

9 November 2015

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## Agreement

### **Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions\***

(Revision 2, including the amendments which entered into force on 16 October 1995)

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#### **Addendum 109 – Regulation No. 110**

#### **Revision 3 - Amendment 2**

Supplement 3 to the 01 series of amendments – Date of entry into force: 8 October 2015

#### **Uniform provisions concerning the approval of:**

**I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system**

**II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system**

This document is meant purely as documentation tool. The authentic and legal binding text is: ECE/TRANS/WP.29/2015/13.



**UNITED NATIONS**

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\* Former title of the Agreement: Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

*Paragraph 3., insert a new class and amend Figure 1-1 and Figure 1-2, to read:*

"3. Classification of components

Class 0 High pressure parts including tubes and fittings containing CNG at a pressure higher than 3 MPa and up to 26 MPa.

...

Class 5 Parts in contact with temperature range extending below -40 °C.

Class 6 High pressure parts including tubes and fittings containing CNG, excluding CNG containers, at a pressure higher than 26 MPa.

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

... according to Figure 1-1.

Figure 1-1  
Flow scheme for CNG and/or LNG components classification

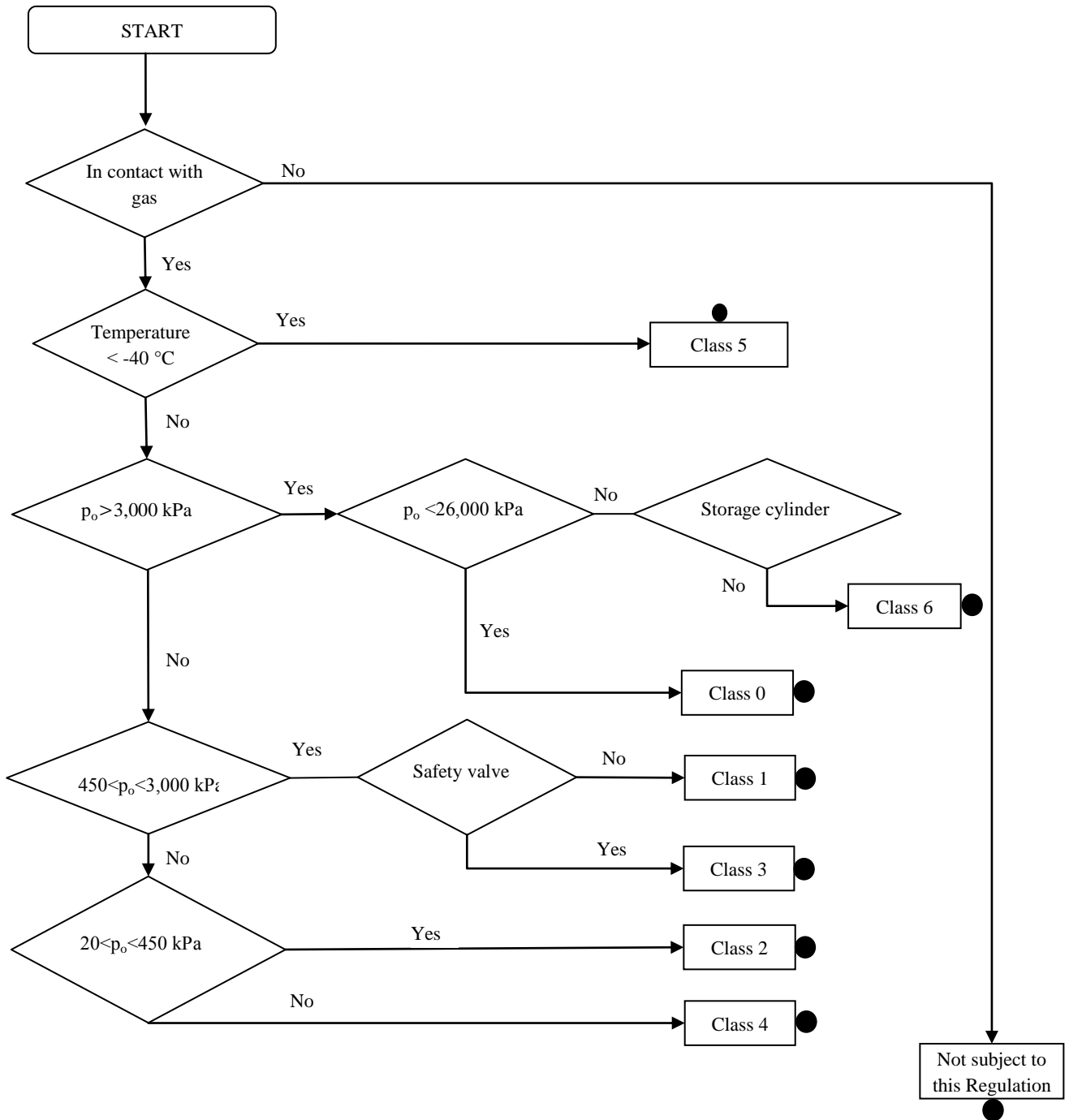


Figure 1-2

**Test applicable to specific classes of components (excluding CNG cylinders and LNG tank)**

<i>Test</i>	<i>Class 0</i>	<i>Class 1</i>	<i>Class 2</i>	<i>Class 3</i>	<i>Class 4</i>	<i>Class 5</i>	<i>Class 6</i>	<i>Annex</i>
Overpressure or strength	X	X	X	X	O	X	X	5A
External leakage	X	X	X	X	O	X	X	5B
Internal leakage	A	A	A	A	O	A	A	5C
Durability tests	A	A	A	A	O	A	A	5L
CNG/LNG compatibility	A	A	A	A	A	A	A	5D
Corrosion resistance	X	X	X	X	X	A	X	5E
Resistance to dry heat	A	A	A	A	A	A	A	5F
Ozone ageing	A	A	A	A	A	A	A	5G
Burst/destructive tests	X	O	O	O	O	A	X	5M
Temperature cycle	A	A	A	A	O	A	A	5H
Pressure cycle	X	O	O	O	O	A	X	5I
Vibration resistance	A	A	A	A	O	A	A	5N
Operating temperatures	X	X	X	X	X	X	X	5O
LNG low temperature	O	O	O	O	O	X	O	5P

*Part I,*

*Paragraph 11.3.,* amend to read:

"11.3. Every flexible fuel line assembly that is applied in the high and medium pressure (Class 0, 1, 5 and 6) according to the Classification as described in paragraph 3 of this Regulation, shall be tested at the pressure twice the working pressure."

*Part II,*

*Insert a new paragraph 18.3.2.8.,* to read:

"18.3.2.8. CNG accumulator"

*Paragraph 18.7.2.,* amend to read:

"18.7.2. The CNG rigid fuel line may be replaced by a flexible fuel line if used in Class 0, 1, 2 or 6."

*Annex 4A,*

*Insert a new paragraph 4.2.2.,* to read:

"4.2.2. The pressure relief valve and pressure relief device in Class 6 shall be so designed as to withstand a pressure of 1.5 times the working pressure (MPa) with the outlet closed off."

*Paragraphs 4.2.2. to 4.2.5. (former),* renumber as paragraphs 4.2.3. to 4.2.6.

*Insert a new paragraph 4.2.7., to read:*

"4.2.7. The pressure relief valve of Class 6 shall be so designed to operate at temperatures as specified in Annex 5O."

*Insert new paragraphs 6.3. and 6.4., to read:*

"6.3. The manual valve device in Class 6 shall be designed to withstand a pressure of 1.5 times the working pressure.

6.4. The manual valve device in Class 6 shall be designed to operate at temperatures as specified in Annex 5O."

*Paragraph 6.3. (former), renumber as paragraph 6.5. and amend to read:*

"6.5. Manual valve device requirements

One specimen shall be submitted to a fatigue test at a pressure cycling rate not to exceed 4 cycles per minute as follows: held at 20 °C while pressured for 2,000 cycles between 2 MPa and 26 MPa (for Class 0) or between 2 MPa and declared working pressure (for Class 6)."

*Paragraph 7.2.2., amend to read:*

"7.2.2. The burst pressure of the PRD (pressure triggered) of Class 0 shall be 34 MPa ± 10 per cent at ambient temperature and at the maximum operating temperature as indicated in Annex 5O."

*Insert new paragraphs 7.2.3. and 7.2.4., to read:*

"7.2.3. The PRD (pressure triggered) of Class 6, shall be so designed to operate at temperatures as specified in the Annex 5O.

7.2.4. The burst pressure of the PRD (pressure triggered) of Class 6 shall be at least 1.5 times working pressure at ambient temperature and at the maximum operating temperature as indicated in Annex 5O."

*Paragraph 7.4.2.2.2., amend to read:*

"7.4.2.2.2. At the completion of the test, the Class 0 PRD (pressure triggered) burst pressure shall be 34 MPa ± 10 per cent at ambient temperature and at the maximum operating temperature as indicated in Annex 5O."

*Insert new paragraph 7.4.2.2.3., to read:*

"7.4.2.2.3. At the completion of the test, the Class 6 PRD (pressure triggered) burst pressure shall be at least 1.5 times working pressure at ambient temperature and at the maximum operating temperature as indicated in Annex 5O."

*Annex 4B,*

*Paragraph 0., amend to read:*

"0. The purpose of this annex is to determine the provisions regarding the approval of flexible hoses for use with CNG or LNG.

...

- (a) High pressure hoses (Class 0, Class 6);
- (b) Medium pressure hoses (Class 1);
- (c) Low pressure hoses (Class 2);
- (d) LNG hoses (Class 5)."

*Paragraph 1.*, amend to read:

"1. High pressure hoses, Class 0 and Class 6 classification"

*Paragraph 1.7.2.1.*, amend to read:

"1.7.2.1. The test has to be completed with circulating oil having a temperature of 93 °C, and a minimum pressure of 26 MPa (Class 0) or declared working pressure (Class 6)."

*Paragraph 1.8.1.4.*, amend to read:

"1.8.1.4. For Class 0, the identification-marking "CNG Class 0", for Class 6 the identification-marking "CNG Class 6"."

*Annex 4C,*

*Insert a new paragraph 2.2.2.*, to read:

"2.2.2. Class 6: The CNG filter shall be so designed to withstand a pressure of 1.5 times the working pressure (MPa)."

*Paragraphs 2.2.2. (former) to 2.2.3.*, renumber as paragraphs 2.2.3. to 2.2.4.

*Annex 4D,*

*Paragraph 2.3.*, amend to read:

"2.3. The component shall comply with the test procedures provided for in Class 0 or Class 6 for the parts subject to high pressure and Class 1, 2, 3 and 4 for the parts subject to medium and low pressure."

*Insert new paragraphs 3.2. to 3.2.3.5.*, to read:

"3.2. The part of the pressure regulator which is in contact with pressure higher than 26 MPa is regarded as Class 6.

3.2.1. The Class 6 part of the pressure regulator shall be leak-proof (see Annex 5B) at a pressure up to 1.5 times the working pressure (MPa) with the outlet(s) of that part closed off.

3.2.2. The Class 6 part of the pressure regulator shall withstand a pressure up to 1.5 times the working pressure (MPa).

3.2.3. The part of the pressure regulator that is in contact with pressure below 26 MPa is classified as per Part I, Section 3, of this Regulation.

3.2.3.1. The Class 0 part of the pressure regulator shall be leak-proof (see Annex 5B) at a pressure up to 1.5 times the working pressure (MPa) with the outlet(s) of that part closed off.

3.2.3.2. The Class 0 part of the pressure regulator shall withstand a pressure up to 1.5 times the working pressure (MPa).

3.2.3.3. The Class 1 and Class 2 part of the CNG pressure regulator shall be leak-proof (see Annex 5B) at a pressure up to twice the working pressure.

3.2.3.4. The Class 1 and Class 2 part of the CNG pressure regulator shall withstand a pressure up to twice the working pressure.

3.2.3.5. The Class 3 part of the CNG pressure regulator shall withstand a pressure up to twice the relief pressure of the pressure relief valve, on which it is subject."

*Paragraph 3.2. (former)*, renumber as paragraph 3.3.

*Annex 4E,*

Insert new paragraphs 3.1.4. to 3.1.6., to read:

- "3.1.4. The part of the CNG pressure and temperature sensors which is in contact with pressure higher than 26 MPa is regarded as Class 6.
- 3.1.5. The Class 6 part of the CNG pressure and temperature shall be leakproof at a pressure up to 1.5 times the working pressure (MPa) (see Annex 5B).
- 3.1.6. The Class 6 of the CNG pressure and temperature sensors shall withstand a pressure up to 1.5 times the working pressure (MPa)."

Paragraphs 3.1.4. and 3.1.5. (former), renumber as paragraphs 3.1.7. and 3.1.8.

Annex 4G,

Insert new paragraphs 2.3.3. to 2.3.4., to read:

- "2.3.3. The CNG gas injector or fuel rail of Class 6 shall withstand a pressure 1.5 times the declared working pressure.
- 2.3.3.1. The CNG gas injector or fuel rail of Class 6 shall be free from leakage at a pressure 1.5 times the declared working pressure.
- 2.3.4. The CNG gas injector or fuel rail of Class 6 shall be so designed to operate at temperatures as specified in Annex 5O."

Annex 5,

Table 5.1, amend to read:

"Table 5.1

Test	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Annex
Overpressure or strength	X	X	X	X	O	X	X	5A
External leakage	X	X	X	X	O	X	X	5B
Internal leakage	A	A	A	A	O	A	A	5C
Durability tests	A	A	A	A	O	A	A	5L
CNG/LNG compatibility	A	A	A	A	A	A	A	5D
Corrosion resistance	X	X	X	X	X	A	X	5E
Resistance to dry heat	A	A	A	A	A	A	A	5F
Ozone ageing	A	A	A	A	A	A	A	5G
Burst/destructive tests	X	O	O	O	O	A	X	5M
Temperature cycle	A	A	A	A	O	A	A	5H
Pressure cycle	X	O	O	O	O	A	X	5I
Vibration resistance	A	A	A	A	O	A	A	5N
Operating temperatures	X	X	X	X	X	X	X	5O
LNG low temperature	O	O	O	O	O	X	O	5P

"

Annex 5A,

Table 5.2, amend to read:

"Table 5.2

<i>Classification of component</i>	<i>Working pressure [kPa]</i>	<i>Overpressure [kPa]</i>
Class 0	$3,000 < p < 26,000$	1.5 times the working pressure
Class 1	$450 < p < 3,000$	1.5 times the working pressure
Class 2	$20 < p < 450$	2 times the working pressure
Class 3	$450 < p < 3,000$	2 times the relief pressure
Class 5	as specified by the manufacturer	1.5 times the working pressure
Class 6	as specified by the manufacturer	1.5 times the working pressure

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