Technical Safety Authority of Saskatchewan

THE SASKATCHEWAN CODES OF PRACTICE

PROPANE STORAGE AND HANDLING CODE

CSA-B149.2 - 20

Gas Installation Supplement

Adoption Date: January 1, 2023

Technical Safety Authority of Saskatchewan

CONTENTS

The following clauses have been amended, noted, explained, or added and are a supplement to the B149.2 Propane Storage and Handling Code.

Note: The acronym S.C.O.P. refers to the Saskatchewan Codes of Practice.

5 GENERAL REQUIREMENTS FOR PROPANE AND PROPANE EQUIPMENT

5.9.1 Underground piping or tubing used to conduct liquid propane is restricted to non-residential purposes and subject to these requirements:

1) The installation of underground liquid propane piping shall not commence until approval is granted by the local gas inspector.
2) Where a pump is used,
    i) the liquid supply line shall have an automatic shut off valve (located upstream of buried piping) that will close automatically when the pump is shut off.
    ii) vapor return piping shall comply with liquid requirements except that listed in (i) above.
3) Piping risers shall be sleeved at least one size larger than the riser and shall extend from the horizontal section of the underground line to 12" (300 mm) above grade to provide for ventilation of the underground line.

6 CYLINDER SYSTEMS

6.5.2.6 Cylinder Exchange Requirements

6.5.2.6.1 Facilities operating cylinder exchange stations for propane that are accessible to the public shall comply with the following requirements:

(j) Protection of cylinders for resale shall be in accordance with Clause 6.5.4.2b) however, protection shall not be required for 20 lb, or 30 lb, cylinders provided they are in cabinets as noted in Clause 6.5.2.6.1a).

6.5.2.6.3 The installation of retail storage cages, or automated cylinder exchange machines, shall not commence until an application with a site plan is submitted to The Chief Gas Inspector for approval. All installations are to be reported on a gas permit.

6.5.2.6.3.1 Retail propane cylinder exchange cabinets, and automated cylinder exchange machines shall have its base on a firm level footing; and shall be securely anchored in an upright position.

6.5.2.6.3.2 At all retail propane cylinder exchange cabinets, and automated cylinder exchange machines, a sign shall be prominently displayed and be worded as follows: "TRANSPORT CYLINDERS SECURED IN AN UPRIGHT POSITION IN A VENTILATED SPACE" in red lettering that is a minimum of 1 inch (25 mm) high on a white background.

7 TANK SYSTEMS FILLING PLANTS AND REFILL CENTERS

7.1 General

7.1.7 A propane tank shall not be installed within a diked area containing a tank of flammable or combustible liquid and shall be located not less than 20 ft (6 m) from the centreline of the dike.

7.1.7.1 Clause 7.1.7 is not applicable to the diked area created by a dike constructed around the perimeter of an oilfield lease site.

7.1.8.1 On an oilfield lease site the propane tank may be positioned in any orientation along the flow line from the wellhead to the oil tank as long as the position does not create a vehicular hazard.

7.1.8.2 On an oilfield lease site the propane tank may be adjacent to the secondary liquid tank containment system provided clearances specified in CAN/CSA B149.2 clause 7.1.8, S.C.O.P. clause 7.10.2 and CAN/CSA B149.2 - Table 7.4 are met.

7.4.1 Subject to 7.4.2 to 7.4.4, and 7.5.2, each ***tank*** opening utilized for ***propane*** flow shall be equipped with an ***excess-flow valve*** sized for the application. Common practice is that the excess flow valve setpoint should be at least 50% larger than the maximum flow rate of the load to avoid nuisance trips.

7.4.8.1 Any line utilized for propane flow shall have a flow capacity to atmosphere greater than the design flow rate of the excess-flow valve protecting the line. To approximate a line's propane flow capacity to atmosphere, the line shall have a vapour flow capacity based on Annex A of CSA B149.1, or a liquid flow capacity based on Appendix A of this SCOP, of at least 75% of the rated capacity of the excess flow valve protecting the line.

7.8 Installation of Underground Tanks

7.8.1 A tank shall only be installed underground with the approval of the authority having jurisdiction. In Saskatchewan, approval from TSASK Gas Inspections will be conditional upon the stability of the slope and soil conditions for the location – over the potential range of temperature and moisture conditions - as evidenced by a professional geotechnical review.

7.10 Location of Consumer Tanks

7.10.3 A tank used in a consumer application shall be located with respect to a property line, building opening, or an adjacent tank in accordance with Table 7.4, except that

(c) on an oilfield lease with a tank capacity over 1000 USWG (3800 L) the clearance can be reduced to 10 ft (3 m) from the wall of an unoccupied building.

7.10.4 A tank located on an oilfield lease site shall have not less than 25 ft (7.5 m) separation between the propane tank and the wellhead.

7.11 Tank Supports

7.11.1 Secure anchorage or sufficient pier height shall be provided for each tank to prevent flotation wherever high flood water can occur.

7.11.2 A horizontal tank with a capacity of 2000 USWG (7500 L) or less shall

(a) be mounted on a maximum of two supports, and these supports shall be of noncombustible material in the form of piers, pads, saddles, blocks, steel beam skid rails, or concrete, each of sufficient strength to support the weight of the tank when filled to capacity with propane;

(b) not be installed with an individual block or pad at each leg of the tank;

(c) have the top of any support not less than 3 in (75 mm) above grade, and the clearances between the bottom of the tank and grade shall not be less than 6 in (150 mm); and

(d) be installed with a maximum distance of 30 in (750 mm) between the bottom of the tank and a concrete pad, slab, or grade.

(e) or, at wellhead sites only, be mounted on two propane tank supports consisting of 3” x 12” rough cut lumber (approximately 10 feet in length) which are then covered with a minimum of 2” gravel.

7.12 Filling Plants and Refill Centers

7.12.14 The installation of all new and relocated propane filling plants (including bulk plants over 5000 USWG) shall not proceed until site plans are submitted to Gas Inspections and approved to proceed. All installations are to be reported on a gas permit. This includes a filling plant where propane is not for resale (for owner use only).

7.19.4 Protection Against Vehicular Traffic

7.19.4.4.1 Acceptable barriers for permanent installation, other than those specified in Clauses 7.19.4.1 and 7.19.4.2, include precast concrete blocks not less than 20 inches in height, not less than 40 inches in length, and weighing not less than 900 lbs each, spaced at a maximum 54 inches between blocks.

APPENDIX A - SIZING

Maximum capacity of Liquid Propane (in thousands of btu/hr) for copper tubing, or Schedule 80 piping gravity fed from a propane tank (no pump)

Length (ft)	TUBING (ID)						SCH 80 PIPE (NPS)					
	¼	3/8	1/2	5/8	3/4	1	1/2	3/4	1	1 ¼	1 ½	2
10	*(7,110)*	14,760	29,700	51,210	72,090	142,830	21,060	44,460	86,670	175,590	261,450	503,820
20	*(4,950)*	*(10,440)*	20,970	36,180	50,940	107,370	14,940	31,410	60,930	124,200	184,770	356,220
30	*(4,050)*	*(8,550)*	17,100	29,520	41,580	87,660	14,220	25,650	49,860	101,610	151,020	290,610
40	*(3,510)*	*(7,380)*	14,850	25,560	36,000	75,870	*(10,350)*	22,230	43,290	87,840	130,770	251,910
50	*(3,150)*	*(6,570)*	*(13,230)*	22,860	32,220	67,860	*(9,630)*	19,980	38,700	78,570	116,910	225,810
60	*(2,880)*	*(6,030)*	*(12,060)*	20,880	29,430	62,010	*(8,460)*	18,000	35,280	71,730	106,560	205,920
70	*(2,610)*	*(5,580)*	*(11,160)*	19,350	27,180	57,330	*(8,010)*	16,830	32,940	66,690	98,910	190,530
80	*(2,430)*	*(5,220)*	*(10,440)*	18,090	25,470	53,640	*(7,290)*	15,750	30,690	62,100	92,790	178,290
90	*(2,340)*	*(4,860)*	*(9,900)*	17,010	24,030	50,580	*(6,930)*	14,580	28,800	58,680	87,030	167,940
100	*(2,160)*	*(4,680)*	*(9,360)*	16,200	22,770	47,970	*(6,750)*	14,220	27,180	55,620	82,800	159,120
125	*(1,980)*	*(4,140)*	*(8,370)*	14,490	20,340	42,930	*(6,120)*	*(12,690)*	24,570	49,860	73,980	142,650
150	--	*(3,780)*	*(7,650)*	*(13,230)*	18,540	39,150	--	*(11,520)*	22,230	45,270	67,500	129,960
175	--	*(3,510)*	*(7,110)*	*(12,240)*	17,190	36,270	--	*(10,710)*	20,700	42,210	62,460	120,420
200	--	*(3,240)*	*(6,570)*	*(11,430)*	16,110	33,930	--	*(9,990)*	19,170	39,150	58,680	112,680
225	--	*(3,060)*	*(6,210)*	*(10,800)*	15,120	31,950	--	*(9,630)*	18,000	37,170	55,170	106,200
250	--	*(2,880)*	*(5,940)*	*(10,170)*	14,400	30,330	--	*(8,820)*	17,640	35,280	52,560	100,800
275	--	*(2,790)*	*(5,670)*	*(9,720)*	13,680	28,890	--	*(8,460)*	16,470	33,390	49,860	95,850
300	--	*(2,700)*	*(5,400)*	*(9,360)*	13,140	27,720	--	*(8,010)*	15,750	32,220	47,970	91,980
350	--	*(2,430)*	*(4,950)*	*(8,640)*	12,150	25,650	--	*(7,650)*	14,580	29,880	44,100	85,140
400	--	*(2,340)*	*(4,680)*	*(8,100)*	11,340	23,940	--	*(6,930)*	*(13,770)*	27,990	41,400	79,740
450	--	*(2,160)*	*(4,410)*	*(7,560)*	10,710	22,590	--	--	*(13,050)*	26,100	39,150	75,150
500	--	*(2,070)*	*(4,140)*	*(7,200)*	10,170	21,420	--	--	*(11,610)*	24,930	37,170	71,280
550	--	--	*(3,960)*	*(6,840)*	9,720	20,430	--	--	*(11,520)*	23,760	35,280	68,220
600	--	--	*(3,780)*	*(6,570)*	9,270	19,530	--	--	*(11,160)*	22,590	33,750	65,160
650	--	--	*(3,690)*	*(6,300)*	8,910	18,810	--	--	*(10,710)*	21,870	32,580	62,460
700	--	--	*(3,510)*	*(6,120)*	8,550	18,090	--	--	*(10,350)*	21,060	31,410	60,210
750	--	--	*(3,420)*	*(5,850)*	8,280	17,460	--	--	*(9,990)*	20,340	30,330	58,320
800	--	--	*(3,240)*	*(5,670)*	8,010	16,920	--	--	*(9,720)*	19,530	29,160	56,340
900	--	--	*(3,060)*	*(5,400)*	7,560	15,930	--	--	*(9,180)*	18,360	27,630	52,920
1000	--	--	*(2,970)*	*(5,040)*	7,200	15,120	--	--	*(8,460)*	17,640	26,100	50,220

Flow rates are based on Darcy's equation with 20% reduction due to minor internal flashing of liquid in the piping. Calculation assumes turbulent flow, a pressure drop of 1 psig, and the weight density of propane taken at 0°F.

Flow rates shown in brackets (red italics) are considered too low to be protected by a single 4 USGPM excess flow valve mounted on the tank, per CSA B149.2-20 SCOP 7.4.8.1, and shall not be considered for single line services to a single appliance.

7.4.8.1 Any line utilized for propane flow shall have a flow capacity to atmosphere greater than the design flow rate of the excess-flow valve protecting the line, or have a vapour flow capacity based on Annex B of CSA B149.1, or a liquid flow capacity based on Appendix A of this SCOP, of at least 75% of the rated capacity of the excess flow valve protecting the line.

Rationale: The capacity on this chart is based on a pressure drop of 1 psig, whereas the excess flow valve will experience a flow rate based on a pressure drop to zero psig.