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Inland Transport Committee

Working Party on the Transport of Dangerous Goods

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Item 5 (b) of the provisional agenda:

**Proposals for amendments to RID/ADR/ADN:
new proposals**

Proposal for amendment to packing instruction P200 in 4.1.4.1 of RID/ADR to permit the interval between the periodic inspection of Liquefied Petroleum Gas cylinders manufactured according to EN 14140 to be extended from 10 to 15 years

Transmitted by Liquid Gas Europe

Annex to document ECE/TRANS/WP.15/AC.1/2024/17

Introduction

1. EN 14140 was originally published in 2003 and it is estimated that there are currently roughly 11 million cylinders designed and manufactured according to this standard in the European market. Slightly over 10 million of these cylinders circulate in Portugal and Spain, with 95% of them in the latter.
2. After nearly 20 years of service, there have been no reported incidents involving such cylinders related to their failure due to lack of mechanical resistance, or external or internal corrosion.

I. Additional requirements for the manufacture of EN 14140 cylinders when compared with the manufacture of EN 1442 cylinders.

3. One of the characteristics of [Liquefied Petroleum Gas \(LPG\)](#) cylinders designed and manufactured according to EN 14140 is that it has a lower wall thickness than those designed and manufactured according to EN 1442. That lower wall thickness can mislead to the incorrect interpretation that such cylinders have a lower resistance, which is not the case.
4. Actually, the yield strength of the steel used in EN 14140 cylinders is 560 MPa, and their tensile strength is 670 Mpa. On the other hand, the yield strength of the commonly used carbon steels used in EN 1442 cylinders is 310 Mpa and their tensile strength is 460 Mpa. Thus, the mechanical resistance of EN 14140 cylinders is higher than the mechanical resistance of EN 1442 cylinders, hence, they are sufficiently resistant to pressure.

5. Furthermore, EN 14140 requires additional tests that are not required by EN 1442, such as external corrosion tests, cylinder body integrity impact tests, drop tests, and the vacuum test.

6. Thus, in addition to their resistance to pressure, EN 14140 cylinders are also resistant to impacts and drops, as well as having effective anticorrosion protection.

7. Hence, the manufacturing requirements of EN 14140 cylinders are quite more demanding than the ones applicable to EN 1442 cylinders, resulting in a cylinder with quality and safety levels at least equivalent to EN 1442 cylinders, to which a 15-year interval between periodic inspections is already able to be granted.

II. LPG quality to prevent internal corrosion of cylinders

8. LPG of a quality mandated by 4.1.4.1 P200 (12) (2.5) does not cause internal corrosion in steel cylinders.

9. This LPG quality is the same as that required for EN 1442 cylinders, for which a 15-year interval between periodic inspections is already able to be granted.

III. Applicable requirements for the periodic inspection of cylinders according to EN 16728 in relation to EN 1440

10. EN 14140 cylinders are subjected to periodic inspection according to the requirements of EN 16728, which differ from the requirements of EN 1440, under which the periodic inspection of EN 1442 cylinders is done. This is important due to the fact that EN 16728 has more stringent requirements than EN 1440.

11. For instance, the anticorrosive protective coating to be applied during periodic inspection must comply with the requirements of the original type of approved anticorrosive protective coating, thus ensuring effective protection against external corrosion.

12. It also has to withstand the adhesion tests with a pull-off strength of at least 6 MPa or 8 MPa, depending on the type of break, and also pass the same tests after ageing with a pull-off strength of at least 3 MPa or 4 MPa.

13. It is also recommended that the proof pressure test be pneumatic, or in the case of a hydraulic proof pressure test, a non-corrosive liquid, that is compatible with the material of construction of the cylinder, shall be used as the test medium.

14. Hence, the periodic inspection requirements applicable to EN 14140 cylinders are more demanding than the ones of EN 1440, applicable to the periodic inspection of EN 1442 cylinders, ensuring the prevention of internal and external corrosion.

IV. Quality requirements for filling plants and periodic inspection facilities for cylinders, which have been granted an interval of 15 years between period inspections.

15. When an authorization to extend the periodic inspection interval from 10 years to 15 years is granted, with the additional marking of "P15Y", the cylinder owner is bound to demonstrate to the competent authority, or to a Xa Body to whom the competent authority has delegated such task, on a periodic basis, that the quality system in place at the filling plant(s) and periodic inspection facility(ies), keeps complying with the ADR requirements and the authorization given.

16. This means that a Third Party can confirm, for instance, through regular audits of the authorised filling plants and periodic inspection facilities, that the relevant applicable standards and regulation requirements are still being applied correctly.

17. These checks focus on the organisation of the filling plant and periodic inspection facility, the training of personnel regarding the identification of the criteria that lead to deeming a cylinder unfit to be marketed (physical damages, external corrosion and internal corrosion) and consequent competence assessment of such personnel, the quality of the LPG to be filled according with the requirements of 4.1.4.1 P200 (12) (2.5) by examining the product quality certificates, if the conformity of the filling operations with EN 1439 and EN 13952 and the periodic inspection requirements according with EN 16728 is being fulfilled and if the filling equipment is being maintained.

18. If all these requirements are not confirmed by an independent Third Party then cylinders may only be authorised for a 10-year periodic inspection interval.

V. Conclusions

19. According to the information presented above, one can conclude that the design and manufacture of cylinders in accordance with EN 14140, produce a cylinder with a mechanical resistance equal to or superior to an equivalent cylinder designed and manufactured in accordance with EN 1442, that the prevention and protection against internal and external corrosion are covered by additional tests in EN 14140, and that the LPG quality to be filled has a very low potential contamination.

20. Finally, with the application of the P15Y marking and the extension of the interval between the periodic inspection from 10 to 15 years, the owner of the cylinders owner is bound to demonstrate to the competent authority, or to a Xa body to whom the competent authority has delegated such task, on a periodic basis, that the quality system in place at the filling plant(s) and periodic inspection facility(ies) keeps complying with the ADR requirements and the authorization given, something that does not occur when the interval between periodic inspections is 10 years.
