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**kSIST-TP FprCEN/TR 16787:2014**  
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**Industrijska plinska napeljava - Smernica**

Industrial Gas Installation - Guideline

Industrielle Gasinstallationen - Leitlinien

Installation gaz dans le domaine industriel - Lignes directrices

**Ta slovenski standard je istoveten z: FprCEN/TR 16787**

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**ICS:**

91.140.40      Sistemi za oskrbo s plinom      Gas supply systems

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TECHNICAL REPORT  
RAPPORT TECHNIQUE  
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**FINAL DRAFT**  
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ICS

English Version

## Industrial Gas Installation - Guideline

Installation gaz dans le domaine industriel - Lignes  
directrices

Industrielle Gasinstallationen - Leitlinien

This draft Technical Report is submitted to CEN members for Technical Committee Approval.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

	Page
Foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
3.1 General terms.....	6
3.2 Definitions relating to jointing methods.....	9
3.3 Definitions relating to components .....	10
3.4 Definitions relating to tests .....	11
3.5 Definitions relating to assembly processes for metallic materials .....	11
3.6 Definitions relating to pressure regulating and metering .....	12
4 Safety management.....	13
4.1 General.....	13
4.2 Maintaining records of completed gas work .....	13
4.3 The technical file.....	14
4.4 The construction file .....	15
4.5 The explosion protection document.....	15
4.6 The declaration of conformity file .....	15
5 Gas composition and characteristics.....	16
5.1 Properties of gases.....	16
5.1.1 Natural gas .....	16
5.1.2 LPG.....	16
5.1.3 Non-conventional gases .....	17
5.1.4 Town gas (not widely available in Europe) .....	19
5.2 The Wobbe index and non combustion parameters .....	20
5.2.1 Wobbe index.....	20
5.2.2 Non – combustion parameters .....	21
5.3 Industrial thermal processing equipment versus variations of gas composition .....	22
5.4 Industrial thermal processing equipment – environmental considerations .....	23
6 Environment.....	24
7 Installation pipework .....	25
8 Industrial thermal equipment installations .....	25
9 Inspections .....	25
10 General safety issues .....	25
<b>Annex A (informative) Controlling air and gas flow rates versus energy content to the gas equipment.....</b>	<b>27</b>
<b>A.1 Principles for the measurement of air and gas flows .....</b>	<b>27</b>
<b>A.1.1 General.....</b>	<b>27</b>
<b>A.1.2 Diaphragm meters .....</b>	<b>27</b>
<b>A.1.3 Orifice plate systems.....</b>	<b>27</b>
<b>A.1.4 Turbine meters .....</b>	<b>28</b>

<b>A.1.5</b>	<b>Rotating piston meters (roots)</b> .....	<b>28</b>
<b>A.1.6</b>	<b>Vortex flow meters</b> .....	<b>29</b>
<b>A.1.7</b>	<b>Ultrasonic flow meter</b> .....	<b>29</b>
<b>A.1.8</b>	<b>Mass flow meters</b> .....	<b>29</b>
<b>A.2</b>	<b>Flow calculation</b> .....	<b>30</b>
<b>A.3</b>	<b>Control energy content</b> .....	<b>30</b>
<b>A.4</b>	<b>Flow metering and meter performance</b> .....	<b>31</b>
<b>Annex B</b>	<b>(informative) Industrial thermal processing equipment</b> .....	<b>33</b>
<b>B.1</b>	<b>Sensitivity of gas engines and gas turbines</b> .....	<b>33</b>
<b>B.2</b>	<b>Sensitivity of some industrial thermal processes</b> .....	<b>33</b>
<b>Annex C</b>	<b>(informative) Reverse flow of gases</b> .....	<b>36</b>
<b>Annex D</b>	<b>(informative) Industrial thermal processing equipment and Environmental issues</b> .....	<b>37</b>
<b>Annex E</b>	<b>(informative) National implementation</b> .....	<b>38</b>
<b>E.1</b>	<b>General/introduction</b> .....	<b>38</b>
<b>E.2</b>	<b>Safety and health of workers at work regulations</b> .....	<b>38</b>
<b>E.3</b>	<b>Specifications from utilities and gas suppliers</b> .....	<b>38</b>
<b>E.4</b>	<b>Protection of buildings and equipment against fire</b> .....	<b>38</b>
<b>Annex F</b>	<b>(informative) European Directives</b> .....	<b>40</b>
<b>F.1</b>	<b>EU Safety Directives</b> .....	<b>40</b>
<b>F.1.1</b>	<b>General</b> .....	<b>40</b>
<b>F.1.2</b>	<b>Safety European Directives concerning products</b> .....	<b>40</b>
<b>F.1.3</b>	<b>Safety European Directives concerning general public and workers</b> .....	<b>42</b>
<b>F.1.4</b>	<b>Introduction to Directives</b> .....	<b>43</b>
<b>F.1.5</b>	<b>Synthesis of Directives</b> .....	<b>44</b>
<b>F.2</b>	<b>Environment EU Directives for industrial end-users</b> .....	<b>46</b>
<b>F.2.1</b>	<b>General</b> .....	<b>46</b>
<b>F.2.2</b>	<b>Emissions Trading Scheme ETS</b> .....	<b>46</b>
<b>F.2.3</b>	<b>Measures to reduce emissions (CO<sub>2</sub>, CO, NO<sub>x</sub>, CH<sub>4</sub>)</b> .....	<b>47</b>
<b>F.2.4</b>	<b>Industrial Emissions Directive (IED)</b> .....	<b>47</b>
<b>Annex G</b>	<b>(informative) Natural gas overview</b> .....	<b>48</b>
<b>Annex H</b>	<b>(informative) National data</b> .....	<b>50</b>
<b>Bibliography</b>	.....	<b>53</b>

**FprCEN/TR 16787:2014 (E)**

## **Foreword**

This document (FprCEN/TR 16787:2014) has been prepared by CEN Sector Forum Gas.

This document is currently submitted to the Technical Committee Approval.

## Introduction

Gas industry leaders acknowledge the strategic role of European and National Standards in their efforts to ensure the safety of gas installations in industrial premises. This Technical Report has been prepared to explain to those involved with industrial premises some of the relevance of a range of Directives that affect their operations. In addition guidance is given on the terms and definitions widely in use throughout the European Union, together with some important information on how a consumer of gas can ensure safety in operating their site. Minimizing the adverse effects on the environment is also an important consideration.

European and National legislation and the related framework of standards are complex and changing at an ever increasing pace. For industrial plant engineers, finding the relevant standards can be a difficult task, demands specific knowledge, and can consume a considerable amount of time. A number of the principal standards are highlighted in this Technical Report, but EU Member States may have similar or equivalent standards covering the application. Additionally, member states may have slightly different legal systems and requirements that demand compliance.

Both designers and installers play an important role in applying the current standards for design, construction, testing, commissioning and operation of all industrial gas installations. Safety is therefore improved and the full energy efficiency potential of industrial thermal processes can be utilized.

It is recognized that the main reference is this Technical Report is to Natural Gas but many standards equally apply directly to LPG and LPG/Air mixtures. This Technical Report is also applicable to many bio-gases, and other flammable gases, and the user will need to ensure they are aware of any different requirements needed to ensure safety. For example some gases may be very hot or corrosive, some may be 'wet' and others may contain significant quantities of toxic gases such as carbon monoxide. Hydrogen rich gases may also require special attention to material selection.

Finally, due to the complexities and special needs of some types of process plant, it may be necessary to adopt higher standards of safety and to use risk assessments to ensure reliable judgements on plant safety.

In applying the recommendations contained within this Report it is important that the relevant requirements of national guidance standards and legislation are considered.

In some cases where a lack of information is available in a member state, guidance from other member states or by other recognized national bodies such as ASME or API may be used.

The range of industrial thermal process and heating equipment providing energy solutions to customers for a diverse range of applications is significant.

## FprCEN/TR 16787:2014 (E)

### 1 Scope

This Technical Report applies to safety and operational topics for equipment and pipework systems installed within industrial premises which may be used for process and non-process applications such as Heating, Power Generation, Incineration, etc.

It is applicable to a range of combustible gases used within an industrial environment. The gas plant may include normal combustion with air and/or oxygen, catalytic oxidation or cracking (e.g. as in a refinery).

The user of gas equipment and pipework systems has a responsibility to ensure the safety of the design, of plant operation and plant maintenance.

For piped supplies of gas to a site this Technical Report applies to the system downstream of the 'point of delivery'. The term, 'point of delivery' refers to the isolation valve (or combination of regulator and isolation valve) located before or after the metering station, as will be defined by the particular EU member state national legislation.

The guidance in this Technical Report may also apply to gases generated for the sites own use, such as coke oven gas, site bio-gas plant, site LPG/air plant etc.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1775, *Gas supply — Gas pipework for buildings — Maximum operating pressure less than or equal to 5 bar — Functional recommendations*

EN 15001-1, *Gas Infrastructure — Gas installation pipework with an operating pressure greater than 0,5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations — Part 1: Detailed functional requirements for design, materials, construction, inspection and testing*

EN 15001-2, *Gas infrastructure — Gas installation pipework with an operating pressure greater than 0,5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations — Part 2: Detailed functional requirements for commissioning, operation and maintenance*

EN ISO 6976, *Natural gas — Calculation of calorific values, density, relative density and Wobbe index from composition (ISO 6976)*

### 3 Terms and definitions

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

NOTE These terms and definitions are given for information as they are widely used in the gas industry.

#### 3.1 General terms

##### 3.1.1

##### **air gas ratio**

ratio between the flow of combustion air and the flow of the fuel gas

Note 1 to entry: Sometimes fuel/air ratio is used. It can either be expressed in terms of volume or mass flows.



**3.1.2****air factor**

ratio between the actual flow of combustion air and the stoichiometric flow of combustion air

Note 1 to entry: It can be expressed in terms of volume or mass flows.

**3.1.3****components**

any item from which a gas supply system or installation is constructed

Note 1 to entry: A distinction is drawn between the following groups of components:

- ancillaries (for example; pressure regulators, valves, safety devices, expansion joints, and insulating joints);
- pipes, including bends made from pipe;
- instrumentation pipework;
- fittings (for example; reducers, tees, factory-made elbows, flanges, dome ends, welding stubs, and mechanical joints).

**3.1.4****flexible appliance connector**

fitting of flexible pipe to be fitted between the end of fixed pipework and the appliance inlet connection

**3.1.5****gas appliances**

appliances burning gaseous fuels used for cooking, heating, hot water production, refrigeration, lighting or washing and having, where applicable, a normal water temperature not exceeding 105 °C, except those specifically designed for use in industrial processes carried out on industrial premises

**3.1.6****HAZOP**

hazard and operability study (HAZOP) is a structured and systematic examination of a planned or existing process or operation in order to identify and evaluate problems that may represent risks to personnel or equipment, or prevent efficient operation

**3.1.7****industrial appliances**

appliances burning gaseous fuels installed in industrial premises and are subject to specific national health and safety regulations

**3.1.8****pressure**

gauge pressure of the fluid inside the system, measured in static conditions

**3.1.9****design pressure****DP**

pressure at which the design calculations are based

Note 1 to entry: This is equivalent to the maximum allowable pressure (PS) as given in the PED.

**3.1.10****maximum allowable pressure****PS**

maximum pressure for which pipework is designed in accordance with the strength requirements

**FprCEN/TR 16787:2014 (E)****3.1.11****maximum incidental pressure****MIP**

maximum pressure at which a system can experience during a short time, limited by the safety devices

**3.1.12****operating pressure****OP**

pressure which occurs within a system under normal operating conditions

**3.1.13****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.

**3.1.14****tightness test pressure****TTP**

pressure applied to a system during tightness testing

**3.1.15****strength test pressure****STP**

pressure applied to a system during strength testing

**3.1.16****combined test pressure****CTP**

pressure applied to a system during combined testing

**3.1.17****risk assessment**

identification, evaluation, and estimation of the levels of risks involved in a situation, their comparison against benchmarks or standards, and determination of an acceptable level of risk

Note 1 to entry: In this sense Risk is, 'the likelihood and consequence of a hazard being realised'.

**3.1.18****point of delivery**

point of transfer of ownership of gas from the supplier to the customer

Note 1 to entry: This can be at a means of isolation or at the meter outlet connection.

Note 2 to entry: This can be isolation valve (or combination of regulator and isolation valve) located before or after the metering station, as defined by the particular EU member state.

**3.1.19****user(s)**

person (s) responsible for the safety of the gas installation and associated risks on a site

Note 1 to entry: Normally the user will be the site occupier or owner. It should be assumed that every user has a responsibility for work performed on their site, whether or not the work is performed directly for the user or not. This does not mean that they cannot take advice from an independent specialist.

**3.1.20****pipework**

assembly of pipes and fittings

**3.1.21****installation pipework**

pipework downstream of the point of delivery terminating at the appliance inlet connection

Note 1 to entry: This pipework is normally the property of the customer.

**3.1.22****ventilated space**

space where the air is continuously changed by natural or mechanical means

**3.1.23****safety zone**

area around the pipework from which persons who are not involved in the strength test are excluded during testing

**3.1.24****equipotential bond**

means of ensuring that metallic gas pipework and other metallic parts of the building are at the same electrical potential

Note 1 to entry: For safety reasons, this equipotential bonding is connected to earth.

**3.1.25****duct**

space specifically designed and constructed for the passage of building services

EXAMPLE Building services include gas pipework, water systems, power and telecommunication cables.

**3.1.26****ventilation duct**

duct forming part of the structure of the building and intended exclusively for ventilation purposes

**3.1.27****means of isolation**

device which is intended to interrupt the gas flow in pipework

EXAMPLE Manually operable valve.

**3.2 Definitions relating to jointing methods****3.2.1****joint**

means of connecting elements of a gas installation

**3.2.2****flanged joint**

joint in which gas tightness is achieved by compression of a gasket between the faces of two flanges

**3.2.3****threaded joint**

joint in which gas tightness is achieved by metal-to-metal contact within threads with the assistance of a sealant

**FprCEN/TR 16787:2014 (E)****3.2.4****mechanical joint**

joint in which gas tightness is achieved by compression, with or without a seal and which can be disassembled and reassembled

Note 1 to entry: This definition includes twin ferrule type joints.

**3.2.5****pressed joint**

joint in which tightness is achieved by using a specific tool for either compressing a fitting to form the joint or expanding a pipe to enable forming the joint

**3.2.6****brazed joint**

joint formed by brazing

**3.2.7****welded joint**

joint formed by welding

**3.2.8****electro fusion joint**

joint formed between polyethylene components using fittings which have an integrated electric heating element

**3.2.9****butt fusion joint**

joint formed between polyethylene components where the two pipe ends are heated and brought together to be fused directly without the use of a separate fitting or filler material

**3.2.10****compression joint**

type of joint in which gas tightness is achieved by compression within a socket with or without a seal

**3.3 Definitions relating to components****3.3.1****regulator**

device which reduces the gas pressure to a set value and maintains it within prescribed limits

**3.3.2****appliance connection**

flexible pipe or length of rigid pipework connecting an appliance's means of isolation with the appliance inlet connection

**3.3.3****insulating joint**

fitting installed to insulate electrically one section of pipework from another

**3.3.4****sleeve**

protective pipe through which a gas pipe passes

**3.3.5****vent pipe**

pipework connected to a safety or control device to release gas at a safe location

**3.3.6****creep relief valve**

device designed to release a limited flow of gas in the event of an unacceptable pressure being detected within the system it protects

**3.3.7****safety slam-shut device**

device designed to quickly shut off the gas flow in the event of an unacceptable pressure being detected within the system it protects. This often referred to an over-pressure or under-pressure shut off device

**3.3.8****instrumentation pipework**

pipework required for the proper functioning of the ancillaries installed within the pressure regulating installation

EXAMPLE Sensing, measuring, auxiliary and sampling lines.

**3.3.9****DN**

alphanumeric designation of size for components of a pipework system, which is used for reference purposes

Note 1 to entry: It comprises the letters DN followed by a dimensionless whole number, which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections.

Note 2 to entry: The number following the letters DN does not represent a measurable value and should not be used for calculation purposes except where specified.

Note 3 to entry: Where DN designation is used, any relationship between DN and component dimensions are given, e.g. DN/OD or DN/ID.

**3.4 Definitions relating to tests****3.4.1****strength test**

specific procedure intended to verify that the pipework meets the requirements for mechanical strength

**3.4.2****leak-tightness test**

specific procedure intended to verify that the pipework meets the requirements for leak-tightness

**3.4.3****combined test**

specific procedure to verify that the pipework and/or installation meets the requirements for mechanical strength and leak-tightness

**3.4.4****leak detection fluid**

specially formulated fluid and foaming product that gives a clear indication that a leak exists when applied to an element of pipework

**3.5 Definitions relating to assembly processes for metallic materials****3.5.1****welding**

joining (union) of two or more parts by heat or pressure or a combination of both, (fusion, arc or oxy-acetylene) such that the materials form a continuity

Note 1 to entry: A filler metal having a melting point similar to that of the materials to be welded can be used.