BRITISH STANDARD

BS EN
837-2 : 1998

Pressure gauges

Part 2. Selection and installation recommendations for pressure gauges

The European Standard EN 837-2 : 1997 has the status of a British Standard

ICS 17.100

National foreword

This British Standard is the English language version of EN 837-2 : 1997 published by the European Committee for Standardization (CEN).

The UK participation in its preparation was entrusted by Technical Committee GEL/65, Measurement and control, to Subcommittee GEL/65/2, Elements of systems, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 6, an inside back cover and a back cover.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 March 1998

ISBN 0 580 28894 3

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 837-2

March 1997

ICS 17.100

Descriptors: Metrology, measuring instruments, pressure measurements, manometers, specifications, choice, storage, installation, maintenance

English version

Pressure gauges — Part 2: Selection and installation recommendations for pressure gauges

Manomètres — Partie 2: Recommandations sur le choix et l'installation des manomètres

Druckmeßgeräte — Teil 2: Auswahl- und Einbauempfehlungen für Druckmeßgeräte

This European Standard was approved by CEN on 1997-01-31. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 837-2 : 1997 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 141, Pressure gauges — Thermometers — Means of measuring and/or recording temperature during the distribution of refrigerated, frozen and quick-frozen products, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1997, and conflicting national standards shall be withdrawn at the latest by September 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This European standard consists of the following parts, under the general title *Pressure gauges*:

Part 1 : *Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

Part 2 : *Selection and installation recommendations for pressure gauges*

Part 3 : *Diaphragm and capsule pressure gauges — Dimensions, metrology, requirements and testing.*

Contents

		Page
Foreword		2
0	Introduction	3
1	Scope	3
2	Normative references	3
3	Definitions	3
4	Selection	3
5	Transport	4
6	Storage prior to installation	4
7	Installation	4
8	Putting into service	6
9	Maintenance	6

0 Introduction

Pressure gauges are instruments used for pressure measurement which implies:

– the selection of a gauge suited to the conditions of use;

– the respect of a certain number of rules and precautions concerning:

· storage;

· installation;

· safety in view of the service conditions;

· maintenance.

1 Scope

This European standard only applies to those pressure gauges whose pressure responsive element measuring system is a metal part which deforms under the effect of the pressure measured, as defined in EN 837-1 and EN 837-3.

This standard has been prepared to assist in the selection, installation and use of pressure gauges to ensure that they give satisfactory service for the intended application with the maximum level of safety.

2 Normative references

This European standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any these publications apply to this part of this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 472 : 1994 *Pressure gauges — Vocabulary*

EN 837-1 : 1996 *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

EN 837-3 : 1996 *Pressure gauges — Part 3: Diaphragm and capsule pressure gauges — Dimensions, metrology, requirements and testing*

3 Definitions

For the purpose of this European Standard the definitions given in EN 472 apply.

4 Selection

Following criteria should be considered:

4.1 Selection of pressure sensitive element

The type of pressure responsive element may be selected according to the following table 1.

4.2 Safety

4.2.1 *Pressure range*

The range should be such that the maximum working pressure does not exceed 75 % of the maximum scale value for steady pressure or 65 % of the maximum scale value for cyclic pressures.

4.2.2 *Safety design*

The safety design shall be selected in consideration of safety requirements of the specific applications.

Criteria for the selection of pressure gauges with Bourdon tube are given in table 2.

For diaphragm and capsule gauges normally there are no specific requirements but the manufacturer should be consulted where special conditions may apply: for instance possibility of high pressure overload.

NOTE. Capsule and diaphragm gauges are not recommended for oxygen and acetylene use. However, where absolutely necessary, consultation between user and manufacturer is required.

4.3 Materials

Pressure gauges are manufactured with pressure responsive elements that can be made from various materials. It is therefore necessary to choose from these materials the one best suited to the type of process fluid and its pressure. The purchaser shall indicate to the manufacturer all information concerning the materials which are compatible with the fluid in relation to the specific conditions of measurement.

If none of the standard materials are suitable, it shall be necessary to interpose a separator between the process fluid and the pressure gauge.

The filling of a chemical seal pressure gauge assembly shall always be done by the manufacturer and these two instruments shall never be uncoupled.

Table 1.

Reference of the standard	Type of pressure gauge	Pressure range	Process fluid			
			Gas or steam	Liquid		
				Low viscosity	High viscosity	Polluted
EN 837-1	Bourdon tube	0,6 bar to 1600 bar	x	x	1)	1)
EN 837-3	Diaphragm	2,5 mbar to 25 bar	x	x	x	x
EN 837-3	Capsule	1 mbar to 600 mbar	x	x2)		

1) Separators should be used.

2) The capsule and the pipe shall be fully filled with the liquid.

Table 2. Criteria for selection of pressure gauges with Bourdon tube (safety aspect)

Pressure fluid	**Liquid**								**Gas or steam** (see note 1)							
Case filling	**Dry**				**Liquid**				**Dry**				**Liquid**			
Nominal size	< 100		≥ 100		< 100		≥ 100		< 100		≥ 100		< 100		≥ 100	
Pressure range (in bar)	≤ 25	> 25	≤ 25	> 25	≤ 25	> 25	≤ 25	> 25	≤ 25	> 25	≤ 25	> 25	≤ 25	> 25	≤ 25	> 25
Minimum safety design code	0	0	0	0	S1	S1	S1	S1	0	S2	S1	S3	S1	S2	S1	S3

Safety design codes :

0 Gauge without blow-out device
S1 Blow-out device gauge
S2 Safety pattern gauge without baffle wall
S3 Safety pattern gauge with baffle wall (providing a higher level of safety)

NOTE 1. All oxygen and acetylene gauges shall be safety pattern gauges.
NOTE 2. Glycerine filled gauges shall not be used with oxygen or other strong oxidizing process fluid. For such applications, highly fluorinated and chlorinated liquids can be used.
NOTE 3. This table indicates the normal safety design code. Users must have cognizance of their special requirements and may use safety pattern gauges at pressures lower than 25 bar.

4.4 Accuracy

The accuracy class required shall be selected from EN 837-1 or EN 837-3.

4.5 Pressure connection

The pressure connection shall be selected from EN 837-1 or EN 837-3.

Other connections specific to certain industries and applications shall be specified.

4.6 Nominal size

The size of gauge required shall be selected from EN 837-1 or EN 837-3.

4.7 Mounting

Type of mounting required shall be selected from EN 837-1 or EN 837-3.

4.8 Other criteria

If the application involves pressure pulsations, vibrations, extremes of temperature, shock loading, solids in suspension, viscous or chemically aggressive pressure fluid, hostile environment, or requires correction for a static head, the manufacturer shall be consulted.

5 Transport

Certain modes of transport may be incompatible with certain types of pressure gauges (for instance: high precision gauges or gauges with sensitivity to variations of atmospheric pressure). In these cases, the customer shall leave the manufacturer with free choice of the means of transport, even the free choice of the carrier.

6 Storage prior to installation

Gauges should be stored in dry, clean conditions within the temperature range of −40 °C to +70 °C and protected against any impact damage.

7 Installation

7.1 General

The user shall ensure that the correct gauge has been selected and has the correct range and construction.

If necessary an isolating valve shall be inserted to facilitate removal for maintenance.

Pressure connections shall be leak tight:

– gauges with parallel threads: The pressure seal is made on the sealing face using a sealing washer which is compatible with the fluid (see figure 1a);

– gauges with tapered threads: The pressure seal is normally made by the mating of the thread, but it is common practice to apply jointing material to the male thread before assembly. The jointing material shall be compatible with the fluid (see figure 1b);

– diaphragm gauges with flange connection should be fitted in accordance with recommendations from the relevant standards;

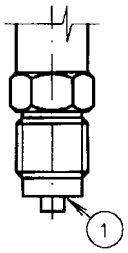
– direct mounting gauges should have the tightening torque applied to the connection by means of a spanner applied to the flats on the shank of the gauge. When tightening the pressure connection of a surface or flush mounted gauge, the tightening torque applied to the connection should be opposed by a spanner fitted to the flat on the shank of the gauge to prevent damaging the gauge or its mounting points.

Do not tighten by grasping the case of the gauge as this may cause damage.

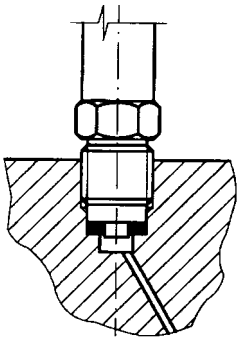
When first applying pressure, the leak tightness of the connection shall be checked.

All gauges shall be mounted vertically unless marked on the dial (see EN 837-1 or EN 837-3).

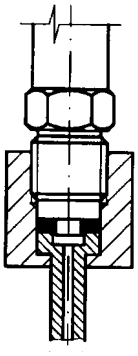
When the gauge incorporates a blow out device or blow-out back, a minimum distance of 20 mm from any obstacle shall be ensured.



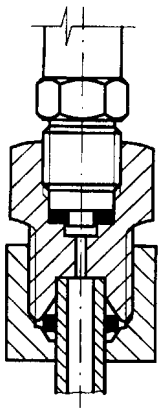
(1) Pressure joint shall be made on this face only by means of the correct type sealing washer



(2) Direct mounting

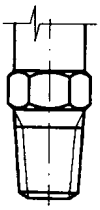


(3) Union nut and tailpipe connection

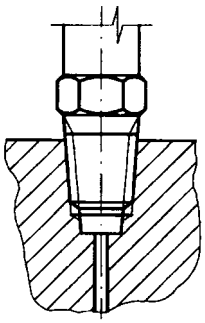


(4) Compression fitting adaptor

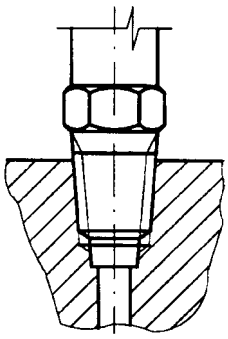
Figure 1a. Parallel thread connections



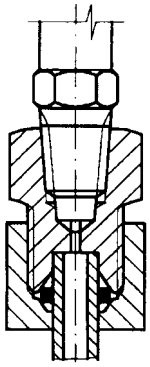
(5) Pressure joint shall be made on the thread only. A suitable jointing material may be applied to the threads.



(6) Direct mounting flat bottom hole



(7) Direct mounting through hole



(8) Compressiong fitting adaptor

Figure 1b. Taper thread connections

Figure 1. Correct methods of making pressure connections

7.2 Special conditions

7.2.1 *Mechanical shocks*

Pressure gauges shall not be subject to mechanical shocks. If installations are subject to mechanical shocks, gauges shall be mounted remotely and connected by flexible pipe.

7.2.2 *Vibrations*

When the actual support of the pressure gauge is subject to vibrations several solutions may be considered:

– use of liquid filled pressure gauges;

– when vibrations are large scale or random, it is preferable to proceed as for mechanical shocks, as defined in **7.2.1**.

The presence of vibrations may be detected by continuous oscillations, often irregular, of the tip of the pointer.

7.2.3 *Pressure pulses*

These are generally present when pressure gauges are installed on pumps. They are the cause of a considerable reduction of the life of the pressure responsive element and movement of the pressure gauge.

They are generally indicated by the large amplitude of the pointer oscillations. It is necessary to reduce these pulses of pressure by interposing a damper between the pressure source and the pressure responsive element.

7.2.4 *Overpressure*

Any overpressure creates stress in the pressure responsive element and consequently reduces its life and accuracy.

It is therefore always preferable to use an instrument whose maximum scale value is greater than the maximum working pressure and which will consequently absorb overpressure and surges more easily (see **4.2.1**).

Surges can be handled in the same way as pressure pulses. Longer overpressures can be overcome by installing an overrange protection system.

7.2.5 *Temperature*

7.2.5.1 *Ambient temperature*

It is difficult to shield a pressure gauge from an ambient temperature that is too high or too low. One solution consists of moving the gauge away from the source of heat or cold when possible.

A correction shall be applied when a gauge accuracy class 0,6 or better is used at an ambient temperature different from the reference temperature (20 °C ± 2 °C).

7.2.5.2 *Fluid temperature*

To protect a pressure gauge from a fluid which is too hot, a siphon or a similar device may be inserted so as to provide condensed fluid in the pressure responsive element. A siphon or a similar device shall always be placed close to the pressure gauge and be filled with condensate before the installation is pressurised in order to avoid the hot fluid reaching the gauge on the initial pressurisation.

The fluid in the pressure responsive element shall not be allowed to freeze or crystallize.

When the temperature of the fluid cannot be modified, it is often necessary to insert a separator between the process fluid and the gauge provided the buffer fluid used is capable of withstanding the temperature of the process fluid.

7.2.6 *Cleanliness*

Certain applications require gauges which are purchased specially cleaned. In such instances the user shall ensure that the instrument is correctly specified and installed (for example: oxygen service pressure gauge oil free)

7.2.7 *Effect of liquid columns*

The installer shall be aware that if a static head of liquid is acting on the gauge, it shall have been calibrated accordingly and the compensation marked on the dial.

8 Putting into service

An installation shall always be brought into service carefully to avoid surges or sudden variations in temperature. Isolating valves shall therefore be opened slowly.

9 Maintenance

The overall safety of an installation often depends on the operating condition of the pressure gauges it contains. It is essential that the measurements indicated by these gauges are reliable.

Thus any pressure gauge whose indications appear to be abnormal shall be immediately removed, verified or recalibrated if necessary.

Confirmation of gauge accuracy should be maintained by periodic testing.

Verification and recalibration shall be carried out by competent personnel using appropriate test equipment.

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL