



Economic and Social Council

Distr.: General
2 September 2011

Original: English

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

155th session

Geneva, 15–18 November 2011

Item 4.7.3 of the provisional agenda

1958 Agreement – Consideration of draft amendments to existing Regulations submitted by GRSG

Proposal for Supplement 10 to the 01 series of amendments to Regulation No. 67 (LPG vehicles)

Submitted by the Working Party on General Safety Provisions *

The text reproduced below was adopted by the Working Party on General Safety Provisions (GRSG) at its 100th session. It is based on ECE/TRANS/WP.29/GRSG/2011/14, as amended by GRSG-100-02-Rev.1 and on ECE/TRANS/WP.29/GRSG/2011/15, as amended by GRSG-100-28. The amendments are reproduced in Annex VII to the report (ECE/TRANS/WP.29/GRSG/79, paras. 28-29). It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Paragraph 2., amend to read:

"2. Definition and classification of components

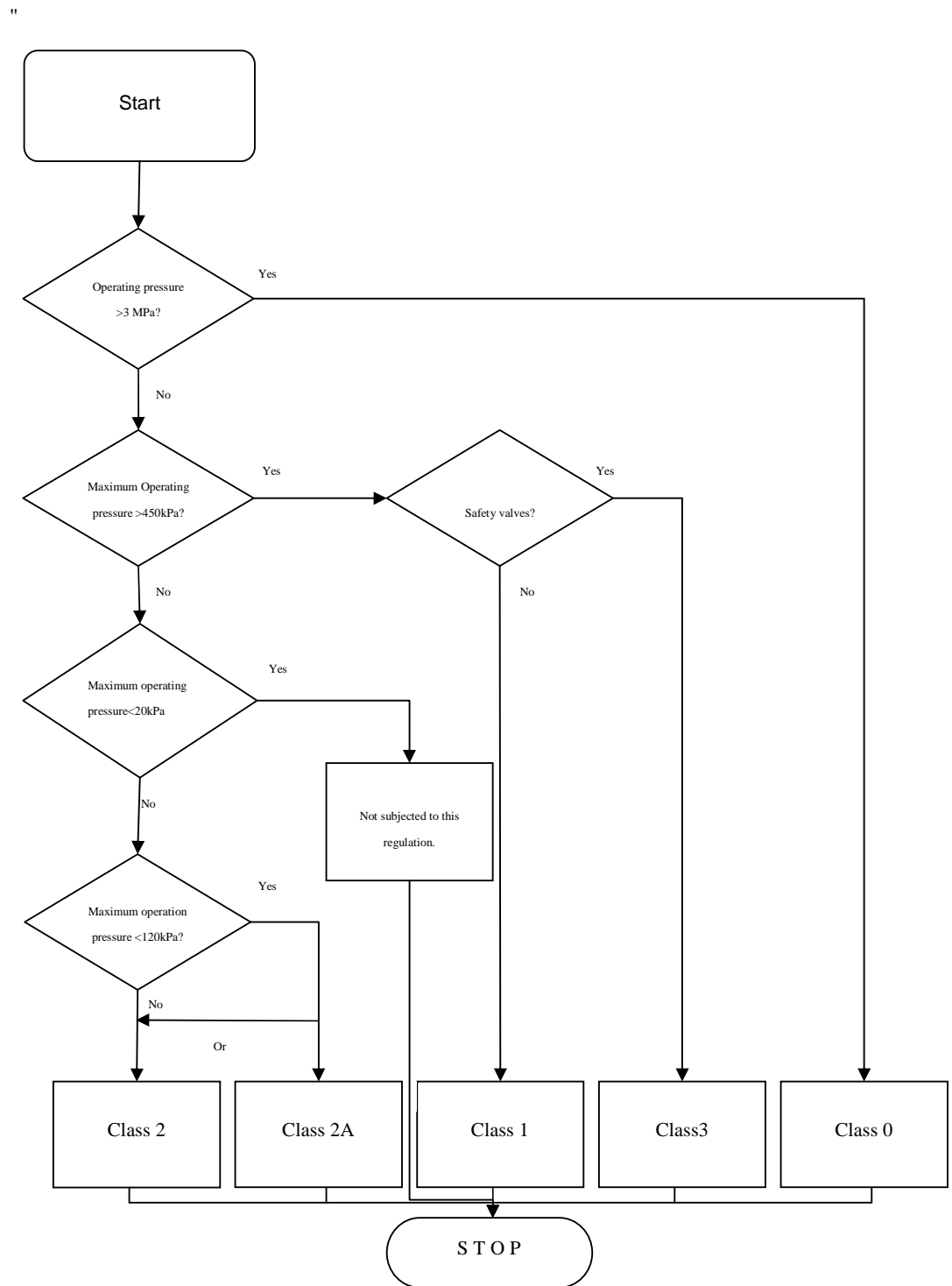
LPG components for use in vehicles shall be classified with regard to the maximum operating pressure and function, according to Figure 1.

- | | |
|----------|---|
| Class 0 | High pressure parts including tubes and fittings containing liquid LPG with a pressure > 3,000 kPa. |
| Class 1 | High pressure parts including tubes and fittings containing liquid LPG at vapour pressure or increased vapour pressure up to 3,000 kPa. |
| Class 2 | Low pressure parts including tubes and fittings containing vaporized LPG with a maximum operating pressure below 450 kPa and over 20 kPa above atmospheric pressure. |
| Class 2A | Low pressure parts for a limited pressure range including tubes and fittings containing vaporized LPG with a maximum operating pressure below 120 kPa and over 20 kPa above atmospheric pressure. |
| Class 3 | Shut-off valves and pressure relief valves, when operating in the liquid phase. |

LPG components designed for a maximum operating pressure below 20 kPa above atmospheric pressure are not subjected to this Regulation.

A component can consist of several parts, each part classified in his own class with regard to maximum operating pressure and function."

Figure 1, amend as follows:



Paragraph 2.2., amend to read:

"2.2. "Specific equipment" means:

- (a) the container,
- (b) the accessories fitted to the container,
- (c) the vaporizer/pressure regulator,
- (d) the shut-off valve,
- (e) the gas injection device or injector or gas mixing piece,
- (f) the gas dosage unit, either separate or combined with the gas injection device,
- (g) flexible hoses,
- (h) filling unit,
- (i) non-return valve,
- (j) gas-tube pressure relief valve,
- (k) filter unit,
- (l) pressure or temperature sensor,
- (m) fuel pump,
- (n) service coupling,
- (o) electronic control unit,
- (p) fuel rail,
- (q) pressure relief device,
- (r) multi-component;"

Insert new paragraphs 2.20. and 2.21., to read:

"2.20. "LPG running mode" means an operational mode during which only LPG or more than one fuel is supplied to the engine.

2.21. "Bi-fuel vehicle" means a vehicle that, originally or after the application of a LPG retrofit system, is equipped with two separate fuel storage systems, can run on petrol and also on LPG and is designed to run on only one fuel at a time."

Paragraph 4.2., amend to read:

"4.2. All equipment shall have a space large enough to accommodate the approval mark including the classification of the component (see Annex 2A) and in case of components of Class 0 also the working pressure (WP); this space shall be shown on the drawings referred to in paragraph 3.2.2. above."

Insert new paragraph 5.7., to read:

"5.7. In case of a Class 0 component also the working pressure shall be marked in the vicinity of the approval mark mentioned in paragraph 5.4."

Paragraph 6.15.6.2., amend to read:

"6.15.6.1. Pumps of Class 1 shall be so designed that the outlet pressure never exceeds 3,000 kPa, when there is e.g. blocking of the tubing or not opening of a shut-off valve. This can be realized by switching off the pump or by recirculating to the container.

Pumps of Class 0 shall be so designed that the outlet pressure never exceeds the WP of the components downstream of the pump, when there is, e.g. blocking of the tubing or not opening of a shut-off valve. This can be realized by switching off the pump or by recirculation to the container."

Paragraphs 6.15.7. to 6.15.7.2., amend to read:

"6.15.7. Provisions regarding the gas tube relief valve

6.15.7.1. Gas-tube pressure relief valves of Class 1 shall be so designed as to open at a pressure of $3,200 \pm 100$ kPa.

Gas-tube pressure relief valves of Class 0 shall be so designed as to open at a pressure of 1.07 WP of the pipe ± 100 kPa (if needed).

6.15.7.2. Gas-tube pressure relief valves of Class 1 shall not have internal leakage up to 3,000 kPa.

Gas-tube pressure relief valves of Class 0 shall not have internal leakage up to WP of the pipe."

Paragraph 6.15.13.1.2., amend to read:

"6.15.13.1.2. Service valves of Class 1 shall withstand a pressure of 6,750 kPa in the open and closed position. Service valves of Class 0 shall withstand a pressure of 2.25 WP in the open and closed position."

Insert new paragraph 9.6.1., to read:

"9.6.1. Every hose assembly which is applied in the high pressure class (Class 0) according to the classification as prescribed in paragraph 2. of this Regulation, shall, during half a minute, be subjected to a test with gas under a pressure of the declared WP."

Paragraph 17.1.1., amend to read:

"17.1.1. The LPG equipment as installed in the vehicle shall function in such a manner that the working pressure for which it has been designed and approved cannot be exceeded."

Paragraph 17.3.1.6., amend to read (including the addition of a new footnote ⁵):

"17.3.1.6. Pressure regulator and vaporizer, which may be combined;⁵"

⁵ These components might not be necessary in case of liquid LPG injection.

Insert a new paragraph 17.6.1.3., to read:

"17.6.1.3. Notwithstanding the provision of paragraph 17.6.1.2., in case of liquid injection systems, if a fuel recirculation is required to purge the system from gas bubbles (vapour lock), it is allowed to keep the remotely controlled service valve with excess flow valve open for a period not longer than 10 seconds before starting the engine in LPG running mode."

Paragraph 17.8.1., amend to read:

"17.8.1. Soldered or welded joints and bite-type compression joints are not permitted. Soldering or welding can be permitted for connecting the individual parts of detachable couplings to the gas tube or component."

Insert a new paragraph 17.9.5., to read:

"17.9.5. Notwithstanding the provision of paragraph 17.9.4., in case of liquid injection systems, if a fuel recirculation is required to purge the system from gas bubbles (vapour lock), it is allowed to keep the remotely controlled shut-off valve open for a period not longer than 10 seconds before starting the engine in LPG running mode and during the fuel switching-over."

Paragraphs 17.11.5. and 17.11.6., amend to read:

"17.11.5. Vehicles with more than one fuel system shall have a fuel selection system to activate and deactivate the LPG running mode.

17.11.6. In case of bi-fuel vehicles, the fuel selection system shall ensure that no more than one fuel is supplied to the engine at any time. A short overlap time to allow switching over is allowed."

Annex 1, items 1.2.4.5.18. to 1.2.4.5.18.4., amend to read:

"1.2.4.5.18. Multi-component: ¹
1.2.4.5.18.1. Make(s):
1.2.4.5.18.2. Type(s):
1.2.4.5.18.3. Description and drawings:
1.2.4.5.18.4. Operating pressure(s): ² kPa"

Items 1.2.4.5.18. (former) to 1.2.8.5.18.5. (former), renumber as items 1.2.4.5.19. to 1.2.4.5.19.5.

Annex 2A, the title, replace the reference to paragraph 5.2. by a reference to paragraph 5.4.

Footnote ¹, amend to read:

"¹ Class 0, 1, 2, 2A or 3"

Annex 2B, item 1., amend to read:

"1. LPG equipment considered: ²
Container ...
LPG filter unit
Multi-component"

Annex 2C, models A and B, replace the reference to paragraph 16.2. by a reference to paragraph 16.4.

Annex 3

Paragraphs 4.2. and 4.3., amend to read:

"4.2. Component classification (according to Figure 1, para.2.): Class 3 or Class 0 if WP declared.

4.3. Classification pressure: 3,000 kPa or WP declared if $\geq 3,000$ kPa."

Paragraphs 5.2. to 5.4., amend to read:

- "5.2. Component classification (according to Figure 1, para. 2): Class 1 or Class 0.
- 5.3. Classification pressure:
- | | |
|------------------|-------------|
| Parts of Class 0 | WP declared |
| Parts of Class 1 | 3,000 kPa |
- 5.4. Component classification (according to Figure 1, para. 2.):
- Class 0 for the part which is in contact with liquid LPG at a pressure > 3,000 kPa;
- Class 1 for the part which is in contact with liquid LPG at a pressure ≤ 3,000 kPa."

Annex 4

Paragraph 2., amend to read:

- "2. Component classification (according to Figure 1, para. 2.):
- Class 0 for the part which is in contact with liquid LPG at a pressure > 3,000 kPa;
- Class 1 for the part which is in contact with liquid LPG at a pressure ≤ 3,000 kPa. "

Paragraph 3., amend to read:

- "3. Classification pressure:
- | | |
|------------------|-------------|
| Parts of Class 0 | WP declared |
| Parts of Class 1 | 3,000 kPa" |

Annex 5

Paragraph 2., amend to read:

- "2. Component classification (according to Figure 1, para. 2.):
- Filter units can be Class 0, 1, 2 or 2A."

Paragraph 3., amend to read:

- "3. Classification pressure:
- | | |
|-------------------------|-------------|
| Components of Class 0: | WP declared |
| Components of Class 1: | 3,000 kPa. |
| Components of Class 2: | 450 kPa. |
| Components of Class 2A: | 120 kPa." |

Annex6

Paragraph 2, amend to read:

- "2. Component classification (according to Figure 1, para. 2.):
- Class 0: for the part which is in contact with LPG at a pressure > 3,000 kPa.
- Class 1: for the part which is in contact with the pressure ≤ 3,000 kPa.

Class 2: for the part which is in contact with the regulated pressure and with a maximum regulated pressure during operation of 450 kPa.

Class 2A: for the part which is in contact with the regulated pressure and with a maximum regulated pressure during operation of 120 kPa."

Paragraph 3., amend to read:

- "3. Classification pressure:
- | | |
|--------------------|-------------|
| Parts of Class 0: | WP declared |
| Parts of Class 1: | 3,000 kPa. |
| Parts of Class 2: | 450 kPa. |
| Parts of Class 2A: | 120 kPa. " |

Annex 7

Paragraph 1.3., amend to read:

- "1.3. Classification pressure: 3,000 kPa or WP declared if > 3,000 kPa."

Paragraph 3.3., amend to read:

- "3.3. Classification pressure: 3,000 kPa or WP declared if > 3,000 kPa."

Annex 8

The scope, amend to read:

"Scope

The purpose of this annex is to determine the provisions regarding the approval of flexible hoses for use with LPG, having an inside diameter up to 20 mm.

This annex covers four types of flexible hoses:

- (i) High pressure rubber hoses (Class 1, e.g. Filling hose)
- (ii) Low pressure rubber hoses (Class 2)
- (iii) High pressure synthetic hoses (Class 1)
- (iv) High pressure synthetic hoses (Class 0)

Insert new paragraphs 4. to 4.8.2., to read:

- "4. High pressure synthetic hoses, Class 0 classification
- 4.1. General specifications
- 4.1.1. The purpose of this chapter is to determine the provisions regarding the approval of synthetic flexible hoses for use with LPG, having an inside diameter up to 10 mm.
- 4.1.2. This chapter covers, in addition to general specifications and tests for synthetic hoses, also specifications and tests applicable for specific material types or a synthetic hose.
- 4.1.3. The hose shall be so designed as to withstand a maximum operating pressure of WP.

- 4.1.4. The hose shall be so designed as to withstand temperatures between $-25\text{ }^{\circ}\text{C}$ and $+125\text{ }^{\circ}\text{C}$. For operating temperatures exceeding the above-mentioned values, the test temperatures must be adapted.
- 4.1.5. The inside diameter shall be in compliance with Table 1 of standard ISO 1307.
- 4.2. Hose construction
- 4.2.1. The synthetic hose must embody a thermoplastic tube and a cover of suitable thermoplastic material, oil and weatherproof, reinforced with one or more synthetic interlayer(s). If for the reinforcing interlayer(s) a corrosion-resistant material is used (i.e. stainless-steel) a cover is not required.
- 4.2.2. The lining and the cover must be free from pores, holes and strange elements.
An intentionally provided puncture in the cover shall not be considered as an imperfection.
- 4.3. Specifications and tests for the lining
- 4.3.1. Tensile strength and elongation
- 4.3.1.1. Tensile strength and elongation at break according to ISO 37. Tensile strength not less than 20 MPa and elongation at break not less than 200 per cent.
- 4.3.1.2. Resistance to n-pentane according to ISO 1817 with the following conditions:
- (i) Medium: n-pentane
 - (ii) Temperature: $23\text{ }^{\circ}\text{C}$ (tolerance acc. to ISO 1817)
 - (iii) Immersion period: 72 hours
- Requirements:
- (i) Maximum change in volume 20 per cent
 - (ii) Maximum change in tensile strength 25 per cent
 - (iii) Maximum change in elongation at break 30 per cent
- After storage in air with a temperature of $40\text{ }^{\circ}\text{C}$ for a period of 48 hours the mass compared to the original value may not decrease more than 5 per cent.
- 4.3.1.3. Resistance to ageing according to ISO 188 with the following conditions:
- (i) Temperature: $115\text{ }^{\circ}\text{C}$ (test temperature = maximum operating temperature minus $10\text{ }^{\circ}\text{C}$)
 - (ii) Exposure period: 336 hours
- Requirements:
- (i) Maximum change in tensile strength 35 per cent
 - (ii) Maximum change in elongation at break -30 per cent and +10 per cent
- 4.3.2. Tensile strength and elongation specific for polyamide 6 material
- 4.3.2.1. Tensile strength and elongation at break according to ISO 527-2 with the following conditions:
- (i) Specimen type: type 1 BA
 - (ii) Tensile speed: 20 mm/min

The material has to be conditioned for at least 21 days at 23 °C and 50 per cent relative humidity prior to testing.

Requirements:

- (i) Tensile strength not less than 20 MPa
- (ii) Elongation at break not less than 50 per cent.

4.3.2.2. Resistance to n-pentane according to ISO 1817 with the following conditions:

- (i) Medium: n-pentane
- (ii) Temperature: 23 °C (tolerance according to ISO 1817)
- (iii) Immersion period: 72 hours

Requirements:

- (i) Maximum change in volume 2 per cent
- (ii) Maximum change in tensile strength 10 per cent
- (iii) Maximum change in elongation at break 10 per cent

After storage in air with a temperature of 40 °C for a period of 48 hours the mass compared to the original value may not decrease more than 5 per cent.

4.3.2.3. Resistance to ageing according to ISO 188 with the following conditions:

- (i) Temperature: 115 °C (test temperature = maximum operating temperature minus 10 °C)
- (ii) Exposure period: 24 and 336 hours

After ageing the specimens have to be conditioned at 23 °C and 50 per cent relative humidity for at least 21 days prior to carrying out the tensile test according to paragraph 4.3.2.1.

Requirements:

- (i) Maximum change in tensile strength 35 per cent after 336 hours ageing compared to the tensile strength of the 24 hours aged material
- (ii) Maximum change in elongation at break 25 per cent after 336 hours ageing compared to the elongation at break of the 24 hours aged material.

4.4. Specifications and test method for the cover

4.4.1.1. Tensile strength and elongation at break according to ISO 37. Tensile strength not less than 20 MPa and elongation at break not less than 250 per cent.

4.4.1.2. Resistance to n-hexane according to ISO 1817 with the following conditions:

- (i) Medium: n-hexane
- (ii) Temperature: 23 °C (tolerance according to ISO 1817)
- (iii) Immersion period: 72 hours

Requirements:

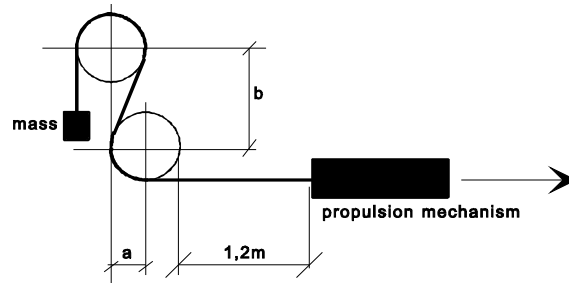
- (i) Maximum change in volume 30 per cent
- (ii) Maximum change in tensile strength 35 per cent

- (iii) Maximum change in elongation at break 35 per cent
- 4.4.1.3. Resistance to ageing according to ISO 188 with the following conditions:
- (i) Temperature: 115 °C (test temperature = maximum operating temperature minus 10 °C)
 - (i) Exposure period: 336 hours
- Requirements:
- (i) Maximum change in tensile strength 25 per cent
 - (ii) Maximum change in elongation at break -30 per cent and +10 per cent
- 4.4.2. Resistance to ozone
- 4.4.3. Specifications and test method for the cover made of polyamide 6 material
- 4.4.3.1. Tensile strength and elongation at break according to ISO 527-2 with the following conditions:
- (i) Specimen type: type 1 BA
 - (ii) Tensile speed: 20 mm/min
- The material has to be conditioned for at least 21 days at 23 °C and 50 per cent relative humidity prior to testing.
- Requirements:
- (i) Tensile strength not less than 20 MPa
 - (ii) Elongation at break not less than 100 per cent.
- 4.4.3.2. Resistance to n-hexane according to ISO 1817 with the following conditions:
- (i) Medium: n-hexane
 - (ii) Temperature: 23 °C (tolerance according to ISO 1817)
 - (iii) Immersion period: 72 hours
- Requirements:
- (i) Maximum change in volume 2 per cent
 - (ii) Maximum change in tensile strength 10 per cent
 - (iii) Maximum change in elongation at break 10 per cent
- 4.4.3.3. Resistance to ageing according to ISO 188 with the following conditions:
- (i) Temperature: 115 °C (test temperature = maximum operating temperature minus 10 °C)
 - (ii) Exposure period: 24 and 336 hours
- After ageing the specimens have to be conditioned for at least 21 days before carrying out the tensile test according to paragraph 4.3.1.1.
- Requirements:
- (i) Maximum change in tensile strength 20 per cent after 336 hours ageing compared to the tensile strength of the 24 hours aged material

- (ii) Maximum change in elongation at break 50 per cent after 336 hours ageing compared to the elongation at break of the 24 hours aged material.
- 4.4.3.3.1. The test has to be performed in compliance with standard ISO 1431/1.
- 4.4.3.3.2. The test-pieces, which have to be stretched to an elongation of 20 per cent shall have to be exposed to air of 40 °C and a relative humidity of 50 per cent \pm 10 per cent with an ozone-concentration of 50 parts per hundred million during 120 hours.
- 4.4.3.3.3. No cracking of the test pieces is allowed.
- 4.5. Specifications for uncoupled hose
 - 4.5.1. Gas-tightness (permeability)
 - 4.5.1.1. A hose at a free length of 1 m has to be connected to a container filled with liquid propane, having a temperature of 23 ± 2 °C.
 - 4.5.1.2. The test has to be carried out in compliance with the method described in standard ISO 4080.
 - 4.5.1.3. The leakage through the wall of the hose shall not exceed 95 cm³ of vapour per metre of hose per 24 h. Leakage of the liquid LPG shall be measured and be lower than the gaseous leakage (95 cm³/hour).
 - 4.5.2. Resistance at low temperature
 - 4.5.2.1. The test has to be carried out in compliance with the method described in standard ISO 4672 method B.
 - 4.5.2.2. Test temperature: -25 ± 3 °C.
 - 4.5.2.3. No cracking or rupture is allowed.
 - 4.5.3. Resistance at high temperature
 - 4.5.3.1. A piece of hose, pressurized at WP, with a minimal length of 0.5 m must be put in an oven at a temperature of 125 ± 2 °C during 24 hours.
 - 4.5.3.2. No leakage is allowed.
 - 4.5.3.3. After the test the hose shall withstand the test pressure of 2.25 WP during 10 minutes. No leakage is allowed.
 - 4.5.4. Bending test
 - 4.5.4.1. An empty hose, at a length of approximately 3.5 m must be able to withstand 3,000 times the hereafter prescribed alternating-bending-test without breaking.

After the test the hose must be capable of withstanding the test pressure as mentioned in paragraph 4.5.5.2.

Figure 4
(example only) ($a = 102 \text{ mm}$; $b = 241 \text{ mm}$)



- 4.5.4.2. The testing machine (see Figure 4) shall consist of a steel frame, provided with two wooden wheels, with a rim-width of approximately 130 mm.
- The circumference of the wheels must be grooved for the guidance of the hose. The radius of the wheels, measured to the bottom of the groove, must be 102 mm.
- The longitudinal median planes of both wheels must be in the same vertical plane. The distance between the wheel-centres must be vertical 241 mm and horizontal 102 mm.
- Each wheel must be able to rotate freely round its pivot-centre.
- A propulsion mechanism pulls the hose over the wheels at a speed of four complete motions per minute.
- 4.5.4.3. The hose shall be S-shape-like installed over the wheels (see Figure 4).
- The end, which runs over the upper wheel, shall be furnished with a sufficient mass as to achieve a complete snuggling of the hose against the wheels. The part that runs over the lower wheel is attached to the propulsion mechanism.
- The mechanism must be so adjusted, that the hose travels a total distance of 1.2 m in both directions.
- 4.5.5. Hydraulic test pressure and determination of the minimum burst-pressure
- 4.5.5.1. The test has to be carried out in compliance with the method described in standard ISO 1402.
- 4.5.5.2. The test pressure of 2.25 WP shall be applied during 10 minutes, without any leakage.
- 4.5.5.3. The burst pressure shall not be less than 2.25 WP.
- 4.6. Couplings
- 4.6.1. The couplings shall be made from steel or brass and the surface must be corrosion-resistant.
- 4.6.2. The couplings must be of the crimp-fitting type and made up of a hose-coupling or banjo bolt. The sealing shall be resistant to LPG and comply with paragraph 4.3.1.2.
- 4.6.3. The banjo bolt shall comply with DIN 7643.
- 4.7. Assembly of hose and couplings

- 4.7.1. The hose assembly has to be subjected to an impulse test in compliance with standard ISO 1436.
- 4.7.1.1. The test has to be completed with circulating oil having a temperature of 93 °C, and a minimum pressure of WP.
- 4.7.1.2. The hose has to be subjected to 150,000 impulses.
- 4.7.1.3. After the impulse-test the hose has to withstand the test pressure as mentioned in paragraph 4.5.5.2.
- 4.7.2. Gas-tightness
- 4.7.2.1. The hose assembly (hose with couplings) has to withstand during five minutes a gas pressure of 1.5 WP without any leakage.
- 4.8. Markings
- 4.8.1. Every hose must bear, at intervals of not greater than 0.5 m, the following clearly legible and indelible identification markings consisting of characters, figures or symbols.
- 4.8.1.1. The trade name or mark of the manufacturer.
- 4.8.1.2. The year and month of fabrication.
- 4.8.1.3. The size and type-marking.
- 4.8.1.4. The identification marking "L.P.G. Class 0".
- 4.8.2. Every coupling shall bear the trade name or mark of the assembling manufacturer."

Annex 11

Paragraphs 1.2. and 1.3., amend to read:

- "1.2. Component classification (according to Figure 1, para. 2.): Class 1 or Class 0.
- 1.3. Classification pressure:
Class 0: WP declared
Class 1: 3,000 kPa."

Paragraphs 3.2.and 3.3., amend to read:

- "3.2. Component classification (according to Figure 1, para. 2.):
Fuel rails can be of Class 0, 1, 2 or 2A.
- 3.3. Classification pressure:
Parts of Class 0 WP declared
Parts of Class 1: 3,000 kPa.
Parts of Class 2: 450 kPa.
Parts of Class 2A: 120 kPa."

Paragraph 3.6.1., amend to read:

- "3.6.1. For fuel rails of Class 0 and 1:
Over pressure test Annex 15, para. 4.
External leakage Annex 15, para. 5.

High temperature	Annex 15, para. 6.
Low temperature	Annex 15, para. 7.
LPG compatibility	Annex 15, para. 11. **/
Corrosion resistance	Annex 15, para. 12. */
Resistance to dry heat	Annex 15, para. 13. **/
Ozone ageing	Annex 15, para. 14. **/
Creep	Annex 15, para. 15. **/
Temperature cycle	Annex 15, para. 16. **/"

Annex 13

Paragraph 2., amend to read:

- "2. Component classification (according to Figure 1, para. 2.):
Pressure and temperature sensors can be of Class 0, 1, 2 or 2A."

Paragraph 3., amend to read:

- "3. Classification pressure:
Parts of Class 0: WP declared
Parts of Class 1: 3,000 kPa.
Parts of Class 2: 450 kPa.
Parts of Class 2A: 120 kPa."

Paragraph 6.1., amend to read:

- "6.1. For parts of Class 0 and 1:
Over pressure test Annex 15, para. 4.
External leakage Annex 15, para. 5.
High temperature Annex 15, para. 6.
Low temperature Annex 15, para. 7.
LPG compatibility Annex 15, para. 11. **/
Corrosion resistance Annex 15, para. 12. */
Resistance to dry heat Annex 15, para. 13. **/
Ozone ageing Annex 15, para. 14. **/
Creep Annex 15, para. 15. **/
Temperature cycle Annex 15, para. 16. **/"

Annex 15

Paragraph 2., table 1, amend to read:

"Table 1

Test	Class 0	Class 1	Class 2(A)	Class 3	Paragraph
Overpressure	x	x	x	x	4.
External leakage	x	x	x	x	5.

High temperature	x	x	x	x	6.
Low temperature	x	x	x	x	7.
Seat leakage	x	x		x	8.
Endurance / Functional tests	x	x		x	9.
Operational test	x			x	10.
LPG compatibility	x	x	x	x	11.
Corrosion resistance	x	x	x	x	12.
Resistance to dry heat	x	x		x	13.
Ozone ageing	x	x		x	14.
Creep	x	x		x	15.
Temperature cycle	x	x		x	16.
Compatibility with heat exchange fluid	x		x		17.

Paragraph 4., table 2, amend to read:

"Table 2

Classification of component	Classification pressure [kPa]	Hydraulic test pressure for over-pressure test [kPa]
Class 0	WP	2.25 WP
Class 1	3,000	6,750
Class 3	3,000 or WP	6,750 or 2.25 WP
Class 2A	120	270
Class 2	450	1,015

Paragraph 8.2., amend to read:

"8.2. The seat of a shut-off valve, when in the closed position, shall be free from leakage at any aerostatic pressure between 0 to 3,000 kPa or from 0 to WP in accordance with the classification pressure of the valve."

Paragraph 8.7., amend to read:

"8.7. The gas-tube pressure relief valve shall not have internal leakage up to 3,000 kPa or up to WP, in accordance with the classification pressure of the valve."

Paragraph 9.2., amend to read:

"9.2. A shut-off valve is to be tested with the valve outlet plugged. The valve body filled with n-hexane, and the valve inlet subjected to a pressure of 3,000 kPa or of WP in accordance with the classification pressure of the valve."