Product Information Process Connection ESP **PHARMA**

Build-In System PHARMadapt ESP

Application/Specified usage

- Build-in system for temperature measurement with temperature sensors type **TFP-58P, -68P, -168P, -188P**
- Temperature measurement in pipes (diameter DN10...DN100) and vessels
- Demounting the sensor without opening the process
- Temperature measurement in hazardous areas with appropriately approved temperature sensors

Application examples

- Process monitoring especially for pharmaceutical industries
- Monitoring of CIP-/ SIP-cleaning
- Temperature measuring in hotsteam- and pressure pipes (enclosed process)

Hygienic design/Process connection

- Hygienic, flow optimized and easy sterilizable installation by using Negele build-in system ESP
- Further porcess connections: adapter for BioControl, Tri-Clamp, Varivent ...
- Product contacting material according to FDA regulation

Features

- Pin stamping
- 3.1 inspection certificate acc. to DIN EN 10204 incl. ADW 2 statement

Options/Accessories

- Deliverable for several pipe styles (DIN 11866 series A ... C, ISO 1127, ASME BPE)
- Surface quality $R_a \leq 0.6$ µm and 0.4 µm incl. certificate
- Delta ferrite < 0.5 % and Basel II Norm
- 3-A conforming version ESP-G, ESP-E, ESP-C and ESP-V
- Customer specific labelling, stainless steel TAG-number plate

Authorisations

FDA

3-A 74-06

ESP-G with temperature sensor

Build-in system ESP-W

Specification of measure point and adapter		
Pipe style	DIN 2 ISO ASME	DIN 11866 series A DIN 11866 series B, ISO 1127 DIN 11866 series C, OD-Tube
Material	thermowell pipe pipe	stainless steel 1.4435 (316L) with 3.1 inspection certificate stainless steel 1.4435 (316L) with 3.1 inspection certificate stainless steel 1.4404 (316L) with sulphur content acc. to ASME BPE (only for order option "S")
Surface	wetted parts optional	$R_a \leq 0.8$ µm (not in welded areas) electro polished $R_a \leq 0.6$ µm, $R_a \leq 0.4$ µm
Delta Ferrite DF	standard optional Basel II Norm	< 1.0 % (weld seam < 3 %) < 0.5 % (weld seam < 3 %) BN II
Sulfur content at pipe edges	standard acc. to ASME	max. 0.030 % min. 0.005 %, max. 0.017 %
Diameter		see tables
Tolerances	pipes DN10...DN40 pipes DN50...	±0.3 mm, length: ±1.0 mm ±0.5 mm, length: ±1.0 mm
Sensor connection	thread	G3/8"
Sealing principle		weld-in thermowell
Operating pressure	weld-in thermowell build-in system ESP-G / -W	max. 50 bar acc. to standard for pipe fittings (DIN 11865)

Advice

The technical specification of pipe is according to DIN 11866 if no other is defined. Delta ferrite values are valid for delivering condition. Mechanical machining after delivery can increment the delta ferrite value.
Customized versions are possible on request.

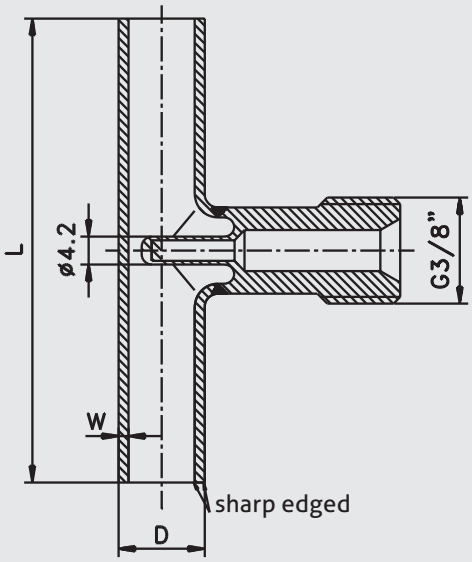
Response time

The below-mentioned times were measured by emersing a temperature sensor from room temperature into media with 150 °C.
We recommend the use of heat-conductive paste to reduce the reaction times about 50 % as mentioned below!

Table reaction time	ESP-G-DIN2-10
t_{50}	4.4 s
t_{90}	13.1 s

Build-in system ESP-G-... DN10...DN20

Build-in system ESP-G-... DN10...DN20



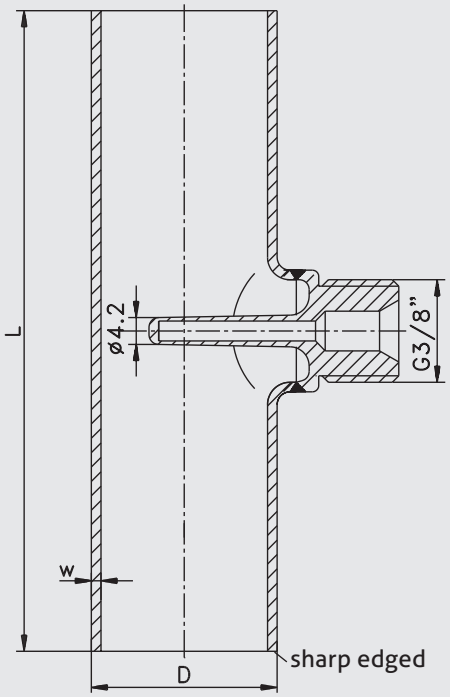
DIN 11866 series A				
Type	**DN**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-G-DIN2-10	10	70	13 x 1.5	TFP-... /037
ESP-G-DIN2-15	15	70	19 x 1.5	TFP-... /037
ESP-G-DIN2-20	20	80	23 x 1.5	TFP-... /037

DIN 11866 series B / ISO 1127				
Type	**DN**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-G-ISO-8	8	64	13.5 x 1.6	TFP-... /037
ESP-G-ISO-10	10	68	17.2 x 1.6	TFP-... /037
ESP-G-ISO-15	15	72	21.3 x 1.6	TFP-... /037
ESP-G-ISO-20	20	110	26.9 x 1.6	TFP-... /037

DIN 11866 series C / OD-Tube / Dimensions acc. to ASME BPE				
Type	**DN**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-G-ASME-1/2"	1/2"	95	12.7 x 1.65	TFP-... /037
ESP-G-ASME-3/4"	3/4"	102	19.05 x 1.65	TFP-... /037

Build-in system ESP-G-... DN25...DN100

Build-in system ESP-G-... DN25...DN100



DIN 11866 series A (with 3-A approval)				
Type	**DN**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-G-DIN2-25	25	100	29 x 1.5	TFP-... /037
ESP-G-DIN2-40	40	120	41 x 1.5	TFP-... /037
ESP-G-DIN2-50	50	160	53 x 1.5	TFP-... /037
ESP-G-DIN2-65	65	210	70 x 2.0	TFP-... /037
ESP-G-DIN2-80	80	260	85 x 2.0	TFP-... /037
ESP-G-DIN2-100	100	310	104 x 2.0	TFP-... /083

DIN 11866 series B / ISO 1127 (with 3-A approval)				
Type	**DN**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-G-ISO-25	25	120	33.7 x 2.0	TFP-... /037
ESP-G-ISO-32	32	130	42.4 x 2.0	TFP-... /037
ESP-G-ISO-40	40	130	48.3 x 2.0	TFP-... /037
ESP-G-ISO-50	50	180	60.3 x 2.0	TFP-... /037
ESP-G-ISO-65	65	220	76.1 x 2.0	TFP-... /037
ESP-G-ISO-80	80	260	88.9 x 2.3	TFP-... /037

DIN 11866 series C / OD-Tube / Dimensions acc. to ASME BPE (with 3-A approval)				
Type	**DN**	**L [mm]**	**Piper D x w**	**for insertion length**
ESP-G-ASME-1"	1"	108	25.4 x 1.65	TFP-... /037
ESP-G-ASME-1½"	1½"	120.6	38.1 x 1.65	TFP-... /037
ESP-G-ASME-2"	2"	146	50.8 x 1.65	TFP-... /037
ESP-G-ASME-2½"	2½"	158.8	63.5 x 1.65	TFP-... /037
ESP-G-ASME-3"	3"	171.4	76.2 x 1.65	TFP-... /037
ESP-G-ASME-4"	4"	209.6	101.6 x 2.11	TFP-... /083

Order code build-in system PHARMadapt ESP-G

ESP-G- build-in system straight line incl. 3.1 inspection certificate acc. to DIN EN 10204

Pipe style

DIN2	(see specification of pipes)
ISO	(see specification of pipes)
ASME	(see specification of pipes)

Diameter: see dimension tables

Surface

0.8	($R_a \leq 0.8$ µm, standard)
0.6	($R_a \leq 0.6$ µm)
0.4	($R_a \leq 0.4$ µm)

Delta ferrite- / sulphur content

X	(standard: DF < 1 % - class 2)
DF	(DF < 0.5 % - class 3)
BN	(DF < 0.5% - Baseler Norm II)
S	(material pipe 1.4404/316L, sulphur content acc. to ASME BPE, only weld ends)

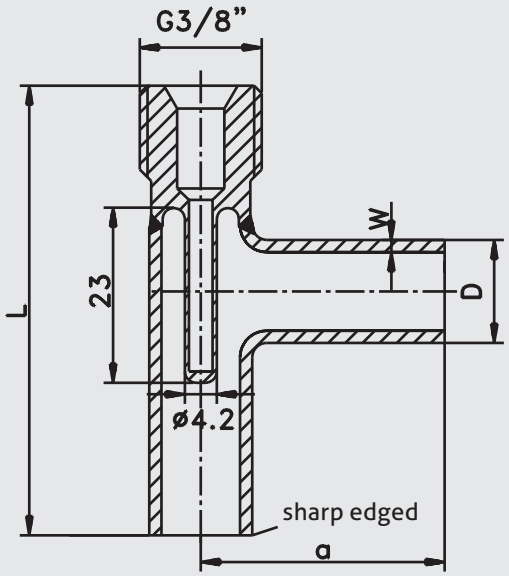
ESP-G-	**DIN2 /**	**40 /**	**0.8 /**	**X**

Option

RAC	certificate surface quality incl. measurement protocoll
DFC	certificate delta-ferrite incl. measurement protocoll

Build-in system ESP-W-... DN10...DN15

Build-in system ESP-W-... DN10...DN15



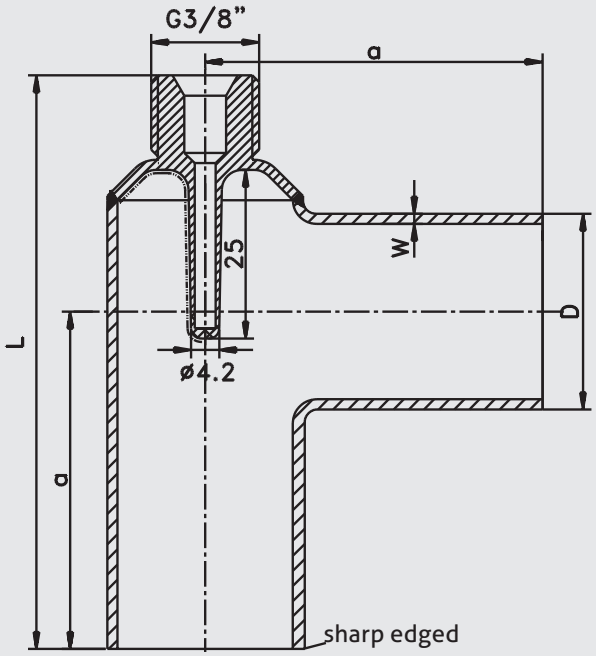
DIN 11866 series A					
Type	**DN**	**a [mm]**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-W-DIN2-10	10	35	62	13 x 1.5	TFP-... /037
ESP-W-DIN2-15	15	35	64.5	19 x 1.5	TFP-... /037

DIN 11866 series B / ISO 1127					
Type	**DN**	**a [mm]**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-W-ISO-8	8	32	59	13.5 x 1.6	TFP-... /037
ESP-W-ISO-10	10	34	63.5	17.2 x 1.6	TFP-... /037
ESP-W-ISO-15	15	36	63	21.3 x 1.6	TFP-... /037

DIN 11866 series C / OD-Tube / Dimensions acc. to ASME BPE					
Type	**DN**	**a [mm]**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-W-ASME-1/2"	1/2"	47.5	74.5	12.7 x 1.65	TFP-... /037
ESP-W-ASME-3/4"	3/4"	50.8	80.3	19.05 x 1.65	TFP-... /037

Build-in system ESP-W-... DN20...DN25

Build-in system ESP-W-... DN20...DN25



DIN 11866 series A					
Type	**DN**	**a [mm]**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-W-DIN2-20	20	40	69	23 x 1.5	TFP-... /037
ESP-W-DIN2-25	25	50	85	29 x 1.5	TFP-... /037

DIN 11866 series B / ISO 1127					
Type	**DN**	**a [mm]**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-W-ISO-20	20	55	88	26.9 x 1.6	TFP-... /037

DIN 11866 series C / OD-Tube / Dimensions acc. to ASME BPE					
Type	**DN**	**a [mm]**	**L [mm]**	**Pipe D x w**	**for insertion length**
ESP-W-ASME-1"	1"	54	85	25.4 x 1.65	TFP-... /037

Order code build-in system PHARMadapt ESP-W

ESP-W- build-in system angeled incl. 3.1 inspection certificate acc. to DIN EN 10204

Pipe style
- **DIN2** (see specification of pipes)
- **ISO** (see specification of pipes)
- **ASME** (see specification of pipes)

Diameter: see dimension tables

Surface
- **0.8** ($R_a \leq 0.8$ µm, standard)
- **0.6** ($R_a \leq 0.6$ µm)
- **0.4** ($R_a \leq 0.4$ µm)

Delta ferrite- / sulphur content
- **X** (standard: DF < 1 % - class 2)
- **DF** (DF < 0.5 % - class 3)
- **BN** (DF < 0.5% - Baseler Norm II)
- **S** (material pipe 1.4404/316L, sulphur content acc. to ASME BPE, only weld ends)

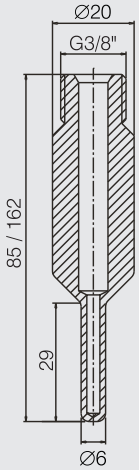
ESP-W-	**DIN2 /**	**40 /**	**0.8 /**	**X**

Option

RAC	certificate surface quality incl. measurement protocoll
DFC	certificate delta-ferrite incl. measurement protocoll

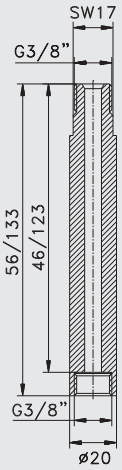
Weld-in thermowell ESP-E

Weld-in thermowell ESP-E



Extension ESP-VL

Extension ESP-VL



Information

ESP-VL is suitable for all ESP adapters and weld-in systems.
With this extension it's possible to displace the position of sensor connection, e.g. at pipe isolation. For dry calibration maybe it's needed to have temperature sensors with longer sensor tip. This extension enables the use of sensors with 83 mm resp. 160 mm lenght in combination with ESP-W and ESP-G.

Order code weld-in Sleeves PHARMadapt ESP

Extension for ESP-G and ESP-W

ESP-VL-046	(extension of sensor connection 46 mm, suitable for TFP-58P/083, -68P/083, -168P/083, -188P/083)
ESP-VL-123	(suitable for TFP-58P/160, -68P/160, -168P/160, -188P/160-188P/160)

Weld-In sleeves with thermowell

ESP-E-083-00	(suitable for TFP-58P/083, -68P/083, -168P/083, -188P/083)
ESP-E-160-00	(suitable for TFP-58P/160, -68P/160, -168P/160, -188P/160)

Surface

0.8	($R_a \leq 0.8$ µm, standard)
0.6	($R_a \leq 0.6$ µm)
0.4	($R_a \leq 0.4$ µm)

Delta Ferrite

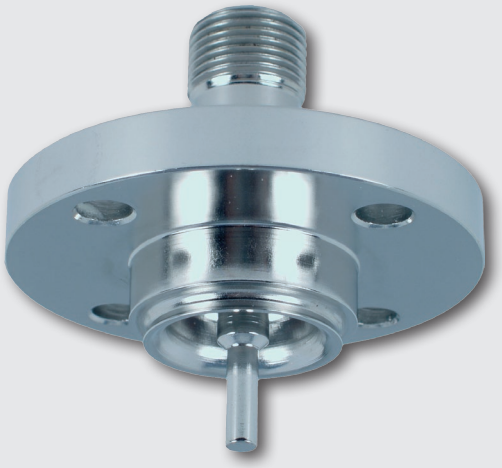
X	(standard: DF < 1 % - class 2)
DF	(DF < 0.5 % - class 3)
BN	(DF < 0.5% - Baseler Norm II)

ESP-E-083-00 / 0.8 / X

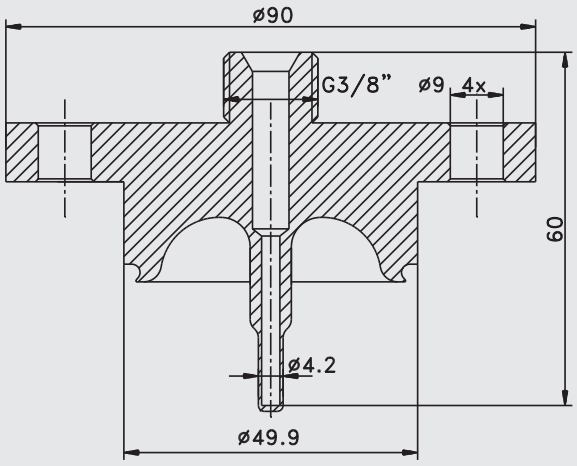
Option

RAC	certificate surface quality incl. measurement protocoll
DFC	certificate delta-ferrite incl. measurement protocoll

Adapter for BioControl ESP

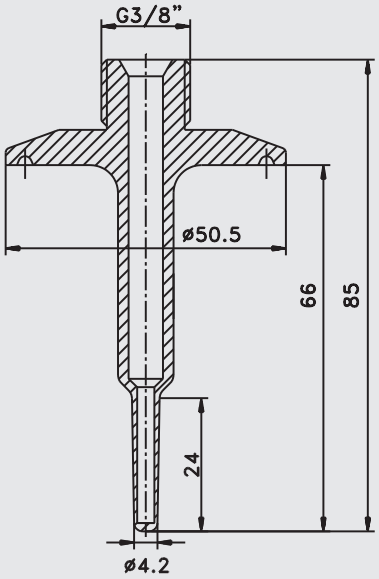


Adapter for BioControl ESP-B-50/059

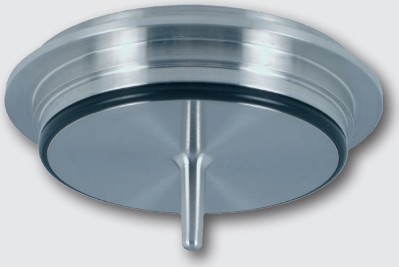


Adapter for Tri-Clamp ESP

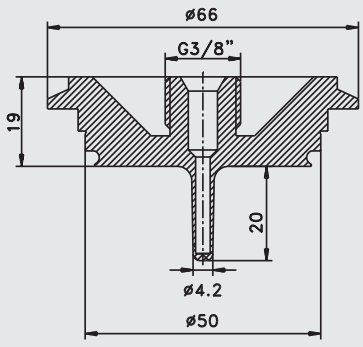
Adapter for Tri-Clamp ESP-C1"



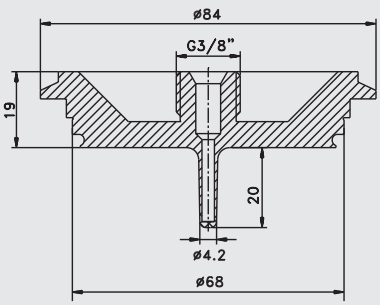
Adapter for Varivent ESP



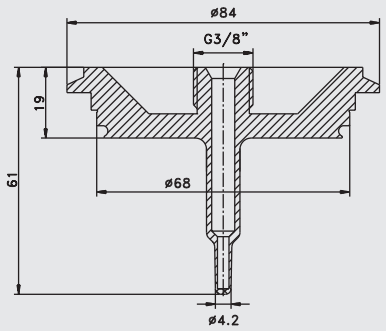
Adapter for Varivent ESP-V25-037



Adapter for Varivent ESP-V40-037



Adapter for Varivent ESP-V40-059



Order code adapter PHARMadapt ESP

Adapter for BioControl-, Tri-Clamp- and Varivent-Connection incl. 3.1 inspection certificate acc. to DIN EN 10204

ESP-B-25/059	for BioControl DN25 (suitable for TFP-58P/059, -68P/059, -168P/059, -188P/059)
ESP-B-50/059	for BioControl DN50 (suitable for TFP-58P/059, -68P/059, -168P/059, -188P/059)
ESP-B-65/059	for BioControl DN65 (suitable for TFP-58P/059, -68P/059, -168P/059, -188P/059)
ESP-C1"-083	for Tri-Clamp 1"...1½" (suitable for TFP-58P/083, -68P/083, -168P/083, -188P/083)
ESP-V-25-037	for Varivent DN25 (suitable for TFP-58P/037, -68P/037, -168P/037, -188P/037)
ESP-V-40-037	for Varivent DN40 (suitable for TFP-58P/037, -68P/037, -168P/037, -188P/037)
ESP-V-40-059	for Varivent DN40 (suitable for TFP-58P/059, -68P/059, -168P/059, -188P/059)

Surface

0.8	($R_a \leq 0.8$ µm, standard)
0.6	($R_a \leq 0.6$ µm)
0.4	($R_a \leq 0.4$ µm)

Delta Ferrite

X	(standard: DF < 1 % - class 2)
DF	(DF < 0.5 % - class 3)
BN	(DF < 0.5% - Baseler Norm II)

ESP-B-25 / 059 / 0.8 / X

Option

RAC	certificate surface quality incl. measurement protocoll
DFC	certificate delta-ferrite incl. measurement protocoll

Spare parts




	Flat seal	Sealing ring for ESP-B	Sealing ring for ESP-V	Sealing ring for ESP-C	
1"				M55.031001	
DN25	**M26.014051**	**M26.024033**	M26.042033		
DN40			M26.062033		
DN50		**M26.042033**			
DN65		**M26.062033**			

Surface quality

In order to provide favourable conditions for sterile production, the surface must be smooth and non-porous down into the microscale range. Overlapping areas, or material laminations, must be avoided as far as possible on account of the dead spaces that result, since these areas are difficult or impossible to clean and therefore represent ideal breeding grounds for germs and bacteria.

Moreover, the dimensions (including height!) must be kept as small as possible to minimise the influences of the surfaces in contact with the product. Such surfaces can be obtained by means of electropolishing. In the pharmaceutical sector, but not only there, the quality of the surface is generally defined in terms of the "R_a"-roughness. A surface with $R_a \leq 0{,}8$ µm is normal, in special cases also $R_a \leq 0{,}6$ µm and even $R_a \leq 0{,}4$ µm. All these qualities can be achieved by machining appropriately good quality steels and electropolishing them for a sufficiently long period of time. R_a is the arithmetic average of all protuberances on the surface y over a certain measurement distance L in the x-direction.

Inspecition certificate

Delta Ferrite

The higher the delta ferrite content (DF), the more magnetic phases are present in the austenitic structure. These arise as a result of thermal effects, e.g. during welding and turning. The strain-induced martensite that is formed here leads to increased susceptibility to corrosion for the workpiece and is therefore undesirable.

According to DIN 11866 Table B.1 differentiation can be made between three DF classes:

- Class 1: < 3.0 % delta ferrite in the as-supplied state
- Class 2: < 1.0 % delta ferrite in the as-supplied state
- Class 3: < 0.5 % delta ferrite in the as-supplied state

In order to achieve DF Classes 2 and 3, the tubes must in general be "solution annealed" before delivery. The solution annealing takes place at temperatures between 1020 °C and 1150 °C, depending on the material.
1.4435 stainless steel has a reduced delta ferrite content much lower than 1 % compared with 1.4404. The increase caused by welding processes can be minimised by the use of suitable welding materials, shielding gas, and the correct current, so that the delta ferrite content at least remains below 3 %. If the whole work piece is required to have a delta ferrite content less than 0,5 %, it must be ordered in accordance with "Baseler II Norm".
The reduction of the delta ferrite must not be too excessive, however, because with too low a content there is a tendency for the stainless steel to form cracks during machining or welding.

Inspecition certificate

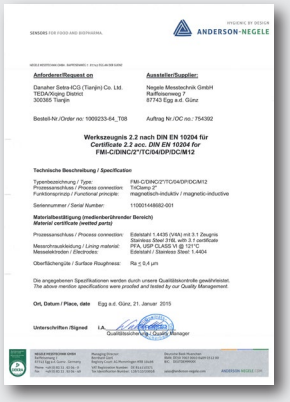
ASME

In the pharmaceutical sector one often comes across the requirement to deliver tubes to meet ASME. In most cases what is meant here is simply the tube dimensions with regard to diameter and wall thickness. In this event ASME is identical with the ODT dimensions.
However, ASME BPE also defines a minimum and maximum content for elemental sulphur, which in fact must lie between 0.005 % and 0.017 %. According to ASME regulations this requirement applies, however, just to tube ends that are still to be automatically welded, and not to those that are already welded. The definition of a certain range for the sulphur content makes total sense, since parts with strongly differing sulphur content would deflect the arc during welding and as a result would lower the quality of the weld seam.
Otherwise, the value prescribed in the German Key to Steel or the value defined in AISI for 316L of 0.030 % sulphur content applies.
Comment: ASME BPE specifies not only the sulphur content of the work piece, but also the contents of other materials contained in the steel such as nickel, molybdenum, etc. These, however, essentially correspond to the values in the German Key to Steel, which applies in Europe.

FDA

The „Food and Drug Administration" (FDA) is a US authority that issues approvals for agents, foodstuffs, cosmetics and pharmaceutical products. In addition, it generates recommendations for the use of materials in facilities in the foodstuffs and pharmaceutical industries. This supplementary task is administered because the individual components, materials and design details have significant influence on the quality of the end product.
An "FDA Approval" can only be issued for a product generated in the particular facility in question. For components and materials there is no FDA approval; these parts are "FDA listed" in terms of their innocuousness if in direct contact with the product.
The FDA directives are published as so-called „Codes of Federal Regulations" (CFR...). The 21 CFR 170 – 199 directives have a special significance, in particular with regard to material selection for sensor manufacturers. They contain a listing of specifications for plastics. Thus, 21 CFR 177.2415, for example, contains the plastic PEEK that is often used in the food and pharmaceutical market sectors.

FDA certificate


ANDERSON-NEGELE

Werkszeugnis 2.2 nach DIN EN 10204 für
Certificate 2.2 acc. DIN EN 10204 for
FMI-C/DINC/2"/TC/04/DP/DC/M12

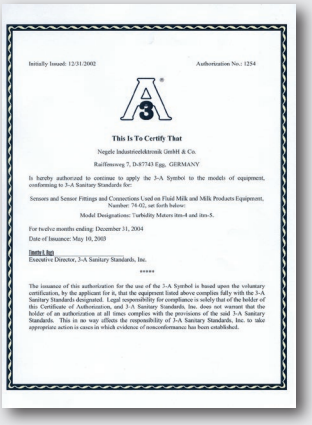
3-A Sanitary Standards

In 1920 three US associations published directives for milk pipe connections. Hence the name 3-A, for 3 Associations.

These organisations are:
- International Association of Milk, Food and Environmental Sanitarians (IAMFES)
- United Public Health (UPH)
- Dairy Industry Committee (DIC)

In 1944 the body of regulations, which in the intervening period had become more comprehensive, was accredited by the US Government. Over 50 standards have been published, primarily for the milk industry. Other sectors, in particular the pharmaceutical industry, are oriented towards these standards or prescribe them as mandatory.

3-A certificate


Initially Issued: 12/31/2002 Authorization No.: 1254

This Is To Certify That

Negele Industrieelektronik GmbH & Co.

Raiffeisenweg 7, D-87743 Egg, GERMANY

Is hereby authorized to continue to apply the 3-A Symbol to the models of equipment, confirming to 3-A Sanitary Standards for:

Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number: 74-02, set forth below:

Model Designations: Turbidity Meters itm-4 and itm-5.

For twelve months ending: December 31, 2004

Date of Issuance: May 10, 2003

Executive Director, 3-A Sanitary Standards, Inc.

Advice

Certificates can be ordered as option.
See options on page 5, 8, 9, 11.

Conditions for a measuring point according to 3-A Sanitary Standard 74-06

- Suitable temperature sensors of type TFP don't need a 3-A approval, because they have no contact to the media.
- ESP-G diameter ≥ DN25, ISO 20 and ASME 1", ESP-E, ESP-C and ESP-V.
- The weld must comply to the requirements of the current 3-A Sanitary Standard.
- Mounting position, self draining and the position of the leackage hole must be in accordance to current 3-A Sanitary Standard.

Transport/Storage

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -55...+90 °C
- Relative humidity maximum 98 %

Reshipment

- Sensors and process connection shall be clean and free of media or heat-conductive paste and must not be contaminated with dangerous media!
- Use suitable transport packaging only to avoid damage of the equipment!

Cleaning/Maintenance

- In case of using pressure washers, dont't point nozzle directly to electrical connections of built-in sensors!

Standards and guidelines

- You have to comply with applicable regulations and directives.

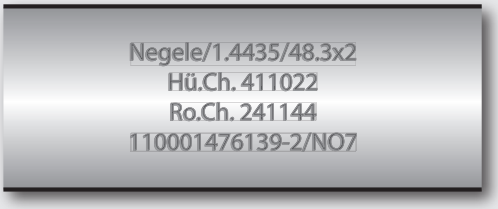
Identification of measurement point

The pipes are labeled with following informations:

· Material
· Pipe dimensions
· Charge number of the pipe
· Charge number of the weld-on bushing
· Serial number

The weld-on bushings are labeled with following informations:
· Material
· Charge number

Pipe labeling

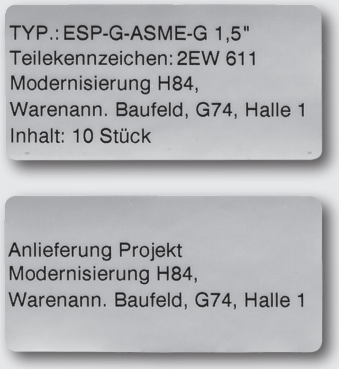


Weld-on bushing labeling

Customized labeling of package

The Package can be labeled with cutomized informations on request.

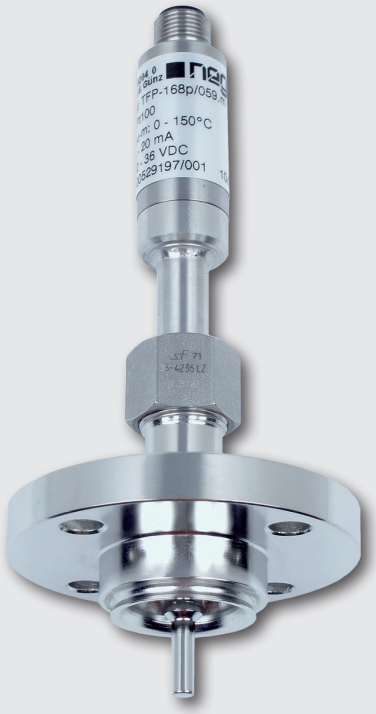
Example package labeling



Information

The build-in system ESP is used for temperature measurement with temperature sensors type TFP-58P, TFP-68P, TFP-168P and TFP-188P.

TFP-168P with ESP-B-50/059



TFP-68P with ESP-G-...-25

TFP-58P with ESP-E-083-00

NEGELE MESSTECHNIK GMBH
Raiffeisenweg 7
87743 Egg an der Guenz

Phone +49 (0) 83 33 . 92 04 - 0
Fax +49 (0) 83 33 . 92 04 - 49
sales@anderson-negele.com

Tech. Support:
support@anderson-negele.com
Phone +49 (0) 83 33 . 92 04 - 720