

Industrial valves — Isolating valves for LNG — Specification for suitability and appropriate verification tests

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 24, an inside back cover and a back cover.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 69, Industrial valves, 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of an identical text or by endorsement, at the latest by January 2001, and conflicting national standards shall be withdrawn at the latest by January 2001.

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.

1 Scope

This European Standard specifies the general performance requirements of isolating valves (gate valves, globe valves, plug and ball valves and butterfly valves) used in the production, storage, transmission (by pipeline, rail, road or sea) of Liquefied Natural Gas (LNG). LNG filling valves for vehicle refuelling systems are excluded from the scope of this standard.

DN range from DN 8 to DN 1000.

PN range from PN 16 to PN 100.

Class range from Class 150 to Class 900.

Temperature range from $-196\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$.

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 of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 19, *Industrial Valves – Marking*.

EN 736-1, *Valves - Terminology - Part 1: Definition of types of valves*.

EN 736-2, *Valves - Terminology - Part 2: Definition of components of valves*.

EN 736-3, *Valves - Terminology - Part 3: Definition of terms*.

EN 764, *Pressure equipment - Terminology and symbols - Pressure, temperature and volume*.

EN 1160, *Installations and equipment for liquefied natural gas - General characteristics of liquefied natural gas*.

EN 10045-1, *Metallic materials - Charpy impact tests - Part 1: Test method*.

EN 12308, *Installations and equipment for LNG - Suitability testing of gaskets designed for flanged joints used on LNG piping*.

EN ISO 5210, *Industrial valves – Multi-turn actuator attachments (ISO 5210:1991)*.

prEN ISO 5211:2000, *Industrial valves - Part-turn valve actuator attachments (ISO/FDIS 5211:2000)*.

prEN 12266-1:1999, *Industrial valves – Testing of valves - Part 1: Tests, test procedures and acceptance criteria to be fulfilled by every valve*.

prEN 12516-1:2000, *Industrial Valves – Shell Design Strength – Part 1: Tabulation Method for Steel Valves*.

prEN 12516-2:2000, *Industrial Valves – Shell Design Strength – Part 2: Calculation Method for Steel Valves*.

prEN 12516-3:1999, *Valves - Shell design strength - Part 3: Experimental method*.

EN 12570, *Industrial valves - Method for sizing the operating element*.

ISO 10497, *Testing of valves - Fire type-testing requirements*.

ASTM A 380, *Standard practice to cleaning, descaling and passivation of stainless steel parts, equipment and systems*.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions of EN 736-1, EN 736-2, EN 736-3 and EN 764 apply together with the following terms and definitions.

3.1

LNG (liquefied natural gas)

see EN 1160

3.2

allowable pressure p_s

see EN 764

3.3

minimum allowable temperature

minimum temperature which a valve can permanently withstand at pressures equal to or less than the allowable pressure p_s (see EN 764)

3.4

operating cycle

full motion from closed position to open position and back to closed position

3.5

type test

see EN 736-3

3.6

production test

see EN 736-3

4 Tests and design requirements

4.1 Tests

The requirements for production and type tests shall be as given in Tables 1 to 23.

The range of valves approved on the basis of a type test shall be as given in annexes C and D.

4.2 Consideration of thermal conditions in steady state

The stress and the strength calculations shall be in accordance with the requirements of prEN 12516-1:2000, prEN 12516-2:2000 and prEN 12516-3:1999.

4.3 Consideration of thermal conditions in transient state

Table 1

Requirement	Production test	Type test
The valve shall be designed to take into account the thermal stresses in transient state occurring during the cool down operation. NOTE Thermal stresses in transient state present the following characteristics: — they are often much larger than static pressure stresses; — they increase with an increase in thickness of the valve body. The general requirements of EN 1160 shall be observed when necessary. The valve design with respect to thermal stresses in transient state shall be accepted provided that the valve passes the thermal shock test.	No test is required.	Thermal shock test defined in annex A (normative).

4.4 Protection against thermal expansion of LNG

Table 2

Requirement	Production test	Type test
The valve shall be designed in such a way that LNG cannot be trapped in any cavity, regardless of the position of the obturator, or an internal safety device shall be fitted to prevent the pressure from rising above the p_s. Under no circumstances shall LNG be allowed to be released to the atmosphere.	Examination of drawings.	Examination of drawings.

4.5 Cryogenic neck extension

Table 3

Requirement	Production test	Type test
The valve shall be designed so that the sealing device on the stem or the shaft, and the operating device shall remain above a minimum temperature ensuring proper operation of the valve. Any icing shall not hinder operation of the valve nor impair the sealing device of the stem or the shaft.	No test is required.	Examination carried out during the endurance strength test defined in annex B (normative).

4.6 Sealing devices for stem or shaft

Table 4

Requirement	Production test	Type test
The sealing device shall be sufficiently distant from the body to prevent any risk of icing.	Verification that the materials and design of the valve are in conformity with those of the valve submitted to the type test.	Examination carried out during the endurance strength test defined in annex B (normative).

4.7 Assembly of valve (with the exception of the connection to the pipework)

Table 5

Requirement	Production test	Type test
External sealing of the valve shall ensure leak tightness in any operating position, at both ambient temperature and minimum allowable temperature, as well as during cooling and warming operations. The bolting load shall be determined to take into account the relaxation of bolts occurring during the cooling down. Flange gaskets shall be in accordance with EN 12308. NOTE The relaxation is due to: — the delay between cooling of the body and cooling of bolting; — the difference in contraction coefficients between the metal of the body and the metal of the bolts; — the gasket. The flanges shall be designed to withstand: — pressure stresses; — bolting loads necessary to ensure leak tightness of the joint at both ambient and low temperatures.	Verifications that the materials and design of the valve is in conformity with those of the valve submitted to the type test.	The external leak tightness shall be confirmed during the endurance strength test defined in annex B (normative).

4.8 Connections to the pipework

Table 6

Requirement	Production test	Type test
Flanges and welding ends shall be in accordance with European Standards.	Examination of drawings.	Examination of drawings.