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PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 110
(Specific components for CNG)

Submitted by the expert from India

Note: The text reproduced below was prepared by the expert from India in order to clarify the applicability of different tests for specific CNG components. The text is based on a document without a symbol (informal document No. GRPE-50-9), distributed during the fiftieth GRPE session (ECE/TRANS/WP.29/GRPE/51, para. 32). The modifications to the current text of the Regulations are marked as ~~strike through~~ or in **bold** characters.

Note: This document is distributed to the Experts on Pollution and Energy only.

A. PROPOSAL

Annex 5, paragraph 2., amend to read:

"2. Applicable test procedures:

In table 5.1 below the applicable test procedures dependent on the classification are shown..

Table 5.1

Test	Class0	Class 1	Class 2	Class 3	Class 4	Paragraph
Overpressure or strength	X	X	X	X	O	5A
External leakage	X	X	X	X	O	5B
Internal leakage	A	A	A	A	O	5C
Durability tests	A	A	A	A	O	5L
CNG compatibility	A	A	A	A	A	5D
Corrosion resistance	X	X	X	X	X	5E
Resistance to dry heat	A	A	A	A	A	5F
Ozone ageing	A	A	A	A	A	5G
Burst/destructive tests	X	O	O	O	O	5M
Temperature cycle	A	A	A	A	O	5H
Pressure cycle	X	O	O	O	O	5I
Vibration resistance	A	A	A	A	O	5N
Operating temperatures	X	X	X	X	X	5O

X = Applicable

O = Not applicable

A = As applicable

Remarks:

- (a) **Internal leakage:** Applicable if the Class of the component consists of internal valve seats that are normally closed during engine "OFF" condition.
- (b) **Durability test:** Applicable if the Class of the component consists of integral parts that will move repeatedly during engine operation.
- (c) **CNG compatibility, resistance to dry heat, ozone ageing:** Applicable if the class of the component consists of synthetic / non-metallic parts.
- (d) **Temperature cyclic test:** Applicable if the class of the component consists of synthetic / non-metallic parts.
- (e) **Vibration resistance test:** Applicable if the Class of the component consists of integral parts that will move repeatedly during engine operation.

The materials used for the components shall have written specifications

Annex 5A, paragraph 1., amend to read:

"OVER PRESSURE TEST (STRENGTH TEST)

1. A CNG containing component shall withstand without any visible evidence of rupture or permanent distortion a hydraulic pressure of 1.5-2 times the maximum working pressure during minimal **3 minutes** at room temperature with the outlet of the high pressure part plugged. Water or any other suitable hydraulic fluid may be used as a test medium."

Annex 5E, amend to read:

"CORROSION RESISTANCE TEST

Test procedures:

1. A metal CNG containing component shall comply with the leakage tests mentioned in annexes 5B and 5C and after having been submitted to 144 hours salt spray test according to ISO CD 15500-2, with all connections closed.

Test procedure:

~~Before the test the component shall be cleaned according to the instructions of the manufacturer. All the connections shall be closed off. The component shall not be operated during the test.~~

~~Subsequently the component shall be submitted during 2 hours to spraying with a solution of salt, containing 5 per cent NaCl (mass per cent) with less than 0.3 per cent contamination and 95 per cent distilled or demineralised water, at a temperature of 20 EC. After the spraying the component is stored at temperature of 40 EC and 90-95 per cent relative humidity for 168 hours. This sequence shall be repeated 4 times.~~

~~After the test the component shall be cleaned and dried during 1 hour at 55 EC. The component shall now be conditioned to reference conditions during 4 hours, before submitting it to further testing.~~

2. A copper or brass CNG containing component shall comply with"

Annex 5L, amend to read:

"DURABILITY TEST (CONTINUED OPERATION)

Test method

The component shall be connected to a source of pressurized dry air or nitrogen by means of a suitable fitting and subjected to the number of cycles specified for that specific component (**number of cycles for pressure regulator shall be 50,000 cycles as specified in ISO 15500, part 9, para. 6.4.**). A cycle shall consist of one opening and one closing of the component within
....."

B. JUSTIFICATION

Ad Annex 5, paragraph 2.:

Remarks for applicability of tests (i.e. internal leakage, durability, CNG compatibility, ozone ageing, resistance to dry heat, temperature cyclic test, vibration resistance, etc) are added for more clarity. This will avoid different interpretation of applicability of tests by various technical services.

Ad Annex 5A:

This clause stipulates that the test duration for hydrostatic strength test shall be 1 minute which is contradictory to the paragraph for the test duration for hydrostatic strength tests (Annex 5, paragraph 3.3. stipulates "The test period for leakage- and hydrostatic strength-tests shall not be less than 3 minutes". To avoid contradiction, the test duration shall be amended to 3 minutes. (ISO 15500 also stipulates a 3 minutes duration for this test).

Ad Annex 5E:

Annex 5E mentions two different test procedures for corrosion resistance test (i.e. ISO CD 15500-2 for a test duration of 144 hrs and corrosion test according to paragraph 1 for test duration of 672 hrs). It is proposed to retain only one test procedure i.e. according to ISO CD 15500-2 and to delete the text of the test procedure (the text marked as strikethrough).

Ad Annex 5L:

For the durability test, the number of cycles are not specified for components i.e. pressure regulator, injector, gas flow adjuster etc. The number of cycles should be defined in the Regulation for the applicable components. India is following the specifications of ISO 15500 standard for CNG regulator testing, which prescribe 50,000 cycles. For other components, advice may be sought from GRPE experts.
