STORAGE TANK SYSTEM

PLANS EXAMINATION GUIDE

This guide is not all encompassing but will assist in ensuring that the key sections of Part 4 of the National Fire Code – 2023 Alberta Edition (NFC(AE)) are identified as well as any STANDATA that is currently in force by Alberta Municipal Affairs. The 'Facility Design' and 'Supplementary Requirements' tables can be used to narrow in on the applicable section(s) for the project.

*** Works that require plans stamped by a professional engineer: 1. Underground tanks and/or piping (including alterations), 2. Large Aboveground tanks (>8 000 L), 3. Complex installation (i.e. indoor tanks and piping, piping penetrations, interconnected systems, etc.)**

IDENTIFICATION	
Facility Name:	TMS Permit #:
Address/Location:	TMS Site #:

DEFINITIONS
Storage tank **means a vessel for** ***flammable liquids*** **or** ***combustible liquids*** **having a capacity of more than 230 L and designed to be installed in a fixed location.**
Storage tank system **means a system for the storage and dispensing of** ***flammable liquids*** **and** ***combustible liquids*** **and is not limited to** ***storage tanks*****, associated piping, vents, pumps, and dispensing equipment**

FACILITY DESIGN (Check all that are applicable)		
	Aboveground storage tank(s) with *no* piping or dispensers: Used Oil or API tanks, pumps mounted on tanks	**Section 2**
	Aboveground storage tank(s) with aboveground piping and dispensers	**Section 3**
	Aboveground storage tank(s) with underground piping and dispensers	**Section 4**
	Aboveground storage tank(s) *inside* buildings	**Section 5**
	Supplementary requirements for *sea cans*	**Section 5A**
	Underground storage tank(s) with *no* piping and with or without dispensers	**Section 6**
	Underground storage tank(s) with underground piping and dispensers	**Section 7**

SUPPLEMENTARY REQUIREMENTS (to previous Sections)		
	Self-service, Cardlock/Commercial, Unattended self-service, Bulk Plant/Railway	**Section 8**

DECLARATION
The installation of tanks, piping, vents, and equipment conforms with the current National Fire Code – 2023 Alberta Edition (NFC(AE))

SECTION 1: General Information (required for all installations)		
1.	Storage tank(s) ULC or API construction standards indicated on drawings and specifications.	
2.	Fire extinguishers (rating, size, quantity)	
3.	Spill protection for tank loading and dispensing	
4.	Tank capacity (by compartment and contents)	
5.	Electrical/lighting in proximity IAW CEC Part I for Class I, Zone 2 hazardous locations	
6.	Access for firefighting (within 60 m)	
7.	Site plan including roadways, access points	
8.	Site drainage plan showing storm/sanitary openings, grade, waterways etc.	
9.	Tank manufacturer's specification sheet	

SECTION 2: Aboveground Storage Tank(s) with no piping or dispensers		
1.	Tank distance to buildings and property lines	
2.	Tank contents & capacity	
3.	Spacing between multiple storage tanks	
4.	Clearances from Liquefied Petroleum Gas (LPG) cylinders and tanks	
5.	Tank Supports and foundation details (>300 mm min. 2 hr. fire-resistance rating; minimize design stress thresholds; anchored [flood hazard areas]) and as per manufacturer's instructions	
6.	Valve details (material, types, construction standards)	
7.	Collision protection (type and spacing)	
8.	Secondary containment (double-walled, go to **9.** or containment area, (*see a - h*))	
a.	Construction (noncombustible materials)	
b.	Withstand full hydrostatic head	
c.	Permeability as per Clause 4.3.7.2.(1)(b) of NFC(AE)	
d.	Membrane as per CAN/ULC-S668	
e.	Capacity as per Article 4.3.7.3. of NFC(AE) (Calculation provided)	
f.	Clearance from wall (min. 1.5 m to tank[s])	
g.	Access (to valves, equip., egress, firefighting)	
h.	Monitoring and provisions for liquid removal from secondary containment	
9.	Signs (no smoking/ignition off, emergency shut-off, contents ID/placards), CFA 1990 Markings	
10.	Vent piping (Normal and Emergency as per tank design standards and API 2000)	
a.	Flammable liquids (min. 3.5 m above grade/1.5 m to openings)	
b.	Combustible liquids (min. 2 m above grade/1.5 m to openings)	
11.	Evidence of bonding and grounding	
12.	Connections for filling and emptying as per Article 4.3.6.4. of NFC(AE)	
13.	Spill control as per Subsection 4.1.6. of NFC(AE)	
14.	Tank with a mounted pump: Evidence that the fuel dispensing equipment conforms to CSA B346-M, provide make & model # of pump	
15.	Delivery hose and nozzle conforms to Subsection 4.6.5. of NFC(AE)	
16.	Evidence of remote placement for emergency shutdown button must be shown on drawing	

SECTION 3: Aboveground Storage Tank(s) with Aboveground Piping and Dispensers		
1.	Tank distance to buildings and property lines	
2.	Tank contents & capacity (max. 80 000 L or 200 000 L aggregate)	
3.	Spacing between storage tanks	
4.	Clearance from Liquefied Petroleum Gas (LPG) cylinders and tanks	
5.	Tank supports and foundation details (>300 mm min. 2 hr. fire-resistance rating, minimize design stress thresholds, anchored [flood hazard areas]) and as per manufacturer's instructions	
6.	Valve details (material, types, construction standards)	
7.	Collision protection (type and spacing)	
8.	Secondary Containment (double-walled, go to **9.** or containment area (*see a - h*))	
a.	Construction (noncombustible materials)	
b.	Withstand full hydrostatic head	
c.	Permeability as per Clause 4.3.7.2.(1)(b) of NFC(AE)	
d.	Membrane as per CAN/ULC-S668	
e.	Capacity as per Article 4.3.7.3. of NFC(AE) (Calculation provided)	
f.	Clearance from wall (min. 1.5 m to tank[s])	
g.	Access (to valves, equip., egress, firefighting)	
h.	Monitoring and provisions for liquid removal from secondary containment	
9.	Signs (no smoking/ignition off, emergency shut-off, contents ID/placards), CFA 1990 Markings	
10.	Vent piping (Normal and Emergency as per tank design standards and API 2000)	
a.	Flammable liquids (min. 3.5 m above grade/1.5 m to openings)	
b.	Combustible liquids (min. 2 m above grade/1.5 m to openings)	
11.	Evidence of bonding and grounding	
12.	Piping details (materials and CAN/ULC Std. as per Article 4.5.2.1. and arrangement as per Articles 4.5.6.3. and 4.5.6.4. of NFC(AE).	
13.	Fill line (valve at fill point, anti-siphoning protection)	
14.	Connections for filling and emptying as per Article 4.3.6.4. of NFC(AE)	
15.	Gravity discharge protection (where required)	
16.	Leak detection methods and commissioning as per Subsection 4.4.1. of NFC(AE)	
17.	Remote emergency shut-off device	
18.	Pumping system (suction or pressure)	
19.	Dispenser sumps as per CAN/ULC-S664	
20.	Dispenser collision protection type and/or Island height	
21.	Dispenser emergency valves (shear valves)	
22.	Delivery hose and nozzles as per Subsection 4.6.5. of NFC(AE)	
23.	Fixed dispenser distances for Class I liquids to: (NFC(AE) 4.6.3.3.)	
a.	Property lines and right-of-ways/building openings	
b.	Propane and natural gas dispensers and storage tanks/cylinders	
c.	Fixed ignition sources	
d.	Manhole or sewer openings	
24.	Spill control as per Subsection 4.6.7. of NFC(AE)	
25.	Absorbent material and at least 2 portable fire extinguishers (min. 40-B:C rating)	

26.	Evidence of remote placement for emergency shutdown button must be shown on drawing	

SECTION 4: Aboveground Storage Tank(s) with Underground Piping and Dispensers		
1.	Tank distance to buildings and property lines	
2.	Tank contents & capacity (max. 80 000 L or 200 000 L aggregate)	
3.	Spacing between tanks	
4.	Clearances from Liquefied Petroleum Gas (LPG) cylinders and tanks	
5.	Tank supports and foundation details (>300 mm min. 2 hr. fire-resistance rating, minimize design stress thresholds, anchored [flood hazard areas]) and as per manufacturer's instructions	
6.	Valve details (material, types, construction standards)	
7.	Collision protection (type and spacing)	
8.	Secondary containment (double-walled, go to **9.** or containment area (*see a – h*))	
a.	Construction (noncombustible materials)	
b.	Withstand full hydrostatic head	
c.	Permeability as per Clause 4.3.7.2.(1)(b) of NFC(AE)	
d.	Membrane as per CAN/ULC-S668	
e.	Capacity as per Article 4.3.7.3. of NFC(AE) (Calculation provided)	
f.	Clearance from wall (min. 1.5 m to tank[s])	
g.	Access (to valves, equip., egress, firefighting)	
h.	Monitoring and provisions for liquid removal from secondary containment	
9.	Signs (no smoking/ignition off, emergency shut-off, contents ID/placards), CFA 1990 Markings	
10.	Vent piping (Normal and Emergency as per tank design standards and API 2000)	
a.	Flammable liquids (min. 3.5 m above grade/1.5 m to openings)	
b.	Combustible liquids (min. 2 m above grade/1.5 m to openings)	
11.	Evidence of bonding and grounding	
12.	Connections for filling and emptying as per Article 4.3.6.4. of NFC(AE)	
13.	Piping details (materials and CAN/ULC Std. as per Article 4.5.2.1. and arrangement as per Articles 4.5.6.5. and 4.5.6.6. of NFC(AE)).	
14.	Sumps	
a.	Under dispenser as per CAN/ULC-S664	
b.	Spill containment at fill point(s) as per ULC/ORD-C58.19	
c.	Transition and turbine as per CAN/ULC-S664	
15.	Pressure system (STP) or suction (single check valves)	
16.	Leak detection methods and commissioning as per Subsection 4.4.1. of NFC(AE)	
a.	Inventory reconciliation (IR)	
b.	IR and monitoring wells, statistical IR and single check valve	
c.	ELLD, CELLD, ATG	
d.	Secondary containment monitoring	
17.	Dispenser collision protection	
18.	Dispenser emergency valves (shear valves)	
19.	Delivery hose and nozzles as per Subsection 4.6.5. of NFC(AE)	
20.	Fixed dispenser distances for Class I liquids to:	

a.	Property lines and right-of-ways/building openings	
b.	Propane and natural gas dispensers and storage tanks/cylinders	
c.	Fixed ignition sources	
d.	Manhole or sewer openings	
21.	Spill control as per Subsection 4.6.7. of NFC(AE)	
22.	Absorbent material and at least 2 portable fire extinguishers (min. 40-B:C rating)	

SECTION 5: Aboveground Storage Tanks Inside Buildings		
1.	Occupancy Type	
2.	Capacity, contents and Location as per Article 4.3.13.4. of NFC(AE)	
3.	Tank construction standard/type (Double wall or min. 300 deg. Secondarily contained as per Sentence 4.3.13.5.(1) of NFC(AE)	
4.	Type of use as per Article 4.3.13.2. NFC(AE)	
5.	Leak detection (high or low tech)	
6.	Storage room as per Article 4.3.13.9. or Subsection 4.3.14. of NFC(AE)	
7.	Tank supports and clearances (around)	
8.	Venting as per Article 4.3.13.10. and 4.3.14.3. of NFC(AE)	
9.	Tank and equipment bonded and grounded	
10.	Valve details (location)	
11.	Fire safety plan updated and placards/product ID sign(s) installed	
12.	Overfill protection as per Article 4.3.1.8. of NFC(AE)	
13.	Piping details (materials and CAN/ULC Std. as per Articles 4.5.2.1. and arrangement as per Articles 4.5.6.2., 4.5.6.8. and 4.5.6.9. to 4.5.6.13. of NFC(AE)).	
14.	Connections for filling and emptying as per Article 4.3.6.4. of NFC(AE)	
15.	Openings in storage tanks as per Subsection 4.3.15. of NFC(AE)	
16.	Storage tanks outside of storage rooms for incidental use in industrial occupancies as per Subsection 4.2.8. of NFC(AE)	
17.	Collection of used liquids as per Sentence 4.3.6.4.(1) of NFC(AE)	

SECTION 5A: Aboveground Storage Tank(s) Inside Sea Cans		
1.	Sea can vented side walls 4 top, 4 bottom. Top at ceiling, lower no lower than 3cm above the floor	
2.	Tank contents & capacity (max. 4,500 L)	
3.	Door interlocked with ESD	
4.	ESD available at door with-out entry	
5.	Tank supports and foundation details (>300 mm min. 2 hr. fire-resistance rating, minimize design stress thresholds, anchored [flood hazard areas]) and as per manufacturer's instructions	
6.	Tank contents signage on 2 sides of the sea can and 1 on tank facing door	
7.	Spill kit and fire extinguisher inside sea can accessible without entry	
8.	Operating/warning signage visible from fueling position	
9.	Nozzle holster drained to outside non-combustible container with lid	

SECTION 6: Underground Storage Tank(s) with No Piping		
1.	Double-walled construction standard as per Article 4.3.8.1. and 4.3.8.6. of NFC(AE)	
2.	Tank location and orientation to buildings, tanks, structures, property lines and street lines as per Article 4.3.8.2. of NFC(AE)	
3.	Tank contents and capacity (max. 80 000 L or 200 000 L aggregate)	
4.	Ground cover as per Article 4.3.8.3. of NFC(AE)	
5.	Anchored as per Article 4.3.8.9. of NFC(AE)	
6.	Tank installed and leak tested in accordance with manufacturer's instructions	
7.	Spill containment, dispenser and turbine sumps and leak detection	
8.	Vent Piping (Normal and Emergency as per tank design standards and API 2000)	
a.	Flammable liquids (min. 3.5 m above grade/1.5 m to openings)	
b.	Combustible liquids (min. 2 m above grade/1.5 m to openings) and above the fill pipe opening	
9.	Fill piping and discharge piping as per Article 4.3.12.3. of NFC(AE)	
10.	Leak detection methods and commissioning *(see Subsection 4.4.1. of* NFC(AE))	
a.	Inventory reconciliation (IR)	
b.	IR and Monitoring Wells and Statistical IR	
c.	Automatic tank gauge/Continuous in-tank leak detection	
d.	secondary containment monitoring	
13.	Signs (no smoking/ignition off, emergency shut-off, contents ID/placards), CFA 1990 Markings	
14.	Spill Control as per Subsection 4.6.7. of NFC(AE)	

SECTION 7: Underground Storage Tank(s) with Underground Piping and Dispensers		
1.	Double-walled construction standard as per Article 4.3.8.1. and 4.3.8.6. of NFC(AE)	
2.	Tank location and orientation to buildings, tanks, structures, property lines and street lines as per Article 4.3.8.2. of NFC(AE)	
3.	Tank contents and Capacity (max. 80 000 L or 200 000 L aggregate)	
4.	Ground cover as per Article 4.3.8.3. of NFC(AE)	
5.	Anchored as per Article 4.3.8.9. of NFC(AE)	
6.	Tank installed and leak tested in accordance with manufacturer's instructions	
7.	Vent Piping (Normal and Emergency as per tank design standards and API 2000)	
a.	Flammable Liquids (min. 3.5 m above grade/1.5 m to openings)	
b.	Combustible liquids (min. 2 m above grade/1.5 m to openings) and above the fill pipe opening	
8.	Evidence of overfill device	
9.	Evidence of spill containment on fill tube	
10.	Fill piping and discharge piping as per Article 4.3.12.3. of NFC(AE)	
11.	Leak detection methods and commissioning as per Subsection 4.4.1. of NFC(AE)	
a.	Inventory Reconciliation (IR)	
b.	IR and monitoring wells and statistical IR	
c.	Automatic tank gauge/Continuous in-tank leak detection	
d.	Secondary containment monitoring	
12.	Sumps	
a.	Under dispenser as per CAN/ULC-S664	

b.	Spill containment at fill point(s) as per ULC/ORD-C58.19	
c.	Transition and turbine as per CAN/ULC-S664	
13.	Dispenser collision protection	
14.	Signs (no smoking/ignition off, emergency shut-off, contents ID/placards), CFA 1990 Markings	
15.	Piping details (materials and CAN/ULC Std. as per Articles 4.5.2.1. and arrangement as per Articles 4.5.6.5. and 4.5.6.6. of NFC(AE)).	
16.	Pressure system (STP) or Suction (single check valves)	
17.	Dispenser emergency valves (shear valves)	
18.	Delivery hose and nozzles as per Subsection 4.6.5. of NFC(AE)	
19.	Fixed Dispenser distances for Class I liquids to:	
a.	Property lines and right-of-ways/building openings	
b.	Propane and natural gas dispensers and storage tanks/cylinders	
c.	Fixed ignition sources	
d.	Manhole or sewer openings	
20.	Spill Control as per Subsection 4.6.7. of NFC(AE)	
21.	Absorbent material and at least 2 portable fire extinguishers (min 40-B:C rating)	

SECTION 8: Supplementary Requirements		
Self-service Outlets		
1.	Operating instructions posted	
2.	Control console within 25 m with direct view of all dispensers	
3.	2-way communication to each pump/dispenser islands	
Cardlock/Commercial		
1.	Location and signage for emergency shutdown of dispensers	
2.	Evidence of remote placement for emergency shutdown button	
3.	Signage for emergency contacts, operating instructions	
4.	Location of telephone or other means to contact emergency personnel	
5.	Evidence that delivery hose/nozzle conforms to requirements listed in Subsection 4.6.5 of the Code	
6.	Evidence that the fuel dispensing equipment conforms to CSA-B346-M (Section 4.6.3 of the Code)	
Unattended Self-Service Outlets		
1.	A video recording surveillance system connected to a monitoring facility	
2.	Emergency shut-off switches at each dispensing unit	
3.	Master emergency shut-off switch located >6 m and <10 m from dispensing island	
4.	Telephone or other means for contacting fire department	
5.	Audible alarm actuated by the emergency shut-off switches	
6.	Strobe light actuated by the emergency shut-off switch	
7.	Dispensing pump cabinets and panels monitored with intrusion alarms connected to a monitoring facility	

8.	Pump controls/accessory buildings protected with intrusion alarms and smoke and heat detection devices connected to monitoring facility	
9.	Electronic storage tank monitoring for inventory control.	
10.	Maximum quantity for dispensing at one time is 100 L	
	Weather resistant signs indicating:	
a.	Locations of dispenser and master emergency shut-off switches	
b.	User to stay out of their view and in view of the fueling nozzle during dispensing	
c.	Emergency instructions and telephone numbers for the fire department	
Bulk Plant		
1.	Distances from loading fill stem to a storage tank, buildings and property line	
2.	Details for fencing requirements between bulk storage operations area (fence height, gates, materials construction as per Article 3.3.2.6. of NFC(AE))	
3.	Spill control as per Article 4.7.2.5. of NFC(AE)	
4.	Absorbent material and at least 2 portable fire extinguishers (min 80-B:C rating)	
Facilities near railways		
5.	Minimum distance from a loading structure to a railway line as per TC General Order No. O-32, C.R.C., c1148, "Flammable Liquids Bulk Storage Regulations."	
6.	For product transfers from/to railway tank cars, bonding/grounding in conformance with TC SOR1/82-1015, "Railway Prevention of Electric Sparks Regulation" as per Article 4.7.4.5. of NFC(AE).	