

CSA B149.1:25

This Informative Document provides helpful information relevant to the code.

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3 Definitions

Combustible

materials made of, or surfaced with, wood, compressed paper, plant fibers, or other materials that are capable of being ignited and burned; such material shall be considered combustible even though flame-proof, fire-retardant treated, plastered, or part of the construction of a fire-rated barrier.

Non-combustible

material that conforms to CAN/ULC-S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials; to pass this test, the sample cannot flame or cause a temperature rise within an oven at 750°C; any building material containing even a small proportion of combustibles will be classified as combustible when subjected to this test.

Combination system

an installation that combines both potable hot water and hydronic space heating.

Manufactured or mobile home

a transportable, single or multiple section single family dwelling conforming to the CAN/CSA – Z240 MH, Series of Standards, Manufactured Homes, at time of manufacture; it is ready for occupancy upon completion of setup in accordance with required factory recommended installation instructions; these structures are required to have all gas fired appliances installed in accordance with CAN/CSA – Z240 MH, Series of Standards, Manufactured Homes, per CSA B149.1:25 Clause 4.8.1; all appliances must be certified for installation in Canada.

Modular or ready to move (RTM) homes

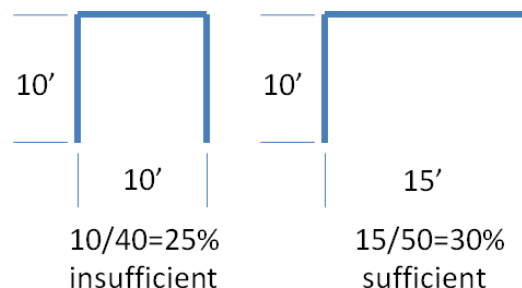
are constructed to The National Building Code, and the installation of the gas appliances conforms to the B149.1:25 Natural Gas and Propane Installation Code; modular or RTM homes certified through CAN/CSA - A - 277, Procedure for Certification of Prefabricated Buildings, Modules, and Panels, covers the installation of hidden or closed-in gas components (gas piping and venting) and require no additional inspection; if the modular or RTM home is not certified to CAN/CSA - A - 277, the inspection of the hidden or closed-in gas components shall be inspected to conform with the B149.1:25 Natural Gas and Propane Installation Code; all appliances must be certified for installation in Canada.

Note: *Some modular or RTM homes come with furnaces certified for manufactured or mobile homes. These furnaces typically do not have return air ducting. Usually, the central hallway serves as the return air path. Because of this, any other gas appliance installed must have its' combustion process separate from the living space.*

Outdoors

for the purpose of the TSASK CSA B149.1:25 Informative Document, an appliance that is certified for outdoor use is considered to be outdoors if installed with shelter no more inclusive than:

- a) with walls on all sides, but with no overhead cover; or
- b) within a partial enclosure that includes an overhead cover and up to three side walls, as long as 30% or more of the total horizontal perimeter of the enclosure is permanently open.



For example, consider a 10'x10' space versus a 10' x 15' space, each open to one side, as shown above.

Permanently Open

for the purpose of the TSASK CSA B149.1:25 Informative Document, a sidewall is considered to be permanently open if constructed with shelter no more inclusive than:

- a) for natural gas;
 - i) solid or air-restrictive construction (railings, lattice, etc.) is permitted only within the lowest vertical 4' from floor level to guard rail; and
 - ii) the remaining area of the sidewall located vertically above 4' is permanently open or screened, except for roof support columns.
- b) for propane;
 - i) no solid or air-restrictive construction is permitted. Railings must not be air-restrictive in construction.

If any of the space (above 4' from the floor for natural gas) is equipped with glass, panels, shutters, blinds, curtains or draperies, even temporarily, then these walls can no longer be considered permanently open. Outdoor gas-fired appliances may then need to be relocated as appropriate.

4 General

4.4 Training and quality of labour

4.4.3 Permit

No person shall apply for a permit to install any works to which the Gas Inspection Act applies unless they have the requisite license in Saskatchewan from TSASK Gas Licensing to do so. No person shall commence any work to which this Act applies unless the person has been issued a permit from Gas Inspections authorizing the work to commence.

Note: *The Gas Licensing Regulations stipulate that the holder of a domestic contractor's license may undertake work only on installations where the total combined gas load (connected to one meter or delivery point) does not exceed 700 000 Btu/h and individual appliance load does not exceed 400 000 Btu/h.*

4.4.4 Plan review

All systems exceeding 2000 feet of piping (in a single run) and all systems having an input rating exceeding 5 000 000 Btu/h (as listed on a New or Addition permit) are subject to a Plan Review by Gas Inspections prior to commencement.

4.5 Suitability of use

4.5.5.2 Flooding inspection qualifications

A Saskatchewan licensed gas fitter is an acceptable person to conduct an inspection pursuant to CSA B149.1:25 Clause 4.5.5. For appliances, accessories, components, and equipment exposed to flooding, they shall refer to the Emergency Flood Guidelines in Appendix D.

4.23 Protection of appliances from physical damage

4.23.1 Conditions

When appliances are installed in locations that do not afford protection from damage from motor vehicles, they shall be protected by posts or guardrails in compliance with CSA B149.1:25 Clause 6.16.15 or other equivalent means of acceptable protection.

6 Gas piping systems

6.2 Material

6.2.14.1 Stainless Steel

Examples of other permissible materials which meet or exceed the minimum acceptable performance standards for gas piping and fittings listed in CSA B149.1:25 Clause 6.2 include ASTM 312 stainless steel piping, and ASTM A182 stainless steel flanges, fittings, and valves commonly used in an aggressively corrosive environment such as potash or salt facilities.

6.3 Size

6.3.1.1 Use of capacity tables for sizing of piping and tubing

As per CSA B149.1:25 Clause 6.3, the gas piping system shall be of sufficient size as determined by

- a) the formulas in clause A.3.5 of CSA B149.1:25,
- b) the capacity tables provided in Annex A of CSA B149.1:25, and/or

- c) the capacity tables provided in Appendix A of the TSASK CSA B149.1:25 Informative Document.

The method used in the application of the formulas or capacity tables may be either

- a) the Total Length/Total Load method as described in Annex A of CSA B149.1:25, or
- b) the Actual Length/Actual Load method as described in Appendix A of the TSASK CSA B149.1:25 Informative Document.

For the maximum capacity of schedule 40 piping, or plastic pipe, with an inlet pressure of 3 psig based on a pressure drop of 2 psig, refer to Table A.18 a) in Appendix A of the TSASK CSA B149.1:25 Informative Document.

For the maximum capacity of liquid propane copper tubing or schedule 80 piping which is gravity fed from a propane tank (not using a pump), refer to Table B.13 in Appendix A of the TSASK CSA B149.1:25 Informative Document.

6.3.6.1 Pressure drop

For natural gas installations with a designed delivery pressure of 7 inches water column. The maximum allowable pressure drop is 0.5 inches water column.

For propane installations with designed delivery pressure of 11 inches water column, the maximum allowable pressure drop is 1 inch water column.

6.3.6.2 Schedule 80 pipe capacity

Where Schedule 80 pipe is used in natural gas or propane vapour service, Schedule 80 pipe has a lower capacity than that provided in the capacity tables for Schedule 40 pipe.

The capacity tables A.1 through A.7 in CSA B149.1:25 can be used for Schedule 80 pipe by using the following derating factors:

NPS $\frac{3}{4}$ sch 40 pipe – take the value from the table and multiply by 0.76

NPS 1 sch 40 pipe – take the value from the table and multiply by 0.78

NPS 1 $\frac{1}{4}$ sch 40 pipe – take the value from the table and multiply by 0.82

NPS 1 $\frac{1}{2}$ sch 40 pipe – take the value from the table and multiply by 0.83

NPS 2 sch 40 pipe – take the value from the table and multiply by 0.84

NPS 2 $\frac{1}{2}$ sch 40 pipe – take the value from the table and multiply by 0.85

NPS 3 sch 40 pipe – take the value from the table and multiply by 0.86

NPS 4 sch 40 pipe – take the value from the table and multiply by 0.87

These factors are identical for each table (A.1 through A.7). For reference, these derated values for Schedule 80 pipe are provided as Tables A.1 c) to A.7 c) in Appendix A of the TSASK CSA B149.1:25 Informative Document.

6.9 Joints and connections

6.9.3.1 Welding requirements

Welding of gas piping within Saskatchewan shall be performed in accordance with a procedure supplied to and approved by the Chief Gas Inspector. Welding procedures, registered with the Technical Safety Authority of Saskatchewan (TSASK), are acceptable. Welding of gas piping shall be performed by an operator qualified under the applicable welding procedure. Documentation of welder registration in the province, territory, state or country shall be provided to and approved by the Chief Gas Inspector.

6.9.4.1 QC program

All welding projects shall conform to the installer's Quality Control (QC) Program, which has been developed following the principles of an appropriate standard, and shall be documented with a copy submitted to The Chief Gas Inspector. The QC Program shall contain records of welding procedures, qualification of personnel, weld schedules, repair schedules, and inspection reports.

6.15 Underground piping and tubing

6.15.17 Horizontal directional drilling

The installer shall ensure that the gas piping systems installed by Horizontal Directional Drilling are not subject to a pull strength (lbs) exceeding the piping manufacturer's maximum pull over time specifications, or the values in the table shown below.

Allowable Tensile Loads for HDPE, MDPE, Steel Pipe Sizes at 73°F (23°C) & Pull Duration of 1 Hour or Less

O.D.	MDPE SDR 11	MDPE SDR 9	HDPE SDR 11	HDPE SDR 9	Sch 40	Sch 80
½	191	228	235	280	323	404
¾	307	367	378	451	430	548
1	467	558	575	687	632	804
1 ¼	744	889	916	1095	854	1113
1 ½	974	1164	1200	1434	1020	1349
2	1524	1821	1875	2241	1367	1808
3	3309	3924	4072	4867	2824	3815
4	5470	6563	6732	8045	4021	5576

* Plastic Pipe Institute TN-63 Safe Pull Strength (2021)

6.18 Manual shut-off valves

6.18.1.1 Liquid propane

Manual shut-off valves on liquid propane piping systems shall be certified to UL 125 or approved for use with liquid propane.

6.20 Gas hose and fittings

6.20.9 Hoses for torches

In propane applications, one or several gas hoses may be run from a tank and/or vaporizer that is installed outdoors at ground level to provide vapour propane to portable torches for temporary roofing operations on the roof of a building under the following conditions:

- a) where the torches are certified with a rated working pressure of at least 350 psig, 100% tank vapour pressure may be used without the need for a regulator. Where a vaporizer is used, the downstream hose pressure shall be regulated and protected to not exceed 90% of the lowest torch rated working pressure.
- b) no hose shall exceed 100 ft in length, in accordance with CSA B149.1:25 Clause 6.20.3
- c) means shall be provided to prevent the liquefaction of propane between the tank and any portable torch. One acceptable means is to depressurize the supply system by closing the tank valve while at least one torch on the roof remains lit, until it is extinguished.

7 Installations of specific types of appliances

7.1 Boilers

7.1.5 Requirements for boilers not requiring registration with TSASK

These requirements apply to any boiler installation which is exempt from design registration with the Technical Safety Authority of Saskatchewan (TSASK) under the Boiler and Pressure Vessel Act and Regulations, such as;

- Low pressure boilers with heating surfaces of 32.3 ft² (3 m²) or less; or
- High pressure boilers with heating surfaces of 21.5 ft² (2 m²) or less.

7.1.5.3 Pressure relief valves

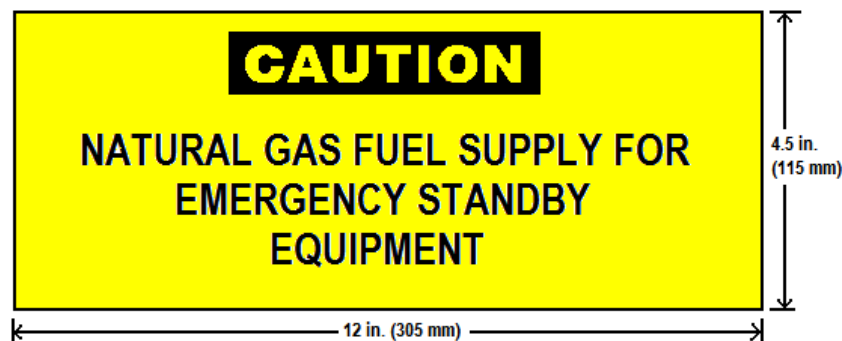
Pressure relief valves shall be installed so as to stand in an upright position, with the spindle vertical and;

- a) discharge outlets shall extend downwards, and shall have the same internal diameter as the relief valve opening, and
- b) terminate no more than 12 in (300 mm), nor less than twice the internal diameter of the discharge pipe, off the floor. The end of the discharge pipe shall not be threaded or provided with a fitting, which could allow the discharge pipe to be blocked or restricted.

7.2.3 Emergency generators

7.2.3.1.1 Sign

The sign referenced in CSA B149.1 Clause 7.2.3.1 shall conform to requirements in CSA C282, Emergency Electrical Power Supply for Buildings, or otherwise meet the following specifications:



Note: *The appropriate fuel must be identified.*

Color code: *yellow background with black lettering*

7.2.5 Additional requirements for gas engines and turbines in buildings

7.2.5.3.1 Acceptable construction

Examples of acceptable construction for walls with a 2-hour fire resistance rating includes:

- a) brick construction – minimum 4 in thick.
- b) wood stud framing, 16 in on centre, mineral-fibre insulated between studs and covered with gypsum board drywall, minimum 1 in thickness on each side (such as two ½ in thick gypsum boards, overlayed on each side).
- c) minimum 2.5 in thickness of gypsum drywall sandwiched between metal cladding on each side.

Source: *Appendix D of The National Building Code 2020*

7.13 Central furnaces

7.13.8 Plenum protection

A furnace that is permanently installed where there is only a return air filter, or warm air plenum with take offs, shall have both the return air filter and warm air plenum outlets protected against an influx of waste or discarded material.

7.23 Infrared Heaters

7.23.1.1 Worksheet

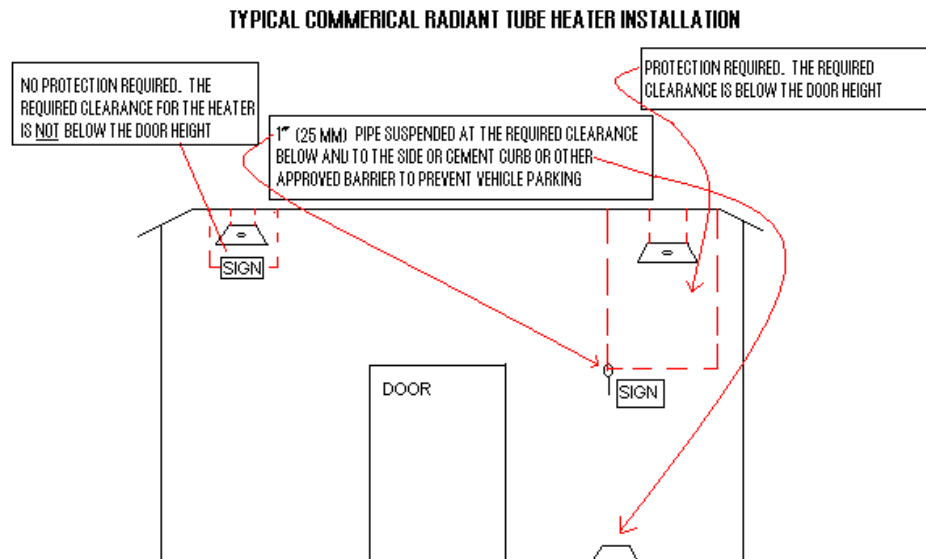
For a worksheet to calculate compliance to code for unvented heaters in livestock and poultry barns, see Appendix H.

7.23.3.1 Acceptable methods

Acceptable means of maintaining clearance:

- a) photoelectric sensor which is interlocked to shut off the heater;
- b) cement barriers to prevent encroachment into clearance area;
- c) 1 in (25 mm) Schedule 40 black pipe hung at appropriate level; or

d) other effective barriers which must receive prior approval.



7.25 Decorative appliances and gas logs

7.25.1.1 Vented gas fireplace heaters installation

All gas fireplaces and heaters that are certified to CSA 2.33 Vented Gas Fireplace Heaters have special requirements when it comes to clearances to combustibles. The standards under which these fireplaces and heaters are constructed contain the definitions for "Combustible" and "Non-combustible" found in the Definitions section of the TSASK CSA B149.1:25 Informative Document.

Ensure that any material placed within the zone specified by the heater/fireplace manufacturer for non-combustible material has only non-combustible material installed. As an example, cement board and steel sheets are considered non-combustible. Fire-rated drywall or gypsum wallboard is considered combustible and cannot be used in a non-combustible material zone. Any material that does not meet this strict requirement for non-combustible will have to be replaced.

8.24 Venting arrangements

8.24.5 Unvented heaters

For a worksheet to calculate compliance to code for unvented heaters in livestock and poultry barns, see Appendix E.

8.30 Venting of appliances into canopies

8.30.5 Applications

The practice of permitting an exhaust hood to act as the venting of appliances that require venting is now restricted to only those appliances with flue outlets located directly under the exhaust hood per CSA B149.1 clause 8.30.1(c). The past practice of locating an appliance adjacently and venting this appliance horizontally by cutting into, or terminating the vent under, an exhaust hood is not permitted.

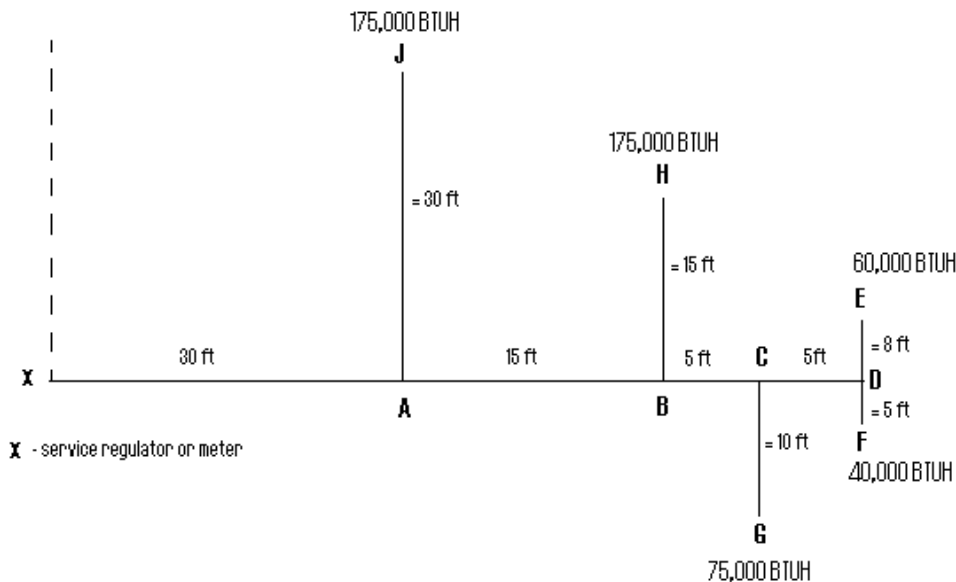
Appendix A – Sizing

Actual length/actual load

Pipe sizing method example (imperial)

Step #	Actual Distance	Actual Load (BTU/H)	Natural Gas: Pressure 7" WC Specific Gravity = 0.6 Pressure Drop = 0.5" WC Table A-1.1 (B149.1-M95) Minimum Pipe Size Required	Propane: Pressure 11" WC Specific Gravity = 1.52 Pressure Drop = 1" WC Table A-1.1 (B149.2 M95) Minimum Pipe Size Required
1	X to F = 60 ft	40,000 at F	½ in. D to F	½ in. D to F
2	X to E = 63 ft	60,000 at E	¾ in. D to E	½ in. D to E
3	X to D = 55 ft	100,000 at D (E + F)	¾ in. C to D	½ in. C to D
4	X to G = 60 ft	75,000 at G	¾ in. C to G	½ in. C to G
5	X to C = 50 ft	175,000 at C (E+F+G)	1 in. B to C	¾ in. B to C
6	X to H = 60 ft	175,000 at H	1 in. B to H	¾ in. B to H
7	X to B = 45 ft	350,000 at B (E+F+G+H)	1 ¼ in. A to B	1 in. A to B
8	X to J = 60 ft	175,000 at J	1 in. A to J	¾ in. A to J
9	X to A = 30 ft	525,000 Total Load	1 ¼ in. X to A	1 in. X to A

**EXAMPLE OF PIPING DESIGN SIZING
(IMPERIAL MEASUREMENTS)**



Actual length/actual load

Pipe sizing method example (metric)

Step #	Actual Distance (Meter)	Actual Load (Kilowatt)	Natural Gas: Pressure 1.75 KPa Specific Gravity = 0.6 Pressure Drop = 125 Pa Table A-1.1 (B149.1-05) Minimum Pipe Size Required	Propane: Pressure 2.7 KPa Specific Gravity = 1.52 Pressure Drop = 250 Pa Table A-1.1 (B149.1-05) Minimum Pipe Size Required
1	X to F = 17.4 m	12 kW at F	12.5 mm. D to F	12.5 mm. D to F
2	X to E = 17.9 m	18 kW at E	19 mm. D to E	12.5 mm. D to E
3	X to D = 16.5 m	29 kW at D (E+F)	19 mm. C to D	12.5 mm. C to D
4	X to G = 18 m	22 kW at G	19 mm. C to G	12.5 mm. C to G
5	X to C = 15 m	51 kW at C (E+F+G)	25 mm. B to C	19 mm. B to C
6	X to H = 18 m	51 kW at H	25 mm. B to H	19 mm. B to H
7	X to B = 13.5 m	103 kW at B (E+F+G+H)	31.75 mm. A to B	25 mm. A to B
8	X to J = 18 m	51 kW at J	25 mm. A to J	19 mm. A to J
9	X to A = 9 m	152 kW -Total Load	31.75 mm. X to A	25 mm. X to A

EXAMPLE OF PIPING DESIGN SIZING (METRIC MEASUREMENTS)

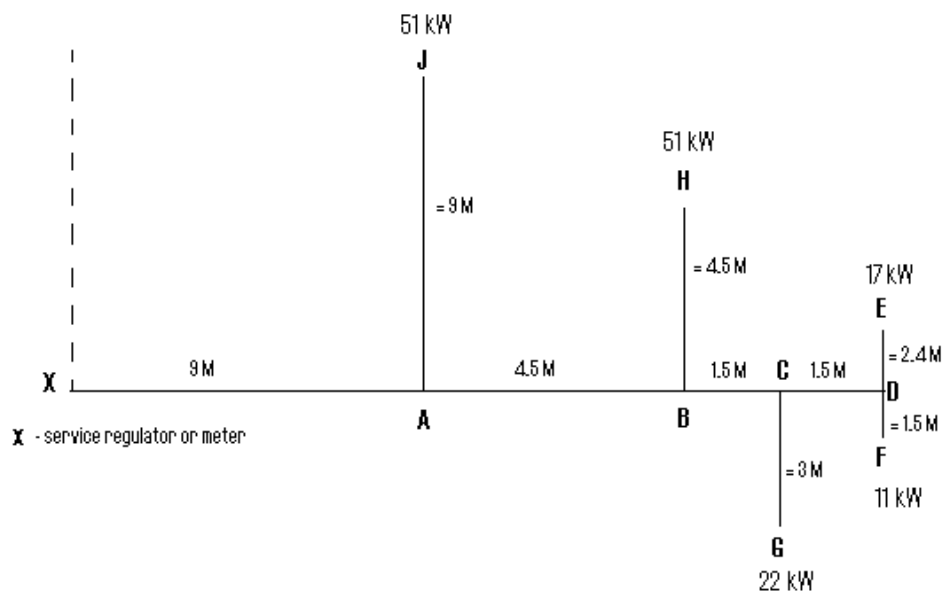


Table A.2 c) [Sch 80]

Table A.2 c) Maximum capacity of natural gas in thousands of Btu/h for Schedule 80 pipe and plastic pipe for pressures over 7 in w.c. up to 14 in w.c. based on a pressure drop of 1 in w.c.									
<u>Length of pipe</u> ft	<u>Pipe Size (NPS)</u>								
	<u>"1/2"</u>	<u>"3/4"</u>	<u>1</u>	<u>"1-1/4"</u>	<u>"1-1/2"</u>	<u>2</u>	<u>"2-1/2"</u>	<u>3</u>	<u>4</u>
10	N/A	360	697	1505	2282	4448	7173	12830	26473
20	N/A	248	479	1034	1569	3057	4930	8818	18195
30	N/A	199	385	831	1259	2454	3959	7081	14612
40	N/A	170	329	711	1078	2101	3388	6060	12505
50	N/A	151	292	630	955	1862	3003	5372	11083
60	N/A	137	264	571	866	1687	2721	4867	10042
70	N/A	126	243	525	796	1552	2503	4477	9239
80	N/A	117	226	489	741	1444	2329	4165	8595
90	N/A	110	212	458	695	1355	2185	3908	8064
100	N/A	104	200	433	657	1280	2064	3692	7618
125	N/A	92	178	384	582	1134	1829	3272	6751
150	N/A	84	161	348	527	1027	1658	2964	6117
175	N/A	77	148	320	485	946	1525	2727	5628
200	N/A	71	138	298	452	879	1419	2537	5236
250	N/A	63	122	264	400	780	1257	2249	4640
300	N/A	57	111	239	363	706	1139	2037	4204
350	N/A	52	102	220	334	650	1048	1875	3868
400	N/A	49	94	204	310	605	975	1744	3598
450	N/A	46	89	192	291	567	915	1637	3376
500	N/A	43	84	181	275	536	864	1545	3189
600	N/A	40	76	164	249	486	783	1400	2889
700	N/A	36	70	151	229	447	720	1288	2659
800	N/A	33	65	140	213	416	670	1199	2473
900	N/A	32	61	132	200	390	629	1125	2320
1000	N/A	30	58	125	189	368	594	1062	2192
1200	N/A	27	52	113	171	333	538	962	1986
1400	N/A	25	48	104	158	307	495	886	1827
1600	N/A	23	44	97	147	286	461	824	1700
1800	N/A	22	42	91	138	268	432	773	1595
2000	N/A	21	40	85	129	253	408	730	1507

Table A.3 c) [Sch 80]

Table A.3 c) Maximum capacity of natural gas in thousands of Btu/h for Schedule 80 pipe and plastic pipe for pressure of 2 psig based on a pressure drop of 1 psig									
Length of pipe ft	Pipe Size (NPS)								
	"1/2"	"3/4"	1	"1-1/4"	"1-1/2"	2	"2-1/2"	3	4
10	N/A	2289	4425	9551	14485	28232	45535	81443	168050
20	N/A	1573	3041	6564	9955	19404	31295	55976	115499
30	N/A	1263	2442	5272	7995	15582	25131	44950	92751
40	N/A	1081	2090	4512	6843	13337	21509	38471	79382
50	N/A	958	1853	3998	6064	11820	19063	34096	70355
60	N/A	868	1679	3623	5495	10709	17273	30894	63747
70	N/A	799	1544	3333	5055	9852	15891	28422	58646
80	N/A	743	1437	3101	4703	9166	14783	26442	54559
90	N/A	697	1348	2909	4412	8600	13870	24809	51191
100	N/A	659	1273	2748	4168	8124	13102	23434	48355
125	N/A	584	1129	2435	3694	7200	11612	20770	42856
150	N/A	529	1023	2207	3347	6523	10521	18819	38831
175	N/A	486	941	2030	3079	6002	9680	17313	35724
200	N/A	453	875	1888	2864	5583	9005	16106	33234
250	N/A	401	775	1674	2539	4948	7981	14275	29455
300	N/A	363	703	1517	2301	4484	7231	12934	26688
350	N/A	334	647	1396	2117	4125	6653	11899	24552
400	N/A	311	601	1298	1969	3837	6189	11070	22842
450	N/A	292	565	1218	1848	3600	5807	10386	21432
500	N/A	276	533	1150	1745	3401	5485	9811	20244
600	N/A	250	483	1042	1581	3082	4970	8890	18342
700	N/A	230	445	959	1454	2835	4572	8179	16875
800	N/A	214	413	892	1353	2638	4253	7608	15699
900	N/A	201	388	837	1270	2475	3991	7139	14730
1000	N/A	189	367	790	1199	2338	3770	6743	13914
1200	N/A	172	332	717	1086	2118	3416	6109	12606
1400	N/A	158	306	659	999	1949	592	5621	11598
1600	N/A	147	284	613	930	1813	2923	5229	10790
1800	N/A	138	267	576	872	1701	2743	4906	10123
2000	N/A	130	252	544	824	1607	2591	4635	9563

Table A.4 c) [Sch 80]

Table A.4 c) Maximum capacity of natural gas in thousands of Btu/h for Schedule 80 pipe and plastic pipe for pressure of 2 psig based on a pressure drop of 1.5 psig									
Length of pipe ft	Pipe Size (NPS)								
	"1/2"	"3/4"	1	"1-1/4"	"1-1/2"	2	"2-1/2"	3	4
10	N/A	2826	5465	11794	17887	34863	56228	100569	207514
20	N/A	1943	3756	8106	12293	23961	38644	69121	142623
30	N/A	1560	3015	6509	9872	19242	31033	55506	114532
40	N/A	1335	2581	5571	8449	16468	26560	47506	98025
50	N/A	1183	2288	4938	7488	14596	23540	42104	86877
60	N/A	1072	2072	4474	6785	13225	21329	38150	78717
70	N/A	986	1907	4116	6242	12167	19622	35097	72419
80	N/A	917	1774	3829	5807	11318	18255	32651	67372
90	N/A	861	1665	3592	5449	10620	17128	30635	63212
100	N/A	813	1572	3394	5147	10031	16179	28938	59710
125	N/A	720	1394	3008	4562	8891	14339	25647	52920
150	N/A	653	1263	2725	4133	8056	12992	23238	47949
175	N/A	601	1161	2507	3802	7411	11953	21379	44112
200	N/A	559	1080	2332	3537	6895	11120	19888	41039
250	N/A	496	958	2067	3135	6110	9855	17627	36371
300	N/A	449	868	1873	2840	5536	8929	15971	32956
350	N/A	413	799	1723	2614	5094	8215	14693	30319
400	N/A	384	743	1603	2431	4738	7642	13670	28205
450	N/A	360	697	1504	2281	4446	7171	12825	26465
500	N/A	340	658	1421	2155	4200	6774	12115	24998
600	N/A	309	597	1287	1952	3805	6137	10977	22650
700	N/A	283	548	1184	1796	3501	5646	10099	20837
800	N/A	264	510	1102	1671	3257	5253	9395	19385
900	N/A	248	479	1034	1568	3056	4928	8815	18189
1000	N/A	234	452	977	1481	2886	4655	8327	17181
1200	N/A	212	410	885	1342	2615	4218	7545	15567
1400	N/A	195	377	814	1234	2406	3880	6941	14322
1600	N/A	182	351	757	1149	2239	3610	6457	13323
1800	N/A	170	329	710	1077	2100	3387	6059	12501
2000	N/A	161	311	671	1018	1984	3199	5722	11809

Table A.5 c) [Sch 80]

Table A.5 c) Maximum capacity of natural gas in thousands of Btu/h for Schedule 80 pipe and plastic pipe for pressure of 5 psig based on a pressure drop of 2.5 psig									
<u>Length of pipe</u> ft	<u>Pipe Size (NPS)</u>								
	<u>"1/2"</u>	<u>"3/4"</u>	<u>1</u>	<u>"1-1/4"</u>	<u>"1-1/2"</u>	<u>2</u>	<u>"2-1/2"</u>	<u>3</u>	<u>4</u>
10	N/A	4450	8602	18567	28158	54883	88516	158323	326682
20	N/A	3058	5912	12761	19353	37721	60837	108814	224527
30	N/A	2456	4748	10248	15541	30291	48854	87381	180303
40	N/A	2102	4064	8771	13302	25926	41813	74787	154316
50	N/A	1863	3601	7773	11788	22977	37058	66283	136767
60	N/A	1688	3263	7043	10681	20819	33578	60056	123921
70	N/A	1553	3002	6480	9826	19153	30891	55252	114006
80	N/A	1445	2793	6028	9142	17818	28738	51400	106061
90	N/A	1355	2620	5656	8577	16719	26964	48228	99513
100	N/A	1281	2475	5342	8102	15792	25469	45556	93999
125	N/A	1135	2193	4735	7181	13996	22573	40375	83310
150	N/A	1028	1987	4290	6506	12681	20453	36583	75485
175	N/A	946	1828	3947	5986	11667	18816	33656	69445
200	N/A	880	1701	3672	5568	10854	17505	31310	64605
250	N/A	780	1508	3255	4935	9620	15514	27750	57258
300	N/A	707	1366	2949	4472	8716	14057	25143	51881
350	N/A	650	1257	2713	4114	8019	12933	23131	47729
400	N/A	605	1169	2524	3827	7460	12031	21519	44403
450	N/A	568	1097	2368	3591	6999	11289	20191	41662
500	N/A	536	1037	2237	3392	6612	10663	19072	39354
600	N/A	486	939	2026	3073	5990	9661	17281	35657
700	N/A	447	863	1865	2828	5511	8888	15898	32804
800	N/A	416	803	1734	2630	5127	8269	14790	30518
900	N/A	390	754	1628	2468	4811	7759	13877	28633
1000	N/A	369	712	1538	2331	4544	7329	13108	27047
1200	N/A	334	645	1393	2112	4117	6640	11877	24507
1400	N/A	307	594	1282	1943	3788	6109	10926	22546
1600	N/A	286	552	1192	1808	3524	5683	10165	20975
1800	N/A	268	518	1118	1697	3306	5332	9537	19680
2000	N/A	253	490	1056	1602	3123	5037	9009	18589

Table A.6 c) [Sch 80]

Table A.6 c) Maximum capacity of natural gas in thousands of Btu/h for Schedule 80 pipe and plastic pipe for pressures of 10 psig based on a pressure drop of 5 psig									
Length of pipe ft	Pipe Size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	"2-1/2"	3	4
10	N/A	7155	13834	29859	45284	88263	142352	254614	525370
20	N/A	4918	9508	20522	31123	60663	97838	174995	361084
30	N/A	3950	7635	16480	24993	48714	78567	140527	289963
40	N/A	3380	6535	14105	21391	41693	67244	120273	248171
50	N/A	2996	5792	12501	18958	36952	59597	106595	219949
60	N/A	2715	5248	11327	17178	33481	53999	96583	199290
70	N/A	2497	4828	10421	15803	30802	49678	88855	183344
80	N/A	2323	4491	9694	14702	28656	46216	82663	170566
90	N/A	2180	4214	9095	13795	26887	43363	77560	160037
100	N/A	2059	3980	8592	13030	25397	40961	73263	151169
125	N/A	1825	3528	7615	11549	22509	36303	64931	133979
150	N/A	1654	3196	6899	10464	20394	32892	58833	121395
175	N/A	1521	2941	6348	9626	18763	30261	54125	111682
200	N/A	1415	2736	5905	8956	17455	28152	50353	103898
250	N/A	1254	2425	5233	7937	15470	24950	44627	92083
300	N/A	1136	2197	4742	7192	14017	22607	40435	83434
350	N/A	1046	2021	4362	6616	12896	20798	37200	76758
400	N/A	973	1881	4058	6155	11997	19349	34607	71409
450	N/A	913	1764	3808	5775	11256	18154	32471	67000
500	N/A	862	1667	3597	5455	10633	17148	30672	63288
600	N/A	781	1510	3260	4943	9634	15538	27791	57343
700	N/A	718	1389	2999	4548	8863	14294	25567	52755
800	N/A	669	1292	2790	4231	8245	13298	23785	49078
900	N/A	627	1213	2617	3969	7736	12477	22317	46049
1000	N/A	593	1145	2472	3749	7308	11786	21080	43497
1200	N/A	537	1038	2240	3397	6621	10679	19101	39412
1400	N/A	494	955	2061	3125	6092	9824	17572	36258
1600	N/A	460	888	1917	2907	5667	9140	16348	33732
1800	N/A	431	833	1799	2728	5317	8576	15338	31649
2000	N/A	407	787	1699	2577	5022	8101	14488	29896

Table A.7 c) [Sch 80]

Table A.7 c) Maximum capacity of natural gas in thousands of Btu/h for Schedule 80 pipe and plastic pipe for pressures of 20 psig based on a pressure drop of 10 psig									
Length of pipe ft	Pipe Size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2"	3	4
10	N/A	12187	23561	50855	77125	150326	242447	433646	894785
20	N/A	8376	16194	34953	53008	103318	166633	298042	614981
30	N/A	6727	13004	28068	42567	82968	133812	239339	493851
40	N/A	5757	11130	24023	36432	71010	114526	204843	422673
50	N/A	5103	9864	21290	32289	62934	101502	181549	374607
60	N/A	4623	8938	19291	29256	57023	91968	164497	339421
70	N/A	4253	8223	17747	26915	52461	84610	151334	312263
80	N/A	3957	7649	16511	25039	48805	78713	140787	290501
90	N/A	3713	7178	15491	23494	45792	73854	132096	272568
100	N/A	3507	6780	14633	22192	43255	69762	124777	257465
125	N/A	3108	6008	12969	19669	38336	61829	110588	228187
150	N/A	2816	5444	11751	17821	34735	56021	100200	206754
175	N/A	2591	5008	10811	16395	31956	51539	92183	190211
200	N/A	2410	4660	10057	15253	29728	47947	85759	176955
250	N/A	2136	4129	8913	13518	26348	42494	76007	156831
300	N/A	1936	3742	8076	12248	23873	38503	68867	142101
350	N/A	1781	3442	7430	11268	21963	35422	63357	130731
400	N/A	1657	3203	6913	10483	20432	32954	58942	121620
450	N/A	1554	3005	6485	9836	19171	30920	55303	114112
500	N/A	1468	2838	6126	9291	18109	29206	52239	107790
600	N/A	1330	2572	5551	8418	16408	26463	47332	97665
700	N/A	1224	2366	5107	7745	15095	24346	43545	89851
800	N/A	1138	2201	4751	7205	14043	22649	40510	83589
900	N/A	1069	2065	4458	6760	13176	21251	38009	78429
1000	N/A	1009	1951	4211	6385	12446	20074	35903	74083
1200	N/A	914	1767	3815	5786	11277	18187	32531	67125
1400	N/A	841	1626	3510	5323	10375	16732	29928	61753
1600	N/A	783	1512	3265	4952	9652	15566	27843	57450
1800	N/A	734	1420	3064	4646	9056	14606	26123	53903
2000	N/A	694	1341	2894	4389	8554	13796	24676	50917

Table A.18 a) [3 psig]

Maximum capacity of natural gas in thousands of Btu/h for Schedule 40 pipe and plastic pipe, including fittings, for pressures of 3 psig based on a pressure drop of 2 psig

Length (ft)	Pipe Diameter (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
10	2,131	4,455	8,393	17,231	25,817	49,721	79,247	140,095	285,749
20	1,464	3,062	5,768	11,843	17,744	34,173	54,466	96,286	196,394
30	1,176	2,459	4,632	9,510	14,249	27,442	43,738	77,321	157,711
40	1,006	2,105	3,964	8,139	12,195	23,487	37,434	66,177	134,980
50	892	1,865	3,514	7,214	10,808	20,816	33,177	58,652	119,630
60	808	1,690	3,184	6,536	9,793	18,861	30,061	53,143	108,394
70	744	1,555	2,929	6,013	9,010	17,352	27,656	48,890	99,721
80	692	1,446	2,725	5,594	8,382	16,142	25,728	45,483	92,771
90	649	1,357	2,557	5,249	7,864	15,146	24,140	42,675	87,044
100	613	1,282	2,415	4,958	7,429	14,307	22,803	40,311	82,221
125	543	1,136	2,140	4,394	6,584	12,680	20,209	35,727	72,871
150	492	1,029	1,939	3,981	5,965	11,489	18,311	32,371	66,027
175	453	947	1,784	3,663	5,488	10,570	16,846	29,781	60,744
200	421	881	1,660	3,408	5,106	9,833	15,672	27,705	56,510
250	373	781	1,471	3,020	4,525	8,715	13,890	24,555	50,084
300	338	708	1,333	2,736	4,100	7,896	12,585	22,248	45,380
350	311	651	1,226	2,517	3,772	7,264	11,578	20,468	41,749
400	290	606	1,141	2,342	3,509	6,758	10,771	19,042	38,839
450	272	568	1,070	2,197	3,292	6,341	10,106	17,866	36,442
500	257	537	1,011	2,076	3,110	5,990	9,546	16,876	34,422
600	233	486	916	1,881	2,818	5,427	8,650	15,291	31,189
700	214	447	843	1,730	2,592	4,993	7,958	14,068	28,694
800	199	416	784	1,610	2,412	4,645	7,403	13,087	26,694
900	187	391	736	1,510	2,263	4,358	6,946	12,279	25,046
1000	176	369	695	1,427	2,137	4,117	6,561	11,599	23,658
1200	160	334	630	1,293	1,937	3,730	5,945	10,510	21,436
1400	147	307	579	1,189	1,782	3,431	5,469	9,669	19,721
1600	137	286	539	1,106	1,658	3,192	5,088	8,995	18,347
1800	128	268	506	1,038	1,555	2,995	4,774	8,440	17,214
2000	121	254	478	980	1,469	2,829	4,509	7,972	16,260

Table B.13 [Liquid Propane]

Maximum capacity of liquid propane (in thousands of Btu/h) for copper tubing or schedule 80 piping, gravity fed from a propane tank (no pump).

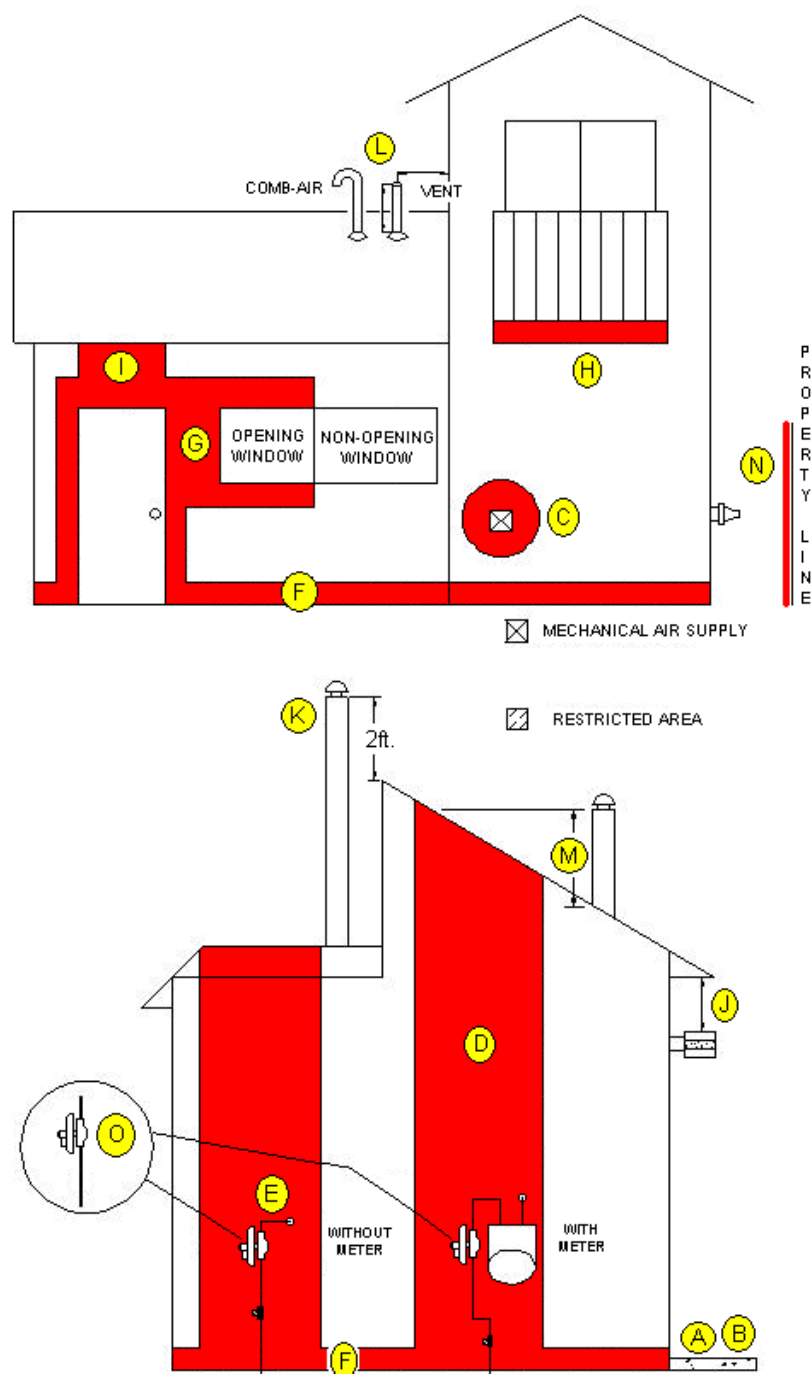
Length (ft)	TUBING (ID)						SCH 80 PIPE (NPS)					
	¼	3/8	1/2	5/8	3/4	1	1/2	3/4	1	1 ¼	1 ½	2
10	(7,110)	14,760	29,700	51,210	72,090	142,830	21,060	44,460	86,670	175,590	261,450	503,820
20	(4,950)	(10,440)	20,970	36,180	50,940	107,370	14,940	31,410	60,930	124,200	184,770	356,220
30	(4,050)	(8,550)	17,100	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 TSASK CSA B149.2 Informative Document Clause 7.4.8.1, and shall not be considered for single line services to a single appliance.

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 the TSASK CSA B149.1:25 Informative Document, of at least 75% of the rated capacity of the excess flow valve protecting the line.

Appendix B – Appliance vent termination



Appliance vent termination and regulator discharge clearances

8.14.8 Vent termination limitations

A vent shall not terminate

- (A) where it may cause hazardous frost or ice accumulations on adjacent property surfaces.
- (B) less than 7 ft (2.1 m) above a paved public sidewalk or driveway that is located on public property.
- (C) less than 6 ft (1.8 m) of a mechanical air-supply inlet to any building.
- (D) above a regulator within 3 ft (900 mm) horizontally of the vertical centerline of the regulator vent outlet to a maximum vertical distance of 15 ft (4.5 m);
- (E) except as required in 8.14.8 d), any distance less than detailed in Table 5.3
- (F) less than 1 ft (300mm) above grade.
- (G) less than the following distances of a window or door that can be opened in any building, of any nonmechanical air-supply inlet to any building, or of the combustion air inlet of any other appliance:
 - i) 6 in (150 mm) for inputs up to including 10 000 Btu/h (3 kW);
 - ii) 12 in (300 mm) for inputs 10 000 Btu/h (3 kW) up to including 100 000 Btu/h (30 kW); and
 - iii) 3 ft (0.9 m) for inputs exceeding 100 000 Btu/h (30 kW); and
- (H) underneath a veranda, porch or deck unless
 - i) the veranda, porch, or deck is fully open on a minimum of two sides beneath the floor; and
 - ii) the distance between the top of the vent termination and the underside of the veranda, porch, or deck is greater than 1 ft (300 mm);
 - iii) the 1 ft (300 mm) min. clearance to the underside of the veranda, porch, or deck shall be measured from the top of the vent to the bottom of the joists;
- (I) through a sidewall above a pedestrian doorway;
- (J) less than 4 ft (1.2 m) below a ventilated soffit unless specified as per the manufacturer's instructions. For unvented soffits follow manufacturer's installation instructions;

(K) 8.14.2 Vent minimum distances

Except for a special venting system with positive vent pressure, a vent shall extend not less than 2 ft (600 mm) above the highest point where it passes through a flat roof of a building and not less than 2 ft (600 mm) higher than any portion of a building within a horizontal distance of 10 ft (3 m).

(L) 8.14.3 Positive vent pressure minimum distances

A vent used in a special venting system with positive vent pressure and passing through a roof shall extend at least 18 in (450 mm) above the highest point where it passes through the roof surface and the same distance above any other obstruction within a horizontal distance of 18 in (450 mm).

(M) 8.14.5 Pitched roof distances *

Except for a special venting system with positive vent pressure, a vent passing through a pitched roof shall extend above the highest point where it passes through a roof surface in accordance with Figure 8.1 and shall extend not less than 2 ft (600 mm) above any obstruction within a horizontal distance of 10 ft (3 m).

(N) 8.14.14 Property Clearance (TSASK CSA B149.1:25 Interpretations)

A vent from a Category IV appliance:

- a) shall not pass through an exterior wall and terminate adjacent to the exterior wall unless there is a minimum unobstructed distance of 4 ft (1.2m) or greater from the foundation to the property line of the adjacent lot;
- b) that terminates into a side yard which measures not less than 4 ft (1.2m), and not greater than 8 ft (2.4m), from the foundation wall to the property line of the adjacent lot, shall have a means of redirecting the vent plume with a certified fitting such as a tee, a 90 degree elbow or a termination acceptable to the Authority Having Jurisdiction, installed in accordance with the manufacturer's installation instructions; and
- c) that terminates into a side yard which measures greater than 8 ft (2.4m), from the foundation wall to the property line of the adjacent lot will not require redirection.

(O) 5.6 Termination of vent lines

Except where permitted by Clauses 5.5.1.4 and 5.5.4, the vent line from overpressure protection devices, relief devices, and internal relief valves, and the termination of any other vent line not eligible to be vented into a ventilated space shall terminate outdoors with the clearances specified in Table 5.3.

**Exposed lengths of B Vent shall be installed in an adequately insulated chase.*

Appendix C – Termination of vent lines

5.6 Termination of vent lines

Except where permitted by Clauses 5.5.1.4 and 5.5.4, the vent line from overpressure protection devices, relief devices, and internal relief valves, and the termination of any other vent line not eligible to be vented into a ventilated space shall terminate outdoors with the clearances specified in Table 5.3.

Table 5.3

Clearance from vent line and bleed vent terminations, ft (m)

	A Column Natural gas and hydrogen-natural gas blend vents (relief or bleed) $\leq 50 \text{ ft}^3/\text{h}$ ($1.5 \text{ m}^3/\text{h}$)	B Column Natural gas and hydrogen-natural gas blend relief vents (relief or bleed) $> 50 \text{ ft}^3/\text{h}$ ($1.5 \text{ m}^3/\text{h}$) and $\leq 1900 \text{ ft}^3/\text{h}$ ($55 \text{ m}^3/\text{h}$)	C Column Natural gas and hydrogen-natural gas blend relief vents (relief or bleed) $> 1900 \text{ ft}^3/\text{h}$ ($55 \text{ m}^3/\text{h}$)	D Column Propane relief vents and bleed vents
Building opening *	1 (0.3)	3 (0.9)	10 (3)	3 (0.9)
Appliance vent outlet †	Dimension A	3 (0.9)	Dimension B	Dimension B
Moisture exhaust duct ‡	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)
Mechanical air intake	3 (0.9)	10 (3)	10 (3)	10 (3)
Appliance air intake	1 (0.3)	3 (0.9)	10 (3)	10 (3)
Source of ignition	1 (0.3)	3 (0.9)	3 (0.9)	5 (1.5)

Notes:

Dimension A = 1 ft (0.3 m) in any direction from the vent termination of a gas appliance, and additionally 3 ft (0.9 m) horizontally when within a vertical distance of 15 ft (4.6 m) between the appliance vent termination and the gas vent termination.

Dimension B = 3 ft (0.9 m) in any direction from the vent termination of a gas appliance, and additionally 0.9 m (3 ft) horizontally when within a vertical distance of 15 ft (4.6 m) between the appliance vent termination and the gas vent termination.

** Outdoor air intakes that are less than 8 in (200 mm) in diameter or equivalent area shall be considered a building opening in using this table.*

† See also Clause 8.14.8.

‡ Applies to gas or electric dryer termination.

Note: The outdoor air intake referred to in this table is the ducting that goes from the outside of the structure and terminates into the return air plenum before the appliance, sometimes referred to as a “fresh-air intake”.

Note: CSA Z662 specifies the necessary minimum clearances from the vent of a regulator or an associated overpressure relief device that belongs to a utility or propane supplier is required to building features similar to those shown in this table. Annex D contains a reprinting of the mandated clearances specified in CSA Z662. Piping and appliance installers and repairers and other construction trades are reminded to maintain these clearances when planning and executing work.

Note: CSA B149.2 specifies the minimum clearances from the propane containers to a source of ignition.

Table 5.3
CLEARANCE FROM VENTLINE AND
BLEEDVENT TERMINATIONS

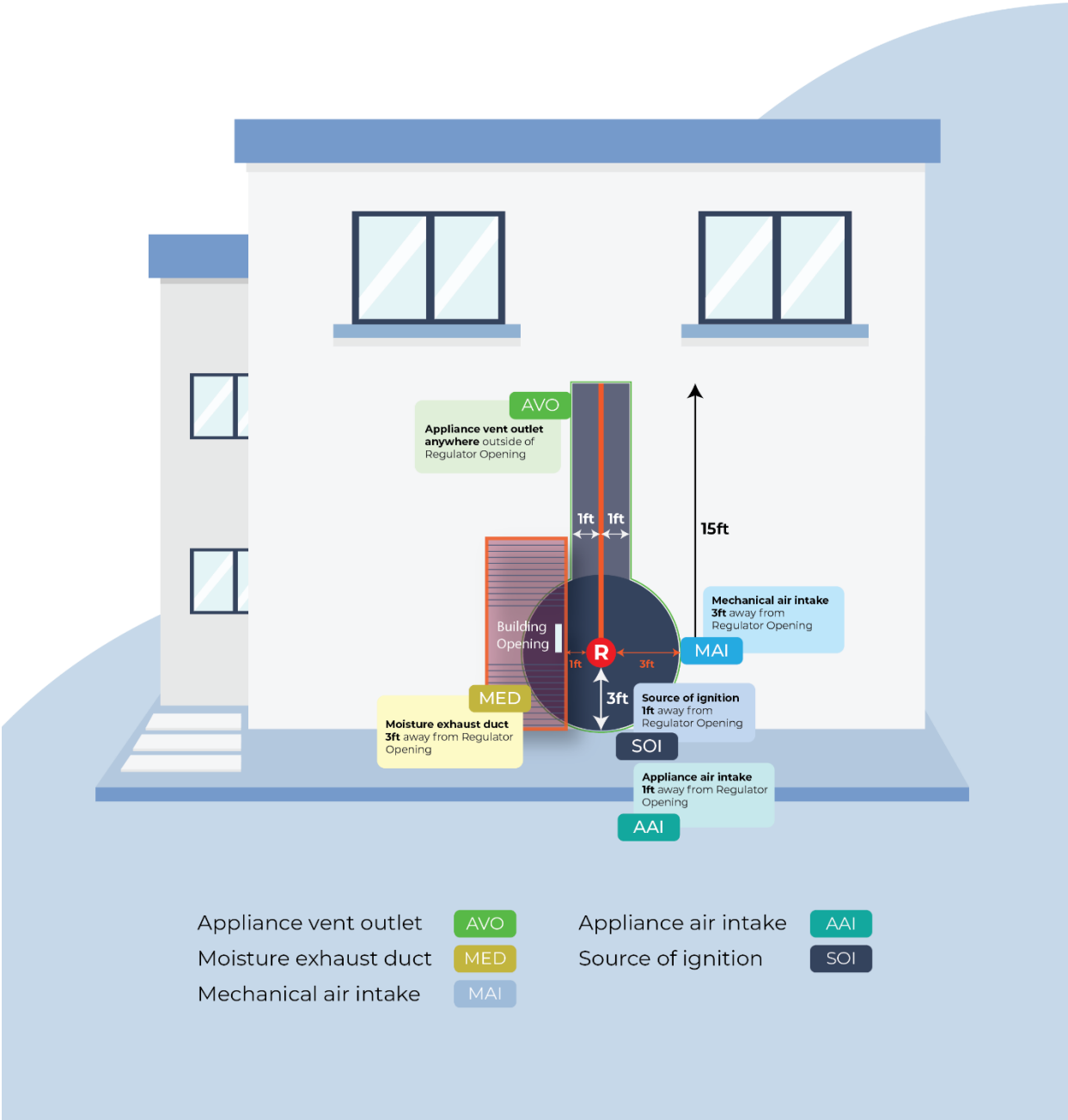


Table 5.3
CLEARANCE FROM VENTLINE AND
BLEEDVENT TERMINATIONS

B
Column

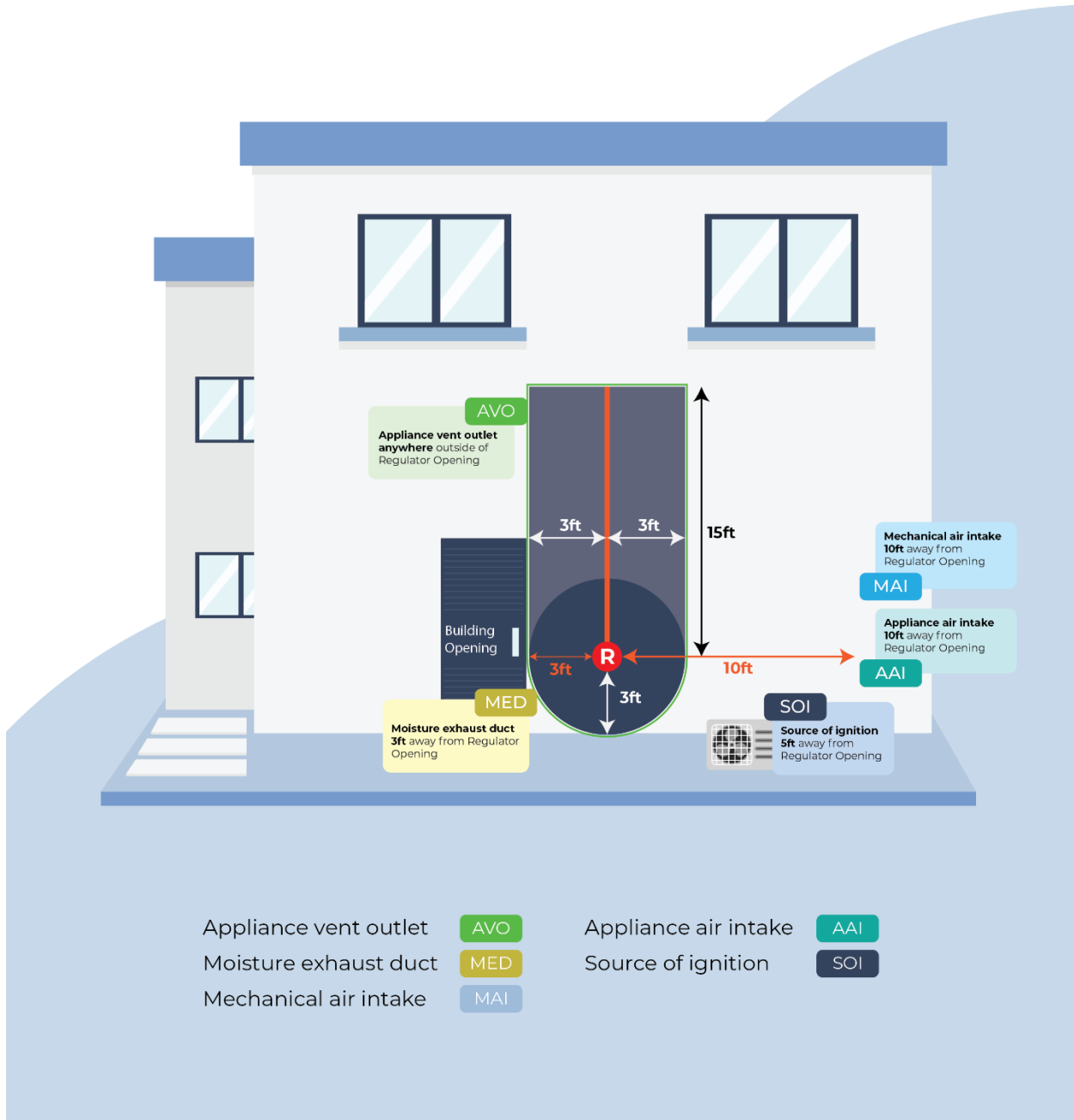


Table 5.3
CLEARANCE FROM VENTLINE AND
BLEEDVENT TERMINATIONS



Table 5.3
CLEARANCE FROM VENTLINE AND
BLEEDVENT TERMINATIONS

D
Column



Appendix D – Test pressures for steel pipe

Test pressures for steel pipe

Maximum allowable air or nitrogen test pressures for steel pipe (seamless or ERW) to limit hoop stress to 30% of the specified minimum yield strength (SMYS) per CSA Z662 Clause 4.3.5.

Nominal Pipe Size	CSA Z245.1 Category 1 Pipe Grade	Schedule	Wall Thickness t_n	Outside Diameter D	Maximum Air Test Pressure Not Exceeding 30% of SMYS <i>below which must be air or nitrogen tested</i>		Operating Pressure Test / 1.5
					(MPa)	(psig)	
3/4	172	40	2.87	26.7	4.44	644	429
3/4	172	80	3.91	26.7	6.05	877	585
1	172	40	3.38	33.4	4.18	606	404
1	172	80	4.55	33.4	5.62	815	543
1	241	40	3.38	33.4	5.85	848	565
1	241	80	4.55	33.4	7.88	1143	762
1 – 1/4	172	40	3.56	42.2	3.48	505	337
1 – 1/4	172	80	4.85	42.2	4.74	687	458
1 – 1/4	241	40	3.56	42.2	4.88	708	472
1 – 1/4	241	80	4.85	42.2	6.65	964	643
2	241	20	3.18	60.3	3.05	442	295
2	241	40	3.91	60.3	3.75	544	363
2	241	80	5.54	60.3	5.31	770	513
2	290	20	3.18	60.3	3.67	532	355
2	290	40	3.91	60.3	4.51	654	436
2	290	80	5.54	60.3	6.39	927	618
3	241	20	3.96	88.9	2.58	374	249
3	241	40	5.49	88.9	3.57	518	345
3	241	80	7.62	88.9	4.96	719	479
3	290	20	3.96	88.9	3.1	450	300
3	290	40	5.49	88.9	4.3	624	416
3	290	80	7.62	88.9	5.97	866	577
4	241	20	4.78	114.3	2.42	351	234
4	241	40	6.02	114.3	3.05	442	295
4	241	80	8.56	114.3	4.33	628	419
4	290	20	4.78	114.3	2.91	422	281
4	290	40	6.02	114.3	3.67	532	355
4	290	80	8.56	114.3	5.21	755	503

Nominal Pipe Size	CSA Z245.1 Category 1 Pipe Grade	Schedule	Wall Thickness t_n	Outside Diameter D	Maximum Air Test Pressure Not Exceeding 30% of SMYS <small>below which must be air or nitrogen tested</small>		Operating Pressure Test / 1.5
			(mm)	(mm)	(MPa)	(psig)	(psig)
6	290	20	5.56	168.3	2.3	334	223
6	290	40 STD	7.11	168.3	2.94	426	284
6	290	80 XS	10.97	168.3	4.54	658	439
6	317	20	5.56	168.3	2.51	364	243
6	317	40 STD	7.11	168.3	3.21	465	310
6	317	80 XS	10.97	168.3	4.96	719	479
8	290	20	6.35	219.1	2.02	293	195
8	290	40 STD	8.18	219.1	2.6	377	251
8	290	80 XS	12.7	219.1	4.03	584	389
8	317	20	6.35	219.1	2.2	319	213
8	317	40 STD	8.18	219.1	2.84	412	275
8	317	80 XS	12.7	219.1	4.41	639	426
10	290	20	6.35	273.1	1.62	235	157
10	290	40 STD	9.27	273.1	2.36	342	228
10	290	60 XS	12.7	273.1	3.24	470	313
10	290	80	15.09	273.1	3.85	558	372
10	317	20	6.35	273.1	1.77	257	171
10	317	40	9.27	273.1	2.58	374	249
10	317	60 XS	12.7	273.1	3.54	513	342
10	317	80	15.09	273.1	4.2	609	406
12	290	20	6.35	323.9	1.36	197	131
12	290	STD	9.53	323.9	2.05	297	198
12	290	40	10.31	323.9	2.22	322	215
12	290	80 XS	12.7	323.9	2.73	396	264
12	317	20	6.35	323.9	1.49	216	144
12	317	STD	9.53	323.9	2.24	325	217
12	317	40	10.31	323.9	2.42	351	234
12	317	80 XS	12.7	323.9	2.98	432	288
12	359	20	6.35	323.9	1.69	245	163
12	359	STD	9.53	323.9	2.54	368	245
12	359	40	10.31	323.9	2.74	397	265
12	359	80 XS	12.7	323.9	3.38	490	327

Notes: % SMYS = $(Sh) / SMYS \times 100$ where:

Specified Minimum Yield Strength (SMYS) = CSA Z245.1 Category I Pipe Grade in megapascals (MPa)

Design Hoop Stress $(Sh) = (P \times D) / (2 \times t_n) \times F \times L \times J \times T$

Test Pressure (P) is calculated in MPa and converted to psig. 1 MPa = 1000 kilopascals (kPa)

Wall Thickness (t_n) and Outside Diameter (D) are measured in millimetres

Design Factor (F) = 0.8 per CSA Z662 Clause 4.3.5.1

Location Factor (L) = 0.5 per Z662 clause 4.3.5.1

Joint Factor (J) = 1.0 per Z662 clause 4.3.5.1 since ERW Pipe is limited to 57% of SMYS per 8.2.4.3 and 0.6 times 57% is 34% thus 30% with a joint factor of 1.0 remains conservative for both seamless and ERW.

Temperature Factor (T) = 1.0 per Z662 clause 4.3.5.1

Test pressures exceeding these limits must meet the requirements of TSASK CSA B149.1:25 Interpretations Clause 6.22.2.2.

Appendix E – Emergency flood guidelines

REVISION: July 2019

For Licensed Gas Contractors

PAGE: 1 of 2

Flooding in the province of Saskatchewan can occur from the following ways:

1. Waterway spillover.
2. Flash Floods.
3. City, town or village water/sewer system failures
4. Single home flooding stream water system failures & sewage backup

When flooding occurs damage to property can be extensive. The safe operation of gas appliances is a priority for Gas Inspections. To ensure this, Gas Inspections enforces The B149.1 National Gas and Propane Installation Code requirement for gas appliances that are involved in a flood;

4.5.5 Damaged appliances and piping

Appliances, accessories, components, equipment, piping and tubing that have been exposed to fire, explosion, flood, or other damage shall not be offered for sale, installed, reactivated, or reconnected to the supply until the appliance, accessory, component, equipment, piping or tubing has been inspected by a person acceptable to the authority having jurisdiction. The inspection of piping or tubing exposed to flood shall include a check for water in the piping or tubing system. (Water depth over 7" can back feed through a gas valve.)

Note: *In Saskatchewan, a licensed gas fitter is acceptable to the Authority Having Jurisdiction.*

Any gas-fired appliance found to be unsuitable for continued use shall have its rating plate removed by the licensed gas fitter. Gas-fired appliances without a rating plate are no longer certified and cannot be installed or reinstalled.

Procedure for Single Property Flooding:

1. Gas suppliers may isolate area flooded and Red Tag affected appliance(s) or property.
2. Buildings affected by flooding must have their entire gas system inspected by a licensed gas contractor and have affected gas appliances serviced or replaced. Contractors must follow the Red Tag process in cases where necessary corrections are identified but not yet conducted. The local gas inspector will provide advice to contractors and homeowners as required.
3. Listed on the following page are common gas appliances and the corresponding required action depending on the flood condition. For other gas-fired appliances, contact the local gas inspector for advice. For gas inspector and electrical inspector contact information call: **Toll-free 1-866-530-8599**

Procedure for Multiple Property Flooding:

Gas Inspections requires the Red Tag process to be followed for reporting and documentation of all flood damaged appliances for all properties affected.

1. Local Gas Inspector in conjunction with local gas utility will coordinate start-up of affected areas to ensure public safety. For properties that have been shut-off but have no required corrections to the gas system or appliances, the local gas inspector will authorize reactivation of the service – no permit or air test is required.
2. Public will be advised through the EMO Centre that, when returning to their homes, they:
 - a) Have a licensed gas contractor inspect gas-fired equipment and have it serviced as necessary, and
 - b) If they smell gas upon returning home, leave immediately and notify appropriate authorities – i.e. for natural gas – SaskEnergy 1-888-700-0427, for propane contact 911 and their propane supplier.
3. Local Gas Inspector will advise local gas contractors to hang an air test verification tag on the meter and to phone-in applicable permit numbers to the utility before the utility turns the gas on to the home or facility.
4. Local Gas Inspector will advise Homeowners to apply to SaskEnergy for a meter activation.

Gas appliance	Condition	Solution
Furnace	Completely submerged	Replace furnace
	Flooded above gas valve or burner	Replace furnace
	Wet, or in contact with fan blade assembly	Replace fan assembly or replace furnace
	Wet, or in contact with fan motor	Replace fan motor or replace furnace
	Wet, or in contact with electronic components	Replace electronic board or replace furnace
	Floor wetness not in contact with fan or electronic components	Service and test
Storage water heater	Completely submerged	Replace water heater
	Flooded above gas valve, or burner (non FVIR water heaters only)	Replace affected components or replace water heater
	Flooded above FVIR sensor or arrestor screen (FVIR-equipped water heaters)	Replace water heater
	Floor wetness not in contact with gas valve, burner or FVIR components	Service and test
Tankless (instantaneous) water heater	Completely submerged	Replace water heater
	Flooded above gas valve, burner or electronic components	Replace affected components or replace water heater
Clothes dryer	Completely submerged	Replace clothes dryer
	Flooded above gas valve, burner or electronic components	Replace affected components or replace clothes dryer
	Floor wetness not in contact with gas valve, burner or electronic components	Service and test
Fireplace	Completely submerged	Replace fireplace
	Flooded above gas valve, burner or electronic components	Replace affected components or replace fireplace
	Floor wetness not in contact with gas valve, burner or electronic components	Service and test
Boiler	Completely submerged	Replace boiler
	Flooded above gas valve, burner or electronic components	Replace affected components or replace boiler
	Floor wetness not in contact with gas valve, burner or electronic components	Service and test

Note: Appliances that have been removed for replacement due to flooding shall have their rating plates removed, and then the appliances shall be scrapped as a non-certified appliance.

Note: Health concerns caused by the release of water or sewage into ductwork or insulation are the responsibility of the Health Authority and must be addressed by the local health inspector.

Appendix F - Worksheet for unvented heaters in livestock and poultry barns

Worksheet for Unvented Heaters in Livestock and Poultry Barns

Livestock ventilation systems with propane and natural gas appliances have to meet the Natural Gas and Propane Installation Code CSA-B149.1:25. This worksheet is designed to assist in the calculations to meet code specifics of CSA B149.1:25 Clauses 7.23.1 and 8.24.5. All requirements of CSA B149.1:25 must be in compliance, including Clauses 4.9, 7.23 and 8.24 in their entirety including all sub-clauses. This worksheet is an aid-only for the following two calculations:

7.23.1 Where an infrared heater is of the unvented type, it shall

(e) be provided with mechanical ventilation that

(ii) has a ventilation volume of at least 300 cfm (142 dm³/s) for each 100 000 Btu/h (30 kW) input or fraction thereof;

Note: 300 cfm per 100 000 Btu/h input (or fraction thereof) is the minimum ventilation volume acceptable to Gas Inspections to meet the standard of the term, "adequately ventilated space", used in CSA B149.1:25, particularly Clause 8.24.5.

8.24.5 When located in a large and adequately ventilated space, an appliance may be operated by discharging the combustion products directly into the space, subject to the approval of the authority having jurisdiction and provided that the maximum input of the appliance does not exceed 20 Btu/h/ft³ (0.2 kW/m³) of the space in which the appliance is located.

Worksheet

- A) Barn Owner: _____
- B) Barn Land Location: _____
- C) Barn Occupancy (# of animals, type of animal): _____
- D) Barn Dimensions: _____ ft X _____ ft X _____ ft (high) = Barn volume (E)
- E) Barn Volume (E): _____ cubic feet
- F) Description of Heaters (number/type): _____

- G) Total Heaters Combined Input into Barn (G): _____ Btu/h
- H) Description of Ventilation Equipment (number/type): _____

- I) Minimum Ventilation Rate of All Ventilation Equipment Combined (I): _____ CFM
- J) Ratio of min. ventilation rate to heaters' input = (I) divided by (G) [Must be at least 0.003 CFM per Btu/h]: _____
_____ CFM per Btu/h. NOTE: 0.003 CFM per Btu/h = 300 CFM per 100,000 Btu/h
- K) Ratio of heaters input to barn volume = (G) divided by (E) [must not exceed 20 btu/hr per cubic foot]: _____
_____ 20 btu/hr per cubic foot
- L) Calculations verified by Licensed Gas Contractor: (please print)
Gas Fitter License #: _____ Gas Fitter Name: _____
- M) Date of Verification: Month: _____ Day: _____ Year: _____