



**Committee of Experts on the Transport of Dangerous Goods
and on the Globally Harmonized System of Classification
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Sixty-fourth session**

Geneva, 24 June-3 July 2024

Item 3 of the provisional agenda

Listing, classification and packing**Present and future products in the Liquefied Petroleum Gas
(LPG) industry – Addition of a new special provision to UN
1075 and UN 1965****Transmitted by the World Liquid Gas Association (WLGA – ex.
WLPGA)***

Executive summary:	<p>The LPG industry introduced into the market in 2018 bioLPG, i.e. LPG (C3/C4) of identical molecular composition as conventional LPG, but of bio/renewable origin. However, the existing definition of UN 1075 (liquefied petroleum gases), does not currently reflect that it can either be from renewable origin (bioLPG), or conventional LPG extracted from natural gas.</p> <p>In addition, today, other molecules with similar physical properties like renewable dimethyl ether (DME), are being blended with LPG (and also used as stand-alone product), they are already present in the US market, and will also be in Europe and other markets very soon.</p> <p>Document ST/SG/AC.10/C.3/2022/53 and informal document INF.23 were discussed during the 61st session and the preferred option was for a new special provision to be added to UN 1075 and UN 1965. This was followed up by three informal documents at the 63rd meeting (INF.18, INF.19 and INF.35), which refined the proposal, summarised the testing and provided copies of the endorsements.</p> <p>This present proposal is separate from, and not linked to the proposal to create a new UN number for hydrocarbon and DME blends (ST/SG/AC.10/C.3/2024/50).</p>
Action to be taken	Introduce a new special provision in Chapter 3.3.1 and assign it to the entries for UN 1075 and UN 1965 in the Dangerous Goods List in Chapter 3.2.2
Related documents:	ST/SG/AC.10/C.3/2024/49, ST/SG/AC.10/C.3/2022/53 and informal documents INF.23 from the 61 st session and INF.18 from the 63 rd session.

* A/78/6 (Sect. 20), table 20.5.



I. Background

1. LPG has been a commercial fuel for just over a century. It consists of mostly propane and butane, produced until a few years ago through only:
 - (a) Petroleum refining (covered by existing definitions and UN numbers), currently meeting 30 % to 40 % of the world demand and decreasing.
 - (b) Natural gas processing (not covered by UN 1075 which refers only to “petroleum”), currently meeting 60 % to 70 % of the world demand.
2. Today, in the context of the energy transition and aiming at decarbonisation and de-fossilisation, and reduction of the overall carbon footprint, the LPG industry is transforming itself, by including also in its product range, the same propane C₃H₈ and butane C₄H₁₀ products, but of bio/renewable/recycled origin and gradually moving away from product originating from both, petroleum refining and extraction from natural gas. These two current sources are being replaced by bio/renewable/recycled and non-fossil derived supplies.
3. In addition, the LPG industry, started recently (in the USA) to include in its offerings other products and blends of molecules of bio/renewable/recycled origin of lower carbon footprint. Such an example is the renewable or recycled carbon DME, as a blend component, or as a standalone fuel. DME is a molecule with similar physical properties to LPG, that can originate from fossil, non-fossil and/or renewable or recycled carbon sources. The renewable or recycled carbon DME, is a complementary liquid gas that can be produced from multiple renewable/recycled carbon feedstocks. Being a non-corrosive, non-toxic and clean-burning fuel, it is a viable sustainable addition to the energy mix. With its low greenhouse gas (GHG) footprint, it can reduce emissions by up to 85 % compared to fossil fuel alternatives. In both its pure and blended form, it can help the decarbonisation and de-fossilisation of the LPG industry in all types of applications, as it can be highly compatible with the existing LPG infrastructure and equipment, either with no modifications or only minor modifications.
4. Some characteristics of DME and its blends include:
 - (a) DME (UN 1033) has the same classification code¹ as LPG (2F), the same label² (2.1) and identical hazards.
 - (b) Its vapour pressure is approximately midway between that of butane and propane (almost the same as a 50/50 mix of butane and propane). Blending will have the effect of reducing the vapour pressure of propane rich mixtures and increasing the vapour pressure of butane rich mixtures, but only by small amounts, even when added at the maximum percentage mass (12 %) set out in this proposal.
 - (c) Filling ratios will not need to be amended as DME has a higher liquid density than both butane and propane and their thermal expansion ratios are almost the same.
 - (d) Calculations have been undertaken on the required flow capacity for safety valves (pressure relief valves) and those calculations show that if the safety valves are sized for LPG, they will have also the correct (conservative) flow capacity for DME/LPG blends (and unblended DME).
5. The above-mentioned blends, constitute new product offerings, and like any other fuel, they need to be assigned to a UN number that reflects them correctly.
6. For several years, there have been products transported, that did not completely correspond to the UN number used like, for example, bioLPG (renewable LPG from biological or recycled carbon feedstock), which is available today in many European markets. It is transported in some areas under UN 1075, however that is “Petroleum Gases, Liquefied” and although the bioLPG is identical to the fossil LPG, it is not a petroleum gas. BioLPG can exist as standalone product or as blend with fossil LPG.

¹ See Column (3b) of Table A of Chapter 3.2 of the *Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)*.

² See Column (5) of Table A of Chapter 3.2 of the *Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)*.

7. Permitting the addition of up to 12 % of renewable/recycled DME (by mass) to LPG assigned to UN Nos. 1075 or 1965 will reduce the carbon footprint of the product and will have no effect on safety in the transport chain. WLGA have undertaken a large degree of testing on non-metallic and certain metallic materials that are used in the LPG industry. Document ST/SG/AC.10/C.3/2024/49 provides further supporting information on the research and testing undertaken by the WLGA.

8. All of the testing undertaken by the WLGA (in testing facilities around the world) with blends of 20 % DME (by mass in the liquid phase) with LPG show that the materials used in the transport and storage chain are still suitable – this allows the proposed 12 % maximum percentage to be used with a minimum 50 % safety factor.

9. However, in the same way as different grades of LPG cannot safely be used in all appliances and equipment (for example if propane is used in a butane appliance or the reverse), this can be controlled on a local basis in the same way that motor spirit or gasoline or petrol with up to 10 % ethanol can still be assigned to UN 1203, but it is not suitable for all traditional uses of UN 1203.

10. It should also be noted that currently, mixtures of gases that are completely unsuitable for use as LPG can still be assigned to UN 1075 or UN 1965, for example with high percentages of ethane or propylene.

11. The Sub-Committee in the 61st session welcomed the initiative of the LPG industry to offer, in the context of the circular economy and the sustainable use of natural resources, a solution to reduce the overall carbon footprint and had agreed that more research and data was needed on the percentage of DME blended with LPG, including the results on the compatibility of DME with material used for tanks, cylinders and their sealings. The Sub-Committee agreed to resume consideration of this subject at a further session, based on new documents to be provided, including the outcome of the research work.

12. This research work and data collection on the percentage of DME blended with LPG was since completed and was presented at the 63rd session of the Sub-Committee. It was well received and accepted by the majority of the participants, with the only main objection to the second sentence of the special provision that required the percentage of the dimethyl ether content to be shown in the transport documentation. This requirement has now been deleted from the revised wording of the new special provision.

13. The proposed amendment will assist in the decarbonisation of the fuel supplied by the LPG industry and thus contribute towards the United Nations Sustainable Development Goal 7 (affordable and clean energy).

II. Proposal

Chapter 3.2, dangerous goods list

14. For UN Nos. 1075 and 1965, in column (6), add “XXX”.

Chapter 3.3

15. In 3.3.1 add the following new special provision:

“XXX This substance may contain hydrocarbon gases from non-petroleum sources and may also contain up to 12 % by mass of UN 1033 DIMETHYL ETHER.”

III. Safety implications

16. No safety implications are foreseen from the proposal. The LPG industry is of the opinion that safety in the transport of the proposed LPG/DME blend will not be affected or changed compared to conventional LPG. See annex (below) for the pressure temperature curves for DME, butane, propane and butane/propane mixtures.

Annex

[English only]

Pressure-temperature curves for DME, butane, propane and butane/propane mixtures

