

Technical Report No.: 120367 – 07 – TAC
ECE Regulation No.: R67.01
Manufacturer: STEFANELLI GROUP SRL, SEDE LEGALE:
VIA VETURIA, 45; 00181 ROMA, ITALY
Type: Pressure Regulator type: GEO 110LPG INJECTION

**TECHNICAL REPORT
No. 120367 – 07 - TAC**

Test according to ECE Regulation No. 67.01

Uniform provisions concerning the approval of:

- I. Approval of specific equipment of motor vehicles using liquefied petroleum gases in their propulsion system**
- II. Approval of a vehicle fitted with specific equipment for the use of liquefied petroleum gases in its propulsion system with regard to the installation of such equipment**

ECE No. 67.00 – date of entry into force: 1 June 1987
including all amendments up to and including
ECE No. 67.01, Supplement 4 - date of entry into force: 4 April 2005

Objectives: Document for issue of approval

I. Technical data

- | | | |
|--------|------------------------------------|--|
| 0.1. | Make (trade name of manufacturer): | STEFANELLI GROUP |
| 0.2. | Type: | GEO 110 LPG INJECTION |
| 0.2.1. | Commercial name: | Not applicable |
| 0.3. | Means of identification of type: | Stamped on the regulator body |
| 0.3.1. | Location of that marking: | On the body of regulator |
| 0.4. | Class of component: | 1/2 |
| 0.5. | Name and address of manufacturer: | STEFANELLI GROUP SRL
SEDE LEGALE:
VIA VETURIA, 45
00181 ROMA
Italy |
| 0.8. | Address of assembly plant: | See point 0.5 |
| 0.9. | Location of the approval mark: | On the body of regulator |





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Type: Pressure Regulator type: GEO 110LPG INJECTION

II. Test report

The approval tests of submitted samples were conducting in collaboration with Aeronautical Research and Test Institute in Prague.
The technical data and the test results are indicated in attachments to this Technical Report.

3. Specimen submitted to test on: 9 March 2007

4. Date of test: 9 March 2007 to 10 April 2007

III. Manufacturer's information folder

Application for approval of Vaporizer Regulator "GEO 110 LPG INJECTION" with "SHUT-OFF VALVE LPG" and "FILTER" 29 January 2007, 45 pages total

IV. Attachments

Test report No. E28016/07 5 pages

Measuring and test equipment and test site meet the requirements of the applicable legislation. This report must never be reproduced incomplete without a written permission of the testing laboratory.

V. Final assessment

The described sample

complies

with the requirements of ECE Regulation No. 67.01
for issue of approval certificate

This technical report consists of pages No. 1 to 2 and 5 pages of attachments.

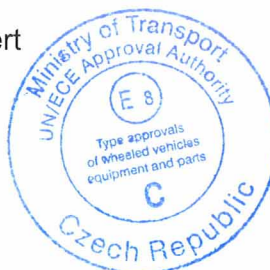

Vladimír Perný

Officially recognized expert


Vít Dvořák

Head of Group of experts

Prague, 14 May 2007



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Test Report

VAPORIZER / PRESSURE REGULATOR WITH SHUT-OFF VALVE LPG AND FILTER

(Annex 6, Annex 7 - para. 1.)

Mark: STEFANELLI GROUP
Type: GEO 110 LPG INJECTION
 with shut-off valve LPG and filter
Manufacturer: STEFANELLI GROUP srl
 Stab.: Via Mola Saracena, 10
 00065 Fiano Romano (Roma), Italy
Samples: 3 - No.: 1,2,3
Date of the tests: 09.03. 2007 - 10.04. 2007

Classification of component:	Class 1	Class 2
Classification pressure:	3000 kPa	450 kPa
Design temperatures:	- 20°C to + 120°C	

General design rules:

Para. 6.15.2.	It must have the electrical system isolated from the body. Isolation resistance shall be >10 MΩ.	N/A
Para. 6.15.2.2.	It shall comply with insulation class IP 54 (IEC 529).	N/A
Para. 6.15.3.1.	The valve shall be in „closed“ position when its power is switched off.	yes
Para. 6.15.4.1.	The materials of heat exchanger shall be compatible with that fluid.	N/A
	The materials of heat exchanger shall withstand a pressure of 200 kPa.	yes
Para. 6.15.4.2.	The heat exchanger shall be leakage proof at a pressure of 200 kPa.	yes
Para. 6.15.5.	V/PR must be so designed to prevent a pressure build up in the low pressure part above 2,25 times the maximum working pressure.	yes
Para. 6.15.6.2.	V/PR must be so designed as to prevent any gas flow when V/PR is supplied with LPG at a pressure ≤ 4,5 MPa when V/PR is not operating.	yes

Applicable test procedures according to Annex 15, para.:

4. Over pressure test under hydraulic conditions	yes
5. External leakage test	yes
6. High temperature test	yes
7. Low temperature test	yes
8. Seat leakage test	yes
9. Endurance test	yes
11. LPG compatibility test for synthetic materials	yes
12. Corrosion resistance	yes
13. Resistance to dry-heat	yes
14. Ozone ageing	yes
15. Creep	N/A
16. Temperature cycle test	N/A
17. Compatibility with heat exchange fluid	yes

Note: N/A = not applicable



Date: 23.04. 2007	Worked up by: Žďánský	Signature: <i>Žďánský</i>
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Para. 6.15.5.: Pressure relief by-pass

By-pass is created by pressure relief valve (positions: 18, 19 and 20).

		Samples		
	Requirement	1	2	3
Growth of pressure	< 1015 kPa	170 kPa	210 kPa	190 kPa

Annex 15, para. 4: Overpressure test under hydraulic conditions

Test pressure 6750 kPa (class 1) and 1015 kPa (class 2) during 1 minute

		Samples		
	Requirement	1	2	3
Rupture	no	no	no	no
Permanent distortion	no	no	no	no

Annex 15, para. 5: External leakage test

Test pressure 0 to 4500 kPa (class 1) and 0 to 675 kPa (class 2) during 1 minute

			Samples		
	Temperature	Requirement	1	2	3
External leakage	+ 20°C	< 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h
	- 20°C	< 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h
	+ 120°C	< 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h

Annex 15, para. 6: High temperature test

Test pressure 4500 kPa (class 1) and 675 kPa (class 2) during 1 minute by + 120°C (8 hours of tempering)

		Samples		
	Requirement	1	2	3
Leakage	≤ 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h

Annex 15, para. 7: Low temperature test

Test pressure 4500 kPa (class 1) and 675 kPa (class 2) during 1 minute by - 20°C (8 hours of tempering)

		Samples		
	Requirement	1	2	3
Leakage	≤ 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h

Annex 15, para. 8: Seat of a shut-off valve leakage test

Test pressure 0 to 4500 kPa (Para. 6.15.6.2.) during 1 minute

		Samples		
	Requirement	1	2	3
Leakage	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h	0 cm ³ /h



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Annex 15, para. 9: Endurance test

6000 cycles of a shutt-off valve opening and closing - Samples No.: 3

Test pressure: 3000 kPa

Rate: 10 cycles/minute

Temperature: + 20°C

Testing medium: n-hexan

External leakage test (Annex 15, para. 5) after Endurance test

Test pressure 0 to 4500 kPa during 1 minute

		Samples				
	Temperature	Requirement	3			
External leakage	+ 20°C	< 15 cm ³ /h	0 cm ³ /h			
	- 20°C	< 15 cm ³ /h	0 cm ³ /h			
	+ 120°C	< 15 cm ³ /h	0 cm ³ /h			

Seat of a shutt-off valve leakage test (Annex 15, para. 8) after Endurance test

Test pressure 0 to 4500 kPa during 1 minute

		Samples				
	Requirement	3				
Leakage	0 cm ³ /h	0 cm ³ /h				

Annex 15, para. 11: LPG compatibility test for synthetic materials

Samples:

- 1 - High pressure diaphragm - position 16
- 2 - Seat sealing Ø 10,35 x 2,4 - position 4
- 3 - O-ring Ø 11,11 x 1,78 - position 8
- 4 - Seat sealing Ø 8 x 2 - position 11

		Samples		
	Requirement	1	2	3
Maximum change in volume	20 %	+ 3,87 %	+ 1,17 %	- 1,81 %
Change of mass after air tempering	≥ - 5 %	- 2,51 %	- 0,07 %	- 1,93 %

		Samples		
	Requirement	4		
Maximum change in volume	20 %	+ 1,11 %		
Change of mass after air tempering	≥ - 5 %	- 0,06 %		



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Annex 15, para. 12: Corrosion resistance

Salt spray (144 hours) according to ISO 9227 - Sample No.: 1

Immersion in Ammonia (24 hours) according to ISO 6957 - Sample No.: 2

Overpressure hydrostatic test (Annex 15, para. 4) after Corrosion resistance test

Test pressure 6750 kPa (class 1) a 1015 kPa (class 2) during 1 minute

		Samples	
Requirement		1	2
Rupture	no	no	no
Permanent distortion	no	no	no

External leakage test (Annex 15, para. 5) after Corrosion resistance test

Test pressure 0 to 4500 kPa (class 1) and 0 to 675 kPa (class 2) during 1 minute

			Samples	
Requirement			1	2
External leakage	Temperature			
	+ 20°C	< 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h
	- 20°C	< 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h
	+ 120°C	< 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h

High temperature test (Annex 15, para. 6) after Corrosion resistance test

Test pressure 4500 kPa (class 1) and 675 kPa (class 2) during 1 minute by + 120°C (8 hours of tempering)

		Samples	
Requirement		1	2
Leakage	≤ 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h

Low temperature test (Annex 15, para. 7) after Corrosion resistance test

Test pressure 4500 kPa (class 1) and 675 kPa (class 2) during 1 minute by - 20°C (8 hours of tempering)

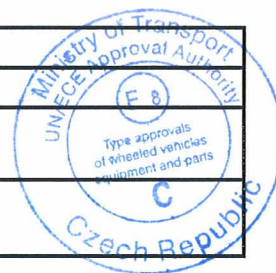
		Samples	
Requirement		1	2
Leakage	≤ 15 cm ³ /h	0 cm ³ /h	0 cm ³ /h

Annex 15, para. 13: Resistance to dry-heat

Samples:

1 - O-ring Ø 11,11 x 1,78 - position 8

		Samples	
Requirement		1	2
Allowable change in tensile strength	≤ + 25 %	- 4,0 %	
Allowable change in ultimate elongation	≤ + 10 % ≥ - 30 %	- 7,1 %	



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Annex 15, para. 14: Ozone ageing

Samples:

1 - O-ring \varnothing 11,11 x 1,78 - position 8

		Samples	
	Requirement	1	
Cracking of test piece	no	no	

Annex 15, para. 17: Compatibility with heat exchange fluids of non metallic parts

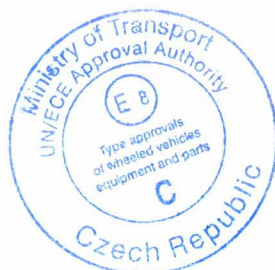
Samples:

1 - High pressure diaphragm - position 16

		Samples	
	Requirement	1	
Maximum change in volume	20 %	+ 7,55 %	
Change of mass after air tempering	$\geq - 5$ %	+ 2,78 %	
Allowable change in tensile strength	$\geq - 25$ %	- 10,1 %	
Allowable change in ultimate elongation	$\leq + 10$ % $\geq - 30$ %	- 17,3 %	

Presented results are only applicable to samples, which have been tested.
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The tests results and examinations according to ECE Regulation No. 67.01 were handed over to the Motor Vehicle Research Institute, Ltd, CZ 180 68 Praha 9, Lihovarská 12. This Institute has authorised the Departmental Test-room 1401 of Aeronautical Research and Test Institute to carry out approval tests under the Contract of Agreement.



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Dipl. Ing. Karel Sejk
Head of Departmental Test-room 1401

Prague, 23 April 2007

Date: 23.04. 2007	Worked up by: Žďánský	Signature: <i>Žďánský</i>
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