



U.S. Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

AUG 15 2000

Mr. Henry Renfrew
Compliance and Response Management
25 Audette Drive
Wallingford, CT 06492

Ref. No. 00-0159

Dear Mr. Renfrew:

This is in response to your letter dated May 12, 2000, requesting assistance in selecting an appropriate proper shipping name and packaging requirements for a mixture of Liquefied Petroleum Gases (LPG), 80% Butane and 20% Isobutane (which are expelled from 2Q inner containers, 8 oz. - 227 gm, and used for heat/flame in small portable cooking appliances), under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). The 2Q inner containers are packaged in an outer packaging containing approximately 12 cans. Your questions are paraphrased and answered as follows:

- Q1. Are the following descriptions the preferred or appropriate proper shipping name(s) for LPG containing 80% Butane and 20% Isobutane: "Petroleum gases"; "Liquefied petroleum gas"; or "Liquefied petroleum gases"?
- A1. When a material is not specifically listed by name in the § 172.101 Hazardous Materials Table (§ 172.101 HMT), selection of a proper shipping name must be made from the general description entries corresponding to the specific hazard class, packing group, and subsidiary hazards of the material. In accordance with the § 172.101 HMT, the most appropriate proper shipping name(s) for the LPG blend would be: "Petroleum gases, liquefied" or "Liquefied petroleum gas" or "gases". Proper shipping names may be used in either the singular or plural (see § 172.101(c)(1) and (12)).
- Q2. Can the "Aerosols" description in the § 172.101 HMT be used for the LPG blend (expelled as a vapor from the container) and shipped under the limited quantity exceptions in § 173.306(a)(3) when it originates and is distributed in the United States by highway?
- A2. No. The exception in § 173.306(a)(3) is limited to aerosol containers not exceeding one liter capacity in which one or more gases are used to expel other material that is a liquid, paste or powder. A liquefied compressed gas (e.g., LPG blend) packaged without a liquid, paste, or powder in the container, is not eligible for the exception, and may not be described under the "Aerosols" description when shipped solely in domestic transportation by highway or rail.



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For aircraft and vessel shipments, except as provided for limited quantities of compressed gases in containers of not more than 4 fluid ounces capacity under § 173.306(a)(1), aerosols must meet the definition for "Aerosol" in § 171.8 (See §§ 171.11(d)(14) and 171.12(b)(17)).

- Q3. Are the packagings in § 173.304(d)(3)(ii) acceptable for the LPG blend (packaged in inner 2Q containers having less than a maximum capacity of 31.83 cubic inches and less than the maximum charging pressure of 45 p.s.i.g. at 70 degrees F. and 105 p.s.i.g. at 130 degrees F.)?
- A3. The containers in § 173.304(d)(3)(ii) are authorized for the LPG blend and may be used within the limits of quantity and pressures specified in the table shown in this paragraph. Such containers must be equipped with safety relief devices which will prevent rupture of the containers and dangerous projection of the closing devices when the containers are exposed to the action of fire.

I hope this satisfies your inquiry. If we can be of further assistance, please contact us.

Sincerely,



Delmer F. Billings
Chief, Standards Development
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Henry Renfrew
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May 12, 2000

U.S. Department of Transportation
Research and Special Programs Administration
Office of Hazardous Material Safety
Mr. Edward T. Mazzullo, Director
Office of Hazardous Materials Standards (DHM-10)
400 Seventh Street, S.W.
Washington, D.C. 20590-0001

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Ref: Proper Shipping Name and Packaging Requirements
LP Gas Blend (Butane and Isobutane) - Expelling Vapor - 2Q container

Dear Director Mazzullo:

The purpose of this letter is to request assistance from DOT RSPA in determining

- (1) the preferred proper shipping name, per 172.101(a), and**
- (2) packaging requirements, per 173**

for a mixture or blend of two liquefied petroleum gases containing approximately 80% Butane and 20% Isobutane in 2Q containers with a relief device (8 oz - 227 gm average). The LP-Gases vapors in the containers are expelled and used for heat / flame in small portable cooking appliances. These containers are usually packaged in outer packaging containing approximately 12 cans or containers.

(1) PROPER SHIPPING NAME

Both Butane and Isobutane are listed in the Table and both contain the phrase see also Petroleum gases, liquefied

Haz Mat Description and Proper Shipping Name	HC	ID #	Special Provision	Packaging 173*	
				Exception	Nonbulk
2	3	4	7	8A	8B
Butane, see also Petroleum gases, liquefied	2.1	UN1011	19	306	304
Isobutane, see also Petroleum gases,	2.1	UN1969	19	306	304

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liquefied					
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The entry in the table for Petroleum gases, liquefied is:

Haz Mat Description and Proper Shipping Name	HC	ID #	Special Provision	Packaging 173*	
				Exception	Nonbulk
2	3	4	7	8A	
Petroleum gases, liquefied or Liquefied petroleum gas	2.1	UN1075		306	304

In trying to determine the most appropriate shipping description, the following Proper Shipping Names (PSNs) were also considered and rejected.

PSNs from HM Table	Rejected / Reason
<i>Flammable compressed gas, see Compressed or Liquefied gas, flammable, etc.</i>	Refers you to Liquefied gas
Liquefied gas, flammable, n.o.s.	PSN - Petroleum gases, liquefied or Liquefied petroleum gas is more specific (See Table)
<i>Flammable compressed gas (small receptacles not fitted with a dispersion device, not refillable), See Receptacles, etc.</i>	Not sure what the meaning of "dispersion device is. See comment Receptacles
Receptacle, small, containing gas (gas cartridges) <i>flammable, without release device, non refillable and not exceed 1 L capacity</i>	By design, the 2Q containers have a safety relief device per 173.304(d)(ii) Note 2. Rejected because of the release device.

PSN "Butane" - Comment: 172.101(c)(14) states "A proper shipping name that describes all isomers of a material may be used to identify any isomer of that material if the isomer meets criteria for the same hazard class or division, subsidiary risk(s) and packing group, unless the isomer is specifically identified in the Table". Because Isobutane is listed in the table, 172.101(c)(14) prohibits using just "Butane" as a shipping name.

PSN "Butane Mixture or Solution" - Comment: Section 172.101(c)(10)(iii) addresses mixtures or solution with two or more hazardous materials in the same hazard class

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requiring use of the most appropriate shipping description. Butane and Isobutane are both Hazard Class 2.1.

Most appropriate Proper Shipping Name

With both Butane and Isobutane in the HM Table, referring the user to "Petroleum gases, liquefied", it would appear that this entry in the table is the most appropriate or would be DOT's preferred proper shipping name per Section 172.101(c)(10)(iii).

Haz Mat Description and Proper Shipping Name	HC	ID #	Special Provision	Packaging 173*	
				Exception	Nonbulk
2	3	4	7	8A	
Petroleum gases, liquefied or Liquefied petroleum gas	2.1	UN1075		306	304

It is unclear if this entry is intended to represent a mixture or solution of two LP-Gases. However, 172.101(e)(1) states the proper shipping name may be used in the singular or plural.

172.101(c)(10)(iii) states that additional information from subparts C and D (technical names of at least two components most predominately contributing to the hazards) may be required for mixtures or solutions. Per 172.203(k)(1) "containing Butane and Isobutane" would be required as part of the proper shipping name, however, per 172.203(k)(iii) Butane and Isobutane would not be required as part of the PSN if LP-Gases was considered by DOT as the name of the "Chemical Element or Group" which is primarily responsible for the material being included in the hazard class.

The National Fire Protection Association Standard NFPA 58 entitled the "LP-Gas Code" dated 1998 defines Liquefied Petroleum Gas(LP-Gas) as "Any Material having a vapor pressure not exceeding that allowed for commercial propane composed predominantly of the following hydrocarbons, either by themselves or as mixtures: propane, propylene, butane (normal butane or isobutane), and butylenes".

Questions #1

Therefore, based on the requirement in 172.101(a) to determine the preferred proper shipping name, I am asking DOT if based on the above information regarding this blend of LP-Gases, if the following proper shipping names are in fact the DOT preferred proper shipping names:

- Petroleum gases, or**
- Liquefied petroleum gas, or**
- Liquefied petroleum gases (plural per 172.101(e)(1))**

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If the above shipping names are not, what other proper shipping name(s) would be appropriate and acceptable to DOT.

(2) PACKING REQUIREMENTS

Haz Mat Description and Proper Shipping Name	HC	ID #	Special Provision	Packaging 173*	
				Exception	Nonbulk
2	3	4	7	8A	8B
Butane, see also Petroleum gases, liquefied	2.1	UN1011	19	306	304
Isobutane, see also Petroleum gases, liquefied	2.1	UN1969	19	306	304
Petroleum gases, liquefied or Liquefied petroleum gas	2.1	UN1075		306	304

PACKING EXCEPTION - 49 CFR 173.306 Limited quantities of compressed gases.

The Haz Mat Table for all three entries refers the user to 173.306 for Packaging exceptions

Based on a review of the 173.306, this mixture or solution appears to not qualify for any of these exceptions.

Specifically, 173.06(a)(3) applies only to expelling liquid, paste or powder. See DOT letter from Director Mazzullo to a Mr. Shaw of Claire Manufacturing Company (pdf file 07701) dated May 18, 1995 which states -

"this exception was never intended to address one or more gases packaged by themselves. For a given container size, liquefied gases packaged by themselves would pose greater stored energy and, when flammable, a greater fire risk than smaller volume of gases used to expel a liquid, paste or solid. Liquefied compressed gases (see 173.115(e) are not "liquids" for purposes of paragraph 173.306(a)(3) exception, regardless of the fact that they may be present in both a gaseous and liquid phase when contained under pressure. A compressed or liquefied gas, packaged without a liquid, paste or powder in the container, is not eligible for this exception".

Please Note: I was recently informed that the ICAO and/or IMDG includes GASES being expelled in addition to liquid, paste and solids and therefore international shipments would

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apparently qualify under some condition for and be considered Aerosols whereas domestic shipments can not use 173.306(a)(3) because "gases" is not included. Apparently, International shipments into the United States under the Aerosol definition can be shipped to their final destination via ground transportation and warehoused. When these "packages" using the Aerosol Shipping Name are warehoused and then shipped domestically to users, the Aerosol Shipping Name can not be used for domestic highway shipment.

Questions #2

Therefore, based on these 2Q containers expelling an LP-Gas blend as vapor, I am asking DOT if domestic highway shipments originating and distributed within the United States can use the Aerosol shipping name and qualify for 173.306.

PACKING NONBULK - 49 CFR 173.304 Charging of cylinders with liquefied compressed gas.

Based on filling density, other chemical properties and pressure of the LP-Gas blend section (d)(3)(ii) of 173.304 applies:

173.304(d) Requirements for liquefied petroleum gas.

- (3) Liquefied petroleum gas must be shipped in specification containers as follows:
 - (ii) Additional containers may be used within the limits of quantity and pressure as follows:

Type of container	Maximum capacity		Maximum charging pressure-p.s.i.g.
	Cubic inches	Gallons	
DOT-2P or DOT-2Q (see Note 1)	31.83	-----	45 p.s.i.g. at 70° F. and 105 p.s.i.g. at 130° F. (see Note 2).

Note 1: Containers must be packed in strong wooden or fiber boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each completed container filled for shipment must have been heated until contents reached a minimum temperature of 130° F., without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

Note 2: Containers must be equipped with safety relief devices which will prevent rupture of the containers and dangerous projection of the closing devices when the containers are exposed to the action of fire.

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Questions #3

Therefore, based on a LP-Gas blend in these 2Q containers less than 31.83 cubic inches and less than the maximum charging pressure - p.s.i.g. in the table above, I am asking DOT if the packaging requirements are in fact 173.304(d)(3)(ii).

If closing, I am asking for help from DOT in answering these three important questions to ensure compliance with DOT regulations. If you need any general or technical information in order to answer these questions, please feel free to contact me by phone, fax or email.

Sincerely,



Henry Renfrew