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# Gas Infrastructure — CEN/TC 234 Pressure Definitions — Guideline Document

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# National foreword

This Published Document is the UK implementation of CEN/TR 16395:2023. It supersedes PD CEN/TR 16395:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/33, Gas supply.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

# Gas Infrastructure - CEN/TC 234 Pressure Definitions - Guideline Document

Infrastructures gazières - Définitions des pressions du CEN/TC 234 - Lignes directrices

Gasinfrastruktur - CEN/TC 234 Druckdefinitionen - Leitliniendokument

This Technical Report was approved by CEN on 13 November 2023. It has been drawn up by the Technical Committee CEN/TC 234.

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## European foreword

This document (CEN/TR 16395:2023) has been prepared by Technical Committee CEN/TC 234 “Gas Infrastructure”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TR 16395:2012.

In comparison with the previous edition, the following modifications have been made:

— updating the scope for the alignment with the current scope of CEN/TC 234;

— updating of titles of the documents in the bibliography;

— addition of new documents published by CEN/TC 234 in the bibliography;

— updating of the reference to PED in term 3.3.1;

— introduction of a new clause on pressure units in CEN/TC 234 European Standards;

— editorial alignment of the wording to the current CEN drafting rules for Technical Reports.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

# Introduction

## Background

The standards issued by CEN/TC 234 "Gas Infrastructure" contain a large number of definitions used for the design, testing and operation of the different parts of the gas infrastructure.

This document clarifies the CEN/TC 234 concept behind the pressure definitions and advises how to use the pressure definitions correctly and consistently. In order to further that goal an inventory of existing definitions is made and the primary definitions are identified.

This document also gives guidance for the selection of components falling into the scope of the European Pressure Equipment Directive (PED) [1] and used in the gas infrastructure.

Apart from the issue of the consistency of the pressure definition in the standards there is also the issue of the pressure rating of equipment and systems. Other classifications (e.g. PN or class) do not necessarily completely coincide with the classification as defined in the CEN/TC 234 standards.

Operating pressures levels of the gas infrastructure are different from one country to another in EU, because of many different factors such as history of gas systems, technologies and materials used or technical constraints.

When starting drafting the functional standards on gas infrastructure, CEN/TC 234 recognized various pressure levels and ranges in the European member countries, which are to some extent laid down in national laws.

To form a consensus for the standardization work, all pressure levels used in Europe have been brought together and classified in ranges. This subdivision in pressure levels also permits the manufacturers of components to focus on a limited number of designs in order to reduce the costs.

## Concept of pressure conditions

On one hand three different sets of pressure conditions are to be considered:

— conditions during testing and commissioning ($P_1$);

— conditions during exceptional operating circumstances ($P_2$);

— conditions during normal operation ($P_3$).

where:

$P_1 > P_2 > P_3$

The maximum pressure levels related to these conditions are the topic of the primary definitions.

On the other hand two other pressure conditions are used for specifying the system:

— pressure on which design calculations are based ($p_A$);

— pressure rating of the system ($p_B$).

where

$p_A > p_B$.

The relationship between $p_A$ and $P_2$ or $P_3$ is not uniform in the different CEN/TC 234 standards. This situation is confusing and undesirable. The recommended practice is stated in 4.4 and 4.5.

**Piping versus pressure regulating installations**

Only two out of the three aforementioned conditions apply when specifying piping:

— conditions during testing and commissioning;

— operating conditions.

Normally for piping no distinction is made between normal operating conditions and exceptional operating conditions, as piping is a passive component. However, in gas infrastructure piping and pressure regulating installations both are present. This necessitates identification of the “normal operating conditions” and “exceptional operating conditions” of the pressure regulating installations and the “operating conditions” of the piping.

# 1 Scope

This document gives explanation on the pressure definitions and pressure units used by the gas network operators with regard to the standards of CEN/TC 234 "Gas Infrastructure".

The European Standards of CEN/TC 234 cover the field of gas pipeline infrastructure for gaseous energy carriers and blends thereof from the input into the on-shore transmission network up to the inlet connection of gas appliances; This includes related functional requirements for injection, transmission, compression, pressure control, storage, blending, gas treatment, odorisation, distribution, measuring, and associated installation pipework, as well as related requirements such as safety, gas quality, sustainability, environment and emissions.

Within the scope of CEN/TC 234, gaseous energy carriers and blends describe gases which are in the gaseous state when conveyed in the gas pipeline infrastructure such as hydrogen, hydrogen rich, and methane rich gases, dimethyl ether (DME) and propane and butanes used for combustion and/or as feedstock, excluding steam and compressed air.

# 2 Normative references

There are no normative references in this document.

# 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

## 3.1 Key pressure definitions used in CEN/TC 234 standards

**3.1.1**
**design pressure**
**DP**
pressure on which design calculations are based

Note 1 to entry: A system designed for a design pressure DP can comprise components designed for a different maximum allowable pressure (PS).

**3.1.2**
**maximum operating pressure**
**MOP**
maximum pressure at which a system can be operated continuously under normal operating conditions

Note 1 to entry: Normal operating conditions are: no fault in any device or stream.

Note 2 to entry: The set point of the regulator does not exceed MOP.

**3.1.3**
**maximum incidental pressure**
**MIP**
maximum pressure which a system can experience during a short time, limited by the safety devices

## 3.2 Derived pressure definitions used in CEN/TC 234 standards

**3.2.1**
**operating pressure**
**OP**
nominal pressure on which the system is operated

**3.2.2**
**temporary operating pressure**
**TOP**
pressure at which a system can be operated temporarily under control of regulating devices

**3.2.3**
**test pressure**
**TP**
pressure at which pressure tests are conducted

**3.2.4**
**strength test pressure**
**STP**
pressure applied to a system during strength testing

**3.2.5**
**tightness test pressure**
**TTP**
pressure applied to a system during tightness testing

**3.2.6**
**combined test pressure**
**CTP**
pressure applied to a system during combined testing, i.e. tightness and strength testing

## 3.3 Commonly used pressure definitions in European product standards

**3.3.1**
**maximum allowable pressure**
**PS**
maximum pressure for which the equipment is designed, as specified by the manufacturer

Note 1 to entry: Definition and requirements are according to Directive 2014/68/EU (Pressure Equipment Directive – PED) [1].

**3.3.2**
**nominal pressure**
**PN xx**
alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a flanged or welded component of a pipework system, comprising the letters PN followed by a dimensionless number

Note 1 to entry: The number following the letters PN does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard.

Note 2 to entry: The designation PN is not meaningful unless it is related to the relevant component standard number.

Note 3 to entry: It is intended that all components with the same PN and DN designations have the same mating dimensions for compatible flange types.

[SOURCE: EN 1333 [2], modified]

**3.3.3**
**class xxx**
alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a flanged or welded component of a pipework system, comprising the word "Class" followed by a dimensionless whole number

Note 1 to entry: The number following the word "Class" does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard.

Note 2 to entry: The designation class is not meaningful unless it is related to the relevant component standard number.

Note 3 to entry: It is intended that all components with the same class and NPS designations have the same mating dimensions for compatible flange types.

[SOURCE: EN 1759-1 [3]]

# 4 Explanation of Gas pressure definitions for gas transport and distribution systems

## 4.1 General

The pressure levels in the system MOP, TOP and MIP are chosen by the network operator when designing and operating its network according to its constraints (see also national regulations).

## 4.2 Pressure demarcation

For a pipeline system, the maximum pressure values will occur at the entrance of a pipeline section. However, in case the gas stream is interrupted for any reason, the whole pipeline section will be subjected to the same pressure level.

The demarcation line for different pressure levels are in the case of gas pressure regulating stations at the exit flange of the gas pressure regulator[1] [4] and for compressor stations at the entrance of the compressor [5].

[1] For details regarding the pressure demarcation in gas pressure regulating stations see EN 12186 [4].