

INSTALLATION – USE – MAINTENANCE FOR PRESSURE GAUGES

THE FOLLOWING RECOMMENDATION/NOTES HERE BELOW MENTIONED HAVE BEEN EXCERPTED FROM EN 837/1/2/3 e ANSI B40.1

“P.E.D.” CONFORMITY

97/23/EC

GENERAL NOTE

DELTA CONTROLS Ltd. pressure gauges have been designed and manufactured in strictly conformity to the safety requirements stated on the current international regulations.
In particular meets the criterion of the 97/23/EC (P.E.D.) directive for the following two categories:
- pressure up to 200 Bar – designed and manufactured in accordance with the so called “Sound Engineering Practice” and the mark **CE** is not required
- pressure over 200 Bar – designed and manufactured in conformity with the PED safety requirements, are classified under the Category 1 and are certified as per Form A. The pressure dial must bear **CE** the logo.
The recommendations and the notes here below stated, which the user must know for a correct installation to the safety purpose, are an excerpt of what stated into the EN 837/1/2/3 and ANSI B40.1 standard
Carefully select the instruments considering their use and installation on the under pressure process, with the purpose to get the highest possible safety degree and comply with the maintenance procedure suggested by the manufacturer
Technical spec sheet for a correct selection of the instruments, see our web site.
The final user is the only responsible for a correct installation and maintenance of the instruments
The choice of correct instruments and their installation must be done by qualified people, able to evaluate any process aspect who may preclude a correct operation of the instruments and consequently avoiding possible failure and anomaly.

ATEX CONFORMITY

DELTA CONTROLS Ltd is able to delivery, when required, instruments manufactured in accordance with the directive

94/9/EC

in compliance with
group II - category 2 G/D

SAFETY ASPECT, SELECTION CRITERIA OF PRESSURE GAUGES

As per UNI EN 837/1/2/3 paragraph 4.2.2 standard here below stated it's suggested to select the proper type if instrument with suitable safety degree related to the specific application. DELTA CONTROLS pressure gauges belong to code S1 when are fitted with safety blow out plug which open as soon as the pressure into the case is exceeding a certain safety value discharging it to the atmosphere and are of code S3 when the back discharge is a full case blow out disc (pressure gauges solid front type) which is a further protection for the operator.

| Process fluid under press | Liquid | | | | Gas or steam (see note 1) | | | |
|----------------------------|--|-------|--------|-------|---------------------------|-------|--------|-------|
| | Dry | | Liquid | | Dry | | Liquid | |
| Case filling | < 100 | > 100 | < 100 | > 100 | < 100 | > 100 | < 100 | > 100 |
| Normal diameter | < 25 | > 25 | < 25 | > 25 | < 25 | > 25 | < 25 | > 25 |
| Pressure range (bar) | 0 | 0 | 0 | 0 | S1 | S1 | S1 | S3 |
| Safety design minimum code | 0 | 0 | 0 | 0 | S1 | S1 | S2 | S3 |
| Safety design code | 0 Pressure gauges without any safety device S1 Pressure gauges with safety device S2 Safety pressure gauges without buffer wall S3 Safety pressure gauges with buffer wall (high level of safety is guaranteed) | | | | | | | |
| Note 1 | All pressure gauges for oxygen and acetylene measuring must be of safety execution | | | | | | | |
| Note 2 | Pressure gauges glycerine filled must not use measuring oxygen or other process fluids high oxidising. For those applications pressure gauges must be filled with fluorine or chlorine based filling. | | | | | | | |
| Note 3 | This prospect is showing the current safety design code. The user must know their special requirements and they may use safety pressure gauges even if process pressure lower than 25 bar. | | | | | | | |

OPERATING PRESSURE

The selected instrument should have the full scale value in such a way that operating pressure is contained between the 25% and the 75% of the said full scale. A good practice is to select a pressure gauge with a full scale pressure two time the intended operating pressure. In case the pressure gauge dial has a black triangle at end scale this means the operating pressure could be raised up to 90 % of f.s. for fluctuating pressures and up to 100 % of f.s. for steady pressure.

PULSATING PRESSURE

They normally occur in application with pumps, compressors, etc. and are cause of movement wear as well as a potential failure of the sensing element due to the fatigue stress. It's suggested to place a pressure snubber between the socket and the process pressure side.

It's likewise suggested to fill the pressure gauge case with proper dampening fluid which reduce the harmful effect of the pulsation on both the movement and the sensing element.

OVERPRESSURE

Any abnormal overpressure may cause stress to the sensing element, consequently instrument life is compromised, accuracy and repeatability are affected too. It's then suggested to select a pressure gauge where the f.s. value is greater than the max operating pressure, which consequently may easily absorb potential overpressure and pick pressure who may cause the same harmful effect on the sensing element. For such applications it's suggested then to protect the pressure gauge with an automatic overload protector (pressure limiting valve).

WETTED PARTS MATERIAL EXPOSED TO PROCESS MEDIUM

Carefully select the material of the sensing element taking into account the chemical compatibility with the process fluid. If any of the sensing element current material is suitable then must be considered to fit the pressure gauge with a diaphragm seal which are available with a variety of exotic material.

USE IN OXYGEN CIRCUIT

Pressure gauges suitable for oxygen service, the dial shall be clearly marked in red colour: oxygen-use no oil- and a crossed-out oil can.
For such execution the pressure gauges are manufactured with a suitable cleaning and degreasing procedure, packed in a single sealed plastic bag, with pressure port protected by cap.
The final user must guarantee to keep such cleanness until the installation.

VIBRATIONS

When the installation produce severe vibrations various solution may be choose, such as :
- select pressure gauges with case liquid filled
- install the instruments at a distance from vibration sources and connect the pressure gauge with flexible pipe.

MECHANICAL SHOCK

Must be avoid as much as possible, the instrument must be installed at a distance, in a free area, and connected to the pressure source with flexible pipe.

LIQUID FILLED PRESSURE GAUGES

It has been general practice to use glycerine or silicone filling fluids Care has to be taken to select proper filling fluid, depending on the process fluid to be measured, to the ambient temperature where the pressure gauges is use to work. If the application is to measure oxidizing process medium such as oxygen, chlorine,

nitric acid, hydrogen peroxide, etc. potential hazard can result from chemical reaction, ignition or explosion. Complete fluorinate and/or chlorinate filling fluids may be suitable for such application. As far as concern the ambient temperature select the filling fluid in accordance with the below table:

DAMPING LIQUIDS

| Damping liquids | Limit ambient temperature |
|-----------------|----------------------------|
| Glycerine | +10...+60°C (+50...+140°F) |
| Silicone oil | -30...+60°C (-22...+140°F) |
| Fluorolube | -50...+60°C (-58...+140°F) |

PROCESS FLUID TEMPERATURE

To protect a pressure gauge from too high process fluid temperature (over 60 °C) it's suggested to fit a siphon or similar device in a way to get the fluid coming into the sensing element condensate. A siphon or similar device must always be set as close as possible to the pressure gauge, filled with condensed fluid before the system is pressurized, to avoid that the hot process fluid reach the pressure gauges during the start up. Make sure that the process fluid must not frozen or crystallize inside the sensing element. For very high process temperature it's suggested to connect the pressure gauge to the process source by piping with O.D. of approx 6 mm, length 2 meters, which will fall down the process temperature at a value close to the ambient temperature.

When the process fluid composition or their temperature does not permit the connection with small diameter pipe it's often necessary to fit to the pressure gauge a diaphragm seal, make sure that the diaphragm seal filling fluid is suitable with the process fluid temperature.

TRANSPORT

Check before the installation that the instrument have not been damaged during transport, check that the pointer fall into the zero band, Pointer not returning to zero position means a significant damage to the instruments who must not installed and must be check for correct calibration.

INSTALLATION

Final user must make sure before the installation that the selected pressure gauge is the correct one and also that range and features are correct. It's suggested to fit between the pressure gauge and the process side an isolating valve which will make easier any removal for maintenance or replacement.

The process connection must be proof pressure :

- pressure gauges with socket parallel thread : sealing to the pressure is achieved on the top flat face by means of a ring gasket of proper material suitable with the process fluid data
 - pressure gauges with taper thread : sealing to the pressure is achieved by threading coupling, it's common practice to wrap a PTFE tape around the male thread of the pressure gauge socket before coupling
 - pressure gauges with flanged connection must be installed in accordance with the recommendation of the pertaining rules
- In case of direct mounting pressure gauges with threaded socket the torque must be applied to the socket flats with a spanner, where available another spanner must be set to the process side female nut. Never use the pressure gauge case as tightening point, any case distortion may cause inner damage to the sensing element or movement. At start up make sure the socket is pressure tight. All the pressure gauges dial must be vertically, any other position must be stated on front dial When pressure gauges include a safety device (blow out disc) or a back safety device system (solid front) it must be guarantee a minimum space of 20 cm from the nearest solid object. For the panel mounting or the wall mounting design make sure that the process fluid pipe is coupled with the pressure gauge socket smoothly, without any torque or tensions.

LIQUID COLUMN EFFECT

Final user must know the fact that to the pressure gauges is applied the charge originate from the liquid column, the pressure gauge has then to be calibrated accordingly by compensating the column effect, the value of such compensation has to be mention on the dial.

ZERO POINTER READING

It's not suggested to use the pressure gauges to check value close to the zero pressure value because in this area the accuracy may be inaccurate. For this reason pressure gauges must not be use to check possible residual pressure inside tank or container of high volume because, despite the pressure gauge may show zero pressure, could have been left inside the tank a danger pressure for the operator.

AMBIENT TEMPERATURE

It's difficult to isolate the pressure gauge from an ambient temperature too high or too low. A solution consist on keep away the pressure gauge from the cool or hot sources, when available. When pressure gauges with accuracy 0,6% or better is used at ambient temperature different from the reference temperature of 20°C (+/- 2 °C) proper correction must be applied.

REUSE OF PRESSURE GAUGES

It's not recommended that pressure gauges be moved from one application to another because system may have different process fluids. This may cause chemical reactions, explosions due to the contamination of the wetted parts. Remainder of the process fluid contained in the pressure sensing element may be hazardous or toxic. Take good care of this occurrence when handling and storing the removed pressure gauges to avoid personal injuries.

OPERATION CHECK THROUGH THE INDICATING POINTER

Make sure that an unfailling dial pressure indication of the pointer for a long time, anomalous, is not due to the clogging of the socket hole which inlet the pressure to the sensing element. Especially if the pressure gauges pointer show zero make sure that there is not pressure left inside of the pressurized system before removing the pressure gauge.

CLEANING

Some applications require that pressure gauges are needed with special cleaned execution. In this case the final user must check that the pressure gauge is correctly specified and installed (for example: pressure gauges free of oil for oxygen applications).

MAINTENANCE

In most application the general safety of an installation or process plant often depend on the operating conditions of the instrumentation which control it. Reliability of the instruments is essential for safety purpose. Any instrument who may send to the operator not perfectly operating must be removed from the application and check for calibration. Pressure gauges accuracy must be assured by scheduled check Check and recalibrations must be done by qualified personnel, by using proper test equipments. The calibrating fluids must be compatible with the process fluid. Fluid containing hydrocarbon must not be used when process medium is oxygen or others oxidising media. Instruments kept in its original standard packing (carton box) must be settled in a dry close room , the suggested storage temperature should be between -30 to + 60 °C, if not differently stated on catalogue sheet.

PRESSURE GAUGES FITTED WITH ELECTRICAL CONTACT

DELTA CONTROLS Ltd will supply upon request, the conformity declaration relating to electric contact assembled to gauges:

- snap action contacts – conformity to CEE 72/23;
- electronic contacts – TURK conformity N° 2070;
- inductive contacts – PTB 99 ATEX 2219 X.

WARNING

The company DELTA CONTROLS LTD declines all responsibility for any direct or indirect damage to property or person as well as for the consequences, for example, of lost production resulting from failure to observe the instructions in this leaflet, and all informations of our catalogue, see our web site.