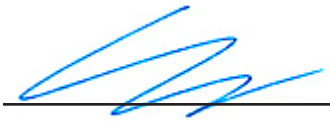
Nova Scotia Construction, Installation and Operation Standards for Petroleum Storage Tank Systems

Department of Environment and Climate Change

NOVA SCOTIA

Approved by:  Scott Farmer, Deputy Minister

Effective date: December 11, 2021

Version control:
Replaces a version with administrative amendments only, dated August 18, 2005 and a version with significant technical amendments, dated June 5, 1997. Original standard was issued on May 2, 1991.

I. PURPOSE

(a) The purpose of this Standard is to provide clear, concise and consistent direction for the design, installation, operation, maintenance and relocation, refurbishment or removal of petroleum storage tank systems.

(b) The Standard builds on a technical framework composed primarily of the Canadian Council of Ministers of the Environment (CCME) *Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products,* the National Fire Code of Canada (as amended and adopted by Nova Scotia) and specific industry and standard development organization-derived standards, codes and guidelines that require a competent authority having jurisdiction to adopt them in order to have the force of law in this province.

(c) The intent of this Standard is to align as closely as feasible with other Canadian and Nova Scotian authorities that regulate petroleum management for the purpose of protecting human health and the environment without overlapping or conflicting with authorities that regulate fire or worker safety issues.

II. LEGISLATION

(a) Section 2(z) of the Petroleum Management Regulations reads as follows:
"Standard" means the document produced by the Department entitled "Nova Scotia Construction, Installation and Operation Standards for Petroleum Storage Tank Systems", as amended from time to time and available from the Department.

(b) Section 6(1) of the Petroleum Management Regulations reads as follows:
"A person responsible for, or a person who constructs, installs or alters, a new or relocated storage tank system shall meet the minimum requirements set forth in the Standard."

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Part 1

GENERAL

1.1 Scope

1.1.1 This Standard describes the minimum requirements for design, construction, installation and operation of aboveground and underground petroleum storage tank systems in Nova Scotia. The location and installation requirements for all underground petroleum tank systems are deemed as Class A sites where all soil, water and ecological receptors require full protection by use of a minimum of secondary containment for all equipment conveying or storing petroleum products.

1.1.2 This Standard does not describe requirements of the Fire Code, rather it adopts the latest edition as per the Nova Scotia Fire Safety Act. Interpretation, inspection and compliance associated with the Fire Code shall be provided at the discretion of the Office of the Fire Marshal or their duly authorized municipal representatives. Where a conflict arises between the requirements in the Standard and the Fire Code, the most stringent requirement shall prevail.

1.1.3 To adapt and become resilient to climate change , all new or upgraded petroleum storage tank systems located in areas that may be subject to extreme events such as flooding or high winds, shall

(a) for aboveground tanks, be designed, constructed, installed, and operated to withstand or avoid forces of buoyancy or water action through measures designed and approved by a professional engineer and may include locating fill and vent piping above the worst case water level, raised bases or footings, and additional anchor points; or

(b) for underground tanks, be designed, constructed, installed and operated to withstand forces of buoyancy, erosion and scour, intrusion of water or electrical system damage through measures designed and approved by a professional engineer and may include increasing burial depth, installation of additional hold-down straps and extended vent pipes.

1.2 Variance

1.2.1 Design, construction and installation requirements may be varied if:

(a) equal or superior requirements are specified by the manufacturer of the equipment; and

(b) variance is approved specifically in writing by an Administrator appointed under the Petroleum Management Regulations.

1.3 Design Standards and Codes

1.3.1 This Standard includes references to technical design, construction and operation standards and codes produced by standard development organizations that have been developed through a rigorous, open, collaborative process involving experts in that field and recognized formally by a government body such as the Standards Council of Canada or a broad-based industry organization. By inclusion through direct reference in legislation, regulation or this Standard, they become mandatory for all persons in Nova Scotia participating in this activity.

1.3.2 Unless otherwise specified within this Standard, any reference to a technical standard or other document shall include the latest edition as well as amendments, revisions and supplements to these documents.

1.3.3 Where there is a conflict between the provisions of this Standard and those of any reference document listed within, the provisions of this Standard shall apply.

1.4 Definitions

1.4.1

(a) "aboveground storage tank" means a storage tank with more than 90% of its volume above surface grade and that operates at atmospheric pressure plus or minus 10 kPa;

(b) "aboveground storage tank system" means one or more commonly connected aboveground storage tanks and all connecting piping, both aboveground and underground, including pumps and product transfer apparatus, diking, overfill protection equipment, and associated spill containment and collection apparatus;

(c) "Act" means the Environment Act;

(d) "Administrator" means a person appointed by the Minister pursuant to the regulations and includes a person acting for an Administrator;

(e) "alter" means to

(i) enlarge, reduce, upgrade or remove a storage tank system,

(ii) change the configuration of the piping, storage tanks or diking of a storage tank system, or

(iii) replace any storage tank in a storage tank system, but does not mean to carry out minor maintenance activities that do not affect the integrity of the system, and "alteration" has a corresponding meaning;

(f) "attended service outlet" means a facility for the dispensing of motive fuels or fuel oil where the dispensing units are operated by a pump island attendant, and not by a consumer;

(g) "aviation fueling facility" means a facility for the dispensing of motive fuels from fixed storage tanks into an aircraft but does not include marinas where floating aircraft may be serviced;

(h) "bulk plant" means one or more aboveground storage tanks or underground storage tanks, including any appurtenances, where petroleum products are stored in bulk for subsequent transmission to other facilities, but does not include a service station or a facility storing petroleum products only for use at that facility;

(i) "cardlock/ keylock outlet" means a non-attended facility for the dispensing of motive fuels or fuel oil that requires the entry of a specific, limited-issue card, key or code issued by the facility owner or operator to allow the transfer of fuel to the user and is not open to the general public;

(j) "certified" when used in reference to a storage tank, component or accessory, means that the storage tank, component or accessory

(i) has been investigated by the Underwriter's Laboratories of Canada (ULC),

(ii) has been found to be in compliance with ULC established requirements,

(iii) is being manufactured under the ULC follow-up service program, and

(iv) is identified with ULC authorized marking;

(k) "certification mark" means the mark, such as a tag, label, plate or embossing, on or affixed to a tank or a component of a storage tank system, certifying that the tank or component conforms to the standards of a certification organization accredited by the Standards Council of Canada or conforms to the standards of the American Petroleum Institute or of the ASTM International;

(l) "certification standard" means a document developed and issued by a certification organization accredited by the Standards Council of Canada or by the American Petroleum Institute or by NACE International or by the Steel Tank Institute and referenced in the Petroleum Management Regulations or in the Standard described in subsection (bc);

(m) "contaminated used oil" means used oil that

(i) has a flash point less than $38^{O}C$; or

(ii) contains any of the substances listed in Column I of Schedule "A" in a concentration in excess of the limit stated in Column II of Schedule "A" of the Used Oil Regulations, as amended from time to time;

(n) "containment system" means a system designed and installed to retain and collect any leak or spill of a petroleum product from a storage tank system;

(o) "contingency plan" means a planned procedure for reporting, containing, removing and cleaning up a spill or leak. Departmental guidance on contingency plans is provided in the Contingency Planning Guidelines (https://www.novascotia.ca/nse/dept/docs.policy/Guidelines-Contingency.Plan.pdf), as amended from time to time;

(p) "corrosion" means the deterioration of a material resulting from a reaction with its environment;

(q) "corrosion expert" means a registered professional engineer experienced in corrosion protection or a person certified by the NACE International Institute as a corrosion technician, corrosion technologist, corrosion protection technician, corrosion protection technologist or corrosion protection specialist;

(r) "corrosion protection" means a method of reducing or preventing corrosion of a storage tank system or component through cathodic protection, the application of protective coatings or the use of a non-corroding material in its construction;

(s) "conveying" means using a storage tank system for the movement of petroleum products;

(t) "crankcase oil" means internal combustion engine crankcase oil;

(u) "crude oil" means a mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Depending upon the characteristics of the crude stream, it may also include: small amounts of hydrocarbons that exist in gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well gas; condensate recovered as a liquid from natural gas wells; small amounts of non-hydrocarbons produced with the oil, such as sulfur and various metals; drip gases, and liquid hydrocarbons produced from coal, tar sands, oil sands, gilsonite, bitumen and oil shale;

(v) "Department" means the Department of Environment and Climate Change;

(w) "dike" means a barrier surrounding aboveground storage tanks that provides liquid retention capacity;

(x) "emergency generator" means a device used to produce electricity only when a loss of power from the utility or normal electrical connection occurs;

(y) "emptied" means, in relation to a storage tank system, that the liquid contents of the storage tank system have been removed, as far as is practicable, by any means including suction, pouring, draining or pumping;

(z) "field-erected storage tank" means a storage tank that has been constructed to a specified standard at the site of installation and use;

(aa) "Fire Code" means the Fire Code made under the Nova Scotia Fire Safety Act, as amended from time to time.

(ab) "flow-through process tank" means any tank that forms an integral part of an industrial process and through which there is a steady or uninterrupted flow of a petroleum product during operation of the industrial process, and includes an oil/water separator;

(ac) "fuel oil" means a liquid or gas derived from petroleum or natural gas and all liquids or gases containing any derivative of petroleum or natural gas that are produced, prepared, compounded, acquired, used or may be used for the purpose of generating heat or electrical power, and includes stove oil, furnace oil, bunker, heavy fuel oil, and any other petroleum or natural gas product, but does not include kerosene;

(ad) "heating appliance" means a device that uses petroleum products as fuel to provide space heating for a building or area;

(ae) "inspector" means an inspector appointed pursuant to Section 21 of the Act;

(af) "installer" means a person to whom a Certificate of Qualification has been issued pursuant to the Petroleum Management Regulations;

(ag) "interstitial space" means the space between the two walls of a double-wall tank or double-wall piping or any two adjacent walls of a multi-wall tank or pipe system;

(ah) "inventory" means the amount of petroleum product calculated to be in a storage tank after considering the initial volume of petroleum product in the storage tank and the amount of petroleum product added to and removed from the storage tank during a period of time;

(ai) "leak" means a gradual discharge or loss of petroleum product from a storage tank system, tank vehicle or vessel into the environment, other than through the usual function for which the storage tank system was designed, and "leakage" and "leaking" have corresponding meanings;

(aj) "marina" means premises at which a petroleum product is stored for use in a watercraft or aircraft equipped to float on water;

(ak) "marine bulk petroleum terminal" means a facility, other than a waterborne vessel, where crude oil, natural gas liquids or petroleum products are transferred to or from a waterborne vessel or barge but does not include facilities transferring petroleum products to vessels strictly for use as fuel or lubrication for that vessel;

(al) "Minister" means the Minister of Environment and Climate Change;

(am) "motive fuel" means a petroleum product used to power a vehicle, aircraft or vessel and includes gasoline, diesel oil and aviation fuel;

(an) "motor gasoline" means gasoline intended for use as motor fuel

(ao) "oil/water separator" means a device used to separate petroleum products from mixtures of petroleum products and water;

(ap) "organic halogen compound" means an organic chemical compound in which one or more halogen elements is incorporated;

(aq) "outlet" means a station, shop, establishment or other place or facility where a petroleum product is sold or kept for sale and put into the fuel tank of a vehicle, vessel or aircraft or into a portable container;

(ar) "partially buried tank" means a tank that has part of its volume above grade and part of its volume below grade, unless all of the tank volume is encased within an unfilled secondary containment;

(as) "person responsible" means

(i) a person who is responsible for the day-to-day maintenance and operation of a storage tank system or pipeline,

(ii) the person who has possessory rights to or has care, management or control of a storage tank system, tank vehicle or vessel,

(iii) the owner or occupier of land on which a storage tank system is located,

(iv) a successor, assignee, executor, administrator, receiver, receiver-manager or trustee of a person referred to in subclauses (i) to (iii), or

(v) a person who acts as the principal or agent of a person referred to in subclauses (i) to (iv);

(at) "petroleum monitoring well" means a well installed and used for the primary purpose of detecting and observing leaks from petroleum storage systems

(au) "petroleum product" means a single product or mixture of at least 70% hydrocarbons refined from crude oil, natural gas, tar sands, coal or natural organic matter, with or

without additives, that is used or could be used as a fuel, lubricant or power transmitter, and includes gasoline, diesel oil, aviation fuel, kerosene, naphtha, lubricating oil, fuel oil, engine oil including used oil and hydraulic fluid, but does not include liquified petroleum gas;

(av) "piping" means pipes and tubing, including fittings and valves, that are for the conveying of petroleum products;

(aw) "product transfer area" means the area around the connection point between a delivery truck, railcar, vessel or aircraft and a storage tank system;

(ax) "professional engineer" means a person with a valid and subsisting certificate of registration or license to practice in Nova Scotia under the Engineering Profession Act;

(ay) "release" means to spill, discharge, dispose of, spray, inject, inoculate, abandon, deposit, leak, seep, pour, emit, empty, throw, dump, place, drain, pump or exhaust;

(az) "retailer" means a person who sells or keeps for sale motive fuel or fuel oil directly to a consumer;

(ba) "secondary containment" means containment that prevents liquids that leak from a storage tank system from reaching outside the containment area and includes double-walled tanks, double-walled piping and impermeable barriers;

(bb) "self-service outlet" means an outlet where the dispensing services are operated by a consumer without the assistance of a pump island attendant, but does not include a restricted access outlet;

(bc) "service station" means any premises where a petroleum product is sold and put into the fuel tank of a vehicle, tank vehicle, watercraft or aircraft, or into a portable container;

(bd) "site professional" means site professional as defined in the Contaminated Sites Regulations;

(be) "shop-fabricated storage tank" means a storage tank that has been manufactured at an industrial facility for the construction of storage tanks to a specified standard, bears the mark or label associated with that standard and is transported to the site of installation and use;

(bf) "spill" means a release of a substance

(i) into the environment,

(ii) from or out of a storage tank system, containment system, structure, aircraft, vehicle, tank vehicle, vessel, process tank, pipeline or other container,

(iii) that is abnormal in quantity or quality in light of all the circumstances of the release; or

(iv) in excess of an amount specified in the Environmental Emergency Regulations or an approval;

(bg) "Standard" means the document produced by the Department entitled "Nova Scotia Construction, Installation and Operation Standards for Petroleum Storage Tank Systems", as amended from time to time and available from the Department;

(bh) "storage tank system" means one or more aboveground storage tanks or underground storage tanks and all connecting piping whether aboveground or underground, including pumps and product transfer apparatus, diking, overfill protection equipment and associated spill containment and collection apparatus;

(bi) "tank" means a closed container for the storage of petroleum products with a capacity of more than 230 L that is designed to be installed in a fixed location, including mounting on a tank vehicle;

(bj) "tank vehicle" means a tank truck, stake truck, trailer, semi-trailer, tractor or other conveyance and associated appurtenances designed for or capable of transporting a petroleum product, other than fuel carried for use in the operation of the vehicle;

(bk) "transport" means to convey a petroleum product in or on a tank vehicle or vessel, other than the fuel carried for use in the operation of the vehicle or vessel;

(bl) "underground storage tank" means a storage tank beneath the ground surface or covered or partially covered with material including, but not limited to, earth, backfill, or concrete;

(bm) "underground storage tank system" means a storage tank with 90% or more of its volume beneath the ground surface or covered or partially covered with material including, but not limited to, earth, backfill, or concrete;

(bn) "used oil" means petroleum or synthetic lubrication oils, hydraulic fluids, metal working fluids, and insulating fluids which have been used and are no longer suitable for their original purpose, but are suitable for other uses, including re-refining or other uses that are considered acceptable to the Minister;

(bo) "used oil collector" means a person who holds a valid Used Oil Collector's Approval;

(bp) "used oil storage facility" means a facility that is owned, occupied, operated, leased or used by a used oil collector and is approved by the Department for the storage of used oil and includes all storage tanks, loading and unloading areas, used oil transport vehicle parking areas and all used oil or waste processing and treatment equipment;

(bq) "vessel" means a tank vessel or other conveyance that is designed for or capable of transporting a petroleum product on the water, other than the fuel carried for use in the operation of the vessel;

(br) "volatile organic compound" means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions;

(bs) "wholesaler" means a person who sells or keeps for sale motive fuel or fuel oil but does not include a retailer.

1.5 Technical Standards for Petroleum Storage and Handling Systems

The following list of technical standards is for issues, items and activities that are directly referenced in the Nova Scotia Standards for Design, Construction, Installation and Operation for Petroleum Storage Tank Systems. There are often other standards and codes that are included or referenced within these technical standards that users of these documents shall be required to be familiar with and implement where required. The date of note (ex. API Standard 650-13, where the bold notation refers to the most recent edition or update of the reference) is included to reflect the version in force at the date when this list of technical standards was compiled and is intended for guidance only. These standards are reviewed and updated regularly so any user is advised to always check for the latest version.

American Petroleum Institute (API)

API 570-**16**, "Piping Inspection Code: In-service Inspection, Repair, and Alteration of Piping Systems"

API Standard 650-**13**, "Welded Tanks for Oil Storage"

API Standard 620-**13**, "Design and Construction of Large, Welded, Low-pressure Storage Tanks"

API Standard 653-**14**, "Tank Inspection, Repair, Alteration and Reconstruction"

API Standard 2350, "Overfill Protection for Storage Tanks in Petroleum Facilities"

API Standard 2610-**05**, "Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities"

API Specification 5L-**18**, "Line Pipe"

API RP 651-**14**, "Cathodic Protection of Aboveground Petroleum Storage Tanks"

API RP 652-**14**, "Linings of Aboveground Petroleum Storage Tank Bottoms"

API RP 1604-**96**, "Closure of Underground Petroleum Storage Tanks"

API RP 1632-**96**, "Cathodic Protection of Underground Storage Tanks and Piping Systems"

API RP 2350-**12**, "Overfill Protection for Storage Tanks in Petroleum Facilities"

American Society for Testing Materials (ASTM)

ASTM A53/ A53M-18, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"

Canadian Fuels Association (formerly Canadian Petroleum Products Institute)

CFA-**2012**, "Using the Canadian Fuels Association Colour-Symbol System to Mark Equipment and Vehicles for Product Identification"

CFA-**2017**, "Professional Petroleum Driver's Manual"

CPPI/PACE Report 87-1, "Impressed Current Method of Cathodic Protection of Underground Petroleum Storage Tanks"

CPPI Best Management Practices – **March 2004**, "Stormwater Runoff from Petroleum Facilities"

Canadian General Standards Board (CGSB)

CAN/CGSB-3.2-**2017**, "Heating Fuel Oil"

CAN/CGSB-3.3-**2014**, "Kerosene"

CAN/CGSB-3.5-**2016**, "Automotive Gasoline"

CGSB-3.11-**2017**, "Naval Distillate Fuel"

CAN/CGSB-3.18-**2016**, "Diesel Fuel for Locomotive-Type Medium-Speed Diesel Engines"

CAN/CGSB-3.22-**2017**, "Wide-Cut Type Aviation Turbine Fuel (Grade Jet B)"

CAN/CGSB-3.23-**2018**, "Aviation Turbine Fuel (Grades Jet A and Jet A-1)"

CGSB-3.24-**2018**, "Aviation Turbine Fuel (Military Grades F-34, F-37 and F-44)"

CAN/CGSB-3.27-**2018**, "Naphtha Fuel"

CAN/CGSB-3.511-**2018**, "Oxygenated Automotive Gasoline Containing Ethanol (E1-E10 and E11-E15)"

CAN/CGSB-3.512-**2018**, "Automotive Ethanol Fuel (E50-E85 and E20-E25)"

CAN/CGSB-3.517-**2017**, "Diesel Fuel"

CAN/CGSB-3.520-**2017**, "Diesel Fuel Containing Low Levels of Biodiesel (B1-B5)"

CAN/CGSB-3.522-**2017**, "Diesel Fuel Containing Biodiesel (B6-B20)"

CAN/CGSB-3.524-**2017**, "Biodiesel (B100) for Blending in Middle Distillate Fuels"

CAN/CGSB-3.1000-**2019**, "Vapour Control Systems in Gasoline Distribution Networks"

Canadian Standards Association

CAN/CSA Z245.1-**18**, "Steel Pipe"

CSA Standard B139-**15**, "Installation Code for Oil Burning Equipment"

CSA Standard B346-M1980 – R**2018**, "Power-Operated Dispensing Devices for Flammable Liquids"

CSA Standard B836-**14**, "Storage, Handling and Dispensing of Aviation Fuels at Aerodromes"

CAN/CSA-B837-**14**, "Collapsible Fabric Storage Tanks (Bladders)"

NACE International

NACE RP0193-**2001**, "External Cathodic Protection of On-Grade Metallic Storage Tank Bottoms"

NACE SP0169-**2013**, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems"

NACE SP0285-**2011**, "External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection"

NACE TM0101-**2012**, "Measurement Techniques Related to Criteria for Cathodic Protection on Underground Storage Tank Systems"

NACE No. 10/SSPC-PA 6, "Fibreglass-Reinforced Plastic (FRP) Linings Applied to Bottoms of Carbon Steel Aboveground Storage Tanks"

Steel Tank Institute

STI SP001-**2018**, "Standard for the Inspection of Aboveground Storage Tanks"

STI R011-**2006**, "Recommended Practice for Anchoring of Steel Underground Storage Tanks"

STI R891-**2006**, "Recommended Practice for Hold Down Strap Isolation"

STI R893-**2006**, "Recommended Practice for External Corrosion Protection of Shop Fabricated Aboveground Tank Floors"

Underwriters Laboratories of Canada (ULC)

CAN/ULC-S601-**2014**, "Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids"

CAN/ULC-S602-**2014**, "Standard for Aboveground Steel Tanks for Fuel Oil and Lubricating Oil"

CAN/ULC-S603-**2014**, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids"

CAN/ULC-S603.1-**2017**, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids"

CAN/ULC-S612-**2016**, "Standard for Hose and Hose Assemblies for Flammable and Combustible Liquids"

ULC-1316-**2018**, "Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids"

ULC-S618-**2008**, "Standard for Anodes and Reference Electrodes for Cathodic Protection of Steel Underground Tanks"

CAN/ULC-S620-**2007**, "Standard for Hose Nozzle Valves for Flammable and Combustible Liquids"

CAN/ULC-S633-**2017**, "Standard for Flexible Connector Piping for Fuels"

CAN/ULC-S634-**2016**, "Standard for Hose Swivel Connectors for Flammable and Combustible Liquids"

CAN/ULC-S642-**2016**, "Standard for Compounds and Tapes for Threaded Pipe Joints"

CAN/ULC-S644-**2016**, "Standard for Emergency Breakaway Fittings for Flammable and Combustible Liquids"

CAN/ULC-S651-**2016**, "Standard for Emergency Valves for Flammable and Combustible Liquids"

CAN/ULC-S652-**2016**, "Standard for Tank Assemblies for Collection, Storage and Removal of Used Oil"

CAN/ULC-S653-**2016**, "Standard for Aboveground Horizontal Steel Contained Tank Assemblies for Flammable and Combustible Liquids"

CAN/ULC S655-**2015**, "Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids"

CAN/ULC-S656-**2014**, "Standard for Oil-Water Separators"

CAN/ULC-S660-**2008**, "Standard for Non-metallic Underground Piping for Flammable and Combustible Liquids"

CAN/ULC-S661-**2010**, "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks"

CAN/ULC-S663-**2011**, "Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks"

CAN/ULC-S664-**2017**, "Standard for Containment Sumps, Sump Fittings and Accessories for Flammable and Combustible Liquids"

CAN/ULC-S667-**2011**, "Standard for Metallic Underground Piping for Flammable and Combustible Liquids"

CAN/ULC-S668-**2012**, "Standard for Liners Used for Secondary Containment of Aboveground Flammable and Combustible Liquid Tanks"

CAN/ULC-S669-**2014**, "Standard for Internal Retrofit Systems for Underground Tanks for Flammable and Combustible Liquids"

CAN/ULC-S675.1-**2014**, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids"

CAN/ULC-S675.2-**2014**, "Standard for Non-Volumetric Precision Leak Detection Devices for Underground and Aboveground Storage Tanks and Piping for Flammable and Combustible Liquids."

CAN/ULC-S676-**2015**, "Standard for the Refurbishing of Underground and Aboveground Tanks for Flammable and Combustible Liquids"

CAN/ULC-S677-**2014**, "Standard for Fire Tested Aboveground Tank Assemblies for Flammable and Combustible Liquids"

ULC/ORD-C58.4-**2005**, "Double Containment Fibre Reinforced Plastic Linings for Flammable liquid and Combustible Liquid Storage Tanks"

ULC -ORD - C142.**1995**, "Standard for Concrete Encased Aboveground Tank Assemblies for Flammable and Combustible Liquids"

ULC-ORD-C142.15-**2014**, "Precast Concrete Tanks"

ULC -ORD-C142.20-**1995**, "Aboveground Secondary Containment Tanks"

ULC -ORD-C536-**1998**, "Flexible Metallic Hose"

US Environmental Protection Agency (EPA)

EPA/530/UST-90/004, "Standard Test Procedures for Evaluating Leak Detection Methods: Volumetric Tank Tightness Testing Methods"

EPA/530/UST-90/005, "Standard Test Procedures for Evaluating Leak Detection Methods: Non-volumetric Tank Tightness Testing Methods"

EPA/530/UST-90/006, "Standard Test Procedures for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems"

EPA/530/UST-90/007, "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods (SIR)"

EPA 510-B-95-009, "Introduction to Statistical Inventory Reconciliation for Underground Storage Tanks"

Part 2

Design and Construction of Aboveground Storage Tank Systems

2.1 Scope

2.1.1 This part applies to all new, relocated or upgraded aboveground storage tank systems.

2.1.2 A storage tank installed in a concrete vault located below grade with the interior of the vault not filled with backfill material shall be considered to be an aboveground storage tank.

2.2 General Requirements

2.2.1 An aboveground storage tank system shall be designed, constructed and installed in accordance with this Standard, the appropriate equipment design standard and the manufacturer's instructions.

2.2.2 Tank vehicles and rail cars shall only be used for the transportation of petroleum products and are not approved as aboveground storage tanks.

2.2.3 Aboveground storage tanks consisting of more than one compartment shall only be used for different classes of petroleum products where:

(a) each compartment is separated by a double bulkhead; and

(b) the space between bulkheads is continuously monitored for leaks.

2.2.4 (1) An aboveground storage tank shall not be installed:

(a) less than 15.2 m from a drilled water well;

(b) less than 30 m from a dug water well; and

(c) except at marinas, less than 30 m from a watercourse.

2.3 Field-Erected Storage Tank Systems

2.3.1(1) A field-erected aboveground storage tank shall be designed and constructed in conformance with the latest edition of the following, as applicable:

(a) for atmospheric pressure tanks, API Standard 650, "Welded Steel Tanks for Oil Storage"; or

(b) for low pressure tanks, API Standard 620, "Design and Construction of Large, Welded, Low-pressure Storage Tanks".

2.3.1(2) A field-erected storage tank system shall:

(a) have corrosion protection in conformance with Section 2.7;

(b) have a secondary containment system in conformance with Section 2.8;

(c) have leak detection in conformance with Part 5;

(d) have containment sumps, as applicable;

(e) be provided with overfill protection:

(i) in the form of a visual and audible alarm system for detecting a high level that will activate and alert personnel in enough time to terminate the flow of petroleum product to the storage tank and prevent an overflow. This shall not exceed two minutes of the maximum transfer rate into the storage tank; or

(ii) in conformance with API RP 2350, "Overfill Protection for Storage Tanks in Petroleum Facilities"; and

(f) have piping in conformance with Part 4.

2.4 Shop-Fabricated Storage Tank Systems

2.4.1(1) A shop-fabricated aboveground storage tank shall be designed and constructed in conformance with the latest edition of, as applicable:

(a) CAN/ULC-S601, "Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids";

(b) CAN/ULC-S602, "Standard for Aboveground Steel Tanks for Fuel Oil and Lubricating Oil";

(c) ULC-S653, "Standard for Aboveground Steel Contained Tank Assemblies for Flammable and Combustible Liquids";

(d) CAN/ULC-S677, "Standard for Fire Tested Aboveground Tank Assemblies for Flammable and Combustible Liquids";

(e) CAN/ULC-S652, "Standard for Tank Assemblies for Collection, Storage and Removal of Used Oil";

(f) CAN/CSA-B837, "Collapsible Fabric Storage Tanks (Bladders)".

2.4.1(2) An aboveground storage tank for used oil shall be designed and constructed in conformance with CAN/ULC-S652, "Standard for Tank Assemblies for the Collection, Storage and Removal of Used Oil "

2.4.1(3) A shop-fabricated aboveground storage tank system shall:

(a) have corrosion protection in conformance with Section 2.7;

(b) have a secondary containment system in conformance with Section 2.8;

(c) have leak detection in conformance with Part 5;

(d) have containment sumps, as applicable;

(e) except as specified in clause (4) of subsection 2.4.1, be provided with overfill protection:

(i) compatible with the intended method of filling;

(ii) designed and constructed in conformance with CAN/ULC-S661, "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks" which will:

(a) prevent the filling of the tank beyond 95% of the tank's capacity; or

(b) activate an audible and visual alarm at a product level of 90% of the tank's capacity, with the alarms located where personnel are constantly on duty during product transfer operations to the tank and can promptly stop or divert transfers to the tank; and

(f) have piping in conformance with Part 4.

2.4.1(4) A shop-fabricated storage tank system having a capacity of less than 5000 L may be provided with overfill protection in the form of visual monitoring and gauging of the level in the storage tank system by personnel in constant attendance when product is being transferred into the tank and who are located such that they are able to promptly stop or divert transfers to the tank.

2.4.2(1) A horizontal shop-fabricated storage tank shall be supported above grade level by a cradle that is:

(a) fire-proof;

(b) non-degradable due to exposure to weather elements;

(c) compatible with the material being stored;

(d) designed and constructed to support the storage tank system when filled with petroleum product;

(e) constructed to allow water to drain away from the tank and its supports;

(f) if the cradle is not permanently attached to the tank assembly, separated from the tank and the support by a rubber or other non-degradable gasket designed to prevent corrosion at the contact point; and

(g) if the tank is at a fixed location for more than 30 days, supported by a concrete base or equivalent that is designed and constructed to support the weight of the storage tank system when filled with petroleum product.

2.4.3 Where there is a dispenser, leak detection for the dispenser and related components shall be in conformance with Part 5.

2.5 Associated Equipment Design Standards

2.5.1 An overfill protection device shall be designed and constructed in conformance with CAN/ULC-S661, "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks".

2.5.2 A containment sump shall be designed and constructed in conformance with CAN/ULC-S664, "Standard for Containment Sumps, Sump Fittings and Accessories for Flammable and Combustible Liquids".

2.5.3 A liner shall be designed and constructed in conformance with CAN/ULC-S668, "Standard for Liners Used for Secondary Containment of Aboveground Flammable and Combustible Liquid Tanks".

2.6 Repair, Alteration, Reconstruction and Relocation

2.6.1(1) The repair, alteration, reconstruction or relocation of an aboveground storage tank system shall be done in accordance with the technical requirements of, as applicable:

(a) API Standard 653, "Tank Inspection, Repair, Alteration and Reconstruction"; or

(b) CAN/ULC-S676, "Standard for the Refurbishing of Underground and Aboveground Tanks for Flammable and Combustible Liquids"; or

(c) STI SP001, "Standard for the Inspection of Aboveground Storage Tanks".

2.7 Corrosion Protection of Aboveground Steel Storage Tank Systems

2.7.1(1) Where cathodic protection is used, it shall be designed by a corrosion expert and shall be in conformance with, as applicable:

(a) API Standard 653, "Tank Inspection, Repair, Alteration and Reconstruction";

(b) API RP 651, "Cathodic Protection of Aboveground Petroleum Storage Tanks";

(c) NACE RP0193, "External Cathodic Protection of On-Grade Metallic Storage Tank Bottoms"; or

(d) STI R893, "Recommended Practice for External Corrosion Protection of Shop Fabricated Aboveground Tank Floors".

2.7.2(1) Atmospheric corrosion of an aboveground storage tank system shall be controlled by:

(a) a protective coating designed for this service, compatible with the petroleum products being handled and applied in conformance with the manufacturer's instructions;

(b) the use of a non-corroding material in the construction of the system and components; or

(c) a corrosion control program in accordance with API Standard 653, "Tank Inspection, Repair, Alteration and Reconstruction".

2.8 Secondary Containment

2.8.1(1) A secondary containment system for an aboveground storage tank shall:

(a) for a single storage tank, have a volumetric capacity of not less than 110% of the capacity of the tank; or

(b) for a system consisting of more than one storage tank, have a volumetric capacity of not less than:

(i) the capacity of the largest storage tank in the contained space; and

(ii) 10% of the greater of:

(a) the capacity of the largest storage tank in the contained space; or

(b) the aggregate capacity of all other storage tanks located in the contained space.

2.8.1(2) A secondary containment system for a shop-fabricated storage tank shall be designed and constructed in conformance with:

(a) CAN/ULC-S653, "Aboveground Steel Contained Tank Assemblies for Flammable and Combustible Liquids";

(b) CAN/ULC -S655, "Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids";

(c) ULC - ORD - C 142.5, "Standard for Concrete Encased Aboveground Tank Assemblies for Flammable and Combustible Liquids"; or

(d) CAN/ULC-S669, "Standard for Double Containment Fibre Reinforced Plastic Linings for Flammable liquid and Combustible Liquid Storage Tanks";

2.8.1(3) A secondary containment system for a field-erected aboveground storage tank shall be:

(a) a single-wall and single-bottom storage tank placed entirely within a diked area, with an impermeable barrier in the floor of the containment area, including under the tank and in the dike walls;

(b) a single-wall, double-bottom storage tank placed entirely within a diked area, with an impermeable barrier in the floor of the containment area and in the dike walls, sealed to the perimeter of the storage tank or pad when the liner is not installed under the tank;

(c) a double-wall storage tank for a storage tank with a capacity of 50 000 L or less; or

(d) a double-wall storage tank placed entirely within a diked area, with an impermeable barrier in the floor of the containment area and in the dike walls, for a storage tank with a capacity of more than 50 000 L.

2.8.2(1) Except as provided in clause (2) of subsection 2.8.2, a secondary containment impermeable barrier shall be:

(a) designed and constructed in conformance with:

(i) CAN/ULC-S668, "Standard for Liners Used for Secondary Containment of Aboveground Flammable and Combustible Liquid Tanks"; or

(ii) ULC - ORD-C142.20, "Aboveground Secondary Containment Tanks"; and

(b) installed so that:

(i) the liner is sealed to the perimeter of the storage tank or pad when the liner is not installed under the tank;

(ii) the liner extends to the top of the dike wall;

(iii) the liner is covered with a non-combustible material of such nature and thickness that it will not fail when the secondary containment is exposed to fire; and

(iv) liners that are intended to be exposed in service are listed for aboveground (exposed) use.

2.8.2(2) A secondary containment impermeable barrier that does not conform to Section 2.8.2(1) shall:

(a) use material compatible with the product being stored; and

(b) be designed, constructed, and maintained to ensure a maximum hydraulic conductivity of 1×10^{-6} cm/s for a minimum period of 72 hours in order to withstand the full hydrostatic head of petroleum product within the dike.

2.8.3(1) Liner penetrations shall be located at the high point or in a raised part of the dike floor.

2.8.3(2) All liner penetrations shall be sealed to prevent any loss of containment.

2.8.4(1) Monitoring of the interstitial space of the secondary containment system shall be provided in conformance with Part 5 of this Standard.

2.8.4(2) Monitoring of the double-bottom space in any tank so equipped shall be in conformance with Part 5 of this Standard.

2.8.5(1) A secondary containment area shall not be used for storage purposes.

2.8.5(2) Liquids, debris and precipitation shall not accumulate in secondary containment. Provision sections for removal of liquids from secondary containment shall be provided in accordance with section 2.9 of this Standard.

2.8.5(3) Dikes shall be inspected on a regular basis to ensure that no surface water or petroleum product is accumulating inside.

2.8.5(4) Accumulated surface water shall not be allowed to build up such that the capacity of the dike is reduced below that required in clause (1) of subsection 2.7.1.

2.8.5(5) Dike walls and floors shall be maintained to prevent the growth or accumulation of plants or other natural organic debris. This prevents loss of capacity in the dike as well as the potential of plant roots to pierce or otherwise compromise containment barriers.

2.9 Spill Containment and Runoff Collection

2.9.1 Spills, overfills, and storm water from product transfer areas shall be contained, treated and disposed of in conformance with the applicable provincial or municipal regulations, approvals, guidelines or policies.

2.9.2 Containment area floors within dikes shall slope away from the tank base towards a sump at a slope greater than 1%.

2.9.3(1) Where a dike is provided with valves that allow the removal of accumulated surface water or spilled petroleum product, they shall be closed and locked when not engaged in a supervised draining operation and the valve positions shall be clearly marked whether opened or closed.

2.9.3(2) Control of drainage shall be accessible under emergency conditions from outside the dike.

2.9.3(3) When draining water from dike areas, the drains shall be attended, only manually activated and controlled in a manner that prevents petroleum products from entering watercourses, groundwater, public sewers or public drains.

2.9.4(1) An oil-water separator used to treat storm water runoff, overfills, or a spill from the product transfer area shall be sized for a minimum hydraulic flow rate of a ten year return, one hour storm event, with the one hour rainfall intensity data obtained for the nearest weather station, and to capture a spill of petroleum product at a volume equal to the amount of petroleum product transferred in two minutes at the highest pumping rate within the area used to drain to the oil-water separator and:

(a) be designed and constructed in conformance with ULC-S656, “Standard for Oil-Water Separators”; or

(b) conform to the following:

(i) be designed based on an input concentration of 2000 mg/L to produce a discharge of water that does not contain more than 15 mg/L of free oil and grease as measured by the partition-gravimetric method;

(ii) be designed for an insoluble-in-water oil with a specific gravity of 0.875 ±0.025; and

(iii) be designed based on the hydraulic retention time required to separate oil with a particle droplet size of 60 microns from storm water.

2.10 Identification

2.10.1 Aboveground storage tanks shall be permanently marked to identify the product they contain, on at least two sides, in a size to ensure clear legibility from at least 4.5 m from the tank wall or from outside the dike, whichever distance is greater.

2.10.2 Marking required by subsection 2.10.1 shall be

(a) of a colour specified in Canadian Fuels Association "Using the Canadian Fuels Association Colour-Symbol System to Mark Equipment and Vehicles for Product Identification" on a contrasting background; and

(b) be maintained to be clearly legible at all times.

2.11 Impact Protection

2.11.1 Aboveground storage tanks that are exposed to vehicular traffic shall be protected from impact.

2.11.2 For tanks exposed to common road vehicles, acceptable means of impact protection include:

(a) Concrete -filled bollards, consisting of a minimum of 15 cm concrete-filled schedule 80 steel pipe, buried a minimum of 100 cm below grade and extending a minimum of 75 cm above grade, placed a maximum of 140 cm center to center apart and a minimum of one metre from the tank; or

(b) Jersey barriers, consisting of a concrete structure having a minimum mass of 900 kg, 60 cm wide at base, 80 cm in height and 15 cm wide at top and anchored with #6 rebar at a minimum of 60 cm in length, placed a maximum of 125 cm between barriers and one metre from the tank; or

(c) Steel guardrails, of the steel deep, W- beam type, with a minimum dimension of 30 x 405 cm, supported by a minimum of 15 cm pressure-treated wooden posts buried a minimum of 90 cm below grade and located not more than 190 cm center to center apart and the bottom of the rail shall be 45 cm above grade; or

(d) A substantial and permanent type, designed, constructed and installed according to specifications from, and plans bearing the signature of, a professional engineer.

2.11.3 For tanks exposed to heavy construction or logging off-road vehicles, specific impact protection shall be designed, constructed and installed according to specifications from, and plans bearing the signature of, a professional engineer.

Part 3

Design and Installation of Underground Storage Tank Systems

3.1 Scope

3.1.1 This Part applies to the design and installation of a new, relocated or upgraded underground petroleum storage tank systems for Class A sites. The location and installation requirements for all underground petroleum tank systems are deemed as Class A sites where all soil, water and ecological receptors require full protection by use of a minimum of secondary containment for all equipment conveying or storing petroleum products.

3.2 General Requirements

3.2.1 An underground storage tank, components, and accessories, for which there is a recognized equipment design standard, shall be approved only for the uses indicated by the appropriate design standard.

3.2.2 An underground storage tank system shall be designed, constructed and installed in accordance with these Standards, the appropriate equipment design standard and the manufacturer's instructions.

3.2.3 An underground storage tank shall not be installed:

(a) inside or under any building;

(b) less than 1 m from a building;

(c) less than 1.5 m from a property line;

(d) less than 60 cm from an adjacent underground storage tank;

(e) less than 15.2 m from a drilled water well;

(f) less than 30 m from a dug water well or watercourse; and

(g) where the loads carried by a building foundation or supports could be transmitted to the tank.

3.2.4(1) Except as specified in clause (2) of subsection 3.2.4, an underground storage tank system shall be designed and installed to have:

(a) double-wall tank(s) with monitorable interstitial space;

(b) an overfill protection device;

(c) a fill pipe spill containment device;

(d) containment sumps, as applicable;

(e) leak detection in conformance with Part 5;

(f) except for venting purposes, liquid and vapour-tight connections, caps and adapters; and

(g) corrosion protection, as applicable.

3.2.4(2) An underground storage tank system for storing used oil shall be designed and installed to have:

(a) double-wall tank(s) with monitorable interstitial space;

(b) corrosion protection;

(c) 50 mm Schedule 40 suction pipe, for product removal, that can be removed or serviced for the purpose of clearing a blockage;

(d) product removal or transfer connections located within a spill containment device;

(e) an overfill protection device where the storage tank is filled by pump or remote manual fill;

(f) where the fill port is outside, it shall be fitted with a spill containment device having a capacity of at least 25 L and the spill containment device shall be fitted with:

(i) a rain cover; and

(ii) a screen to prevent nuts, bolts, rags, and other such objects from entering the storage tank;

(g) intake venting with an open area at least twice the open area of the suction pipe to avoid vacuum collapse from high rate of product removal; and

(h) leak detection in conformance with Part 5.

3.2.5 An underground storage tank shall be located and maintained to permit the eventual removal of the storage tanks when the storage tank system is taken out-of-service.

3.2.6 Fibre-reinforced plastic tanks manufactured prior to December 31, 1978 shall not be used for the handling of petroleum products containing ethanol or methanol.

3.2.7 Underground storage tanks consisting of more than one compartment may be used for different classes of petroleum product where:

(a) each compartment is separated by double bulkheads; and

(b) the space between the bulkheads is continuously monitored for leaks. In the case of discovery of a leak, the tank shall not be used until it has been repaired.

3.3 Equipment Design Standards

3.3.1(1) An underground storage tank shall be designed, built, and installed in conformance with the following, latest edition:

(**a**) CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids";

(b) CAN/ULC-S615, "Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids";

(c) CAN/ULC-S661, "Standard for Underground Jacketed Steel Tanks";

(d) CAN/ULC-S652, "Standard for Tank Assemblies for Collection, Storage and Removal of Used Oil"; or

(e) CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids".

3.3.2 An overfill protection device shall be designed, built, and installed in conformance with CAN/ULC-S661, "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks".

3.3.3 A spill containment device shall be designed, built, and installed in conformance with CAN/ULC-S664, "Standard for Containment Sumps, Sump Fittings and Accessories for Flammable and Combustible Liquids".

3.3.4(1) A dispenser sump shall be designed, built, and installed in conformance with CAN/ULC-S664, "Standard for Containment Sumps, Sump Fittings and Accessories for Flammable and Combustible Liquids".

3.3.4(2) An under-dispenser sump shall be leak-tight and equipped with a liquid sensor that will signal the attendant at a facility and shut down the dispenser when any petroleum product or high level of liquid is present in the sump.

3.3.4(3) Water shall be removed from all sumps to within 50 mm of the bottom of the sump.

3.3.5 If used, a liner shall be designed, built, and installed in conformance with ULC-ORD-C58.9, "Secondary Containment Liners for Underground and Aboveground Tanks".

3.3.6(1) Subject to Part 5, a leak detection device shall be designed, built, and installed in conformance with one of the following:

(a) CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids"; or

(b) CAN/ULC-S675.2, "Standard for Non-Volumetric Precision Leak Detection Devices for Underground and Aboveground Storage Tanks and Piping for Flammable and Combustible Liquids.".

3.3.6(2) Subject to Part 5, a leak detection method shall be in conformance with EPA/530/UST-90/007, "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods".

3.3.7(1) A storage tank designed to contain petroleum products may be constructed of materials other than steel when necessitated by the properties of the liquid stored and if approved for use with that liquid.

3.3.7(2) A storage tank shall:

(a) be designed, built, and installed in conformance with:

(i) CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids";

(ii) CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids"; or

(iii) ULC-ORD-C58.10, "Jacketed Steel Underground Tanks for Flammable and Combustible Liquids ".

(b) be constructed of materials compatible with the liquid to be stored; and

(c) have corrosion protection in conformance with section 3.5.

3.3.8(1) Secondary containment for underground storage tanks shall be designed, built, and installed in conformance with:

(a) for a double-wall steel storage tank, CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids";

(b) for a double-wall fibreglass-reinforced plastic storage tank, ULC-S615, "Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids "; or

(c) for a jacketed-steel storage tank, ULC-ORD-C58.10 " Jacketed Steel Underground Tanks for Flammable and Combustible Liquids ".

3.4 Installation

3.4.1(1) Where a tank is added to an existing underground storage tank farm, adequate precautions shall be taken to ensure that no damage is caused to existing tanks and that the stability of the surrounding backfill material is maintained.

3.4.1(2) Where addition of a new tank to an existing underground storage tank farm is reasonably suspected of causing harm to the support or structure of existing tanks, piping or backfill, repairs shall be made to all affected existing storage tank systems before using the tank systems for handling petroleum products.

3.4.2 Petroleum products shall not be placed in an underground storage tank until:

(a) a fill pipe and vent line have been installed in the tank; and

(b) all other openings have been sealed or piping systems have been installed in accordance with their operational requirements.

3.5 Corrosion Protection of Underground Steel Storage Tank Systems

3.5.1(1) A steel underground storage tank system shall be provided with corrosion protection in conformance with:

(a) CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids";

(b) a storage tank built in conformance with CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids" and coated in conformance with CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids" shall be provided with a cathodic protection system designed by a corrosion expert to conform with:

(i) CPPI/PACE Report 87-1, "Impressed Current Method of Cathodic Protection of Underground Petroleum Storage Tanks"; or

(ii) NACE SP0285, "External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection";

(c) a storage tank with the entire primary tank surface encased in the interstice of a non-corrodible jacket built in conformance with ULC-ORD-C58.10, "Jacketed Steel Underground Tanks for Flammable and Combustible Liquids"; or

(d) a storage tank with the entire primary tank surface encased in a non-corrodible jacket built in conformance with CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids".

3.5.2(1) Except for a storage tank jacketed in conformance with ULC-ORD-C58.10- "Jacketed Steel Underground Tanks for Flammable and Combustible Liquids" or installed in a vault with backfill, the cathodic protection system on all new installations of steel underground storage tank systems shall be tested for electrical isolation and system effectiveness after final backfilling in order to allow any corrective measures to be completed before final grading and placement of asphalt or concrete covers, as applicable.

3.5.2(2) A cathodic protection system shall meet the requirements of section 6.6.

3.5.2(3)

(a) When a cathodic protection system does not satisfy the requirements as specified in Section 6.6, the owner shall take corrective action in accordance with the recommendations of a corrosion expert. Such corrective actions shall be completed within 60 days.

(b) Where the corrosion protection system cannot be restored to proper working order within 60 days, the storage tank system shall no longer be used for petroleum products until a fully compliant corrosion protection system can be restored and confirmed by testing by a corrosion expert.

3.5.2(4) The owner of an underground storage tank system shall, upon completion of the installation, ensure that the cathodic protection system meets the requirements as specified in Section 6.6 and record the measured voltage potential(s) and whether or not cathodic protection has been achieved.

3.5.3(1) A new steel storage tank added to an existing system that already has an impressed current cathodic protection system shall:

(a) be in conformance with CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids"; and

(b) be electrically bonded into the impressed current cathodic protection system.

3.5.3(2) When a new storage tank built in conformance with CAN/ULC-S603.1, "External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids" is installed near an existing underground storage tank with cathodic protection, precautions shall be taken to ensure both the new and existing tanks are adequately protected.

3.5.4(1) Impressed current cathodic protection shall be interlocked in such a manner that if the cathodic-protection system is turned off or bypassed either:

(a) power to the pump will be shut off; or

(b) audible and visual alarms will be turned on.

3.5.4(2) Pump shutoffs or audible and visual alarms shall not be silenced, blocked or bypassed while the pumps can still be used.

3.5.5 Impressed current cathodic-protection systems shall be equipped with a running time or a downtime totalizer. This shall record the total length of time, over a two-year period, that the impressed current corrosion protection system was turned off or bypassed.

3.5.6(1) Cathodically protected storage tanks shall be installed with:

(a) test wires brought to the surface and fastened at an accessible location; or

(b) a permanent reference electrode and approved monitoring station, including test wires for each tank.

Part 4

Design and Installation of Piping Systems

4.1 Scope

4.1.1 This Part applies to the design and installation of piping associated with a storage tank system.

4.2 General Requirements

4.2.1(1) Materials for piping systems shall be suitable for the maximum anticipated working pressures and operating temperatures and for the chemical properties of the petroleum products it is used with.

4.2.1(2) Piping materials shall, as applicable, be designed, built, and approved in conformance with the following:

(a) ASTM A53/A53M, "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless";

(b) CAN/CSA Z245.1, "Steel Pipe";

(c) CAN/ULC-S667, "Standard for Metallic Underground Piping for Flammable and Combustible Liquids";

(d) CAN/ULC-S633, "Standard for Flexible Underground Hose Connectors for Flammable and Combustible Liquids";

(e) CAN/ULC-S660, "Standard for Non-metallic Underground Piping for Flammable and Combustible Liquids";

(f) API 5L, "Line Pipe"; or

(g) ULC -ORD-C536, "Flexible Metallic Hose".

4.2.2 Except as provided in this Part, the design and installation of piping connected to an oil-burning appliance and equipment that comes within the scope of CSA Standard B139, "Installation Code for Oil Burning Equipment", shall be in conformance with that Code.

4.2.3 Piping material shall be installed and maintained in accordance with an approved design standard, code, or in a manner described in this Standard.

4.2.4 Single-wall piping shall not have buried or concealed mechanical joints.

4.2.5 All pressure systems where the entire piping is run underground shall have Electronic Line Leak Detection (ELLD) that will stop or restrict flow or activate an alarm when a release is detected. Leak detection testing and monitoring of piping shall be in conformance with Part 5.

4.2.7 A thermal relief valve shall discharge into the low-pressure side of the piping.

4.2.8(1) Piping located below the maximum product level in a tank shall be provided with a means to prevent the release of liquid from the tank by syphon flow.

4.2.8(2) Except as provided in clause (3) of subsection 4.2.8, a manual shut-off valve shall be lockable or have a method of locking.

4.2.8(3) A manual shut-off valve on the piping connecting a storage tank and a heating appliance or a stationary combustion engine does not need to be lockable or have a method of locking.

4.2.9 All aboveground piping shall be protected from external corrosion. Where signs of surface corrosion are evident, maintenance shall be performed to restore corrosion protection.

4.3 Product Transfer

4.3.1(1) Subject to clause (2) of subsection 4.3.1, petroleum product shall not be transferred from a storage tank except by means of pumping.

4.3.1(2)

(a) Where multiple aboveground storage tanks are located in a common dike, tank balancing may be done by gravity transfer; and

(b) underground storage tanks may be balanced through a siphon line located at the tops of the tanks.

4.3.1(3)

(a) All piping shall have a method of pressure relief to prevent the piping from experiencing pressures beyond the design operating pressure.

(b) Product shall not be transferred to or from a storage tank by any method that will change the internal pressure of the tank.

4.3.1(4) Product shall not be transferred from an aboveground storage tank through bottom outlets that are below the liquid level unless the tank is located in a dike.

4.3.2 The fill pipe on a storage tank with a capacity of 5000 L or more shall be equipped for the attachment of a liquid and vapour-tight connection at the time of filling and shall be sealed with a liquid- and vapour-tight cap when not in use.

4.3.3 The suction tube of a used oil tank shall be equipped for the attachment of a liquid-tight fitting and shall be sealed with a liquid-tight cap when not in use.

4.3.4(1) Connections to piping through which tank vehicles, rail cars or pipelines discharge product by means of pumps into aboveground storage tanks shall be

(a) Provided with check valves for automatic protection against backflow; and

(b) Designed, installed and maintained to prevent leakage and spillage.

4.3.5(1)

(a) All fill pipes located below ground shall be equipped with a spill container designed, constructed and installed in conformance with CAN/ULC-S661 "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks".

(b) Unless the spill container is a double-walled system with interstitial monitoring, the spill container shall be tested for leaks at least every three years. A record of the testing and results shall be maintained by the tank owner or operator for a period of at least seven years.

(c) Where the spill container is determined to be leaking, it shall be replaced immediately.

4.4 Design Standards for Underground Piping Systems

4.4.1 Underground piping up to and including 75 mm in diameter shall have secondary containment in accordance with "clause(1) of subsection 4.4.4.

4.4.2(1) Underground piping larger than 75 mm in diameter shall be designed, installed and maintained to meet the requirements of:

(a) secondary containment in conformance with clause (1) of subsection 4.4.4;

(b) leak detection in conformance with Part 5; or

(c) API RP 1632, "Cathodic Protection of Underground Storage Tank and Piping Systems" and API Standard 2610, "Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities".

4.4.3 Non-metallic piping may be used for underground installations provided the piping and fittings are designed, built, and installed in conformance with the requirements of CAN/ULC-S660, "Standard for Non-metallic Underground Piping for Flammable and Combustible Liquids".

4.4.4(1) Secondary containment for underground piping shall:

(a) be designed, built, and installed in conformance with CAN/ULC-S660, "Standard for Non-metallic Underground Piping for Flammable and Combustible Liquids"; or

(b) be double-wall steel piping provided with a cathodic protection system designed by a corrosion expert.

4.4.4(2) Secondary containment systems for piping shall be designed and installed such that leaks:

(a) accumulate in a containment sump that is readily available for visual inspection; or

(b) are detected by a monitoring system.

4.4.5 Underground piping connected to an aboveground storage tank shall terminate in a monitored underground transition sump that is accessible from grade level.

4.5 Vent Piping

4.5.1.1 Double-wall containment and leak detection is not required for vent lines when the tank is equipped with an overfill protection device.

4.5.1.2 Vent piping shall not extend into the tank more than 2.5 cm beyond the depth of the tank fitting.

4.5.1.3 Every tank and every compartment shall be individually vented.

4.5.1.4 Vent piping shall have a slope back to the tank without traps that can collect liquids.

4.5.1.5 Vent pipes, except for emergency vents on aboveground tanks, shall terminate in open air and shall be equipped with a weatherproof hood.

4.5.1.6 Where the vent of a tank is obstructed,

(a) product shall not be withdrawn from the tank; and

(b) the tank shall not be used until corrective action has been taken to remove the obstruction.

4.5.2.1 Every aboveground tank shall be vented in accordance with the standard to which it has been certified.

4.5.2.2 Emergency vents for aboveground tanks shall be equipped with a cover that prevents escape of vapour from the tank during normal operating conditions.

4.6 Installation

4.6.1 Piping shall be installed by or under the direction of an individual that is certified under the Petroleum Management Regulations.

4.6.2 Piping shall be located and maintained to permit the eventual removal of the piping when the storage tank system is permanently withdrawn from service.

4.6.3 Steel piping located aboveground shall not be laid directly on the ground in order to reduce corrosion and facilitate inspection.

4.6.4(1) Piping shall be located in a manner that will prevent allowable operating design stress, including thermal expansion or contraction, from being exceeded.

4.6.4(2) Supports for aboveground piping shall be designed and maintained to be unaffected by weather or temperature or corrosion and shall be non-combustible.

4.6.4(3) Supports for piping shall be designed and maintained to prevent sagging of the piping.

4.6.5(1) Piping located aboveground shall be protected from physical damage due to impact.

4.6.5(2) Piping located aboveground shall not be used for providing support for climbing or pedestrian traffic. Stairs or walkways located near piping shall not rest on piping or adversely affect or have the potential to adversely affect the piping supports.

4.7 Identification

4.7.1 Piping shall be marked with the contents of the line and these markings shall be maintained in a clear and legible form.

4.7.2 Piping shall not be painted red.

4.7.3 Transfer points and valves in piping systems shall be identified in conformance with Canadian Fuels Association, “Using the Canadian Fuels Colour-Symbol System to Mark Equipment and Vehicles for Product Identification”. Identification shall be maintained to be clearly legible at all times.

Part 5

Monitoring and Leak Detection of Storage Tank Systems

5.1 Scope

5.1.1 This Part applies to monitoring and leak detection for a storage tank system.

5.2 General Requirements

5.2.1(1) A storage tank system shall be tested for leaks in conformance with sections 5.2 and 5.3:

(a) at the time of final installation:

(i) for an underground storage tank system, final installation shall be when final surface materials have been installed and prior to being put into service; or

(ii) for an aboveground storage tank system, final installation shall be before the storage tank system is put into service; and

(b) whenever a leak is suspected in the primary or secondary containment of the storage tanks, piping, containment sumps or related components.

5.2.2 A line-leak detector shall be designed, built, and installed in conformance with CAN/ULC-S675.2, "Standard for Non-Volumetric Precision Leak Detection Devices for Underground and Aboveground Storage Tanks and Piping for Flammable and Combustible Liquids"

5.2.3 Manual or electronic dip or inventory reconciliation shall be in conformance with section 6.3.

5.2.4(1) Statistical inventory reconciliation shall be in conformance with:

(a) EPA/530/UST-90/007, "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods"; and

(b) EPA 510-B-95-009, "Statistical Inventory Reconciliation."

5.2.5 An automatic tank gauge system with a precision leak detection capability shall be designed, built, and installed in conformance with CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids".

5.2.6 A continuous in-tank leak detection system shall conform to good engineering practice and shall meet the requirements of a precision leak detection test.

5.2.7(1) Electronic or computerized secondary containment monitoring shall continuously monitor the interstitial space and include the use of an automatic device designed, built, and approved in conformance with:

(a) CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids", or

(b) CAN/ULC-S675.2, "Standard for Nonvolumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids".

5.2.8 Visual leak detection procedures shall be performed in conformance with clause (3) of subsection 6.4.1.

5.2.9(1) A pressure liquid media leak detection test shall be in conformance with the requirements of a precision leak detection test and:

(a) the test device shall be third-party performance certified; and

(b) testing technicians shall be trained in the care and use of the test device and method.

5.2.10(1) A static liquid media leak detection test shall be in conformance with the following requirements:

(a) leak rate shall not exceed 0.38 L/h;

(b) the duration of the test shall be a minimum of one hour;

(c) there shall be no visual evidence of a leak; and

(d) the test fluid shall exceed the elevation of piping and electrical conduit openings installed in sumps at the time of the leak detection test.

5.2.11(1) A high-pressure inert gas or vacuum leak detection test for piping shall be in conformance with the following procedures, as applicable:

(a) a high-pressure decline test using an inert gas or a vacuum test may be used as a leak detection test for piping systems that are in use and that have a volume of less than 1000 L;

(b) whenever permitted by the equipment design and installation, product contained in the piping system shall be drained prior to conducting the high-pressure inert gas or vacuum test procedure;

(c) pumps, dispensers or other auxiliary equipment connected to the piping that cannot be subjected to the pressure of the test shall be isolated from the test procedures to prevent equipment damage;

(d) a test pressure or vacuum shall, as applicable:

(i) be more than 350 kPa (gauge) or 1.5 times the maximum operating pressure, whichever is greater;

(ii) not exceed 700 kPa (gauge), except when the piping system is designed for such pressures; and

(iii) not exceed the equipment manufacturer's design limitations.

(e) stabilization is required after pressurization or vacuum is achieved;

(f) a piping system with a volume of less than or equal to 500 L shall have the pressure or vacuum maintained for a period of at least 60 minutes after stabilization;

(g) a piping system with a volume of greater than 500 L but less than or equal to 1000 L shall have the test pressure or vacuum maintained for a period of at least two hours after stabilization;

(h) a piping system with a volume greater than 1000 L shall be tested using a pressure of at least 1.5 times normal operating pressure and maintained for four or more hours after stabilization; and

(i) a piping system shall be considered to be leaking when pressure variations that occur after stabilization and within the test time period are greater than 2% of the test pressure or vacuum.

5.2.12(1) A low-pressure inert gas or vacuum leak detection test for piping shall be conducted in conformance with the following procedures, as applicable:

(a) a low-pressure decline test using an inert gas or a vacuum test may be used to conduct a leak detection test on the secondary containment of double-wall tanks and double-wall pipe;

(b) product contained in the secondary containment system shall be drained prior to conducting the low-pressure decline or vacuum test procedure;

(c) a test pressure or vacuum shall, as applicable:

(i) be between 20 kPa and 35 kPa; and

(ii) not exceed the equipment manufacturer's design limitations;

(d) stabilization is required after pressurization or vacuum is achieved;

(e) secondary containment shall have the test pressure or vacuum maintained for a period of at least two hours after stabilization; and

(f) a piping system shall be considered to be leaking when pressure variations that occur after stabilization and within the test time period are greater than 2% of the test pressure or vacuum.

5.2.13(1) A precision leak detection test shall be in conformance with:

(a) CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids"; or

(b) CAN/ULC-S675.2, "Standard for Nonvolumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids"

5.3 Leak Detection Interlocks and Alarms

5.3.1(1) Subject to clause (2) of subsection 5.3.1, an automatic leak detection device, including a high-technology secondary containment monitoring device and precision line leak detection device, shall be electrically interlocked in such a manner that:

(a) when the automatic leak detection device is activated, product flow shall be shut off; and

(b) except for on-site maintenance activities, when the automatic leak detection device is turned off or bypassed for more than one minute, product flow shall be terminated.

5.3.1(2) When an electrical interlock as specified in clause (1) of subsection 5.3.1 is not possible, the Department shall be notified whenever the leak detection device or method indicates a leak.

5.3.2 A suction pump shall be equipped with a single check valve installed directly below the suction pump and piping shall slope so the contents of the pipe will drain back to the storage tank if the suction is broken.

5.3.3 A leak detection alarm shall be located where the staff routinely work and, in a place, where such alarms can be readily heard and seen.

5.4 Petroleum Monitoring Wells

5.4.1 Petroleum monitoring wells shall only be used for leak detection for underground single walled tank and piping systems. Double walled tanks and piping with interstitial monitoring are

considered to have inherent leak monitoring so installation of petroleum monitoring wells would be redundant.

5.4.2 When more than one petroleum monitoring well is necessary to monitor an installation effectively, the petroleum monitoring wells shall be numbered so that all monitoring and testing results can be easily correlated to a specific monitoring location.

5.4.3 A petroleum monitoring well shall be equipped with a liquid-proof cap.

5.4.4 A petroleum monitoring well shall be distinguished from a fill pipe and marked in conformance with Canadian Fuels Association, "Using the Canadian Fuels Association Colour-Symbol System to Mark Equipment and Vehicles for Product Identification"

5.4.5 A petroleum monitoring well shall be secured to prevent unauthorized access and tampering.

5.4.6 A petroleum monitoring well located in a traffic area shall be cut off at ground level and/or properly protected from vehicles.

5.4.7 A petroleum monitoring well installed within the interstitial space shall not penetrate the liner.

5.4.8 A damaged petroleum monitoring well shall be repaired or replaced within 30 days after discovery of the damage.

5.4.9 A petroleum monitoring well shall be checked for liquid product and/or vapours at least monthly.

5.5 Groundwater Monitoring Wells

5.5.1(1) When a vertical groundwater petroleum monitoring well is to be used, a professional geoscientist or professional engineer shall:

(a) assess the site and establish the number and positioning of the petroleum monitoring wells so that product releases from any portion of the storage tank system that routinely contains a petroleum product will be detected; and

(b) ensure compliance with the requirements of this section.

5.5.2 The product stored in a storage tank shall be immiscible in water and shall have a specific gravity of less than one.

5.5.3 The hydraulic conductivity of the soil between a storage tank system and the petroleum monitoring wells shall not be less than 0.01 cm/s.

5.5.4 The petroleum monitoring wells shall intercept the excavation zone of an underground storage tank or be as close as technically possible.

5.5.5 A petroleum monitoring well shall be a minimum of 50 mm in diameter.

5.5.6 Subject to clause (1) of subsection 5.5.11, if a petroleum monitoring well is to be used as a recovery well, the screened zone shall extend at least 1.5 m into the water table and at least 1.5 m above the groundwater surface, as determined at the time of installation.

5.5.7 Subject to clause (1) of subsection 5.5.11, the screened portion of a petroleum monitoring well shall be a minimum of 3.0 m in length and shall be factory slotted with a slot size of 0.25 mm.

5.5.8 The area around the screened portion of a petroleum monitoring well shall be surrounded by a filter pack.

5.5.9 Subject to clause (1) of subsection 5.5.11, the filter pack shall extend to 0.5 m above the top of the screened portion of petroleum monitoring wells.

5.5.10 Subject to clause (1) of subsection 5.5.11, the outside of a petroleum monitoring well shall be sealed from the ground surface to the top of the filter pack using bentonite, grout, or other material with equivalent performance.

5.5.11(1) Where the static groundwater level is less than 2.5 m from the ground surface, a professional geoscientist or professional engineer shall determine the length and position of:

(a) the screened portion of a well;

(b) the filter pack; and

(c) the bentonite, grout, or other material with equivalent performance seal.

5.5.12 A petroleum monitoring well shall be installed with a cap or plug at the bottom of the screened section of the well.

5.5.13 A petroleum monitoring well shall be constructed of flush joint, threaded, or bell and spigot Schedule 40 PVC or equivalent.

5.5.14 A continuous monitoring device or a manual method shall detect a minimum of 3 mm of free product on the surface of groundwater in the petroleum monitoring well.

5.6 Vapour Monitoring Wells

5.6.1(1) Where vapour monitoring is to be used, a professional geoscientist or professional engineer shall:

(a) assess the site and establish the number and positioning of the monitoring wells so that product releases from any portion of the storage tank system that routinely contains a petroleum product will be detected; and

(b) ensure compliance with the requirements of this Section.

5.6.2 The product stored or tracer compound placed in the storage tank system shall be sufficiently volatile to result in a vapour level that is detectable by the monitoring devices.

5.6.3 The measurement of vapours by the monitoring device shall not be rendered inoperative by the groundwater, rainfall, soil moisture, or other known interferences so that a leak could go undetected for more than 30 days.

5.6.4 The level of background contamination shall not interfere with the method used to detect leaks from the storage tank system.

5.6.5 A vapour monitor shall have its performance validated by a third-party testing organization in conformance with CAN/ULC-S675.2, "Standard for Nonvolumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids"

5.6.6(1) A vapour monitor shall be designed and installed to detect any significant increase in concentration above the background level of:

(a) the petroleum product stored;

(b) a component or components of the petroleum product; or

(c) a tracer compound placed in the storage tank system.

5.7 Leak Detection Monitoring Frequency and Method

5.7.1 The reference letters in Table 1 represent the leak detection and monitoring methods specified in Tables 2 through 8.

5.7.2(1) Tables 2 through 8 specify the frequencies and methods of leak detection and monitoring that shall be used upon installation and, as applicable:

(a) for in-service monitoring;

(b) for periodic leak detection testing; or

(c) if a leak is suspected.

Table 1 - Leak Detection and Monitoring Methods [1]

ATG	Automatic tank gauge with monthly precision leak detection test
CITLD	Continuous in-tank leak detection system with monthly leak detection test (results are limited to an evaluation of the storage tank only)
CITLDS	Continuous in-tank leak detection system with monthly leak detection test (results provide an evaluation of the storage tank and piping system)
ELLD	Electronic line leak detection device
HPVLDT	High-pressure inert gas or vacuum leak detection test
HTSCM	High-technology secondary containment monitoring
IR	Manual dip and inventory reconciliation; electronic dip and electronic inventory reconciliation; or electronic dip and manual inventory reconciliation in conformance with section 6.3
LPVLDT	Low-pressure inert gas or vacuum leak detection test
MLLD	Mechanical line leak detection device
CMW	Checking petroleum monitoring well (vapour or groundwater) (monthly)
PLDT	Precision leak detection test of a storage tank
PLMLDT	Pressure liquid media leak detection test
SIR	Statistical inventory reconciliation (monthly reporting)
SLMLDT	Static liquid media leak detection test
SVCV	Single, vertical check valve
VLD	Visual leak detection (weekly)

[1] See Section 5.2 for definition and performance requirements of the prescribed methods.

Table 2 - New Underground Storage Tanks

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Double-wall tanks	*PLDT*	*SIR; VLD; ATG; HTSCM; CITLDS; or CITLD*	*Not required*	*PLDT*

Table 3 - Aboveground Storage Tanks

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Double-wall tanks	*VLD*	*HTSCM; or VLD*	*Not required*	*VLD[(1)] ; PLDT; or LPVLDT[(1)]*
API Standard 650 (within approved secondary containment)	*API 650 standard*	*IR and VLD; or HTSCM*	*API 653*	*PLDT; or API Standard 653*
API Standard 650 (within non-approved secondary containment)		*IR and VLD*	*API Standard 653; or PLDT (annually)*	*PLDT; or API Standard 653*
Single wall vertical tanks (within approved secondary containment)	*VLD*	*IR and VLD; or HTSCM*	*API Standard 653*	*PLDT; or API Standard 653*
Single-wall vertical tanks (within non-approved secondary containment)		*IR and VLD*	*API Standard 653; or PLDT (annually)*	*PLDT; or API Standard 653*
Horizontal tanks	*VLD*	*IR and VLD*	*Not required*	*VLD[(2)] ; or PLDT*

(1) on the interstice only
(2) where entire system including piping is visible

Table 4 - Underground Piping

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Single-wall (greater than 75mm)	*PLMLDT; or HPVLDT*	*CMW*	*PLMLDT; or HPVLDT (every year)*	*PLMLDT; or HPVLDT*
		CITLDS; or ELLD	*Not required*	
Double-wall	*PLMLDT; or HPVLDT and LPVLDT*	*ELLD; Sensor; CITLDS; or SVCV*[1]	*Not required*	*PLMLDT; or HPVLDT*

[1] Suction style system only

Table 5 - Aboveground Piping

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
All types	*PLMLDT; or HPVLDT*	*VLD*	*Not required*	*PLMLDT; or HPVLDT*

Table 6 - Turbine, Transition and Dispenser Sumps

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Dispenser Sumps	*SLMLDT*	*HTSCM; or VLD*	*Not required*	*SLMLDT*
Turbine and transition sumps	*SLMLDT*		*VLD (annually)*[1]	*SLMLDT*

[1] In conformance with clause (4)(g) of subsection 6.5.1

Table 7 - Existing Single-Wall Underground Storage Tanks

Type	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Steel without CP[1]	*IR; and CMW or SIR*	*PLDT (annually)*	*PLDT*
Steel with CP[1]*; or FRP*[2]*;*	*IR*	*PLDT (every 2 years)*	
	IR; and CMW or SIR	*PLDT (every 5 years)*	
	ATG; or CITLDS	*Not required*	
	CMW and SIR	*Not required*	

[1] CP - Cathodic protection
[2] FRP - Fibreglass-reinforced-plastic

Table 8 - Existing Single-Wall Underground Piping

Type	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Steel without CP[1]	*IR; and CMW or SIR*	*PLMDT; or HPVLDT (annually)*	*PLMDT; or HPVLDT*
Steel with CP[1], plastic, or FRP[2]	*IR; and CMW or SIR*	*PLMDT; or HPVLDT (every 2 years)*	
	CITLD; or CMW and SIR	*Not required*	
	SVCV[3]; or ELLD[4]	*Not required*	

[1] CP - Cathodic protection
[2] FRP - Fibreglass reinforced plastic
[3] Suction style system only
[4] Pressure Piping

Part 6

Operation and Maintenance

6.1 Scope

6.1.1 This Part applies to the operation and maintenance of a storage tank system.

6.2 Inventory Control

6.2.1(1) Except as provided in clause (2) of subsection 6.2.1, the owner of a storage tank system shall ensure that inventory control and reconciliation is conducted in conformance with this Section.

6.2.1(2) Subject to clause (1) of subsection 6.2.2, inventory control and reconciliation is not required where:

(a) a storage tank system has been temporarily withdrawn from service and the tanks have been emptied; or

(b) for a storage tank system with all exterior surfaces are visible for inspection and all components designed to contain liquids are secondarily contained and have an interstitial space monitored:

(i) manually on any day the storage system is available for use; or

(ii) continuously using electronic sensing that provides a visual or auditory indication of the integrity of the interstice being compromised.

6.2.2(1) The owner of a petroleum product storage tank shall ensure that:

(a) the product level is measured and reconciled in conformance with clause (2) of subsection 6.2.2:

(i) each day that product is added or removed from an underground storage tank; or

(ii) at least weekly where product is added to or removed from an aboveground storage tank system; and

(b) the water level shall be measured and included in all reconciliation computations in conformance with Clause (a).

6.2.2(2) Storage tank inventory control measurements shall be reconciled by comparing product and water level measurements with dispenser meter readings, shipments, deliveries and internal transfers.

6.2.2(3) The computation of any gain or loss of product shall be recorded and included with a monthly summary of cumulative losses or gains of product.

6.2.3 Inventory control and reconciliation records shall be kept in a manner and format as prescribed by the Department

6.2.4(1) For an underground storage tank, the owner or operator of the system shall immediately notify the Department in the manner prescribed in Section 69 of the Environment Act or in the Environmental Emergency Regulations, in the event of:

(a) any unexplained loss in excess of the greater of 0.5% of the throughput in one month from the tank system, as indicated by the recording and reconciliation of inventory records over a month recording period done in conformance with subsection 6.2.2;

(b) inventory reconciliation showing five or more consecutive days of unexplained product losses;

(c) inventory reconciliation showing 18 or more days of unexplained losses in one calendar month; or

(d) the level of water at the bottom of the tank exceeds 50 mm.

6.2.4(2) For an aboveground storage tank, the owner or operator of the system shall immediately notify the Department in the manner prescribed in Section 69 of the Environment Act or in the Environmental Emergency Regulations, in the event of:

(a) any unexplained loss in excess of 1% of the throughput in one month from the storage tank system as indicated by the recording and reconciliation of inventory records done in conformance with subsection 6.2.2; or

(b) inventory reconciliation showing four or more consecutive weeks of unexplained petroleum product losses or gains in excess of 1.0% of the inventory for each week.

6.3 Dispensers

6.3.1 Any dispenser unit, not including transfer pumps for moving petroleum products between storage tanks, for an aboveground or underground storage tank system shall:

(a) be securely fastened, and an approved shear valve installed beneath the dispensing equipment;

(b) be constructed on a base made of material compatible with the product being dispensed and including a catchment area for containing any leaked product;

(c) have a dispensing nozzle conforming to CAN/ULC-S620, "Standard for Hose Nozzle Valves for Flammable and Combustible Liquids";

(d) have a hose conforming to CAN/ULC-S612, "Standard for Hose and Hose Assemblies for Flammable and Combustible Liquids";

(e) have an electrically operated hose reel where the dispenser hose exceeds 6 m in length and, except for a marina installation, shall not exceed 10 m;

(f) have a breakaway coupling on the hose between the nozzle and dispenser conforming to ULC-S644, "Standard for Emergency Breakaway Fittings for Flammable and Combustible Liquids";

(g) have an automatic shut off valve located between the tank and dispenser;

(h) be equipped with devices to shut off power in case of emergency. A remote shut off device shall be located in a central office which is readily accessible to an attendant or, for a cardlock/ keylock installation, an authorized user; and

(i) be located on a dispenser island unless the dispenser is an integrated part of an aboveground tank system.

6.3.2 A dispenser island shall be constructed of concrete and be at least 100 mm high.

6.3.3 A concrete apron shall be installed around all dispenser islands. The apron shall be a minimum of 0.5 m beyond the length of the hose at single dispenser locations. At multiple dispenser locations, the above shall apply perpendicular to the island with a width 0.5 m beyond the length of the island at each end.

6.3.4(1) All openings in dispenser islands shall be equipped with a containment sump designed, built and installed in conformance with CAN/ULC-S664, "Standard for Containment Sumps, Sump Fittings and Accessories for Flammable and Combustible Liquids".

6.3.4(2) All under-dispenser sumps shall be equipped with a liquid sensor that will sound an alarm or signal the attendant and shut down the dispenser when any petroleum product or high level of liquid is present in the sump.

6.3.4(3) Water shall be removed from all sumps to within 50 mm of the bottom of the sump.

6.3.5(1) Gasoline shall not be dispensed at a rate in excess of 38 L/min.

6.3.5(2) Dispensing equipment at a restricted access/cardlock/ keylock outlet shall be installed to stop automatically after dispensing 200 L of motor gasoline or after dispensing 1000 L of other motive fuel.

6.3.5(3) Nozzles used on high-speed pumps shall be truck nozzles equipped with a device to prevent the nozzle from falling out of the fill neck of the vehicle.

6.3.5(4) A nozzle used for dispensing diesel shall have a spout diameter of at least 24 mm.

6.4 Inspection and Maintenance of Storage Tank Systems

6.4.1(1) Routine in-service inspections shall be conducted in conformance with section 6.4.

6.4.1(2) Basic visual inspection of a storage tank facility to ensure that there has been no leakage or equipment failure shall be conducted:

(a) on each day that the storage tank system is in operation; or

(b) at a frequency approved by an Administrator or an inspector or as specified in an Approval.

6.4.1(3) Comprehensive visual inspection of a storage tank facility to ensure that there has not been a leak or equipment failure shall be conducted weekly and documented for:

(a) foundations, tank walls, roof, and tank attachments;

(b) dike capacity, condition of the dike wall and floor, and water removal systems;

(c) pumps and product- handling equipment;

(d) tank gauging equipment;

(e) mechanical and automatic electronic leak detection equipment;

(f) dispenser sumps and spill containment devices; and

(g) overfill protection devices.

6.4.1(4) Inspection and performance testing in conformance with the manufacturer's requirements and procedures to ensure satisfactory equipment performance and operation of a storage tank facility shall be conducted annually and documented for:

(a) automatic tank gauges and monitoring systems;

(b) electronic or computerized sensors;

(c) electronic or mechanical leak detection equipment;

(d) corrosion protection equipment;

(e) pressurized piping emergency valves;

(f) emergency shut-down devices;

(g) containment sumps including dispenser, turbine and transition containment devices; and

(h) overfill protection devices.

6.4.1(5) A storage tank not in service at the time of the inspection shall be noted on the inspection report stating:

(a) date taken out-of-service; and

(b) whether the tanks:

(i) will be out-of-service for less than 12 months; or

(ii) will be out-of-service for a period 12 months.

6.4.2 (1) An aboveground storage tank system installed in conformance with CAN/ULC-S601 "Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids", ULC-S630 "Standard for Shop Fabricated Steel Aboveground Vertical Tanks for Flammable and Combustible Liquids" (now withdrawn with content added to ULC-S601) or API Standard 650, "Welded Steel Tanks for Oil Storage" shall be inspected in conformance with API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction".

6.4.2(2) These aboveground tanks shall be given an external inspection at intervals not exceeding five years in accordance with API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction".

6.4.2(3) These aboveground tanks shall have an internal inspection in accordance with API Standard 653, beginning when the tank is 15 years old unless otherwise specified in regulation or in an Approval, which shall be the earlier of:

(a) within ten years of the most recent internal inspection; or

(b) at the date specified by API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction".

6.4.2(4) Records of these inspections shall be retained for a minimum of the two most recent inspection periods.

6.4.3 Aboveground piping without secondary containment shall

(a) have continuous external aboveground pipe leak monitoring for that piping; or

(b) implement a corrosion analysis program for that piping that is developed and conducted by a corrosion expert and shall include at least an annual inspection.

6.4.4(1) Metallic piping inspection shall follow the requirements of API Standard 570, "Piping Inspection Code: In-service Inspection, Repair, and Alteration of Piping Systems", including determination of piping service class unless otherwise specified in regulation or in an Approval.

6.4.4(2) Records of piping inspection shall be maintained for a minimum of the two previous inspection periods.

6.4.5 Any deficiencies in a storage tank system, including piping, identified as a result of the inspections specified in this Section shall be documented and corrected to be in conformance with this Standard by an individual certified under the Petroleum Management Regulations.

6.5 Product Transfer Operations

6.5.1(1) A person responsible for transferring petroleum product to or from a storage tank system shall take all reasonable steps to prevent spills.

6.5.1(2) A tank shall not be filled beyond 95% of capacity to allow for thermal expansion except where the nature of the hydrocarbon product requires a larger volume of empty space for expansion, mixing or processing.

6.5.2(1) Subject to clause (3) of subsection 6.5.2, when a tank vehicle is being loaded or unloaded, the vehicle operator shall remain:

(a) in constant view of the fill pipe; and

(b) in constant attendance at the delivery control valve.

6.5.2(2) Subject to clause (3) of subsection 6.5.2, when a vessel is being fueled, a vessel operator or, for an attended outlet, an attendant shall remain

(a) in constant view of the fill pipe or nozzle; and

(b) in a position to immediately halt the delivery of fuel.

6.5.2(3) Where the physical dimensions of a bulk transfer facility at a bulk plant, marina or marine bulk petroleum terminal are such that line-of-sight between fuel transfer point and tanks cannot be maintained, personnel must be in attendance and control at both ends of the operation at all times when petroleum products are being transferred. These operational personnel shall be in constant communication using electronic devices such as radios or cellphones approved for service in hydrocarbon handling areas.

6.5.3(1) Transfer of petroleum product into and out of a storage tank system shall be in conformance with procedures outlined in:

(a) API Standard 2610, "Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities"; and

(b) Canadian Fuels Association CFA-2013, "Professional Petroleum Driver's Manual".

6.5.3(2) Product transfer from aboveground storage tanks shall not be allowed using bottom outlets below the liquid level unless the tank is located within a dike.

6.5.3(3) Where multiple aboveground tanks are located within a common dike, tank balancing may be done by gravity transfer.

6.5.3(4) Underground storage tanks may be balanced through a siphon line located at the tops of the tanks.

6.5.3(5) Product shall not be transferred to or from a storage tank by any method that will change the internal pressure of the tank.

6.5.3(6) Standard procedures for normal operation, as well as for emergencies, shall be given to an operator and posted in printed form for convenient reference. An employee involved with the transfer of petroleum product shall be trained in the correct operating procedures for all equipment and shut-down devices.

6.5.4 The owner of a storage tank system shall ensure that filler ports, petroleum monitoring wells, and vapour recovery connections are colour coded in conformance with Canadian Fuels Association, "Using the Canadian Fuels Association Colour-Symbol System to Mark Equipment and Vehicles for Product Identification".

6.5.5 A used oil storage tank shall be fitted with a suction tube and liquid- and vapour- tight coupling and shall not have suction hoses dropped or inserted into the used oil storage tank during the product removal process.

6.5.6 No person shall transfer used oil from a storage tank unless a connection is made to the coupling at the end of the storage tank suction tube.

6.5.7(1) Except for fuel oil tanks connected to a heating appliance, no person shall transfer petroleum product to an aboveground storage tank with a capacity of 5000 L or more unless a liquid- and vapour-tight fill connection is made to the storage tank.

6.5.7(2) No person shall transfer petroleum product to an underground storage tank unless a liquid- and vapour-tight fill connection is made to the underground storage tank.

6.5.8 No person shall cause a petroleum product to be transferred into a storage tank unless the product being transferred is compatible with the internal surface of the storage tank and associated piping and equipment.

6.6 Cathodic Protection Monitoring

6.6.1(1) Maintenance checks on the operation of a cathodic protection system shall be conducted in conformance with:

(a) CAN/ULC-S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids" for sacrificial anode systems;

(b) NACE SP0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems";

(c) NACE SP0285, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection";

(d) NACE RP0193, "External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms";

(e) NACE TM0101, "Measurement Techniques Related to Criteria for Cathodic Protection on Underground Storage Tank Systems"; or

(f) API RP 651, "Cathodic Protection of Aboveground Petroleum Storage Tanks".

6.6.1(2) Cathodic protection measurements for a storage tank system shall be conducted by a person with NACE CP Level 1 (CP tester minimum certification).

6.6.1(3) Maintenance checks on a sacrificial anode system shall be conducted

(a) immediately after installation,

(b) six months after installation, and

(c) every two years thereafter.

6.6.1(4) Maintenance checks on an impressed current system shall be conducted

(a) before energizing the system,

(b) immediately after energizing the system,

(c) one month after installation, and

(d) once yearly thereafter.

6.7 Oil-water Separators

6.7.1 An oil-water separator intended to collect and separate free oil from water shall be designed and installed in conformance with clause (1) of subsection 2.9.4.

6.7.2 The oil-water separator shall be vented to prevent the accumulation of petroleum vapours in the system.

6.7.3 The operation, maintenance and inspection of an oil-water separator shall be in conformance with the requirements of the manufacturer's instructions or as prescribed in this Standard.

6.7.4(1) Subject to clause (2) of subsection 6.7.4, the depth of the free oil layer and separated solids accumulation in an oil-water separator shall be checked and recorded monthly.

6.7.4(2) If a monthly inspection is not possible, an oil-water separator shall be electronically monitored.

6.7.4(3) The depth of the free oil layer and separated solids accumulation in an oil-water separator shall be measured as close to the baffle as possible.

6.7.4(4) An oil-water separator shall have the free oil layer removed:

(a) continuously by an automatic skimmer; or

(b) at a maximum depth of 50 mm.

6.7.4(5) After a spill or leak, the depth of the free oil layer and separated solids accumulation in an oil-water separator shall be checked and recorded.

6.7.5 No person shall discharge tank bottom water or petroleum products, solvents, glycol, detergents, or sludge from outside the storage tank system directly to an oil-water separator.

6.7.6 The amount of solids entering an oil-water separator shall be minimized.

6.7.7(1) An oil-water separator shall have the separated solids removed:

(a) at a maximum depth of 150 mm; or

(b) at the maximum depth allowed by an automatic removal device.

6.7.8(1) Free oil and separated solids from an oil-water separator shall be disposed of at a facility approved for these materials by the appropriate authority having jurisdiction.

6.7.8(2) Water from an oil-water separator shall be disposed of:

(a) in a municipal sewer system, if in accordance with any applicable municipal bylaw;

(b) in a separate holding tank, for collection and disposal at an approved facility;

(c) to free drainage where site conditions permit, and the discharge will have no adverse effects on the environment or on neighbouring properties. No discharge to a neighbouring property shall be permitted without the written consent of the owner of the affected property.

6.7.8(3) Effluent from an oil-water separator shall not be discharged into a dry well.

6.8 Transfer of Ownership

6.8.1 The new owner of a storage tank system shall notify an Administrator in writing 90 days prior to the transfer of ownership and provide the information specified by an Administrator.

6.8.2 When the ownership of a storage tank system is transferred, all as-built drawings and records, or copies thereof required by this Standard shall be transferred to the new owner of the storage tank system.

6.8.3 The owner of real property on which underground storage tanks are located shall inform the purchaser of the real property, in writing, of the existence of any underground storage tanks on the real property before the sale is closed.

6.9 Leak and Spill Response

6.9.1 The owner of each registered storage tank system shall prepare and maintain a contingency plan for spills.

6.9.2(1) The owner or operator of a storage tank system shall immediately notify the Department and provide the information requested when the owner or operator discovers, suspects, or is notified by any person of:

(a) any leak, spill or overfill that is 100 L or more; or

(b) any spill or overfill that could threaten fresh water supplies, groundwater, or the health and safety of the public.

6.9.3(1) The owner of a storage tank system where a leak or spill is known or suspected shall take such all practicable actions to verify, stop, clean up, and mitigate the impact of the leak or spill, including but not limited to:

(a) following their contingency plan for spills;

(b) isolating leaking components of the storage tank system;

(c) arranging for immediate removal of the petroleum product from the isolated leaking components of the storage tank system;

(d) inspecting the storage tank or piping and:

(i) arranging for a leak test in conformance with this Standard; or

(ii) removing the suspected leaking storage tank or piping;

(e) obtaining the services of a Site Professional to determine if notification of contamination is required in accordance with the Contaminated Sites Regulations; and

(f) ensuring contamination is addressed in accordance with the Contaminated Sites Regulations.

6.10 Precision Leak Detection Test

6.10.1 In addition to the requirements of Part 5, the owner of a storage tank system shall conduct a precision leak detection test when directed by an Administrator or inspector.

6.10.2(1) A precision leak detection test shall be conducted by an individual that has been trained in the proper care and use of the test equipment and its operating procedures.

6.10.2(2) When a precision leak detection test has been required, a precision leak test report shall be forwarded by the owner to the Department within ten days of the test unless otherwise directed by an inspector or an Administrator.

6.10.2(3) A precision leak detection test report shall contain as a minimum:

(a) storage tank and piping identification number and product type;

(b) owner's name and mailing address;

(c) facility address;

(d) test date;

(e) test results;

(f) test methods;

(g) test technician certification number provided by the test equipment manufacturer to verify satisfactory completion of applicable training and certification requirements; and

(h) name and address of testing company or technician.

6.10.4 Where a precision leak detection test or inspection indicates a leak, the individual performing the test shall immediately notify the owner or operator of the storage tank system and the Department.

6.11 Records

6.11.1(1) The owner of a storage tank system shall maintain records for at least seven years of all:

(a) inventory control and reconciliation as required by section 6.2;

(b) inspections and maintenance as required by section 6.4;

(c) cathodic protection monitoring as required by section 6.6;

(d) precision leak detection tests as required by section 6.10;

(e) maintenance and repairs;

(f) monitoring well results;

(g) construction, alterations, or upgrades;

(h) as-built drawings; and

(i) excavation or nearby construction that could affect the integrity of the storage tank system.

6.11.1(2) Subject to clause (3) of subsection 6.11.1 the owner of a storage tank system shall maintain records required by this Standard on-site.

6.11.1(3) Where computerized records are stored off-site, they shall be made available within 48 hours of a request from an inspector.

6.11.2(1) The owner of an oil-water separator shall maintain records of:

(a) the free oil layer in the separator;

(b) the separated solids level, measured at a point where the maximum buildup can be expected;

(c) the date and quantity of oil removed;

(d) the date and quantity of separated solids removed;

(e) the name of the contractor; and

(f) all inspections and maintenance.

6.12 Tank Bottom Water

6.12.1(1) Tank bottom water shall:

(a) not be drained onto the ground or into an oil-water separator; and

(b) be segregated from rainwater and disposed of at a facility approved for that purpose by the appropriate authority having jurisdiction.

6.13 Transfer of Oil-contaminated Water

6.13.1 Centrifugal-type pumps shall not be used to transfer oil-contaminated water from dikes or sumps to an oil-water separator.

6.14 Corrosion Under Insulation

6.14.1(1) Any evidence of corrosion under insulation on insulated piping shall require testing of all insulated piping of similar age and service at a facility.

6.14.1(2) Any corrosion under insulation that has or is likely to cause a release to the environment from affected piping shall be repaired or the piping shall be replaced.

6.15 Marinas

6.15.1 An aboveground storage tank at a marina shall be installed so that it is above and protected from any ice or debris damage that may result from a one in one hundred year flood, but in no case shall be less than 5 m measured horizontally above the ordinary high-water mark or, in tidal areas, above the highest high-water mark, and all tanks that may be subjected to flooding shall be anchored to prevent dislodgement.

6.15.2 An underground storage tank at a marina shall be installed so that it is no less than 5 m

measured horizontally above the ordinary high-water mark or, in tidal areas, above the highest high-water mark.

6.15.3 Where a storage tank at a marina is at an elevation above the dispenser, the storage tank shall be equipped at the piping outlet with an electrically-operated solenoid valve that is normally closed and is designed to be only open when the dispenser is being operated to prevent siphoning in the case of a rupture of the supply line to the dispenser. In locations where electricity is not available, an anti-syphon valve must be installed.

6.15.4(1) A dispenser at a marina shall meet the following requirements:

(a) No dispenser installed on a shore, dock, wharf or pier at or below the ordinary high-water mark or, in tidal areas, the highest high-water mark, shall be connected to a storage tank at a time when the dock, wharf or pier may be subject to flooding or ice or debris damage.

(b) At any time when a dispenser is disconnected from a storage tank, the lines connecting the storage tank to the dispenser shall be securely capped, locked and protected from physical damage.

(c) Where a dispenser is located on a floating structure, a flexible hose system designed by a professional engineer and suitable for the products being handled, shall be installed between the piping on shore and the piping on the floating structure to accommodate changes in water level.

6.15.4(2) The dispenser unit shall be protected from accidental damage from watercraft or motor vehicles.

6.15.4(3) The dispenser unit shall be securely mounted onshore or on the dock, pier or wharf. For seasonal installations, during the off-season either:

(a) the dispensing unit shall be removed from the shore, dock, pier or wharf and the lines drained and capped; or

(b) the entire system, including the petroleum storage tanks, shall be drained of all petroleum products; and

(c) if petroleum products remain onsite, the petroleum storage tank systems including piping and dispensers shall be checked monthly to ensure fill pipe caps and dispensers are locked, no loss of product or infiltration of water has occurred, and systems have not been damaged by weather or other hazards.

6.15.5(1) Where piping is located on or above the surface of a pier or wharf, the line shall be protected from impact and damage. The piping or hoses shall be supported to prevent any stress on connections.

6.15.5(2) Piping shall be located so that it is not possible to use the piping as a cleat or tie-up point for watercraft.

6.15.6 The maximum hose length at a marina shall not exceed 33 m and shall meet the following requirements:

(a) the hose shall be kept out of the water;

(b) a breakaway fitting shall be installed at the nozzle;

(c) a retraction mechanism or hose storage system shall be installed;

(d) the hose shall be visually inspected daily when the marina is in use;

(e) an emergency stop shall be installed within 20 m of the point of fueling; and

(f) the hose shall be retracted or stored when not in immediate use and the nozzle shall be returned to the storage position.

6.15.7(1) A person shall be in attendance at the fueling transfer point at all times when petroleum products are being transferred and shall be capable of immediately stopping transfers.

6.15.7(2) Where manual filling is taking place, the dispenser nozzle shall be the automatic shut-off type without a hold-open device.

6.15.7(3) Where remote bulk transfer of petroleum products is taking place, a person shall be in attendance at the control point of transfer from the shore-based facility and a person shall be in attendance at the vessel at all times during the transfer and shall be capable of immediately stopping transfer. Bulk transfers should also account for the volume of petroleum in the piping or hoses that must be cleared after the transfer is complete.

6.15.7(4) All storage tank systems and components at marine bulk fueling that may be exposed to “shock pressure” or “hydraulic hammer” during petroleum product transfer operations shall be designed, installed and maintained to accommodate this stress.

6.15.8 Piping or hose connections between dispensing facilities and the vessel being filled shall incorporate sufficient flexibility to be able to transfer petroleum products without spillage caused by vessel movement or water action.

6.15.9(1) After installation or repair, prior to each marina season and at a minimum annually, the dispensing hose shall be examined for continuity and integrity from the dispenser to the nozzle with the hose fully extended.

6.15.9(2) Piping or hoses used for transfer of petroleum products shall be successfully tested for a hydrostatic pressure of one and one-half times its maximum design pressure at least annually and shall bear a test tag showing the test date, test pressure and company that conducted the test. Hoses shall be tested for electrical continuity at the time they are pressure-tested.

6.15.9(3) Any cracked or damaged hose shall be replaced with a new hose that is compatible with the material being handled and the exposure to weather elements. Hoses shall not be taped, clamped, patched, glued or otherwise temporarily repaired.

6.15.10 The operator of a marina shall retain a record of all inspections required by this Part for a minimum of two years.

6.16 Bulk Plants

6.16.1(1) Where perimeter protection is used at a bulk plant, it shall be:

(a) not less than 2 m high;

(b) of designed and constructed to discourage climbing;

(c) shall have at least two gates, located as far from each other as practicable, and which are locked when the bulk plant does not have staff in attendance.

6.16.1(2) When a bulk plant is unattended, tank valves connected to the loading racks shall be in the normally closed position but need not be locked where product transfer is prevented by automated electrical valves.

6.16.2 Emergency contact information shall be posted on the perimeter protection of the bulk plant.

6.16.3(1) Bulk plant tanks receiving petroleum products shall be equipped with an overfill protection device for each storage tank that will automatically shut off the flow to the tank.

6.16.3(2) The overfill protection device shall be independent of the tank gauging system used for operation.

6.16.4(1) Fill pipes for tank vehicles at a bulk plant shall be designed with control valves that shall be held open manually, except where an automatic device is provided for shutting off the flow of petroleum product when the vehicle is full or filled to a preset amount or level.

6.16.4(2) Filling through the open dome of a tank vehicle or rail car shall be done using a downspout that reaches the bottom of the tank and that is shaped to minimize turbulence.

6.16.5 Motive fuel dispensers serving the general public or, for a cardlock/ keylock/ aviation fueling facility, an authorized user, shall not be located at a bulk plant unless it is separated by perimeter security from the area of bulk plant operations.

6.16.6 Electrically operated pumps at bulk plants shall be equipped with secondary control switches that are capable of shutting down the delivery pumps and are readily accessible to the person at the vehicle being loaded.

6.16.7 All storage tank systems and components at bulk plants that may be exposed to "shock pressure" or "hydraulic hammer" during petroleum product transfer operations shall be designed, installed and maintained to accommodate this stress.

6.16.8 All rail cars used to load or unload petroleum products at a bulk plant shall be on an area designed to capture any spilled or leaked petroleum product.

6.16.9 If a tank vehicle is used for transferring petroleum products directly to another tank vehicle, it shall be located on an area with secondary containment that provides 110% capacity of the tank vehicle being filled.

6.16.10 All bulk plants will have an oil- water separator meeting the requirements of Section 6.7.

6.16.11 All petroleum product transfers at a bulk plant shall be performed by a person who is trained in transfer operations and who:

(a) has access to written operating and emergency procedures;

(b) is in constant attendance at the location controlling the product transfer; and

(c) is in continuous communication with the operator of the pipeline, tank vehicle, rail car or watercraft that is receiving or sending the petroleum product.

6.17 Aviation Fueling Facilities

6.17.1 At aviation fueling facilities, all storage tank systems that handle petroleum products containing lead-based additives shall be labelled to indicate this hazard.

6.18 Restricted Access/ Cardlock/ Keylock Outlets

6.18.1 All restricted access/ cardlock/ keylock outlets shall be equipped with an environmental concrete apron at the dispensers that drains to an oil/ water separator meeting the requirements of Section 6.7.

6.18.2(1) All nozzles at restricted access/cardlock or keylock outlets shall conform to CAN/ ULC- S620, "Hose Nozzle Valves for Flammable and Combustible Liquids" and shall be either:

(i) kept open only by the continuous application of manual pressure, or

(ii) equipped with a hold open device that is an integral part of the nozzle which will automatically shut off when the vehicle tank is full and shut off if the nozzle is dropped or falls from the fill pipe; and

(iii) a breakaway coupling conforming to ULC-S644, "Standard for Emergency Breakaway Fittings for Flammable and Combustible Liquids".

6.18.2(2) Nozzles used on high speed pumps shall be truck nozzles equipped with a device to prevent the nozzle from falling out of the fill neck.

6.18.3 The approval holder for a restricted access/cardlock/keylock outlet shall post clearly legible operating instructions at dispensers at that site.

6.18.4(1) The restricted access/cardlock/keylock outlet shall be equipped with two single-action emergency shutoffs, one located near the dispensers and the other located remote from the dispensers.

6.18.4(2) Only an authorized person shall be able to reset the emergency shutoff specified in clause (1) of subsection 6.18.4.

6.18.5(1) Emergency instructions at restricted access/ cardlock/ keylock outlets shall be conspicuously posted to advise a user:

(i) how to use the emergency shut off switch, and

(ii) the telephone numbers of emergency response personnel.

6.18.5(2) Every restricted access/cardlock/ keylock outlet shall have a telephone or other clearly identified means of contacting emergency response staff readily accessible to a user.

6.18.6(1) The approval holder for a restricted access/cardlock/keylock outlet shall ensure, on an annual basis, that users are provided with written operating procedures for that site. The approval holder shall maintain records of transmission of these instructions.

6.18.6(2) Persons dispensing petroleum products from a restricted access/cardlock/keylock facility shall be trained in the procedures noted in clause (1) of subsection 6.18.6 and shall remain in constant attendance at the vehicle when petroleum products are being dispensed.

6.18.7(1) The approval holder for a restricted access/cardlock/keylock outlet shall conduct a daily inspection of the outlet on each day that the outlet is open to users to check for spillage. Where spillage is found, the approval holder shall take immediate action to end the spill, clean the affected area and follow requirements of the Environmental Emergency Regulations and Contaminated Sites Regulations as applicable.

6.18.7(2) The approval holder of a restricted access/cardlock/keylock outlet shall conduct a daily inspection of the outlet on each day that the outlet is open to users to ensure the safe operation of all equipment. Where equipment is found to be damaged or working improperly, the approval holder shall have it repaired before putting it back into service.

6.18.7(3) The approval holder of a restricted access/cardlock/keylock outlet shall retain records of all inspections and any required repairs or spill responses for a minimum of two years.

6.19 Self-Serve Outlets

6.19.1 All self-serve outlets shall be equipped with a control console located within 25 m of the dispensers. The control console shall be operated by a trained attendant at all times that motive fuel is being dispensed.

6.19.2 All nozzles at self-serve outlets shall be ULC certified and shall be either:

(a) kept open only by the continuous application of manual pressure, or

(b) equipped with a hold open device that is an integral part of the nozzle which will automatically shut off when the vehicle tank is full and shut off if the nozzle is dropped or falls from the fill pipe and a breakaway coupling conforming to ULC-S644, “Standard for Emergency Breakaway Fittings for Flammable and Combustible Liquids”.

6.19.3 Clearly legible operating instructions shall be posted at the dispensers.

6.19.4(1) The console operator at a self-serve outlet shall have a clear and unobstructed view of the dispensers and any vehicles being served. This may also take the form of a video monitoring system or mirrors.

6.19.4(2) Where a video monitoring system is used, it shall be dedicated to monitoring the dispensers and shall not monitor images of the store or other spaces associated with the outlet.

6.19.4(3) Where a video monitoring system is used, it shall be interlocked with each dispenser monitored such that failure of the video monitoring system will automatically shut off all dispensers monitored by that system.

6.19.5 All self-serve outlets shall have a two-way communication system between the control console and the dispenser location.

6.19.6 The control console will include an emergency shut off switch which can shut off all power to the dispensers and any associated submersible pumps.

6.19.7 At self-service stations that also provide attended service, the attendant is permitted to dispense motive fuels if each dispenser island is equipped with an emergency shut-off switch as described in subsection.6.19.6 and the attendant is never more than 25 m from the self-service island or the control console.

6.19.8(1) The console operator shall be trained on

(a) safety requirements;

(b) preventative maintenance;

(c) spill prevention and inventory monitoring; and

(d) emergency procedures.

6.19.8(2) A record of individual staff training shall be maintained by the outlet owner for as long as that individual is working at the facility.

Part 7

Withdrawal from Service of Storage Tank Systems

7.1 Scope

7.1.1 This Part applies to procedures to be followed when a storage tank system is removed, relocated, abandoned, disposed of, refurbished, or temporarily taken out-of-service.

7.2 General Requirements

7.2.1(1) A storage tank system shall be removed by an individual certified under the *Petroleum Management Regulations*.

7.2.1(2) An individual removing a storage tank system shall ensure that the system is removed in conformance with the requirements of this Part.

7.3 Temporary Withdrawal from Service

7.3.1 If a cathodic protection system is provided, it shall be maintained and operated while the storage tank system is temporarily withdrawn from service.

7.3.2(1) A shop-fabricated aboveground storage tank system shall pass an annual inspection in conformance with clause 6.3.1(4) before the storage tank system is returned to service.

7.3.2(2) A field-erected aboveground storage tank that has been out-of-service for more than one year shall, before being returned to service:

(a) pass an internal inspection conducted by an individual certified in conformance with API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction"; or

(b) pass a precision leak detection test.

7.3.2(3) For a field-erected aboveground storage tank that has been returned to service as specified in clause (2) of subsection 7.3.2, the next internal inspection shall be the earlier of:

(a) within ten years of the most recent internal inspection; or

(b) at the date specified by API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction".

7.3.3(1) When an aboveground or underground storage tank system is to be out-of-service for more than 180 days, the owner or operator shall notify an Administrator in writing, within seven days after the storage tank system goes out of service, providing:

(a) the name and mailing address of the owner;

(b) the name and mailing address of the operator;

(c) the location of the storage tank system;

(d) a description of the nature and quantity of the contents; and

(e) the registration number of the storage tank.

7.4 Removal from Service

7.4.1 The owner of an aboveground or underground storage tank system shall notify an Administrator in writing within 30 days of a decision to remove a storage tank system.

7.4.2(1) When an aboveground or underground storage tank system has been permanently removed from service, the owner of a storage tank system shall ensure that:

(a) petroleum products are removed;

(b) petroleum vapours are purged from the storage tank, piping, dispensing, and transfer equipment to a sustained level of less than 10% of the lower flammable limit for the product stored in the system;

(c) the storage tank, piping, dispensing, and transfer equipment are removed; and

(d) all associated piping and supports, including cement slabs and anchors are removed.

7.4.2(2)

(a) Subject to clause (2)(b) of subsection 7.4.2, the site where petroleum storage tank systems have been removed shall be assessed by a site professional to determine if contamination is present and if formal notification is required under the Contaminated Sites Regulations.

(b) Where piping or dispensers are being replaced or upgraded and there is no excavation, an assessment to determine if contamination is present is not required.

7.5 Abandonment In-place

7.5.1 An aboveground storage tank system shall not be abandoned in-place.

7.5.2(1) In accordance with subsections 3.2.4 and 4.5.2, an underground storage tank system installed after the effective date of the Standard shall not be abandoned in-place

7.5.2(2) Subject to clause (1) of subsection 7.5.3 and subsection 7.5.4 an existing underground storage tank system shall not be abandoned in-place.

7.5.3(1) An owner of an existing underground storage tank system may apply to the Department for approval to abandon a storage tank system in-place by:

(a) describing fully in the written application, the circumstances relating to the storage tank system location that would justify abandoning the storage tank system in-place;

(b) hiring a site professional to assess the site to determine if contamination is present and if formal notification is required under the Contaminated Sites Regulations;

(c) ensuring any contamination is addressed in accordance with the Contaminated Sites Regulations; and

(d) providing confirmation that the owner of the property is aware and in agreement with the plan and procedures to abandon the storage tank system in-place.

7.5.3(2) Factors to be considered when considering abandonment in-place shall include:

(a) if the tank system is located in whole or in part beneath a permanent building or other facility so that excavation of the storage tank is not practicable (this would not include temporary structures like decks or small outbuildings);

(b) so large or of a type of construction that the excavation of the storage tank is not practicable;

(c) inaccessible to the heavy equipment necessary for the removal of the storage tank;

(d) situated so that removal of the storage tank would endanger nearby buildings or other facilities.

7.5.3(3) Financial hardship or inconvenience will not be considered as reasons for considering abandonment in-place.

7.5.4 When the Department considers it impractical to remove an underground storage tank system, approval in writing may be granted by an Administrator to the owner to abandon the system in-place.

7.5.5(1) When an Administrator has granted approval in writing to an owner to abandon an underground storage tank system in-place, the abandonment procedures shall ensure that:

(a) any liquid or sludge in the underground storage tank system is removed and disposed of at a facility approved for that material;

(b) the underground storage tank system is purged of vapours to less than 10% of the lower flammable limit and that the presence of vapours is checked with a combustible gas meter (refer to API RP1604, "Closure of Underground Petroleum Storage Tanks");

(c) any water used in purging the tank system is collected and disposed of a facility approved for that material;

(d) sufficient holes are cut along the top of the underground storage tank to enable the complete filling of the storage tank system with an inert, non-degradable material such as sand, gravel or concrete;

(e) the underground storage tank system is completely filled with an inert material;

(f) a record of the size, description, and location of the underground storage tank is;

(i) permanently appended to the deed of the property;

(ii) submitted to an Administrator; and

(g) associated piping not abandoned in place is removed from the site.

7.6 Disposal of Storage Tank Systems

7.6.1(1) When a storage tank system is to be disposed of:

(a) liquid petroleum product shall be removed from the storage tank system;

(b) sludge in the storage tanks shall be removed and disposed at a facility approved for that purpose;

(c) the storage tank shall be purged of vapours to less than 10% of the lower flammable limit and the presence of vapours shall be checked with a combustible gas meter;

(d) sufficient openings shall be cut in the storage tank to render it unfit for further use;

(e) subject to clause (2) of subsection 7.6.1, the storage tank shall be transported to an approved disposal facility; and

(f) a Petroleum Storage Tank System Removal Report shall be provided to an Administrator by the tank owner or certified petroleum tank installer. The Report must show that removed tank systems were taken to an approved disposal facility.

7.6.1(2) Field-erected aboveground storage tanks shall be dismantled onsite and the individual components transported to an approved disposal facility.

7.7 Reuse of Storage Tanks

7.7.1 A shop-fabricated aboveground storage tank may be reused for the storage of petroleum products after being refurbished in conformance with CAN/ULC-S676, "Standard for Refurbishing of Storage Tanks for Flammable and Combustible Liquids".

7.7.2 A field-erected aboveground storage tank may only be reused for the storage of petroleum products after

(a) being refurbished in accordance with API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction"; and

(b) after having the revised drawings prepared and bearing the stamp and signature of a professional engineer.

7.7.3 An underground storage tank removed from service shall not be reused as an aboveground storage tank.

7.7.4(1) Subject to clause (2) of subsection 7.7.4, a storage tank system may be used for the storage of materials other than petroleum products if:

(a) liquid petroleum product is removed from the storage tank system;

(b) sludge in the storage tanks is removed and disposed at a facility approved for that purpose;

(c) the storage tank is purged of petroleum vapours to less than 10% of the lower flammable limit;

(d) the storage tank system is thoroughly cleaned of all petroleum product residue and scale;

(e) the storage tank system owner submits a written report to an Administrator bearing the stamp and signature of a professional engineer that the system has been assessed for its intended new purpose; and

(f) the owner or operator notifies an Administrator in writing of a request to unregister the storage tank system, providing:

(i) the name and mailing address of the owner;

(ii) the name and mailing address of the operator;

(iii) the location of the storage tank system;

(iv) a description of the nature and quantity of the proposed contents; and

(v) the registration number of the storage tank.

7.7.4(2) A used petroleum storage tank system shall not be repurposed for the storage of potable water or foodstuffs for human or animal consumption.

Nova Scotia Construction, Installation and Operation
Standards for Petroleum Storage Tank Systems
Department of Environment and Climate Change
October 2021

ISBN: 978-1-77448-231-5

NOVA SCOTIA