B621-14

Selection and use of highway tanks, TC portable tanks, and other large containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8, and 9

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The Technical Committee thanks Kevin Green of Transport Canada (retired) for his contributions to the development of this Standard.

Preface

This is the fifth edition of CSA B621, *Selection and use of highway tanks, TC portable tanks, and other large containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8, and 9.* It supersedes the previous editions published in 2009, 2003, 1998, and 1987.

This Standard is one of a series of Standards that have been prepared for use in conjunction with the *Transportation of Dangerous Goods Regulations*. It should be noted that this Standard, by itself, does not have the force of law unless it is officially adopted by a regulatory authority. Since the Standard may be adopted into regulations with certain exceptions or additional requirements, it is recommended that the regulations of the relevant jurisdiction be consulted in order to establish the extent to which this Standard has been adopted. Where an industry practice differs from the requirements of this Standard, an application for a permit for equivalent level of safety may be requested from the regulatory authority.

This Standard was prepared giving due consideration to current industry practices in North America, the *US Code of Federal Regulations, Title 49*, and the United Nations publication *Recommendations on the Transport of Dangerous Goods: Model Regulations.* CSA B620-14, *Highway tanks and TC portable tanks for the transportation of dangerous goods,* is the reference document for design, construction, testing, and inspection requirements.

This Standard was prepared by the Technical Committee on Highway Tanks and TC Portable Tanks for Transportation of Dangerous Goods, under the jurisdiction of the Strategic Steering Committee on Mechanical Industrial Equipment Safety, and it has been formally approved by the Technical Committee.

Notes:

(1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

(2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*

(3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*

(4) *To submit a request for interpretation of this Standard, please send the following information to* ***inquiries@csagroup.org*** *and include "Request for interpretation" in the subject line:*

- *(a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
- *(b) provide an explanation of circumstances surrounding the actual field condition; and*
- *(c) where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

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(5) *This Standard is subject to review five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to* ***inquiries@csagroup.org*** *and include "Proposal for change" in the subject line:*

- *(a) Standard designation (number);*
- *(b) relevant clause, table, and/or figure number;*
- *(c) wording of the proposed change; and*
- *(d) rationale for the change.*

B621-14
Selection and use of highway tanks, TC portable tanks, and other large containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8, and 9

1 Scope

1.1
This Standard details the requirements for the selection and use, handling, filling, and unloading of highway tanks, TC portable tanks, and other large containers when they are used as a primary means of containment for the transportation of dangerous goods of Classes 3, 4, 5, 6.1, 8, and 9.

1.2
This Standard sets out certain minimum requirements for the selection of the appropriate means of containment for the transportation of dangerous goods. This Standard does not, however, prescribe selection of the materials of construction of the means of containment to ensure chemical compatibility with the dangerous goods. Consequently, it is essential to exercise competent technical and engineering judgment in conjunction with this Standard.

1.3
Where any requirement of this Standard differs from the *Transportation of Dangerous Goods (TDG) Regulations*, the requirements of the *TDG Regulations* apply.

1.4
This Standard does not apply to TC 56, CTC 56, and DOT 56 tanks. Requirements for these tanks are provided in CAN/CGSB-43.146. (See Clause 6.4.)

1.5
This Standard does not apply to TC 57, CTC 57, and DOT 57 tanks. Requirements for these tanks are provided in CAN/CGSB-43.146. (See Clause 6.5.)

1.6
In CSA Standards, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; “may” is used to express an option or that which is permissible within the limits of the standard; and “can” is used to express possibility or capability.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

1.7
The values given in SI (metric) units are the standard. The values given in parentheses are for information only. Units for pressure refer to gauge pressure unless otherwise noted.

2 Reference publications
This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below. Where there is an inconsistency between this Standard and a referenced publication other than the *Transportation of Dangerous Goods (TDG) Act* or *Regulations*, the requirements of this Standard shall prevail. Application of a referenced publication shall be made only with careful consideration of this Standard's reference to that particular publication.

CSA Group
B620-1987 (superseded)
Highway tanks and portable tanks for the transportation of dangerous goods

CAN/CSA-B620-98 (superseded)
Highway tanks and portable tanks for the transportation of dangerous goods

B620-03 (superseded)
Highway tanks and portable tanks for the transportation of dangerous goods

B620-09 (superseded)
Highway tanks and TC portable tanks for the transportation of dangerous goods

B620-14
Highway tanks and TC portable tanks for the transportation of dangerous goods

ASTM International (American Society for Testing and Materials)
B162-99 (2009)
Standard Specification for Nickel Plate, Sheet, and Strip

CGSB (Canadian General Standards Board)
CAN/CGSB-43.146-2002
Design, Manufacture and Use of Intermediate Bulk Containers for the Transportation of Dangerous Goods

CAN/CGSB-43.147-2005
Construction, Modification, Qualification, Maintenance, and Selection and Use of Means of Containment for the Handling, Offering for Transport, or Transporting of Dangerous Goods by Rail

Government of Canada
Transportation of Dangerous Goods Act, S.C. 1992, c. 34, and the *Transportation of Dangerous Goods Regulations,* as amended from time to time

Government of USA
US Code of Federal Regulations, Title 49, Parts 107 to 180, as amended from time to time (referenced as CFR 49)

NFPA (National Fire Protection Association)
10-2013
Standard for Portable Fire Exinguishers

United Nations
Recommendations on the Transport of Dangerous Goods: Model Regulations, 15th rev. ed (2007)

3 Definitions

3.1 General

In addition to the definitions given in Clause 3.2, the definitions in the *TDG Act* and *Regulations* and in CSA B620-14 apply in this Standard.

3.2 Definitions

The following definitions apply in this Standard:

Highway tank — a tank intended for the transport of dangerous goods by road, consisting of a tank wall fitted with service equipment and structural equipment necessary for the transport or handling of such dangerous goods, and that
(a) is permanently attached to or forms a part of a truck or trailer; and
(b) is loaded or unloaded without being removed from the vehicle.

Liquid dangerous goods — those dangerous goods that are in liquid or slurry form at any time during loading or transportation, including dangerous goods transported under a liquid blanket.

Maximum allowable working pressure (MAWP) — the highest permissible internal gauge pressure at the top of a loaded tank in its normal operating orientation, including the highest internal gauge pressure during tank loading, unloading, or transport, and not exceeding design pressure.

Outage — the amount by which a means of containment falls short of being full of liquid, usually expressed in per cent by volume.

Padding — a gas, or mixture of gases, that fills the vacant space in a means of containment.

Portable tank — a tank intended for the transport of dangerous goods by different modes of transport, consisting of a tank wall fitted with service equipment and structural equipment necessary for the transport or handling of such dangerous goods, and that
(a) is designed to be loaded into or onto and temporarily attached to a transport vehicle or ship;
(b) is equipped with skids, mountings, or accessories to facilitate mechanical handling;
(c) enables the dangerous good to be loaded and unloaded without the removal of structural equipment and without the tank being loaded onto or attached to a transport vehicle;
(d) is capable of being lifted when full, unless otherwise specified in this Standard; and
(e) is not a highway tank, a rail tank car tank, a nonmetallic tank, or an intermediate bulk container (IBC).

Primary means of containment — any enclosure used as the innermost means of containment for dangerous goods being transported. This can include highway tanks, portable tanks, and other large containers.

Solid dangerous goods — those dangerous goods that are in solid, granular, crystalline, or powder form throughout their transport.

4 Selection of the means of containment

4.1 General requirements

In addition to any Specific Requirements given in Clause 8 for the particular dangerous goods to be transported, the means of containment shall comply with the requirements of Clauses 4.2, 4.3, and 4.4. Where a TC specification tank is required by this Standard, the tank shall comply with the applicable requirements of CSA B620-14, unless otherwise specified.

4.2 Means of containment

All primary means of containment used for the transportation of dangerous goods shall be

(a) watertight and constructed so that neither rain nor road spray can come into contact with the dangerous goods;
(b) dust-proof, sift-proof, and constructed so that the dangerous goods are securely retained in the means of containment under normal conditions of transport;
(c) constructed of impermeable, nonabsorbent materials that will not be corroded by the lading;
(d) designed to facilitate cleaning and decontamination;
(e) where the dangerous goods are liquid, leak-free and designed for the transport of liquids; and
(f) capable of withstanding any internal pressure likely to be encountered under normal conditions of transport, without any permanent deformation or leaks.

4.3 Dangerous goods and containment material compatibility

Those parts of the means of containment and accessories that contact the dangerous goods shall be constructed of a material that is

(a) appropriate for the temperature of the material being transported; and
(b) one of the following:
    (i) resistant to deterioration by the goods being transported;
    (ii) passivated or otherwise treated to reduce the rate of deterioration so that any minimum thickness requirement is maintained during transportation; or
    (iii) lined with a nonporous, imperforate material that is resistant to deterioration by the goods being transported and that has thermal expansion and elasticity characteristics compatible with those of the material of construction of the means of containment.

4.4 MAWP and pressure-relief valve settings

The MAWP and the set-to-discharge pressure of each safety relief device of a tank shall be greater than or equal to

(a) for tanks equipped with a 7 kPa (1 psig) normal vent, the sum of the static head of the lading plus 7 kPa (1 psig) provided:
    (i) the lading is gasoline UN 1203, or ethanol and gasoline mixtures UN 3475, transported pursuant to Specific Requirement 6 of Clause 8.4; or
    (ii) the vapour pressure of the lading does not exceed 7 kPa (1 psig) at 46 °C (115°F);
(b) except as provided in Item (a) above, the total pressure of the product vapours and any padding at the top of the tank at the loading temperature or 46 °C (115°F), whichever is greater;
(c) the maximum pressure that will be applied to the tank for loading or unloading purposes;
(d) the MAWP prescribed by the Specific Requirements in Clause 8.4 of this Standard for the dangerous goods to be transported; and
(e) the minimum MAWP prescribed by the specification for the tank.

The set-to-discharge pressure requirements of this clause do not apply to hydrogen peroxide vents permitted in Specific Requirement 26 of Clause 8.4, or to normal vents permitted in CSA B620-14, Clause 5.7.4.4.

For tanks that were required by their specification to be marked with a design pressure instead of a MAWP, the design pressure may be used interchangeably with MAWP for the purposes of this clause.

5 Highway tanks

5.1 Equivalent and substitute specifications

5.1.1 General

Where Clause 8 of this Standard requires the use of a highway tank of a specification included in CSA B620

(a) a highway tank constructed and certified in accordance with CFR 49 and listed in column 3 of Table 1 may be used instead of the tank in column 2 of the same item number. Specific Requirements in Clause 8.4 for the tank in column 2 shall nonetheless be met; and

(b) a highway tank listed in column 4 of Table 1 that is constructed and certified in accordance with the edition of CFR 49 or CSA B620 in force at the date of its certification may be used instead of the tank listed in column 2 of the same item number if

  (i) the tank complies with the Specific Requirements of Clause 8 for the tank in column 2;

  (ii) the certification date of the tank is before the applicable date given in column 5; and

  (iii) the tank complies with the requirements of Clauses A.5, A.6, and A.7 in Annex A of CSA B620-14.

Table 1
Equivalent and substitute specifications
(See Clauses 5.1.1, 5.2, and 5.4.)

Column 1	Column 2	Column 3	Column 4	Column 5
Item number	CSA B620 highway tank specification	CFR 49 DOT or MC equivalent specification	CSA B620-1987 or CFR 49 TC or MC substitute specification	Date limit for certification of TC or MC substitute specification
1	TC 406	DOT 406	TC 306	Aug. 15, 2002
			MC 306	Sept. 1, 1995
2	TC 407	DOT 407	TC 307	Aug. 15, 2002
			MC 307	Sept. 1, 1995
3	TC 412	DOT 412	TC 312	Aug. 15, 2002
			MC 312	Sept. 1, 1995
4	TC 331	MC 331	MC 330	May 15, 1967

5.1.2 Ground clearance for equivalent and substitute specifications

Where Clause 5.1.1 permits the use of an equivalent or substitute specification, the ground clearance requirements of the equivalent or substitute specification shall not apply if the requirements of Clause 5.6.9.1.6 of CSA B620-14 are satisfied or, for MC 330 and MC 331 tanks, the requirements of Clause 5.2.8 of CSA B620-14 are met.

5.2 Restriction on use of DOT 407, DOT 412, TC 412, MC 312, and TC 312 highway tanks

Where Clause 8 permits the transportation of dangerous goods in a DOT 407, DOT 412, TC 412, MC 312, or TC 312 specification highway tank, that tank shall

(a) have a MAWP of at least 172 kPa, gauge (25 psi), unless the dangerous goods can also be transported in a TC 406 specification highway tank;

(b) if equipped with one or more bottom outlets, have each such outlet provided with an automatic heat-actuated closing device that operates at 121 °C (250°F) or less, in addition to any bottom outlet valve; and

(c) if used for the transportation of flammable liquids, be equipped with pressure-relief devices required by Clause 5.6.11 of CSA B620-14, by Clause 5.6.11 of CSA B620-09, Clause 5.6.11 of CSA B620-03, Clause 5.6.10 of CAN/CSA-B620-98, or §178.342-4 in Clause 5.7 of CSA B620-1987, as applicable.

A non-ASME-certified DOT 407 tank listed in column 3 of Table 1 that is manufactured on or after the enforcement date of this standard shall not be used in Canada, unless the requirements of Clause 5.1.1.3 of CSA B620-14 are met.

5.3 Specification TC 350 tanks

5.3.1

Liquid dangerous goods may be transported in a Specification TC 350 tank instead of the tank prescribed in Clause 8 if the TC 350 tank complies

(a) with the Specific Requirements of Clause 8 for the prescribed tank; and

(b) after 15 August 2005, with the requirements of Clause 5.6.11 of CAN/CSA-B620-98, Clause 5.6.12 of CSA B620-03, or Clause 5.6.12 of CSA B620-09 or Clause 5.6.12 of CSA B620-14 for thermal and remotely activated self-closing stop valves.

5.3.2

The requirements in Clause 5.3.1 shall not apply to a Specification TC 350 tank transporting petroleum crude oil (UN1267) and marked “TC 350 Crude”.

5.3.3

The insulation requirements of Specific Requirement 19 in Clause 8.4 shall not apply to TC 350 tanks when used for transporting wastes.

5.4 Inspection and testing

Irrespective of its date of construction or certification, each tank shall have been tested and inspected

(a) if it conforms to a TC specification, in accordance with

  (i) Clause 7 of CSA B620-14 where the inspection or test is performed in Canada; and

  (ii) either Clause 7 of CSA B620-14 or CFR 49, Part 180, for the corresponding MC or DOT specification listed in column 3 of Table 1 of this Standard, where the inspection or test is performed in the US, provided that the types of inspections and tests and the intervals prescribed in Clause 7 of B620-14 are satisfied; and

(b) if it conforms to an MC or DOT specification, in accordance with

  (i) Clause 7 of CSA B620-14 for the corresponding TC specification listed in column 2 of Table 1 of this Standard, where the inspection or test is performed in Canada; and

  (ii) either CFR 49, Part 180, or Clause 7 of CSA B620-14 for the corresponding TC specification listed in column 2 of Table 1 of this Standard, where the inspection or test is performed in the US, provided that the types of inspections and tests and the intervals prescribed in Clause 7 of CSA B620-14 are satisfied.

An inspection or test performed in accordance with CSA B620-1987 prior to 15 August 2002, CAN/CSA-B620-98 prior to 21 September 2005, CSA B620-03 prior to the enforcement date of CSA B621-09, or CSA B620-09 prior to the enforcement date of CSA B620-14 shall be deemed equivalent

to the corresponding test or inspection in CSA B620-14, provided that the intervals specified in Clause 7 of CSA B620-14 have not been exceeded.

6 Portable tanks

6.1 General

Where Clause 8 of this Standard requires the use of a highway tank of a specification included in CSA B620-14, a portable tank listed in column 2 or 3 of Table 2 of this Standard may be used instead of the highway tank in column 1 of the same row if

(a) the Specific Requirements in Clause 8.4 for the tank in column 1 are nonetheless met;
(b) the portable tank, if in column 2, was constructed and certified in accordance with the requirements of the edition of CSA B620 in force on the date of certification of the portable tank;
(c) the portable tank, if in column 3, was constructed and certified in accordance with the requirements of either
    (i) CFR 49; or
    (ii) the regulations for the transportation of dangerous goods by rail in force in Canada before 5 December 1991; and
(d) the portable tank
    (i) if TC 51, was constructed and certified prior to the enforcement date of this Standard in the *TDG Regulations*; and
    (ii) if DOT 51 was constructed and certified prior to 1 Jan 2003.

Table 2
Equivalent and substitute portable tank specifications
(See Clauses 6.1 and 6.3.2.)

Column 1	Column 2	Column 3
CSA B620 highway tank specification	**CSA B620 portable tank specification**	**CTC/DOT equivalent specification**
TC 407	TC 60 or TC 51	CTC 60, DOT 60, CTC 51, or DOT 51
TC 412	TC 60 or TC 51	CTC 60, DOT 60, CTC 51, or DOT 51
TC 331	TC 51	CTC 51 or DOT 51

6.2 Bottom discharge outlets — TC 60, CTC 60, and DOT 60 portable tanks

Bottom discharge outlets on TC 60, CTC 60, and DOT 60 portable tanks shall be prohibited unless the tank is used to transport sludge acid or alkaline corrosive liquids.

6.3 Inspection and testing

6.3.1

Specification 51 portable tanks constructed and certified in accordance with CSA B620-09, CSA B620-03, CAN/CSA-B620-98, CSA B620-1987, or the regulations for the transportation of dangerous goods by rail in force in Canada before 5 December 1991 shall be tested and inspected in accordance with

(a) Clause 7 of CSA B620-14 where the inspection or testing is performed in Canada; and
(b) either Clause 7 of CSA B620-14 or CFR 49, Section 173.32, for the corresponding DOT specification where the inspection or testing is performed in the US, provided that the types of inspections and tests and the intervals prescribed in Clause 7 of CSA B620-14 are satisfied.

Specification 60 portable tanks constructed and certified in accordance with CSA B620-14, CSA B620-03, CAN/CSA-B620-98, CSA B620-1987, or the regulations for the transportation of dangerous goods by rail in force in Canada before 5 December 1991 shall be tested and inspected in accordance with

(a) Clause 7 of CSA B620-14 where the inspection or testing is performed in Canada; and
(b) either Clause 7 of CSA B620-14 or CFR 49, Section 173.32, for the corresponding DOT specification where the inspection or testing is performed in the US, provided that the types of inspections and tests and the intervals prescribed in Clause 7 of CSA B620-14 are satisfied.

6.3.2

Specification 51 or 60 portable tanks constructed and certified in accordance with the requirements of CFR 49 shall be tested and inspected in accordance with

(a) Clause 7 of CSA B620-14 for the corresponding TC specification listed in column 2 of Table 2 of this Standard, where the testing or inspection is performed in Canada; or
(b) either CFR 49, Section 173.32, or Clause 7 of CSA B620-14 for the corresponding TC specification listed in column 2 of Table 2 of this Standard, where the inspection or testing is performed in the US, provided that the types of inspections and tests and the intervals prescribed in Clause 7 of CSA B620-14 are satisfied.

6.3.3

An inspection or test performed in accordance with CSA B620-1987 prior to 15 August 2002, CAN/CSA-B620-98 prior to 21 September 2005, or CSA B620-03 prior to the enforcement date of CSA B621-09 or CSA B620-09 prior to the enforcement date of CSA B620-14 shall be deemed equivalent to the corresponding test or inspection in CSA B620-14, provided that the intervals specified in Clause 7 of CSA B620-14 have not been exceeded.

6.4 Selection and use of TC 56, CTC 56, and DOT 56 tanks

TC 56, CTC 56, and DOT 56 tanks shall be selected, used, inspected, and retested in accordance with Section 7 of CAN/CGSB-43.146 as if they were UN11A, UN11B, or UN11N intermediate bulk containers, as applicable.

6.5 Selection and use of TC 57, CTC 57, and DOT 57 tanks

TC 57, CTC 57, and DOT 57 tanks shall be selected, used, inspected, and retested in accordance with Section 7 of CAN/CGSB-43.146 as if they were UN31A, UN31B, or UN31N intermediate bulk containers, as applicable.

6.6 Tank protection

A portable tank shall be completely contained within the length of the vehicle into or on which it is loaded or to which it is attached. A tank shall not be mounted below the vehicle body or deck. The following protection shall be provided either by the vehicle or the portable tank:

(a) a rear-end protection that can deflect at least 15 cm (6 in) horizontally forward without any contact with any part containing lading when subjected to an impact of twice the combined weight of the full tank and the vehicle to which it is attached; and
(b) suitable damage protection to protect all valves, safety devices, and other accessories from damage by collision, jackknifing, or overturning.

7 Use of means of containment

7.1 General requirements

A means of containment shall not be used unless the following conditions are fulfilled:

(a) it has been selected in accordance with Clauses 4, 8, and either 5 or 6 of this Standard;
(b) any repair or modification has been performed as required for its specification;

(c) it is free of any visible defect that could affect its integrity during loading, unloading, or transportation;
(d) if it is a tank, it has a MAWP equal to or greater than that specified in Clause 4.4;
(e) where a fire hazard exists, precautions have been taken to prevent a difference in electrical potential between conductive surfaces and to ensure safe dissipation of static electricity through bonding or grounding, or both, as appropriate;
(f) all flexible hoses and their couplings have been inspected visually to ensure mechanical fitness, integrity, and compatibility with lading. A hose assembly shall not be used to load or unload dangerous goods if it is determined to have any of the conditions identified in Clause 7.2.10.4 of CSA B620-14 or if the markings are not in accordance with Clause 7.2.10.6 or 7.2.10.8 of CSA B620-14. Despite the requirement of Clause 7.2.10.4(a) of CSA B620-14, a hose may continue to be used if the reinforcement is exposed as long as there is no evidence of wear, deterioration, or other damage in the exposed reinforcement; and
(g) prior to transport, the gauge glass valves on TC 44 tanks shall be closed and remain closed during transport.
(h) while parked for loading or unloading,
  (i) a fail-safe brake interlock system is used that will apply the parking brake while the loading and unloading hoses are connected; or
  (ii) chock blocks are used at the wheels.
(i) as of 1 Jan 2015, highway tanks and vehicles transporting portable tanks containing Dangerous Goods of primary Class 3, or subsidiary Class 3, shall be equipped with one or more dry chemical fire extinguishers accessible from the ground, with a combined total effective rating of not less than 40BC. Each fire extinguisher shall be recharged immediately after each use and shall be inspected and marked annually in accordance with NFPA 10;
(j) as of 1 Jan 2016, diesel engines on highway tanks and portable tanks containing Dangerous Goods of primary Class 3, or subsidiary Class 3, and being used during loading or off loading shall be equipped with an automatic engine air intake shut off device that will prevent engine runaway in case of exposure to flammable vapours. The device shall activate automatically if engine runaway is detected and remain activated until manually reset.

7.2 Pre-loading requirements

In addition to the requirements in Clause 7.1, a means of containment shall not be loaded with dangerous goods unless the following conditions are fulfilled:
(a) it has been inspected, tested, retested, and is marked as required for its specification (see Clause 5.4);
(b) if it is a tank, and a component such as piping, a valve, or a fitting has been restored or replaced since the last time the tank was loaded or unloaded, that component has been tested for leaks at 80% of MAWP;
(c) it does not contain any residues or foreign materials that could react with the intended lading or otherwise create a hazard;
(d) those parts that contact the intended lading will not react with the lading or cause the lading to decompose and thereby create a hazard; and
(e) if the mixture of two or more materials would result in a direct or indirect hazard (such as an explosion, fire, excessive increase in pressure or heat, or the release of toxic vapours), precautions shall be taken to ensure that a highway tank vehicle is not loaded with those materials unless the materials are separated by a double bulkhead.

7.3 Loading requirements

During loading of a means of containment,
(a) The operator responsible for the transfer shall have been trained in product hazards and emergency procedures, and shall remain alert, within easy access of the flow shutdown control, and to the extent possible, with the hose and tank in clear view except for brief periods to operate controls or to check the receiving container.
(b) The loading limits for the means of containment shall not be exceeded, including the rate of filling, the gross vehicle weight, the maximum product load, and the MAWP and vacuum limits.

(c) The quantity of dangerous goods to be transferred shall be controlled.
(d) If the means of containment is a tank, the outage left in the tank shall
  (i) not be less than 2% of its volumetric capacity;
  (ii) be sufficient to prevent the tank from becoming liquid-full should the temperature of the contents rise to 55 °C (131°F); and
  (iii) if the tank is to be placed, stored, or parked within an enclosed space, be sufficient to prevent venting should the temperature of the contents rise to 55 °C (131°F).

7.4 Post-loading requirements

The following requirements shall apply:
(a) Immediately after the means of containment has been loaded
  (i) all hatches, valves up to and including the outermost valve, and other openings in the means of containment shall be closed and secured; and
  (ii) the exterior surfaces shall be clean and free of residue or spills of dangerous goods.
(b) The closing and securement of valves and openings in Item (a) (i) shall not interfere with the normal functioning of any safety relief devices.
(c) Prior to transport, the means of containment shall be secured to the transport vehicle in a manner that will endure the normal conditions of transportation.

7.5 Pre-unloading requirements

In addition to the requirements in Clause 7.1, prior to unloading a means of containment, the following conditions shall be fulfilled:
(a) unloading connections shall be inspected to ensure that the lading will be discharged into the proper receiving line;
(b) precautions shall be taken to isolate from each other substances that can react violently together, if such substances are to be unloaded simultaneously at the same location;
(c) the space available in the receiving means of containment shall be verified to ensure that it is sufficient to accommodate the quantity of goods to be unloaded; and
(d) if the periodic inspection or test interval has expired since the tank was last loaded, the tank may be transported to its unloading destination and unloaded.

7.6 Unloading requirements

During the unloading of a means of containment,
(a) The operator responsible for the transfer shall have been trained in product hazards and emergency procedures, and shall remain alert, within easy access of the tank flow shutdown control, and to the extent possible, with the hose and tank in clear view except for brief periods to operate controls or to check the receiving container.
(b) When the easy access and clear view referred to in Item (a) is not possible, the operator shall remain within easy access of another means of shutting off the flow except to check the supply connection, the hose, and the receiving tank at least once every five minutes for operations that last more than five minutes.
(c) The loading and unloading limits for the delivering and receiving means of containment shall not be exceeded, including the rate of filling, the gross vehicle weight, the maximum product load, and the MAWP and vacuum limits.
(d) The quantity of dangerous goods unloaded shall be controlled.

7.7 Post-unloading requirements

The following requirements shall apply:
(a) Immediately after the means of containment has been unloaded
  (i) all hatches, valves up to and including the outermost valve, and other openings in the means of containment shall be closed and secured; and
  (ii) the exterior surfaces shall be clean and free of residue or spills of dangerous goods.

(b) The closing and securement of valves and openings in Item (a) (i) shall not interfere with the normal functioning of any safety relief devices.

The requirements in Item (a) shall not apply if the means of containment is cleaned and purged immediately after unloading.

8 Tank selection requirements for dangerous goods of Classes 3, 4, 5, 6.1, 8, and 9

8.1 Classification, prohibition, and exemption under the *TDG Act* and *Regulations*

Clause 8 provides tank selection requirements for the handling, offering for transport, and transportation of dangerous goods of Classes 3, 4, 5, 6.1, 8, and 9 that are neither prohibited from transportation nor exempted by the *TDG Regulations*.

Notes:

(1) *Dangerous goods are classified in Part 2 of the* TDG Regulations*. The appropriate shipping name and the corresponding particulars (description, UN number, class, division, and packing group, as applicable) are assigned by Schedule 1 of the* TDG Regulations*.*

(2) *Certain dangerous goods are exempted by the* TDG Regulations*, and others are prohibited from transport by Schedule 3 of the* TDG Regulations*.*

8.2 General tank selection requirements

Dangerous goods shall be transported in

(a) a means of containment that is selected and used in accordance with Clauses 4, 7, 8, and either 5 or 6 of this Standard; or

(b) TC 106A or TC 110A multi-unit tank car tanks (ton containers) or their CTC or DOT equivalents, if the tanks are selected, used, maintained, and periodically inspected and tested as prescribed in CAN/CGSB-43.147.

8.3 Requirements for specific dangerous goods

The Specific Requirements in Clause 8.4, listed in column 6 of Tables 4 and 5, shall apply to specific dangerous goods where

(a) the UN number in column 1 and the shipping name and description in column 2 match those of the dangerous goods; or

(b) if the shipping name and description are not known or not included in either Tables 4 or 5, the general description in bold letters in column 2, the primary classification in column 3, the subsidiary classification in column 4, and the packing group in column 5 match those of the dangerous goods.

8.4 Specific Requirements

Note: *Some Specific Requirements are followed by parentheses containing the letter B and a number. These parenthetical references specify the equivalent Special Provision in §172.102 of CFR 49.*

The following Specific Requirements shall be applied pursuant to Clause 8.3:

1. Tanks shall be TC 407, TC 412, or TC 331 tanks having a minimum MAWP of 276 kPa, gauge (40 psi).
2. Tanks shall be TC 407, TC 412, or TC 331 tanks having a minimum MAWP of 172 kPa, gauge (25 psi).
3. Tanks shall be TC 406, TC 407, TC 412, or TC 331 tanks.
4. A means of containment
   (a) shall be a specification tank listed in Specific Requirement 3;
   (b) shall be a specification tank listed in Specific Requirement 2 if the combined vapour pressure of the product and any padding is greater than or equal to 200 kPa (29 psia) (absolute) at 46 °C (115°F); and

(c) despite Item (a), may be a non-specification means of containment that complies with the requirements in Clause 4 if
   (i) the capacity of the means of containment is greater than 3000 L; and
   (ii) the tank is leak free and suitable for the transport of liquids.

5. A means of containment
   (a) shall be a specification tank listed in Specific Requirement 3;
   (b) shall be a specification tank listed in Specific Requirement 2 if the combined vapour pressure of the product and any padding is greater than or equal to 200 kPa (29 psia) (absolute) at 46 °C (115°F); and
   (c) despite Item (a), may be a non-specification means of containment that complies with the requirements in Clause 4 if the capacity of the means of containment is greater than 3000 L.
6. Tanks shall not be loaded at ambient temperatures and lading temperatures exceeding those listed in column 1 of Table 3 in accordance with the volatility of the ladings (see column 2).(B33)

Table 3
Loading specifications
(See Specific Requirement 6.)

Column 1	Column 2
Maximum lading and ambient temperature	**Volatility**
55.0 °C (131°F)	RVP ≤ 61.8 kPa (9.0 psia)
51.1 °C (124°F)	RVP ≤ 68.7 kPa (10.0 psia)
46.7 °C (116°F)	RVP ≤ 79.0 kPa (11.5 psia)
41.7 °C (107°F)	RVP ≤ 92.8 kPa (13.5 psia)
37.8 °C (100°F)	RVP ≤ 103.1 kPa (15.0 psia)

Note: *RVP refers to the Reid vapour pressure.*

7. Tanks shall be
   (a) TC 407, TC 412, or TC 331 tanks having a minimum MAWP of 172 kPa, gauge (25 psi); and
   (b) designed for a working temperature of at least 121 °C (250°F). (B5)
8. Tanks shall
   (a) be TC 407, TC 412, or TC 331 tanks having a minimum MAWP of 1207 kPa, gauge (175 psi);
   (b) not be equipped with bottom outlets; and
   (c) be insulated so that the overall thermal conductance at 15.5 °C (60°F) is not more than 1.5333 kJ/h•m^2/°C (0.075 Btu/h•ft^2/°F). (B11)
9. Tanks shall be
   (a) TC 406 Crude, TC 406, TC 407, TC 412, or TC 331 tanks; or
   (b) TC 306 or MC 306 tanks that meet the requirements of Clause A.8 of CSA B620-14;
10. Tanks shall contain a padding composed only of nitrogen, inert gas, or other inert material. (B16)
11. Open bins shall be authorized for iron oxide, spent, or iron sponge, spent (obtained from coal gas purification), UN1376. (B18)
12. Tanks shall
   (a) comply with Specific Requirement 2;
   (b) be insulated with at least 100 mm (4 in) of insulation, except that the insulation may be reduced to 51 mm (2 in) over exterior heater coils;
   (c) not be equipped with interior heating coils;
   (d) contain a padding composed only of inert gas, or be filled with water to the tanks' capacity; and
   (e) not be loaded with dangerous goods at a temperature above the tank's design temperature range. (B26)

13. Tanks shall
    (a) comply with Specific Requirement 1, except that the MAWP shall be at least 1034 kPa, gauge (150 psi); and
    (b) contain a padding composed only of dry inert gas at a pressure not to exceed 103 kPa, gauge (15 psi). (B27)
14. Tanks shall
    (a) be TC 331;
    (b) be loaded with molten sodium, which shall solidify prior to transportation;
    (c) have an outage of at least 5% at 98 °C (208°F); and
    (d) be equipped with fusion-welded and stress-relieved exterior heating coils. (B68)
15. Deleted
16. Tanks shall be prohibited. (B82)
17. Deleted
18. Tanks shall not be equipped with bottom outlets. (B9)
19. Tanks shall be insulated so that the overall thermal conductance at 15.5 °C (60°F) is not more than 1.5333 kJ/h•m^2/°C (0.075 Btu/h•ft^2/°F). Insulating materials shall not promote corrosion to the tank when wet. (B14)
20. Tanks shall not be equipped with interior heating coils. (B49)
21. Tanks shall
    (a) be TC 412 with
        (i) at least 20% of the minimum total thickness composed of nickel cladding in accordance with ASTM B162; or
        (ii) a lining of lead of at least 4.7 mm (0.205 in) thick;
    (b) have an outage of not more than 12% or less than 4% of the volume of the tank; and
    (c) have a shell and head minimum thickness of 9.5 mm (0.374 in), which shall not include any lead lining.
22. Portable tanks may be visually inspected according to Clause 7 of CSA B620-14 at least once every five years instead of fulfilling the requirements for regular periodic test and inspection given in Clause 7 of CSA B620-14, and if so inspected, the date of the visual inspection shall be stencilled on the tank near the other required markings. (B48)
23. Tanks shall be
    (a) TC 406 Crude, TC 406, TC 407, TC 412, or TC 331 tanks; or
    (b) until 1 January 2016, non-specification tanks meeting the requirements of Clause 4, if
        (i) the tanks were manufactured before 1 January 2007;
        (ii) no more than 15 years has elapsed since the date of manufacture of the tank, or if that date is unknown, since 1 January 1996;
        (iii) the tanks are inspected, tested, retested, and marked in accordance with the applicable requirements for TC 406 Crude tanks set out in Clause 7 of CSA B620-14, except that a pressure of 21 kPa (3 psi) may be used for the pressure test; and
        (iv) a metal identification plate is permanently attached by the registered facility conducting the test, marked with at least the following information:
            (1) the words “Non-spec Flammable Liquids Tank” and “Not for Dangerous Goods Use after January 1, 2016” or “Citerne hors spécification pour liquides inflammables” and “Inutilisable pour les marchandises dangereuses après le 1er janvier 2016”;
            (2) the date of the first inspection or test done in accordance with Item (b) (iii); and
            (3) the name of the registered facility.
24. Tanks shall be TC 423.
25. Tanks shall be TC 44.
26. Tanks shall be equipped with a device to prevent the buildup of excess pressure due to the slow decomposition of the dangerous goods being transported. The device shall be located in the vapour space when the tank is filled to its maximum permitted fill level, and shall be liquid tight in the event of an overturn.
27. A non-specification means of containment is authorized provided that it is sift-proof, prevents liquid water from reaching the dangerous good, and is provided with sufficient venting to preclude dangerous accumulation of flammable, corrosive, or toxic gaseous emissions such as methane, hydrogen, and ammonia. This dangerous good shall be loaded dry. (B115)

Table 4
Liquid dangerous goods
(See Clause 8.3.)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN number	Shipping name	Primary class	Subsidiary class	Packing group	Specific requirement
	All Goods of Class 3 and Packing Group I	3	6.1[(1)] or 8	I	1, 18, 19
UN1194	Ethyl nitrite solution	3	6.1	I	16
	All Goods of Class 3 and Packing Group I	3	None, or any other than 6.1[(1)] or 8	I	2
UN1131	Carbon disulphide	3	6.1	I	2, 10
UN1089	Acetaldehyde	3	—	I	2, 10
	All Goods of Class 3 and Packing Group II	3	6.1[(1)] or 8	II	2
	All Goods of Class 3 and Packing Group II	3	None, or any other than 6.1[(1)] or 8	II	3
UN3475	Ethanol and gasoline mixture	3	—	II	3, 6
UN1203	Gasoline	3	—	II	3, 6
UN1105	Pentanols	3	—	II	2
UN1267	Petroleum crude oil	3	—	II	9
UN1999	Tars, liquid (including road asphalt and oils, bitumen, and cut backs)	3	—	II	3, 9, or 23
	All Goods of Class 3 and Packing Group III	3	Any or none	III	3
UN1202	Diesel fuel	3	None	III	3 or 25
UN2684	Diethylaminopropylamine	3	8	III	3, 2
UN1105	Pentanols	3	—	III	2
UN1267	Petroleum crude oil	3	—	III	9
UN1999	Tars, liquid (including road asphalt and oils, bitumen, and cut backs)	3	—	III	3, 9, or 23
	All Goods of Class 4 and Packing Group I	4	Any or none	I	1, 18, 19
UN3052	Aluminum alkyl halides	4.2	4.3	I	8
UN3051	Aluminum alkyls	4.2	4.3	I	8
UN1366	Diethylzinc	4.2	4.3	I	8

(Continued)

Table 4 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN number	Shipping name	Primary class	Subsidiary class	Packing group	Specific requirement
UN1370	Dimethylzinc	4.2	4.3	I	8, 10
UN2445	Lithium alkyls	4.2	4.3	I	8
UN3053	Magnesium alkyl	4.2	4.3	I	8
UN2447	Phosphorus, white, molten	4.2	6.1	I	12, 18
UN1381	Phosphorus, white or yellow, in solution or underwater	4.2	6.1	I	12, 18
UN2845	Pyrophoric liquid, organic, N.O.S.*	4.2	—	I	8
UN1422	Potassium sodium alloys	4.3	—	I	13
UN1420	Potassium metal alloys	4.3	—	I	13
	All Goods of Class 4 and Packing Group II	4	Any or none	II	2
	All Goods of Class 4 and Packing Group III	4	Any other than none	III	3
	All Goods of Class 4 and Packing Group III	4	None	III	4
	All Goods of Class 5.1 and Packing Group I	5.1	Any or none	I	1, 18, 19
UN2015	Hydrogen peroxide, stabilized, or hydrogen peroxide, aqueous solution, stabilized (with more than 60% hydrogen peroxide)	5.1	8	I	1, 26
	All Goods of Class 5.1 and Packing Group II	5.1	Any or none	II	2
UN2426	Ammonium nitrate, liquid (hot concentrated solution) with not more than 0.2% combustible material, in a concentration exceeding 80%	5.1	—	—	7
UN2014	Hydrogen peroxide, aqueous solution (with not less than 20% but not more than 60% hydrogen peroxide, stabilized as necessary)	5.1	8	II	1, 26
UN3375	Ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives	5.1	—	II	24
	All Goods of Class 5.2 and Packing Group II	5.2	Any or none	II	16

(Continued)

Table 4 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN number	Shipping name	Primary class	Subsidiary class	Packing group	Specific requirement
UN3109	Organic peroxide type F, liquid	5.2	—	II	2, 18
UN3119	Organic peroxide type F, liquid, temperature controlled	5.2	—	II	2, 18
	All Goods of Class 5.1 and Packing Group III	5.1	Any or none	III	3
	All Goods of Class 6.1 and Packing Group I	6.1[(1)]	Any or none	I	1, 18, 19
UN1051	Hydrogen cyanide, stabilized, containing less than 3% water	6.1	3	I	16
	All Goods of Class 6.1 and Packing Group I	6.1[(2)]	Any other than none	I	1, 18, 19
	All Goods of Class 6.1 and Packing Group I	6.1[(2)]	None	I	2
	All Goods of Class 6.1 and Packing Group II	6.1	Any or none	II	2
UN1738	Benzyl chloride	6.1	8	II	8
UN1569	Bromoacetone	6.1	3	II	16
UN2312	Phenol, molten	6.1	—	II	2, 19
UN1701	Xylyl bromide	6.1	—	II	16
	All Goods of Class 6.1 and Packing Group III	6.1	Any other than 3 only	III	3
	All Goods of Class 6.1 and Packing Group III	6.1	3 only	III	3
	All Goods of Class 6.1 and Packing Group III	6.1	None	III	4
	All Goods of Class 8 and Packing Group I	8	Any or none	I	1, 18
UN1744	Bromine or bromine solution	8	6.1	I	21
UN2029	Hydrazine, anhydrous	8	3, 6.1	I	1, 10, 18, 19
UN1829	Sulphur trioxide, stabilized	8	—	I	1, 18, 20
	All Goods of Class 8 and Packing Group II	8	Any or none	II	2
UN2922	Corrosive liquids, toxic, N.O.S.*	8	6.1	II	2

(Continued)

Table 4 (Concluded)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN number	Shipping name	Primary class	Subsidiary class	Packing group	Specific requirement
UN2030	Hydrazine hydrate or hydrazine, aqueous solution (with more than 37% but not more than 64% hydrazine, by mass)	8	6.1	II	2, 10
UN2443	Vanadium oxytrichloride	8	—	II	2, 10
	All Goods of Class 8 and Packing Group III	8	Any other than none	III	3
	All Goods of Class 8 and Packing Group III	8	None	III	4
	Goods of Class 9	9	—	Any	4

**N.O.S. — not otherwise specified.*

Notes:

(1) *Applies only to those dangerous goods that are included in Class 6.1 due to inhalation toxicity.*

(2) *Applies only to those dangerous goods that are included in Class 6.1 due to oral or dermal toxicity.*

Table 5
Solid dangerous goods

(See Clause 8.3.)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	Shipping name	Primary Class	Subsidiary class	Packing group	Specific requirement
	All Goods of Class 4.1 and Packing Group I	4.1	Any or none	I	16
	All Goods of Class 4.1 and Packing Group II	4.1	6.1 or 8	II	3
	All Goods of Class 4.1 and Packing Group II	4.1	None, or any other than 6.1 or 8	II	5
UN1326	Hafnium powder, wetted with not less than 25 percent water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	4.1	—	II	4
UN1871	Titanium hydride	4.1	—	II	4
UN3175	Solids containing flammable liquid, n.o.s.	4.1	—	II	4

(Continued)

Table 5 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	Shipping name	Primary Class	Subsidiary class	Packing group	Specific requirement
UN1358	Zirconium powder, wetted with not less than 25 percent water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	4.1	—	II	4
	All Goods of Class 4.1 and Packing Group III	4.1	6.1 or 8	III	3
	All Goods of Class 4.1 and Packing Group III	4.1	None, or any other than 6.1 or 8	III	5
UN2623	Firelighters, solid with flammable liquid	4.1	—	III	16
UN2254	Matches, fusee	4.1	—	III	16
UN1331	Matches, “strike anywhere”	4.1	—	III	16
UN1944	Matches, safety (book, card or strike on box)	4.1	—	III	16
UN1945	Matches, wax “Vesta”	4.1	—	III	16
UN2304	Naphthalene, molten	4.1	—	III	4
UN1338	Phosphorus, amorphous	4.1	—	III	12, 18
	All Goods of Class 4.2 and Packing Group I	4.2	Any or none	I	1
UN3393	Organometallic substance, solid, pyrophoric, water-reactive	4.2	4.3	I	8
UN1381	Phosphorus, white dry; Phosphorus, white, in solution; Phosphorus, white, under water; Phosphorus, yellow, dry; Phosphorus, yellow, in solution; or Phosphorus, yellow, under water	4.2	6.1	I	12, 18
UN3200	Pyrophoric solid, inorganic, n.o.s.	4.2	—	I	3
	All Goods of Class 4.2 and Packing Group II	4.2	6.1 or 8	II	3
	All Goods of Class 4.2 and Packing Group II	4.2	None, or any other than 6.1 or 8	II	4
UN1361	Carbon, animal or vegetable origin	4.2	—	II	3
UN3400	Organometallic substance, solid, self-heating	4.2	—	II	3

(Continued)

Table 5 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	**Shipping name**	**Primary Class**	**Subsidiary class**	**Packing group**	**Specific requirement**
UN1382	Potassium sulphide, anhydrous; Potassium sulphide with less than 30% water of crystallization; Potassium sulphide, anhydrous; or Potassium sulphide with less than 30% water of crystallization	4.2	—	II	4, 10
	All Goods of Class 4.2 and Packing Group III	4.2	4.3, 6.1, or 8	III	3
	All Goods of Class 4.2 and Packing Group III	4.2	None, or any other than 4.3, 6.1, or 8	III	4
UN1376	Iron oxide, spent obtained from coal gas purification; or Iron sponge, spent obtained from coal gas purification	4.2	—	III	5, 11
UN3400	Organometallic substance, solid, self-heating	4.2	—	III	3
UN1932	Zirconium scrap	4.2	—	III	5
UN2009	Zirconium, dry, finished sheets, strip or coiled wire	4.2	—	III	5
	All Goods of Class 4.3 and Packing Group I	4.3	Any or none	I	3
UN2257	Potassium	4.3	—	I	13
UN3403	Potassium metal alloys, solid	4.3	—	I	13
UN3404	Potassium sodium alloys, solid	4.3	—	I	13
UN1428	Sodium	4.3	—	I	14, 18, 22
	All Goods of Class 4.3 and Packing Group II	4.3	Any or none	II	4
UN1394	Aluminum carbide	4.3	—	II	3
UN1395	Aluminum ferrosilicon powder	4.3	6.1	II	3
UN3170	Aluminum remelting by-products including, but not limited to, aluminum dross, aluminum skimmings, spent cathodes, spent potliner and aluminum salt slags; or aluminum smelting by-products including, but not limited to, aluminum dross, aluminum skimmings, spent cathodes, spent potliner and aluminum salt slags	4.3	—	II	3, 27

(Continued)

Table 5 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	Shipping name	Primary Class	Subsidiary class	Packing group	Specific requirement
UN3292	Batteries, containing sodium; or cells, containing sodium	4.3	—	II	16
UN3078	Cerium, turnings or gritty powder	4.3	—	II	3
UN3208	Metallic substance, water-reactive, n.o.s.	4.3	—	II	3
UN3209	Metallic substance, water-reactive, self-heating, n.o.s.	4.3	4.2	II	3
UN3395	Organometallic substance, solid, water-reactive	4.3	—	II	3
UN3397	Organometallic substance, solid, water-reactive, self-heating	4.3	4.2	II	3
UN1340	Phosphorus pentasulfide, free from yellow or white phosphorus	4.3	4.1	II	3
UN2835	Sodium aluminum hydride	4.3	—	II	3
	All Goods of Class 4.3 and Packing Group III	4.3	Any or none	III	4
UN3170	Aluminum remelting by-products including, but not limited to, aluminum dross, aluminum skimmings, spent cathodes, spent potliner and aluminum salt slags; or aluminum smelting by-products including, but not limited to, aluminum dross, aluminum skimmings, spent cathodes, spent potliner and aluminum salt slags	4.3	—	III	4, 27
UN1408	Ferrosilicon with 30 percent or more but less than 90 percent silicon	4.3	6.1	III	5
UN2950	Magnesium granules, coated, particle size not less than 149 microns	4.3	—	III	5
UN2968	Maneb preparation, stabilized against self-heating; or Maneb, stabilized against self-heating	4.3	—	III	3
UN3209	Metallic substance, water-reactive, self-heating, n.o.s.	4.3	4.2	III	3
	All Goods of Class 5.1 and Packing Group I	5.1	Any or none	I	1, 18, 19

(Continued)

Table 5 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	**Shipping name**	**Primary Class**	**Subsidiary class**	**Packing group**	**Specific requirement**
UN2015	Hydrogen peroxide, aqueous solution, stabilized with more than 60 percent hydrogen peroxide; or Hydrogen peroxide, stabilized	5.1	8	I	1, 26
UN3085	Oxidizing solid, corrosive, n.o.s.	5.1	8	I	3
UN1479	Oxidizing solid, n.o.s.	5.1	—	I	3
UN3087	Oxidizing solid, toxic, n.o.s.	5.1	6.1	I	3
	All Goods of Class 5.1 and Packing Group II	5.1	Any or none	II	3
UN2880	Calcium hypochlorite, hydrated with not less than 5.5 percent but not more than 16 percent water; or Calcium hypochlorite, hydrated mixture with not less than 5.5 percent but not more than 16 percent water	5.1	—	II	5
UN1458	Chlorate and borate mixture	5.1	—	II	5
UN1459	Chlorate and magnesium chloride mixture, solid	5.1	—	II	5
UN2465	Dichloroisocyanuric acid, dry; or Dichloroisocyanuric acid salts excluding the dihydrated sodium salts	5.1	—	II	5
UN3212	Hypochlorites, inorganic, n.o.s	5.1	—	II	5
UN1471	Lithium hypochlorite, dry; or Lithium hypochlorite mixture	5.1	—	II	5
UN1477	Nitrates, inorganic, n.o.s.	5.1	—	II	5
UN1479	Oxidizing solid, n.o.s.	5.1	—	II	5
UN3356	Oxygen generator, chemical	5.1	—	II	16
UN1487	Potassium nitrate and sodium nitrite mixture	5.1	—	II	5
UN1490	Potassium permanganate	5.1	—	II	5
UN1495	Sodium chlorate	5.1	—	II	5
UN3247	Sodium peroxoborate, anhydrous	5.1	—	II	5
UN2468	Trichloroisocyanuric acid, dry	5.1	—	II	5
UN1514	Zinc nitrate	5.1	—	II	5
	All Goods of Class 5.1 and Packing Group III	5.1	Any or none	III	5

(Continued)

Table 5 (Continued)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	Shipping name	Primary Class	Subsidiary class	Packing group	Specific requirement
	All Goods of Class 5.2 and Packing Group I	5.2	Any or none	I	16
	All Goods of Class 5.2 and Packing Group II	5.2	Any or none	II	16
UN3110	Organic peroxide type F, solid	5.2	—	II	2, 18
	All Goods of Class 5.2 and Packing Group III	5.2	Any or none	III	16
	All Goods of Class 6.1 and Packing Group I	6.1	Any or none	I	3
UN3462	Toxins, extracted from living sources, solid, n.o.s.	6.1	—	I	2
	All Goods of Class 6.1 and Packing Group II	6.1	Any or none	II	3
UN2017	Ammunition, tear-producing, non-explosive without burster or expelling charge, non-fuzed	6.1	8	II	16
UN2016	Ammunition, toxic, non-explosive without burster or expelling charge, non-fuzed	6.1	—	II	16
UN2312	Phenol, molten	6.1	—	II	2, 19
UN3243	Solids containing toxic liquid, n.o.s.	6.1	—	II	4
UN2936	Thiolactic acid	6.1	—	II	2
UN3462	Toxins, extracted from living sources, solid, n.o.s.	6.1	—	II	2
	All Goods of Class 6.1 and Packing Group III	6.1	Any or none	III	5
UN2431	Anisidines	6.1	—	III	4
UN3462	Toxins, extracted from living sources, solid, n.o.s.	6.1	—	III	4
	All Goods of Class 8 and Packing Group I	8	Any or none	I	3
UN1829	Sulphur trioxide, stabilized	8	—	I	1, 18, 20
	All Goods of Class 8 and Packing Group II	8	Any or none	II	5
UN3419	Boron trifluoride acetic acid complex, solid	8	—	II	2

(Continued)

Table 5 (Concluded)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	**Shipping name**	**Primary Class**	**Subsidiary class**	**Packing group**	**Specific requirement**
UN3420	Boron trifluoride propionic acid complex, solid	8	—	II	2
UN2921	Corrosive solid, flammable, n.o.s.	8	4.1	II	3
UN3084	Corrosive solid, oxidizing, n.o.s.	8	5.1	II	3
UN3244	Solids containing corrosive liquid, n.o.s.	8	—	II	4
UN3423	Tetramethylammonium hydroxide, solid	8	—	II	2
	All Goods of Class 8 and Packing Group III	8	Any or none	III	5
UN2511	2-Chloropropionic acid	8	—	III	4
UN3028	Batteries, dry, containing potassium hydroxide solid, electric storage	8	—	III	16
	All Goods of Class 9	9	—	Any	5
UN3090	Lithium metal batteries, including lithium alloy batteries	9	—	II	16
UN3091	Lithium metal batteries contained in equipment, including lithium alloy batteries; or lithium batteries packed with equipment, including lithium alloy batteries	9	—	II	16
UN3152	Polyhalogenated biphenyls, solid; or Polyhalogenated terphenyls, solid	9	—	II	4
UN3268	Air bag inflators, or air bag modules, or seat belt pretensioners	9	—	III	16
UN3258	Elevated temperature solid, n.o.s., at or above 240 C	9	—	III	5, 9, or 23
UN3171	Battery-powered equipment, regulated by aircraft only or battery-powered vehicle, regulated by aircraft only	9	—	—	16
UN3363	Dangerous Goods in Apparatus; or Dangerous Goods in Machinery	9	—	—	16
UN3072	Life-saving appliances not self inflating, containing dangerous goods as equipment	9	—	—	16
UN2990	Life-saving appliances, self inflating	9	—	—	16

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