OFFICIAL MEXICAN STANDARD
NOM-030-SCT2/1994
SPECIFICATIONS AND CHARACTERISTICS FOR THE CONSTRUCTION AND RECONSTRUCTION OF TANK-CONTAINERS INTENDED FOR THE MULTIMODAL TRANSPORT OF REFRIGERATED LIQUEFIED GASES.

1. OBJECTIVE.

The purpose of this Official Mexican Standard is to set forth the specifications and characteristics for the construction and reconstruction of tank-containers intended for the transport of refrigerated liquefied gases, and for their approval, marking and certification, as well as the provisions regarding transport, with a view to protecting the general lines of communication and the safety of their users.

2. SCOPE.

This Official Mexican Standard applies compulsorily to the manufacturers of tank-containers intended for the transport of refrigerated liquefied gases, the persons having responsibility for the transport of refrigerated liquefied gases, the officials of factories authorized for the reconstruction of said tank-containers, and the manufacturers and carriers involved in the handling of such tank-containers that transit through the general lines of land communication.

These specifications do not apply to road tank-vehicles, rail tank-wagons, non-metal containers or containers intended for the transport of refrigerated liquefied gases having a capacity of 1000 liters (1.3 m^3) or less.

3. REFERENCES.

For the correct implementation of this Standard, the following Mexican Official Standards must be consulted:

NOM-003-SCT2/1994	"CHARACTERISTICS OF LABELS FOR PACKAGES AND PACKAGINGS INTENDED FOR THE TRANSPORT OF HAZARDOUS MATERIALS AND WASTES."
NOM-004-SCT2/1994	"SYSTEM FOR THE IDENTIFICATION OF UNITS INTENDED FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES."

NOM-023-SCT2/1994 "TECHNICAL INFORMATION WHICH MUST BE CONTAINED IN THE PLACARD TO BE DISPLAYED BY ROAD TANK-VEHICLES, METAL INTERMEDIATE BULK-CONTAINERS AND CONTAINERS WITH A CAPACITY GREATER THAN 450 LITERS THAT TRANSPORT HAZARDOUS MATERIALS AND WASTES".

4. DEFINITIONS.

Tank-container.- A container having a volumetric capacity of more than 1,000 liters (1 m^3), fitted with the items of equipment necessary for the transport of hazardous substances, materials and residues, such as items of service and structural equipment, which are necessary for the transport of refrigerated liquefied gases.

The tank-container must be capable of being transported, loaded and discharged without the need of removal of its structural equipment, must possess stabilizing members external to the tank, and must be capable of being lifted when full.

Tank.- This term is understood to mean a construction which, for refrigerated liquefied gases, normally includes:

a) An outer jacket and one or more inner shells, whereas there exists, between the jacket and the shells, an intermediate space which is thermally insulated and which has been exhausted of air (vacuum insulation).

b) An outer jacket and an inner shell with an intermediate layer of compacted thermally insulating material (e.g., compacted foam), or

c) An outer shell, with an inner layer of compacted thermally insulating material.

Shell.- This refers to the tank proper, including its openings and closures.

Items of service equipment of a tank-container.- This refers to all the devices for the loading, discharging, venting, safety and thermal insulating as well as the measuring instruments.

Items of structural equipment.- This refers to the reinforcing, fastening, protective and stabilizing members external to the container.

Maximum Allowable Working Pressure (MAWP).- This is the maximum effective manometric pressure permissible at the top of the shell of a loaded container in its operating position.

Test pressure.- The maximum manometric pressure which is achieved within the shell during the pressure test.

Leakage test.- This consists of subjecting the shell, complete with its items of service equipment, to an internal pressure equivalent to the MAWP. The method thus used must be approved by the competent authority.

Gross weight.- This is the sum of the vehicle weight and the load weight. It must not exceed the maximum design weight indicated by the manufacturer.

Holding time.- The time that elapses between the moment the liquid starts boiling at atmospheric pressure and to the moment the pressure of the tank contents reaches the MAWP, under equilibrium conditions.

Minimum design temperature.- The minimum content temperature at which the tank-container can be used.

5. GENERAL SPECIFICATIONS AND CHARACTERISTICS.

5. Regarding the design, construction and use of tank-containers intended for the transport of refrigerated liquefied gases.

5.1.1 The shells of the tank-containers must be made of steel, aluminum or aluminum alloys suitable for shaping, having adequate ductibility and toughness at the minimum design temperature, having regard to the risk of brittle fracture. Only materials whose weldability has been fully demonstrated shall be used. The welds must be well made and afford complete safety and, if the manufacture procedure of the materials so requires, a suitable thermal treatment shall be applied to the shell so as to guarantee an adequate toughness in the welded unions and in the heat affected zones. The jacket must be made of steel. All parts of a tank-container, including fittings and pipings, that are exposed to the elements must also have characteristics suitable to the environment.

5.1.2 All parts of a tank-container, including fittings and pipings, that would normally come in contact with the substance being transported, must be compatible with said substance.

5.1.3 Precautions must be taken to avoid impairments due to the galvanic corrosion resulting from the juxtaposition of dissimilar metals.

5.1.4 The thermal insulation shall consist of a complete covering, whether external or internal, of the shell of the tank, constructed in effective insulating materials. The external insulation must be protected by a suitable jacket so as to prevent, under normal transport conditions, the ingress of moisture and other damage.

5.1.5 If the jacket is so closed as to be gas-tight, a device shall be incorporated to prevent dangerous increases in pressure in the insulating space, in the event that the tightness of the shell or its items of service equipment are [sic] insufficient.

5.1.6 The thermal insulation of the tanks intended for the transport of refrigerated liquefied gases having a boiling point below 182EC [sic] at atmospheric pressure, must not contain any material that could react dangerously with oxygen. Compact means of attachment between the shell and jacket may contain plastic materials, provided that they have been shown to have adequate properties at their service temperature.

5.1.7 The insulating materials must be such that they do not unduly deteriorate under service conditions.

5.1.8 For calculating the holding time, the following shall be taken into account:

a) The effectiveness of the insulation system provided,

b) The Maximum Allowed Working Pressure (MAWP),

c) The degree of filling,

d) A theoretical ambient temperature of 50EC, and

e) The physical properties of the substance to be transported.

5.1.9 The jacket of the vacuum-insulated double-wall tanks must be designed so as to withstands an external manometric pressure of at least 100 kpa (1 bar), or a collapsing pressure equivalent to at least 200 kpa (2 bar) of manometric pressure. When calculating the ability of the jacket to resist the external pressure, the internal and external reinforcement devices may be taken into account.

5.1.10 The tank-containers must be designed and constructed with supports to provide a stable base during transport and with suitable items of attachment for lift them and tying them down.

5.1.11 The tank-containers must be constructed so as to withstand, without any loss of contents, at least the internal pressure and the thermal loads exerted by said contents, assuming the most unfavorable combination of static and dynamic loads that may be given under normal handling and transport operations.

5.1.12 The container-tanks and their means of fastening must withstand the following separately applied forces:

a) Twice the total mass, in the direction of travel of the tank, simultaneously with the weight of said tank,

b) The total mass, acting horizontally and perpendicularly toward the angles in the direction of travel of the tank (when the direction of travel is not clearly determined, twice the total mass must be applied), simultaneously with the weight of the tank,

c) The total mass, acting vertically upwards, and

d) Twice the total mass, acting vertically downwards.

5.1.13 For each of these loads, the safety factors to be applied are the following:

a) For metals having a defined elastic limit, a safety factor of 1.5 in relation to the elastic stress being sustained, or

b) For metals with no defined elastic limit, a safety factor of 1.5 in relation to the 0.2% stress test (1.0% stress test for austenitic steels).

5.1.14 The shells must be designed and manufactured so as to withstand a test pressure equivalent to at least 1.3 times the Maximum Allowed Working Pressure (MAWP). In the case of a vacuum insulated shell, the test pressure must not be less than 1.3 times the sum of the

Maximum Allowed Working Pressure (MAWP) and 100 kpa (1 bar). In no case shall the test pressure be less than the 300 kpa (3 bar) manometric pressure. See likewise the requirements related to the minimum thickness of the shell walls (paras. 5.2.2 through 5.2.4).

5.1.15 At the test pressure, the stress in the shell membrane shall conform to certain limitations, depending on the material being used, which limitations are described below:

a) For the metals and allows having a clearly defined elastic limit or characterized by having a guaranteed conventional elastic stress, the stress of the membrane must not exceed 0.50 Rm, Rm being the guaranteed minimum tensile strength,

b) In the case of the steel, the percentile fracture elongation must not be less than 10,000 Rm.

Where Rm is expressed in N/mm², with an absolute minimum of 17%, and

c) In the case of aluminum, the percentile fracture elongation must not be less lower than (10,000/Rm), Rm being expressed in N/mm², with an absolute minimum of 12%.

5.1.16 The specimens used for determining the fracture elongation, must be taken transversely in the direction of rolling, and they must be assured [sic] that:

$$Lo = 5\ d$$

or

$$Lo = 5.65\ \sqrt{\%_A}$$

where Lo = length of the specimen before the test.
d = diameter
A = cross-sectional area of the specimen.

5.1.17 The shell must be of a circular cross-section.

5.2 Specifications and characteristics regarding the minimum thickness of the shell sheet.

5.2.1 The figures indicated in the following paragraphs refer to mild steel.

5.2.2 Mild steel shells with a diameter equal to or lower than 1.80 m must have walls at least 5 mm thick or an equivalent thickness if they are of another metal. Shells with a diameter greater than 1.80 m must have walls at least 6 mm thick if they are made of mild steel, or an equivalent thickness if they are made of another metal.

5.2.3 Vacuum insulated shells with a diameter equal to or lower than 1.80 m must have walls of at least 3 mm thick if they are made of mild steel, or an equivalent thickness if they are made of another metal. Shells with a diameter greater than 1.80 m have walls at least 4 mm thick if they are made of mild steel, or an equivalent thickness if they are made of another metal.

5.2.4 All shells must be at least 3 mm thick regardless of the metal [sic] used in their construction.

5.2.5 The equivalent thickness of a metal other than mild steel shall be determined by the following equation:

$$e_1 = \frac{21.4\ e_o}{\sqrt[3]{Rm_1 \times A_1}}$$

where: e_1 = Minimum equivalent thickness of the metal being used.

e_o = Minimum thickness prescribed for mild steel.

Rm_1 = Guaranteed minimum tensile strength of the metal being used (N/mm^2);

A_1 = Guaranteed minimum percentile elongation in the tensile fracture of the metal being used.

5.2.6 There must be no unexpected [sic] changes in the plate thickness at the attachments of the head to the cylindrical portion of the shell and, after the head has been given its shape, the plate thickness at the knuckles must not be less than the thickness set forth by the regulation for pressure vessels or in accordance with paragraphs 5.2.2 through 5.2.4, as applicable.

5.3 Specifications and characteristics regarding the items of service equipment.

5.3.1 The items of service equipment (valves, fittings, safety devices, level indicators, etc.) must be so arranged as to be protected against the risk of being wrenched off or damaged during the

handling and transport operations. If the connection between the frame and the tank or between the jacket and the shell allows any relative movement between them, the items of service equipment must be fastened in such a way that this movement causes no damage to the working parts. The protection of the items of service equipment must be such as to offer a degree of safety comparable to that of the shell.

5.3.2 All the filling and discharge openings of a tank-container that are used for the transport of flammable gases must be fitted with three shut-off devices arranged in series: the first shall be a stop valve, situated as close as possible to the jacket; the second shall be a stop valve, and the third shall be

a blank flange or equivalent device. In the case of flammable gases, the stop valve nearest to the substance being transported must be a shutting device which closes automatically in the event that the tank is engulfed in flames. This device must also be actionable by remote control. All the filling and discharge openings of a tank-container used for the transport of non-flammable gases must be fitted with at least two shut-off devices, arranged in series: the first shall be a stop valve, situated as close as possible to the outer jacket, and the second shall be a blank flange or equivalent device.

5.3.3 The sections of pipings that may be closed at both ends, and in which a liquid product can be trapped, must be fitted with an automatic pressure relief device that prevents any excessive increase in said pressure.

5.3.4 Inspection openings are not necessary in the case of vacuum insulated tanks.

5.3.5 Inasmuch as possible, external fittings must be grouped together.

5.3.6 All tank connections must display markings that clearly indicate their respective functions.

5.3.7 Stop valves with fine rope [sic] must close by clockwise rotation.

5.3.8 All the pipings must be of a suitable material. In order to prevent leaks, in case of fire, between the tank shell and the connection to the first closure of any outlet, only steel pipings and welded joints shall be used. The technique used for attaching the closure to this connection must be satisfactory in the judgment of the competent authority. Elsewhere, the joints of the pipes shall be welded whenever necessary.

5.3.9 Joints of copper pipings must be made with a brass weld or by means of an equally strong metal union. Such unions must not in any case decrease the strength of the pipings, as can happen with threaded unions [sic]. The melting point of the welding allow must not be lower than 525EC.

5.3.10 In the manufacture of the valves and fittings, only metals that are ductile at the lowest operating temperatures shall be used.

5.3.11 All the pipings and their fittings must have a bursting strength equivalent, as a minimum, to four times the strength corresponding to the MAWP of the tank, as well as, also as a minimum, four times the strength corresponding to the pressure that may be experienced under service conditions owing to the operation of a pump or any other device (except pressure relief valves).

5.3.12 In all cases, the necessary precautions must be taken to prevent damage to the pipings due to thermal dilatations and contractions, jarring or vibrations.

5.3.13 The tank-containers that are intended for the transport of flammable gases must be capable of being electrically grounded.

5.4 Specifications and characteristics regarding pressure relief devices.

5.4.1 Any shell must be fitted with at least two pressure relief valves that are independent and activated by springs or coils.

5.4.2 Shells intended for the transport of flammable refrigerated liquefied gases may be fitted, in addition, with breaking [sic] disks, arranged in parallel, with the spring-activated valves as specified in paragraphs 5.3.2 and 5.3.3.

5.4.3 The pressure relief devices must be designed so as to prevent:

a) The accumulation of moisture and foreign matters in the external portion of their seat;
b) Gas leaks and any dangerous pressure increase.

5.4.4 The pressure relief devices must be approved by the competent authority.

5.4.5 Capacity, placement and setting of the aluminum pressure-relief devices.

5.4.5.1 The capacity of each spring- or coil-activated pressure relief valve shall be sufficient to prevent the pressure from exceeding, due to normal rise, 110% of the MAWP. Such valves must be set in such a way that they start to discharge at a nominal pressure equal to the MAWP and that they close, after discharge, at a pressure not lower than 90% of the maximum authorized service pressure, remaining closed at any lower pressure.

5.4.5.2 In the case of loss of vacuum in a vacuum-insulated tank, or a loss of 20% of the insulation in a tank insulated with solid materials, the combined capacity of all the valves installed must be sufficient to prevent the pressure from exceeding 110% of the MAWP. For the transport of helium, this capacity may be achieved by using breaking discs in combination with the required safety valves. These discs must break at a nominal pressure equal to the test pressure.

5.4.5.3 Under the conditions indicated in the above paragraph and with the tank completely engulfed in flames, the combined capacity of all installed pressure relief devices installed must be sufficient to prevent said capacity from exceeding the test pressure. Breaking discs, if used, must break at a nominal pressure equal to the test pressure.

5.4.5.4 The required capacity of the pressure relief devices shall be calculated in accordance with a recognized technical regulation.

5.4.6 Marking of the pressure reduction devices.

5.4.6.1 Any pressure relief device must be marked in clearly legible and indelible characters, the pressure at which said device is designed to discharge, and the freeing rate [sic] of the device, at 15EC and 1 bar. The capacity marked on valves shall be estimated at a pressure not greater than 110% of the set pressure.

5.4.7 Connections to pressure relief devices.

5.4.7.1 Connections to pressure relief devices must be of sufficient size to enable the required discharge to arrive without difficulty at the safety device. No stop-valve may be installed between the shell and the pressure relief devices, unless other devices have been installed for maintenance purposes or for other reasons, and the stop-valves serving the devices are locked in the open position, or the stop-valves are interconnected [sic] in such a way that the requirements of section 5.4.5 are always fulfilled. Pressure relief devices having vents must deliver to the atmosphere the vapor or liquid, in such a way that the back-pressure exerted on the safety device be minimal.

5.4.8 Positioning of the pressure relief valves.

5.4.8.1 All inlets of pressure relief devices must go in the vapor space of the tanks, and the devices must be arranged in such a way that the escaping vapor is discharged freely, without hitting on the tank-container. The use of protective devices shall be allowed to deflect the flow of vapor, provided that the required valve capacity is not reduced.

5.5 Specifications and characteristics regarding gauging devices.

5.5.1 Use shall not be made of level gauges that are made of glass or other fragile or flimsy materials, if they have to be in direct communication with the contents of the shell.

5.5.2 The tank-containers vacuum-insulated in the jacket must be fitted with device indicating the vacuum.

5.6 Specifications and characteristics regarding the tank supports, frameworks as well as lifting and tie-down elements.

5.6.1 The tank-containers must be designed and manufactured with a support that ensures their stability during transport. Skids, frameworks, wedges [sic] and other similar devices are considered acceptable. The loading aspects described in paragraph 5.1.12 and the safety factors set forth in paragraph 5.1.13 must be considered.

5.6.2 The supports for tanks (such as wedges [sic] and frameworks) and the lifting and tie-down elements must be designed so as not to cause an excessive concentration of stresses in any point of the tank. Likewise, the combined action of stresses by the supports, lifting and tie-down */missing word/* must not cause excessive stresses in any point of said tank. In the case of all tanks fitted with permanent lifting and tie-down elements, said elements will preferably be mounted on the tank supports, but they could also go onto reinforcing plates affixed at the points of support of the tank.

5.6.3 Supports and frameworks shall be designed having regard to the effects of environmental corrosion. Items of structural equipment that are not made of anticorrosive materials must be calculated with a minimal corrosion allowance determined by the competent authority.

5.6.4 Tank-containers frameworks that must be lifted or tied down by means of their corner castings must be subjected to special tests that are internationally accepted (e.g., those of ISO). Generally, the use of such frameworks as part of an integrated system is recommended.

5.7 Table 1, which is attached to this Standard, indicates the Class 2 refrigerated liquefied gases that are transported in tank-containers, as well as the special requirements that modify or supplement this Standard for said substance in particular.

6. Testing and approval of the tank-containers.

6.1 For each new tank-container model[,] the institutions authorized by the competent authority must issue a certificate attesting that the tank-container and its attachments, as surveyed by

said institutions, are suitable for the purpose for which they are intended and meet the Official Mexican Standards regarding the equipment construction and requirements, as well as the special requirements for Table 1 gases. The certificate must indicate the gases or teams of gases [sic] allowed to be transported in the tank-container[.] The results of the prototype test, the gases for which the tank-container is approved and the approval number must be specified in a test report. For tank-containers manufactured in a series, without any change in the structural design, this approval may be considered valid.

6.2 Design approval shall be given for at least one tank-container of each design and each size. It shall be, however, understood that a series of tests made on a tank-container of any one size may serve for the approval of smaller tank-containers made of material of the same class and thickness, with the same fabrication technique, with identical supports, and with equivalent closure systems and other appurtenances.

6.3 The shell and the various items of equipment of each tank-container must be inspected and tested, together or separately, first before being put into service (initial inspection and tests) and thereafter at intervals of no more than five years (periodic inspection and tests).

6.4 The initial inspection and the tests [sic] must include a check of the design characteristics, an internal and external inspection, and a hydraulic pressure test, which test may be replaced, with the approval of the competent authority, by a pressure test using another liquid or gas. If the shell and equipment have been pressure-tested separately, they must be, after assembly, subjected to a leakproofness test.

6.5 All shell welds shall be, in the initial test, tested by radiography; by ultrasonic or another approved, non-destructive method. These provisions do not apply to the tank jacket.

6.6 The periodic inspections and tests must include an external inspection of the container and a leakproofness test. In the case of non-vacuum-insulated containers, the jacket, the thermal insulation and the like shall not be removed except to the extent required for a proper appraisal of the tank-container's condition. In the case of vacuum-insulated containers, a measurement of said vacuum will have to be taken.

6.7 The initial test and the periodic pressure tests must be carried out by a technician approved by the competent authorities.

6.8 While under pressure, the tank-container must be inspected to verify that it does not have any leaks, corrosions, dents or other signs of weakness that might render said container unsafe in transport, and in the event that any such signs of weakness are found, the container must not be put in service, whether for its first trial or anew, until it has been repaired and a new test has been satisfactorily passed.

6.9 Before being put into service, and thereafter midway between the inspections and tests provided in paragraph 6.8, the tank-containers must be subjected to the following tests and inspections:

a) A leakproofness test, whenever necessary,

b) A test of satisfactory operation of all the items of service equipment,

c) An external inspection of the tank-container and its fittings, with due regard to the gases to be transported, and

d) A measurement of the vacuum, where applicable.

6.10 In case of damage, the use of any tank-container shall not be allowed until it has been repaired so as to comply with this Official Mexican Standard. If the damage relates to the shell, said shell must be repaired and subjected to a new test, in accordance with the provisions of paragraph 6.11.

6.11 All cutting and welding operations performed on the burnt shell of a tank-container must be satisfactory in the judgment of the competent authorities, and it will be necessary to carry out a pressure test in which said pressure is at least equal to the pressure applied in the initial test.

6.12 Certificates attesting the results of the tests must be issued.

7. MARKING AND CERTIFICATION

7.1 Marking

7.1.1 The tank-containers intended for the transport of refrigerated liquefied gases must display an identification plate in accordance with the provisions of Standard NOM-023-SCT2/1994.

7.1.2 The tank-container must display an indication of the hazardous substance or waste being transported in accordance with Standard NOM-004-SCT2/1994.

7.2 Certificate

7.2.1 The results of the above-described tests must be displayed in writing in the unit and must be accessible for inspection, whenever the competent authorities so require.

7.2.2 This document must, at a minimum, display the following information:

a) Code under which the shell was constructed,

b) Shell material,

c) Original test pressure in Kg/cm² (lb./sq.in.),

d) Month and year of the most recent test, as well as pressure at which said test was conducted,

_____month _____year _____kg/cm² (lb./sq.in.)

e) Seal, signature or corporate name of person or entity who carried out the test, and

f) Name of gases for the transport of which the container was approved.

8. PROVISIONS RELATED TO THE TRANSPORT.

8.1 The following tank-containers must not be used for transport:

a) Those that are not full enough, thereby making possible a movement of contents that may produce unacceptable hydraulic forces,

b) Those in which leaks may be noted,

c) Those presenting damages of such an extent as to affect their integrity or that of the lifting or tie-down devices, and

d) Those with service equipment that has not been examined and found to be in good working order.

8.2 Empty tank-containers that are not clean and freed of gas must meet the same requirements as tank-containers that are filled with the substance previously transported.

8.3 During transport, tank-containers must be protected against lateral and longitudinal shocks as well as overturning. This protection is not necessary if the shells and items of service equipment are so constructed as to withstand shocks and overturns.

8.3.1 Protection against lateral shocks may consist, for example, of longitudinal bars that protect the tank on both sides at the level of the median line.

8.3.2 Protection of the tank-containers against overturning may consist, for example, of reinforcement rings or bars fixed across the frame.

8.3.3 Protection against rear shocks may consist of a bumper or a frame.

8.3.4 External fittings must be designed or protected so as to preclude the release of contents upon impact or overturning of the tank upon said fittings.

8.3.5 In estimating the initial degree of filling, the holding time necessary for the anticipated trip and any possible delay must be taken into consideration. The initial degree of filling of a shell must be such that, if the contents, except helium, were to be increased to a temperature at which the vapor pressure equalled the MAWP, the volume occupied by liquid would not exceed:

a) 95%, in the case of flammable gases of Division 2.1,

b) 98%, in the case of non-flammable, non-toxic gases of Division 2.2.

8.3.6 Shells intended for the transport of helium may be filled at the most up to the level of the inlet of the pressure relief valve. Provided that the competent authorities are satisfied with the changes in the tank, a higher initial degree of filling may be allowed when the anticipated trip is considerably shorter than the holding time.

TABLE 1 - LIST OF REFRIGERATED LIQUEFIED GASES IN CLASS 2 TRANSPORTED IN TANK-CONTAINERS.

UN **m**	SUBSTANCE	DIVISION	SECONDARY RISK LABEL	SPECIAL REQUIREMENTS
1003	AIR, refrigerated liquid	2.2	5.1	Lubricants for joints or other devices must be inert to oxygen
1038	ETHYLENE, refrigerated liquid	2.1		
1073	OXYGEN, refrigerated liquid	2.2	5.1	Lubricants for joints or other devices must be inert to oxygen
1913	NEON, refrigerated liquid	2.2		
1951	ARGON, refrigerated liquid	2.2		
1961	ETHANE, refrigerated liquid	2.1		
1963	HELIUM, refrigerated liquid	2.2		
1966	HYDROGEN, refrigerated liquid	2.1		Carriage permitted under special conditions, prescribed by the competent authorities. Frangible discs are allowed at the discretion of the competent authority.
1970	KRYPTON, refrigerated liquid	2.2		

UN **m**	SUBSTANCE	DIVISION	SECONDARY RISK LABEL	SPECIAL REQUIREMENTS
1972	METHANE, refrigerated liquid	2.1	5.1	Lubricants for joints or other devices must be inert to oxygen
1972	NATURAL GAS WITH A HIGH METHANE CONTENT, refrigerated liquid	2.1		
1977	NITROGEN, refrigerated liquid	2.2		
2187	CARBON DIOXIDE, refrigerated liquid	2.2	5.1	Lubricants for joints or other devices must be inert to oxygen
2201	NITROUS OXYGEN, refrigerated liquid	2.2	5.1	
2591	XENON, refrigerated liquid	2.2		
3138	ETHYLENE, ACETYLENE AND PROPYLENE IN MIXTURE, refrigerated liquid; containing at least 71.5% ethylene with not more than 22.5% acetylene and not more than 6% propylene	2.1		

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