
Nizkotla'ni nenastavljivi regulatorji z najve'jim izhodnim tlakom do vklju'no 200 mbar, s pretokom do vklju'no 4 kg/h in pripadajo'imi varnostnimi napravami za butan, propan ali njuni zmesi

Low-pressure, non adjustable regulators having a maximum outlet pressure of less than or equal to 200 mbar, with a capacity of less than or equal to 4 kg/h, and their associated safety devices for butane, propane or their mixtures

Festeingestellte Druckregelgerte mit einem Hchstreglerdruck bis einschlielich 200 mbar, und einem Durchfluss bis einschlielich 4 kg/h fr Butan, Propan und deren Gemische sowie die dazugehrigen Sicherheitseinrichtungen

Dtendeurs  rglage fixe  pression de dtente maximale infrieure ou gale  200 mbar, de dbit infrieur ou gal  4 kg/h, et leurs dispositifs de scurit associs pour butane, propane ou leurs mlanges

Ta slovenski standard je istoveten z: EN 12864:2001

ICS:

23.060.40

SIST EN 12864:2002

en

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SIST EN 12864:2002

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English version

Low-pressure, non adjustable regulators having a maximum outlet pressure of less than or equal to 200 mbar, with a capacity of less than or equal to 4 kg/h, and their associated safety devices for butane, propane or their mixtures

Détendeurs à réglage fixe, à pression de détente maximale inférieure ou égale à 200 mbar, de débit inférieur ou égal à 4 kg/h, et leurs dispositifs de sécurité associés pour butane, propane ou leurs mélanges

Festeingestellte Druckregelgeräte mit einem Höchstreglerdruck bis einschließlich 200 mbar, und einem Durchfluss bis einschließlich 4 kg/h für Butan, Propan und deren Gemische sowie die dazugehörigen Sicherheitseinrichtungen

This European Standard was approved by CEN on 18 October 2000.

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

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Contents

1	Scope	5
2	Normative references	5
3	Terms and definitions	6
3.1	General definitions	6
3.2	Definitions concerning gas	7
3.3	Definitions concerning pressures	7
3.4	Definitions concerning rates	7
4	Terminology	8
5	Structural characteristics	9
5.1	General	9
5.2	Materials	10
5.3	Special requirements	11
5.4	Mechanical strength	13
5.5	Soundness	14
5.6	Mechanical endurance	15
5.7	Resistance to humidity changes	15
5.8	Resistance to corrosion	15
6	Performance characteristics	15
7	Test methods	18
7.1	General conditions	18
7.2	Verification of structural characteristics	19
7.3	Verification of performance characteristics	27
8	Marking – Packaging – Instructions	31
8.1	General	31
8.2	Marking of the regulator	31
8.3	Packaging	32
8.4	Instructions for use and maintenance	32
Annex A	(normative) Special requirements for regulators fitted with pressure or rate operated safety devices	33
A.1	Regulators fitted with an overpressure relief valve of a limited flow rate	33
A.2	Regulators fitted with an overpressure shut off device	34
A.3	Regulators fitted with an underpressure shut off safety device	36
A.4	Regulators fitted with an excess flow valve	37
Annex B	(normative) Special requirements for regulators fitted with a temperature operated safety device	40
B.1	Definition	40
B.2	Structural characteristics	40
B.3	Performance characteristics	40
B.4	Test methods	40
Annex C	(normative) Special requirements for low pressure regulators under extreme temperature conditions	42
Annex D	(normative) Multimode connection regulator for LPG cylinders to supply appliances installed in caravans and motor caravans	43
D.1	Scope	43
D.2	Design characteristics	43
D.3	Structural characteristics	44
D.4	Operating characteristics	46
D.5	Marking – Packaging – Instructions	47

Annex E (normative) Complementary test requirements for non metallic thermoplastic or thermosetting materials used in the construction of regulators.....	51
E.1 Scope	51
E.2 Materials	51
E.3 Special conditions for carrying out the tests mentioned in the body of the standard	51
E.4 Special requirements	52
E.5 Sampling and order of tests.....	53
Annex F (normative) Supplementary requirements for reinforced diaphragms and elastomeric seals used in LPG appliances and their associated equipment	54
Annex G (normative) Inlet connections.....	55
Annex H (normative) Outlet connections	81
Annex I (normative) Special requirements for low pressure non adjustable regulators fitted with two or three outlets for outdoor use	90
I.1 Structural characteristics.....	90
I.2 Performance characteristics.....	90
I.3 Test methods	90
I.4 Marking	92
Annex J (normative) Method for measuring leaks at test pressures less than or equal to 20 bar	93
J.1 Scope	93
J.2 Diagram of the test bench.....	93
J.3 Determination of coefficient K	94
J.4 Measurement of the leak	94
J.5 Checks	95
Annex K (normative) Special requirements for regulators fitted with an inlet valve.....	96
K.1 Definition	96
K.2 Structural characteristics.....	96
K.3 Performance characteristics : mechanical strength.....	96
K.4 Test method.....	96
Annex L (informative) Alternative test method for resistance to corrosion.....	97
L.1 Principle.....	97
L.2 Reagents.....	97
L.3 Apparatus	98
L.4 Test method.....	99
L.5 Results	100
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU directives.....	103

Foreword

This document has been prepared by CEN /TC 181, "Dedicated liquefied petroleum gas appliances", the Secretariat of which is held by AFNOR

This document has to be implemented at national level, either by publication of an identical text or by endorsement, by February 2002, and conflicting national standards have to be withdrawn by February 2002.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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

This document only covers type testing.

Items relating to quality assurance systems, production testing and particularly certificates of conformity are not covered by this standard.

It is intended that this text will be the first part of a standard covering different applications of the equipment considered. At the time of issue of this document, two complementary documents are envisaged :

- prEN 13785 : regulators with a capacity not greater than 100 kg/h, having an outlet pressure of not greater than 4 bar, other than those which are the subject of EN 12864, and their associated safety devices for butane, propane or their mixtures ;
- prEN 13786 : automatic change-over devices with a capacity not greater than 100 kg/h, having an outlet pressure of not greater than 4 bar, and their associated safety devices for butane, propane or their mixtures.

WARNING NOTICE – At the date of publication of this standard, annexes G and H are the subject of an amendment.

1 Scope

This European standard defines the structural and operational characteristics, the safety requirements and test methods, the marking, of low-pressure, non adjustable regulators for butane, propane or their mixtures, referred to in the body of the text as "regulators".

This European Standard covers regulators supplied at vapour pressure by one or several portable cylinders. They are normally directly connected to the cylinder valve or the self closing valve.

The regulators covered by this standard are designed for a maximum outlet pressure of up to and including 200 mbar and a maximum rate of up to and including 4 kg/h.

This European Standard also applies to the safety devices which are supplied as part of the regulators. The characteristics of these devices are given in annex A and B.

The requirements of this European Standard apply generally to regulators used in locations where the temperature likely to be reached during use is between - 20 °C and + 50 °C, + 50 °C being the maximum temperature allowable for the cylinder. When the devices are subjected to temperatures below this range, they shall comply with special requirements defined in annex C.

Regulators designed for specific purposes (caravans and motor caravans) which are subjected to special requirements are dealt with in annex D.

This European standard does not include the installation rules for regulators and their possible associated safety devices. In this matter, reference should be made to national regulations in force in the member countries.

Regulators which are intended to be used with gases containing methylacetylene and propadiene are excluded from the scope of this European Standard.

This European standard only covers type testing.

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WARNING NOTICE: The figures in annexes G and H show the types of connections used according to the country of use of the regulators

The top part of these figures (above the horizontal line) applies to the regulator and is normative.

The bottom part of these figures (below the horizontal line) applies to the tap (or the valve) to which the regulator is fitted. This is given as a guide for the tests and is not normative.

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 437:1993, *Test gases - Test pressures – Appliance categories*.

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*.

EN 561:1994, *Gas welding equipment – Quick-action coupling with shut off valves for welding, cutting and allied processes*.

prEN 1763-1:1999, *Rubber and plastics tubing, hoses and assemblies for use with commercial propane, commercial butane and their mixtures in the vapour phase – Part 1 : Requirements for rubber and plastics tubing and hoses*.

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions - Part 1: Country codes (ISO 3166-1:1997)*.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads – Part 1 : Dimensions, tolerances and designation.*

ISO 75, *Plastics - Determination of temperature of deflection under load.*

ISO 178, *Plastics - Determination of flexural properties.*

ISO 180, *Plastics - Determination of IZOD impact strength.*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads – Part 1 : Dimensions, tolerances and designation.*

ISO 301, *Zinc alloy ingots intended for casting.*

ISO 426-1, *Wrought copper-zinc alloys - Chemical composition and forms of wrought products - Part 1 : Non-leaded and special copper-zinc alloys.*

ISO 426-2, *Wrought copper-zinc alloys - Chemical composition and forms of wrought products - Part 2 : Leaded copper-zinc alloys.*

ISO 527, *Plastics - Determination of tensile properties.*

ISO 565, *Test sieves – Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings.*

ISO 1210, *Plastics - Determination of the burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source.*

ISO 4892-3, *Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV Lamps.*

ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests.*

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3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply :

3.1 General definitions

3.1.1

regulator

device which maintains an outlet pressure constant independent of the variations of the inlet pressure and/or flow rate and/or temperature within defined limits

3.1.2

quick coupling

connection system which allows the fitting of the regulator to the cylinder valve without a threaded connection and without using tools

3.1.3

tap

device for closing the gas flow which requires an intentional manual action (for example on a lever, a knob, etc.)

3.1.4

self closing valve

device allowing the automatic shut off of the gas flow by simple disconnection of the regulator

3.1.5

valve pad

component part of the regulation sub-assembly which ensures soundness between the part of the regulator at supply pressure and the part of the regulator at outlet pressure when this is equal to the lock-up pressure

3.1.6**sealing**

any arrangement of any device, for example an adjuster, such that any interference likely to change its position causes the breaking of the device or sealing material making the interference apparent

3.2 Definitions concerning gas**3.2.1****butane**

mixture of third family gases whose vapour pressure (p_v) at 50 °C is greater than or equal to 4,3 bar and at most equal to 7,5 bar, of mean density in the gas phase equal to 2,4 kg/m³

3.2.2**propane**

mixture of third family gases whose vapour pressure (p_v) at 50 °C is greater than or equal to 7,5 bar or at most equal to 16 bar, of mean density in the gas phase equal to 1,85 kg/m³

3.2.3**LPG**

mixture of third family gases whose vapour pressure (p_v) at 50 °C is greater than or equal to 4,3 bar or at most equal to 16 bar, of mean density in the gas phase equal to 2,12 kg/m³

3.3 Definitions concerning pressures

The values of pressures given in the text are to be considered as values of relative pressure.

3.3.1**supply pressure**

p

value of the gas pressure measured at the manual valve outlet (regulator inlet) or at the self closing valve inlet

NOTE Supply pressure is expressed in bars.

3.3.2**outlet pressure**

value of the gas pressure measured at the regulator outlet

3.3.3**nominal outlet pressure**

p_d

value of the outlet pressure corresponding to the normal pressure for appliances as defined in 3.6 of EN 437:1993

NOTE Nominal outlet pressure is expressed in millibars.

3.3.4**lock up pressure**

p_0

the maximum outlet pressure obtainable at no flow for all values of the supply pressure

NOTE Lock-up pressure is expressed in millibars.

3.4 Definitions concerning rates**3.4.1****guaranteed rate**

M_g

the mass flow of gas that can be obtained at the minimum allowed outlet pressure, whatever the value of the supply pressure

NOTE Guaranteed rate is expressed in grams per hour or in kilograms per hour.

3.4.2

pilot rate

M_p
gas rate (15 g/h) necessary for the supply of the ignition system of the appliance, generally called pilot

NOTE Pilot rate is expressed in grams per hour.

3.4.3

lock-up area

range of rates between 0 and pilot rate

3.4.4

operational area

range of rates between pilot rate and the guaranteed rate

4 Terminology

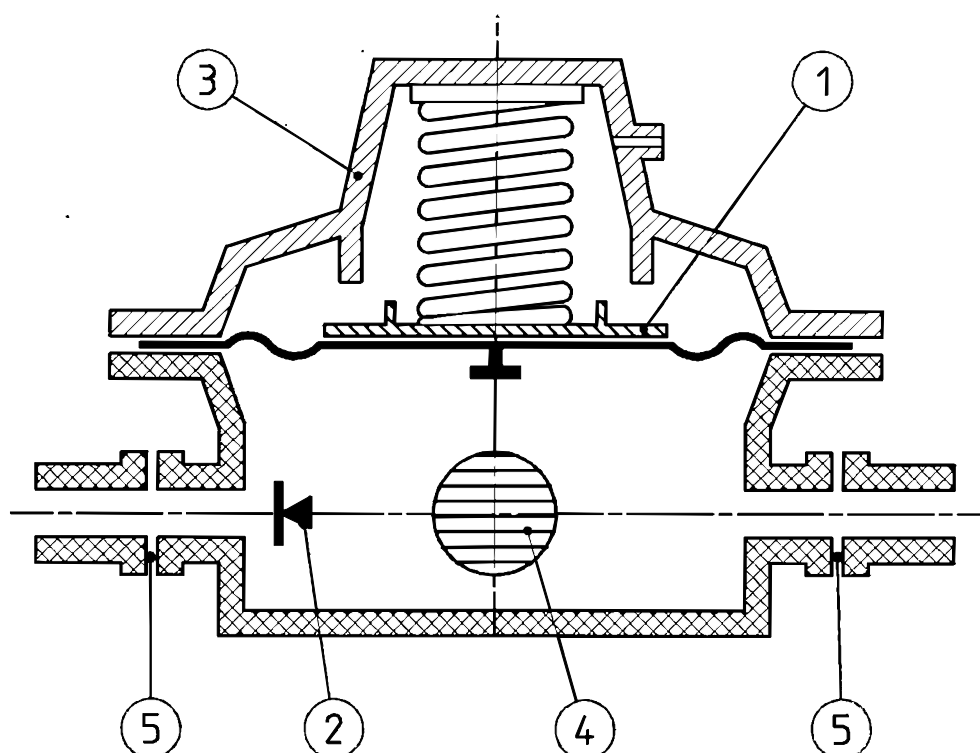
The terminology used is shown in Figure 1.

The diagram is shown as a guide ; no other method is excluded

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Key

- | | | |
|---|------------------------------------|--|
| 1 | Pressure sensing sub-assembly | |
| 2 | Regulation sub-assembly | |
| 3 | Back pressure sub-assembly | |
| 4 | Mechanical connection sub-assembly | |
| 5 | Connection sub-assembly | |

Figure 1 – Regulator diagram

5 Structural characteristics

5.1 General

Regulators shall be designed, manufactured and assembled in such a way that their operation is satisfactory under the installation and service conditions specified by the manufacturer.

Where appropriate, safety devices which are likely to be fitted onto the regulators covered by this European Standard shall be designed and constructed in accordance with provisions of annex A and B.

All the parts of a regulator shall be free from sharp corners or edges capable of causing deterioration, injury or faulty operation.

Parts shall be clean internally and externally.

Holes for screws, pins, etc. intended for the assembly of the regulator components and for their fixing shall not open into the gas ways. The thickness of the wall between these holes and the gas ways shall be at least 1 mm.

Holes necessary for machining which join gas ways to the atmosphere, but which have no influence on the operation of the regulator, shall be permanently sealed by metallic means. Appropriate additional sealing compounds may be used.

Threads shall be suitable for their purpose. In particular, gas-tight threads shall be in accordance with ISO 7-1, where pressure-tight joints are made on the threads.

Devices capable of modifying the operation of the regulator shall not go out of adjustment and shall be sealed. In particular, the body and the cover shall be assembled in such a way that a separation is not possible without permanent damage to these parts or to the sealing.

The operation of moving parts, for example diaphragms or bellows, shall not be impaired by other parts.

5.2 Materials

The quality of materials, the dimensions used and the means of assembling the various components shall be such that the construction and performance characteristics are ensured. Performance characteristics shall not alter significantly during the life expectancy mentioned in the literature when the regulator is installed and used in accordance with the manufacturer's instructions. Under these conditions, all components shall withstand the mechanical, chemical and thermal conditions to which they may be subjected during their use when operating under normal conditions.

The regulator shall withstand the action of organic substances, either of vegetable or animal origin.

The body and the cover shall be made of metallic material. However for regulators directly fitted onto the cylinder using a quick coupling with self-closing valve and non threaded outlet connection, thermoplastic or thermosetting materials may be used.

Thermoplastic or thermosetting components used in the regulator construction shall meet the specific requirements of annex E.

Zinc alloys shall only be used if they are of the Zn Al₄ or Zn Al₄ Cu₁ quality in accordance with ISO 301 and, like the thermoplastic or thermosetting components, the zinc alloy items are not exposed to a temperature higher than 80 °C. Brass alloys shall comply with ISO 426-1 or ISO 426-2.

The rotating threaded parts of connections, whether they are male or female, shall be made of brass in accordance with ISO 426-1 or ISO 426-2 or any equivalent standard or of steel. The materials and manufacturing processes used shall not cause subsequent risk of stress corrosion.

Fixed parts of connections shall be made of metallic material. However, zinc alloys shall not be used for tapered threads.

Non threaded fixed parts of connections may be made of thermoplastic or thermosetting material, provided that they meet the test requirements specified in annex E.

The assembly of parts of the gas ways intended to assure soundness shall not be made with solder whose lowest temperature in the melting range, after application, is below 450 °C.

Elastomeric components shall comply with the requirements of EN 549, within the temperature range specified in clause 1, including for diaphragms, the requirements concerning resistance to ozone. In addition, reinforced materials shall comply with the additional requirements defined in annex F.

5.3 Special requirements

5.3.1 Pressure sensing sub-assembly

The dimensions, the shape and the method of assembly of the components of the pressure sensing sub-assembly shall avoid any risk of damaging the diaphragm.

The pressure sensing sub-assembly shall be manufactured in such a way that the operation of the regulator complies with the requirements defined in clause 6 in the mounting positions of the regulator on the installation as specified by the manufacturer in his instructions. The regulator shall meet the lock-up requirements in all other mounting positions.

Whatever the position taken by the diaphragm, the spring shall not be fully compressed.

The diaphragm shall meet the requirements of the tests described in 7.2.2.2 without rupturing or slipping out of its fixing.

5.3.2 Regulation sub-assembly

At lock-up, the regulation sub-assembly shall act as a seal between the supply pressure and the outlet pressure. It shall not move accidentally in use.

The soundness and function of the regulation sub-assembly shall not be affected by the tensile strength or bending tests on the connections.

After the test carried out in accordance with 7.2.4, the valve pad shall not be displaced or come out of its housing.

5.3.3 Back pressure sub-assembly

The support surfaces of the cover and of the body shall be designed in such a way that they retain the diaphragm firmly in its housing and make it capable of resisting the pressure tests defined in 7.2.2.

Vent holes shall be

- arranged or located in such a way to reduce the risks of accidental blockage and to minimize the penetration of rain water, particularly if their cross section is greater than 3 mm²;
- constructed in such a way that accidental damage to the internal parts of the regulator, caused by any object inserted through the vent hole, may be reasonably prevented,

when the regulator is installed in accordance with the instructions.

5.3.4 Connection sub-assembly

5.3.4.1 General

The regulator shall be fitted with a corrosion and gas resistant filter situated upstream of the valve pad. The filter mesh shall not exceed the recommended dimensions for the 125 opening in accordance with ISO 565.

Whatever their type, the connections shall comply with:

a) inlet connections :

- 1) one of the types in Figures G.1 to G.49¹⁾ if they are threaded ;
- 2) one of the types in Figures G.50 to G.99¹⁾ if they are not threaded.
- 3) future types will be acceptable providing they are not interchangeable with the connections specified in this European Standard, and providing their assembly gives an equivalent degree of safety ;

b) outlet connections :

- 1) one of the types in Figures H.1 to H.49¹⁾ if they are threaded ;
- 2) one of the types in Figures H.50 to H.99¹⁾ if they are non threaded ;
- 3) other connections may be provided as long as the regulator is marketed with a fixed outlet tube ;
- 4) future types will be acceptable providing they are not interchangeable with the connections specified in this European Standard and providing their assembly gives an equivalent degree of safety.

Tables G.1 and G.2, H.1 and H.2 show, for information, the inlet and outlet connections used in the various countries.

The design of the connection shall ensure soundness under the assembly conditions specified in the instructions.

If the connection incorporates a seal it shall

- be mounted in such a way that it cannot fall off ;
- be easily replaced by a new seal, if necessary, without using special tools ;
- be dimensioned in accordance with the indications given in annexes G and H ;
- be fixed onto the regulator so as to be subjected to all the tests in this standard.

No distortion or breakage shall be noted and the regulator shall meet the requirements of the soundness test described in 5.5 after application of the forces defined in 5.4.2 and 5.4.3.

In addition, the manufacturer's instructions shall specify the use of a spanner when this is necessary for fitting or removing the regulator.

The regulator can be fitted with an inlet valve which shall meet the requirements of annex K.

For outdoor use, the regulator can be fitted with multiple outlets; in this case, it shall comply with the requirements of annex I.

5.3.4.2 Quick coupling regulators

It shall be checked that disconnection cannot take place accidentally, especially when operating the gas opening or closing device.

When turning off the gas and disconnecting the regulator is combined in a single control, a single continuous movement of the control shall be prevented by a mechanism which shall be separately operated before the regulator can be disconnected.

¹⁾ A range of 49 figures has been reserved for each type of connection. However, the needs of this document do not use all this range.

5.3.4.3 Regulators for fitting to a self closing valve

For regulators intended to be fitted to a self closing valve either with a thread or with a quick coupling, if the cylinder valve does not include a manual valve as a means of closure, there shall be a tap on the regulator to provide manual opening and closing of the gas supply. The open and closed positions shall be marked and clearly visible in the position of use.

External soundness shall be maintained during the operation of fitting on or removing the regulator from the cylinder valve, even if the manual gas tap has been left accidentally in the open position. Only the escape of the volume of gas contained downstream of the self closing valve is allowed during disconnection. If this requirement cannot be met, fitting and removing shall only be possible if the gas tap is in the closed position.

5.4 Mechanical strength

5.4.1 Resistance to impact

After being tested under the conditions of 7.2.1, the regulator shall satisfy the requirements of 5.5 and clause 6.

Only the distortion due to the fall onto the ground is allowed.

5.4.2 Resistance to pressure

5.4.2.1 The regulator shall withstand the pressure test described in 7.2.2.1 without rupturing.

After this pressure test, the regulator shall meet the soundness requirements specified in 5.5.

5.4.2.2 The regulator shall withstand the pressure test described in 7.2.2.2, without the diaphragm rupturing.

After this pressure test, the regulator shall meet the soundness requirements specified in 5.5.

5.4.2.3 The regulator shall withstand the pressure test described in 7.2.2.3 without any fracturing of the body, cover or fastenings if provided.

Distortion or permanent deformation is permitted.

5.4.3 Strength of connections

5.4.3.1 Strength of the connection/regulator assembly

Whether the fixing of the inlet connection onto the regulator body is of the threaded or non threaded type or in one piece, there shall be no damage or distortion that could affect the safety of the regulator at the end of the tests in 7.2.3 carried out with the following values:

- a torque of at least 30 N.m in both directions (see Table 3) ;
- a bending moment created by a force of 400 N directed upwards and whose application point is at the base of the outlet connection (see Table 5) ;
- a tensile strength test of 2 000 N (see Table 3).

Whether the fixing of the outlet connection onto the regulator body is of the threaded or non threaded type or in one piece, there shall be no damage or distortion that could affect the safety of the regulator at the end of the tests in 7.2.3 Table 4 carried out with the following values:

a) non threaded hose connections

- 1) a torque of at least 20 N.m in one direction (verification not required for one piece connection and for freely rotating connections) ;
- 2) a bending moment of 10 N.m ;