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### **High pressure regulator for use with Liquefied Petroleum Gas — Specification**

EAST AFRICAN COMMUNITY

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## Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC XXXXXXXXXXXXXXXX.

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# High pressure regulator for use with Liquefied Petroleum Gas — Specification

## 1 Scope

This Draft East African Standard specifies materials, construction, performance and testing requirements for variable high-pressure regulators for liquefied petroleum gases (butane, propane and their mixtures) in the vapour phase above 50g gf/cm<sup>2</sup> outlet pressure.

NOTE Generally LPG appliances are being designed to operate at a pressure of 1 kg/cm<sup>2</sup>, but specialized equipment may call for use of higher pressure

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

There are no normative references in this document.

## 3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### liquefied petroleum gas (LPG)

pure propane, butane or a mixture of the propane and butane

### 3.2

#### variable high-pressure regulator

a high-pressure regulator fitted with means of adjustment intended to be operated by the user

## 4 Requirements

### 4.1 Materials

4.1.1 All component parts shall be manufactured from, or be treated with, materials unaffected by chemical or thermal influences that may be encountered in normal use.

4.1.2 Brass parts shall not be susceptible to season cracking.

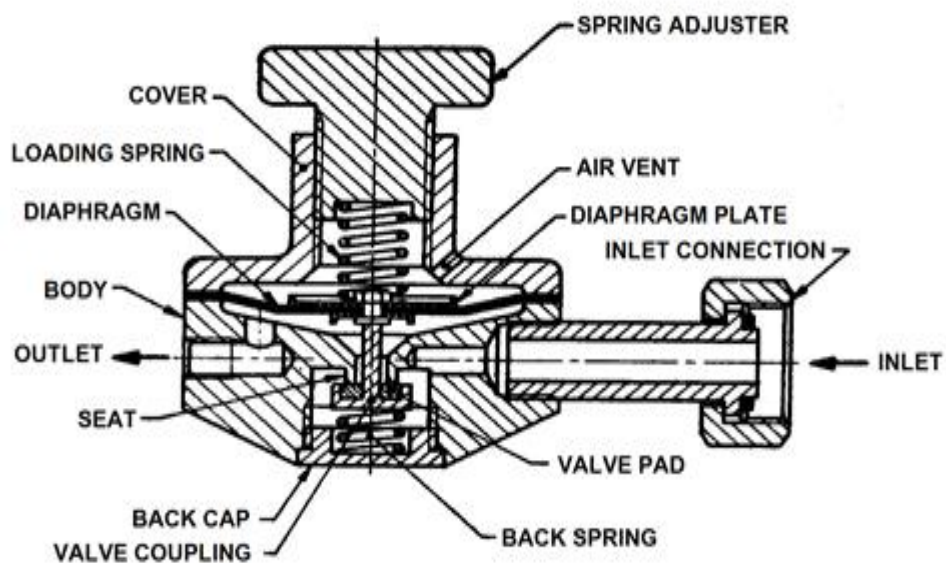
### 4.2 Diaphragm material

Diaphragm material shall be of synthetic rubber or other material equally suitable for the application and shall satisfy the following requirements:

- a) the material shall be impermeable to the test gas at a pressure of 2.5 times the maximum outlet pressure obtainable from the regulator when subjected to a suitable permeability and porosity test;
- b) the material shall be such that when the assembled regulator is subjected to the test specified in Annex B, the diaphragm shall not pull out, or burst, at a pressure less than 10 kgf/cm<sup>2</sup>;
- c) the material shall be capable of withstanding a clamping pressure of 5 kgf/cm<sup>2</sup> whereby the material itself or the substance with which the fabric layer has been impregnated shall not be pressed away, flow away, or be bruised or damaged;
- d) The materials shall not after immersion in pentane for 72 hours and in the liquid test gas for a similar time show a weight or volume change greater than 15 %. After this test, the material shall still be capable of meeting the flexibility requirements. The foregoing tests are work batch tests. On initial selection of a diaphragm material, it shall also be tested in the test gas in the vapour phase for 72 hours, and shall not show a weight or volume change greater than 15 %;
- e) the material shall not show appreciable evidence of deterioration when subjected to the accelerated ageing test;
- f) the valve pad shall be so retained that it cannot become loose or work out of position under service conditions;
- g) the valve pad fitted in its housing shall be immersed in pentane or the test gas in the vapour phase for 72 hours after which the pad shall not show evidence of being forced out of position due to swelling or other causes;
- h) the hardness of the material shall not vary over a temperature range between the lowest temperature at which it will be required to function and 65 °C to the extent that the performance of the regulator is not compromised.
- i) the material shall have a low compression set cold flow and creep characteristics and shall be free from porosity, pits and foreign particles and shall have a smooth non-tacky surface with minimum bloom.

## 5 Construction

5.1 A typical variable higher-pressure regulator is as shown in Figure 1.



## Figure 1 — Typical regulator

**5.2** The regulator, including all the component parts, shall be of sound construction and of a high degree of workmanship and finish.

### **5.3 Interchangeability**

The components of a regulator shall be interchangeable with the corresponding components of any other regulator of the same model and size made by the same manufacturer.

### **5.4 Screw threads**

The threads on the inlet and outlet of the bodies of regulators fitted with screwed ends shall have sufficient length of threads to provide clearance and prevent bottoming.

### **5.5 Body**

After machining and before finishing treatment, the body shall be non-porous when pressure tested at a gas or air pressure of not less than 10 kgf/cm<sup>2</sup>.

### **5.6 Vent**

The air vent hole shall be located such that:

- a) the accidental entry of foreign matter is minimized;
- b) it does not easily become blocked; and
- c) it would be difficult for an instrument inserted through the air vent hole to reach the diaphragm.

### **5.7 Range of pressure adjustment**

The range of pressure adjustments and the maximum outlet pressure shall be by mutual agreement between the purchaser and the manufacturer.

In the case of regulators fitted with direct-reading calibrated means of adjustment, the calibrations shall be clear and legible

### **5.8 Relief valves**

The inclusion of relief valves in regulator construction is not recommended.

### **5.9 Excess flow check valves**

If an excess flow check valve is included in the construction of the regulator, its performance shall be specified by the manufacturer.

### **5.10 Pressure gauges**

Where an outlet pressure gauge is fitted as an integral part of the regulator, the maximum pressure (plus over pressure) which the gauge will withstand shall be higher than the maximum outlet pressure setting that can be provided by the regulator.

## **6 Performance**

**6.1** The regulator shall be capable of being operated in all positions, but the test shall be carried out with the regulator horizontal and with the cover uppermost. The pipe between the outlet of the regulator and the outlet pressure gauge shall be of the same nominal diameter of outlet regulator and not less than 8 diameters long but not so long as to cause a significant pressure drop.

**6.2** With an initial setting and an inlet pressure as specified by the manufacturer, the outlet pressure shall not deviate by more than 10 % from the setting, at flows measured whilst rising from 10 % to 100 % of the specified test capacity. The static pressure shall not exceed the outlet pressure setting by more than 20 %.

### **6.3 Propane regulators**

After setting as in 6.2 and with inlet pressure of 3.5 kgf/cm<sup>2</sup> and 11 kgf/cm<sup>2</sup>, the outlet or delivery pressure shall not deviate from the setting by more than 20 % with flows measured whilst rising from 10 % to 100 % of the specified test capacity. The static pressure shall not exceed the outlet pressure setting by more than 30 %. These requirements shall also be met after the regulator has been exposed and has recovered from ambient temperature between 20 °C and 45 °C.

### **6.4 Butane regulators**

After setting as in 6.2 and with inlet pressure of 0.8 kgf/cm<sup>2</sup> and 3.2 kgf/cm<sup>2</sup> the outlet or delivery pressure shall not deviate from the setting by more than 20 % with flows measured whilst rising from 10 % to 100 % of the specified test capacity. The static pressure shall not exceed outlet pressure setting by more than 30 %. This requirement shall also be met after the regulator has been exposed to and has recovered from ambient temperature between 20 °C and 45 °C.

## **7 Tests**

### **7.1 Regulator**

The completed regulator shall not leak when tested at 2.5 times the maximum outlet pressure obtainable from the regulator applied through the outlet connection and held for a period of not less than 30 seconds.

### **7.2 Inlet connection**

Those parts of the regulator normally subjected to cylinder pressure shall be capable of withstanding a pressure of 25 kgf/cm<sup>2</sup> held for 2 minutes, without leakage.

### **7.3 Diaphragm**

The diaphragm of regulator shall not pull out from their fixing when the assembled regulator is subjected to test generally similar to that prescribed in Annex B.

## **8 Sealing**

After tests, the body and cover of each regulator shall be sealed to discourage interference with the internal mechanism. The manner of sealing shall be agreed to between the purchaser and the manufacturer.

## **9 Marking**

**9.1** Each regulator shall be legibly and indelibly marked with the following:

- a) manufacturer's name and/or registered trademark;
- b) the month and year of manufacture;
- c) this East African Standard number, followed by the letter B indicating butane or the letter P indicating propane or LPG;
- d) model number;
- e) the set outlet pressure;
- f) the nominal gas-flow rate of the regulator (expressed in kilograms per hour of the gas used); and
- g) the direction of flow indicated by, for example, an arrow.

## **10 Packaging**

**10.1** The regulators shall be so packaged as to avoid damage in storage and transit. The openings shall be sealed off to prevent the entry of foreign matter.

**10.2** The packaging shall include technical specification of the regulator such as;

- a) threads;
- b) direction of increase/decrease of flow;
- c) mounting position (either horizontal or vertical); and
- d) country of origin.

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## **Annex B (normative)**

### **Bursting and pull-out test of diaphragm in an assembled condition**

#### **B.1 General**

The test takes the form of a simple application of pressure (air or nitrogen is suitable) through the outlet connection to the underside of the diaphragm mounted in a regulator in the fully assembled condition (that is, as it would be supplied by the manufacturer to a buyer).

#### **B.2 Test rig**

**B.2.1** The outlet of the assembled regulator is connected to a supply of air or nitrogen.

**B.2.2** A gauge is incorporated in the test rig between the air or nitrogen supply and the regulator to indicate the applied pressure.

#### **B.3 Test method**

The pressure is applied at approximately 0.8 kgf/cm<sup>2</sup> per second up to 10 kgf/cm<sup>2</sup>.

## **Annex C (Informative)**

### **Low temperature test for diaphragms**

#### **Determination of diaphragm flexibility at low temperature**

The following test has been found satisfactory for quickly assessing the low temperature behavior of diaphragm material.

A strip of the material is immersed in a methyl alcohol solution cooled to the required test temperature by small additions of dry ice; after the test piece has been maintained at the test temperature for approximately 10 min, the flexibility can be checked, and when compared with the flexibility of a similar test piece at room temperature, should show little or no increased resistance to flexing.

## Bibliography

IS 4786:1968 Variable high-pressure regulator for use with liquefied petroleum gas

KS 2498:2013 High-pressure regulator for use with liquefied petroleum gas — Specification

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