	256
100-250				on request

Stainless steel diaphragm valve, ST 195-S

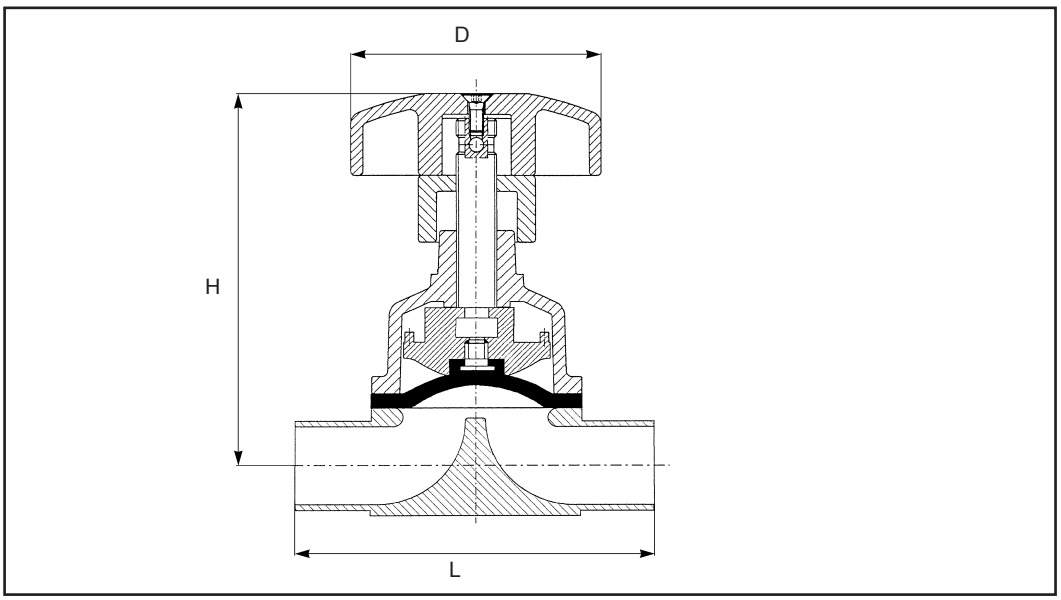
Description

The ST 195-S stainless steel diaphragm valve is a manually operated diaphragm valve with a stainless steel bonnet. Handwheels can be delivered in stainless steel or plastic.

All available valve body versions are listed on pages 19-27.

Technical data

Nominal diameter:	DN8 - DN150
Valve body:	Forged stainless steel 1.4435/316L or precision casting CF3M/316 (special material up to DN250)
Surface finish:	see page 18
Diaphragm:	Elastomers or PTFE (see page 28)
Bonnet:	Stainless steel
Handwheel:	Stainless steel or plastic
Working pressure:	max. 10 bar
Working temperature:	max. 175°C (depending on diaphragm material)



Product features

- **Compact manually operated bonnet in stainless steel**
- **Adjustable overclosure stop**
- **Optical position indicator**
- **Autoclavable**
- **Handwheel in stainless steel or plastic**
- **Low torque for easy operation**
- **Variable flow direction and installation position**

Dimensions and Weights

DN mm	D	H	Weight kg	L	
8	40	65	0.3	90	
10					on request
15	62	101	0.8	110	
20	62	116	1.2	119	
25	87	128	1.8	129	
32					on request
40	107	165	3.9	161	
50	107	195	5.5	192	
65 - 150					on request

Stainless steel diaphragm valve, ST 195-MA

Description

The ST 195-MA stainless steel diaphragm valve is a manually operated diaphragm valve with a plastic bonnet. The valve locking option is a valuable extra.

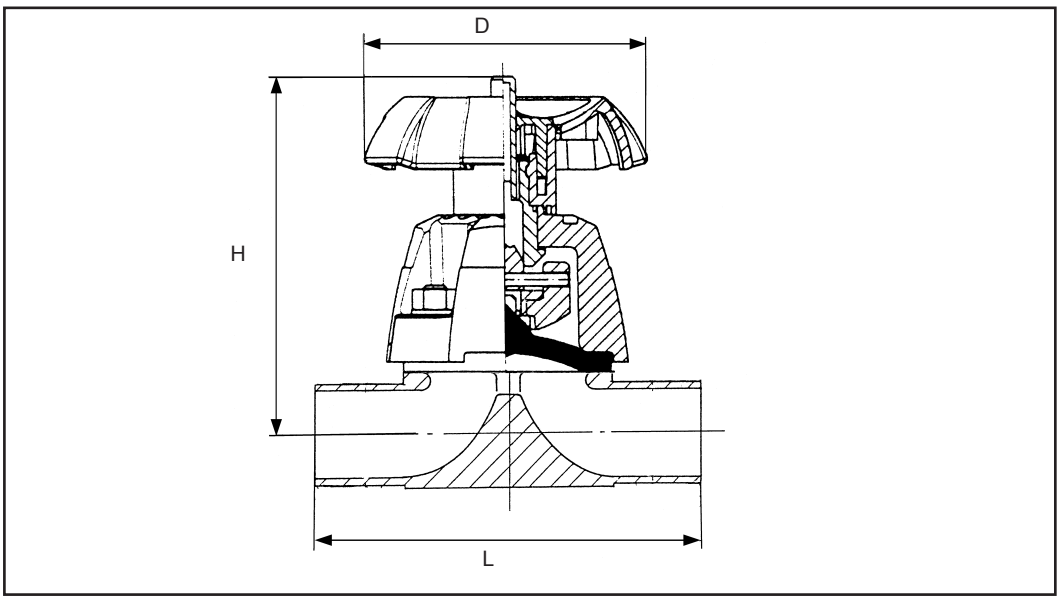
All available valve body versions are listed on pages 19-27.

Product features

- **Compact manually operated bonnet**
- **Lightweight**
- **Ergonomic handwheel**
- **Optical position indicator**
- **Locking set to lock the valve as a valuable extra**
- **Low torque for easy operation**
- **Variable flow direction and installation position**

Technical data

Nominal diameter:	DN15 - DN100
Valve body:	Forged stainless steel 1.4435/316L or precision casting CF3M/316 (special materials up to DN250)
Surface finish:	see page 18
Diaphragm:	Elastomers or PTFE (see page 28)
Bonnet:	Polypropylene fiberglass reinforced
Handwheel:	Polypropylene
Working pressure:	max. 10 bar
Working temperature:	max. 80°C
Ambient temperature:	max. 50°C



Dimensions and Weights

DN mm	D	H	Weight kg	L	
15	80	90	0.5	110	
20	80	102	0.9	119	
25	94	118.5	1.4	129	
32					on request
40	117	139	3.0	161	
50	152	172	4.2	192	
65-100					on request

Stainless steel diaphragm valve Diastar ST 195-DS

Description

This compact diaphragm valve is low-maintenance, has a pneumatic actuator in plastic and is available in the fail safe to open, fail safe to close and double acting modes of operation. The pneumatic actuators are available in plastic or with stainless steel intermediate part, dimensionally reduced to a minimum and especially suited to applications where space is limited. A wide range of accessories such as electrical feedback unit, positioner, BUS-systems or stroke limiter, allow optimal adaptation to all types of control tasks.
All available valve body versions are listed on pages 19-27.

Technical data

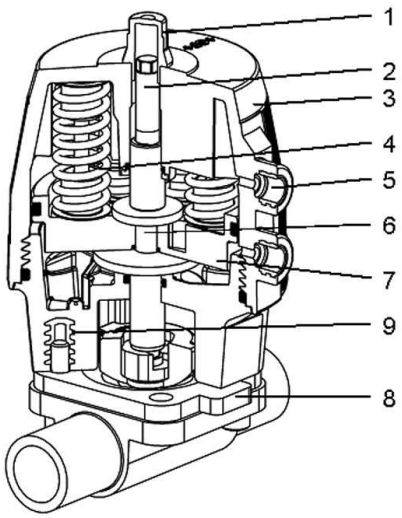
Nominal data:	DN8 - DN80
Valve body:	Forged stainless steel 1.4435/316L or precision casting CF3M/316 (special materials up to DN250)
Surface finish:	see page 18
Diaphragm:	Elastomers oder PTFE (see page 28)
Actuator housing DN8-DN50:	PPS
Actuator housing DN8-DN50:	PPS with stainless steel intermediate part
Actuator housing DN65/DN80:	PP-GF with stainless steel intermediate part
Working pressure:	max. 10 bar
Working temperature:	max. 150°C for actuator housing in PPS max. 120°C for actuator housing in PP-GF
Control medium:	Compressed air (oil-free) / neutral, non-aggressive gases, max. 50°C
Max. permissible control pressure:	6 bar for mode FC, 5 bar for mode FO and DA
Ambient temperature:	max. 50°C

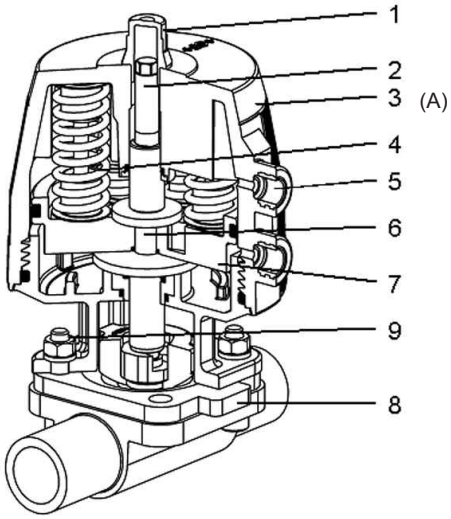
Product features

- **Compact pneumatic actuator in plastic**
- **Optional stainless steel intermediate part**
- **Optical position indicator included**
- **Lightweight**
- **Autoclavable**
- **Wide selection of accessories**
- **Variable flow direction and installation position**

Valve design (DN8-DN80)

1. Indicator cap
2. Optical position indicator
3. Plastic body/ (A) or with stainless steel intermediate part
4. Preloaded spring sets
5. Connection for control air
6. Lifting spindle assembly
7. Piston
8. Diaphragm
9. Screws

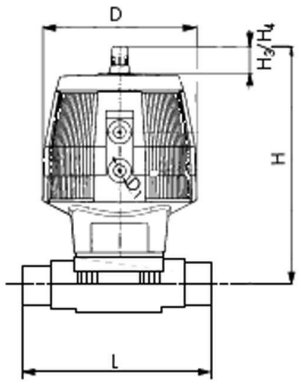




Dimensions, Performance Diagrams DN15-DN50

Mode:	Fail safe spring to close (FC)
Control pressure:	max. 6 bar
Diaphragms:	Elastomers/PTFE
Actuator:	Plastic

Dimensions



Mode of operation FC

DN mm	D mm	D1 G	H mm	H3 mm	H4[1] mm	L mm
08*	68	1/8"	109	16	46	90
15 EPDM	68	1/8"	115	16	46	110
15 PTFE	96	1/8"	144	16	46	110
20	96	1/8"	148	16	46	119
25	96	1/8"	160	16	65	129
32**						
40	150	1/4"	240	27	65	161
50	150	1/4"	254	27	65	192

1) = with stroke limiter / manual override
* only with stainless steel intermediate part
** on request

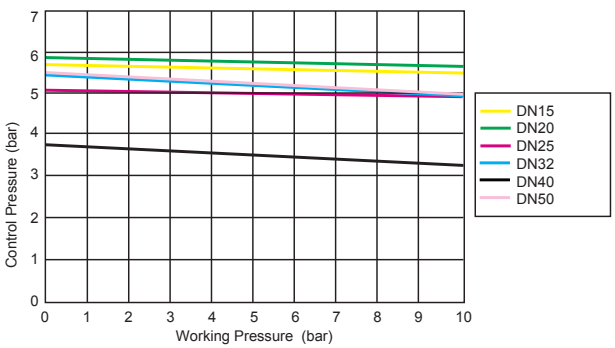
Max. working pressure at 23°C medium temperature

DN	EPDM Gr.	EPDM → bar	EPDM →← bar	PTFE Gr.	PTFE → bar	PTFE →← bar
15	**1**	10	10/9	**2**	10	10/9
20	**2**	10	10/9	**2**	10	10/9
25	**2**	10	9/8	**3**	10	10/9
32	**3**	10	8/7	**4**	10	10/9
40	**4**	10	10/9	**5**	10	10/9
50	**4**	10	8/7	**5**	10	10/9

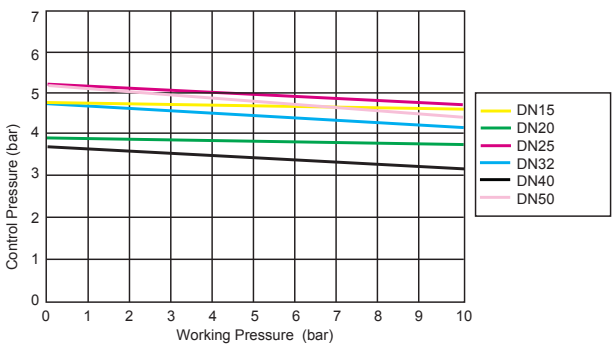
→ Working pressure on one side →← Working pressure on both sides

Control/Working Pressure Diagram

Fail safe spring to close (FC) with EPDM diaphragm



Fail safe spring to close (FC) with PTFE diaphragm

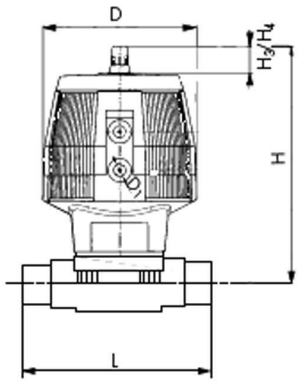


Lower control pressure is possible by reducing the number of springs.

Dimensions, Performance Diagrams DN15-DN50

Mode:	Fail spring to close (FC)
Control pressure:	max. 6 bar
Diaphragms:	Elastomers/PTFE
Actuator:	Stainless steel intermediate part

Dimensions



Mode of operation FC

DN mm	D mm	D1 G	H mm	H3 mm	H4[1] mm	L mm
08	68	1/8”	109	16	46	90
15	96	1/8”	144	16	46	110
20	96	1/8”	148	16	46	119
25	120	1/8”	193	27	65	129
32**						
40	180	1/4”	263	27	65	161
50	180	1/4”	274	27	65	192

1) = with stroke limiter / manual override
** on request

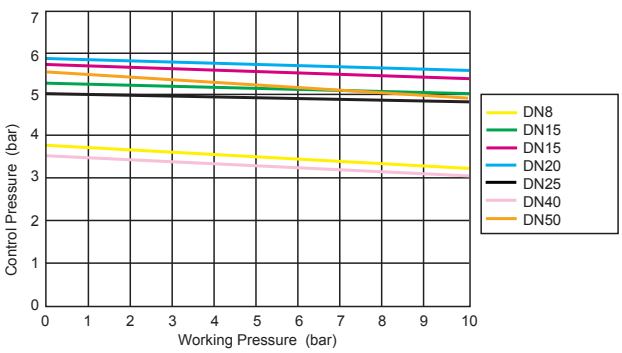
Max. working pressure at 23°C medium temperature

DN	EPDM Gr.	EPDM → bar	EPDM ←→ bar	PTFE Gr.	PTFE → bar	PTFE ←→ bar
08	**1**	10	10/9	**1**	10	10/9
15	**1**	10	10/9	**1**	-	-
15	**-**	-	-	**2**	10	10/9
20	**2**	10	10/9	**2**	10	10/9
25	**3**	10	10/9	**3**	10	10/9
40	**5**	10	10/9	**5**	10	10/9
50	**5**	10	10/9	**5**	10	10/9

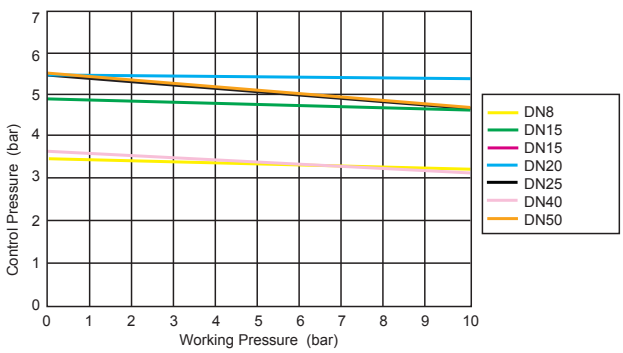
→ Working pressure on one side ←→ Working pressure on both sides

Control/Working Pressure Diagram

Fail safe spring to close (FC) with stainless steel intermediate part with PTFE diaphragm



Fail safe spring to close (FC) with stainless steel intermediate part with EPDM diaphragm

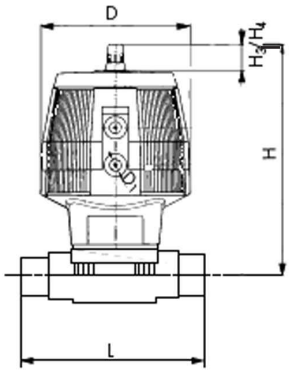


Lower control pressure is possible by reducing the number of springs.

Dimensions, Performance Diagrams DN15-DN50

Mode:	Fail safe spring to open or double acting (FO, DA)
Control pressure:	max. 5 bar
Diaphragms:	Elastomers/PTFE
Actuator:	Plastic / stainless steel intermediate part

Dimensions



Mode of operation FO DA

DN mm	D mm	D1 G	H mm	H3 mm	H4[1] mm	L mm
08*	68	1/8”	109	16	46	90
15	68	1/8”	115	16	46	110
20	96	1/8”	148	16	46	119
25	96	1/8”	160	16	46	129
32**						
40	150	1/4”	240	27	65	161
50	150	1/4”	254	27	65	192

1) = with stroke limiter / manual override
* only with stainless steel intermediate part
** on request

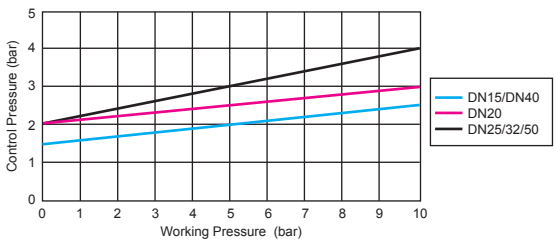
Max. working pressure at 23°C medium temperature

DN	EPDM Gr.	EPDM → bar	EPDM →← bar	PTFE Gr.	PTFE → bar	PTFE →← bar
15	**1**	10	10/9	**1**	10	10/9
20	**2**	10	10/9	**2**	10	10/9
25	**2**	10	10/9	**2**	10	9/8
32	**3**	10	10/9	**3**	10	10/9
40	**4**	10	10/9	**4**	10	10/9
50	**4**	10	10/9	**4**	10	10/9

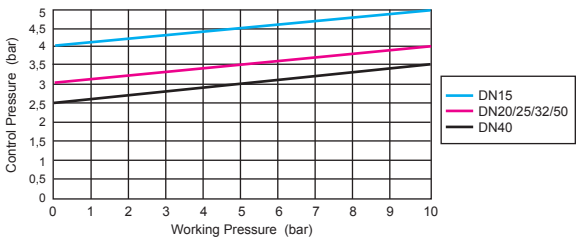
→ Working pressure on one side
→← Working pressure on both sides
FO/DA measuring with 5 bar control pressure

Control/Working Pressure Diagram

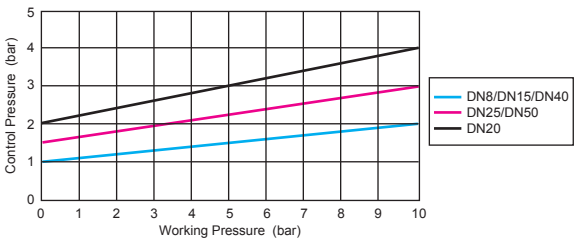
FO/DA EPDM (Plastic actuator)



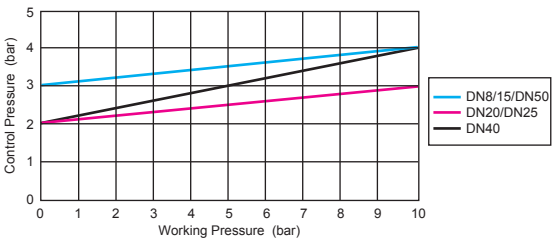
FO/DA PTFE (Plastic actuator)



FO/DA EPDM (Actuator with stainless steel intermediate part)



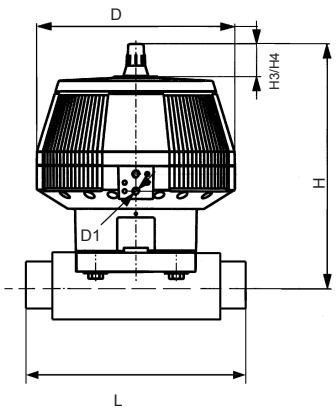
FO/DA PTFE (Actuator with stainless steel intermediate part)



Dimensions, Performance Diagrams DN65-DN80

Mode:	Fail safe spring to close, to open, double acting (FC, FO, DA)
Control pressure:	max. 6 bar for FC mode, max. 5 bar for FO and DA modes
Diaphragms:	Elastomers/PTFE
Actuator:	Stainless steel intermediate part

Dimensions



Mode of operation FC FO DA

DN mm	D mm	D1 G	H mm	H3 mm	H4[1] mm	L mm
65	280	1/4"	344	46	100	218
80	280	1/4"	354	46	100	256

1) = with stroke limiter / manual override

Max. working pressure

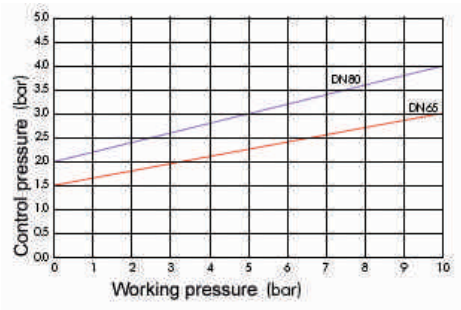
DN	EPDM → bar	EPDM ←→ bar	PTFE → bar	PTFE ←→ bar
65	10	10/9	10	7/6
80	10	10/9	10	6/5

→ Working pressure on one side ←→ Working pressure on both sides

Control/Working Pressure Diagram

Fail safe spring to close (FC)

Fail safe spring to open / double acting (FO/DA)



Lower control pressure is possible by reducing the number of springs, only for fail safe spring to close.

Stainless steel diaphragm valve Silverstar ST 195-SL

Description

This compact diaphragm valve is low-maintenance, has a pneumatic actuator in stainless steel and is available in the fail safe spring to close, to open and double acting modes of operation. Dimensions reduced to a minimum are suited especially for applications where space is limited.
A wide range of accessories, such as electrical feedback unit, positioner or stroke limiter, allow optimal adaptation to all types of control tasks.
All available valve body versions are listed on pages 19-27.

Product features

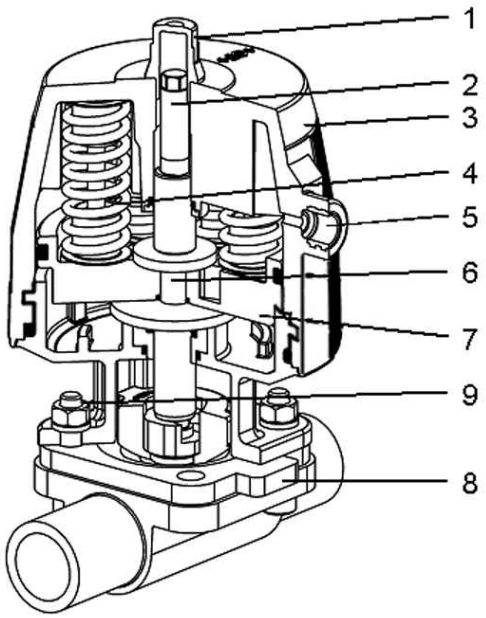
- **Compact design**
- **Proofed engineering**
- **Easy maintenance by bayonet connection**
- **Quick connection by plug-in screw**
- **Preload spring allow a safe adjustment to unit requirements**
- **Wide selection of accessories: limit switches, positioner, BUS-systems**
- **Variable flow direction and installation position**
- **Autoclavable**

Technical data

Nominal diameter:	DN8 - DN50
Valve body:	Forged stainless steel 1.4435/316L or precision casting CF3M/316 (special materials up to DN250)
Surface finish:	see page 18
Diaphragm:	Elastomers or PTFE (see page 28)
Actuator housing DN8-DN50:	Stainless steel
Working pressure:	max. 10 bar
Working temperature:	max. 150°C
Control medium:	Compressed air (oil-free) / neutral, non-aggressive gases, max. 80°C
Max. permissible control pressure:	6 bar for mode FC, 5 bar for mode FO and DA
Ambient temperature:	max. 80°C

Valve design (DN8-DN50)

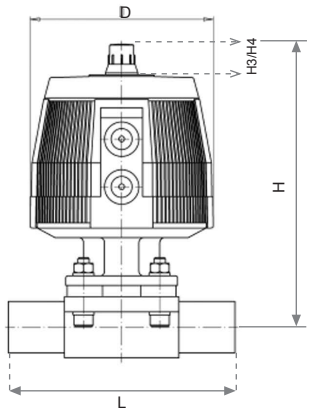
1. Indicator cap
2. Optical position indicator
3. Stainless steel housing
4. Preloaded spring sets
5. Connection for control air
6. Lifting spindle assembly
7. Piston
8. Diaphragm
9. Screws



Dimensions, Performance Diagrams, DN8-DN50

Mode:	Fail safe spring to close, to open, double acting (FC, FO, DA)
Control pressure:	max. 6 bar for mode FC, max. 5 bar for mode FO/DA
Diaphragms:	Elastomers/PTFE
Size:	SL

Dimensions



Mode of operation FC FO DA

DN mm	D mm	D1 * G	H mm	H3 mm	H4 [1] mm	L mm
08*	60	M5	84			90
15	92	M5	114	16	46	110
20	115	M5	147	16	46	119
25	115	M5	152	16	65	129
32**						
40	166	1/8”	204	27	65	161
50	166	1/8”	216	27	65	192

1) = with stroke limiter / manual override
** on request
* with stainless steel intermediate part

Maximum working pressure at 23°C medium temperature

	FC			FO/DA						FC		
	EPDM			EPDM			PTFE			PTFE		
DN	Gr.	→ bar	→← bar	Gr.	→ bar	→← bar	Gr.	→ bar	→← bar	Gr.	→ bar	→← bar
08	**1**	10	10/9	**1**	10	10/9	**1**	10	10/9	**1**	10	10/9
15	**1**	10	10/9	**1**	-	-	**1**	10	10/9	**1**	10	10/9
15	**-**	-	-	**2**	10	10/9	**-**	-	-	**-**	-	-
20	**2**	10	10/9	**2**	10	10/9	**2**	10	10/9	**2**	10	10/9
25	**3**	10	10/9	**3**	10	10/9	**3**	10	10/9	**3**	10	10/9
40	**5**	10	10/9	**5**	10	10/9	**5**	10	10/9	**5**	10	10/9
50	**5**	10	10/9	**5**	10	10/9	**5**	10	10/9	**5**	10	10/9

→ Working pressure on one side →← Working pressure on both sides
FO/DA measuring with 5 bar control pressure

Lower control pressure is possible by reducing the number of springs, only for fail safe spring to close.

Control/Working Pressure Diagrams

same as plastic housing PPS

Accessories for pneumatic actuators DN15-DN150

Electrical Feedback Unit Type 1062

Type of switch	max. switch capacity	
Microswitch Proximity switch Proximity switch DIN 19234 (Namur EEx)	250 V~ / 8A 10 - 30 V= / 200 mA 8 V	

Electrical Feedback Unit, ER 52/53

Type	Type of switch		max. switch capacity ER52	max. switch capacity ER53
ER 52/53-1	Microswitch	AG, Ni	250 V~ /6A	250 V~ /10A
ER 52/53-2	Microswitch with gold contact	Au	4-30 V= /1-100 mA	4-30 V= /1-100 mA
ER 52/53-3	Proximity switch	NPN	4,75-30 V= /0.1 A	9,6-55 V= /0.1 A
ER 52/53-4	Proximity switch	PNP	4,75-30 V= /0.1 A	9,6-55 V= /0.1 A
ER 52/53-5	Proximity switch	Namur	8 V=	8 V=
ER 53-6	Microswitch	EExd		250 V~ /5A
ER 53-7	Analog signal transmitter			15-30 V=/ 4-20 mA

NEW

Electrical Feedback Unit, ER 55

Type	Dimension	Switch capacity
ER 55-1	DN15-DN50	250 V~ / 200 mA

Stroke limiter / manual override

Dimension	Mode FC, FO, DA	
DN15 - 50		

Complete adaptor kit

The complete adaptor kit must be used if the valve with stroke limiter / manual override is combined with the electrical feedback unit ER 52.

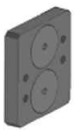
Dimension	Mode FC, FO, DA	
DN15 - 50		

NEW

Electric pneumatic positioner (for all actuators)

Dimension	Type	
DN15-DN150	DSR 100	

Adapter plate NAMUR



Dimension	Mode FC, FO, DA	
DN15 - 50		

Electrical Control Unit VR 1001/VR 2001 with integrated solenoid valve and limit switch

NEW

Type of switch	max. switch capacity	
Proximity switch Proximity switch (Namur EEx) further proximity switches on request	10 - 28 V= / 30mA 8 V	

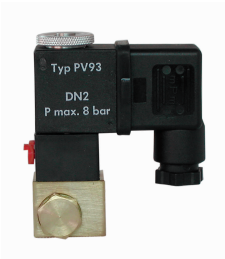
AS/Interface-Box Type BV 1000

- **Compact unit**
- **Integrated pilot valve**
- **Electrical and optical feedback unit**
- **No air consumption in rest position**
- **Easy assembly**

Pilot valves (for all actuators)

Type PV93

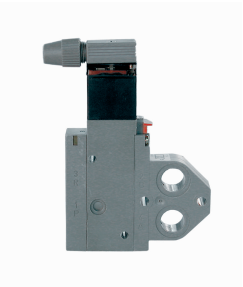
3/2-way solenoid valve to control single acting pneumatic actuators. Installed either via a base plate with hollow screw directly on the actuator or onto multiple manifolds.
Materials: body polyamide/brass, seals NBR, mode of operation C (fail safe to close).
Electrical connection: cable plug ISO/DIN 43650



	Mode FC, FO, DA	
Version for direct mounting or mounting onto multiple manifolds	230 V, 50 - 60 Hz 115 V, 50 - 60 Hz 24 V= 24 V, 50 - 60 Hz	
Multiple manifolds	for 4, 6 or 8 valves	
Cable plug with LED and Varistor	230 V, AC/DC 115 V, AC/DC 24 V, AC/DC	

Type 5470

4/2-way solenoid valve to control double acting pneumatic actuators. Installed with a Namur adapter plate. For dimensions DN15-50 a Namur adaptor plate must be installed between the actuator and the pilot valve.
Materials: body polyamide/brass, seals NBR, mode of operation G.
Electrical connection: cable plug ISO/DIN 43650



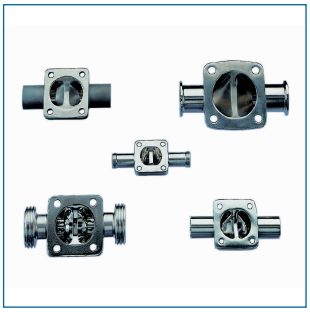
	Service voltage	
Version with Namur plate without throttle screw	230 V, AC/DC 115 V, AC/DC 24 V, AC/DC	

Manifold Type PV 2000

- **Compact design**
- **Modular structure**
- **Low power consumption**
- **BUS-connection for ASI- and PROFI-BUS**

NEW

Type	Mode	Connection
PV 2000	5/2-way valve 3/2-way valve	D-Sub-Plug ASI-/PROFI-BUS D-Sub-Plug ASI-/PROFI-BUS



Valve bodies

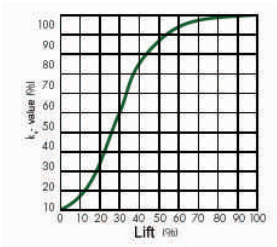
Description

The valve bodies can be assembled to complete valves with all diaphragms, bonnets or pneumatic actuators of our product range. The quality of surface finish corresponds to particular requirements and applications. Forged valve bodies can be supplied in all connection types and dimensions.

Product features

- **Butt weld ends according to all standards for manual and orbital welding**
- **Seamless integrated clamp connections, sterile and diary threads to all standards**
- **Zero static design**
- **Selfdraining when positioned accordingly**
- **Ideal for CIP and SIP processes**
- **Practically turbulence free flow**
- **Special designs for individual requirements**

Flow-characteristics
(average values for diaphragm valves)



Technical data

Nominal diameter:	DN8 - DN80 / special versions up to DN 250 on request		
Version:	Stainless steel 316L/316	forged	investment cast
		1.4435	CF3M
	Δ-ferrite-content:	≤ 0.5%	≤ 1.0%
Surface finish:	Vacublast finish	Ra ≤ 1.6µm	Ra ≤ 6.3 µm
(inside roughness)	Satin finish	Ra ≤ 0.5 µm	Ra ≤ 0.6 µm
	Mirror polish	Ra ≤ 0.1 µm	
	Super mirror polish	Ra ≤ 0.05 µm	
	Electropolish	Ra ≤ 6.3 µm bis 0.4 µm	

Kv-/Cv-values (Pipe standard ISO 4200)

Lift in %	kv in l/min.Δp = 1 bar							
	DN 8	DN 15	DN 20	DN 25	DN 40	DN 50	DN 65	DN 80
100	27	70	146	218	684	1156	1571	2533
90	27	68	140	210	667	1116	1480	2515
80	26	67	133	201	625	1076	1445	2462
70	25	64	124	194	610	994	1365	2312
60	23	59	101	165	545	893	1210	2170
50	20	47	87	142	457	750	1044	1925
40	18	35	55	115	345	606	835	1565
30	11	22	43	65	310	424	625	845
20	10	17	20	25	180	222	280	401
10	2	5	7	14	50	64	125	195

Lift in %	Cv in US Gallons/min.Δp = 1 psi							
	DN 8	DN 15	DN 20	DN 25	DN 40	DN 50	DN 65	DN 80
100	1.9	4.9	10.2	15.3	47.9	81.0	110.0	177.4
90	1.9	4.8	9.8	14.7	46.7	78.2	103.6	176.1
80	1.8	4.8	9.3	14.1	43.8	75.4	101.2	172.4
70	1.8	4.5	8.7	13.6	42.7	69.6	95.6	161.9
60	1.6	4.1	7.1	11.6	38.2	62.5	84.7	152.0
50	1.4	3.3	6.1	9.9	32.0	52.5	73.1	134.8
40	1.3	2.5	3.9	8.1	24.2	42.4	58.5	109.6
30	0.8	1.5	3.0	4.6	21.7	29.7	43.8	59.2
20	0.7	1.2	1.4	1.8	12.6	15.5	19.6	28.1
10	0.1	0.4	0.5	1.0	3.5	4.5	8.8	13.7

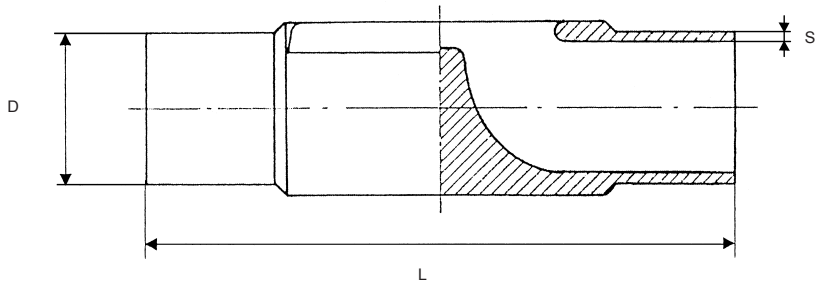
Kv-/Cv-values (Pipe standard BS O.D.Tubing)

Lift in %	kv in l/min.Δp = 1 bar							
	DN 8	DN 15	DN 20	DN 25	DN 40	DN 50	DN 65	DN 80
100	3.4	35	99	180	426	914	1395	2066
90	3.3	35	99	173	425	914	1394	2066
80	3.3	34	97	155	410	913	1393	2058
70	3.3	33	95	145	401	910	1311	2030
60	3.3	33	94	140	388	882	1210	1950
50	3.2	31	90	105	349	776	1090	1753
40	3.1	28	76	95	335	665	872	1445
30	3.1	19	65	66	265	525	630	940
20	3.0	10	45	48	139	370	250	300
10	2.6	3	10	10	22	67	88	142

Lift in %	Cv in US Gallons/min.Δp = 1 psi							
	DN 8	DN 15	DN 20	DN 25	DN 40	DN 50	DN 65	DN 80
100	0.2	2.5	6.9	12.6	29.8	64.0	97.7	144.7
90	0.2	2.5	6.9	12.1	29.8	64.0	97.6	144.7
80	0.2	2.4	6.8	10.9	28.7	63.9	97.5	144.1
70	0.2	2.3	6.7	10.2	28.1	63.7	91.8	142.2
60	0.2	2.3	6.6	9.8	27.2	61.8	84.7	136.6
50	0.2	2.2	6.3	7.4	24.4	54.3	76.3	122.8
40	0.2	2.0	5.3	6.7	23.5	46.6	61.1	101.2
30	0.2	1.3	4.6	4.6	18.6	36.8	44.1	65.8
20	0.2	0.7	3.2	3.4	9.7	25.9	17.5	21.0
10	0.2	0.2	0.7	0.7	1.5	4.7	6.2	9.9

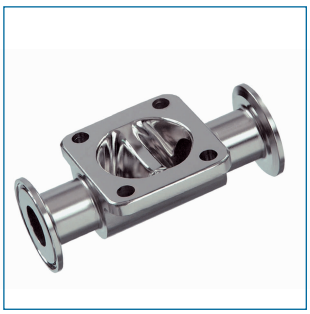
Dimensions

Butt weld ends

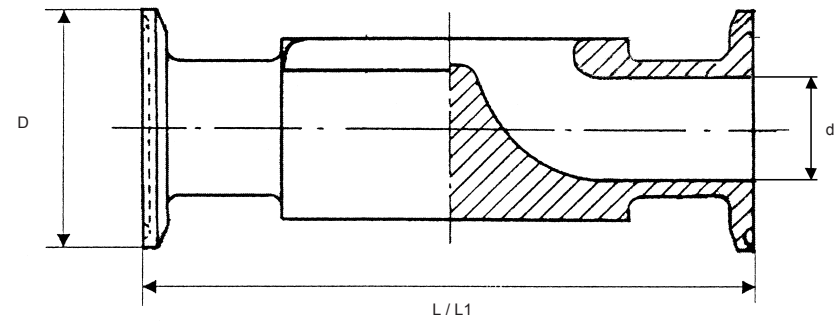


		ISO 4200	DIN 11850 Series 1	DIN 11850 Series 2	DIN 11850 Series 3	SMS 3008	O.D.Tubing Standard	BS O.D. 4825	ASME BPE
DN	L	ø D x s	ø D x s	ø D x s	ø D x s	ø D x s	ø D x s	ø D x s	ø D x s
8	90	13.5 x 1.60					6.35 x 1.60	6.35 x 1.20	6.35 x 0.89
10	*	17.2 x 1.60	12 x 1.00	13 x 1.50	14 x 2.00	12.0 x 1.00	9.53 x 1.60	9.52 x 1.20	9.52 x 0.89
15	110	21.3 x 1.60	18 x 1.00	19 x 1.50	20 x 2.00	18.0 x 1.00	12.7 x 1.60	12.7 x 1.20	12.7 x 1.65
20	119	26.9 x 1.60	22 x 1.00	23 x 1.50	24 x 2.00	25.0 x 1.20	19.05 x 1.60	19.05 x 1.20	19.05 x 1.65
25	129	33.7 x 2.00	28 x 1.00	29 x 1.50	30 x 2.00	32.0 x 1.20	25.4 x 1.60	25.4 x 1.60	25.4 x 1.65
32	*	42.4 x 2.00	34 x 1.00	35 x 1.50	36 x 2.00	33.7 x 1.20	31.75 x 1.60	31.75 x 1.60	
40	161	48.3 x 2.00	40 x 1.00	41 x 1.50	42 x 2.00	38.0 x 1.20	38.1 x 1.60	38.1 x 1.60	38.1 x 1.65
50	192	60.3 x 2.00	52 x 1.00	53 x 1.50	54 x 2.00	51.0 x 1.20	50.8 x 1.60	50.8 x 1.60	50.8 x 1.65
65	218	76.1 x 2.30	70 x 2.00			63.5 x 1.60	63.5 x 1.60	63.5 x 1.60	63.5 x 1.65
80	256	88.9 x 2.30	85 x 2.00			76.1 x 1.60	76.2 x 1.60	76.2 x 1.60	76.2 x 1.65

Dimensions in mm
* on request



Clamp

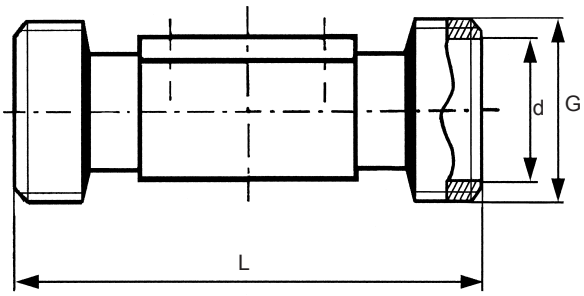


				Clamp DIN 32676 for tube DIN 11850			Clamp ISO 2852 for tube ISO 4200			Clamp BS 4825 for O.D.Tubing Standard			Clamp ASME BPE for tube ASME BPE		
DN	L	L1			ød	øD		ød	øD		ød	øD		ød	øD
10	*				10.0	34.0		14.0	34.0						
15	108	89			16.0	34.0		18.1	34.0		9.5	25.0		9.40	25.0
20	118	102			20.0	34.0		23.7	50.5		15.9	25.0		15.75	25.0
25	127	114			26.0	50.5		29.7	50.5		22.2	50.5		22.10	50.5
32	*				32.0	50.5		38.4	50.5		28.6	50.5			
40	159	140			38.0	50.5		44.3	64.0		34.9	50.5		34.80	50.5
50	191	159			50.0	64.0		56.3	77.5		47.6	64.0		47.50	64.0
65	216	194			66.0	91.0		73.8	91.0		60.3	77.5		60.20	77.5
80	254	222			81.0	106.0		84.3	106.0		73.0	91.0		72.90	91.0

Dimensions in mm L1 = US Size
* on request, DN8 on request

Dimensions

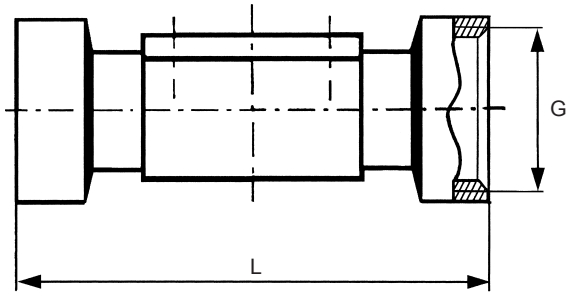
Sterile threads



DN mm	inch	L mm	ød mm	G
15	1/2”	108		
20	3/4”	118		
25	1”	127		
32	1.1/4”	159	on request	
40	1.1/2”	159		
50	2”	191		
65	2.1/2”	216		
80	3”	254		

Sterile and other threads on request

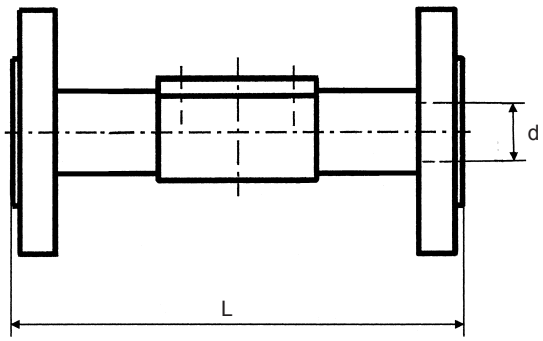
Threaded connection inside, DIN/ISO 228



DN mm	G inch	L mm	
15	1/2”	108	
20	3/4”	118	
25	1”	127	
32	1.1/4”	159	
40	1.1/2”	159	
50	2”	191	
65	2.1/2”	216	
80	3”	254	

Sterile and other threads on request

Flanged



DN		DIN 3202 F1 (2501 PN10) L	ød
mm	inch	mm	mm
15	1/2”	130	17.3
20	3/4”	150	22.3
25	1”	160	28.5
32	1.1/4”	180	37.2
40	1.1/2”	200	43.1
50	2”	230	54.5
65	2.1/2”	290	70.3
80	3”	310	82.5

Other flange standards on request

NEW

DIN 11864 on request

Stainless steel T-valve, ST 195-T

Description

T-valves are designed so that they are selfdraining when installed in the correct position. There are practically no dead legs. T-valves are manufactured in various dimensions. Both, the available bonnets or pneumatic actuators, can be mounted.

Technical data

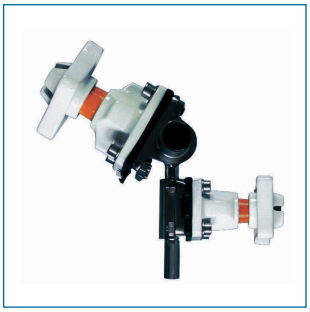
Nominal diameter:	DN8 - DN80
Valve body:	Forged stainless steel 1.4435/316L (special materials on request)
Surface finish:	see page 18
Diaphragm:	Elastomers or PTFE (see page 28)
Bonnet:	Stainless steel, cast iron epoxy-coated Polypropylene fiberglass reinforced or pneumatic actuator
Working pressure:	max. 10 bar
Working temperature:	depending on bonnet and diaphragm

Versions

Valve size	Main line							
	DN 8	DN 15	DN 20	DN 25	DN 40	DN 50	DN 65	DN 80
DN 8	●	●	●	●	●	●	●	●
DN 15		●	●	●	●	●	●	●
DN 20			●	●	●	●	●	●
DN 25				●	●	●	●	●
DN 40					●	●	●	●
DN 50						●	●	●
DN 65							●	●
DN 80								●

Product features

- **Several dimensions**
- **With manually operated bonnet or pneumatic actuator**
- **Butt weld ends acc. to all standards for manual and orbital welding**
- **Zero static design**
- **Selfdrainig when positioned accordingly**
- **Ideal for CIP and SIP processes**
- **Practically turbulence free flow**
- **Special designs for individual requirements**



Tandem valves in stainless steel

Description

Tandem valves are manufactured in various dimensions, angles and positions.

Both, the available bonnets or pneumatic actuator, can be mounted.

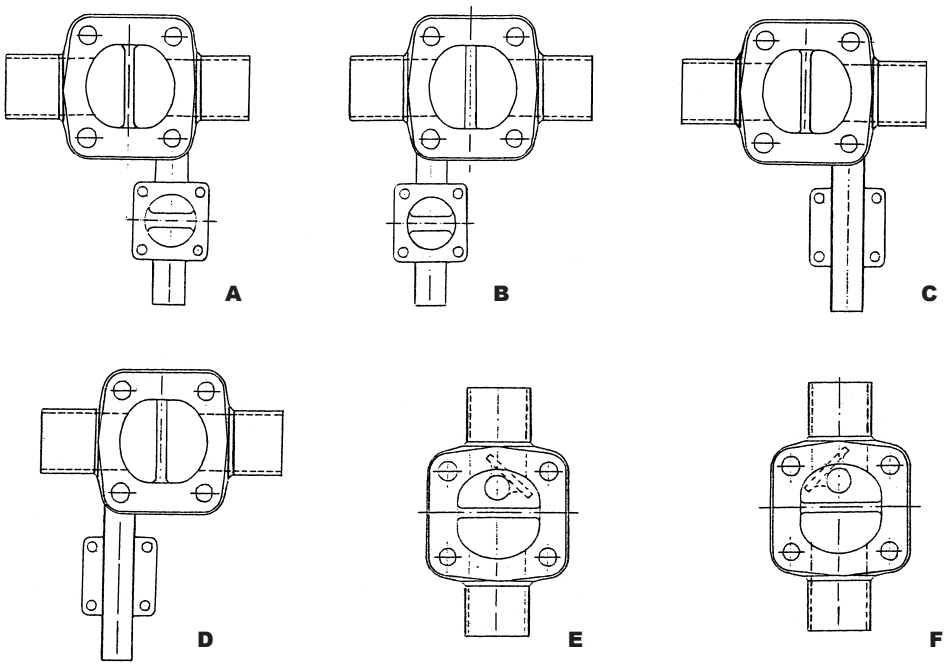
Product features

- **Several dimensions, angles and positions possible**
- **With manually operated bonnet or pneumatic actuator**
- **Butt weld ends according to all standards for manual and orbital welding**
- **Seamless integrated clamp connection, sterile and dairy thread to all standards**
- **Zero static design**
- **Selfdraining when positioned accordingly**
- **Ideal for CIP and SIP processes**
- **Practically turbulence free flow**
- **Special designs for individual requirements**

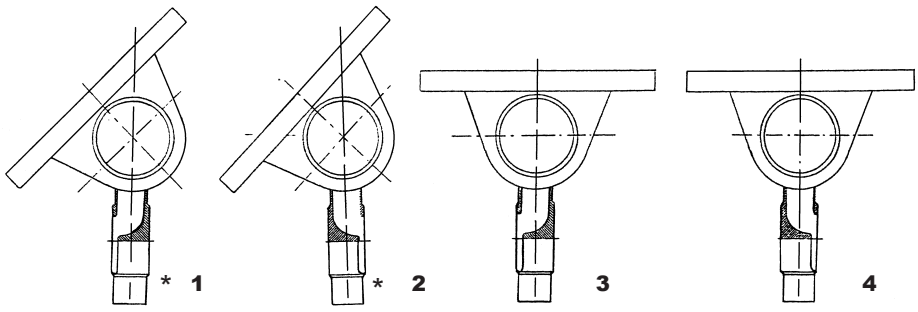
Technical data

Nominal diameter:	DN8-DN80
Valve body:	Forged stainless steel 1.4435/316L (special materials on request)
Surface finish:	see page 18
Diaphragm:	Elastomers or PTFE (see page 28)
Bonnet:	Stainless steel, cast iron epoxy-coated Polypropylene fiberglass reinforced or pneumatic actuator
Working pressure:	max. 10 bar
Working temperature:	depending on bonnet and diaphragm

Position examples



Angles



* Selfdrainig position

G.S.ANDERSON
Process for your application

Tiselab s.l.
C/Alboredo, 6-8 Entlo.

ES-08004 Barcelona

Abnahmeprüfzeugnis entsprechend DIN EN 10204/3.1

Inspection certificate corresponding / Certificate de reception conforme

Besteller / Customer / Commettant	Tiselab s.l.
Bestell-Nr. / Your order No. / Votre commande n° / d	9044
Werks-Nr. / Works No. / N/ACC.N°	MO 9094
Werkstoff / Material / Matérial	1.4435
Erschmelzungsart / Kind of melting / Mode du fusion	
Datum / Date / Data	18.02.09

Pos.-Nr. Item Poste	Stückzahl Quantity Nombre	Gegenstand Object Objet	Schmelze Heat Charge	Probe Nr. Specimen Eprouvette
2	1	ST195 diaphragm valve body forged stainless steel 1.4435 both ends Tri-Clamp-Ends ASME DN 25 = 1	7XV5	9322/PM/06

Schmelzanalyse / Chemical Analysis / Analyse Chimique:

Schmelze/Heat	% AL	% C	% Cr	% Cu	% Mn	%Mo	% N	% Ni	% P	% S	% Si	% Ti
min max	0.010	0.030	17.0 18.0	0.50	2.0	2.5 3.0	0.11	12.5 15.0	0.040	0.005 0.017	0.75	
	0.006	0.018	17.517	0.363	1.580	2.604	0.070	12.721	0.029	0.015	0.417	0.005

Ergebnis der Prüfungen / Test Results / Valeurs obtenues:

Probe Nr. Specimen-No. Eprouvette no	Probenab. Speci.dim Eprou.Dim	Streckgrenze Yield strength Limite d'élasticité N/mm²	Zugfestigkeit Tensile strength Résist. À alatraction N/mm²	Dehnung Elongation Allongem. Lo „/5d%	Einschn. Reduction Striction %	Kerbschlagzähigkeit ISO - V Imp.Value Résillence mkp/cm²	Joule
Anforderungen	min./max.	Rp0.2% - 190	490 - 690	30	60	Q = 55	L = 85
9322/PM/06		292	553	54.4	70.50	188-183-211	
Delta Ferrit Gehalt/Delta Ferrite content AVS <0,5%							

Besichtigung und Abmessung ohne Beanstandung.
Visual inspection and dimensions satisfactory.
Aucun défaut au point de vue aspect et dimension.

Die gestellten Anforderungen sind erfüllt.
Manufacturing requirements are satisfied.
Les résultats ont été trouvés satisfaisants.

Wir bestätigen, dass diese Abschrift mit dem uns vorliegenden Original-Werkszeugnis übereinstimmt.

We confirm that this is a true copy of the original test certificate.

G.S. ANDERSON GMBH

Supervisor
i. A. Andrea Meese

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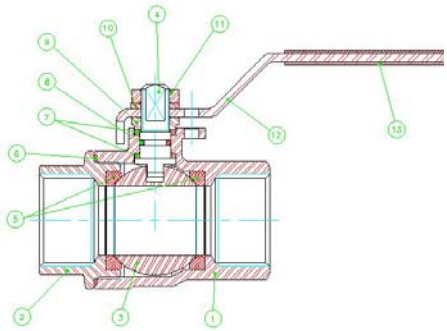
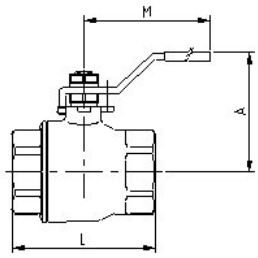
e-mail: genebre@genebre.es
internet: http://www.genebre.es

ARTICULO: 2014
Válvula de esfera paso total 2 piezas Inoxidable.
Stainless steel full port ball valve, 2 piece.

Características
1. Válvula esfera paso total 2 piezas
2. Extremos roscados DIN 2999 Std.
3. Construcción en Inox AISI 316 (CF8M) .
4. Asientos PTFE + 15 % F.V.
5. Vástago inexpulsable.
6. Tórica en el eje de Viton.
7. Juntas del eje PTFE + 15 % Grafito.
8. Sistema de bloqueo.
9. Presión de trabajo máxima 63 Kg/cm2.
10. Temperatura de trabajo –25 ºC + 180 ºC.

Features
1. Stainless steel full port ball valve, 2 piece.
2. Thread ends according DIN 2999 standard.
3. Made of AISI 316 (CF8M).
4. Ball seats PTFE + 15 % G.F.
5.Blow-out proof stem.
6. Viton o'ring stem.
7. Stem gasket PTFE + 15 % Graphite.
8. Locking system.
9. Max.. Working pressure 63 Kg/cm2.
10.Working Temperature –25 ºC + 180 ºC.





Nº	Denominación/Name	Material	Acabado Superficial/Surface Treatment
1	Cuerpo / Body	Acero Inox AISI 316 / SS 316	Granallado / Shot blasting
2	Tapa / Cap	Acero Inox AISI 316 / SS 316	Granallado / Shot blasting
3	Bola / Ball	Acero Inox AISI 316 / SS 316	------
4	Eje / Stem	Acero Inox AISI 316 / SS 316	------
5	Asiento / Seat ball	Teflón + 15% FV / PTFE + 15% GF.	------
6	Junta / Gasket	Teflón (PTFE)	------
7	Arandela / Trust Washer	Teflón + 15% grafito / PTFE + 15% graphite.	------
8	Tórica / O´ring	Viton	------
9	Anillo Prensa / Stem packing	Acero Inox AISI 304 / SS 304	------
10	Arandela / Washer	Acero Inox AISI 304 / SS 304	------
11	Tuerca / Nut	Acero Inox AISI 304 / SS 304	------
12	Maneta / Handle	Acero Inox AISI 304 / SS 304	------
13	Funda / Handle Sleeve	Vynil	------

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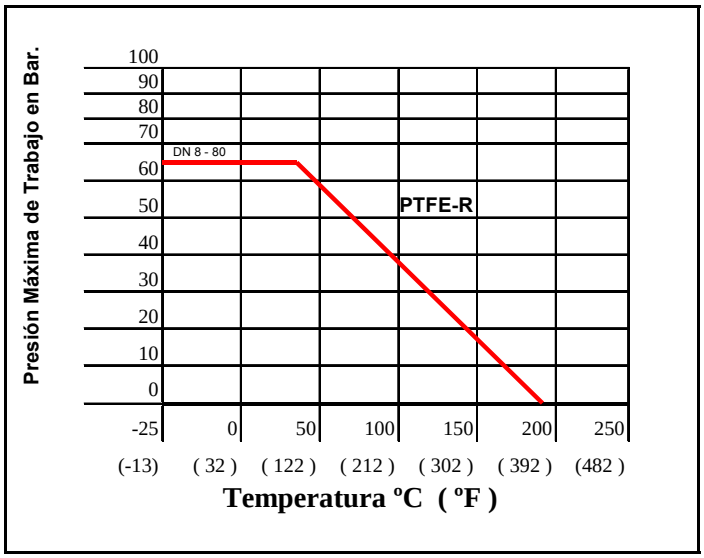
e-mail: genebre@genebre.es
internet: http://www.genebre.es

DIMENSIONES GENERALES / GENERAL DIMENSIONS

Ref	Medida/Size	PN	Dimensiones/Dimensions (mm)				Peso/Weight (g)
			P	A	L	M	
2014 02	1/4"	63	11	50	44.5	104	207
2014 03	3/8"	63	12.7	50	44.5	104	195
2014 04	1/2"	63	15	51.5	55	104	237
2014 05	3/4"	63	20.6	62	70.5	122	442
2014 06	1"	63	25.4	65	82.5	122	606
2014 07	1 ¼"	63	31.8	82	91	180	1084
2014 08	1 ½"	63	38.1	88	103	205	1544
2014 09	2"	63	50.8	106	120	219	2648
2014 10	2 ½"	63	65	119	152	240	4707
2014 11	3"	63	80	135	172	275	7288

CURVA PRESION TEMPERATURA / PRESSURE TEMPERATURE RATING



BOMBA

Shearpump and Powder Mixer

Fristam

Homogenizing, Dispersing, Emulsifying and Dissolving

Our new unit enables you to produce multiphase products of consistently high quality, time after time.

The principle is really quite simple.

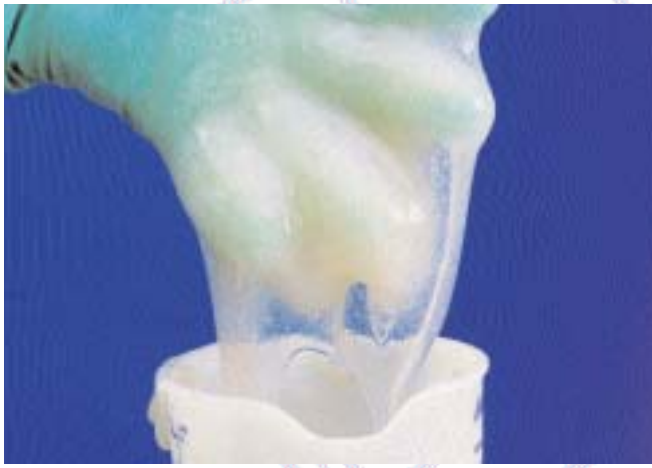
The new, efficient mixing method is based on the proven centrifugal pumps of the Fristam FP range. Instead of the impeller, a rotor/stator system, operating at tip speeds of up to 38 m/s, draws inhomogeneous media through shearing clearances of just 0.3 mm.

Thanks to the extremely high flow rates in the rotor/stator system and the high shear rate of up to 125,000 1/s, a high-perfomance blending of multi-phase products is achieved.

The result: Inseparable emulsions and end products of incomparable homogenity.

The smooth operational performance achieved by this system conforms with the unique precision and quality you have come to expect from all Fristam components.

Since applications vary in type and complexity, we offer customized solutions ranging from the small single unit to large-scale inline installations, as well as expert engineering consultation and support.



Concentrated:
With the Shearpump, it is easy to achieve highly concentrated solutions and to process stabilizers to highly viscous materials.

The stator:
The media are drawn through shear clearances of 3/10 mm. Disintegrated into the smallest particles, these are blended thoroughly until inseparable.

The right solution for every require

Materials

- Casing, cover and rotor/stator system are cast or forged
- Standard materials used:
  - Cr-Ni-Mo steel 1.4404

  Options:
  - Titanium
  - Hastelloy C
  - Other precision-cast materials
  - Materials with less than 0.5% delta ferrite
- Surfaces in contact with the product:
  - Shotblasted
  - Ground
  - Polished or electropolished
  - Hardened or coated
  - Special surface finish requirements can be met

Drives

- Three-phase induction motors
  - Totally enclosed, IP 55 / IP 56

  Options:
  - Frequency controlled
  - Higher enclosure classes
  - Explosion proof
  - Flameproof enclosure
  - Special voltages and special frequencies
  - Special motors

Types of connection

- Threads:
  - DIN 11851, DIN 11864
- Flanges:
  - DIN, ANSI u.a.
- Clamps:
  - Tri-clamp, ISO-clamp
- Special connections possible

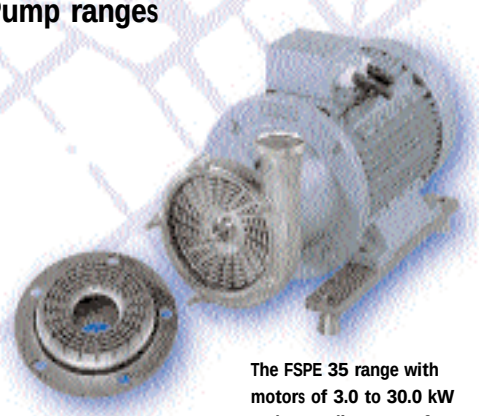
Special options

- Special rotor/stator systems
- Heating/cooling jacket
- Casing drainage
- Position of discharge connection, 360° variable
- Trolleys

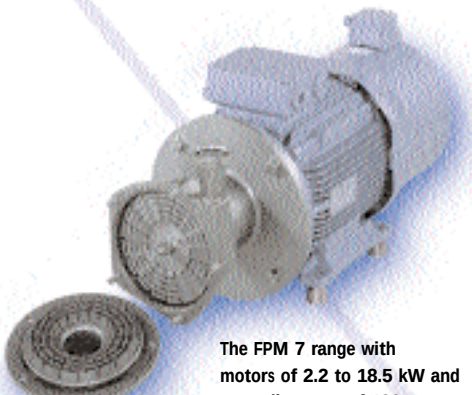
The powder mixer: The compact framed unit described here requires very little space to operate fully, even inline, and is easily integrated into existing systems and processes.

ment

Pump ranges



The FSPE 35 range with motors of 3.0 to 30.0 kW and rotor diameters of 145 to 250 mm are particularly suitable for high viscosities and throughput rates.



The FPM 7 range with motors of 2.2 to 18.5 kW and rotor diameters of 130 to 195 mm is the optimum choice for handling medium viscosities and throughput rates.

Model/Type	Speed	Rotor	Motor size
FSPE 352 / 145	1,450 or 2,900 rpm	145 mm	3.0 kW
FSPE 352 / 145	1,450 or 2,900 rpm	145 mm	4.0 kW
FSPE 352 / 145	1,450 or 2,900 rpm	145 mm	5.5 kW
FSPE 353 / 175	1,450 or 2,900 rpm	175 mm	5.5 kW
FSPE 353 / 175	1,450 or 2,900 rpm	175 mm	7.5 kW
FSPE 353 / 175	1,450 or 2,900 rpm	175 mm	11.0 kW
FSPE 354 / 200	1,450 or 2,900 rpm	200 mm	11.0 kW
FSPE 354 / 200	1,450 or 2,900 rpm	200 mm	15.0 kW
FSPE 354 / 200	1,450 or 2,900 rpm	200 mm	18.5 kW
FSPE 355 / 250	1,450 or 2,900 rpm	250 mm	18.5 kW
FSPE 355 / 250	1,450 or 2,900 rpm	250 mm	22.0 kW
FSPE 355 / 250	1,450 or 2,900 rpm	250 mm	30.0 kW
FPM 712	1,450 or 2,900 rpm	130 mm	2.2 kW
FPM 712	1,450 or 2,900 rpm	130 mm	3.0 kW
FPM 712	1,450 or 2,900 rpm	130 mm	4.0 kW
FPM 722	1,450 or 2,900 rpm	160 mm	4.0 kW
FPM 722	1,450 or 2,900 rpm	160 mm	5.5 kW
FPM 722	1,450 or 2,900 rpm	160 mm	7.5 kW
FPM 742	1,450 or 2,900 rpm	195 mm	5.5 kW
FPM 742	1,450 or 2,900 rpm	195 mm	7.5 kW
FPM 742	1,450 or 2,900 rpm	195 mm	11.0 kW
FPM 742	1,450 or 2,900 rpm	195 mm	15.0 kW
FPM 742	1,450 or 2,900 rpm	195 mm	18.5 kW

Using it pays

Right from the development stage we focus on the profitability of your production.

This is where the saving starts.

Compared with conventional dissolving processes in large tanks or boilers, using the Fristam Shearpump can cut your processing time by up to 90%. The Shearpump disintegrates agglomerates and lumps etc. with its high shear energy, and gives absolutely constant, repeatable results.

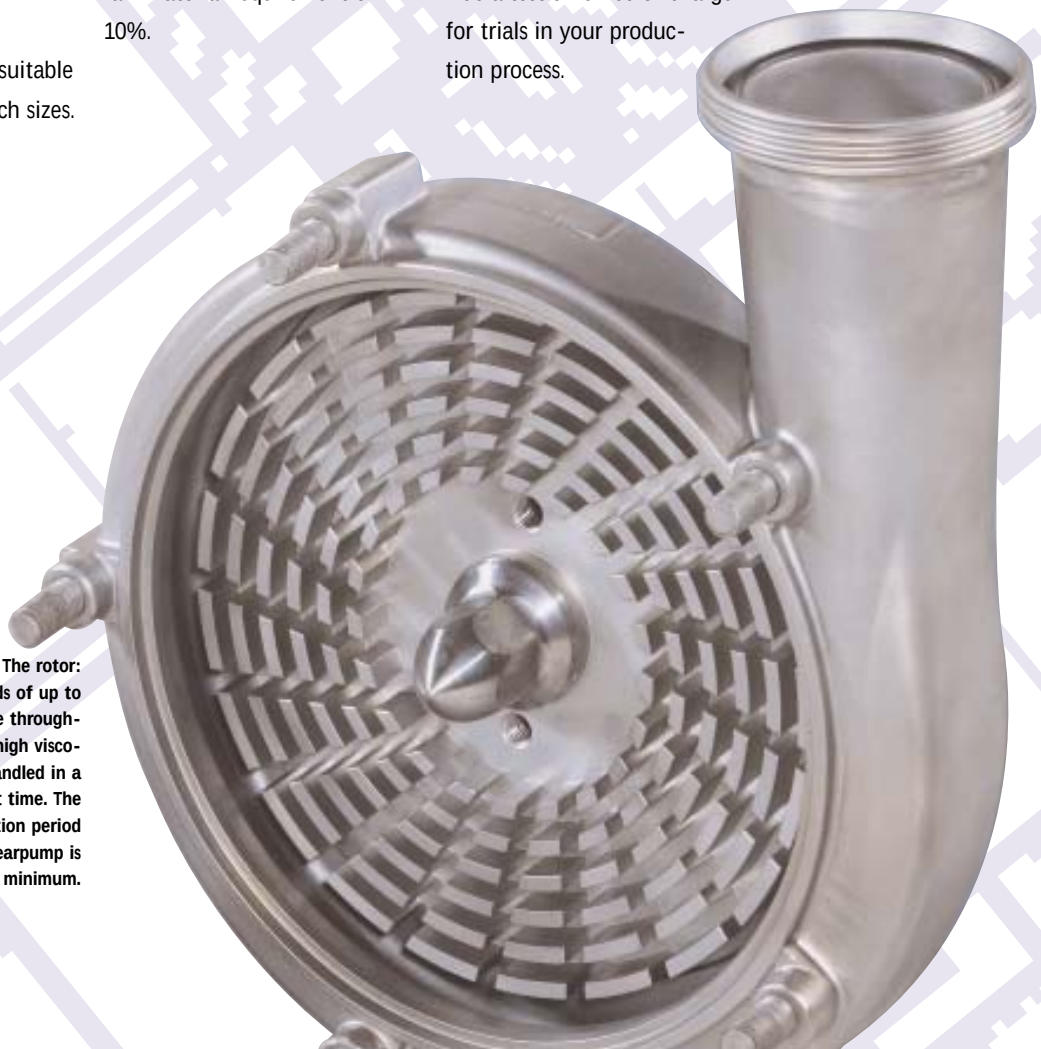
This pump is also highly suitable for handling varying batch sizes.

The forced flow of the products in the Shearpump ensures a continuously high standard of quality.

Depending on the application, you can expect to use fewer raw materials because of the more effective breakdown of constituents: When processing stabilizers, we noted a reduction in the raw material requirement of 10%.

Cleaning - the Shearpump is, like all Fristam pumps, fully CIP-capable. As a rule, you can carry out maintenance yourself since its construction is familiar due to its similarity to the centrifugal pumps.

All in all we are talking here of a very short amortization period. We would be pleased to provide a test unit free of charge for trials in your production process.



The rotor: With tip speeds of up to 38 m/s even large throughput rates and high viscosities can be handled in a very short time. The product retention period in the Shearpump is reduced to a minimum.

Worldwide Contacts

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21008 Hamburg
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Fax: +49-40-7 25 56-166
E-Mail: info@fristam.de

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www.fristam.de

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Fristam Pumpen GmbH
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Skandinavia
Fristam Pumper A/S
Saeby

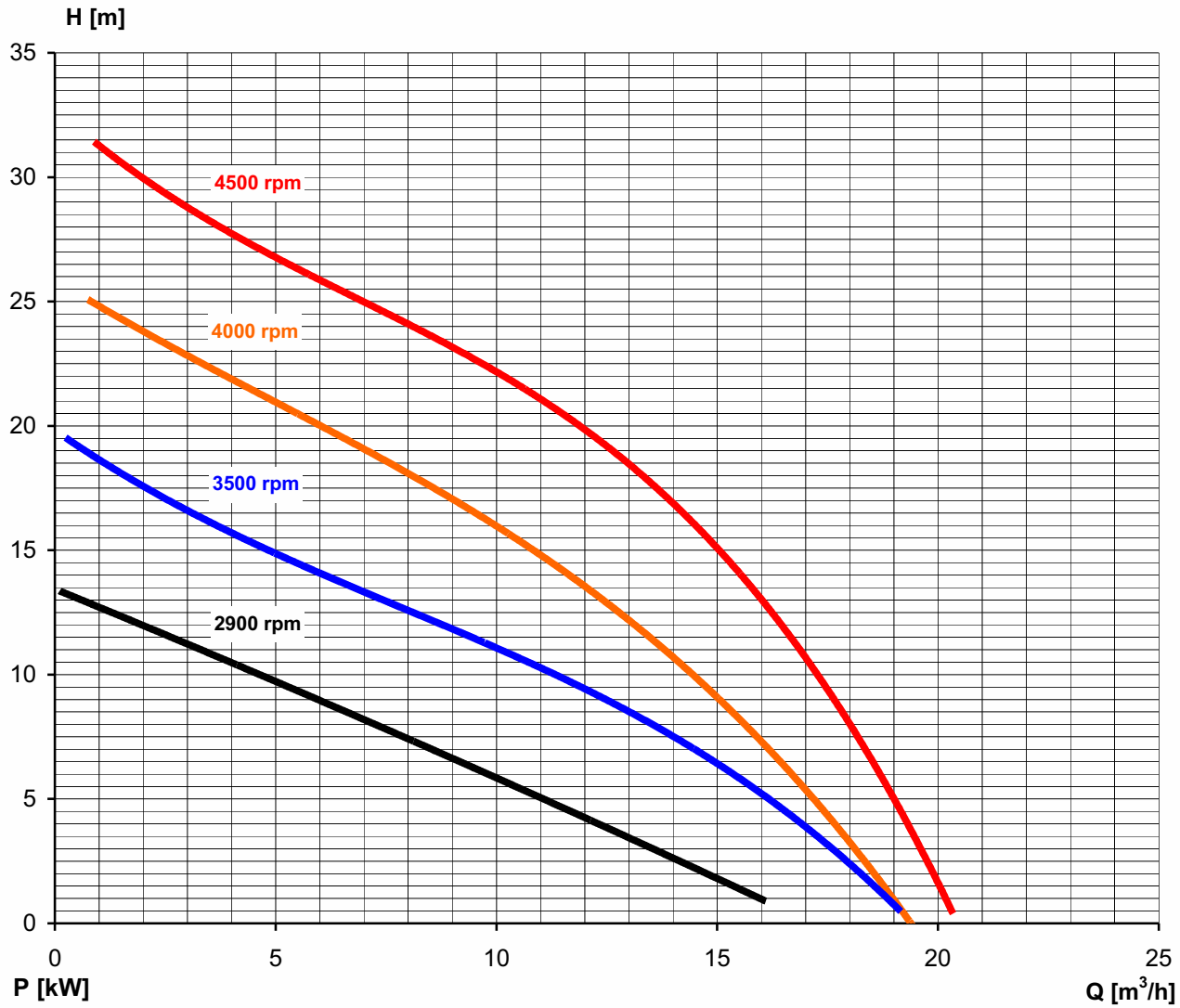
South East Asia
Fristam Pumpen A.R.
Singapore

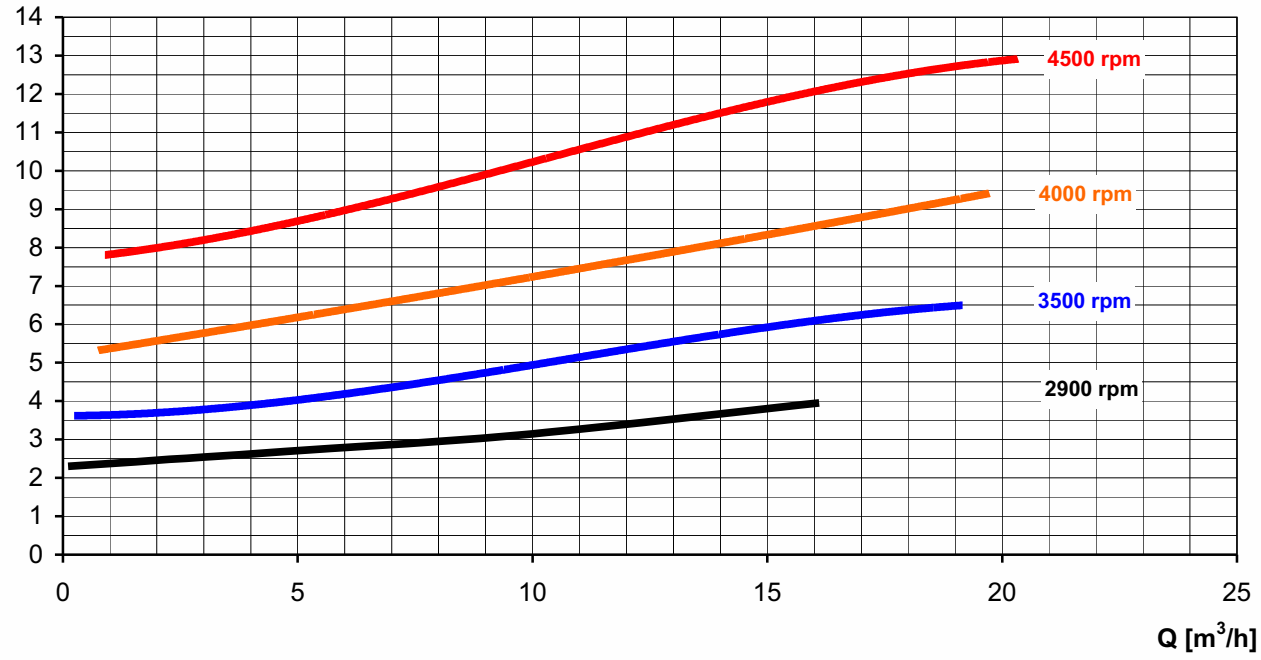
Ukraine
Fristam Kiev Ltd.
Kiev

USA/Canada
Mexico
South America
Fristam Pumps, INC.
Middleton (USA)

Fristam

Fristam PUMPEN





Allowed fluctuation of performance ± 5% All data of water at 20°C	Name: Kopp Datum: 18.07.2006	**FSPE 3522** **(1011)**
Suction side: DN 65 **Delivery side: DN 50**	**n = 2900 - 4500 rpm**	**Performance Curve**

VÁLULAS DE SEGURIDAD

SALVADOR ESCODA S.A.®
www.salvadorescoda.com
Provença, 392 pl. 1 y 2
08025 BARCELONA
Tel. 93 446 27 80
Fax 93 456 90 32

10 MANGUITOS ANTIVIBRATORIOS GOMA

Código	Artículo		€
	MANGUITOS ANTIVIBRATORIOS ROSCADOS		
	• Cuerpo: EPDM • Refuerzo interior: Fibra de nylon • Tuercas de unión: Fundición maleable galvanizadas • Presión máxima: 10 bar • Temperatura máx.: -10 a +110°C • Conexión: Rosca BSP		
AA 10 101	Rosca 3/4"		11,25
AA 10 102	Rosca 1"		14,13
AA 10 103	Rosca 1-1/4"		16,72
AA 10 104	Rosca 1-1/2"		21,01
AA 10 105	Rosca 2"		26,66
	JUNTAS ANTIVIBRATORIAS TIPO "C"		
	• Presión máxima: 10 bar		
AA 10 151	Bridas DN - 32		139,59
AA 10 152	Bridas DN - 40		152,37
AA 10 153	Bridas DN - 50		175,86
AA 10 154	Bridas DN - 65		195,54
AA 10 155	Bridas DN - 80		218,60
AA 10 156	Bridas DN - 100		250,82
AA 10 157	Bridas DN - 125		271,60
AA 10 158	Bridas DN - 150		389,26
AA 10 159	Bridas DN - 200		498,27

11 VÁLVULAS DE SEGURIDAD

Código	Artículo		€
	VÁLVULAS DE SEGURIDAD DE LATÓN TARADAS		
	• Cierre de goma • Temperatura máxima: 120° C		
	Conexión HEMBRA-HEMBRA		
AA 11 001	Rosca 1/2"	Tarada 3 Kgr.	4,89
AA 11 002	Rosca 1/2"	Tarada 4 Kgr.	4,89
AA 11 003	Rosca 1/2"	Tarada 6 Kgr.	4,89
AA 11 004	Rosca 1/2"	Tarada 7 Kgr.	4,89
AA 11 005	Rosca 1/2"	Tarada 10 Kgr.	9,36
AA 11 011	Rosca 3/4"	Tarada 3 Kgr.	9,57
AA 11 012	Rosca 3/4"	Tarada 4 Kgr.	9,57
AA 11 013	Rosca 3/4"	Tarada 6 Kgr.	9,57
AA 11 014	Rosca 3/4"	Tarada 7 Kgr.	9,57
AA 11 015	Rosca 3/4"	Tarada 10 Kgr.	11,44
AA 11 021	Rosca 1"	Tarada 3 Kgr.	22,19
AA 11 022	Rosca 1"	Tarada 4 Kgr.	22,19
AA 11 023	Rosca 1"	Tarada 6 Kgr.	22,19
AA 11 024	Rosca 1"	Tarada 7 Kgr.	22,19
AA 11 025	Rosca 1"	Tarada 10 Kgr.	22,19
AA 11 031	Rosca 1-1/4"	Tarada 3 Kgr.	83,69
AA 11 032	Rosca 1-1/4"	Tarada 4 Kgr.	94,68
AA 11 033	Rosca 1-1/4"	Tarada 6 Kgr.	94,68
AA 11 034	Rosca 1-1/4"	Tarada 7 Kgr.	94,68
AA 11 036	Rosca 1-1/4"	Tarada 8 Kgr.	96,32
AA 11 035	Rosca 1-1/4"	Tarada 10 Kgr.	96,32
	Conexión MACHO-HEMBRA		
AA 11 006	Rosca 1/2"	Tarada 3 Kgr.	5,20
AA 11 007	Rosca 1/2"	Tarada 4 Kgr.	5,20
AA 11 008	Rosca 1/2"	Tarada 6 Kgr.	5,20
AA 11 009	Rosca 1/2"	Tarada 7 Kgr.	5,20
	GRAN CAPACIDAD DE DESCARGA - BRONCE. TARADAS		
	• Asiento inoxidable • Temperatura máxima 110° C		
AA 11 041	Rosca 1-1/2" x 2"	Tarada 3 Kgr.	341,72
AA 11 043	Rosca 1-1/2" x 2"	Tarada 6 Kgr.	372,28
AA 11 045	Rosca 2" x 2-1/2"	Tarada 3 Kgr.	495,70
AA 11 046	Rosca 2" x 2"	Tarada 6 Kgr.	577,35

Descripción

Tipo	Válvula seguridad
Conexiones	Clamp / GAS
Pesión de diseño	PN-10
Material	Acero inoxidable AISI-316L
Rango de temperatura	-10 a +350ºC

Requerimientos técnicos

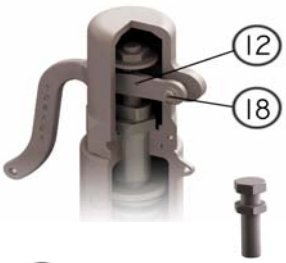
Cálculo	EN-4126-1 / 7
Diseño	EN-12516-1, EN-4126-1 / 7
	DIN 259 y ANSI B2.1
Material	EN
Inspección	EN-4126-1 / 7

Construcción y materiales

Item	Descripción	Material
1	Tobera	AISI-316L
2	Cuerpo	A351 CF-3M
4	Cabezal	A351 CF-8
5 ○	Obturador	AISI-316L
6	Guia	AISI-316L
7	Espiga	AISI-316L
8	Platillos	AISI-303
9	Tllo. Regulación	AISI-303
10	Contratuerca	AISI-303
11 ○	Muelle	AISI-302
12	Palanca	A351 CF-8
17 ○	Tope palanca	AISI-316
18 ○	Eje palanca	AISI-303
19	E. palanca estanca	AISI-303
20 ○	Junta	PTFE
21 ○	Junta	PTFE
22 ○	Junta	Viton
28 ○	oring obturador	Viton / PTFE

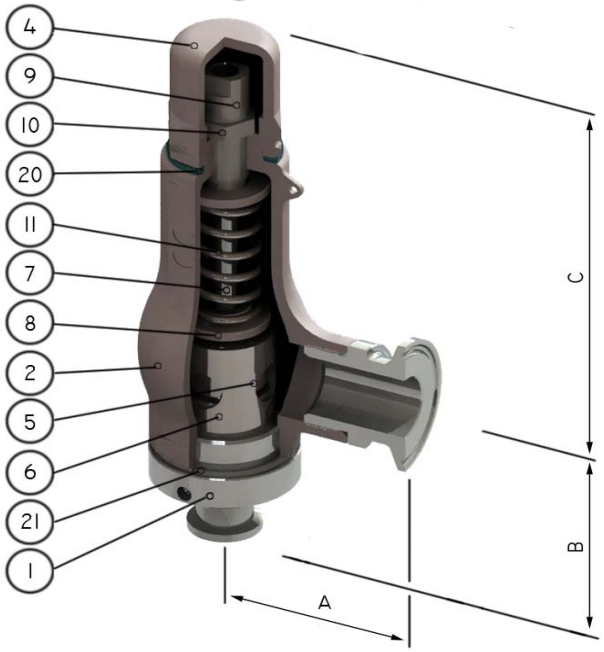
○ Recambios recomendados

Palanca manual
Lifting device



T. Prueba
Test gag

Palanca estanca
Sealed packing lever



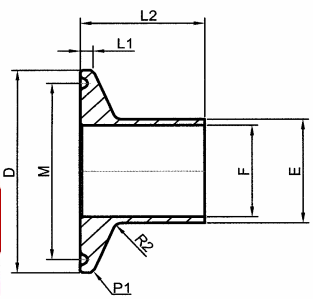
Obturador o-ring
Soft seat

Información técnica

Aplicaciones	Vapor, gases, liquidos
Tara minima	0,2 barg
Sobrepresión	10%
Cierre / blowdown	Gases 10%, liquidos 20%
Tolerancia tara	± 3%
Coeficiente descarga	k= 0,55 para gases
	k= 0,48 para liquidos

Dimensiones

E	S	Orif.	Area (mm^2)	A (mm)	B (mm)	C (mm)	Peso (kg)
15	**25**	9,5	71	66	68	155	2,4
20	**25**	15	176,6	66	68	155	2,4
25	**25**	18	254	66	73	155	2,8
40	**40**	32	804	90	98	234	8,2
15	**1"**	9,5	71	45	68	155	2
20	**1"**	15	176,6	45	68	155	2
25	**1"**	18	254	45	68	155	2,2
40	**2"**	32	804	62	98	234	8,2



Clamp ISO 2852

	D	M	E	L1	L2
15	25	19	12,7	2,85	12,7
20	25	19	19	2,85	12,7
1"(25)	50,5	43,5	25,6	2,85	21,5
1 1/2"(38)	50,5	43,5	38,6	2,85	21,5

ISO 9001
PED 97/23/EC
BUREAU VERITAS

CE 1035
0163

MANÓMETROS

MANÓMETROS ESTÁNDAR DN 40, 50 Y 63

Utilizables con fluidos líquidos o gaseosos que no ataquen químicamente las aleaciones de cobre, no presenten una viscosidad elevada y no cristalicen.
Su aplicación preferente es en circuitos neumáticos e hidráulicos, compresores, filtros y reguladores de presión. Cumplen norma CE.

Características constructivas y funcionales

Precisión:
Ø40 Clase 2.5 según EN 837-1.
Ø50 y Ø63 Clase 1,6 según EN 837-1.

Rangos: -1..0 a 0..40 bar para DN 40 y DN 50, -1..0 a 0..400 bar para DN 63 ó cualquier otra unidad equivalente de presión ó vacío, rangos estándar según DIN 16 128.

Temperatura ambiente: -20...+60ºC.

Temperatura del fluido de proceso: máx. +60º C.

Error por Temperatura:
Error adicional cuando la temperatura del elemento sensible se desvía de 20ºC. +/- 0,3 % cada 10 ºC de variación.

Presión de trabajo:
Máx. 75% del V.F.E.

Sobrepresión temporal: No aplicable.

Racord de conexión a proceso: En latón.

Muelle tubular:
De bronce fosforoso en “C” para escalas ≥ 40 bar en espiral para escalas > 40 bar.

Caja: En plastico ABS.

Visor: En plástico transparente.

Mecanismo: En latón.

Aguja indicadora: en aluminio lacado negro.

Otras opciones:
Soldadura en aleación estaño-plata.
Visor de cristal.
Otros rangos de presión.

MEI Manometría e Instrumentación, s.l.
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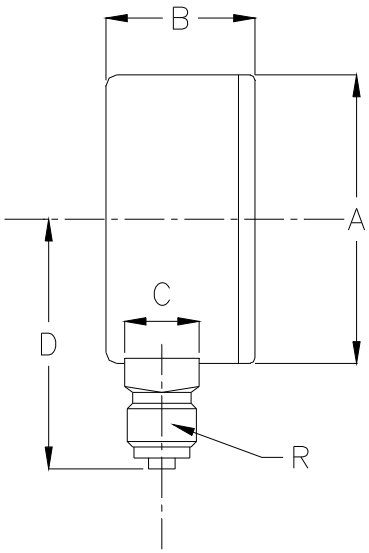
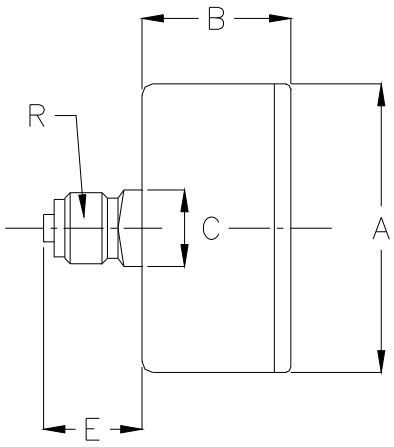
DIMENSIONES





DIMENSIONES (mm)

TIPO RADIAL					
DN	**A**	**B**	**C**	**D**	**R**
40	42	25	11x11	27,5	1/8”
50	53	28	14x14	48	1/4”
63	63,5	28	14x14	51	1/4”

TIPO DORSAL					
DN	**A**	**B**	**C**	**E**	**R**
40	42	25	11x11	14	1/8”
50	53	28	14x14	19	1/4”
63	63,5	28	14x14	19	1/4”

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MANÓMETROS ESTÁNDAR DN 80, 100 Y 160

Utilizables con fluidos líquidos o gaseosos que no ataquen químicamente las aleaciones de cobre, no presenten una viscosidad elevada y no cristalicen.

Su aplicación preferente es en circuitos neumáticos e hidráulicos, compresores, filtros y reguladores de presión. Cumplen norma CE.

Características constructivas y funcionales

Precisión: Clase 1,6 según EN 837-1.

Rangos: -1..0 a 0..600 bar ó cualquier otra unidad equivalente de presión ó vacío, rangos estándar según DIN 16 128.

Temperatura ambiente: -20...+60ºC.

Temperatura del fluido de proceso: máx. +60ºC.

Error por Temperatura:
Error adicional cuando la temperatura del elemento sensible se desvía de 20ºC.
+/- 0,3 % cada 10 ºC de variación.

Presión de trabajo: Máx. 75% del V.F.E.

Sobrepresión temporal: No aplicable

Racord de conexión a proceso: 1/2" BSP en latón.

Muelle tubular: De bronce fosforoso en "C" para escalas ≤ 40 bar, en espiral para escalas >40 bar.

Caja y Aro: En acero al carbono pintado en negro.

Visor: En cristal.

Mecanismo: En latón.

Aguja indicadora: En aluminio lacado negro.

Otras opciones:

Soldadura en aleación estaño-plata.
Otros rangos de presión y manovacuómetros.
Otras roscas.
Borde frontal o bridas para montaje en panel.

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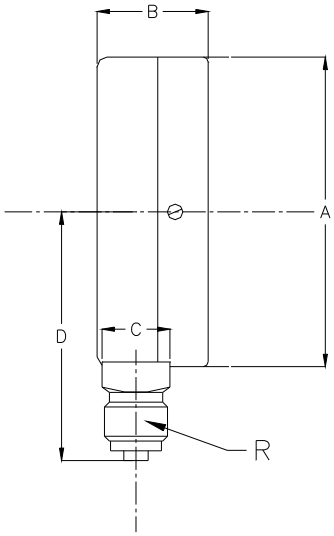
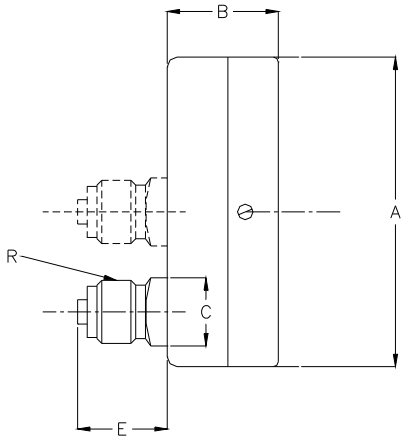
DIMENSIONES





TIPO RADIAL					
DN	**A**	**B**	**C**	**D**	**R**
80	80	35	22	27,5	1 / 2
100	100	35	22	48	1 / 2
160	160	45	22	51	1 / 2

DIMENSIONES (mm)

Rosca centrada

TIPO DORSAL					
DN	**A**	**B**	**C**	**E**	**R**
80	80	35	22	35	1 / 2
100	100	35	22	35	1 / 2
160	160	45	22	35	1 / 2

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FILTRO

MILLIPORE

Autoclaving Guidelines for Opticap® XL and XLT Disposable Capsule Filters

Proper autoclaving is essential to maintaining capsule integrity over multiple sterilization cycles. Use the guidelines provided to ensure proper autoclave sterilization of Millipore Opticap XL and XLT disposable capsule filters.

The autoclave cycle conditions described are based on the maximum thermal and hydraulic stress resistance of the capsule and filter material.

Opticap XL and XLT Capsules

Opticap XL and XLT capsules are robust, reliable and easy to use. Their patented design allows for thermal and hydraulic stress resistance, minimizes hold-up and reduces production losses. Adjustable, easy-turn upstream vents and drain valves with o-ring seals and hose barb connections allow easy process control. Flow directional arrows and ribbed edges on the capsule cage make installation fast and simple. Proper autoclaving of each capsule will ensure capsule integrity over multiple sterilization cycles.

These recommendations are not intended as a substitute for validation. On-site filter sterilization validation must still be performed.

Guidelines

Autoclave Wet or Dry

Capsules may be autoclaved wet or dry. However process conditions should reflect the conditions present during on-site validation.

IMPORTANT: Do not, under any circumstances, in-situ steam sterilize Opticap XL or XLT capsule filter. Never use a deformed filter.

Vent Positions

The vents MUST remain open and unobstructed throughout the entire sterilization cycle to provide proper air displacement and condensate removal.

Inlet and Outlet Fittings

Inlet and Outlet openings must be unobstructed to allow maximum air displacement and steam flow, however the openings must be protected to prevent ingress of contamination post-sterilization. Devices can be sealed in autoclave pouches or the inlet and outlet fittings can be protected with sterilization wrap. Pouches or wrap must be chosen to ensure proper steam penetration and air displacement.

Failure to select the appropriate pouches or wraps can result in device damage or ineffective sterilization. If the wrap or pouch does not allow for unimpeded movement of air and steam during the autoclave cycle, it is possible to subject the device to excessive differential pressure. If the pressure is significantly higher in the chamber than the pressure in the capsule at (or near) the sterilization temperature, it is possible that the capsule could deform. This could occur during autoclave cycles with vacuum pulses during the come-up and/or the cool-down phase of the cycle. Ineffective sterilization due to wraps or pouches that impede steam or air flow is caused by the presence of air pockets or by the absence of sufficient moisture to effectively destroy microorganisms[1].
Never use a deformed capsule.

Tubing

Tubing with the largest possible inner diameter should be used. Tubing should not be crimped, or bent. If tubing is connected to both the inlet and outlet openings it should not be connected to form a continuous loop. Any tubing attached to the capsule MUST be open and unobstructed to provide adequate steam flow so that sterilization wrap can be placed on the ends for protection.

Clamps

Plastic clamps: Plastic two-piece sanitary clamps are recommended for autoclaving. These clamps are available with a torque stop to prevent over tightening.
Stainless steel clamps: Three-piece SS sanitary clamps are preferred over two-piece SS clamps for more uniform stress distribution.

IMPORTANT: Do not, over tighten clamps, over tightening can distort the fittings.

Fittings

Although the design of the capsule allows for multiple autoclave cycles, care must be taken when stainless steel parts are connected to the polypropylene capsule. The weight of these parts, coupled with the loss of the polypropylene's rigidity at autoclave temperatures, may result in capsule deformation. This issue is easily dealt with by supporting any stainless steel parts during the autoclave cycle.

Capsule Orientation

Capsules should be oriented as vertically as possible within the confines of the autoclave chamber. This will facilitate condensate drainage. When capsules are autoclaved in the horizontal direction, condensate collects and heat transfer is less efficient.

The position of the inlet and outlet of the capsule is important. For in-line Opticap XL capsules position the outlet fitting on the bottom (the flow arrow pointing downward). This will allow for maximum condensate drainage. For T-line Opticap XLT capsules the inlet and outlet fittings should be on the bottom. This will facilitate condensate drainage.

IMPORTANT: If hardware is attached to the capsule it must be supported. This is especially important if the capsule has a sanitary flange connection where additional components will generally be stainless steel. The clamps must be supported to prevent warping of the fitting during the autoclave cycle. Special attention should be given to the orientation of the vents so that they are not supporting the weight of the capsule during the autoclave cycle. This may cause distortion of the vents as the heat during the autoclave cycle softens the polypropylene.

Autoclaving

Capsules on a Process Tank

Autoclaving upright on a process tank is beneficial for two reasons. First, an aseptic connection to the sterile side is unnecessary and the sanitary capsule fitting is supported by the stainless steel tank fitting. Second it allows for the use of the three-piece SS clamp. The connection of additional hardware to the upstream side of the capsule is not recommended as it will not be supported and can result in capsule distortion.

Loose Capsules

The Opticap XL or XLT capsule may be placed loose in an autoclave for sterilization. Without any fittings attached, cover the openings with suitable sterilization wrap (as noted above) or place the entire capsule in an autoclave pouch. Then place into a basket or similar container. Make sure the capsule remains in a vertical position with the outlet at the bottom.

IMPORTANT: Loose Opticap XL capsules may inadvertently be placed upside down (inlet facing downward) if care is not taken during cycle loading. Please ensure that all capsules are oriented vertically with the flow arrow pointing downward.

Improper loading will not impact the capsule integrity; however, the resulting increase in Fo value from condensate accumulation in the device core will impact sterility. Avoid placing the capsule in an upside down orientation during cycle loading.

Cycle Guidelines

Excessive differential pressures can result in damage to the capsule. This has been demonstrated by closing the high and low point bleeds and blocking the inlet and outlet connections in combination with autoclave cycles that utilize vacuum pulses during the come-up and cool-down portions of the cycle. Damage can be prevented by using the correct sterilization wrap or pouch. Selecting a slow exhaust (also known as liquid goods) cycle can also minimize the risk of damage. *See Thermal Stress Resistance Tables for detail.*

Troubleshooting

Loss of Capsule Roundness

An oval capsule body shape can be attributed to:

- Capping off the inlet and outlet connections as shown at right
- Accidentally joining the inlet and outlet tubing in a continuous loop
- Crimping inlet or outlet tubing connected to the capsule as shown at right
- Using autoclave paper that does not provide adequate steam flow
- Keeping vents closed during autoclaving

Fitting Distortion

Distortion or warping of capsule fittings can be attributed to their supporting excessive weight such as a heavy stainless steel clamp on a sanitary flange connection. Do not allow capsule fittings to support excessive weight. Also, overtightening clamps or using 2-piece stainless steel clamps can increase risk of deformation.

Vent Distortion

Vents may become distorted if the capsule weight is supported solely by the vents during an autoclave cycle. Capsules should NEVER be suspended solely by a vent and placed into the autoclave.

Never use a deformed capsule.

Thermal Stress Resistance

The autoclave cycle conditions described are based on the maximum thermal and hydraulic stress resistance of the capsule and filter material. These recommendations are not intended as a substitute for validation of filter autoclave sterilization cycles. On-site filter sterilization validation must still be performed.

Thermal Stress Resistance

Opticap XL with Durapore® Multimedia Membrane

Capsule Description	Pore Size	Catalogue No.	Time (Min.)	Temp (°C)	No. Cycles
Multimedia Opticap XL Capsule TC/TC 1pk	0.5+0.2+0.22 µm	KVSSA	60	123	3

Opticap XL with Lifegard™ Membrane

Capsule Description	Pore Size	Catalogue No.	Time (Min.)	Temp (°C)	No. Cycles
Opticap XL Capsule	1.0 µm	KP15A	60	121	3
Opticap XL Capsule	2.0 µm	KP20A	60	121	3

Opticap XL with Polysep™ II Membrane

Capsule Description	Pore Size	Catalogue No.	Time (Min.)	Temp (°C)	No. Cycles
Opticap XL Capsule	1.0+0.2 µm	KGW3A	30	121	3
Opticap XL Capsule	1.0+0.5 µm	KGW6A	30	121	3
Opticap XL Capsule	1.0+1.2 µm	KGW2A	30	121	3
Opticap XL Capsule	2.0+1.2 µm	KGW9A	30	121	3

Opticap XL with Milligard® Membrane

Capsule Description	Pore Size	Catalogue No.	Time (Min.)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.5+0.2 µm	KWSSA	30	121	3
Opticap XL Capsule	1.2+0.5 µm	KWSCA	30	121	3
Opticap XL Capsule	0.2 µm	KW03A	30	121	3
Opticap XL Capsule	0.5 µm	KW06A	30	121	3
Opticap XL Capsule	1.2 µm	KW19A	30	121	3

Opticap XL with Polygard® CR Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.1 µm	KRK1A	30	126	3
Opticap XL Capsule	0.3 µm	KRK3A	30	126	3
Opticap XL Capsule	0.5 µm	KRA5A	30	126	3
Opticap XL Capsule	1.0 µm	KR01A	30	126	3
Opticap XL Capsule	3.0 µm	KR03A	30	126	3
Opticap XL Capsule	5.0 µm	KR05A	30	126	3
Opticap XL Capsule	10.0 µm	KR10A	30	126	3
Opticap XL Capsule	25.0 µm	KR25A	30	126	3
Opticap XL Capsule	50.0 µm	KR50A	30	126	3
Opticap XL Capsule	75.0 µm	KR75A	30	126	3
Opticap XL Capsule	100.0 µm	KR99A	30	126	3

Opticap XL with Aervent® Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.2 µm	KTGRA	30	135	30

Opticap XL with Milligard® LPB Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.5+0.2 µm	KWLSA	30	121	3
Opticap XL Capsule	1.2+0.5 µm	KWLCA	30	121	3
Opticap XL Capsule	0.2 µm	KWL3A	30	121	3
Opticap XL Capsule	0.5 µm	KWL6A	30	121	3
Opticap XL Capsule	1.2 µm	KWL9A	30	121	3

Thermal Stress Resistance (cont'd)

Opticap XL with Polygard® CN Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.3 µm	KN03A	30	126	3
Opticap XL Capsule	0.6 µm	KN06A	30	126	3
Opticap XL Capsule	1.2 µm	KN12A	30	126	3
Opticap XL Capsule	2.5 µm	KN25A	30	126	3
Opticap XL Capsule	5.0 µm	KN50A	30	126	3
Opticap XL Capsule	10.0 µm	KN1HA	30	126	3
Opticap XL Capsule	30.0 µm	KN3HA	30	126	3

Opticap XL with Durapore® Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.22 µm	KVGLA	60	126	3
Opticap XL Capsule	0.1 µm	KVVLA	60	126	3
Opticap XL Capsule	0.45 µm w/Prefilter	KVHLA	60	121	3
Opticap XL Capsule	0.45 µm	KPHLA	60	125	3

Opticap XL with Hydrophobic Durapore® Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.22 µm	KVGBA	30	126	20

Opticap XL with Millipore Express® SHF Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.2 µm	KGEPA	60	126	3

Opticap XL with Millipore Express® SHC Membrane

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.5+0.2 µm	KHGEA	60	126	3

Opticap XL with Millipore Express® SHR Membrane and Prefilter

Capsule Description	Pore Size	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	0.5+0.1	KHVEA	60	126	3

Opticap XL with Viresolve® NFR Membrane

Capsule Description	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsules	KZRVA	60	125	1

Opticap XL with Viresolve® NFP Membrane

Capsule Description	Catalogue No.	Time (min)	Temp (°C)	No. Cycles
Opticap XL Capsule	KVPVA	60	123	1

Following the guidelines presented in the technical note for autoclave sterilization of Opticap XL or XLT disposable capsule filters will ensure that capsule integrity is maintained over multiple sterilization cycles.

These recommendations are not intended as a substitute for validation of filter autoclave sterilization cycles. On-site filter sterilization validation must still be performed.

References

1. Voorspoels, J., Remon, J.P., and Vendebossche, G., "Validation of Filter Sterilization in Autoclaves." Proc. 1st World Meeting APGI/APV, Budapest (9-11 May 1995). Journal of Pharmaceutical Science and Technology "Technical Monograph No. 1" Draft 18 2006 Revision

Go Mobius

Opticap XL and XLT capsules are a Mobius flexible bioprocessing technology and part of a suite of products that together provide an integrated disposable solution to improve process efficiency in biopharmaceutical development and manufacturing. From disposable process containers, capsule filters and connectors, to validated, gamma-compatible turn-key assemblies, Mobius solutions provide faster turnaround time and reliable performance, right out of the box.

mobius™
flexible bioprocessing solutions

To Place an Order or Receive Technical Assistance

For additional information call your nearest Millipore office:
In the U.S. and Canada, call toll-free
1-800-MILLIPORE (1-800-645-5476)
In the U.S., Canada and Puerto Rico, fax orders to
1-800-MILLIFX (1-800-645-5439)
Outside of North America, contact your local office.
To find the office nearest you: www.millipore.com/offices
Internet: www.millipore.com
Tech Service: www.millipore.com/techservice

MILLIPORE

Lit. No. TB072 Rev. C 10/07 Printed in U.S.A. 07-437

Opticap™ Capsule with Aervent™ Membrane

0.2 µm Rated
Catalogue Number: KTGR04TC3
Lot Number: C4KN28498

Good Manufacturing Practices

This product was manufactured in a Millipore facility which meets or exceeds FDA Device Good Manufacturing Practice standards.

ISO 9000 Quality Standard

This product was manufactured in a Millipore facility whose Quality Management System is approved by an accredited registering body to the appropriate ISO 9000 Quality Systems Standard.

Non-Fiber Releasing

This product was manufactured with a PTFE membrane which meets the criteria for a "non-fiber releasing" filter as defined in 21 CFR 210.3 (b) (6).

Component Materials Toxicity

Component materials were tested and meet the criteria for the USP Class VI Biological Test for Plastics.

100% Integrity Testing in Manufacturing

Each unit must pass the Millipore Integrity Test correlated to the *Brevundimonas diminuta* HIMA bacterial challenge test.

Validated Production Process

This product was fabricated using a validated manufacturing process. Principles of statistical process control and determinations of process capability have been applied to critical variables in the cartridge fabrication process. In-process controls are used to assure stability of the process.

Quality Assurance Lot Release Criteria

This manufacturing lot was sampled, tested and released by Quality Assurance to the following specifications:

Bacterial Retention

Samples were quantitatively retentive of a minimum *Brevundimonas diminuta* challenge concentration of 1×10^7 CFU/cm^2 using HIMA methodology.

USP Bacterial Endotoxins

A capsule aqueous extraction contains less than 0.5 EU/mL as determined using the Limulus Amebocyte Lysate (LAL) test.

Integrity

Samples exhibited a bubble point equal to or greater than 16 psig (1100 mbar) in a 70/30% IPA/water mixture using nitrogen as the test gas at 23 °C.
Samples exhibited a HydroCorr test value less than or equal to 0.16 ml/min per capsule at 38 psig (2620 mbar).

Thermal and Hydraulic Stress

Samples were autoclaved at 135 °C and maintained integrity after a forward stress to 80 psid (5.5 bar) and a reverse stress to 40 psid (2.8 bar).

Air Flow Rate and Pressure Drop

Samples met a maximum pressure drop of 1.1 psid (76 mbar) at an air flow rate of 10 SCFM (1.7 nm^3/hr), and 0 psig outlet air pressure at 23 °C per capsule.

Quality Assurance Audit Criteria

This product was designed and manufactured to meet the following specifications. Performance is confirmed by testing on an audit basis.

Toxicity

This product is non-toxic per the current USP General (Mouse) Safety Test.

Gravimetric Extractables

The extractables level was equal to or less than 15 mg per capsule after 24 hours in a 70/30% IPA/water mixture at controlled room temperature.

Multiple Sterilization Cycles

Capsule integrity was maintained after 30 autoclave cycles of 30 minutes at 135 °C.

Nicholas Lambo
Vice President and General Manager,
BioProcess Division

John P. Tuttle
Manager, Worldwide Quality Systems
and Certification, BioProcess Division

MILLIPORE

P35632 Rev C 10/99

LUZ INSPECCIÓN

Sightglass light fittings

Series BKVLR in stainless steel for use in safe areas

Sightglass light fitting type BKVLR 20 HDSch, 20 W, 24 V, with built-in momentary push-button “D”, mounted with tilting hinge “Sch” on sightglass to DIN 28120, DN 100, PN 10, for application “view **and** light through **one** assembly”.

Sightglass light fitting type BKVLR 50 HDSch1, 50 W, 24 V, with built-in momentary push-button “D”, mounted with tilting hinge “Sch1” on screwed sightglass similar to DIN 11581, DN 100, PN 6, for application “view **and** light through **one** assembly”.

The miniature sightglass light fittings of the series BKVLR **entirely in stainless steel** offer the following main features and advantages:

- Very interesting prices due to high series production.
- Only **one** size for use on different sightglass diameters.
- **Easiest mounting** by means of a tilting hinge “Sch”/“Sch 1”.
- **Brilliant and dazzle free illumination,** even of difficult media.
- **Extremely small** dimensions providing **high lighting power**.
- Quick change of bulbs **without** necessity to demount the bolted-on luminaire!
- For use in version “view **and** light through **one** assembly” as well as for the two port system.

Application:

On sightglasses to	DIN 28120	**from DN 25**
On sightglasses to	DIN 28121	**from DN 40**
On screwed sightglasses similar to	DIN 11851	**from DN 50**

On pipeline flow indicators (in-line sightglasses)

Operating conditions:
Independent of internal vessel pressure and vacuum.

Construction:
Housing and fixation elements **in stainless steel**. Cable gland Pg 9, vertical. On request with rectangular cable gland (“K2”). Built-in reflector. Bulb socket for halogen bulbs of 20, 50 or 100 Watts. Built-in, sealed push-button for momentary operation “D” (types BKVLR 20/50 also available **without**, on request). Glass disc resistant against high temperatures. Gaskets resistant against corrosion and alteration.

Electrical data:

Supply:	AC or DC
Terminal voltage:	24 V*
Power:	20, 50 or 100 W (dependent on type)
Maximum current:	4,2 A

* Transformers with 24 V secondary voltage in open design (IP 00) for mounting into control panels or switch boards as well as in closed version (IP 65) may be supplied for different primary voltages and power capacities.

Bulb sockets:

Power 20 W:	2 pins socket G4
Power 50 / 100 W:	2 pins socket GY 6.35

Enclosure protection degree:
IP 65, dust and spray water tight.

Admitted for use in food processing industries.

Survey on standard types:

Type	BKVLR 20 HD*	BKVLR 50 HD*	BKVLR 100 HD
Nominal rating	20 W	50 W	100 W
Terminal voltage**	24 V	24 V	24 V
Bulb	Halogen	Halogen	Halogen
Weight***	0,30 kg	0,30 kg	0,30 kg

* For the version without push-button, the correct type designation omits the “D”.
** Types with 20 and 50 W also available in 12 V.
*** Without fixation. Fixations “Sch” / “Sch1” 0,03 kg each.

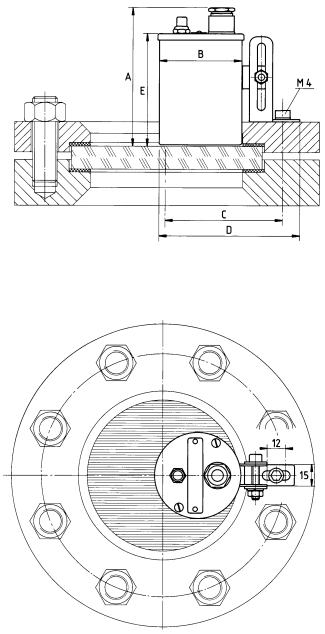
Mounting:
The luminaire is normally mounted by means of its fixation elements, suitably slotted to take a fixing bolt M4. This bolt fits a drilled and tapped hole in the cover flange of a sightglass to DIN 28120 / 28121 or similar as well as in the grooved collar nut of a screwed sightglass similar to DIN 11851. The position of the drilled holes may be taken from the drawings on the back of this leaflet.

Important remarks:
Please indicate in case of order type and size (DN) of the sightglass on which the luminaire has to be mounted.
In case of repeated use within a short period, the temperature raise of the housing has to be observed!

Dimensions

The following dimensions are valid for the types BKVLR 20 / 50 H(D) Sch / Sch1, BKVLR 100 HD Sch / Sch1:

Types BKVLR 20 / 50 H(D)Sch
Type BKVLR 100 HDSch

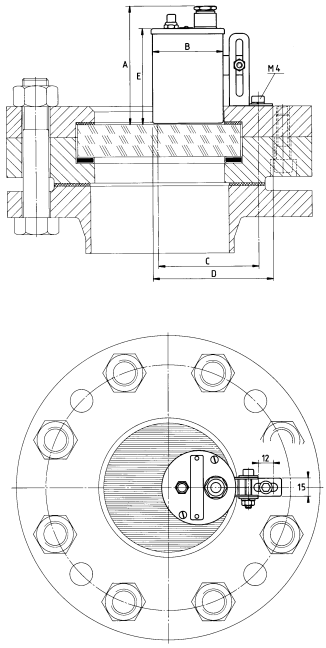


Fixation “Sch”

Sightglass to DIN 28120

DN	A	B	C	D	E
50	90	53	64	90	73
80	90	53	74	90	73
100	90	53	87	90	73
125	90	53	100	90	73
150	90	53	112	90	73
200	90	53	137	90	73

Types BKVLR 20 / 50 H(D)Sch
Type BKVLR 100 HDSch

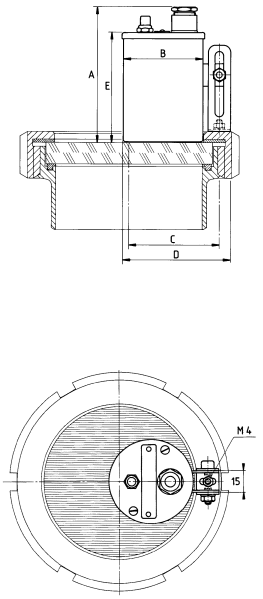


Fixation “Sch”

Sightglass to DIN 28121

DN	A	B	C	D	E
50	90	53	56	90	73
80	90	53	64	90	73
100	90	53	74	90	73
125	90	53	87	90	73
150	90	53	87	90	73
200	90	53	100	90	73

Types BKVLR 20 / 50 H(D)Sch1
Type BKVLR 100 HDSch1



Fixation “Sch1”

Screwed sightglass similar to DIN 11851

DN	A	B	C	D	E
50	90	53	33	72	73
65	90	53	39	72	73
80	90	53	47	72	73
100	90	53	57	72	73
125	90	53	69	72	73
150	90	53	82	72	73

Branch office / exclusive agent:

Do you wish for more information about our wide range of light fittings for use in hazardous and safe areas, about our range of circular sightglasses to DIN 28120/28121, screwed sightglasses similar to DIN 11851, rectangular or D-ended sightglasses, pipeline flow indicators, centrally or sideways operated wipers, hinged sightglasses, spraying devices or our complete sight and lightglass units VETROLUX®? Are you interested in other types, special versions or different protection degrees? If yes, please contact us, our branch office or our local agents – it is our business! You will find the necessary indications about our sales network on the Internet.

All dimensions in mm. Subject to changes without preliminary notice.

MAX MÜLLER AG
PROCESS ILLUMINATION AND VISUAL OBSERVATION SYSTEMS
Hagmattstrasse 19 • CH - 4123 Allschwil / Switzerland
Telephone +41 61 487 92 92 • Telefax +41 61 487 92 99
www.maxmuellerag.com E-Mail: blt@maxmuellerag.com

04.03

8.- PROCEDIEMIENTO PRUEBA HIDRAÚLICA

Consultoría e Instalaciones Farmacéuticas y Alimentarias S.L.
Víctor Font Gual 25 08329-TEIÀ (Barcelona)
Tel. 935554063 Fax 935556018
E-Mail: info@cifa.es

PROCEDIMIENTO NORMALIZADO P-003

PRUEBA HIDRAULICA DE EQUIPOS GENERICOS

Autor	Protocolo	Fecha	Última Rev.	Versión
José Fernández	P-003	22-01-03	01-09-04	0

La realización de este procedimiento fue aprobada por:

Nombre	Cargo	Fecha	Firma
José Fernández	Director Técnico	24-01-2003	
Nombre	Cargo	Fecha	Firma
Montserrat Espuga	Directora Calidad	24-01-2003	

Consultoría e Instalaciones Farmacéuticas y Alimentarias S.L.
Víctor Font Gual 25 08329-TEIÀ (Barcelona)
Tel. 935554063 Fax 935556018
E-Mail: info@cifa.es

PROCEDIMIENTO NORMALIZADO P-003

INDICE

1. APLICACION

El presente procedimiento normalizado pretende describir las condiciones y acciones para la realización de pruebas hidráulicas en equipos sometidas a presión interna y/o vacío, independientemente de los materiales que las conforman y de los equipos, valvulería filtros y accesorios a ellos conectados. En cualquier caso, el fluido que se utilizará para la transmisión de la presión será agua con la calidad descrita en el presente documento.

2. EXCEPCIONES

Como excepciones al ámbito de aplicación de este procedimiento, se señalan:

- Tuberías, equipos, valvulería y accesorios cuyos materiales de construcción sean incompatibles con el fluido de pruebas.
- Tuberías, equipos, valvulería y accesorios cuyo fluido a vehicular ó almacenar sea incompatible y/o pueda reaccionar químicamente con agua y/o la humedad que esta pueda dejar como residuo.

3. MATERIALES

Los materiales precisos para la realización de la prueba hidráulica definida en este procedimiento son:

- 3 Manómetros con las siguientes características:

a) Precisión: al ser una prueba hidráulica de estanqueidad, cuya función no es la de calibración, los manómetros a utilizar no precisarán de certificado de calibración y/o de precisión, si bien deberemos cerciorarnos de su correcto funcionamiento por comparación y/o cualquier otro método empírico.

b) Rango: los tres manómetros deberán ser del mismo rango y este deberá ser al menos un tercio más del valor de la prueba hidráulica; de manera que durante la realización de la prueba, el valor sea de tres cuartos del valor máximo del manómetro.

- 1 Bomba de presión: manual o asistida (eléctricamente o neumáticamente), capaz de proporcionar la presión de prueba mas un 10% y equipada con válvula de retención interna.
- Mangueras provisionales de conexión: de presión nominal igual, al menos, a la presión máxima que la bomba sea capaz de proporcionar.
- Agua: limpia y libre de impurezas, con un contenido en cloruros inferior a 100 pm.

4. RATIOS DE PRESION

Para la definición de la presión de prueba, se aceptará la descrita en el proyecto de construcción si se trata de un equipos de presión de diseño superior a 0,5 bar o, si se trata de equipos atmosféricos, se escogerá la más restrictiva de las siguientes:

- La presión de prueba indicada por la Ingeniería.
- La presión de prueba indicada por la Propiedad.
- 0,5 bar como prueba de estanqueidad.

5. DESCRIPCIÓN

Según el esquema adjunto, se procederá a la conexión de los elementos descritos y al aislamiento hidráulico del equipo de otros sistemas y/o equipos que no sean objetos de la prueba hidráulica en cuestión, asegurándonos mediante inspección visual. Se procederá al llenado del equipo de manera lenta, hasta que el manómetro 03 indique una presión de 0,5 bar, momento en el que se parará dicho llenado y se revisará visualmente el equipo para asegurarse de que no existen fugas apreciables. Si es así, continuaremos el llenado del equipo hasta alcanzar la mitad de la presión de prueba y volveremos a revisar visualmente el equipo para asegurarse de que no existen

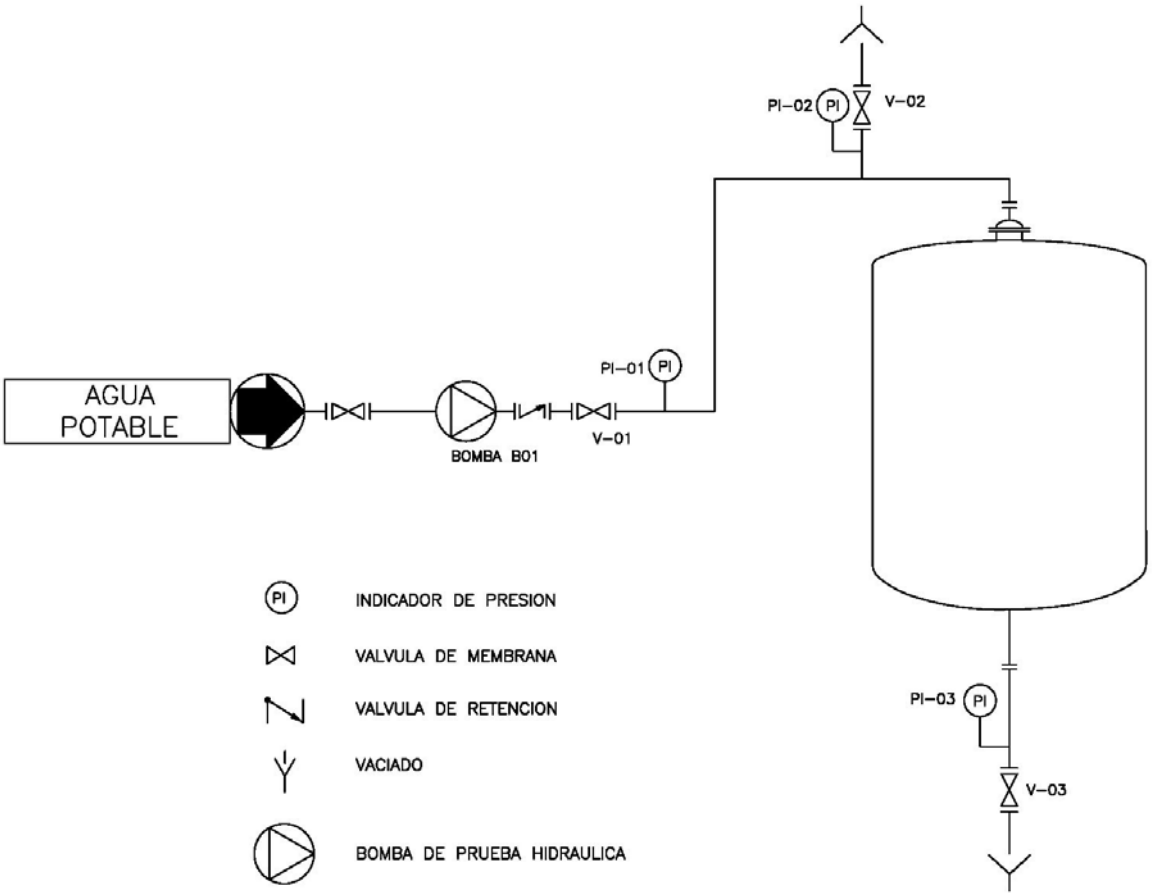
fugas apreciables. Verificada la estanqueidad, acabaremos de llenar el equipo hasta la presión de prueba, abriendo la válvula V-02 para purgar el aire y cerrando la válvula de llenado V-01 cuando se alcance la presión de prueba, para evitar que la presión se descargue a través de la bomba de presión.

Se anotará la hora en que se cierra la válvula V-01 y se dejarán transcurrir dos horas sin descenso apreciable de las presiones en los manómetros 01, 02 y 03. Si no existe este descenso, se dará por buena la prueba y se procederá al vaciado del equipo a través de V-03 (y semejantes) y, si es posible, su barrido con aire comprimido.

Si hubiera descenso de presión, deberá localizarse la causa, subsanarse y repetir el procedimiento.

6. ESQUEMA

El siguiente esquema, servirá de base al montaje de los elementos para la realización de las pruebas hidráulicas.



9.- CERTIFICADO PRUEBA HIDRAÚLICA

Por el presente documento, certificamos que el equipo, ha sido probado a una presión de 3 bar durante 60 minutos sin que se aprecie descenso de la presión manométrica ni fuga alguna.

Se adjunta el procedimiento y certificado.

Y para que conste firmo el presente documento.

José Fernández.

Director Técnico de CIFA, S.L.

10.- CERTIFICADO DE PENDIENTES

Por el presente documento, certificamos que la tubería del equipo realizada, ha sido soportada convenientemente para que las pendientes de drenaje tengan el sentido indicado en los isométricos y el porcentaje de esta pendiente sea superior al 1%.

Y para que conste firmo el presente documento.

José Fernández.

Director Técnico de CIFA, S.L.

11.- MANTENIMIENTO Y REPUESTOS

Dadas las características de la instalación y de los materiales montados, no es necesario un mantenimiento estricto del equipo y la única opción de mantenimiento consiste en la comprobación regular (cada seis meses) del apriete de las abrazaderas clamp y de los tornillos que sujetan las membranas de las válvulas. Para ello no se necesita tampoco ningún útil especial ni personal especialmente cualificado.

En cuanto al material de repuesto, recomendamos tener en stock:

3 abrazadera clamp ¾”

6 juntas clamp ¾”

2 abrazadera clamp 1 ½”

4 juntas clamp 1 ½”

Y para que conste firmo el presente documento.

José Fernández.

Director Técnico de CIFA, S.L.

12.- TRATAMIENTO QUIMICO DE LA TUBERIA

METODOLOGIA

El tratamiento químico se basa en:

Lavado alcalino

Lavado ácido

Pasivado

Secado

LAVADO ALCALINO

Esta fase tiene por objeto la eliminación de posibles aceites, grasas u otras impurezas que puedan haberse depositado durante el proceso de fabricación de la tubería.

Se efectuará a temperatura ambiente, empleando una solución de agua desmineralizada con:

2 % sosa acústica diluida en formato comercial (40%). La solución se recirculará por todo el circuito (incluyendo depósito) durante 1 hora. Se prestará especial atención a cambiar las bombas a la media hora para asegurarnos de que las dos unidades sufren el tratamiento. Posteriormente de enjuagará con agua hasta obtener un pH neutro.

LAVADO ACIDO

Esta fase se efectuará para eliminar posibles partículas de hierro, impurezas y suciedad en las soldaduras. Se efectuará a temperatura ambiente, con una solución formada por agua desmineralizada y:

Ácido fluorhídrico al 5 % en formato comercial (60%)

Ácido nítrico al 10 % en formato comercial (60%)

La solución se recirculará por todo el circuito (incluyendo depósito) durante 1 hora. Posteriormente de enjuagará con agua hasta obtener un pH neutro

PASIVADO

El objetivo de esta fase es el de pasivar la superficie metálica ya limpia y reconstruir la capa de óxido de níquel y cromo. Se realizará con una solución formada por agua desmineralizada y ácido nítrico en formato comercial al 10 %. La solución se recirculará por todo el circuito (incluyendo depósito) durante 2 horas. Posteriormente de enjuagará con agua hasta obtener un pH neutro

SECADO

Finalmente se soplará aire comprimido para barrer la humedad.

Adjuntamos fichas técnicas de los reactivos empleados.

International Chemical Safety Cards

ACIDO NITRICO

ICSC: 0183

MINISTERIO DE TRABAJO Y ASUNTOS SOCIALES

INSTITUTO NACIONAL DE SEGURIDAD E HIGIENE EN EL TRABAJO

ACIDO NITRICO
HNO_3
Masa molecular: 63.0

Nº	CAS	7697-37-2
Nº	RTECS	QU5775000
Nº	ICSC	0183
Nº	NU	2031
Nº CE 007-004-00-1		

TIPOS DE PELIGRO/ EXPOSICION	PELIGROS/ SINTOMAS AGUDOS	PREVENCION	PRIMEROS AUXILIOS/ LUCHA CONTRA INCENDIOS
INCENDIO	No combustible pero facilita la combustión de otras sustancias. En caso de incendio se desprenden humos (o gases) tóxicos e irritantes.	NO poner en contacto con sustancias inflamables. NO poner en contacto con compuestos orgánicos o combustibles.	En caso de incendio en el entorno: no utilizar espuma.
EXPLOSION	Riesgo de incendio y explosión en contacto con muchos compuestos orgánicos.		En caso de incendio: mantener fríos los bidones y demás instalaciones rociando con agua.
EXPOSICION		¡EVITAR TODO CONTACTO!	
• **INHALACION**	Sensación de quemazón, tos, dificultad respiratoria, pérdida del conocimiento (síntomas no inmediatos: véanse Notas).	Ventilación, extracción localizada o protección respiratoria.	Aire limpio, reposo, posición de semiincorporado, respiración artificial si estuviera indicada y proporcionar asistencia médica.
• **PIEL**	Corrosivo. Quemaduras cutáneas graves, dolor, decoloración amarilla.	Traje de protección.	Quitar las ropas contaminadas, aclarar la piel con agua abundante o ducharse y

			proporcionar asistencia médica.
• **OJOS**	Corrosivo. Enrojecimiento, dolor, quemaduras profundas graves.	Pantalla facial o protección ocular combinada con la protección respiratoria.	Enjuagar con agua abundante durante varios minutos (quitar las lentes de contacto si puede hacerse con facilidad) y proporcionar asistencia médica.
• **INGESTION**	Corrosivo. Dolor abdominal, sensación de quemazón, shock.	No comer, ni beber, ni fumar durante el trabajo. Lavarse las manos antes de comer.	NO provocar el vómito, dar a beber agua abundante, reposo y proporcionar asistencia médica.

DERRAMAS Y FUGAS	**ALMACENAMIENTO**	**ENVASADO Y ETIQUETADO**
Evacuar la zona de peligro. Consultar a un experto. Ventilar. Recoger el líquido procedente de la fuga en recipientes precintables, neutralizar cuidadosamente el residuo con carbonato sódico y eliminarlo a continuación con agua abundante. NO absorber en serrín u otros absorbentes combustibles. (Protección personal adicional: traje de protección completa incluyendo equipo autónomo de respiración).	Separado de sustancias combustibles y reductoras, bases, compuestos orgánicos y alimentos y piensos. Mantener en lugar fresco, seco y bien ventilado.	Envase irrompible; colocar el envase frágil dentro de un recipiente irrompible cerrado. No transportar con alimentos y piensos. símbolo O símbolo C R: 8-35 S: (1/2-)23-26-36-45 Nota: B Clasificación de Peligros NU: 8 CE: 

VEASE AL DORSO INFORMACION IMPORTANTE

ICSC: 0183

International Chemical Safety Cards

ACIDO NITRICO

ICSC: 0183

D A T O S	**ESTADO FISICO; ASPECTO** Líquido entre incoloro y amarillo, de olor acre. **PELIGROS FISICOS** **PELIGROS QUIMICOS** La sustancia se descompone al calentarla suavemente,	**VIAS DE EXPOSICION** La sustancia se puede absorber por inhalación del vapor y por ingestión. **RIESGO DE INHALACION** Por evaporación de esta sustancia a 20°C se puede alcanzar muy rápidamente una concentración nociva en el aire.

I M P O R T A N T E S	produciendo óxidos de nitrógeno. La sustancia es un oxidante fuerte y reacciona violentamente con materiales combustibles y reductores, e.j., trementina, carbón, alcohol. La sustancia es un ácido fuerte, reacciona violentamente con bases y es corrosiva para los metales. Reacciona violentamente con compuestos orgánicos (e.j., acetona, ácido acético, anhídrido acético), originando peligro de incendio y explosión. Ataca a algunos plásticos. **LIMITES DE EXPOSICION** TLV (como TWA): 2 ppm; 5.2 mg/m^3 (ACGIH 1993-1994). TLV (como STEL): 4 ppm; 10 mg/m^3 (ACGIH 1993-1994).	**EFECTOS DE EXPOSICION DE CORTA DURACION** La sustancia es muy corrosiva para los ojos, la piel y el tracto respiratorio. Corrosiva por ingestión. La inhalación del vapor puede originar edema pulmonar (véanse Notas). **EFECTOS DE EXPOSICION PROLONGADA O REPETIDA**
PROPIEDADES FISICAS	Punto de ebullición: 121°C Punto de fusión: -41.6°C Densidad relativa (agua = 1): 1.4 Solubilidad en agua: Miscible	Presión de vapor, kPa a 20°C: 6.4 Densidad relativa de vapor (aire = 1): 2.2 Densidad relativa de la mezcla vapor/aire a 20°C (aire = 1): 1.07
DATOS AMBIENTALES		

N O T A S

Está indicado examen médico periódico dependiendo del grado de exposición. Los síntomas del edema pulmonar no se ponen de manifiesto, a menudo, hasta pasadas algunas horas y se agravan por el esfuerzo físico. Reposo y vigilancia médica son, por ello, imprescindibles. Enjuagar la ropa contaminada con agua abundante (peligro de incendio).

Ficha de emergencia de transporte (Transport Emergency Card): TEC (R)-9B
Código NFPA: H 3; F 0; R 0;

INFORMACION ADICIONAL

FISQ: 3-010 ACIDO NITRICO	

ICSC: 0183 **ACIDO NITRICO**

NOTA LEGAL IMPORTANTE:	Ni la CCE ni la IPCS ni sus representantes son responsables del posible uso de esta información. Esta ficha contiene la opinión colectiva del Comité Internacional de Expertos del IPCS y es independiente de requisitos legales. La versión española incluye el etiquetado asignado por la clasificación europea, actualizado a la vigésima adaptación de la Directiva 67/548/CEE traspuesta a la legislación española por el Real Decreto 363/95 (BOE 5.6.95).

International Chemical Safety Cards

FLUORURO DE HIDROGENO

ICSC: 0283

MINISTERIO DE TRABAJO Y ASUNTOS SOCIALES

INSTITUTO NACIONAL DE SEGURIDAD E HIGIENE EN EL TRABAJO

FLUORURO DE HIDROGENO
Acido fluorhídrico
Acido hidrofluórico anhidro
HF
Masa molecular: 20.0

Nº	CAS	7664-39-3
Nº	RTECS	MW7875000
Nº	ICSC	0283
Nº	NU	1052

Nº CE 009-002-00-6

TIPOS DE PELIGRO/ EXPOSICION	PELIGROS/ SINTOMAS AGUDOS	PREVENCION	PRIMEROS AUXILIOS/ LUCHA CONTRA INCENDIOS
INCENDIO	No combustible. Muchas reacciones pueden producir incendio o explosión.	(Véanse Riesgos Químicos).	En caso de incendio en el entorno: Ningún agente hídrico.
EXPLOSION			En caso de incendio: mantener fría la botella rociando con agua pero NO en contacto directo con agua. Combatir el incendio desde un lugar protegido.
EXPOSICION		¡EVITAR TODO CONTACTO!	¡CONSULTAR AL MEDICO EN TODOS LOS CASOS!
• **INHALACION**	Corrosivo. Sensación de quemazón, tos, dificultad respiratoria, dolor de garganta, (Síntomas no inmediatos: véanse Notas).	Ventilación, extracción localizada o protección respiratoria.	Aire limpio, reposo, posición de semiincorporado y proporcionar asistencia médica.

• **PIEL**	¡PUEDE ABSORBERSE! Corrosivo, enrojecimiento, dolor, ampollas.	Guantes protectores y traje de protección.	Quitar las ropas contaminadas, aclarar la piel con agua abundante o ducharse y proporcionar asistencia médica.
• **OJOS**	Corrosivo. Enrojecimiento, dolor, quemaduras profundas graves.	Pantalla facial o protección ocular combinada con la protección respiratoria.	Enjuagar con agua abundante durante varios minutos (quitar las lentes de contacto si puede hacerse con facilidad) y proporcionar asistencia médica.
• **INGESTION**	Corrosivo. Calambres abdominales, sensación de quemazón, diarrea, vómitos y colapso.	No comer, ni beber ni fumar durante el trabajo.	Enjuagar la boca, NO provocar el vómito y proporcionar asistencia médica.

DERRAMAS Y FUGAS	**ALMACENAMIENTO**	**ENVASADO Y ETIQUETADO**
Evacuar la zona de peligro. Consultar a un experto. Ventilar. (Protección personal adicional: traje de protección completa incluyendo equipo autónomo de repiración).	Separado de bases fuertes, alimentos y piensos. Mantener en lugar fresco y bien ventilado.	No transportar con alimentos y piensos. CE: símbolo T+ símbolo C R: 26/27/28-35 S: (1/2-)7/9-26-36/37-45 Clasificación de Peligros NU: 8 Riesgos Subsidiarios NU: 6.1 Grupo de Envasado NU: I 

VEASE AL DORSO INFORMACION IMPORTANTE

ICSC: 0283

International Chemical Safety Cards

FLUORURO DE HIDROGENO

ICSC: 0283

D A T O S

ESTADO FISICO; ASPECTO
Gas o líquido incoloro, de olor acre.

PELIGROS FISICOS

PELIGROS QUIMICOS
La disolución en agua es un ácido fuerte, reacciona violentamente con bases y es corrosiva . Reacciona

VIAS DE EXPOSICION
La sustancia se puede absorber por inhalación y a través de la piel y por ingestión.

RIESGO DE INHALACION
Al producirse una pérdida de gas se alcanza muy rápidamente una concentración nociva de éste en el aire.

I M P O R T A N T E S	violentamente con muchos compuestos originando peligro de fuego y explosión. En contacto con el aire desprende humos corrosivos más pesados que el aire los cuales se desplazarán a ras del suelo. Ataca al vidrio y a los compuestos que contengan silíceo. **LIMITES DE EXPOSICION** TLV (como F): 3 ppm; 2.6 mg/m^3 © (ACGIH 1993-1994).	**EFECTOS DE EXPOSICION DE CORTA DURACION** Corrosivo. La sustancia es corrosiva de los ojos, la piel y el tracto respiratorio. La inhalación del this gaspuede originar edema pulmonar (véanse Notas). La sustancia puede causar efectos en la calcemia, induciendo hipocalcemia, dando lugar a alteraciones cardiacas y renales. La exposición above the OEL puede producir la muerte. Los efectos pueden aparecer de forma no inmediata. Se recomienda vigilancia médica. **EFECTOS DE EXPOSICION PROLONGADA O REPETIDA** La sustancia puede causar fluorosis.
PROPIEDADES FISICAS	Punto de ebullición: 20°C Punto de fusión: -83°C Densidad relativa (agua = 1): 1.0	Solubilidad en agua: Elevada Densidad relativa de vapor (aire = 1): 0.7
DATOS AMBIENTALES	Se aconseja firmemente impedir que el producto químico se incorpore al ambiente. 	

N O T A S

Los síntomas del edema pulmonar no se ponen de manifiesto, a menudo, hasta pasadas algunas horas y se agravan por el esfuerzo físico. Reposo y vigilancia médica son por ello, imprescindibles. Debe considerarse la inmediata administración de un aerosol adecuado por un médico o persona por él autorizada. Con el fin de evitar la fuga de gas en estado líquido, girar la botella que tenga un escape manteniendo arriba el punto de escape.

Ficha de emergencia de transporte (Transport Emergency Card): TEC (R)-78
Código NFPA: H 4; F 0; R 1;

INFORMACION ADICIONAL

FISQ: 3-119 FLUORURO DE HIDROGENO	

ICSC: 0283 **FLUORURO DE HIDROGENO**

NOTA LEGAL IMPORTANTE:	Ni la CCE ni la IPCS ni sus representantes son responsables del posible uso de esta información. Esta ficha contiene la opinión colectiva del Comité Internacional de Expertos del IPCS y es independiente de requisitos legales. La versión española incluye el etiquetado asignado por la clasificación europea, actualizado a la vigésima adaptación de la Directiva 67/548/CEE traspuesta a la legislación española por el Real Decreto 363/95 (BOE 5.6.95).

International Chemical Safety Cards

HIDROXIDO DE SODIO

ICSC: 0360

MINISTERIO DE TRABAJO Y ASUNTOS SOCIALES

INSTITUTO NACIONAL DE SEGURIDAD E HIGIENE EN EL TRABAJO

HIDROXIDO DE SODIO
Hidróxido sódico
Sosa caústica
Sosa
NaOH
Masa molecular: 40.0

Nº	CAS	1310-73-2
Nº	RTECS	WB4900000
Nº	ICSC	0360
Nº	NU	1823
Nº CE 011-002-00-6		

TIPOS DE PELIGRO/ EXPOSICION	PELIGROS/ SINTOMAS AGUDOS	PREVENCION	PRIMEROS AUXILIOS/ LUCHA CONTRA INCENDIOS
INCENDIO	No combustible. El contacto con la humedad o con el agua, puede generar el suficiente calor para producir la ignicion de sustancias combustibles.		En caso de incendio en el entorno: están permitidos todos los agentes extintores.
EXPLOSION			
EXPOSICION		¡EVITAR LA DISPERSION DEL POLVO! ¡EVITAR TODO CONTACTO!	¡CONSULTAR AL MEDICO EN TODOS LOS CASOS!
• **INHALACION**	Corrosivo. Sensación de quemazón, tos, dificultad respiratoria.	Extracción localizada o protección respiratoria.	Aire limpio, reposo, posición de semiincorporado, respiración artificial si estuviera indicada y proporcionar asistencia médica.

• **PIEL**	Corrosivo. Enrojecimiento, graves quemaduras cutáneas, dolor.	Guantes protectores y traje de protección.	Quitar las ropas contaminadas, aclarar la piel con agua abundante o ducharse y proporcionar asistencia médica.
• **OJOS**	Corrosivo. Enrojecimiento, dolor, visión borrosa, quemaduras profundas graves.	Pantalla facial o protección ocular combinada con la protección respiratoria si se trata de polvo.	Enjuagar con agua abundante durante varios minutos (quitar las lentes de contacto si puede hacerse con facilidad) y proporcionar asistencia médica.
• **INGESTION**	Corrosivo. Dolor abdominal, sensación de quemazón, diarrea, vómitos, colapso.	No comer, ni beber ni fumar durante el trabajo.	Enjuagar la boca, NO provocar el vómito, dar a beber agua abundante y proporcionar asistencia médica.

DERRAMAS Y FUGAS	**ALMACENAMIENTO**	**ENVASADO Y ETIQUETADO**
Barrer la sustancia derramada e introducirla en un recipiente adecuado, eliminar el residuo con agua abundante. (Protección personal adicional: traje de protección completa incluyendo equipo autónomo de repiración).	Separado de ácidos fuertes, metales, alimentos y piensos, materiales combustibles. Mantener en lugar seco y bien cerrado (véanse Notas).	No transportar con alimentos y piensos. símbolo C R: 35 S: (1/2-)26-37/39-45 Clasificación de Peligros NU: 8 Grupo de Envasado NU: II 

VEASE AL DORSO INFORMACION IMPORTANTE

ICSC: 0360

International Chemical Safety Cards

HIDROXIDO DE SODIO

ICSC: 0360

D A T O S	**ESTADO FISICO; ASPECTO** Sólido blanco, deliquescente en diversas formas e inodoro. **PELIGROS FISICOS** **PELIGROS QUIMICOS** La sustancia es una base fuerte,	**VIAS DE EXPOSICION** La sustancia se puede absorber por inhalación del aerosol y por ingestión. **RIESGO DE INHALACION** La evaporación a 20°C es despreciable; sin embargo, se puede alcanzar rápidamente una

IMPORTANTES	reacciona violentamente con ácidos y es corrosiva en ambientes húmedos para metales tales como cinc, aluminio, estaño y plomo originando hidrógeno (combustible y explosivo). Ataca a algunas formas de plástico, de caucho y de recubrimientos. Absorbe rápidamente dióxido de carbono y agua del aire. Puede generar calor en contacto con la humedad o el agua. **LIMITES DE EXPOSICION** TLV: 2 mg/m^3 (valor techo) (ACGIH 1992-1993). PDK no establecido. MAK: clase G	concentración nociva de partículas en el aire. **EFECTOS DE EXPOSICION DE CORTA DURACION** Corrosivo. La sustancia es muy corrosiva de los ojos, la piel y el tracto respiratorio. Corrosivo por ingestión. La inhalación del aerosol de la sustancia puede originar edema pulmonar (véanse Notas). **EFECTOS DE EXPOSICION PROLONGADA O REPETIDA** El contacto prolongado o repetido con la piel puede producir dermatitis.
PROPIEDADES FISICAS	Punto de ebullición: 1390°C Punto de fusión: 318°C Densidad relativa (agua = 1): 2.1	Solubilidad en agua, g/100 ml a 20°C: 109 Presión de vapor, kPa a 739°C: 0.13
DATOS AMBIENTALES	Esta sustancia puede ser peligrosa para el ambiente; debería prestarse atención especial a los organismos acuáticos. 	

N O T A S

El valor límite de exposición laboral aplicable no debe superarse en ningún momento de la exposición en el trabajo. Los síntomas del edema pulmonar no se ponen de manifiesto, a menudo, hasta pasadas algunas horas y se agravan por el esfuerzo físico. Reposo y vigilancia médica son por ello, imprescindibles. NO verter NUNCA agua sobre esta sustancia; cuando se deba disolver o diluir, añadirla al agua siempre lentamente. Almacenar en una área que disponga de un suelo de hormigón, resistente a la corrosión.

Ficha de emergencia de transporte (Transport Emergency Card): TEC (R)-121
Código NFPA: H 3; F 0; R 1;

INFORMACION ADICIONAL

FISQ: 3-134 HIDROXIDO DE SODIO	

ICSC: 0360 **HIDROXIDO DE SODIO**

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Health and Safety

Pickling paste, Formula 1

Material Safety Data Sheets

1. Manufacturer

2. Composition/details of constituents

Acid pickling paste for stainless steels and Ni-based alloys.

Hazardous ingredients

CAS-No	Description	%	Letter	R-phrases symbol
7697-37-2	Nitric acid	<20	C, O	8-35
7664-39-2	Hydrofluoric	<5	T+, C	26/27/28-35

3. Possible hazards

Hazard description: Toxic.

Special hazard instructions for persons and environment: R23/24/25, toxic if inhaled, swallowed or allowed to come into contact with skin.

R35 causes serious burns.

Classification system: classification is in accordance with current EC lists but has been supplemented by details taken from technical literature and the firm's information.

4. First-aid measures

General instructions

Immediately remove clothing contaminated with the product. Give artificial respiration if victim is breathing irregularly or has stopped breathing.

After inhalation

supply fresh air or oxygen, obtain medical assistance. If victim is unconscious, arrange and move the victim in the recovery position.

After skin contact

Wash off immediately using water and soap and rinse well.
Immediately rub in Ca Gluconate solution or Ca Gluconate gel.

After eye contact

Rinse open eyes in running water for several minutes and contact doctor.

After swallowing

Do not encourage victim to vomit, obtain medical assistance immediately. Drink copious amounts of water and supply fresh air. Contact doctor immediately.

5. Fire-fighting measures

Suitable extinguishing media

Adapt fire-extinguishing measures to the environment. CO 2, dry powder or water spray jet. Fight relatively large fires with water spray jet or alcohol-resistant foam.

Special protective gear

Wear respiratory equipment.

6. Measures in case of accidental release

Person-related precautionary measures: wear protective gear. Move unprotected persons away.

Environmental protection measures

Dilute with plenty of water.

Cleaning/absorption method

Absorb using materials that absorb liquids (sand, infusorial earth, acid-binders, universal binding agents) and remove for proper disposal. Use neutralising agent. Dispose of contaminated material as waste according to heading 13. Ensure adequate ventilation.

7. Handling and storage

Handling:

Instructions for safe-handling: ensure good ventilation/fume extraction in workplace. Open and handle containers carefully.
Fire and explosion-protection instructions: keep respiratory equipment ready for use.

Storage:

Requirements for storage premises and containers: provide acid-resistant floor. Only store in original packing drum.

Instructions for storage with other materials: not required.

Further details concerning storage conditions: keep in locked room away from children.

Ensure containers are securely closed.

WbF Class: not applicable.

8. Exposure limiting and personal protective gear

Additional instructions concerning design of technical gear: no further details, see heading 7.

Constituents having workplace-related limit values to be monitored:

CAS-No.	Name of substance	Type	Unit value
7697-37-2	Nitric acid	max.	5 mg/m^3
			2 ml/m^3
7664-39-3	Hydrofluoric acid	max.	2 mg/m^3
			3 ml/m^3
10102-44-0	Nitrogen dioxide	max.	9 mg/m^3

Additional notes: the lists that were valid at the time of writing were used as a basis.

Personal protective equipment: general protection and hygiene measures: keep away from foodstuffs, beverages and animal foodstuffs. Remove contaminated, impregnated clothes. Wash hands before breaks and after work.

Keep protective clothing separately.

Avoid eye and skin contact.

Respiratory equipment: use breathing-filter in case of short-term or low exposure, use self-contained respiratory equipment in case of relatively intensive or long exposure.

Short-term breathing filter apparatus: filter B.
Hand protection: neoprene gloves
Eye protection: close-fitting goggles.
Face protection: protective work clothing, body protection.

9. Physical and chemical characteristics

Form: pasty.
Colour: translucent.
Odour: pungent.

Change of state:

Melting point/melting range:	< 20°C.
Boiling point/boiling range:	not determined.
Flash point:	does not apply.
Ignition temperature:	does not apply.
Decomposition point:	> 100°C.
Explosion hazard:	the product is not potentially explosive.
Steam pressure:	at 20°C, 40 mbar.
Density:	at 20°C, 1.25 g/cm 3 .
Solubility/miscibility in water:	dispersable.

10. Stability and reactivity

Decomposition by heat/conditions to be avoided: no decomposition when used as prescribed.

No decomposition when stored and handled as prescribed.

Decomposition by heat takes place after water has evaporated off.

Reactions with metals form hydrogen.

Hazardous decomposition products: nitrous gases, hydrogen fluoride.

11. Toxicology data

Acute toxicity

Primary irritant effect.

On skin: strong caustic effect on skin and mucous membranes.

In eye: strong caustic effect.

Sensitization: no sensitizing effect known.

Additional toxicology notes: on the basis of the calculation method in the latest issue of the EC General Classification Directive for Preparations, the product involves the following hazards: corrosive, toxic.

Hazard through skin absorption: strong caustic effect on mouth cavity and throat if swallowed as well as risk of perforation of

oesophagus and stomach.

12. Ecology data

General notes: potential water hazard class 1 (self-classification): slight potential hazard to water. Do not allow into ground water, water or pipes undiluted or in relatively large quantities. Must not enter waste water or drainage ditches unless diluted or neutralised.

13. Disposal instructions

Product

Recommendation: must not be disposed of with household waste.
Do not allow into piping. Must be taken to a properly approved special waste disposal site after initial treatment in accordance with the Special Waste Regulations. Waste code number: 31 621.

Contaminated packages

Recommendation: disposal in accordance with official regulations.
Recommended cleaning solvent: water, with additional solvent if applicable.

14. Transport data

Land transport ADR/RID and GGVS/GGVE (cross-border/domestic)

ADR/RID - GGVS/E Class: 8 caustic substances.
Numeral/letter class: 7 B.
Code number: 886.
UN number: 1790.
Goods description: hydrofluoric acid solution.
Sea transport :IMDG/GGV Sea:
IMDG/GGV Sea Class 8
Page: 8184
UN number: 1790.
Packaging group: II
EMS number: 8-03
MFAG: 750
Correct technical name: hydrofluoric acid solution.

Air transport ICAO-TI and IATA-DGR:
ICAO/IATA Class: 8
UN/ID number: 1790
Packaging group: II
Correct technical name: hydrofluoric acid solution.

15. Regulations

Identification marking as per EEC Directives:
The product is classified and identification marked in accordance with EG Directive/Hazardous Substance V.

Product code letter and hazard description:

T	Toxic
C	Caustic
R phrases	
23/24/25	Toxic if inhaled, swallowed or allowed to come into contact with skin.
35	Causes serious burns
7/9	Keep containers securely sealed in a well ventilated location.
36/37	Wear suitable protective gloves and protective clothing when working.
2	Keep out of reach of children
26	In case of contact with eyes, rinse thoroughly with water and contact doctor.

National regulations: classification according to VbF and resulting identification marking: not applicable

Potential water hazard class: WGK 1 (self-classification): slight potential hazard to water.

16. Other details

This information is based on the current state of our knowledge, does not constitute guaranteed product characteristics and cannot be construed as implying any legal contractual relationship.

13.- INFORME DEL TRATAMIENTO QUIMICO DE LA TUBERIA

La secuencia del tratamiento químico de la tubería que nos atañe, realizado el 02-07-2009 fue la siguiente:

08:00 presentación en obra y descarga de materiales.

08:30 preparación del circuito para la prueba hidráulica y conexión de bomba de pruebas.

09:00 inicio de la prueba hidráulica a 3 bar. En paralelo se prepara el circuito y las mangueras para la realización del tratamiento químico de la tubería.

09:30 no se aprecia descenso de presión en el manómetro de pruebas ni fugas en el circuito, por lo que despresurizamos y comenzamos el lavado alcalino del sistema.

10:30 procedemos al enjuague del circuito mediante agua desmineralizada hasta obtener un pH de 5,5 (igual que el del agua desmineralizada). En paralelo preparamos la disolución para el decapado.

12:00 comenzamos el decapado del circuito.

13:00 procedemos al enjuague del circuito mediante agua desmineralizada hasta obtener un pH de 5,5 (igual que el del agua desmineralizada). En paralelo preparamos la disolución para el pasivado.

14:30 comenzamos el pasivado del circuito.

16:30 procedemos al enjuague del circuito mediante agua desmineralizada hasta obtener un pH de 5,5 (igual que el del agua desmineralizada).

18:00 Secado de tubería mediante el soplado con aire comprimido.

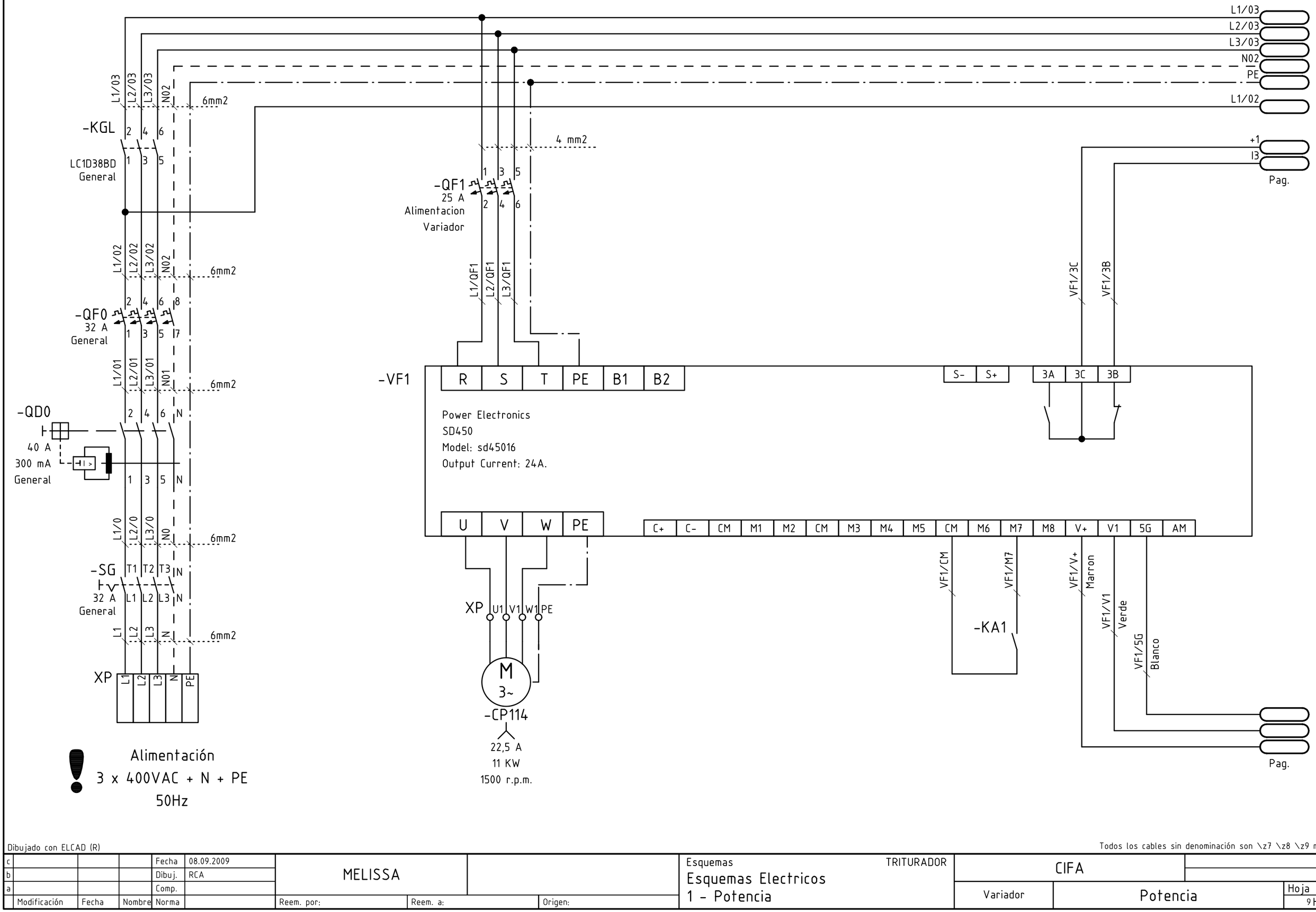
19:00 Damos por acabado lo trabajos relacionados con el tratamiento químico de la tubería.

Y para que conste firmo el presente documento.

José Fernández.

Director Técnico de CIFA, S.L.

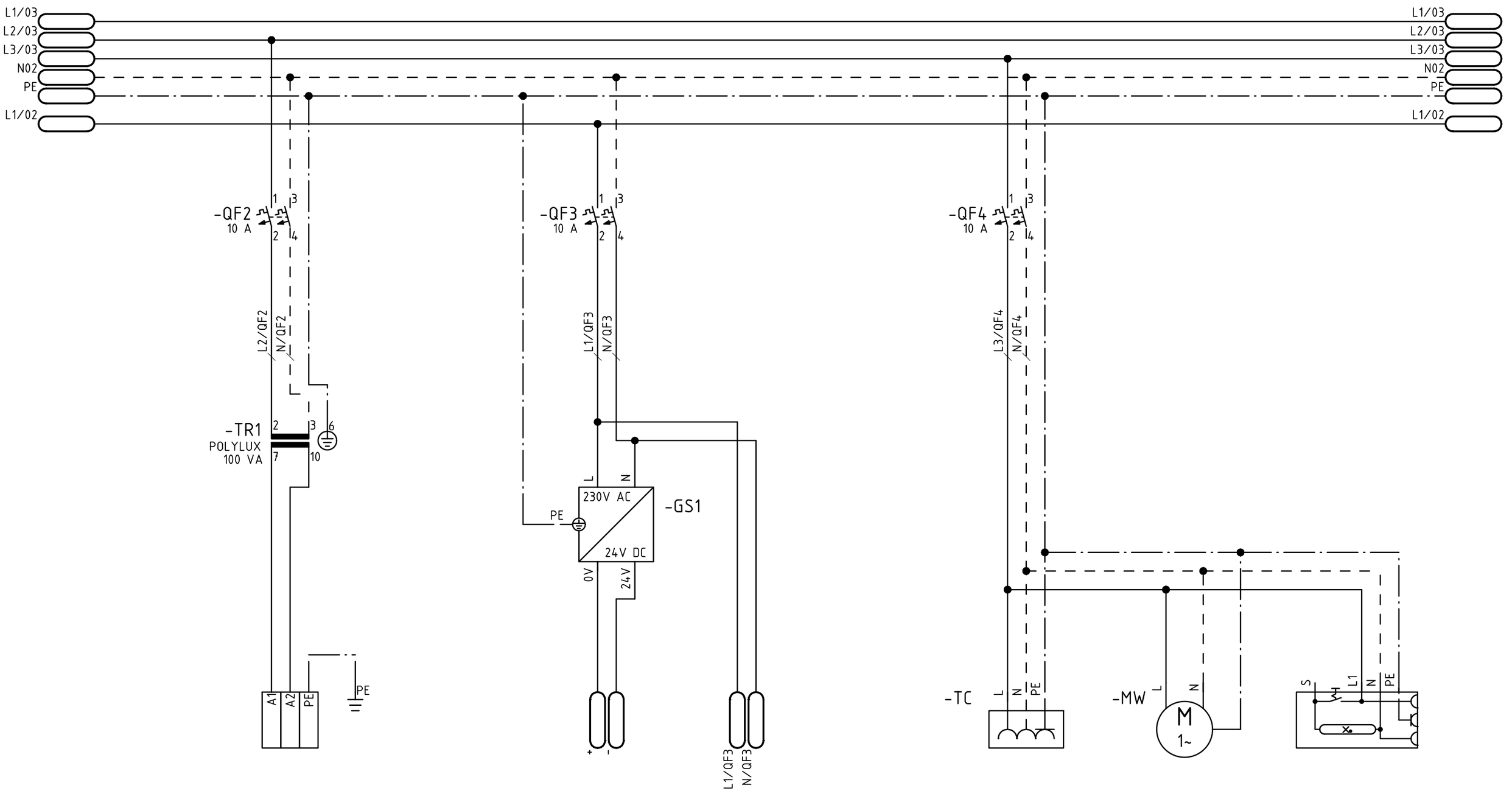
14.- DOCUMENTACIÓN ELECTRICA



Dibujado con ELCAD (R)

Todos los cables sin denominación son \z7 \z8 \z9 mm²

c				Fecha	08.09.2009	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				1 - Potencia	
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	Variador / Potencia / Hoja 1 9 Hjs



Alimentacion
Minima
24 Vac

Alimentacion
24 Vdc
2,2 A

Alimentacion
230 Vac
PLC

Toma de Corriente
Armario 230 Vac

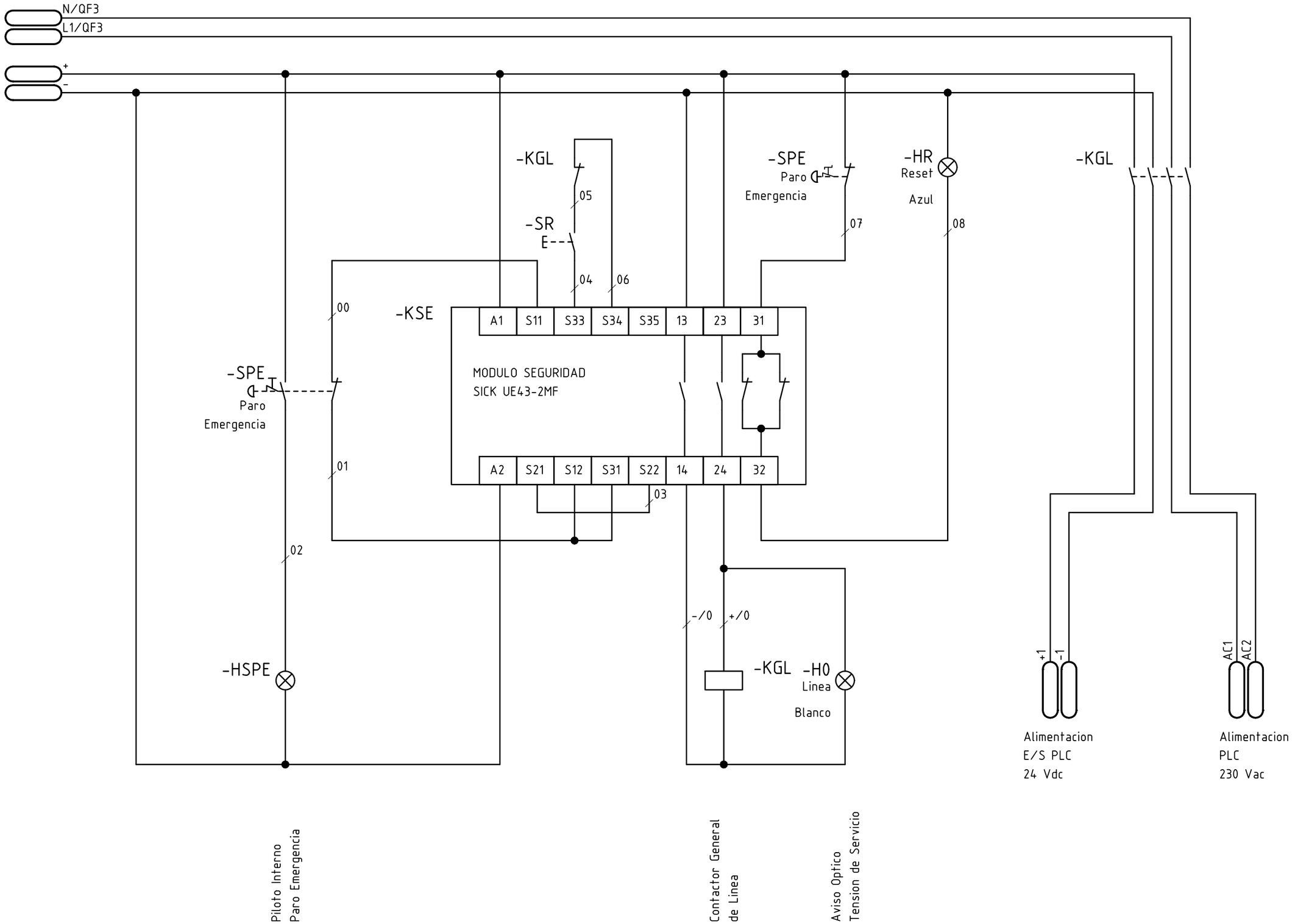
Extractor
Armario
230 Vac
2W

Luminaria
Armario
230 Vac

Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

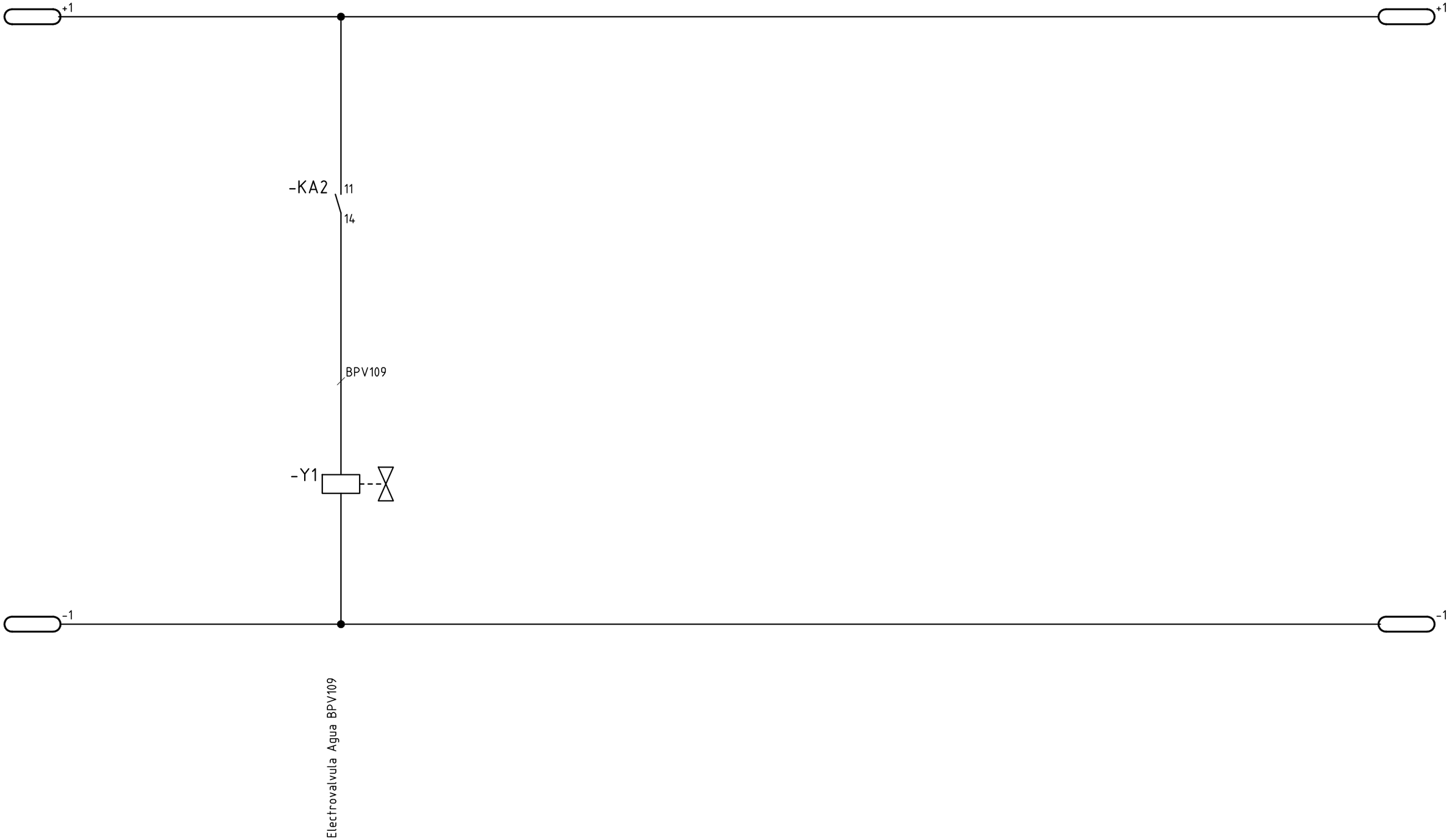
c				Fecha	08.09.2009	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				1 - Potencia	
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	Alimentaciones / Potencia / Hoja 2 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		Esquemas	TRITURADOR	CIFA
b				Dibuj.	RCA			Esquemas Electricos		
a				Comp.				2 - Maniobra	Modulo Seguridad	Maniobra
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:		Hoja 3 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		
b				Dibuj.	RCA			
a				Comp.				
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:

Esquemas TRITURADOR

Esquemas Electricos

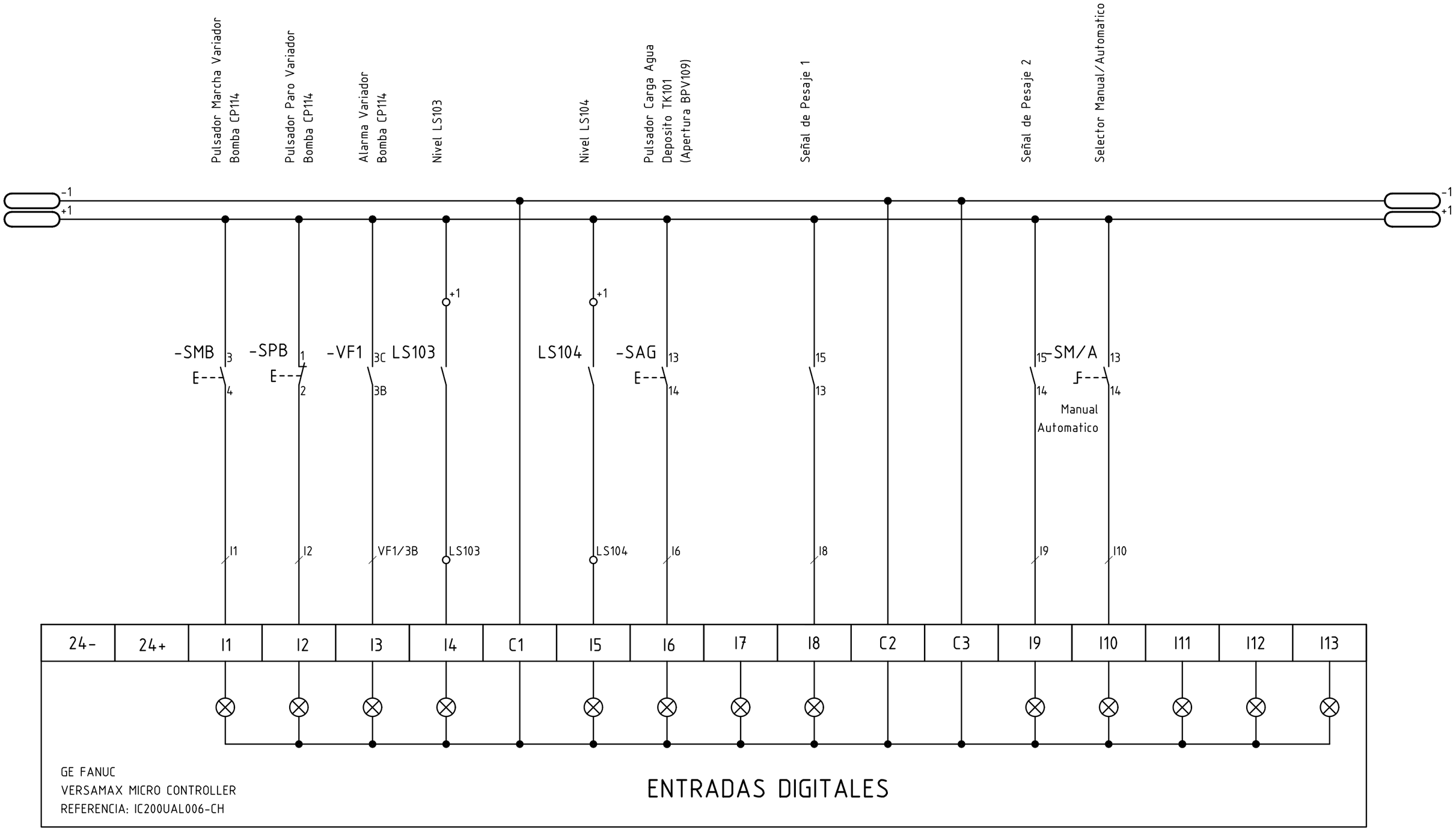
2 - Maniobra

CIFA

Salidas Reles | Maniobra

Hoja 4

9 Hjs



Dibujado con ELCAD (R)

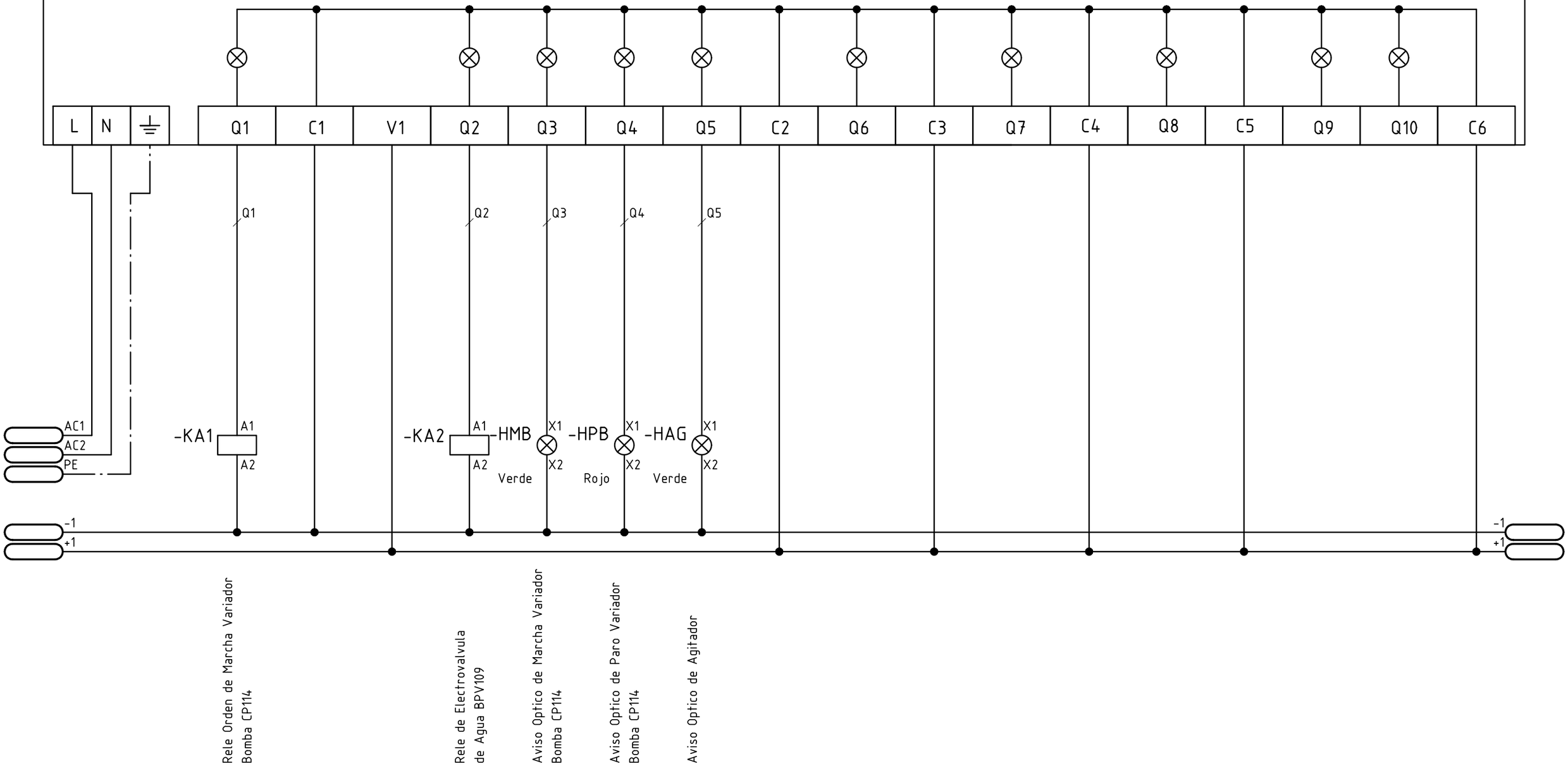
Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		Esquemas TRITURADOR	CIFA	
b				Dibuj.	RCA			Esquemas Electricos		
a				Comp.				3 - Plc	Entradas Digitales	PLC
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:		Hoja 5 9 Hjs

1	2	3	4	5	6	7	8

GE FANUC
VERSAMAX MICRO CONTROLLER
REFERENCIA: IC200UAL006-CH

SALIDAS DIGITALES

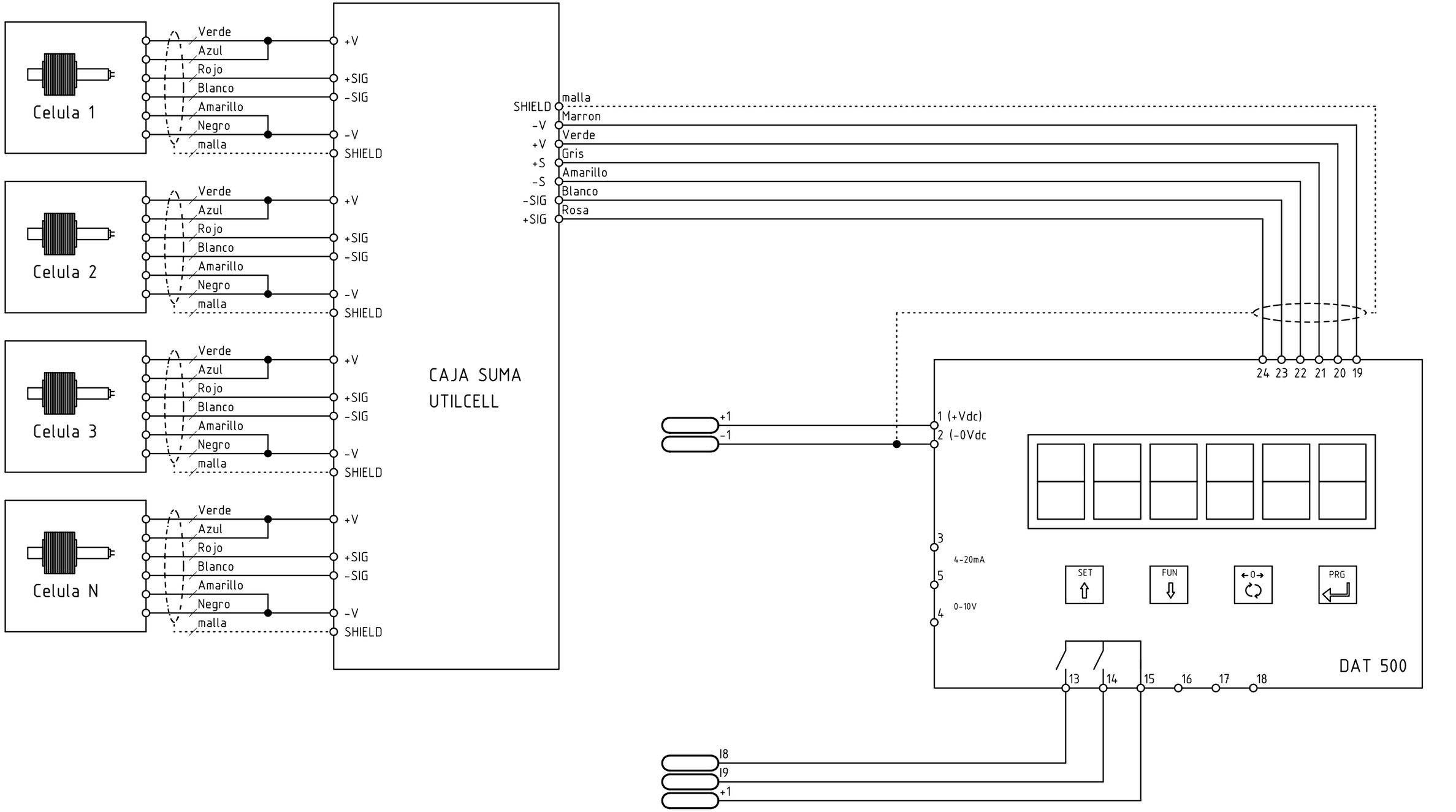


Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		Esquemas TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos
a				Comp.				3 - Plc
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:

CIFA		
Salidas Digitales	PLC	Hoja 6 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		
b				Dibuj.	RCA			
a				Comp.				
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:

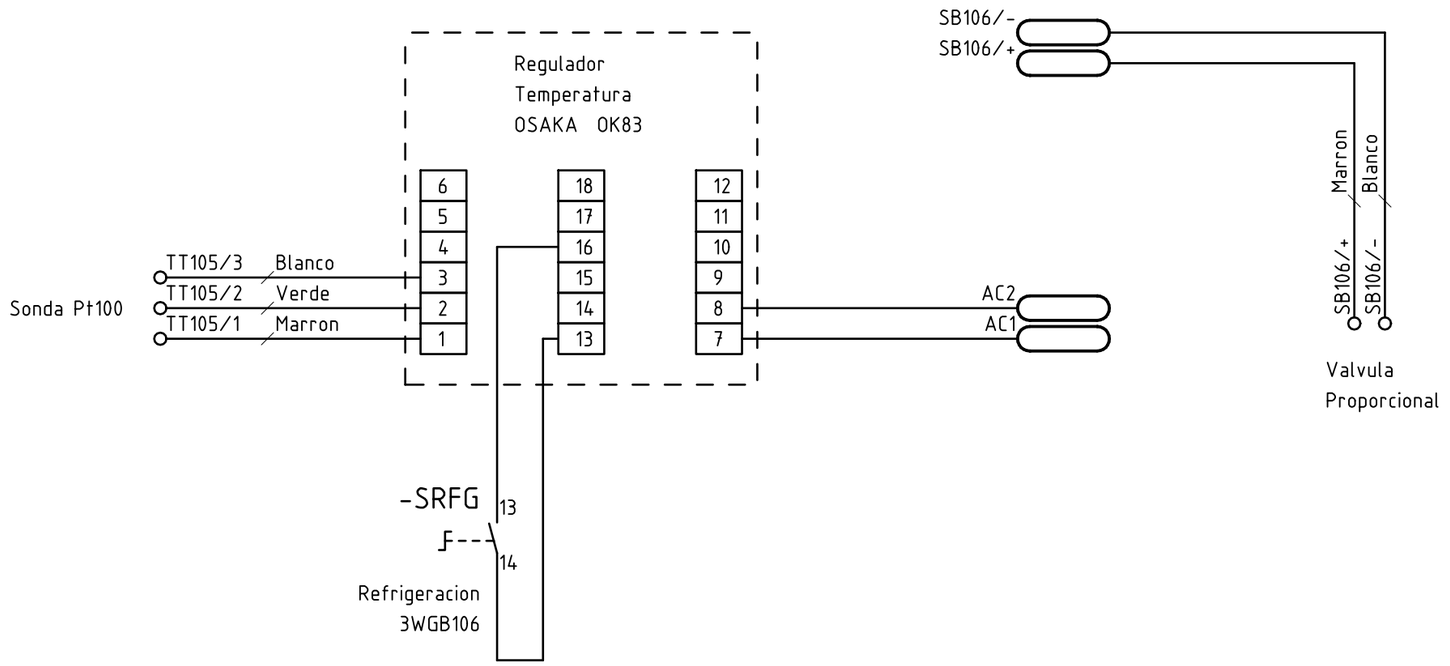
Esquemas — TRITURADOR

Esquemas Electricos

3.1.- UtilCell

CIFA

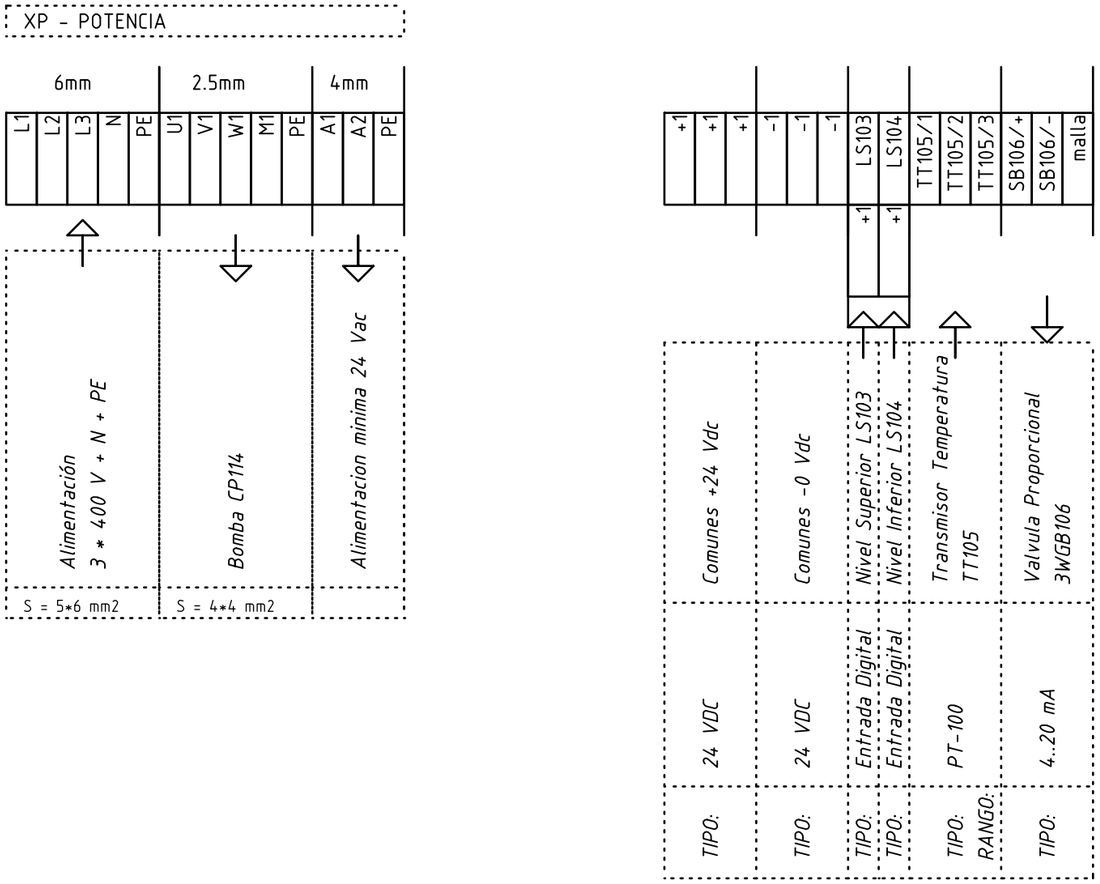
Salidas Digitales | PLC | Hoja 7 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		Esquemas TRITURADOR	CIFA	
b				Dibuj.	RCA			Esquemas Electricos		
a				Comp.				3.2 OSAKA OK83	OSAKA OK83	Regulador de Tº
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:		Hoja 8 9 Hjs



Dibujado con ELCAD (R)

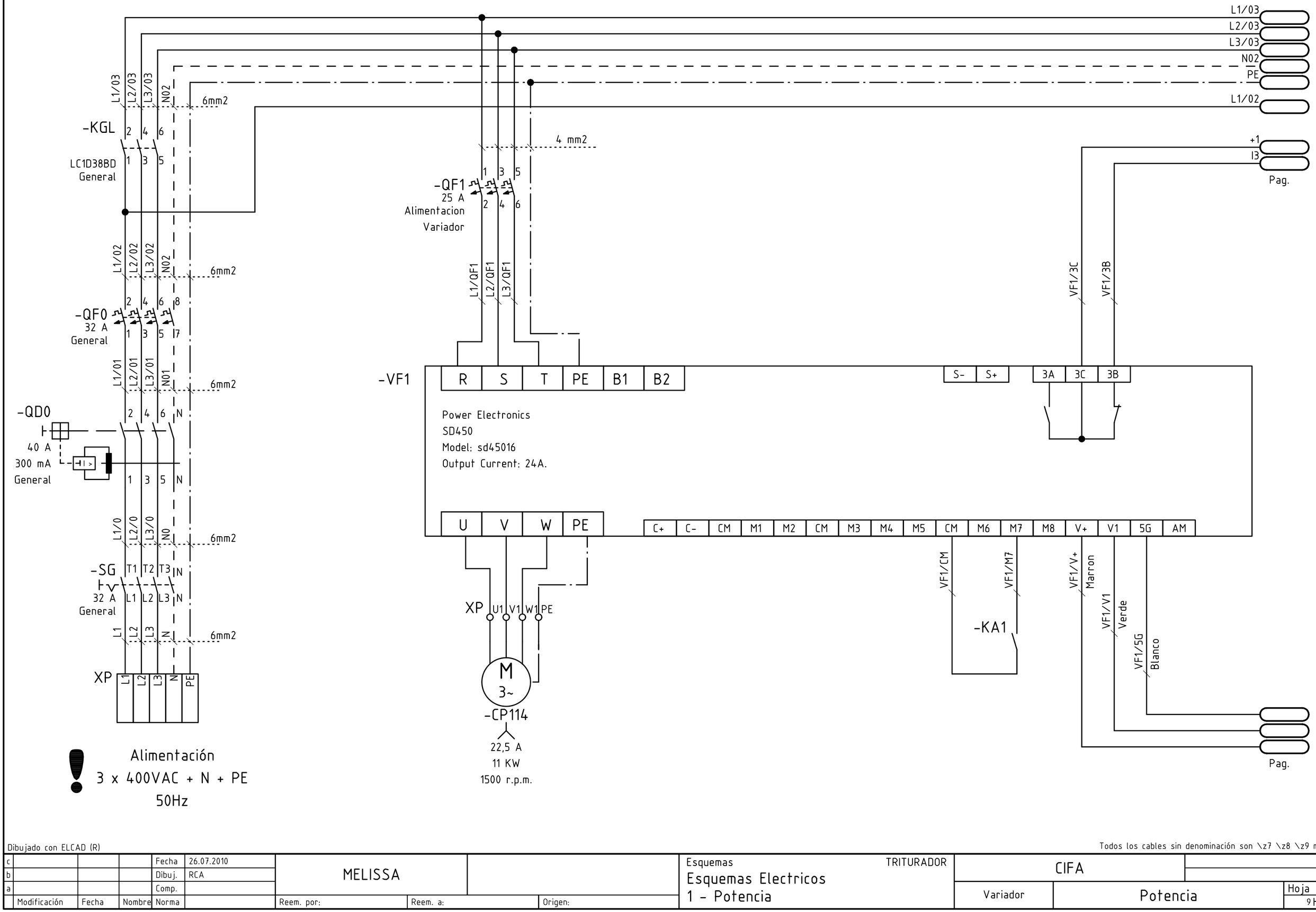
Todos los cables sin denominación son mm²

c				Fecha	08.09.2009	MELISSA		Esquemas TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos
a				Comp.				4 - Hoja de Bornes
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a: / Origen:	CIFA / Bornes / Borneros

Hoja 9
9 Hjs

SECTION 2

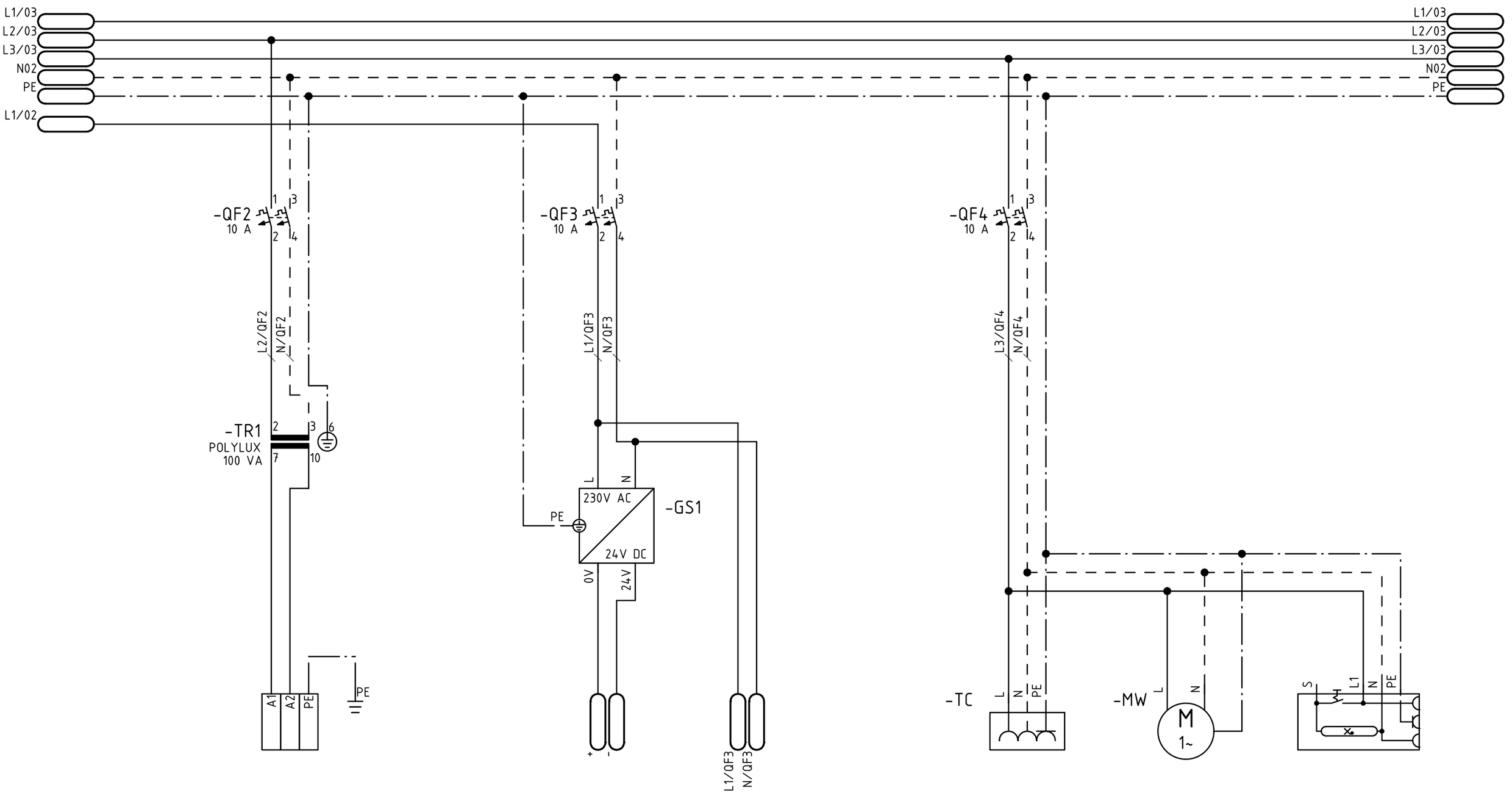
Updated electrical drawings



Dibujado con ELCAD (R)

Todos los cables sin denominación son \z7 \z8 \z9 mm²

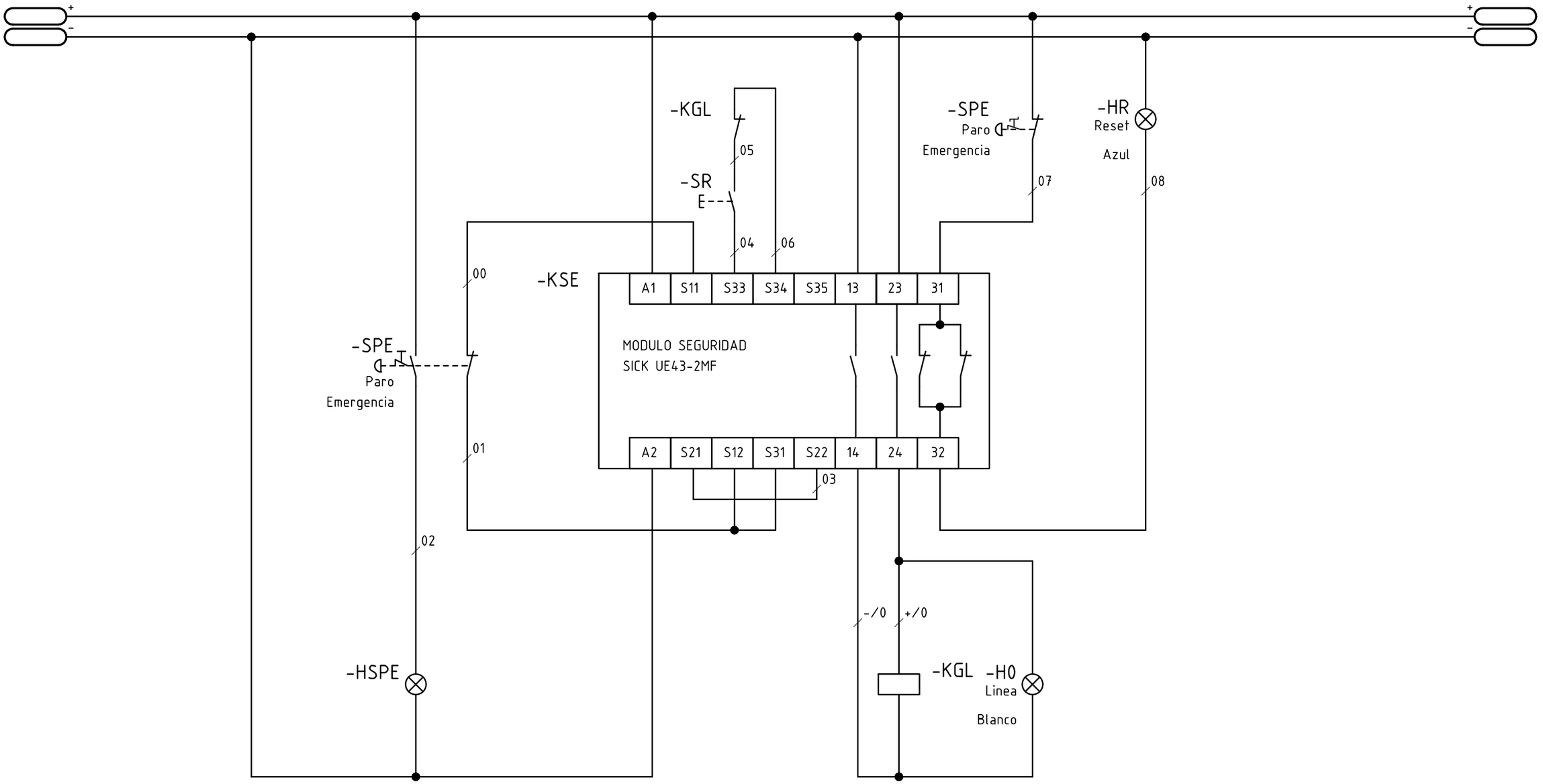
c				Fecha	26.07.2010	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				1 - Potencia	
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	Variador / Potencia / Hoja 1 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

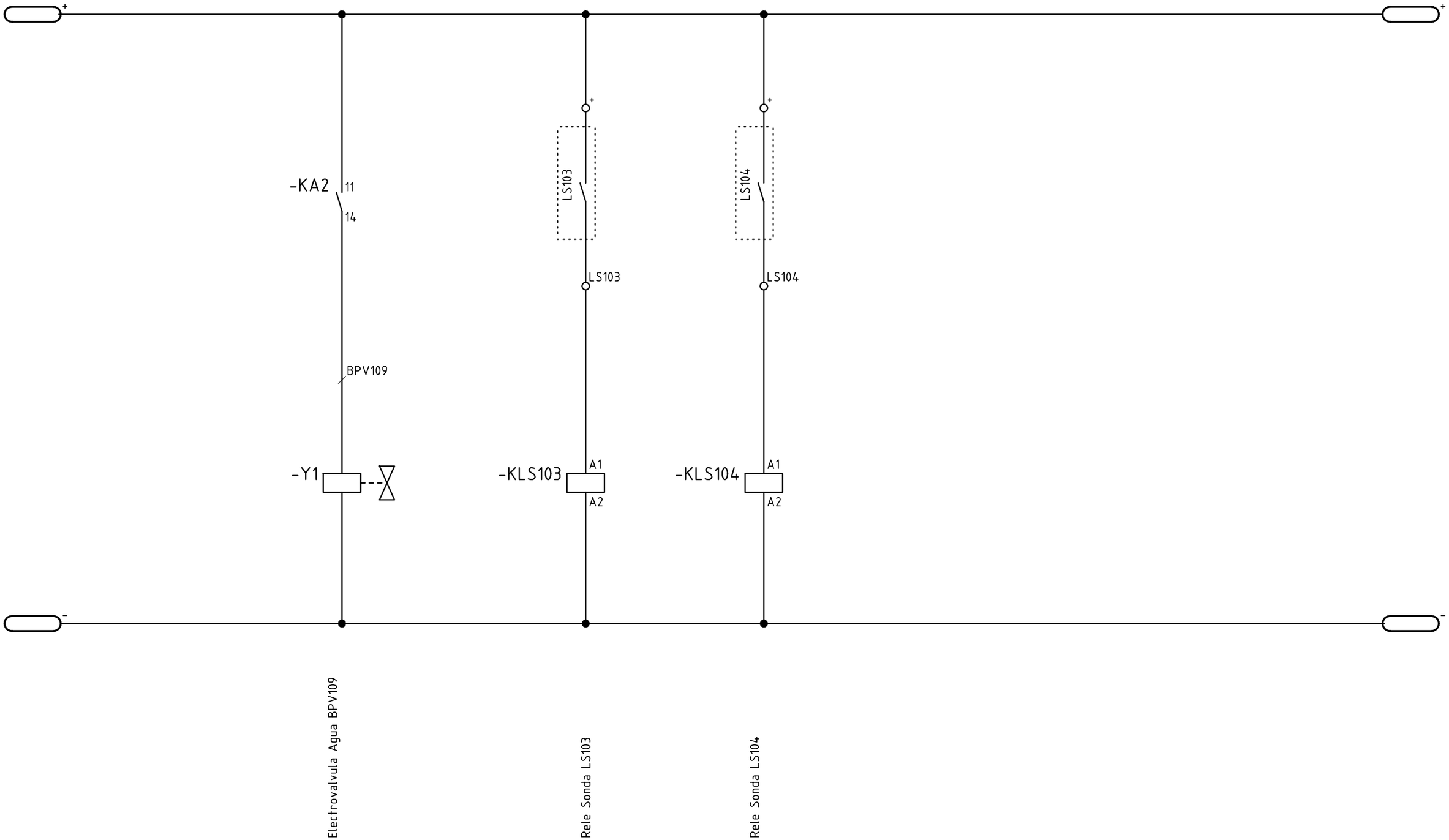
c				Fecha	26.07.2010	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				1 - Potencia	
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	Alimentaciones / Potencia / Hoja 2 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	26.07.2010	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				2 - Maniobra	Modulo Seguridad / Maniobra / Hoja 3
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	9 Hjs

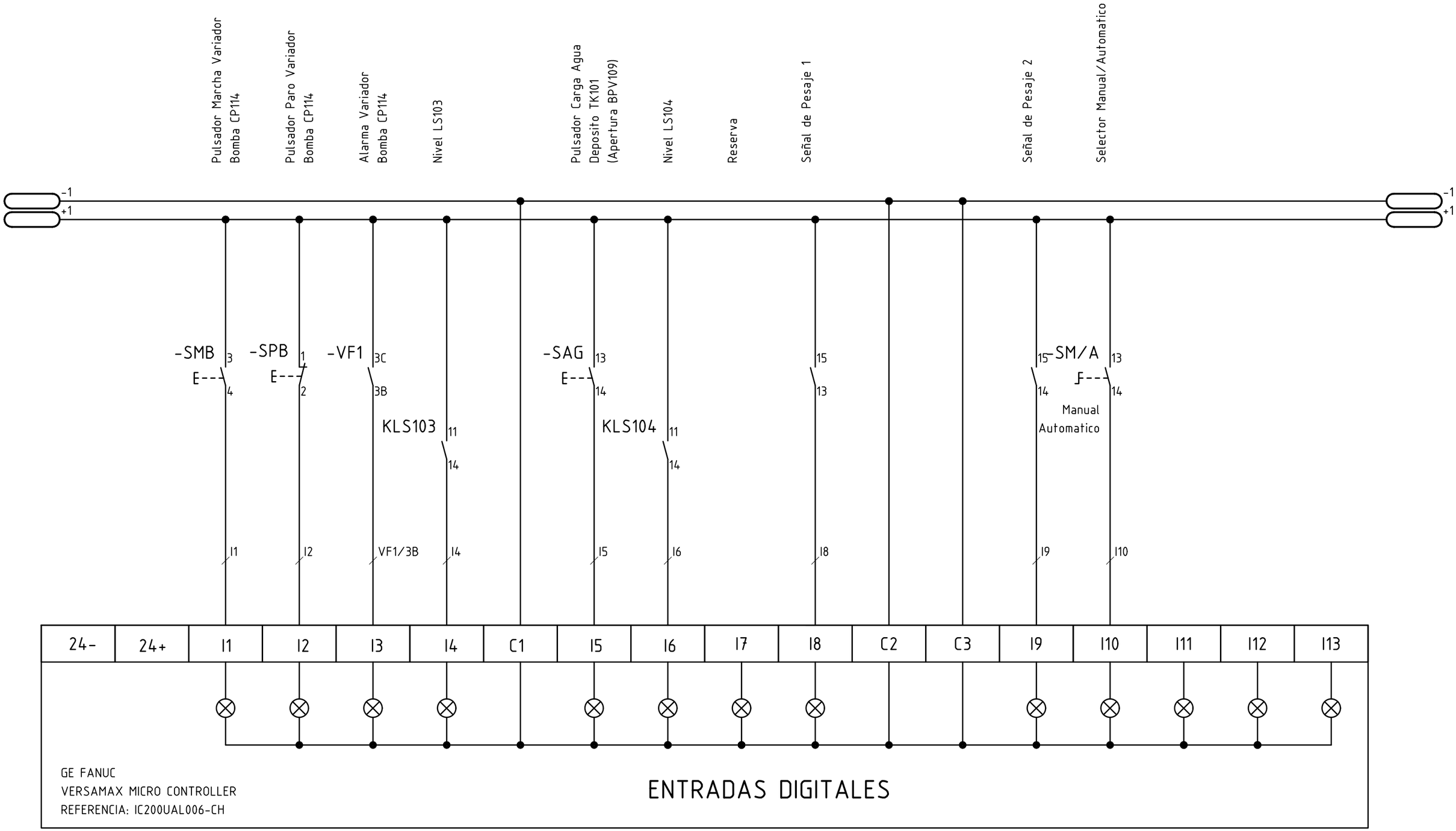


Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	26.07.2010	MELISSA		Esquemas TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos
a				Comp.				2 - Maniobra
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:

CIFA		
Salidas Reles	Maniobra	Hoja 4
		9 Hjs



GE FANUC
VERSAMAX MICRO CONTROLLER
REFERENCIA: IC200UAL006-CH

ENTRADAS DIGITALES

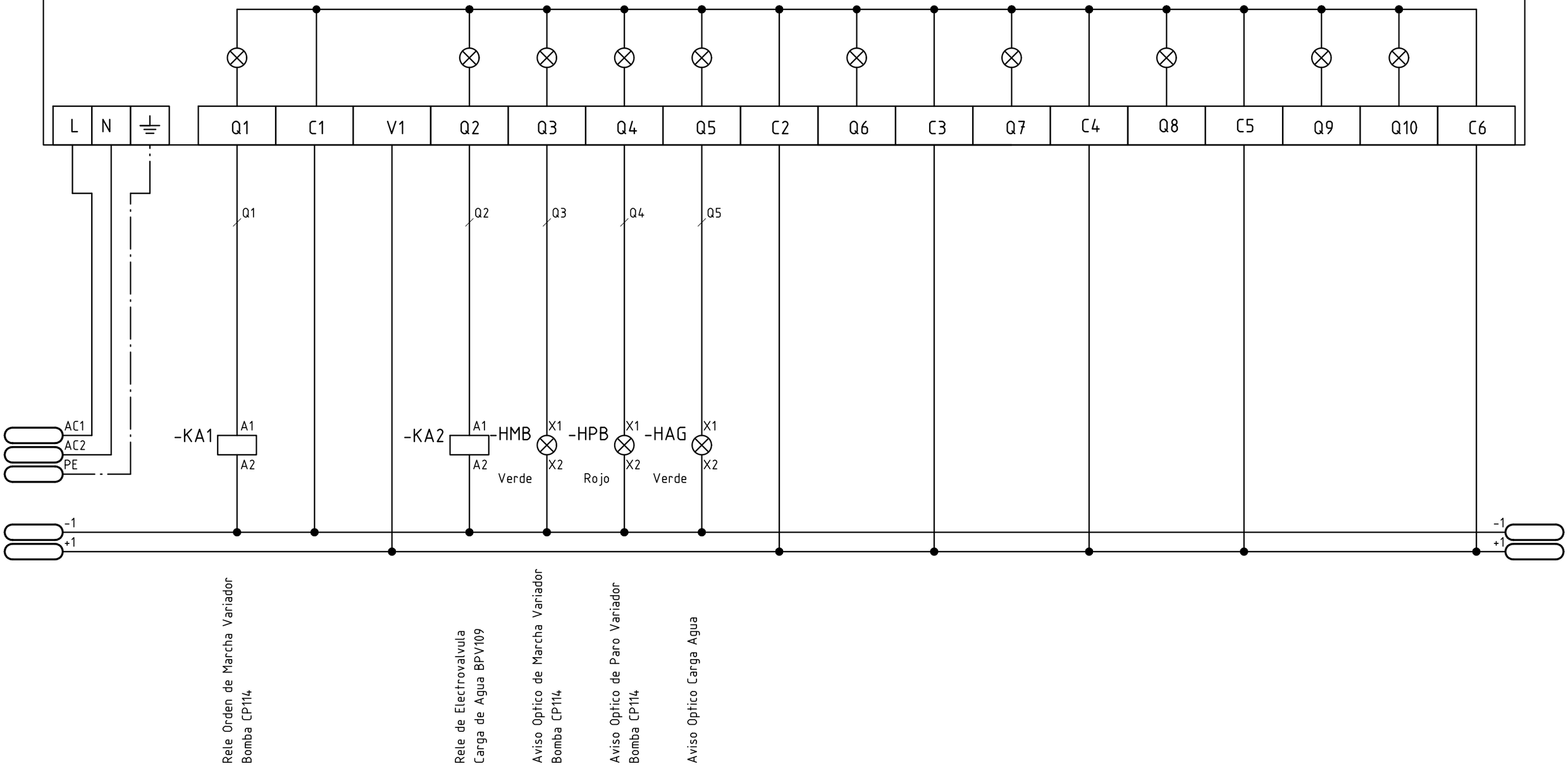
Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	26.07.2010	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				3 - Plc	Entradas Digitales / PLC / Hoja 5 / 9 Hjs
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	

GE FANUC
VERSAMAX MICRO CONTROLLER
REFERENCIA: IC200UAL006-CH

SALIDAS DIGITALES

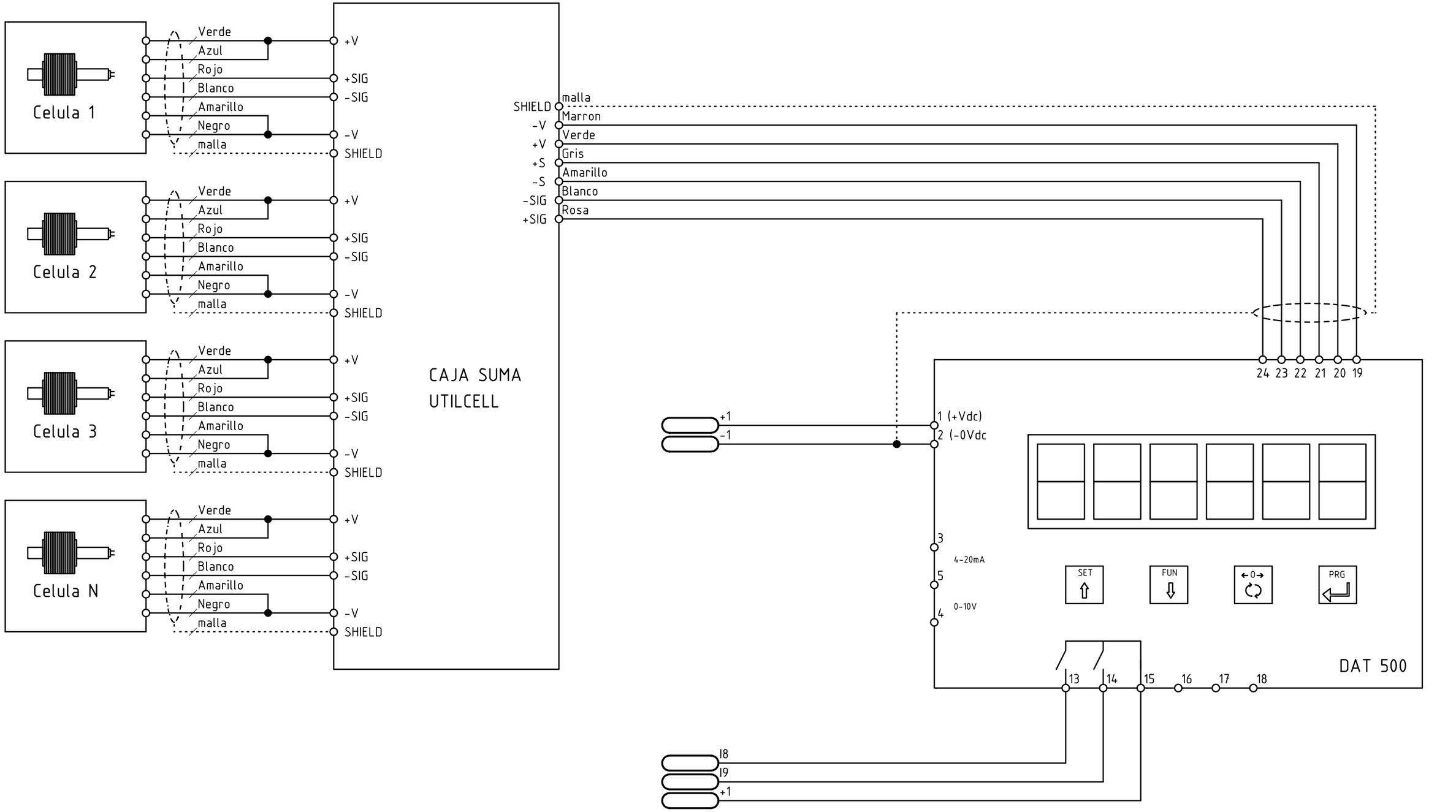


Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	26.07.2010	MELISSA		Esquemas TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos
a				Comp.				3 - Plc
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:

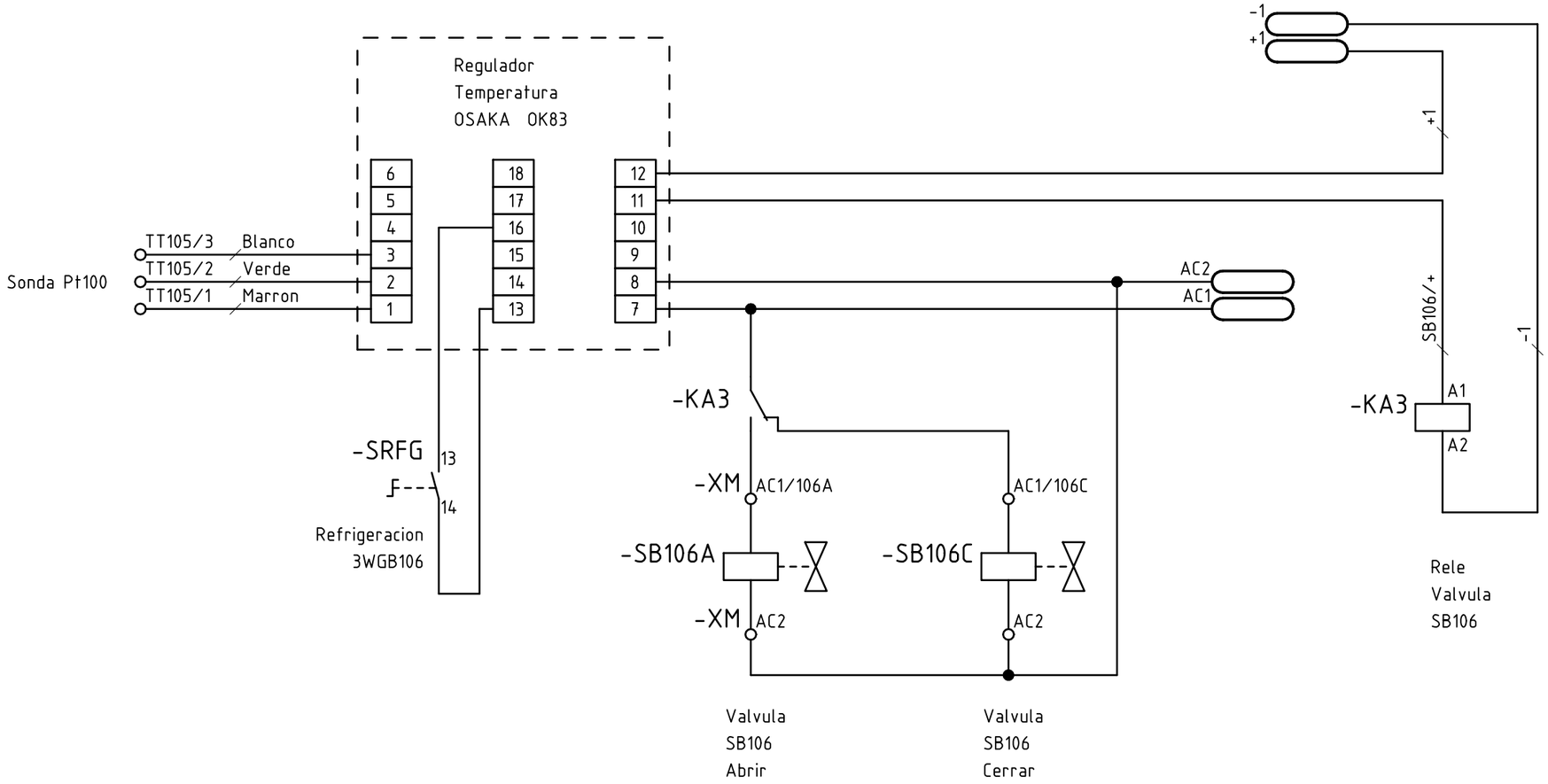
CIFA		
Salidas Digitales	PLC	Hoja 6 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

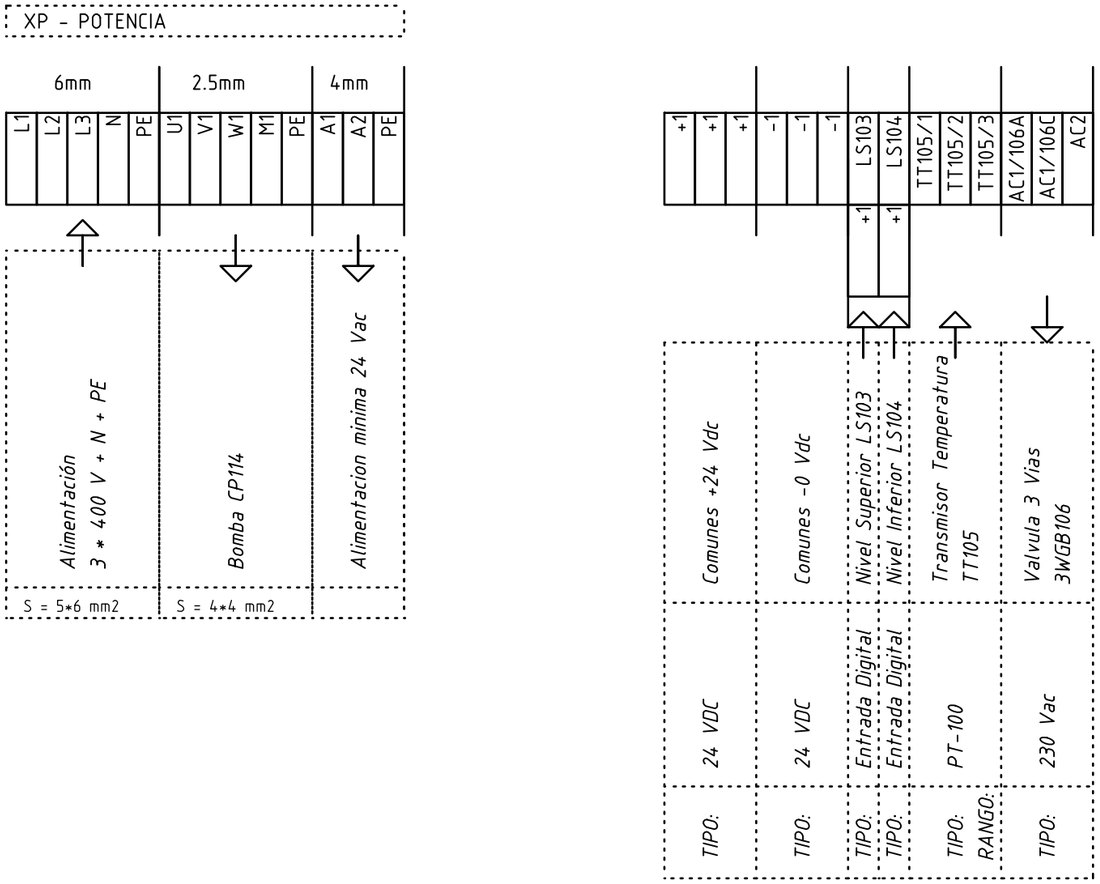
c				Fecha	26.07.2010	MELISSA	Esquemas	TRITURADOR
b				Dibuj.	RCA		Esquemas Electricos	CIFA
a				Comp.			3.1.- UtilCell	Salidas Digitales / PLC / Hoja 7 / 9 Hjs
	Modificación	Fecha	Nombre	Norma		Reem. por: / Reem. a: / Origen:		



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	26.07.2010	MELISSA		Esquemas TRITURADOR	CIFA	
b				Dibuj.	RCA			Esquemas Electricos		
a				Comp.				3.2 OSAKA OK83	OSAKA OK83	Regulador de Tº
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:		Hoja 8 9 Hjs



Dibujado con ELCAD (R)

Todos los cables sin denominación son mm²

c				Fecha	26.07.2010	MELISSA		Esquemas	TRITURADOR
b				Dibuj.	RCA			Esquemas Electricos	CIFA
a				Comp.				4 - Hoja de Bornes	Hoja 9
	Modificación	Fecha	Nombre	Norma		Reem. por:	Reem. a:	Origen:	Bornes / Borneros / 9 Hjs

SECTION 3

WPU PLC program

1 ENTRADAS

2

I00001 — %I00001 Pulsador marcha variador

M00001 — %M00001 Pulsador marcha variador

3

I00002 — %I00002 Pulsador paro variador

M00002 — %M00002 Pulsador paro variador

4

I00003 — %I00003 Alarma variador

M00003 — %M00003 Alarma variador

5

I00004 — %I00004 Nivel mínimo

M00004 — %M00004 Nivel mínimo

6

I00005 — %I00005 Pulsador carga agua

M00005 — %M00005 Pulsador carga agua

7

I00006 — %I00006 Nivel maximo

M00006 — %M00006 Nivel maximo

8

I00007 — %I00007 Reserva

M00007 — %M00007 Reserva

9

I00008 — %I00008 Señal pesaje 1

M00008 — %M00008 Señal pesaje 1

10

I00009 — %I00009 Señal pesaje 2

M00009 — %M00009 Señal pesaje 2

11

I00010

%I00010
Selector
manual/autom
atico

M00010

%M00010
Selector
manual/autom
atico

12 MARCHA BOMBA

13

M00010 **M00001** **M00004** I00006 **Q00001**

%M00010
Selector
manual/autom
atico

%M00001
Pulsador
marcha
variador

%M00004
Nivel mínimo

%I00006
Nivel maximo

%Q00001
Marcha
bomba

M00010 I00009 **M00013**

%M00010
Selector
manual/autom
atico

%I00009
Señal pesaje
2

%M00013
Tiempo
triturado

14

M00010 I00009 **M00013** ONDTR
TENTHS

%M00010
Selector
manual/autom
atico

%I00009
Señal pesaje
2

%M00013
Tiempo
triturado

M00013

%M00013
Tiempo
triturado

R0005

M00010

R
%R00005

%M00010
Selector
manual/autom
atico

9000—PV

15

M00002 **M00010** **Q00001**

%M00002
Pulsador paro
variador

%M00010
Selector
manual/auto
matico

%Q00001
Marcha
bomba

M00010 **M00013**

%M00010
Selector
manual/autom
atico

%M00013
Tiempo
triturado

16 CARGA AGUA

17

M00010 I00005 I00006 **Q00002**

%M00010 Selector manual/automatico | %I00005 Pulsador carga agua | %I00006 Nivel maximo | %Q00002 Carga de agua

M00010 I00008

%M00010 Selector manual/automatico | %I00008 Señal pesaje 1

M00010 **M00012** I00009

%M00010 Selector manual/automatico | %M00012 Fin temporizador carga | %I00009 Señal pesaje 2

18

M00010 I00008 OFDT TENTHS **M00012**

%M00010 Selector manual/automatico | %I00008 Señal pesaje 1 | %M00012 Fin temporizador carga

R00010

9000 PV %R00010

19 AVISOS

20

Q00001 Q00003

%Q00001 Marcha bomba | %Q00003 Optico marcha bomba

21

Q00003 Q00004

%Q00003 Optico marcha bomba | %Q00004 Optico paro bomba

22

Q00002 Q000005

%Q00002 Carga de agua | %Q00005 Optico carga agua

SECTION 4

WPU Validation:

- **Design acceptance**
- **Installation qualification**
- **Operational qualification**

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E-Mail: info@cifa.es

esa MELISSA

DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	FRONT PAGE	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

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DESIGN ACCEPTANCE PROTOCOL
WASTE PREPARATION UNIT

Author	Protocol	Date	SHEET OF REVIEW/ APPROVAL	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

Relation of the persons that edit, check and approve the protocol:

NAME	COMPANY	SIGNATURE	DATE
Enric Vila	CIFA, S.L.		16/06/10
Raúl Moyano	MELISSA PILOT PLANT		16/06/10
Enrique Peiro	MELISSA PILOT PLANT		06/07/10
Arnaud Fossen	MELISSA PILOT PLANT		6/9/10

Relation of the modifications of the protocol:

REVIEW	DESCRIPTION	DATE
00	Creation of the protocol	19-05-2010
01	Orthographic review	21-05-2010
02	Change name of protocol	15-06-2010
03	Orthographic review	07-02-2011
04	Orthographic review	01-05-2011

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	INDEX	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

Relation of all the documents contained in this protocol DQ-WPU-04, with the page corresponding to its initial numbering

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DESIGN ACCEPTANCE PROTOCOL
WASTE PREPARATION UNIT

Author	Protocol	Date	Scope and objective	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

SCOPE AND OBJECTIVE

In agreement with the definition in the Annexe 15 of the GMP of the U.E., the design acceptance constitutes the first stage of the validation of a new or modified equipment or facility.

The object of this design acceptance is the waste preparation unit.

The objective of this design acceptance is to demonstrate that the design of the equipment fulfills the user's specifications.

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	DESCRIPTION	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

DESCRIPTION OF THE EQUIPMENT TO VALIDATE

The supplied equipment and its functioning are described in the attached P&ID ESA-001-A3 in annex 01 and it consists, basically of:

- System buffer composed by a tank in stainless steel AISI-316L of 100 liters of useful capacity, with vibratory sensors, ball for cleanliness and hopper for filling. The tank will be prepared for CIP/SIP's operations and it will have jacket cooling and spy-hole with light.

- System of refrigeration for built-in jacket and with temperature control by means of three way valve and temperature probe.

- System of pipelines of recirculation and unloading, realized in stainless steel AISI-316 and orbital weld. Hook-up by means of clamps.

- System of weighing composed by three load cells, with adding machine, warning screen and flexible piping to reactor to avoid false weight. All this will be mounted in a skid of stainless steel with wheels to facilitate the mobility and positioning in the contiguous room to C-1.

- Dip tube to avoid foam in the recirculation of the product and hopper for feeding of solid in the equipment.

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DESIGN ACCEPTANCE PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** DQ-WPU-04	**Date** 19-05-2010	**ORGANIZATION**	**Page** 1/2	**Version** 04

ORGANIZATION OF THE ACTIVITIES OF ACCEPTANCE

The design acceptance will be carried out by technical personnel that will verify that the criteria of acceptance are fulfilled.

The deviation / deficiencies detected during the execution of the checks that compose this protocol will be registered using the model of record included in the annex of this protocol. The deviations / deficiencies will be assessed as to their criticality..

When the deviations / critical deficiencies have been corrected and the ones considered critical have been addressed by corrective measures, the equipment will be able to be authorized to undergo the tests of the installation protocol.

In this design acceptance the following checks will be made:

Item 1 Previous documents:
It will be verified that this protocol as well as the Validation Master Plan (if it exists) has been approved by MPP.

Item 2 Project documentation
The documentation of CIFA will be checked to verify that it describes adequately the design of the equipment.

Item 3 User's requirements
It will be checked that the documentation of the project contemplates the user's requirements or in this case, the technical specifications.

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DESIGN ACCEPTANCE PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** DQ-WPU-04	**Date** 19-05-2010	**ORGANIZATION**	**Page** 2/2	**Version** 04

ORGANIZATION OF THE ACTIVITIES OF DESIGN ACCEPTANCE

If there is no specific documentation of user's requirements, since in the stage of definition of the project the supplier was incorporating the suggestions formulated by the user, it will be checked that the project has been approved by the user, and that therefore, it can be considered that it contemplates his requirements.

Item 4 Adequacy to regulation of the project
It will be checked that the project contemplates the requirements established by the GMP of the European Union when needed, as well as the other applicable requirements, if any..

Item 5 Deviations / deficiencies
The deviations / deficiencies that are detected will be registered. The design acceptance will be responsible for the evaluation of the deviations/deficiencies and the application of the corrective measures that correspond.

Item 6 Personnel that has intervened in the design acceptance
All personnel that take part in the design acceptance related to the project will be identified and registered.

Item 7 Documentation records
There is a record of the whole documentation that constitutes an indissociable part of this Protocol of design acceptance.

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 1 PREVIOUS REQUIREMENTS	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

ITEM 1 – CHECK OF THE PREVIOUS REQUIREMENTS

Completed the review of:

This DESIGN ACCEPTANCE PROTOCOL of Waste Preparation Unit

Criterion of Acceptance::

"The draft of Design Acceptance Protocol is approved"

RESULT OF THE CHECK	
The draft of this Protocol has been approved, therefore the established acceptance Criterion is satisfied and the Protocol can be executed:	
☑ YES	☐ NO

Observations:

The Validation Master Plan doesn't exist in MPP

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro + Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/7/10

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 2	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010	DOCUMENTATION OF THE PROJECT	1/1	04

ITEM 2 – CHECK OF THE DOCUMENTATION OF THE PROJECT

Documentation of the project:

Title of the document	*Reference*
Oferta técnica y económica de CIFA, S.L.	2.467-D

Criterion of Acceptance::

"The existing documentation describes adequately the characteristics and functions of the equipment"

RESULT OF THE CHECK	
The draft of this Protocol has been approved, the revised documentation defines correctly the design of the equipment and therefore the established acceptance Criterion is fullfied	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro + Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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Consultoría e Instalaciones Farmacéuticas y Alimentarias S.L.
Masia 40-42, local A.
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DESIGN ACCEPTANCE PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** DQ-WPU-04	**Date** 19-05-2010	**ITEM 3** **USER'S REQUIREMENTS**	**Page** 1/2	**Version** 04

ITEM 3 – CHECK OF THE USER'S REQUIREMENTS

Documents:

USER'S REQUIREMENTS	
Title of the document	***Reference***
Technical note (see in the Annex 020) 02	94.31

APPROVAL OF THE PROJECT	
Name of the project:	WASTE PREPARATION UNIT, USER REQUIREMENTS AND TECHNICAL SPECIFICATIONS
Reference of the project:	Melissa Pilot Plant Frame Contract 19445/05/NL/CP Call off Order 3 –compartment 1-Additional characterization phase
Date back of approval of the project:	28/07/09

Criterion of Acceptance::

"The documentation of the project contemplates the user's requirements. The user has approved the project presented by the supplier"

CIFA
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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 3 USER'S REQUIREMENTS	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		2/2	04

RESULT OF THE CHECK

The documentation of the project contemplates the requirements of user and the user has approved the project presented by the supplier:

☑ **YES** ☐ **NO**

Observations:

-The points 1,2,3,4 and 5 are conditioned to the productivity test results (milling size and homogeneity)
-The point 6,is ok, the hopper is removable
-The point 7, weighing platform was installed, so calculation of density is needed in order to comply with the feed composition (technical specifications, page 21, table3)
-The point 8, feasibility of reading 5.000 rpm
-The point 9 and 10, are ok
-The point 11, it's necessary to isolate steam pipe and to conduct the drain of pump drain valve. And replace the drain of bottom valve (damaged)
The finality of the steam should be checked by MPP to guarantee the absence of particles that could damage the stainless steel surface.
-The point 12 and 13, are ok

Quality EP 06.07.10

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro + Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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DESIGN ACCEPTANCE PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** DQ-WPU-04	**Date** 19-05-2010	**ITEM 4** **ADEQUACY REGULATIONS**	**Page** 1/4	**Version** 04

ITEM 4 - CHECK OF THE ADEQUACY OF THE PROJECT TO THE REGULATIONS

Review of regulation / recommendations

In this section are checked both the regulation and the recommendations, applicable for sanitary high purity water systems. In the present case, these recommendations are not applicable unless they coincide with the Technical specifications document or MPP Reference document.

(I) Procedure of correct manufacture (GMP)

Item	*Description*
1.01	The equipment will have the correct design dimensions and location in order to facilitate its operation and maintenance
1.02	The parts of the equipment of production that enter in contact with the product must neither react with the latter, nor absorb it.
1.03	The equipment will be located so that any risk of mistake or pollution is anticipated.
1.04	The surface finish and design of inner parts are optimal for cleanliness.

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(II) Guide to inspections (FDA)

Item	***Description***
2.01	Orbital weld TIG for the union of metallic pipelines and passivation post-installation.
2.02	The system is designed to avoid to overheat the steam, except when the pressure of generation is significantly major than the pressure of use.
2.03	The steam could contain additives (for example inhibitor of the corrosion), and it can deteriorate the equipment.

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

USA: FDA – Recommendations ISPE/ FDA		***Applicable/ Non Applicable***
2.22	Alloys of inert metal such as stainless steel or titanium will be used for the waste preparation unit: Frame, jacket and interiors: 304L o 316L. Conductions of evaporation: 316 /316L. Heat exchangers: 316/ 316L Conductions: 316/ 316L Valves: 316 y Elastomers accepted by FDA (PTFE, EPDM...).	
2.23	The critical instruments must be calibrated. The supplier supplies the certificates of calibration which must include series numbers of the instruments.	
2.24	The selected instruments must be of precision and reliability such that they cover the range of the process	

Criterion of Acceptance::

"The project is adapted to the regulation / recommendations "

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 4 VERIFICATION	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		4/4	04

RESULT OF THE CHECK

The project is adapted both to the regulation and to the applicable recommendations:

☑ YES	☐ NO

Observations:

-Tagging is considered sufficient within the skid, the utilities will be anyway labelled properly.
-Mechanic polishing is compliant, electropolish is not requested.

	REALIZED	CONTROLLED	APPROVED
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Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 5 DEVIATIONS	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

ITEM 5 - REPORTING OF DEVIATIONS / DEFICIENCIES

Reporting of deviations / detected deficiencies:

All the detected deviations are registered. For each of them there will have been completed the attached model "Report of deviations / deficiencies ".

Report Reference	*Content*	*Critical*	*Favourable resolution*
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA

Criterion of Acceptance:
"Deviations / critical deficiencies have not been detected or those who have been detected have been solved satisfactorily"

RESULT OF THE CHECK	
There are no deviations / critical deficiencies, or in case there were some deviations, these have been solved satisfactorily, and the established Criterion of Acceptance is satisfied:	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro + Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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DESIGN ACCEPTANCE PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** DQ-WPU-04	**Date** 19-05-2010	**ITEM 6** **PERSONNEL**	**Page** 1/1	**Version** 04

ITEM 6 - PERSONNEL THAT HAS INTERVENED IN THE DESIGN ACCEPTANCE

Record of the personnel that has intervened in the design acceptance:

Name	*Company /Position*	*Sign*
Enric Vila	CIFA/Director Proyectos	
Raúl Moyano	MELISSA PILOT PLANT	
Enrique Peiro	MELISSA PILOT PLANT	
Arnaud Fossen	MELISSA PILOT PLANT	

Criterion of Acceptance::

"There is a record of all the persons that have intervened in the design acceptance"

RESULT OF THE CHECK	
the Criterion of Acceptance is fulfilled: all the persons who have intervened in the design acceptance have recorded their names on the above list	
☑ **YES**	☐ **NO**
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro + Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 7 DOC. ATTACH	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010		1/1	04

ITEM 7 - DOCUMENTATION ATTACHMENTS

Record of the attached documents:

Denomination	*Reference*	*Num. Page*	*Comments*
Oferta técnica y económica de CIFA, S.L.	2.467-D		
Technical note	94.31		

Criterion of Acceptance::

"All the attached documents have registered to this Protocol of design acceptance"

RESULT OF THE CHECK	
Having registered all the documents that are attached to this Protocol, there is satisfied the Criterion of Acceptance: established:	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro + Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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DESIGN ACCEPTANCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 8	Page	Version
Enric Vila	DQ-WPU-04	19-05-2010	RECORDS	1/1	04

ITEM 8 – MODELS OF RECORD

This record shall be used to trace any deviation when detected.

DEVIATION / DETECTED NON-CONFORMITY						
Reference	Stage of qualification:	☑ DQ	☐ IQ	☐ OQ	☐ PQ	Other :
	Code :					
	Check:					
CORRECTIVE MEASURE CARRIED OUT						
RESULT OF THE CORRECTIVE ACTION						
As a result of the corrective action, the deviation / non-conformity can be considered closed						
		☑ **YES**	☐ **No**			
Observations:						

	REALIZED	CONTROLLED	APPROVED
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Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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DESIGN ACCEPTENCE PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 9	Page	Version
Enric Vila	DQ-WPU-02	19-05-2010	FINAL REPORT	1/1	02

ITEM 9 – FINAL REPORT: APPROVAL

The person(s) signing below certifies that all the verifications mentioned in this protocol were executed and checked and that no (critical) deviation nor critical non conformity was left pending / open

Name	Position	Date	Sign
Enric Vila	CIFA/Director Proyectos	16-06-2010	
ENRIQUE PEIRO	TECHNICAL MANAGER MPP	06/07/10	Enrique Peiro

REVIEW

Certify that after revising the records generated when implementing this protocol, it was completed satisfactorily and that there are no (critical) deviations nor non conformity left pending / open

Name	Position	Date	Sign
Arnaud FOSSEN	Quality Manager MPP	6/9/10	

APPROVAL

Below signatory approves the execution of this protocol

Name	Position	Date*	Sign
ENRIQUE PEIRO	TECHNICAL MANAGER MPP	11.05.11	Enrique Peiro

**** Important! The person who approves the execution of the document will have to record also the date of approval of the execution in the front page***

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THIS SHEET IS LEFT INTENTIONALLY BLANK. THE SPACE IS USED FOR VARIOUS ANNOTATIONS. OTHERWHISE IT IS REMOVED FROM THE PROTOCOL

It's necessary to isolate the steam pipeline and to conduct the drain of ~~/~~ EP pump drain valve, and replace the drain of bottom valve.

23.06.10
EP

Actions performed by CIFA :

- Steam pipeline isolated
- Pump drain valve conducted
- Bottom vave drain collector replaced.

Enrique Peiró

30.06.10

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ANEX 01:
CIFA's OFFER :

Ref. 3008 (Operation Manual)
Ref. 3007 (Validation)
Ref. 2467 (Manufacturing and installation)

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ANEXO 02:
USER'S REQUIREMENTS :

MPP Document "Waste preparation Unit, User requirements and technical specifications" (TN 94.31)

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	FRONT PAGE	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		1/1	04

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	SHEET OF REVIEW/ APPROVAL	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		1/1	04

Relation of the persons that edit, check and approve the protocol:

NAME	COMPANY	SIGNATURE	DATE
Enric Vila	CIFA, S.L.		16/06/10
Raúl Moyano	MELISSA PILOT PLANT		16/06/10
Enrique Peiro	MELISSA PILOT PLANT		06/07/10
Arnaud Fossen	MELISSA PILOT PLANT		6/9/10

Relation of the modifications of the protocol:

REVIEW	DESCRIPTION	DATE
00	Creation of the protocol	19-05-2010
01	Orthographic review	21-05-2010
02	Change name of protocol	15-06-2010
03	Orthographic review	03-03-2011
04	Orthographic review	01-05-2011

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	INDEX	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		1/1	04

Index of all the documents contained in this protocol IQ-WPU-01, with the page corresponding to its initial numbering

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	Scope and objective	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		1/1	04

SCOPE AND OBJECTIVE

The installation qualification constitutes the second stage of the validation of a new or modified equipment or facility.

The present installation qualification is applied to the waste preparation unit.

The object of this protocol is to verify by means of a visual inspection that the equipment has been constructed and installed in agreement with the design specifications, the recommendations of the manufacturer and with the user's requirements.

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 1** **PREVIOUS REQUIREMENTS**	**Page** 1/1	**Version** 04

ITEM 1 – CHECK OF THE PREVIOUS REQUIREMENTS

Objective:
To verify that the design acceptance has been executed and approved and that the protocol of the qualification , which is going to be executed, has been approved.

Criteria of acceptance:

- The design acceptance according to the protocol DQ-WPU-04 has been finished satisfactorily.
- The installation qualification protocol IQ-WPU-04 has been approved.
-

RESULT OF THE CHECK	
The design acceptance has been finished satisfactorily and this protocol has been approved, therefore the criteria of acceptance are fulfilled fully.	
☑ **YES**	☐ **NO**
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	Enrique P.d.V 06/07/10 — 6/9/10

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 2** **RECEIVED DOCUMENTS**	**Page** 1/2	**Version** 04

Item 2 – CHECK OF THE RECEIVED DOCUMENTS

Objective:
To verify that the documentation that installer has received from the supplier is adapted for the operation, the maintenance and the qualification of the equipment.

Procedure:
A list will be made of all the received documents, registering title, code or reference and n º of pages.

Criterion of acceptance:
It is necessary to have of:

- Drawings of the installation: PID, layout, etc.
- Drawings "as built" of all equipment (only for internal IQ).
- Certificates of conformity to specifications and of quality of materials (in contact with the product) of the components and instruments.
- Certificates of calibration of all the instruments of measure.
- Qualification of the welders, of the procedure of welding.
- Documentation relating to the passivation and cleanliness of the equipment.
- Documentation relating to the electrical installation.
- Documentation relating to the test of water tightness of the equipment.
- Instructions of functioning of the system.
- Instructions of functioning of the equipments and instruments of control.
- Instructions of maintenance

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

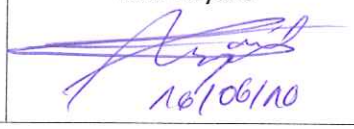
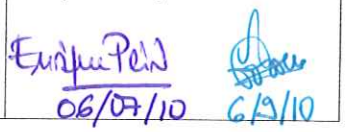
Author	Protocol	Date	ITEM 2	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010	RECEIVED DOCUMENTS	2/2	04

"The existing documentation describes adequately the characteristics and functions of the system"

RESULT OF THE CHECK	
Having checked the suitable documentation, the criteria of acceptance are fulfilled fully.	
☐ YES	☑ NO

Observations:

-The documentation about the flexible pipe is missing
-The calibration certificate of level switch (LSH_1301_01 and LSL_1301_01) are missing
-The electrical drawings are not "as built" drawings

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 3** **CHECK OF THE EQUIPMENT**	**Page** 1/2	**Version** 04

Item 3 – CHECK OF THE EQUIPMENT

Objective:
To verify that the really installed equipment corresponds to the documentation and drawings " as built " supplied by the supplier/installer.

Procedure:
- To identify the documentation and each of the drawings received with n º of protocol, date and the name and signature of the person in charge of verify..
- To check the correspondence between the real installation and the drawing, indicating in this one the differences (preferably in red colour).
- To trace in the record of the check the name and reference number of every drawing used in the check

Criteria of acceptance:
- The documentation and drawings "as built" do not present essential differences, with regard to the design acceptance or if they do, the due justification is available.
- The documentation and drawings "as built " reflect faithfully the reality of the equipment.

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 3 CHECK OF THE EQUIPMENT	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		2/2	04

RESULT OF THE CHECK	
The memory and the drawings "as built " fulfil fully the criteria of acceptance and reflect faithfully the equipment.	
☑ YES	☐ NO

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 4** **COMPONENTS INSTRUMENTS**	**Page** 1/4	**Version** 04

Item 4 - CHECK OF COMPONENTS AND INSTRUMENTS

Objective:
The specifications of the components and installed instruments are the suitable ones

Procedure:
The characteristics of the components, instruments and equipments, verifying the suitability of the materials (that enter in contact with the product), their will be checked location and identification (TAGs).
Three attached lists are made: of the components, instruments and equipments installed with name, brand, model, n º of series, TAG , materials and calibration, certificates.
Photocopies of the certificates will be attached annotating the corresponding TAG.

Criterion of acceptance:
The components, instruments and specified equipments are the installed ones. The materials in contact with the product are adapted for this use.

RESULT OF THE CHECK	
After revising the components, instruments and equipments the criterion of acceptance is fulfilled satisfactorily "	
☑ **YES**	☐ **NO**
Observations:	

	REALIZED	**CONTROLLED**	**APPROVED**
Name	Enric Vila	Raúl Moyano	Enrique Peiro
Sign:			Enrique PEIRO 06/07/10 Arnaud FOSSEN 6/7/10
Date:	16-06-10	16/06/10	

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Item 4 – LIST OF COMPONENTS (1/2)

TAG	DESCRIPTION	BRAND	MODEL	SERIES Nº	CERTIF.
VSL2_1300_01	VESSEL 100 LTS	CIFA	MEL-009-02	MEL-009-02	YES
PV_1301_01	DIAPHRAGM PNEUMATIC VALVE DN-25 TC-1"	ITT	1-C-419-2-0-0-17-AP1009-MET	21246-002-001	YES
HV_1301_01	HAND VALVE R. 1/2 "	GENEBRE	2014 05	-	-
HV_1301_02	HAND VALVE R. 1/2 "	GENEBRE	2014 05	-	-
HV_1302_01	HAND VALVE TC 1"	ANDERSON	ST 195	-	YES
GF_1302_01	FILTER	MILLIPORE	OPTICAP	KTGR04TC3	YES
RV_1302-01	RELIEF VALVE TC 1"	TOSACA	1216C	-	YES
HV_1303_01	HAND VALVE R. 3/4"	GENEBRE	201405	-	-
HV_1303_02	HAND VALVE R. 3/4 "	GENEBRE	201405	-	-
S3V_1303_01	THREE WAYS VALVE	ESBE	VRG-131+ARA652	-	-
RV_1303_01	RELIEF VALVE R.3/4"	SALVADOR ESCODA	ARA11013	-	-
SP_1304_01	SHEAR PUMP	FRISTAM	FSPE 3522/145B	UAB	UAB
HV_1304_01	DIAPHRAGM HAND VALVE DN-65 TC 2 ½"	ITT	2.5-F-419-8-0-0-17-963-M2-MET	21245-001-001	YES
HV_1304_02	DIAPHRAGM HAND VALVE DN-40 TC 1 ½""	ITT	1,5-C-419-2-0-0-17-970-MET	21246-003-001	YES
HV_1304_03	DIAPHRAGM HAND VALVE DN-40 TC 1 ½""	ITT	1,5-C-419-2-0-0-17-970-MET	21246-003-002	YES
HV_1304_04	DIAPHRAGM HAND VALVE DN-40 TC 1 ½""	ITT	1,5-C-419-2-0-0-17-970-MET	21246-003-003	YES

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 4** **COMPONENTS** **INSTRUMENTS**	**Page** 3/4	**Version** 04

Item 4 – LIST OF COMPONENTS (2/2)

TAG	DESCRIPTION	BRAND	MODEL	SERIES Nº	CERTIF.
HV_1305_01	DIAPHRAGM HAND VALVE DN-15 TC ½""	ITT	0.5-8-419-2-0-0-17-18-MET	21246-001-001	YES
HV_1305_02	DIAPHRAGM HAND VALVE DN-40 TC 1 ½""	ITT	1,5-C-419-2-0-0-17-970-MET	21246-003-004	YES
HV_1305_03	DIAPHRAGM HAND VALVE DN-15 TC ½""	ITT	0.5-8-419-2-0-0-17-18-MET	21246-001-002	YES
NOZ_1306_01	SPRAY BALL	NEUMO	TANKO	S40 360º	YES

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	Item 4 COMPONENTS INSTRUMENTS	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		4/4	04

Item 4 – LIST OF INSTRUMENTS

TAG	Description	Brand	Model	Series Nº	Certif.
LSH_1300_01	LEVEL SWITCH	VEGA	VEGASWING S52	16649803	YES
LSL_1300_01	LEVEL SWITCH	VEGA	VEGASWING S52	16649795	YES
PI_1302_01	PRESSURE INDICATOR	MEI	HT STD80	-	YES
PI_1303_01	PRESSURE INDICATOR	MEI	HT STD80	-	YES
TT_1303_01	TEMPERATURE SENSOR	KOSMON	SPT1	36502	YES
LHT_1304_01	SIGHTGLASS LIGHT	MÜLLER	BKVLR	-	-
WT_1307_01	WEIGHT CELL	UTICELL	DAT	500	YES
WT_1307_02	WEIGHT CELL	UTICELL	DAT	500	YES
WT_1307_03	WEIGHT CELL	UTICELL	DAT	500	YES

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 5** **CLEANLINESS PASSIVATION**	**Page** 1/1	**Version** 04

Item 5 - DOCUMENTATION ON CLEANLINESS AND PASSIVATION

Objective:
The equipment has been cleaned and treated chemically, in agreement with approved procedures.

Procedure:
To verify the documentation of the tests and that it includes all the aspects indicated in the protocol of the test.

Criterion of acceptance:
The examined documentation is complete and the circuit has been passivated and cleaned suitably.

RESULT OF THE CHECK	
The received documentation fulfils satisfactorily the criterion of acceptance "	
☑ **YES**	☐ **NO**
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro Arnaud FOSSEN
Sign:			Enrique Peiro
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 6** **HYDRAULIC TEST**	**Page** 1/1	**Version** 04

Item 6 - DOCUMENTATION OF THE WATER TIGHTNESS OF THE CIRCUIT

Objective:
The equipment does not have leaks at a pressure superior to the working pressure.

Procedure:
The documentation of the test will be verified so that the documentation includes all the aspects indicated in the protocol of test.

Criterion of acceptance:
The examined documentation is complete and leaks have not been detected.

RESULT OF THE CHECK	
The received documentation fulfills satisfactorily the criterion of acceptance "	
☑ **YES**	☐ **NO**
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 7 DEVIATIONS	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		1/1	04

Item 7 - REPORTING OF DEVIATIONS / DEFICIENCIES

Reporting of deviations / detected deficiencies:

All the detected deviations are registered. For each of them there will have been completed the attached model "Report of deviations / deficiencies ".

Report Reference	*Content*	*Critical*	*Favourable resolution*
IQ-WPU-02 Item 2	Missing documentation	☐ Yes / ☑ No	☑ Yes / ☐ No / ☐ NA
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA

Criterion of Acceptance:

"Deviations / critical deficiencies have not been detected or those who have been detected have been solved satisfactorily "

RESULT OF THE CHECK	
There are no deviations / critical deficiencies, or in case there were some deviations, these have been solved satisfactorily, and the established Criterion of Acceptance is satisfied:	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/09/10 6/9/10

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INSTALLATION QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** IQ-WPU-04	**Date** 19-05-2010	**ITEM 8** **MODELS OF RECORDS**	**Page** 1/1	**Version** 04

Item 8 – MODELS OF RECORD

This sheet uses in every deviation detected in any check and write later of the sheet of corresponding check.

DEVIATION / DETECTED NON-CONFORMITY						
Reference	Stage of qualification:	☐ DQ	☑ IQ	☐ OQ	☐ PQ	Other :
	Code:	IQ-WPU-02				
	Check:	***OK***				
Missing documentation : as built and certificates						
CORRECTIVE MEASURE CARRIED OUT						
Delivery of documentation						
RESULT OF THE CORRECTIVE ACTION						
Solved Ok						
As a result of the corrective action, the deviation / non-conformity can be considered closed						
	☐ **YES**	☑ **No**				
Observations: *Calibration certificates are not available for switches, only conformity certificates (delivered)*						

	REALIZED	**CONTROLLED**	**APPROVED**
Name	Enric Vila	Raúl Moyano	Enrique Peiro / A. Possen
Sign:			Enrique Peiro 06/07/10 — 6/7/10
Date:	16-06-10	06/07/10	

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INSTALLATION QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 9 FINAL REPORT	Page	Version
Enric Vila	IQ-WPU-04	19-05-2010		1/1	04

ITEM 9 – FINAL REPORT: APPROVAL

The person(s) signing below certifies that all the verifications mentioned in this protocol were executed and checked and that no (critical) deviation nor critical non conformity was left pending / open

Name	Position	Date	Sign
Enric Vila	CIFA/Director Proyectos	16-06-2010	

REVIEW

Certify that after revising he records generated when implementary this protocol, it was completed satisfactorily and that there are no (critical) deviations nor non conformity left pending / open

Name	Position	Date	Sign
Arnaud FOSSEN	Quality Manager	6/9/10	

APPROVAL

Below signature approves the execution of this protocol

Name	Position	Date*	Sign
ENRIQUE PEIRO	TECHNICAL MANAGER MPP	11.05.11	

**** Important! The person who approves the execution of the document will have to record also the date of approval of the execution in the front page***

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THIS SHEET IS LEFT INTENTIONALLY BLANK. THE SPACE IS USED FOR VARIOUS ANNOTATIONS. OTHERWHISE IT IS REMOVED FROM THE PROTOCOL

- The documentation of flexible piping is missing
- The calibration certificate of level switch is missing
- The electrical drawings are not "as built" as drawings
- Copy of PLC program is not delivered.

23.06.10

EP

- Documentation described above has been properly delivered (in case of switches, only conformity certificates are available).

30.06.10

Enrique Peiró

CIFA

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ANEX 01:
FINAL DOCUMENTATION BY CIFA (WPU Assembly Datapackage)

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	FRONT PAGE	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

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Author	Protocol	Date	SHEET OF REVIEW/ APPROVAL	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

Relation of the persons that edit, check and approve the protocol:

NAME	COMPANY	SIGNATURE	DATE
Enric Vila	CIFA, S.L.		16/06/10
Raúl Moyano	MELISSA PILOT PLANT		16/06/10
Enrique Peiro	MELISSA PILOT PLANT		06/07/10
Arnaud Fossen	MELISSA PILOT PLANT		6/9/10

Relation of the modifications of the protocol:

REVIEW	DESCRIPTION	DATE
00	Creation of the protocol	19-05-2010
01	Orthographic review	21-05-2010
02	Change name of protocol	15-06-2010
03	Orthographic review	03-03-2011
04	Orthographic review	01-05-2011

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	INDEX	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

Index of all the documents contained in this protocol OQ-WPU-04, with the page corresponding to its initial numbering

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	Scope and objective	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

SCOPE AND OBJECTIVE

The operational qualification constitutes the third stage of the validation of a facility, system or new or modified equipment.

The present operational qualification is applied to the waste preparation unit.

The object of this protocol is to establish by means of tests, and measurements that the equipment works consistently in agreement with the functional specifications when it is operated according to the user's instructions / specifications.

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OPERATIONAL QUALIFICATION PROTOCOL WASTE PREPARATION UNIT					
Author Enric Vila	**Protocol** OQ-WPU-04	**Date** 19-05-2010	**Operatives character.**	**Page** 1/1	**Version** 04

OPERATIONAL CHARACTERISTICS

Critical parameters for Quality

The equipment is designed to weigh, to maintain at a certain temperature and to crush vegetables down to a particle size determined by the client. The equipment will have to supply the crushed feed that fulfills the following specifications of "Critical parameters for quality ":

Figure 1. – Waste Preparation Unit specifications

Stage	*Specifications*	*Reference*
Productivity test	To obtain a size of particles inferior to 2 mm, homogeneousness in the mixture and the processing in cold	- The sample points - The shear pump, but the sample of the milling machine and the capacity of the shear pump chosen for the client of reducing the particles - Dip tube to avoid foams

Controls:

The system of control of the equipment WPU has the following elements of control and / or instrumentation:

- Level switch LSH_1301_01 ;
- Level switch LSH_1301_02 ;
- Temperature probe TT_1303_01;
- PLC
- Variable Speed Drive

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	Item 1 Prerequisites	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

Item 1 – CHECK OF THE PREVIOUS REQUIREMENTS

Objective:
To verify that installation qualification has been executed and approved and that the protocol of the operational qualification , which is going to be executed, has been approved.

Criteria of acceptance:
- The installation qualification according to the protocol IQ-WPU-04 has been finished satisfactorily.
- The operational qualification protocol OQ-WPU-04 has been approved.

RESULT OF THE CHECK	
The installation qualification has been finished satisfactorily and this protocol has been approved, which means that the criteria of acceptance are fulfilled fully.	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro /Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	Item 2 Functioning	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/7	04

Item 2 – CHECK OF THE FUNCTIONING

Objective:
To verify the functioning of the operations, indicators, elements of control, automatisms and alarms of the equipment WPU

Procedure:
Following the indications of the documentation provided by the supplier and installer CIFA, start the equipment WPU and verify that all the operations, indicators, elements of control, automatisms and alarms work correctly. The attached list is made, where there are traced each and every of the realized checking. In the ANNEXE 01 are available the operating modes, as well as the alarms, events and interlocks..The sequences of the operating modes and alarms, events and interlocks will be verified individually.

Criterion of acceptance:
The operations, indicators, elements of control, automatisms and alarms of the installation work according to the instructions of the supplier.

RESULT OF THE CHECK	
That, when work all the operations, indicators, elements of control, automatisms and alarms in agreement with the specifications of the supplier, the criterion of acceptance is satisfied established:	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
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Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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Item 2- CHECK LIST
(Digital and analogical, inputs and outputs in the PLC)

TAG	E L E M E N T	WORKS		ALARM
		YES / NO	VALUE	YES / NO
INPUT 0.0.1	START VARIABLE SPEED DRIVE	YES	-	-
INPUT 0.0.2	STOP VARIABLE SPEEED DRIVE	YES	-	-
INPUT 0.0.3	ALARM VARIABLE SPEED DRIVE	YES	-	-
INPUT 0.0.4	LEVEL SWITCH LSL_1301_01	YES	-	-
INPUT 0.0.5	OPEN VALVE PV_1301_01	YES	-	-
INPUT 0.0.6	LEVEL SWITCH LSH_1301_01	YES	-	-
INPUT 0.0.7	RESERVE	YES	-	-
INPUT 0.0.8	WEIGHT SIGNAL 1	YES	-	-
INPUT 0.0.9	WEIGHT SIGNAL 20	YES	-	-
INPUT 0.0.10	MANUAL SELECTOR / AUTOMATIC	YES	-	-
INPUT 0.0.11	RESERVE	-	-	-
INPUT 0.0.12	RESERVE	-	-	-
INPUT 0.0.13	RESERVE	-	-	-

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Item 2- CHECK LIST
(Digital and analogical, inputs and outputs in the PLC)

TAG	ELEMENT	WORKS		ALARM
		YES /NO	VALUE	YES / NO
OUTPUT 1.0.0	START VARIABLE SPEED DRIVE	YES	-	-
OUTPUT 2.0.0	OPEN VALVE PV_1301_01	YES	-	-
OUTPUT 3.0.0	START VARIABLE SPEEED DRIVE	YES	-	YES
OUTPUT 4.0.0	STOP VARIABLE SPEEED DRIVE	YES	-	YES
OUTPUT 5.0.0	START LOAD WATER	YES	-	YES
OUTPUT 6.0.0	RESERVE	YES	-	-
OUTPUT 7.0.0	RESERVE	YES	-	-
OUTPUT 8.0.0	RESERVE	YES	-	-
OUTPUT 9.0.0	RESERVE	YES	-	-
OUTPUT 10.0.0	RESERVE	YES	-	-

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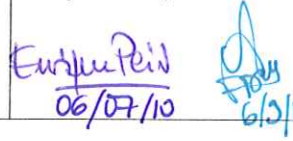
Item 2 CHECK OF THE MANUAL SEQUENCE

Objective:
Checking that the manual sequence of the WPU works correctly.

Procedure:
The sequence of manual mode according to the control system procedure, documents each of the phases in the annex to this check.

Criterion of acceptance:
The manual sequence is realized according to the foreseen procedure.

RESULT OF THE CHECK	
When the manual sequence is implemented according to the established control system procedure, the system works accordingly to the established procedure of the control system and the criterion of acceptance is satisfied .	
☑ **YES**	☐ **NO**
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/7/10

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Item 2 CHECK OF THE MANUAL SEQUENCE

Prerequisites: opened utilities, valves of service opened

DESCRIPTION	WORKS	
	YES	NO
Put to zero the weight cells (close valve HV_1305_02)	X	
Check the jacket temperature (<14ºC)	X	
Press load water button until whished level (<LSL_1301_01)	X	
Until exceeding the minimum level the pump doesn't work	X	
When pump starts can be stopped using the stop button	X	
The emergency stop button works ok	X	
When water arrives at maximum level, the pump doesn't work	X	
When arrive to the wished level it can be start the pump	X	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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WASTE PREPARATION UNIT

Item 2 CHECK OF THE AUTOMATIC SEQUENCE

Objective:
Checking that the automatic sequence of the WPU works correctly.

Procedure:
There begins the sequence of automatic mode according to the procedure of the system of control, receiving documents each of the phases in the annex to this check.

Criterion of acceptance:
The automatic sequence is realized according to the foreseen procedure.

RESULT OF THE CHECK	
when the automatic sequence is activated, the system works accordingly to the established procedure of the control system and the criterion of acceptance is satisfied	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	16/06/10	06/07/10 6/9/10

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Item 2 CHECK OF THE AUTOMATIC SEQUENCE

Prerequisites: opened Supplies, valves of service opened

DESCRIPTION	WORKS	
	YES	NO
Put to zero the weight cells, the HV_1305_02 is closed (1)	X	
Select set point 1 & 2 in the weight cell display (30,53)	X	
Check the temperature in the jacket tank (13,2ºC,set point 10ºC) (1)	X	
Select the automatic operation	X	
Automatically open the valve (HV_1301_01) and load water SP1	X	
Stop the valve and it counts the time to load product	X	
Automatically open the valve and load water SP2	X	
Start the pump and it counts the time to crush	X	
When the time is over the pump stop	X	
(1) Selected directly in the regulator control (start/stop relais was not the adequate one)		X

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			6/9/10
Date:	16-06-10	16/06/10	06/09/10

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WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 4 DEVIATIONS	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

Item 4 - RELATION OF DEVIATIONS / DEFICIENCIES

Objective:
To register the deviations or deficiencies detected in the checks.

Procedure:
For every deviation or detected deficiency the corresponding record will have been completed, photocopying the item 4 all the times be necessary, annexing it to the corresponding check and relating her in the following table.

Report Reference	*Content*	*Critical*	*Favourable resolution*
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA
		☐ Yes / ☐ No	☐ Yes / ☐ No / ☐ NA

Criterion of Acceptance:
There are no deviations or critical deficiencies in the functioning of the equipment WPU.

RESULT OF THE CHECK.	
There are no deviations / critical deficiencies, or in case there were some deviations, these have been solved satisfactorily, and the established Criterion of Acceptance is satisfied:	
☑ YES	☐ NO
Observations:	

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	06/07/10	06/07/10 6/9/10

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esa MELISSA

OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 5 RECORDS	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

Item 5 MODELS OF RECORD

This sheet uses in every diversion detected in any check and write later of the sheet of corresponding check.

DEVIATION / DETECTED NON-CONFORMITY						
Reference	Stage of qualification:	☐ DQ	☐ IQ	☑ OQ	☐ PQ	Other :
	Code :	OQ-WPU-02 Item2				
	Check:	*OK*				
The selector of jacket refrigeration doesn't work						
CORRECTIVE MEASURE CARRIED OUT						
Change the temperature regulator to have a start/stop functional						
RESULT OF THE CORRECTIVE ACTION						
As a result of the corrective action, the deviation / non-conformity can be considered closed						
	☐ **YES**	☑ **No**				
Observations:						

	REALIZED	CONTROLLED	APPROVED
Name	Enric Vila	Raúl Moyano	Enrique Peiro / Arnaud Fossen
Sign:			
Date:	16-06-10	06/07/10	06/07/10 6/9/10

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OPERATIONAL QUALIFICATION PROTOCOL

WASTE PREPARATION UNIT

Author	Protocol	Date	ITEM 6 FI NAL REPORT	Page	Version
Enric Vila	OQ-WPU-04	19-05-2010		1/1	04

ITEM 6 – FINAL REPORT: APPROVAL

The person(s) signing below certifies that all the verifications mentioned in this protocol were executed and checked and that no (critical) deviation nor critical non conformity was left pending / open

Name	Position	Date	Sign
Enric Vila	CIFA/Director Proyectos	16-06-2010	

REVIEW

Certify that after revising the records generated when implementing this protocol, it was completed satisfactorily and that there are no (critical) deviations nor non conformity left pending / open

Name	Position	Date	Sign
Arnaud FOSSEN	QSE Manager	6/9/2010	

APPROVAL

Below signature approves the execution of this protocol

Name	Position	Date*	Sign
ENRIQUE PEIRO	MPP TECH. MANAGER	11.05.11	
Arnaud Fossen	MPP Quality Manager		

**** Important! The person who approves the execution of the document will have to record also the date of approval of the execution in the front page***

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THIS SHEET IS LEFT INTENTIONALLY BLANK. THE SPACE IS USED FOR VARIOUS ANNOTATIONS. OTHERWHISE IT IS REMOVED FROM THE PROTOCOL

- The User Manual is missing.
- It's necessary to install a flow detector
- It's necessary to introduce the temperature signal in the PLC
- Check the PLC program and the electrical installation: the emergency stop system should not stop the PLC.

30.06.10 EP

Actions implemented by CIFA:

- Users Manual delivered
- Temperature signal can be transferred to the PLC once the adequate start/stop relais had been installed.
- Emergency stop repaired: PLC and low tension is not affected by the emergency stop.
- Flow detector: not critical.

15/07/10
Enrique Peiró

A dedicated demonstration test to validate the efficiency of the milling process was performed by the ~~ya~~ MPP and documented separately (see page 5 of the present OQ-WPU-04 for further details). 15/07/10
Enrique Peiró

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ANEX 01:
USER MANUAL BY CIFA

SECTION 5

WPU Validation: evaluation of mixing efficiency in the WPU (Homogeneity tests)

1. **Scope**
2. **First homogeneity test**
3. **Second test in real conditions**
4. **Proposals for improvement**

1. Scope

The design of the WPU did not include an agitator, as the FRISTAM pump was expected to provide enough capacity of mixing during the grinding operations, and this simplified the hardware and reduced considerably the cost of the unit.

In order to provide adequate mixing when recirculating the content of the vegetable mixture in the WPU, a dip tube was provided in the vessel that allowed to reintroduce the outlet of the pump again into the vessel. The total length of this tube and then the part of the tube that should be immersed in the vegetables mixture was discussed, in order to provide the best mixing efficiency and to avoid the potential accumulation of lighter particles in the surface.

2. First Homogeneity Test (25/05/10):

It was decided to test two different configurations (shown in Figure 1), that is the initial one with the dip tube immersed 19 cm in the mixture, or an alternative one with the tube only immersed 5 cm, this was being potentially more effective to create turbulences in the top part of the mixture and avoid accumulation of the small particles in its surface.

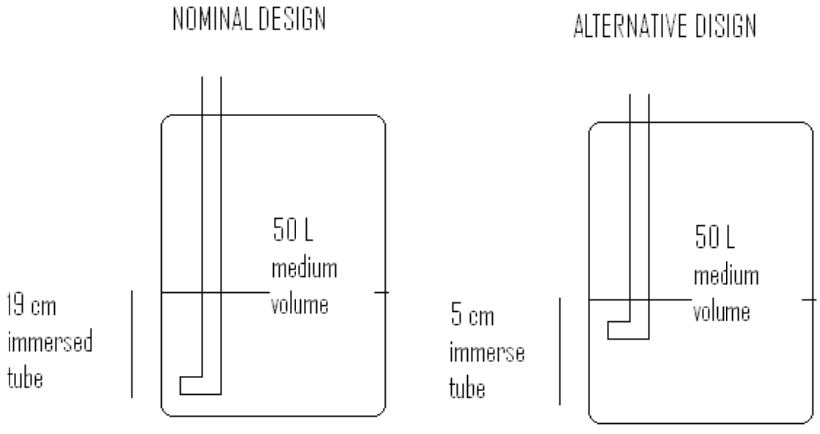


Figure 1. Tested configurations for dip-tube length in the WPU in Test 1.

2.1 Test Conditions:

a) All manual valves 100% open except drain valve, closed
b) Mixture: 10 Kg of vegetable mixture + 40 Kg of water
c) Tube outlet oriented tangentially with the vessel wall
d) Final reduction of the recirculation valve to 50% (at 15 min) for the new design
e) 50 Hz of the FRISTAM pump during the whole test except for the nominal design, where the velocity was increased to 83 Hz (from 10 to 15 min)
f) Samples taken at 1, 3, 5, 10 and 15 min of milling, both from the top and from the bottom (sampling port), as described in Table 1:

	Alternative design: 5 cm inmersed tube		Nominal design: 19 cm immersed tube	
TIME with pump ON (minutes)	BOTTON (sampling port)	TOP (surface)	BOTTON (sampling port)	TOP (surface)
1	Test1—M1	Test1—M1 (TOP)	Test2—M1	Test2—M1 (TOP)
3	Test1—M2	Test1—M2 (TOP)	Test2—M2	Test2—M2 (TOP)
5	Test1—M3	Test1—M3 (TOP)	Test2—M3	Test2—M3 (TOP)
10	Test1—M4	Test1—M4 (TOP)	Test2—M4	Test2—M4 (TOP)
15	Test1—M5	Test1—M5 (TOP)	Test2—M5	Test2—M5 (TOP)

Table 1. Sampling performed along Homogeneity Test 1

The samples highlighted in blue were sent to Centro de Ciencias Medioambientales (CSIC, Madrid) fro the particle size determination, using the equipment Mastersizer S (MALVERN INSTRUMENTS Ltd., England), being able of measure particle size ranges up to 3 mm (further description in TN94.32). The results are

The samples were measured with the Mastersizer S, red laser, wavelength 633 nm, by Fraunhofer and Mie method in wet, lens 1000 mm (range 4 µm – 3500 µm) in water. There were carried out 3 measurements of 5.000 readings each in 10 seconds.

2.2 Test Results:

The average of the readings performed with the Mastersizer was calculated and is shown in the graphics (Annex 1). Figure 2 shows the % of volume of particles higher than the specified value for the vegetable mixture (2 mm).

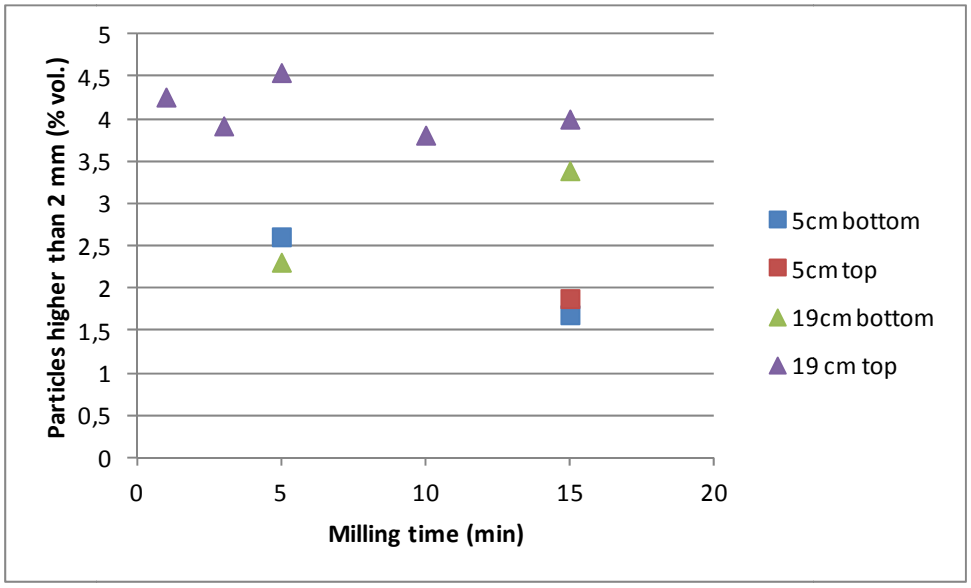


Figure 2. % of volume of particles higher than 2 mm along the milling time in the two design configurations of the dip tube.

2.3 Test Conclusions:

From the observation of Figure 2, several conclusions can be deduced :

a) More than 95% of the particles get lower than the specified value all along the milling process for the two configurations of the dip tube.
b) The relevance of an increase in the milling time is questionable, as the reduction in the particle size is not significant from 1 to 15 min.
c) In average, the % of particles out of specifications for the alternative configuration of the dip tube (5 cm submerged) is strongly reduced with respect to the nominal configuration.

Taking into account these results, the alternative design configuration of the dip tube was selected and the tube was installed accordingly.

3. Second Test in real conditions (21/06/10)

A second test in the nominal design was organized (See Figure 3), in order to check as well two important parameters, both regarding the homogeneity of the mixture and the potential heating of the mixture along the milling operation. This test was performed with a real mixture including as well feces.

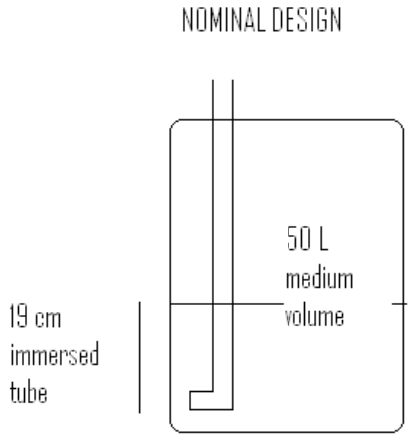


Figure 3. Tested configuration for dip-tube length in the WPU in Test 2.

3.1 Test Conditions:

g) All manual valves 100% open except drain valve, closed
h) Mixture: 8,2 Kg of vegetable mixture + 44,4 Kg of water + 0,4 Kg fecal material. Total weight = 53 Kg.
i) Tube outlet oriented tangentially with the vessel wall
j) Velocity of the FRISTAM pump = 50 Hz during the whole test.
k) Samples taken at 1, 3, 5, 10 and 15 min of milling, both from the top and from the bottom (sampling port), as shown in Table 2:

TIME with pump ON (minutes)	BOTTON (sampling port)	TOP (surface)
1	Test2—M1	Test2—M1 (TOP)
5	Test2—M2	Test2—M2 (TOP)
10	Test2—M3	Test2—M3 (TOP)
15	Test2—M4	Test2—M4 (TOP)

Table 2. Sampling performed along Homogeneity Test 2

pH and Temperature were measured in all of the samples.

3.2 Test Procedure:

l) Selection of Auto Mode in the cabinet of the WPU
m) Automatic filling of 30 Kg of water into the vessel
n) Add the vegetables (8,2 Kg) and the feces (0,4 Kg)
o) Wait the defrosting time (15 minutes programmed in principle, but 100 minutes more were needed)
p) Add water to arrive to the 53 Kg programmed
q) Initial temperature of the liquid before milling: 12,3 ºC
r) Start milling time (15 minutes), and take the corresponding sample

3.3 Test Results:

The results of pH and Temperature determination are shown in Table 3 and Figure 4 below:

BOTTON	M1	M2	M3	M4
Temperature	17.5	18.1	18.9	19.9
PH	6.46	6.69	6.61	6.59

TOP	M1 (TOP)	M2 (TOP)	M3 (TOP)	M4 (TOP)
Temperature	17.3	17.9	18.7	19.7
PH	6.51	6.38	6.53	6.60

Table 3. Off-line measurements performed along Homogeneity Test 2

The final temperature of the liquid after milling was 19,3 ºC (temperature probe in the WPU).

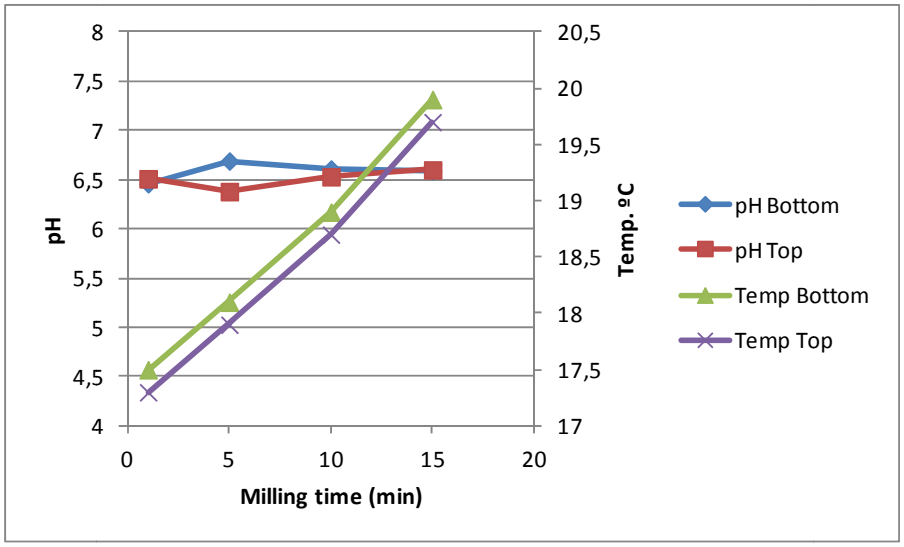


Figure 4. Evolution of temperature and pH along the milling process in Homogeneity Test2.

3.4 Test Conclusions:

As it can be observed in Figure 3, there were no significant differences between top and bottom measurements along the milling process, and in fact the pH was kept quite constant along the period of milling.

Regarding the temperature evolution, some observations should be considered:

a) The off-line measured temperature after 1 min of milling is already quite higher than the on-line temperature at the start of the test. This is probably due to a non homogenous distribution of temperature in the initial mixture (on-line probe is located close to the cooling jacket, and there is not agitation before the start of the pump). Once the pump starts, the presumably warmer mixture content is homogenized and a higher temperature is observed after that.
b) The temperature profile shows a slightly (0,2 ºC) higher temperature in the bottom samples respect to the top ones. This is probably due to the fact that the bottom sampling port is located in the (not isolated) transfer pipe between the vessel and the pump, near the pump, whereas the top sample is taken from the tank directly.
c) The maximum temperature reached after the established milling time is anyway lower than room temperature.

Anyway, the main conclusion is that he differences observed in temperature and pH along the established milling time is acceptable for the process, as on one side pH doesn't show any significant change that could mean an impact in the quality of the feed, and on the other side

the temperature of the mixture remains under room temperature conditions, being acceptable for the operations of transfer to the influent tank, where it exists a dedicated cooling.

4. Proposals for hardware improvement:

Taking into account the results of the tests previously described, some proposal for improvement in the WPU design were identified:

- To install a deflector in the bottom of the mixing vessel in order to reduce the vortex effect during the recirculation process caused by the high speed of recirculation provided by the shear pump effect (see Figure 5). This vortex effect impacts as well the correct measurement of the existing level sensor.

Figure 5: Vortex effect created by the shear pump impulsion of the mixture within the vessel during the milling process.

- To change the location or install an additional switch for the protection of the shear pump to be located in a lower position inside the vessel, as the current one is installed at 46L of volume, being compatible with the preparation of 50L mixture, but not smaller batches that are frequently required.
- To connect the temperature probe to the PLC in order to create strategies of control of the milling process based on the temperature, if considered critical in future.
- To evaluate the implementation of an strategy of mixture transfer based on compressed air vs transfer based on the shear pump impulsion, in order to prevent disturbances created by the shear pump on the recirculation pump of the C1 influent tank during the transfer operation.
- To provide isolation to the process pipelines in order to avoid condensation (quite common due to the initial low temperature of the mixture) that can fall over some electrical components.
- To evaluate the alternative of installing an agitator in the recirculation vessel, to provide homogeneity and temperature control of the mixture not linked to the use of the shear pump (for ex. for maintenance of the mixture in cold during some hours before use).

ANNEXES

ANNEX1 : Granulometric analysis of WPU mixture samples (CCMA, CSIC, Madrid)

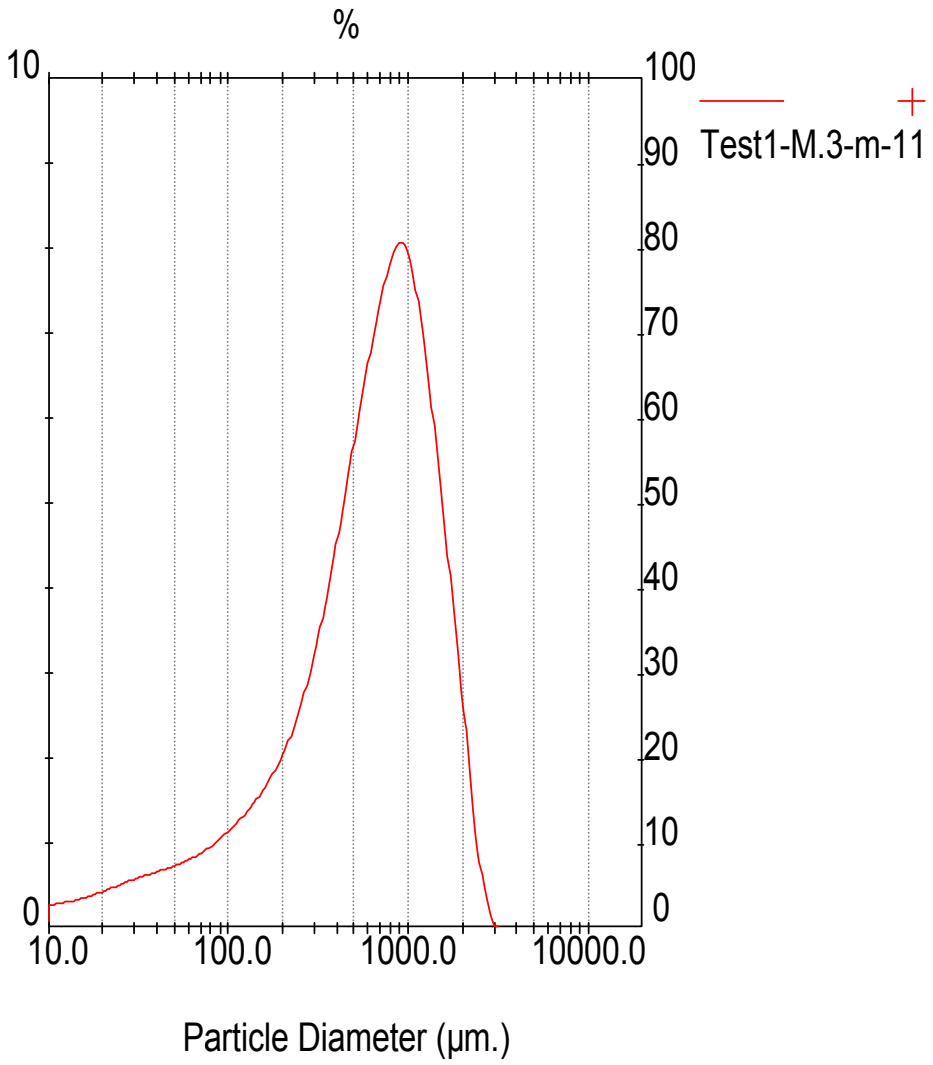
Result: Histogram Table

ID: Test1-M.3-m	Run No: 11	Measured:
File: PEIRO-2	Rec. No: 12	Analysed: 26/5/2010 10:33
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 18.7 %
Presentation: 3OHD	Analysis: Polydisperse		Residual: 3.222 %
Modifications: None			

Conc. = 0.0646 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0375 m^2/g
Distribution: Volume	D[4, 3] = 745.91 um	D[3, 2] = 160.05 um
D(v, 0.1) = 95.17 um	D(v, 0.5) = 654.35 um	D(v, 0.9) = 1518.08 um
Span = 2.175E+00	Uniformity = 6.652E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.22	120.7	0.60	647.4	3.15
4.48	0.04	24.05	0.23	129.1	0.63	692.4	3.28
4.79	0.05	25.73	0.24	138.0	0.66	740.5	3.39
5.13	0.07	27.51	0.25	147.6	0.70	792.0	3.48
5.48	0.08	29.43	0.26	157.9	0.74	847.1	3.54
5.87	0.09	31.47	0.27	168.9	0.79	905.9	3.55
6.27	0.09	33.66	0.28	180.6	0.84	968.9	3.49
6.71	0.10	36.00	0.29	193.1	0.89	1036.2	3.37
7.18	0.11	38.50	0.29	206.6	0.95	1108.3	3.21
7.67	0.11	41.18	0.30	220.9	1.02	1185.3	3.02
8.21	0.12	44.04	0.31	236.3	1.10	1267.7	2.81
8.78	0.12	47.10	0.32	252.7	1.19	1355.8	2.57
9.39	0.12	50.37	0.33	270.3	1.29	1450.0	2.32
10.04	0.13	53.88	0.34	289.1	1.40	1550.8	2.07
10.74	0.13	57.62	0.35	309.1	1.52	1658.6	1.79
11.49	0.13	61.63	0.37	330.6	1.65	1773.9	1.55
12.28	0.14	65.91	0.38	353.6	1.79	1897.2	1.30
13.14	0.14	70.49	0.40	378.2	1.94	2029.1	1.01
14.05	0.15	75.39	0.42	404.5	2.09	2170.1	0.70
15.03	0.16	80.63	0.44	432.6	2.25	2320.9	0.44
16.07	0.17	86.23	0.46	462.7	2.41	2482.2	0.27
17.19	0.17	92.23	0.48	494.8	2.56	2654.8	0.15
18.38	0.18	98.64	0.51	529.2	2.72	2839.3	0.04
19.66	0.20	105.5	0.54	566.0	2.87	3036.6	0.00
21.03	0.21	112.8	0.56	605.3	3.01	3247.7	0.00
22.49		120.7		647.4		3473.5	



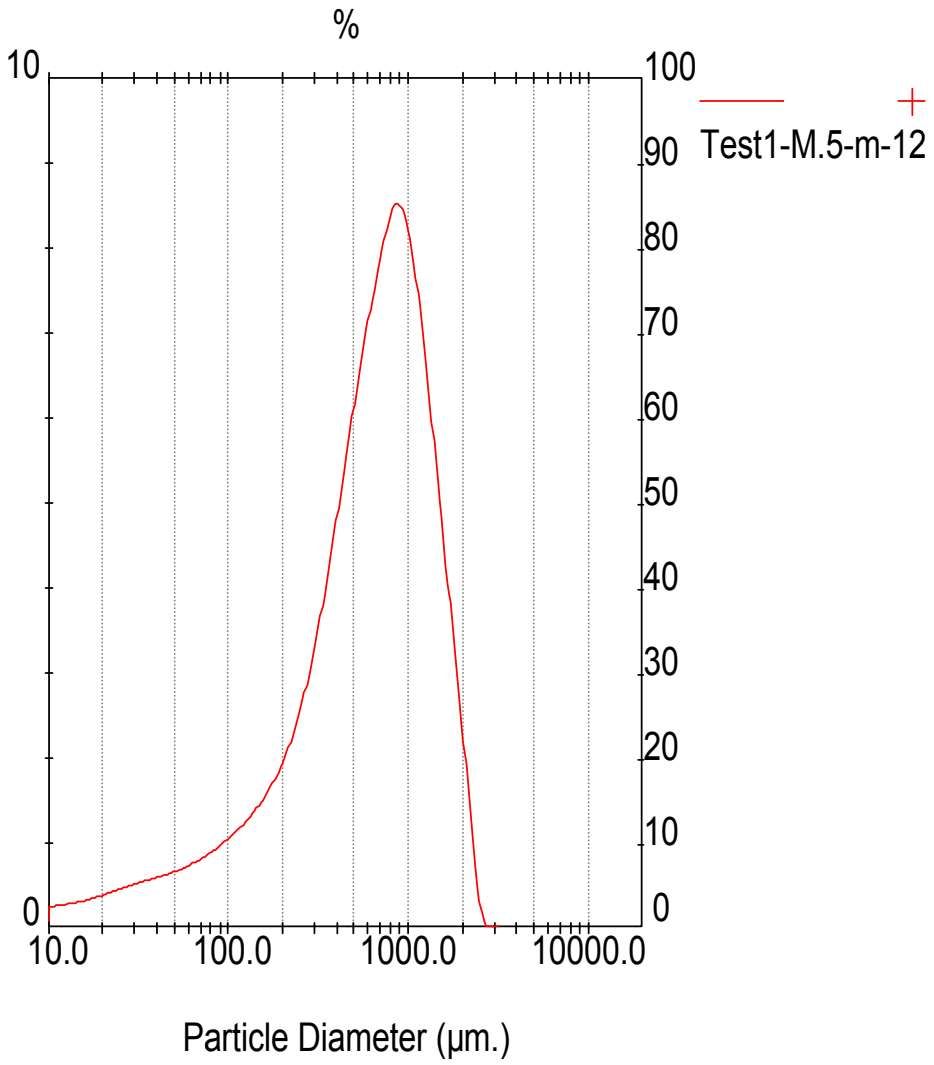
Result: Histogram Table

ID: Test1-M.5-m	Run No: 12	Measured:
File: PEIRO-2	Rec. No: 13	Analysed: 26/5/2010 10:03
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 20.0 %
Presentation: 3OHD	Analysis: Polydisperse		Residual: 1.563 %
Modifications: None			

Conc. = 0.0834 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0355 m^2/g
Distribution: Volume	D[4, 3] = 728.70 um	D[3, 2] = 168.86 um
D(v, 0.1) = 107.31 um	D(v, 0.5) = 650.65 um	D(v, 0.9) = 1449.06 um
Span = 2.062E+00	Uniformity = 6.264E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.20	120.7	0.55	647.4	3.37
4.48	0.04	24.05	0.21	129.1	0.58	692.4	3.50
4.79	0.05	25.73	0.21	138.0	0.62	740.5	3.64
5.13	0.06	27.51	0.22	147.6	0.65	792.0	3.73
5.48	0.07	29.43	0.23	157.9	0.69	847.1	3.76
5.87	0.08	31.47	0.24	168.9	0.74	905.9	3.72
6.27	0.09	33.66	0.25	180.6	0.79	968.9	3.61
6.71	0.09	36.00	0.26	193.1	0.85	1036.2	3.45
7.18	0.10	38.50	0.27	206.6	0.92	1108.3	3.25
7.67	0.10	41.18	0.27	220.9	1.00	1185.3	3.01
8.21	0.11	44.04	0.28	236.3	1.09	1267.7	2.76
8.78	0.11	47.10	0.29	252.7	1.19	1355.8	2.48
9.39	0.11	50.37	0.30	270.3	1.30	1450.0	2.20
10.04	0.12	53.88	0.31	289.1	1.43	1550.8	1.93
10.74	0.12	57.62	0.32	309.1	1.57	1658.6	1.65
11.49	0.12	61.63	0.34	330.6	1.72	1773.9	1.39
12.28	0.13	65.91	0.35	353.6	1.88	1897.2	1.12
13.14	0.13	70.49	0.37	378.2	2.05	2029.1	0.83
14.05	0.14	75.39	0.39	404.5	2.23	2170.1	0.55
15.03	0.14	80.63	0.41	432.6	2.41	2320.9	0.27
16.07	0.15	86.23	0.43	462.7	2.59	2482.2	0.04
17.19	0.16	92.23	0.45	494.8	2.76	2654.8	0.00
18.38	0.17	98.64	0.47	529.2	2.93	2839.3	0.00
19.66	0.18	105.5	0.50	566.0	3.09	3036.6	0.00
21.03	0.19	112.8	0.52	605.3	3.23	3247.7	0.00
22.49		120.7		647.4		3473.5	



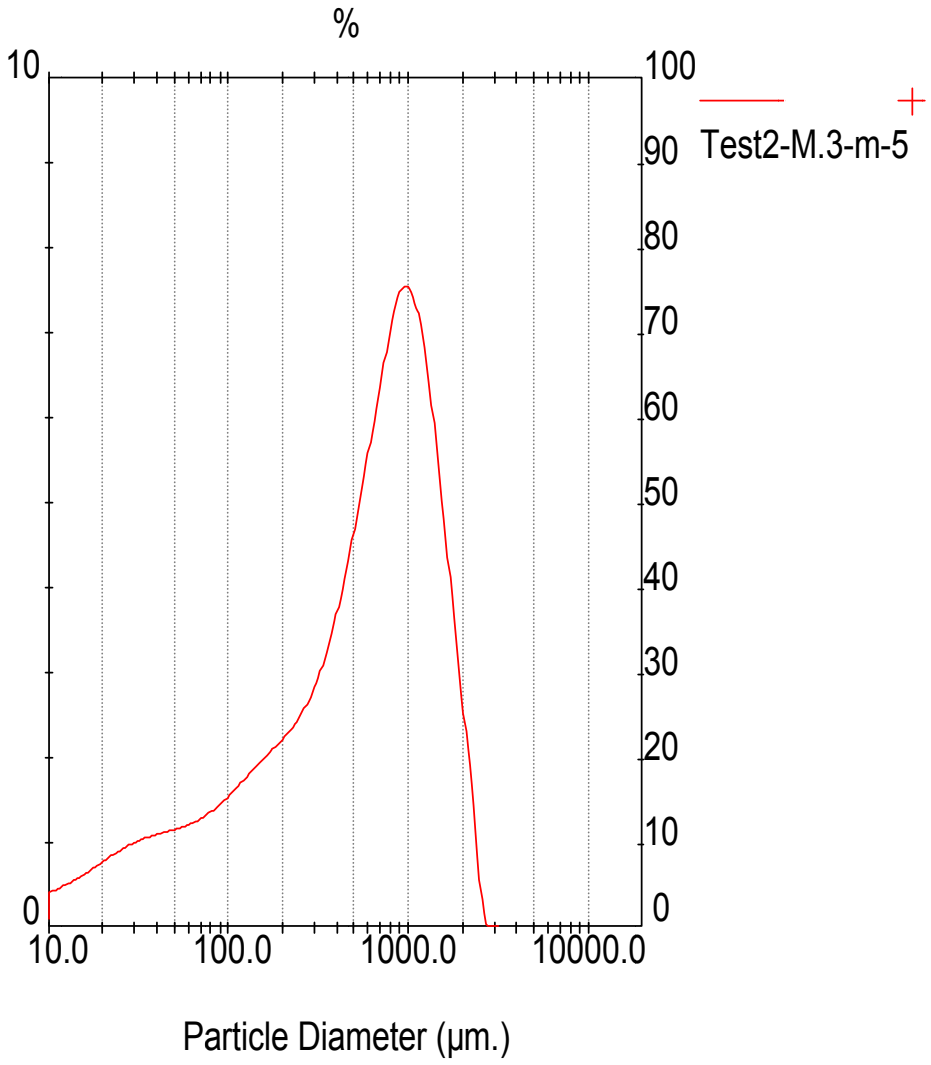
Result: Histogram Table

ID: Test2-M.3-m	Run No: 5	Measured:
File: PEIRO-2	Rec. No: 14	Analysed: 8/6/2010 10:38
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler: Obs': 19.2 %
Presentation: 3OHD	Analysis: Polydisperse	Residual: 1.606 %
Modifications: None		

Conc. = 0.0619 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0512 m^2/g
Distribution: Volume	D[4, 3] = 699.50 um	D[3, 2] = 117.17 um
D(v, 0.1) = 48.95 um	D(v, 0.5) = 608.99 um	D(v, 0.9) = 1500.58 um
Span = 2.384E+00	Uniformity = 7.505E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.39	120.7	0.78	647.4	2.70
4.48	0.05	24.05	0.40	129.1	0.81	692.4	2.85
4.79	0.06	25.73	0.42	138.0	0.84	740.5	3.01
5.13	0.08	27.51	0.43	147.6	0.86	792.0	3.16
5.48	0.10	29.43	0.45	157.9	0.89	847.1	3.26
5.87	0.11	31.47	0.46	168.9	0.92	905.9	3.32
6.27	0.12	33.66	0.47	180.6	0.95	968.9	3.32
6.71	0.13	36.00	0.48	193.1	0.98	1036.2	3.27
7.18	0.14	38.50	0.48	206.6	1.01	1108.3	3.16
7.67	0.15	41.18	0.49	220.9	1.04	1185.3	3.02
8.21	0.16	44.04	0.50	236.3	1.08	1267.7	2.82
8.78	0.17	47.10	0.51	252.7	1.12	1355.8	2.57
9.39	0.18	50.37	0.51	270.3	1.17	1450.0	2.31
10.04	0.19	53.88	0.52	289.1	1.23	1550.8	2.05
10.74	0.20	57.62	0.53	309.1	1.30	1658.6	1.78
11.49	0.21	61.63	0.55	330.6	1.38	1773.9	1.51
12.28	0.23	65.91	0.56	353.6	1.48	1897.2	1.24
13.14	0.24	70.49	0.58	378.2	1.58	2029.1	1.00
14.05	0.26	75.39	0.59	404.5	1.70	2170.1	0.78
15.03	0.27	80.63	0.62	432.6	1.82	2320.9	0.46
16.07	0.29	86.23	0.64	462.7	1.96	2482.2	0.07
17.19	0.31	92.23	0.66	494.8	2.10	2654.8	0.00
18.38	0.33	98.64	0.69	529.2	2.25	2839.3	0.00
19.66	0.35	105.5	0.72	566.0	2.40	3036.6	0.00
21.03	0.37	112.8	0.75	605.3	2.55	3247.7	0.00
22.49		120.7		647.4		3473.5	



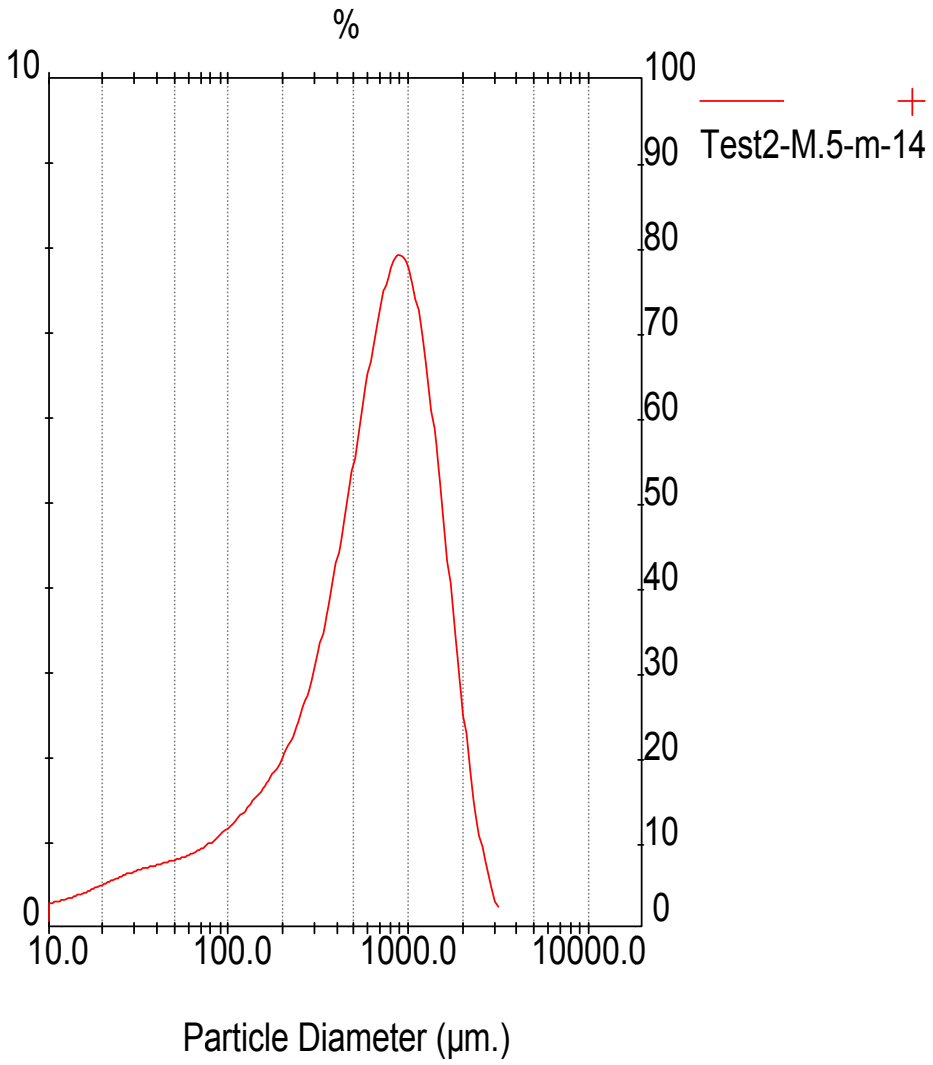
Result: Histogram Table

ID: Test2-M.5-m	Run No: 14	Measured:
File: PEIRO-2	Rec. No: 15	Analysed: 26/5/2010 11:56
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 19.2 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 1.719 %
Modifications: None			

Conc. = 0.0808 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0393 m^2/g
Distribution: Volume	D[4, 3] = 755.43 um	D[3, 2] = 152.55 um
D(v, 0.1) = 83.19 um	D(v, 0.5) = 656.01 um	D(v, 0.9) = 1546.77 um
Span = 2.231E+00	Uniformity = 6.891E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.26	120.7	0.62	647.4	3.12
4.48	0.04	24.05	0.27	129.1	0.65	692.4	3.25
4.79	0.05	25.73	0.28	138.0	0.68	740.5	3.36
5.13	0.06	27.51	0.29	147.6	0.71	792.0	3.45
5.48	0.07	29.43	0.30	157.9	0.75	847.1	3.48
5.87	0.08	31.47	0.31	168.9	0.79	905.9	3.48
6.27	0.09	33.66	0.32	180.6	0.83	968.9	3.42
6.71	0.10	36.00	0.32	193.1	0.88	1036.2	3.32
7.18	0.11	38.50	0.33	206.6	0.94	1108.3	3.17
7.67	0.11	41.18	0.34	220.9	1.00	1185.3	2.99
8.21	0.12	44.04	0.34	236.3	1.06	1267.7	2.79
8.78	0.12	47.10	0.35	252.7	1.14	1355.8	2.56
9.39	0.13	50.37	0.36	270.3	1.23	1450.0	2.31
10.04	0.14	53.88	0.37	289.1	1.33	1550.8	2.04
10.74	0.14	57.62	0.38	309.1	1.44	1658.6	1.76
11.49	0.15	61.63	0.39	330.6	1.56	1773.9	1.50
12.28	0.16	65.91	0.41	353.6	1.70	1897.2	1.24
13.14	0.16	70.49	0.42	378.2	1.84	2029.1	0.99
14.05	0.17	75.39	0.44	404.5	1.99	2170.1	0.75
15.03	0.18	80.63	0.46	432.6	2.15	2320.9	0.55
16.07	0.20	86.23	0.48	462.7	2.31	2482.2	0.42
17.19	0.21	92.23	0.50	494.8	2.47	2654.8	0.31
18.38	0.22	98.64	0.53	529.2	2.65	2839.3	0.20
19.66	0.23	105.5	0.56	566.0	2.81	3036.6	0.11
21.03	0.24	112.8	0.58	605.3	2.97	3247.7	0.06
22.49		120.7		647.4		3473.5	



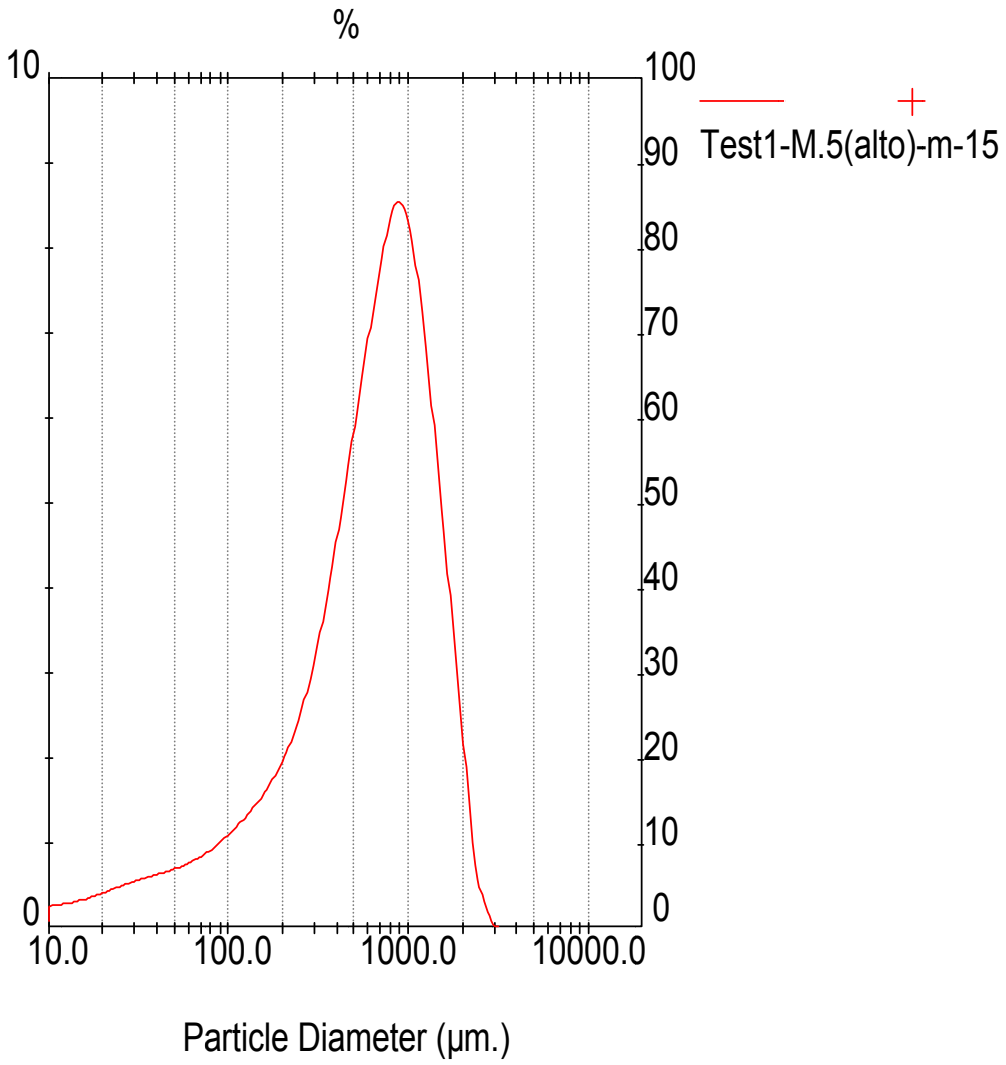
Result: Histogram Table

ID: Test1-M.5(alto)-m	Run No: 15	Measured:
File: PEIRO-2	Rec. No: 16	Analysed: 26/5/2010 10:46
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 18.6 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 1.846 %
Modifications: None			

Conc. = 0.0835 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0361 m^2/g
Distribution: Volume	D[4, 3] = 736.48 um	D[3, 2] = 165.99 um
D(v, 0.1) = 101.50 um	D(v, 0.5) = 660.20 um	D(v, 0.9) = 1464.86 um
Span = 2.065E+00	Uniformity = 6.311E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.21	120.7	0.58	647.4	3.31
4.48	0.04	24.05	0.22	129.1	0.61	692.4	3.46
4.79	0.05	25.73	0.23	138.0	0.64	740.5	3.61
5.13	0.06	27.51	0.24	147.6	0.68	792.0	3.72
5.48	0.07	29.43	0.25	157.9	0.72	847.1	3.76
5.87	0.08	31.47	0.26	168.9	0.76	905.9	3.74
6.27	0.09	33.66	0.26	180.6	0.81	968.9	3.65
6.71	0.09	36.00	0.27	193.1	0.86	1036.2	3.51
7.18	0.10	38.50	0.28	206.6	0.92	1108.3	3.32
7.67	0.10	41.18	0.29	220.9	0.99	1185.3	3.09
8.21	0.11	44.04	0.30	236.3	1.06	1267.7	2.84
8.78	0.11	47.10	0.31	252.7	1.16	1355.8	2.56
9.39	0.12	50.37	0.31	270.3	1.25	1450.0	2.28
10.04	0.12	53.88	0.33	289.1	1.37	1550.8	1.99
10.74	0.12	57.62	0.34	309.1	1.49	1658.6	1.69
11.49	0.13	61.63	0.35	330.6	1.63	1773.9	1.41
12.28	0.13	65.91	0.37	353.6	1.78	1897.2	1.12
13.14	0.14	70.49	0.38	378.2	1.94	2029.1	0.81
14.05	0.14	75.39	0.40	404.5	2.11	2170.1	0.51
15.03	0.15	80.63	0.42	432.6	2.28	2320.9	0.27
16.07	0.16	86.23	0.44	462.7	2.46	2482.2	0.16
17.19	0.17	92.23	0.47	494.8	2.64	2654.8	0.10
18.38	0.18	98.64	0.49	529.2	2.82	2839.3	0.03
19.66	0.19	105.5	0.52	566.0	2.99	3036.6	0.00
21.03	0.20	112.8	0.55	605.3	3.15	3247.7	0.00
22.49		120.7		647.4		3473.5	



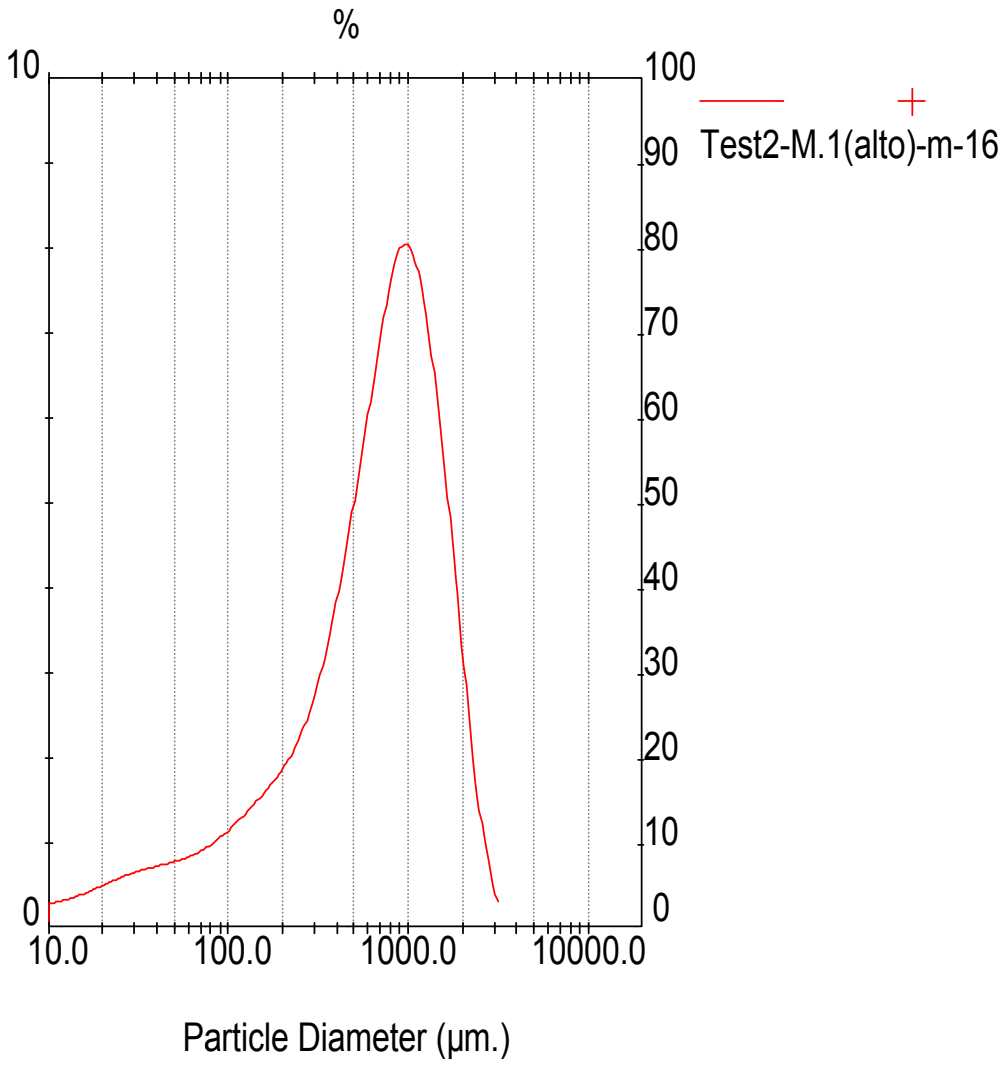
Result: Histogram Table

ID: Test2-M.1(alto)-m	Run No: 16	Measured:
File: PEIRO-2	Rec. No: 17	Analysed: 26/5/2010 11:33
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 18.7 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 1.758 %
Modifications: None			

Conc. = 0.0508 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0384 m^2/g
Distribution: Volume	D[4, 3] = 804.99 um	D[3, 2] = 156.25 um
D(v, 0.1) = 85.83 um	D(v, 0.5) = 708.63 um	D(v, 0.9) = 1644.95 um
Span = 2.200E+00	Uniformity = 6.765E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.25	120.7	0.60	647.4	2.93
4.48	0.04	24.05	0.26	129.1	0.63	692.4	3.10
4.79	0.05	25.73	0.27	138.0	0.65	740.5	3.26
5.13	0.06	27.51	0.28	147.6	0.69	792.0	3.40
5.48	0.07	29.43	0.29	157.9	0.72	847.1	3.50
5.87	0.08	31.47	0.30	168.9	0.75	905.9	3.54
6.27	0.09	33.66	0.31	180.6	0.79	968.9	3.54
6.71	0.10	36.00	0.32	193.1	0.82	1036.2	3.48
7.18	0.10	38.50	0.32	206.6	0.87	1108.3	3.38
7.67	0.11	41.18	0.33	220.9	0.91	1185.3	3.24
8.21	0.12	44.04	0.34	236.3	0.97	1267.7	3.06
8.78	0.12	47.10	0.34	252.7	1.03	1355.8	2.85
9.39	0.13	50.37	0.35	270.3	1.11	1450.0	2.62
10.04	0.13	53.88	0.36	289.1	1.19	1550.8	2.37
10.74	0.14	57.62	0.37	309.1	1.29	1658.6	2.09
11.49	0.15	61.63	0.38	330.6	1.39	1773.9	1.82
12.28	0.15	65.91	0.39	353.6	1.51	1897.2	1.54
13.14	0.16	70.49	0.41	378.2	1.64	2029.1	1.24
14.05	0.17	75.39	0.43	404.5	1.78	2170.1	0.95
15.03	0.18	80.63	0.45	432.6	1.94	2320.9	0.70
16.07	0.19	86.23	0.47	462.7	2.10	2482.2	0.53
17.19	0.20	92.23	0.49	494.8	2.26	2654.8	0.39
18.38	0.21	98.64	0.52	529.2	2.43	2839.3	0.25
19.66	0.23	105.5	0.54	566.0	2.60	3036.6	0.13
21.03	0.24	112.8	0.57	605.3	2.76	3247.7	0.07
22.49		120.7		647.4		3473.5	



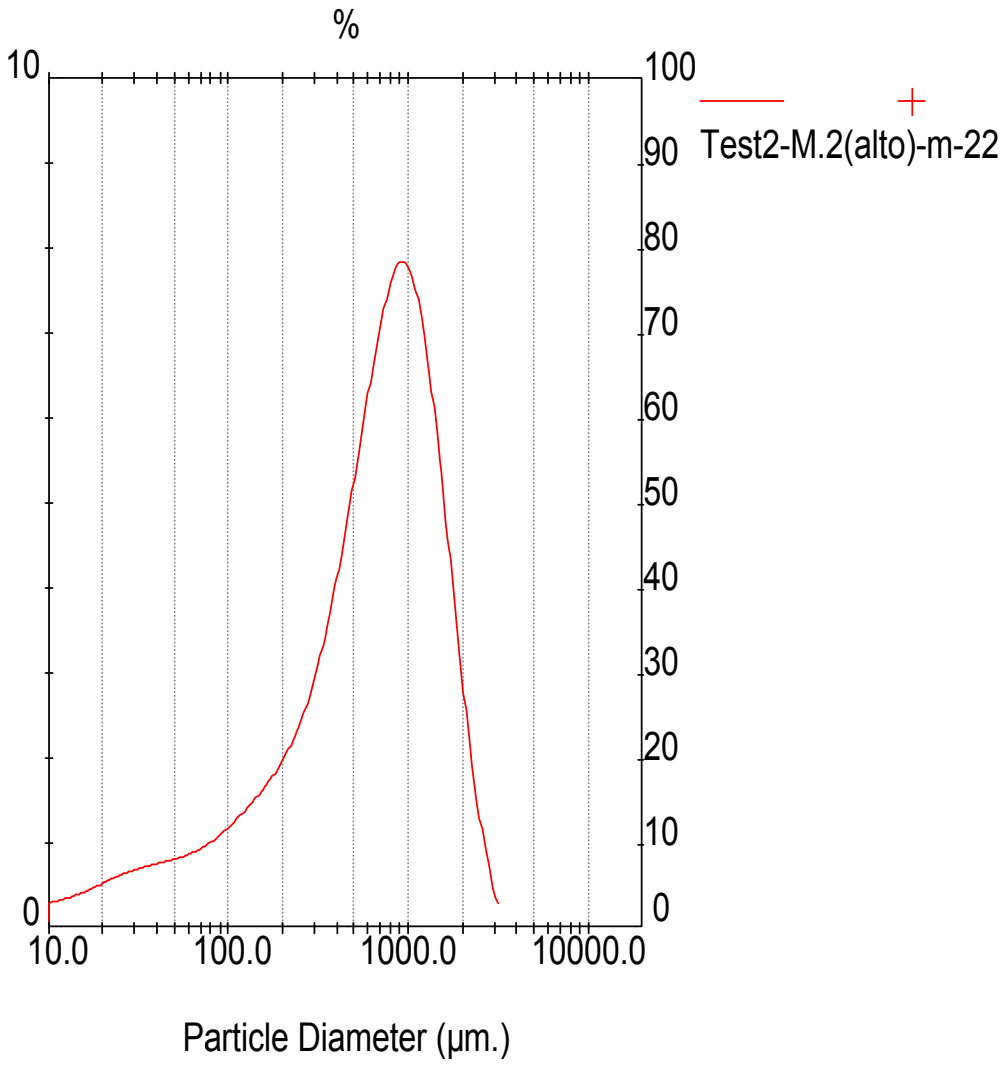
Result: Histogram Table

ID: Test2-M.2(alto)-m	Run No: 22	Measured:
File: PEIRO-2	Rec. No: 18	Analysed: 26/5/2010 12:06
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 19.5 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 2.403 %
Modifications: None			

Conc. = 0.0786 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0395 m^2/g
Distribution: Volume	D[4, 3] = 775.40 um	D[3, 2] = 151.75 um
D(v, 0.1) = 81.35 um	D(v, 0.5) = 672.97 um	D(v, 0.9) = 1595.61 um
Span = 2.250E+00	Uniformity = 6.947E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.26	120.7	0.62	647.4	3.02
4.48	0.04	24.05	0.27	129.1	0.65	692.4	3.15
4.79	0.05	25.73	0.29	138.0	0.68	740.5	3.28
5.13	0.06	27.51	0.30	147.6	0.71	792.0	3.38
5.48	0.07	29.43	0.31	157.9	0.74	847.1	3.43
5.87	0.08	31.47	0.31	168.9	0.78	905.9	3.45
6.27	0.09	33.66	0.32	180.6	0.82	968.9	3.42
6.71	0.10	36.00	0.33	193.1	0.87	1036.2	3.35
7.18	0.11	38.50	0.34	206.6	0.91	1108.3	3.23
7.67	0.11	41.18	0.34	220.9	0.97	1185.3	3.07
8.21	0.12	44.04	0.35	236.3	1.03	1267.7	2.89
8.78	0.12	47.10	0.36	252.7	1.10	1355.8	2.67
9.39	0.13	50.37	0.36	270.3	1.18	1450.0	2.43
10.04	0.14	53.88	0.37	289.1	1.27	1550.8	2.17
10.74	0.14	57.62	0.38	309.1	1.38	1658.6	1.88
11.49	0.15	61.63	0.39	330.6	1.49	1773.9	1.62
12.28	0.16	65.91	0.41	353.6	1.62	1897.2	1.36
13.14	0.17	70.49	0.42	378.2	1.76	2029.1	1.11
14.05	0.18	75.39	0.44	404.5	1.90	2170.1	0.87
15.03	0.19	80.63	0.46	432.6	2.05	2320.9	0.66
16.07	0.20	86.23	0.48	462.7	2.21	2482.2	0.50
17.19	0.21	92.23	0.51	494.8	2.37	2654.8	0.37
18.38	0.23	98.64	0.53	529.2	2.54	2839.3	0.23
19.66	0.24	105.5	0.56	566.0	2.71	3036.6	0.12
21.03	0.25	112.8	0.58	605.3	2.86	3247.7	0.06
22.49		120.7		647.4		3473.5	



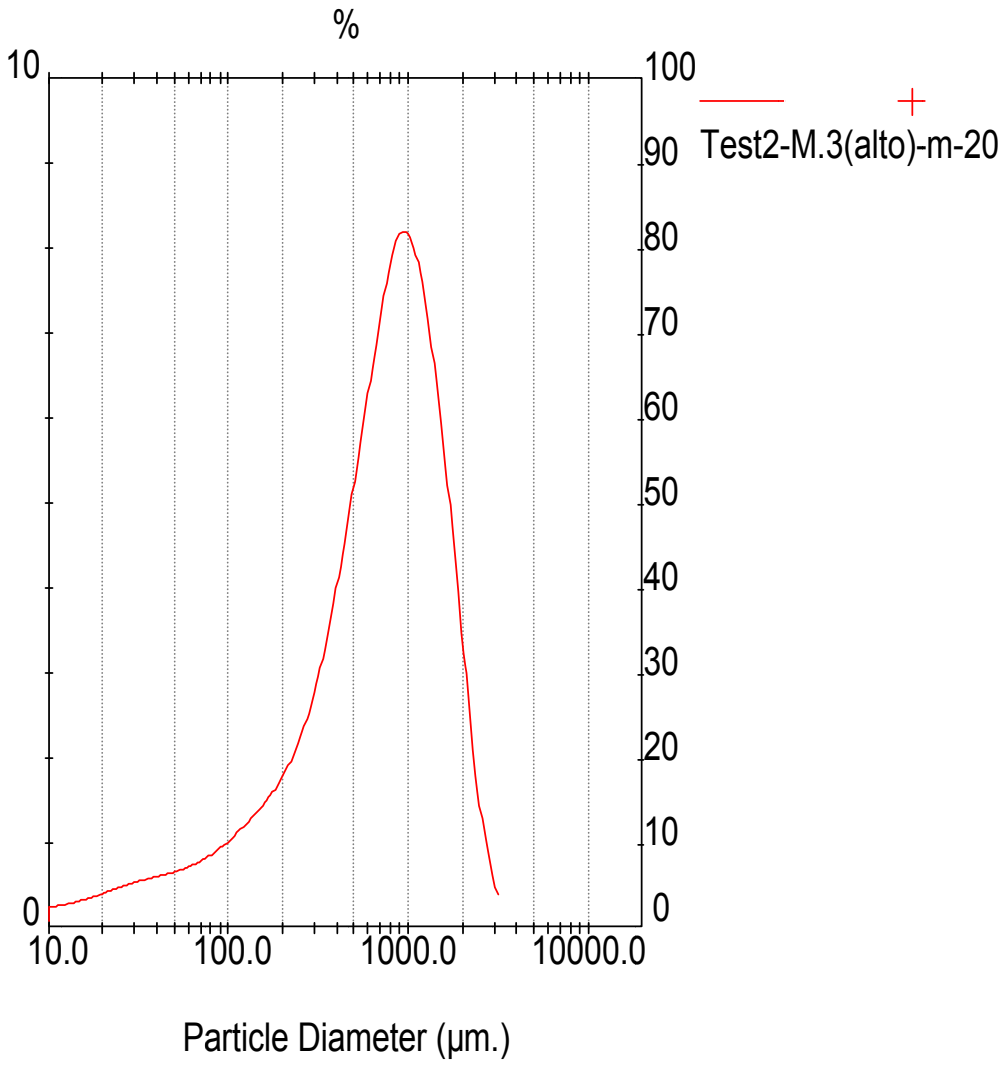
Result: Histogram Table

ID: Test2-M.3(alto)-m	Run No: 20	Measured:
File: PEIRO-2	Rec. No: 19	Analysed: 26/5/2010 11:09
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 18.7 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 2.133 %
Modifications: None			

Conc. = 0.1052 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0342 m^2/g
Distribution: Volume	D[4, 3] = 828.32 um	D[3, 2] = 175.46 um
D(v, 0.1) = 108.61 um	D(v, 0.5) = 728.27 um	D(v, 0.9) = 1669.07 um
Span = 2.143E+00	Uniformity = 6.561E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.03	22.49	0.20	120.7	0.54	647.4	3.04
4.48	0.04	24.05	0.21	129.1	0.57	692.4	3.20
4.79	0.05	25.73	0.22	138.0	0.60	740.5	3.37
5.13	0.06	27.51	0.23	147.6	0.63	792.0	3.50
5.48	0.07	29.43	0.24	157.9	0.66	847.1	3.58
5.87	0.07	31.47	0.25	168.9	0.70	905.9	3.61
6.27	0.08	33.66	0.26	180.6	0.74	968.9	3.59
6.71	0.09	36.00	0.26	193.1	0.78	1036.2	3.53
7.18	0.09	38.50	0.27	206.6	0.83	1108.3	3.43
7.67	0.10	41.18	0.28	220.9	0.89	1185.3	3.28
8.21	0.10	44.04	0.28	236.3	0.95	1267.7	3.10
8.78	0.11	47.10	0.29	252.7	1.03	1355.8	2.90
9.39	0.11	50.37	0.30	270.3	1.11	1450.0	2.67
10.04	0.11	53.88	0.31	289.1	1.20	1550.8	2.43
10.74	0.12	57.62	0.32	309.1	1.32	1658.6	2.16
11.49	0.12	61.63	0.33	330.6	1.43	1773.9	1.89
12.28	0.13	65.91	0.34	353.6	1.57	1897.2	1.61
13.14	0.13	70.49	0.36	378.2	1.71	2029.1	1.30
14.05	0.14	75.39	0.37	404.5	1.86	2170.1	0.99
15.03	0.15	80.63	0.39	432.6	2.02	2320.9	0.73
16.07	0.16	86.23	0.41	462.7	2.19	2482.2	0.56
17.19	0.17	92.23	0.44	494.8	2.36	2654.8	0.43
18.38	0.17	98.64	0.46	529.2	2.53	2839.3	0.28
19.66	0.18	105.5	0.48	566.0	2.70	3036.6	0.16
21.03	0.19	112.8	0.51	605.3	2.87	3247.7	0.10
22.49		120.7		647.4		3473.5	



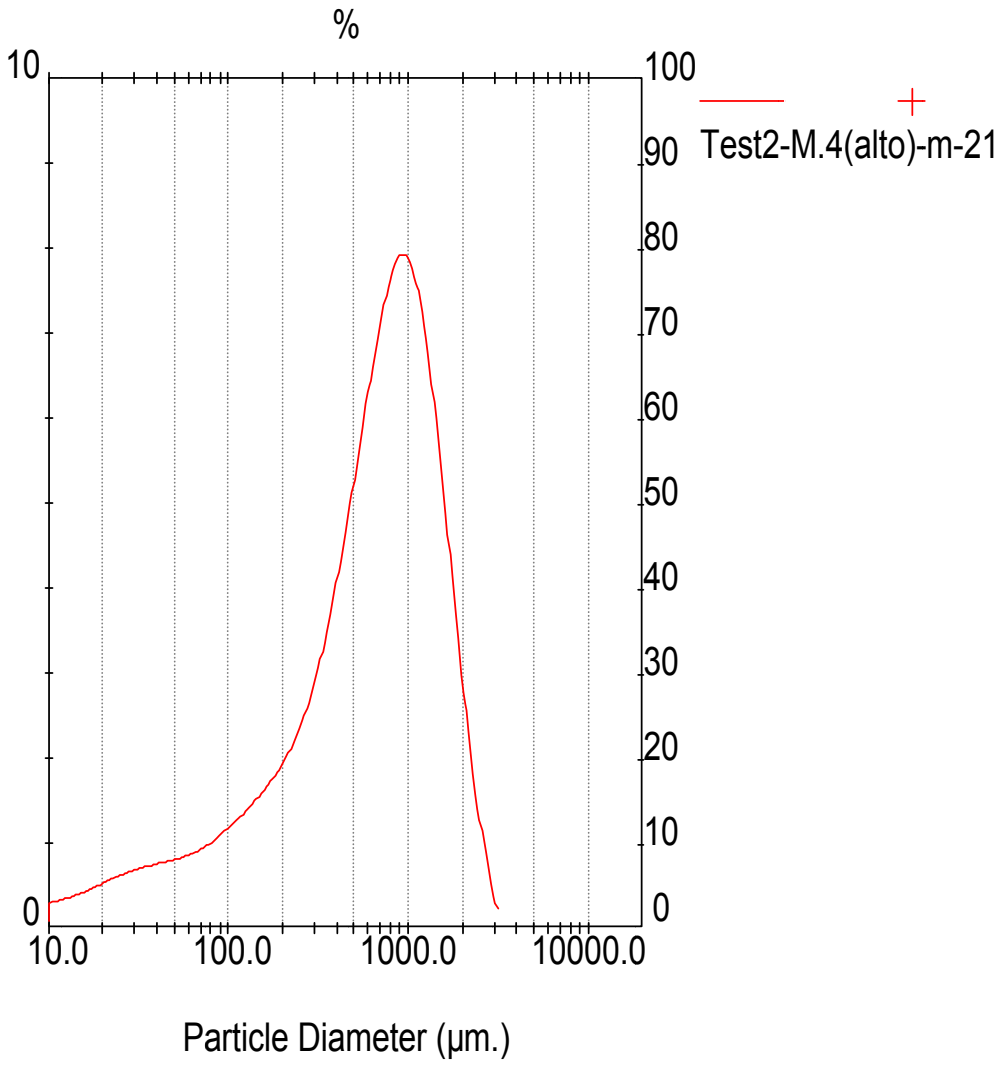
Result: Histogram Table

ID: Test2-M.4(alto)-m	Run No: 21	Measured:
File: PEIRO-2	Rec. No: 20	Analysed: 26/5/2010 13:04
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 20.0 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 1.598 %
Modifications: None			

Conc. = 0.0950 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0394 m^2/g
Distribution: Volume	D[4, 3] = 777.20 um	D[3, 2] = 152.44 um
D(v, 0.1) = 81.86 um	D(v, 0.5) = 678.39 um	D(v, 0.9) = 1593.01 um
Span = 2.228E+00	Uniformity = 6.866E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.03	22.49	0.26	120.7	0.61	647.4	3.03
4.48	0.04	24.05	0.27	129.1	0.64	692.4	3.17
4.79	0.05	25.73	0.29	138.0	0.67	740.5	3.30
5.13	0.06	27.51	0.30	147.6	0.70	792.0	3.40
5.48	0.07	29.43	0.31	157.9	0.73	847.1	3.47
5.87	0.08	31.47	0.31	168.9	0.77	905.9	3.49
6.27	0.09	33.66	0.32	180.6	0.81	968.9	3.47
6.71	0.10	36.00	0.33	193.1	0.85	1036.2	3.40
7.18	0.11	38.50	0.33	206.6	0.90	1108.3	3.28
7.67	0.11	41.18	0.34	220.9	0.95	1185.3	3.12
8.21	0.12	44.04	0.35	236.3	1.01	1267.7	2.92
8.78	0.12	47.10	0.35	252.7	1.08	1355.8	2.69
9.39	0.13	50.37	0.36	270.3	1.16	1450.0	2.45
10.04	0.14	53.88	0.37	289.1	1.25	1550.8	2.18
10.74	0.14	57.62	0.38	309.1	1.36	1658.6	1.90
11.49	0.15	61.63	0.39	330.6	1.47	1773.9	1.63
12.28	0.16	65.91	0.40	353.6	1.60	1897.2	1.37
13.14	0.17	70.49	0.42	378.2	1.74	2029.1	1.11
14.05	0.18	75.39	0.44	404.5	1.88	2170.1	0.85
15.03	0.19	80.63	0.46	432.6	2.04	2320.9	0.64
16.07	0.20	86.23	0.48	462.7	2.20	2482.2	0.50
17.19	0.21	92.23	0.50	494.8	2.36	2654.8	0.36
18.38	0.23	98.64	0.53	529.2	2.54	2839.3	0.19
19.66	0.24	105.5	0.55	566.0	2.71	3036.6	0.09
21.03	0.25	112.8	0.58	605.3	2.87	3247.7	0.07
22.49		120.7		647.4		3473.5	



Result: Histogram Table

ID: Test2-M.5(alto)-m	Run No: 23	Measured:
File: PEIRO-2	Rec. No: 21	Analysed: 26/5/2010 11:46
Path: K:\		Source: Averaged

Range: 1000 mm	Beam: 14.30 mm	Sampler:	Obs': 18.9 %
Presentation: 3OHD		Analysis: Polydisperse	Residual: 1.651 %
Modifications: None			

Conc. = 0.0939 %Vol	Density = 1.000 g/cm^3	S.S.A.= 0.0383 m^2/g
Distribution: Volume	D[4, 3] = 792.52 um	D[3, 2] = 156.46 um
D(v, 0.1) = 86.36 um	D(v, 0.5) = 696.70 um	D(v, 0.9) = 1615.39 um
Span = 2.195E+00	Uniformity = 6.741E-01	

Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %	Size (um)	Volume In %
4.19	0.04	22.49	0.25	120.7	0.60	647.4	3.01
4.48	0.04	24.05	0.26	129.1	0.63	692.4	3.17
4.79	0.05	25.73	0.27	138.0	0.66	740.5	3.33
5.13	0.06	27.51	0.28	147.6	0.69	792.0	3.45
5.48	0.07	29.43	0.29	157.9	0.72	847.1	3.53
5.87	0.08	31.47	0.30	168.9	0.75	905.9	3.56
6.27	0.09	33.66	0.31	180.6	0.79	968.9	3.54
6.71	0.10	36.00	0.31	193.1	0.83	1036.2	3.46
7.18	0.10	38.50	0.32	206.6	0.87	1108.3	3.35
7.67	0.11	41.18	0.33	220.9	0.92	1185.3	3.19
8.21	0.12	44.04	0.33	236.3	0.98	1267.7	3.00
8.78	0.12	47.10	0.34	252.7	1.05	1355.8	2.77
9.39	0.13	50.37	0.35	270.3	1.13	1450.0	2.53
10.04	0.13	53.88	0.36	289.1	1.21	1550.8	2.27
10.74	0.14	57.62	0.37	309.1	1.32	1658.6	1.98
11.49	0.14	61.63	0.38	330.6	1.43	1773.9	1.72
12.28	0.15	65.91	0.39	353.6	1.55	1897.2	1.44
13.14	0.16	70.49	0.41	378.2	1.69	2029.1	1.16
14.05	0.17	75.39	0.43	404.5	1.84	2170.1	0.89
15.03	0.18	80.63	0.45	432.6	1.99	2320.9	0.66
16.07	0.19	86.23	0.47	462.7	2.16	2482.2	0.50
17.19	0.20	92.23	0.49	494.8	2.32	2654.8	0.37
18.38	0.21	98.64	0.52	529.2	2.50	2839.3	0.23
19.66	0.23	105.5	0.54	566.0	2.67	3036.6	0.12
21.03	0.24	112.8	0.57	605.3	2.84	3247.7	0.07
22.49		120.7		647.4		3473.5