


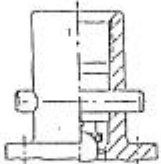
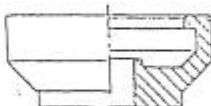
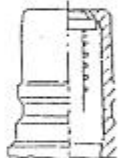
INFORMAL DOCUMENT N°7

41st GRPE session

17-19 January 200

A few years ago, the European LPG Industry identified the need for an harmonisation of the LPG vehicle systems as a major issue to improve the customer friendliness of the LPG refuelling operations with regard to their safety but also their environmental aspects.

Currently, 3 systems are coexisting in EUROPE :

System	ACME-thread	Bayonet-Quick Coupling	Dish Coupling	Japan
Car filling connector				
Mainly used in	Austria, Belgium, Canada, Germany, Poland, Ireland, New Zealand, U.S.A.	The Netherlands, UK, Poland	Italy, France, Poland, Portugal, Greece, Spain	Japan

In addition, the opening of the European market for OEMs LPG vehicles decided the European LPG Industry to develop , through the CEN/TC286/WG6, a new European LPG refuelling systems for passenger cars and light duty vehicles : so called light Euro connector and for heavy duty vehicles, so called HDV Euro connector.

Note : The CEN documents pr EN 12886 on automotive LPG components other than tanks and pr EN 13760 on the future European filling nozzles are currently at the CEN translation stage. The CEN formal vote procedure is expected to be completed in the 2nd half 2001.

The objective in this informal paper is to introduce in the UN/ECE regulatory framework and specially in the R67 – 01 series, all the necessary rules which will help the spread of these new LPG refuelling systems on the European market and guarantee their proper design and appropriate installation on the future LPG vehicles.

AEGPL remain at the disposal of the GRPE experts for any additional information which might be necessary to analyse this proposal.

H. CHAPOTOT
Director General

**Draft amendments to UN/ECE Regulation 67-01 series
with a view to update the requirements on the LPG vehicle connectors**

1. Amendments needed to be introduced in the Part 1

➤ **Changes in the definitions :**

- **The definition of the vehicle connector shall be introduced in the main part in a new paragraph 2.19 :**
 "Vehicle connector" means a device situated at the outside of the vehicle to refuel the vehicle.
 Note : the vehicle connector may be combined with the filling unit and/or the 80% stop valve in the case that the container is not installed inside to the vehicle.
- **The definition of the filling unit in paragraph 2.16 shall be changed as follows :**
 " Filling unit " means a device ~~to allow filling of the container; the filling unit can be realised by integration in the 80% stop valve of the container or by remote filling unit at the outside of the vehicle;~~ that allows filling of the container and prevents the flow of LPG in the opposite direction.
 Note : the filling unit may be combined with the 80% stop valve and with the vehicle connector in the case the tank is installed outside of the vehicle.
- **The paragraph 2.19 shall be renumbered in paragraph 2.20.**

➤ **Changes in the provisions on the devices :**

- **As the filling unit is a component fitted in or on the container, it shall be mentioned in a new paragraph 6.3.1.5 :**
 6.3.1.1. The container shall be equipped with the following accessories, which may be either separate or combined (multivalve(s)):
 6.3.1.1.1. 80 per cent stop valve,
 6.3.1.1.2. level indicator,
 6.3.1.1.3. pressure relief valve (discharge valve),
 6.3.1.1.4. remotely controlled service valve with excess flow valve,
 6.3.1.1.5. **filling unit.**
- **The vehicle connector shall be considered as a component not fitted in or on the container, thus it shall be referred to in the paragraph 6.3 to 6.13 "Provisions regarding other components".
 Thus, the current paragraph 6.8 of the Table 1 shall read :**

Paragraph	Component	Annex
6.8	Filling unit vehicle connector	9

- **The current provisions of the paragraph 6.15.10 regarding the filling unit shall read :**

6.15.10. Provisions regarding the filling unit

6.15.10.1 The filling unit shall be ~~equipped with at least one gas-tight non-return valve~~ provided with at least two non-return valves; one of which shall be soft seated.

6.15.10.2 If the filling unit is combined with the 80% stop valve, the closing device of the 80% stop valve may act as one of the non-return valve.

6.15.10.3. The filling unit shall be protected against contamination.

~~6.15.10.3. The design and dimensions of the filling unit must comply with those in the figures in annex 9. The filling unit shown in figure 3 is only applicable for motor vehicles of categories M2, M3, N2, N3 and M1 having a maximum total mass > 3,500 kg. */~~

~~6.15.10.4. The outside filling unit is connected to the container by a hose or pipe.~~

6.15.10.4 The filling unit shall withstand, without damage, a torque of 150% of the recommended mounting torque specified by the manufacturer.

- **A new paragraph shall be added in the paragraph 6.15 “General design rules regarding components” to introduce the requirements specific to the vehicle connector :**

6.15.14 Provisions regarding the vehicle connector

6.15.14.1 The vehicle connector shall be equipped with at least one soft seated non-return valve.

6.15.14.2 The vehicle connector shall be protected against contamination.

6.15.14.3 Rotation of any part of the vehicle connector shall be prevented in normal operating conditions.

6.15.14.4 The vehicle connector shall withstand, without damage, a torque of 150% of the recommended mounting torque, specified by the manufacturer.

6.15.14.5 Specific provisions for a vehicle connector made of 2 parts:

6.15.14.5.1 If the vehicle connector is composed of two parts, in order to facilitate the implementation of the light vehicle Euro connector on the market, it shall:

- be split in a valve body and a connector body, joined by thread M21,8 x 1,4G'' ; the male thread shall be at the connector body side;
- be provided with at least 1 soft seated non-return valve in the valve body and 1 soft seated non-return valve in the light vehicle connector body;

Note: If during the implementation period of the Euro connector, the connector body is replaced by a connector body of one of the currently existing types (see the drawings in the Annex 9 - paragraph 9), this connector body does not require a non-return valve.

6.15.14.5.2 It shall be impossible to remove the connector body from the valve body without specific measures or the use of dedicated tools.

6.15.14.5.3 The split between the 2 bodies shall be at the normal fixing point as indicated in Annex 9 - figure A2.

6.15.14.5.4 The length of the connector body of any type, not taking the length of the male thread in account, shall not exceed L in Annex 9 - figure A2.

6.15.14.6 Specific provisions for the light vehicle Euro connector:

- The dead volume between the front sealing surface and the front of the non-return valve shall not exceed 0,1 cm³;
- The flow through the connector at a pressure difference of 30 kPa shall be at least 60 L/min, if tested with water.

6.15.14.7 Specific requirements for the heavy-duty vehicle Euro connector:

- The dead volume between the front sealing surface and the front of the non-return valve shall not exceed 0,5 cm³;
- The flow through the connector, with the non-return valve mechanically opened, at a pressure difference of 50 kPa shall be at least 200 L/min, when tested with water.

6.15.14.8 The design and dimensions of the vehicle connector must comply with those in the figures in Annex 9.

6.15.14.8.1 Examples and critical dimensions of current vehicle connectors attachment points and sealing area configurations are shown in Annex 9 - paragraph 9.

6.15.14.8.2 Examples and critical dimensions of the light vehicle and heavy duty vehicle Euro connectors are given in Annex 9 - paragraph 10.

➤ **Addition of new transitional provisions for the implementation of the Euro connectors :**

- **New transitional provisions shall be added in a new paragraph 11.6 to implement the new European connectors on the market place :**

11.6 Transitory provisions for the implementation of the European connector:

11.6.1 From [1 June 2002], all new vehicles of categories M1 and N1, less than 3.5 tons, placed on the market or retrofitted after this date, shall be fitted with a vehicle connector made of 2 parts as defined in Annex 9 paragraph 5.1.

11.6.2 From [1 June 2003], all LPG vehicles of categories M1 and N1 less than 3.5 tons, placed on the market or retrofitted shall be fitted with a European vehicle connector made of one part.

11.6.3 From [1 June 2002], all vehicles of categories M1 and N1, more than 3.5 tons shall be fitted with the heavy duty Euro connector as defined in Annex 9 - paragraph 10.2.

2. Amendments needed to be introduced in the Part 2

The vehicle connector shall be mentioned in the list of accessories being part of the automotive LPG system.

- Introduction of the vehicle connector in the list of components making the automotive LPG system :

17.3. **The LPG-system**

17.3.1. An LPG-system shall contain at least the following components:

17.3.1.1. fuel container;

17.3.1.2. 80 per cent stop valve;

17.3.1.3. level indicator;

17.3.1.4. pressure relief valve;

17.3.1.5. remotely controlled service valve with excess flow valve;

17.3.1.6. pressure regulator and vaporizer, which may be combined;

17.3.1.7. remotely controlled shut-off valve;

17.3.1.8. filling unit;

17.3.1.9. gas tubes and hoses;

17.3.1.10. gas-carrying connections between the LPG-system components;

17.3.1.11. injector or gas injection device or gas mixing piece;

17.3.1.12. electronic control unit;

17.3.1.13. pressure relief device (fuse);

17.3.1.14. vehicle connector.

- The provisions on the installation of the filling unit on the container shall be added in a new paragraph in the section related to the installation of the “accessories to the fuel container” :

17.6.6. Filling unit

17.6.6.1. The filling unit shall be installed on the container.

- The provisions related to the installation of the vehicle connector shall be introduced in the current paragraph showing the provisions on the filling unit :

17.10. ~~Filling unit~~ Vehicle connector

17.10.1. The ~~filling unit~~ vehicle connector shall be secured against rotation and shall be protected against dirt and water.

17.10.2. ~~When the LPG container is installed in the passenger compartment or an enclosed (luggage) compartment,~~ the ~~filling unit~~ vehicle connector shall be located at the outside of the vehicle.

3. Amendments needed to be introduced in the Component Annexes

➤ Introduction of the specific requirements on the filling unit :

According to its new definition, the LPG filling unit is an accessory fitted on the container. Thus, its related provisions currently mentioned in the Annex 9 shall be shown in a new paragraph of the Annex 3 :

8. Provisions regarding the approval of the filling unit

8.1 **Definition:** see paragraph 2.16. of this Regulation.

8.2 **Component classification** (according to figure 1, para. 2):

Filling unit: Class 3

Non-return valve: Class 3

8.3 **Classification pressure:** 3,000 kPa.

8.4 **Design temperatures:**

-20°C to 65°C

For temperatures exceeding the above-mentioned values, special tests conditions are applicable.

8.5 **General design rules:**

Paragraph 6.15.2., Provisions regarding the electrical insulation.

~~Paragraph 6.15.9., Provisions regarding non return valve.~~

Paragraph 6.15.10., Provisions regarding the filling unit.

8.6 Applicable test procedures:

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
Seat leakage test	Annex 15, para. 8
Endurance	Annex 15, para. 9 (with 6,000 operation cycles)
LPG compatibility	Annex 15, para. 11 <u>**/</u>
Corrosion resistance	Annex 15, para. 12 <u>*/</u>
Resistance to dry heat	Annex 15, para. 13
Ozone ageing	Annex 15, para. 14 <u>**/</u>
Creep	Annex 15, para. 15 <u>**/</u>
Temperature cycle	Annex 15, para. 16 <u>**/</u>

*/ only for metallic parts

**/ only for non-metallic parts

➤ **Introduction of the specific requirements on the vehicle connector :**

Annex 9

PROVISIONS REGARDING THE APPROVAL OF THE ~~FILLING UNIT~~-VEHICLE CONNECTOR

- 1. Definition:** see paragraph ~~2.16.~~ 2.19 of this Regulation.
- 2. Component classification** (according to figure 1, para. 2):

Vehicle connector : Class 3
~~Filling unit: Class 3~~
~~Non return valve: Class 3~~
- 3. Classification pressure:** 3,000 kPa.
- 4. Design temperatures:**

-20°C to 65°C
For temperatures exceeding the above-mentioned values, special tests conditions are applicable.
- 5. General design rules:**

Paragraph 6.15.2., Provisions regarding the electrical insulation.
~~Paragraph 6.14.9., Provisions regarding non return valve.~~
~~Paragraph 6.14.10., Provisions regarding the filling unit.~~
Paragraph 6.15.14., Provisions regarding the vehicle connector.

6. Applicable test procedures:

Over pressure test	Annex 15, para. 4 from the outlet of the connector on each non-return valve;
External leakage	Annex 15, para. 5
High temperature	Annex 15, para. 6
Low temperature	Annex 15, para. 7
Seat leakage test	Annex 15, para. 8
Endurance	Annex 15, para. 9 (with 6,000 operation cycles)
	Note : The endurance test shall be carried out with a nozzle specifically intended for the connector under test. 10.000 cycles shall be applied according to the following procedure: <ul style="list-style-type: none">- connect the nozzle to the connector and open the filling system;- leave in open situation for at least 3 seconds;- close the filling system and disconnect the nozzle.
LPG compatibility	Annex 15, para. 11 <u>**/</u>
Corrosion resistance	Annex 15, para. 12 <u>*/</u>
Resistance to dry heat	Annex 15, para. 13
Ozone ageing	Annex 15, para. 14 <u>**/</u>
Creep	Annex 15, para. 15 <u>**/</u>
Temperature cycle	Annex 15, para. 16 <u>**/</u>
Impact test	paragraph 7 of this Annex
Drop test	paragraph 8 of this Annex

*/ only for metallic parts

**/ only for non-metallic parts

7. Impact test requirements

7.1 General requirements

The connector shall be subjected to an impact test of 40 j.

7.2 Test procedure

A hardened steel mass of 4 kg shall be dropped from a height of 1m so as to deliver the impact velocity 4.4 m/s. This shall be achieved by mounting the weight in a pendulum.

The connector shall be installed horizontally on a solid object.

The impact of the weight shall be on the centre of the of the protruding part of the connector.

7.2 Test interpretation

The connector shall comply with the external leak test and seat leak test at ambient temperature.

7.3 Re-testing

If the component fails the test, 2 samples of the same component shall be submitted to the impact test. If both samples pass the test, the first test shall be ignored. In the event where one or both fail the re-test, the component shall not be approved.

8. Drop test requirements

8.1 General requirements (not applicable)

8.2 Test procedure

3 vehicle connectors, without any protection, shall be dropped at random from a height of 1 m on a concrete floor.

8.3 Test interpretation

The vehicle connector shall comply with the external leak test and the seat leak test at ambient temperature

8.4 Re-testing

If the connector fails the test, 2 samples shall be submitted to the impact test. If both samples pass the test, the first test shall be ignored. In the event where one or both fail the re-test, the connector shall not be approved.

9. Examples of current vehicle connectors

Figure 1: Bajonet connector configuration

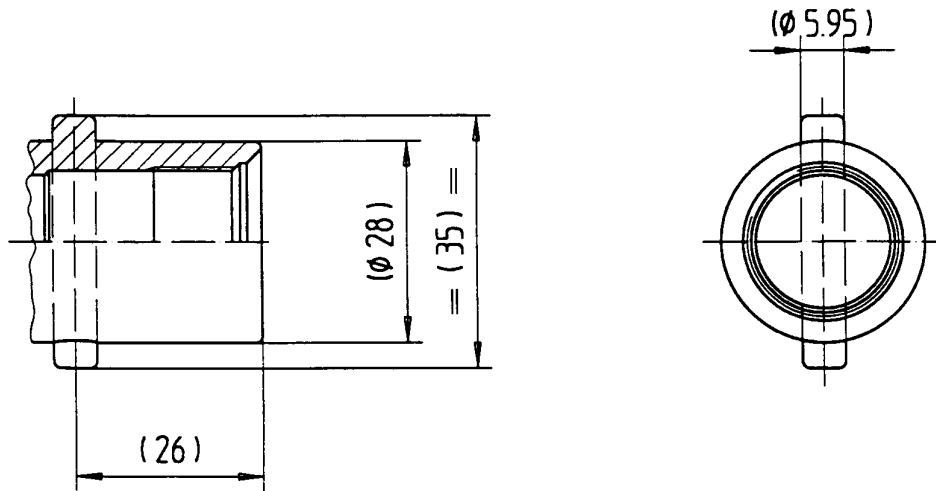


Figure 2: Dish connector configuration

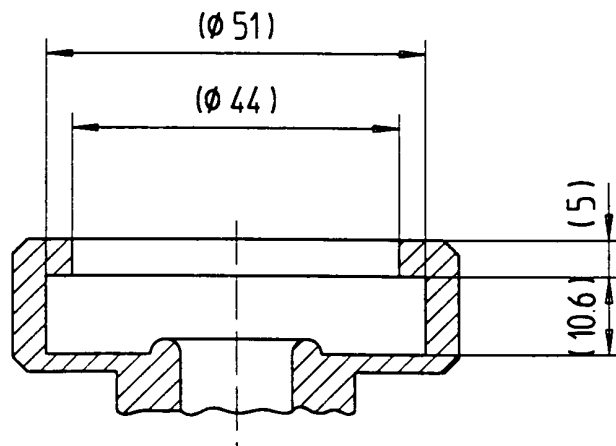
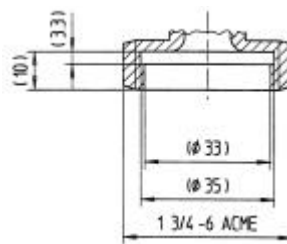


Figure 3: ACME connector configuration



Note: All the currently existing light vehicle connectors may also be used for vehicles of categories M2, M3, N2, N3 and M1, having a total mass > 3500 kg. */

10. Euro-vehicle connectors

10.1 Critical dimensions of the light vehicle Euro connector

Figure 4 Light vehicle Euro connector configuration

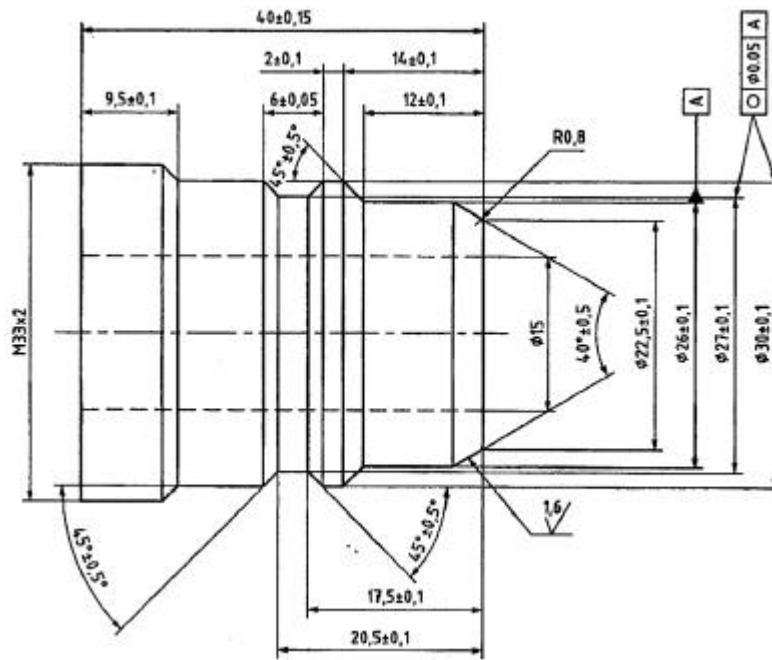
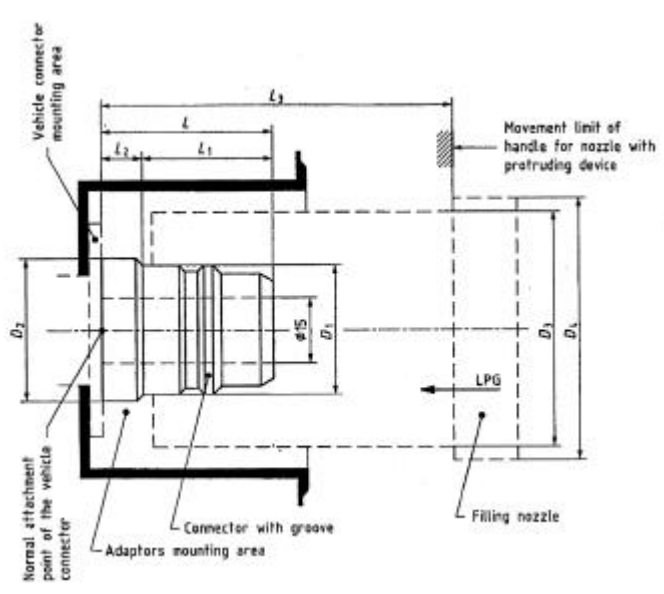


Figure 5 Installation of the light vehicle Euro connector



Note: The Euro light vehicle connector may also be used for vehicles of categories M2, M3, N2, N3 and M1, having a total mass > 3500 kg. */

Critical dimensions of the heavy duty vehicle Euro connector

Figure 6 Critical dimensions of the heavy duty vehicle Euro connector

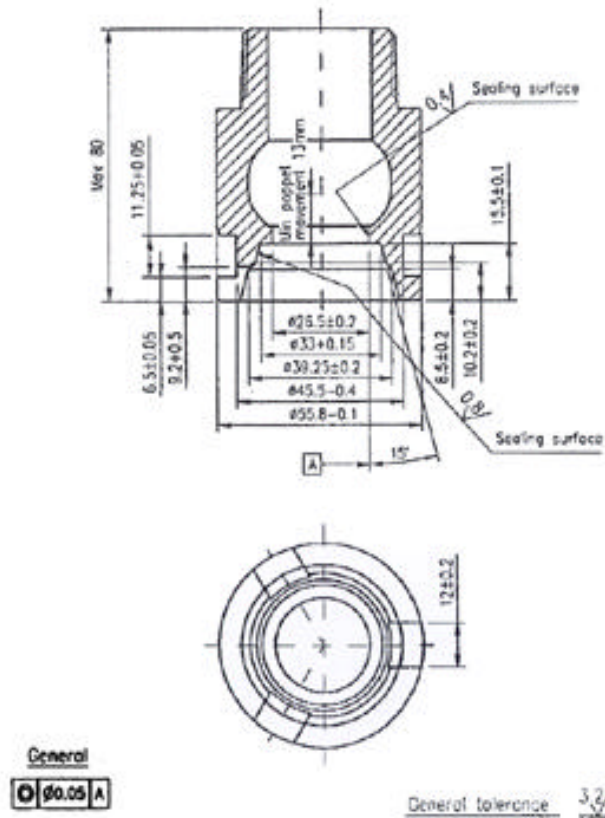
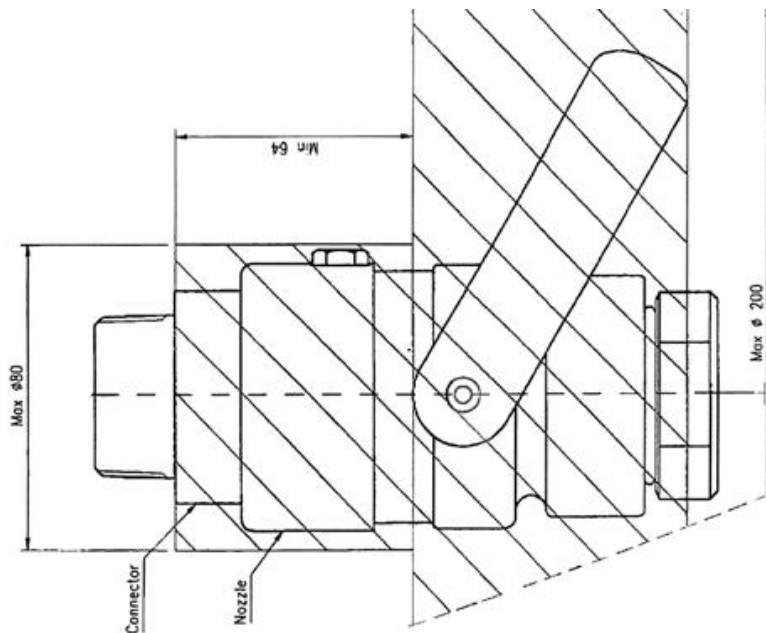


Figure 7 Information on the heavy duty vehicle Euro connector dimensions



*/ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3), annex 7 (document TRANS/WP.29/78/Rev.1)