U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

May 27, 2025

Jim V. McManus
Sr. Principal Engineer
Dangerous Goods Safety Advisor (DGSA)
Entegris Inc.
7 Commerce Drive
Danbury, CT 06810

Reference No. 25-0026

Dear Mr. McManus:

This letter is in response to your March 5, 2025 email requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the proper shipping name (PSN) for "UN2036, Xenon, compressed" as listed in the § 172.101 Hazardous Materials Table (HMT). Specifically, you ask for clarification regarding the appropriate use of the qualifying word "compressed" in association with the PSN for transport of xenon based on your understanding the word was removed under the rulemaking "Harmonization With the United Nations Recommendations, International Maritime Dangerous Goods Code, and International Civil Aviation Organization's Technical Instructions" (HM-215E).[1]

Your questions are paraphrased and answered below:

Q1. For domestic shipments, is "Xenon, compressed" the PSN for UN2036?

A1. Yes. The PSN for xenon (UN2036) was revised to read "Xenon, compressed" in the § 172.101 HMT for consistency with PSNs for other compressed gases (*i.e.*, other inert gases) in the rulemaking "Hazardous Materials: Revision to Requirements for the Transportation of Battery-Powered Devices; and Harmonization With the United Nations Recommendations, International Maritime Dangerous Goods Code, and International Civil Aviation Organization's Technical Instructions" (HM-224D/HM-215J) that postdated final rule HM-215E.[2] Therefore, for purposes of the HMR, the PSN for xenon (UN2036) includes the qualifier "compressed."

[1] 68 FR 44992 (Jul. 31, 2003).

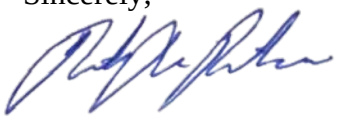
[2] 74 FR 2200 (Jan. 14, 2009).

Q2. As authorized by § 171.22(a), may a shipment of xenon offered for transport in accordance with the International Maritime Dangerous Goods Code for export from the United States use the PSN “Xenon” for UN2036, instead of “Xenon, compressed?”

A2. Yes.

I hope this information is helpful. Please contact us if we can be of further assistance.

Sincerely,



Dirk Der Kinderen
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Horne, T,
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March 5, 2025

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Re: Request for Interpretation

Dear Sir or Madame;

Pursuant to 49 CFR § 105.20, this letter is being submitted by e-mail to PHMSA to request an interpretation on several questions we have pertaining to the correct shipping name for UN2036.

Currently the Hazardous Materials Table (HMT) in 49 CFR § 172.101 lists the proper shipping name for UN2036 as **Xenon, compressed.**

The Xenon we are shipping is not a refrigerated liquid, but is Xenon gas packaged in a DOT specification cylinder under pressure and therefore is assigned the identification number UN2036 from column 4 of the HMT.

It is also noted that the United Nations Recommendations on the Transport of Dangerous Goods (UN Model Regulations), International Maritime Dangerous Goods Code (IMDG Code), the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Technical Instructions) and Transport Canada's Transportation of Dangerous Goods Regulations (TC TDG Regulations) use the proper shipping name **Xenon**, without the qualifying word “compressed” for UN2036.

UN Model Regulations 12th Edition (2001) – Change in Shipping Name for UN2036

Before the 12th revised edition of the UN Model Regulations, the UN Model Regulations, IMDG Code, ICAO Technical Instructions and TC TDG Regulations assigned the proper shipping name **Xenon, compressed** to UN2036.

After reviewing past changes to the UN Model Regulations it was discovered that the 11th revised edition of the UN Model Regulations was amended by removing the qualifying word “compressed” from 11 entries in the Dangerous Goods List. UN2036 was one of the entries.

The word "compressed" was removed from those entries as a consequence of a change to the definition of a non-liquefied compressed gas and a liquefied compressed gas in the UN Model Regulations.

The definition for these types of gases was adjusted such that any gas which is partially liquid above -50 °C (-58 °F) is defined as a *"liquefied compressed gas"* and gases which remain completely gaseous at or above -50 °C (-58 °F) are defined as a *"non-liquefied compressed gas".* Effectively then, any gas with a critical temperature (T_c) above -50 °C (-58 °F) would be considered a *liquefied compressed gas* and those gases with a critical temperature at or below -50 °C (-58 °F) are ones that cannot exist as a liquid above -50 °C (-58 °F) as they remain in a completely gaseous state and are considered a *non-liquefied compressed gas.*

Prior to the 12th edition of the UN Model Regulations, 20 °C (68 °F) was used instead of -50 °C (-58 °F) as the reference temperature to delineate between a non-liquefied compressed gas and a liquefied compressed gas. Thus any gas with a critical temperature less than 20 °C (68 °F), such as Xenon (T_c = 16.6 °C) would be entirely gaseous at 20 °C and therefore meet the old definition of a non-liquefied compressed gas. Apparently, it has been customary to use the qualifying word "compressed" in addition to the name of a gas, if the gas is a non-liquefied compressed gas. This is currently the case for sixteen non N.O.S. entries in the HMT (e.g., UN1066 Nitrogen, compressed).

Subsequent to the UN amendments, the other international standards and regulations were revised to remove the word "compressed" from the 11 entries.

Research and Special Programs Administration Final Rule HM-215E (July 31, 2003)

On July 31, 2003, the Research and Special Programs Administration (RSPA) of the U.S. DOT issued the Final Rule HM-215E which served to maintain alignment of the HMR with certain international standards, including the 12th revised edition of the UN Model Regulations. The Final Rule stated the following regarding the removal of the qualifying word "compressed" from the proper shipping name of eleven entries in the Hazardous Materials Table:

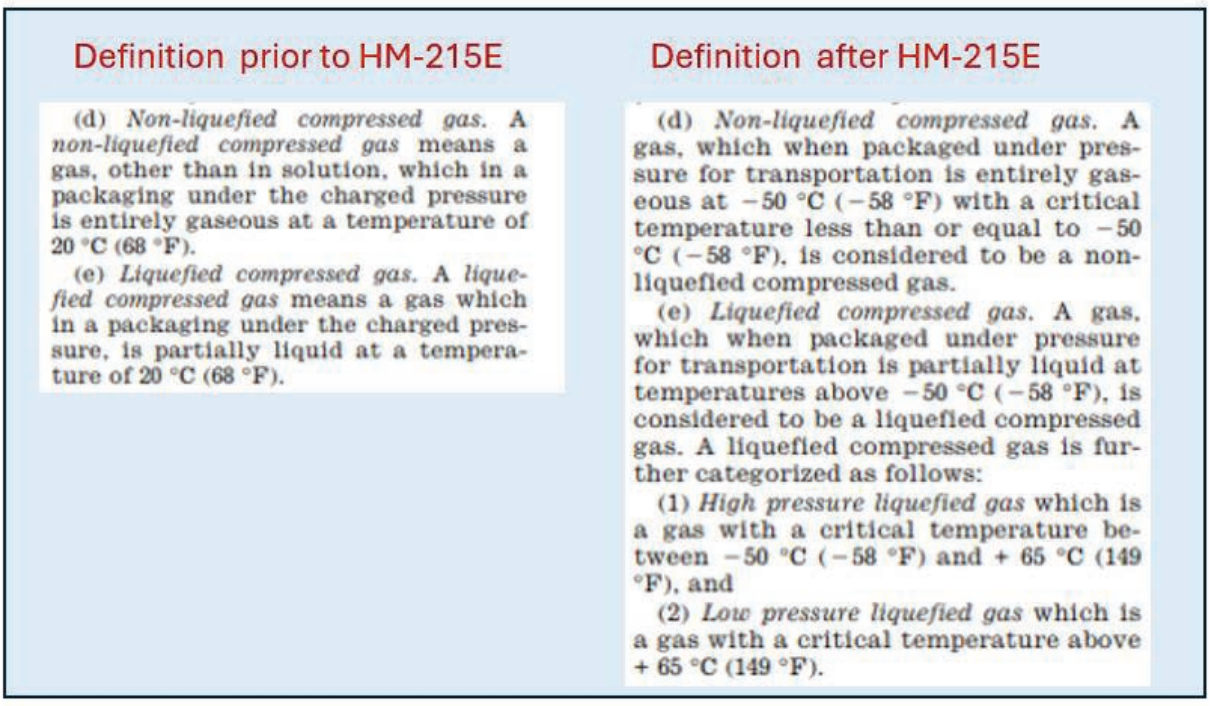
> ■ Eleven entries are revised by removing the qualifying word "compressed." This action is consistent with the revisions to proper shipping names for compressed and liquefied gases that were incorporated into the Twelfth Edition of the UN Recommendations and which we are adopting into the HMR (see § 173.115 for additional discussion). The eleven entries are "Boron trifluoride, compressed," UN1008; "Carbonyl fluoride, compressed," UN2417; "Diborane, compressed," UN1911; "Ethylene, compressed," UN1962; "Hexafluoroethane, compressed*or* Refrigerant gas R 116," UN2193; "Nitrogen trifluoride, compressed," UN2451; "Phosphorus pentafluoride, compressed," UN2198; "Silane, compressed," UN2203; "Silicon tetrafluoride, compressed," UN1859; "Tetrafluoromethane, compressed *or* Refrigerant gas R 14," UN1982; and "Xenon, compressed," UN2036. Also, see § 171.14(d)(6) for the continued use provision of these proper shipping names.

After a review of the above eleven entries in the current Hazardous Materials Table, we have confirmed the qualifying word “compressed” has been removed from ten of the eleven entries with the exception being UN2036 which still states the proper shipping name as “Xenon, compressed”.

RSPA further stated in the Final Rule HM-215E that the reason for the change was due to a change in the HMR to the definitions for a non-liquefied compressed gas and a liquefied compressed gas.

> *Section 173.115.* In paragraphs (d) and (e), we are amending the regulatory text that describes “non-liquefied compressed gas” and “liquefied compressed gas.” The amendment revises the reference temperature from 20 °C to −50 °C, consistent with internationally accepted definitions for gases and consistent with the twelfth edition of the UN Recommendations.
>
> We are also dividing compressed liquefied gases into high and low pressure categories. The UN Subcommittee revised the terminology for gases to align it with the terminology used in the International Organization for Standardization (ISO) Standard 10286. This standard establishes the terminology applicable to gas cylinders and provides definitions for gases. The new regulatory text affects 11 entries in the § 172.101 Table by removing the word “compressed” from the proper shipping names. Under a separate rulemaking, we will address whether the affected gases should be reassigned to more appropriate packagings sections, such as revising the packaging authorization from § 173.302 to § 173.304 in Column (8B) in the § 172.101 Table. We will also address the use of the high- and low-pressure compressed liquefied gas designations.

The figure below shows the definitions in the HMR for a non-liquefied compressed gas and a liquefied compressed gas before and after the Final Rule HM-215E



Should the word "compressed" be associated with the shipping name for UN2036

It seems as if there is merit to consider removing the word compressed from the proper shipping name for UN2036 in a future rulemaking as Xenon meets the definition of a liquefied compressed gas as it has a critical temperature of 16.6 °C (-61.9 °F). This change in the HMR would also provide the benefit of promoting harmonization with the international standards and regulations.

I do note if this change was made, it may be necessary to provide a transitional provision for implementing use of the revised shipping name. For example, HM-215E provided a 4 year transition period to adopt the new shipping names for the gases where the qualifying word compressed was removed. This translational provision was included in 49 CFR § 171.14 (d)(5) in the October 1, 2003 version of 49 CFR.

> (5) Proper shipping names that included the word "inhibited" prior to the June 21, 2001 final rule in effect on October 1, 2001 are authorized on packagings and shipping papers in place of the word "stabilized" until October 1, 2007. Proper shipping names that included the word "compressed" prior to the final rule published on July 31, 2003 and effective on October 1, 2003 may continue to be shown on packagings and shipping papers until October 1, 2007.

Entegris Questions

Question 1

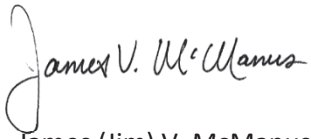
Notwithstanding the difference in the proper shipping name for UN2036 between 49 CFR and the international standards and regulations, is the proper shipping name for domestic shipments of UN2036 in the United States Xenon, compressed?

Question 2

For shipments of Xenon made in accordance 49 CFR § 171.22 (a), in that they are shipped in compliance with the International Maritime Dangerous Goods Code (IMDG Code) and are being exported from the United States to an international destination, can the proper shipping name Xenon be used for UN2036 instead of Xenon, compressed.

I appreciate PHMSA's attention to this matter and look forward to your response.

Sincerely,



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