TECH SOLUTIONS 602.0
STYROFOAM™ BRAND HIGHLOAD INSULATION FOR BURIED UTILITY LINES

BELOW-GROUND PROTECTION AND COST SAVINGS

Buried water and utility lines are normally installed below the maximum expected depth of frost penetration to protect them from freezing. This depth depends on regional climate, ground cover and the type of soil in which the pipe is buried. Such utility lines typically need to be installed 1-4 metres below grade in order to protect them from freezing.

An alternative is to use STYROFOAM™ Brand HIGHLOAD 40, 60 or 100 Extruded Polystyrene Insulation – above the utility line. The insulation layer is a winter barrier against heat loss from the soil region surrounding the utility line. The appropriate thickness and width of STYROFOAM™ Brand HIGHLOAD Insulation allows the utility line to be installed above the frost depth. Using this method, significant cost savings in installation and maintenance of utility lines can be realized.

Use this information sheet as a guide for selection of the appropriate thickness and width of STYROFOAM™ Brand HIGHLOAD Insulation necessary for buried utility line freeze protection in any Canadian region.

To choose the proper thickness and width of STYROFOAM™ Brand HIGHLOAD Insulation, first determine the following information:

1. Location of project (the local climate will determine the design frost depth penetration)
2. Type of soil surrounding the pipe (soil, like climate, determines the frost penetration)
3. Amount of backfill to be used on top of the insulation (this determines the thickness of insulation necessary)
4. Pipe diameter
5. Depth at which the insulation is to be placed (this determines the insulation width to be used)

Tables 1 and 2 and Figure 2 can be used to obtain the above information.

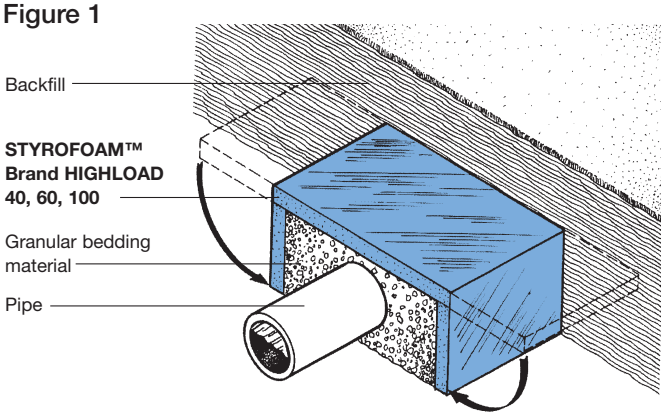
The Utility Line Insulation Worksheet can be used to summarize the project information and determine the total insulation width required to protect the utility line.

In some field conditions and designs it may be difficult to horizontally install the entire width of STYROFOAM™ Brand HIGHLOAD Insulation. In such instances, an inverted "U" configuration can be used (Figure 1). The sum widths of both vertical legs and top portion of the insulation must total the design insulation width (W) as determined by the formulas in the worksheet.

Samples of STYROFOAM™ Brand HIGHLOAD Insulation recovered from various runway, highway and railroad test installations over the years have shown little increase in water absorption or loss of thermal resistance. In all cases, the insulation's structural integrity was retained.

STYROFOAM™ Brand HIGHLOAD Insulation is durable, versatile and reusable – making it a preferred choice for a variety of high-load applications.

Figure 1



STYROFOAM™ Brand HIGHLOAD Insulation for Buried Utility Lines

Table 1: Design Freezing Index (°C-days) for Canadian Locations

	Design Index
British Columbia	
Abbotsford A(1)	303
Armstrong	719
Bavine Lake	1796
Beatton River A	2718
Chilliwak	303
Comox A	609
Cranbrook A	1286
Dawson Creek	2144
Dog Creek A	1365
Fernie	1293
Fort Nelson	3068
Fort St. John A	2138
Golden	1458
Hope	313
Kamloops A	613
Kelowna	631
Kimberley A	1352
Kitimat	502
New Westminster	297
Penticton A	452
Port Hardy A	296
Prince George A	1483
Prince Rupert A	313
Princeton A	1173
Quesnel A	1365
Revelstoke	696
Salmon Arm	688
Sandspit A	297
Smith River A	3259
Smithers A	1388
Terrace A	632
Tofino A	289
Vancouver A	295
Vernon	604
Victoria A	293
Williams Lake A	767
Yukon Territory	
Aishihik A	3355
Dawson	3986
Haines Junction	3055
Mayo	3585
Snag A	4154
Teslin A	2641
Watson Lake A	3287
Whitehorse	2541
Northwest Territories	
Baker Lake	5728
Cambridge Bay A	1146
Cape Dyer A	4477
Coral Harbour A	5307
Fort McPherson	4859
Frobisher Bay A	4459
Hay River A	3618
Inuvik A	5236
Norman Wells A	4459
Resolute Bay A	6759
Tuktoyaktuk	5475
Yellowknife A	4170

(1) A indicates an airport data station.

Table 1: Continued

	Design Index
Alberta	
Athabasca	2358
Banff	1646
Brooks	1793
Calgary A	1551
Camrose	2157
Cold Lake A	2319
Cowley A	1341
Edmonton A	1996
Edson	1902
Embarras A	3022
Fort MacMurray	2791
Grande Prairie A	2204
Jasper	1603
Lake Louise	2117
Lethbridge A	1292
Medicine Hat A	1561
Olds	1695
Peace River A	2669
Penhold A	1992
Red Deer	1879
Suffield A	1811
Vermillion A	2346
Newfoundland	
Grand Falls	2394
St. John's	1148
Stepenville	1425
Wabush Lake	5688
Saskatchewan	
Broadview A	2358
Dafoe A	2623
Estevan A	2026
Moose Jaw A	1975
Nipawin	2682
North Battleford A	2432
Prince Albert A	2633
Regina A	2319
Saskatoon A	2380
Swift Current A	2402
Uranium City A	3639
Yorkton A	2535
Manitoba	
Brandon A	2438
Churchill A	4277
Flin Flon	2933
Gimli A	2454
MacDonald A	2243
Morden	2124
Neepawa A	2379
Portage La Prairie A	2142
Rivers A	2397
Shilo	2362
Souris	2236
The Pas A	2913
Winnipeg A	2362
New Brunswick	
Bathurst	1623
Campbelleton	1601
Chatham	1482

Table 1: Continued

	Design Index
New Brunswick – continued	
Edmunston	1788
Fredericton A	1423
Gagetown	1269
Moncton A	1332
Pennfield Ridge A	1210
Sackville	1208
Saint John	1112
Saint John A	1187
St. George	1175
Sussex	1298
Woodstock	1501
Ontario	
Algonquin Park	1748
Belleville	1191
Brampton	1126
Brantford	717
Chalk River	1720
Chatham	573
Cochrane	2394
Collingwood	819
Dryden	2442
Georgetown	1158
Guelph	1142
Hamilton	646
Huntsville	1476
Iroquois Falls	2438
Kapuskasing A	2466
Kenora A	2318
Kingston	1233
Kirkland Lake	2358
Kitchener	824
Lindsay	1358
London A	757
Moosonee	2823
Niagara Falls	658
North Bay	1783
Orangeville	1346
Orillia	1386
Ottawa A	1572
Owen Sound	831
Parry Sound	1398
Peterborough	1314
Thunder Bay	1967
St. Catharines	559
St. Thomas	672
Sarnia	650
Sault Ste. Marie A	1479
Simco	695
Sioux Lookout A	2472
Stratford	1151
Sudbury A	1889
Timmins A	2311
Toronto	627
Toronto A	776
White River	2413
Windsor A	592
Woodstock	794

continued on next page

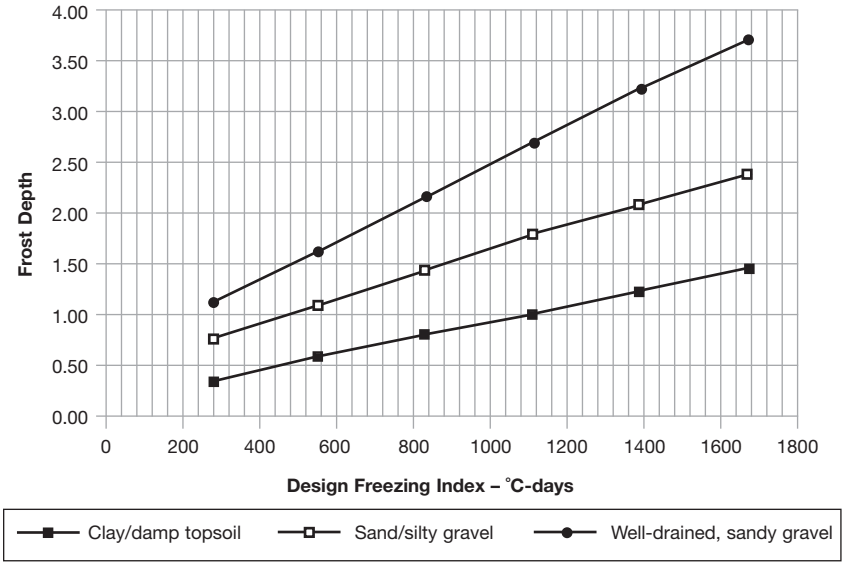
TABLE 1: CONTINUED

	Design Index
Québec	
Amos	2434
Bagotville A	2148
Baie-Comeau A	1954
Beauceville	1656
Brome	1524
Cap-Madeleine	1559
Chapais	2622
Chicoutimi	1964
Donnacona	1727
Drummondville	1571
Gagnon	2898
Gaspé	1673
Joliette	1666
Kenogami	2116
La Malbaie	1691
La Pocatière	1642
La Tuque	1901
Lac Mégantic	1669
Lennoxville	1554
Magog	1495
Maniwaki	1809
Mont Joli	1680
Mont Laurier	1847
Montebello	1638
Montréal A	1435
Québec	1568
Québec A	1699
Roberval	1854
Sept-Iles	2081
Shawinigan	1785
Sherbrooke	1434
Sorel	1665
St. Agathe des Monts	1821
St. Hyacinthe	1537
St. Jérôme	1738
Ste.-Anne-de-la-Pérade	1745
Tadoussac	1688
Thedford Mines	2056
Trois Rivières	1744
Val-d'Or	2293
Victoriaville	1681
Nova Scotia	
Annapolis Royal	1093
Cheticamp	1455
Debert A	2136
Digby	984
Greenwood A	1315
Halifax	1056
Halifax A	1356
Ingonish Beach	1328
Liverpool	953
Shearwater A	1199
Springfield	1433
Sydney	1311
Truro	2025
Yarmouth A	915
Prince Edward Island	
Alliston	2000
Charlottetown A	2201
Summerside A	2242

TABLE 2: INSULATION THICKNESS (MM) SELECTION

Backfill Over Insulation (metres)	Design Freezing Index (°C-days)						
	850	1125	1400	1675	1950	2225	2500
0.6	50	65	75	90	100	115	125
0.9	40	50	65	75	90	100	115
1.2	25	40	50	65	75	90	100
1.5	25	25	40	50	65	75	90
1.8	25	25	25	40	50	65	75
2.1			25	25	40	50	65
2.4				25	25	40	50
2.7					25	25	40
3.0						25	25

Figure 2: Design Frost Depth (metres)



For actual indices over 560 °C-days:
Design freezing index = Actual freezing index + 560 °C-days

For actual indices under 560 °C-days:
Design freezing index = Actual freezing index + 280 °C-days

Actual freezing index: "Normal Freezing and Thawing Degree-Days for Canada 1931-1960" by D.W. Boyd, Environment Canada – Atmospheric Environment CLI 4-73

STYROFOAM™ BRAND HIGHLOAD INSULATION FOR BURIED UTILITY LINES

UTILITY LINE INSULATION WORKSHEET

Date: _____

For: _____ Tel: _____ Fax: _____

From: _____ Tel: _____ Fax: _____

Project: _____

Project Location: _____

Design Freezing Index (Table 1): _____ °C-days Soil Type: _____

Design Frost Depth (Figure 2): _____ metres

Pipe Diameter: _____ metres

Insulation Depth: _____ metres Backfill Over Insulation*: _____ metres

Recommended Insulation Thickness (Table 2): _____ mm

Formula for Insulation Width:

$$W = D + 2 (F - X) - 0.3 \text{ (metres)}$$

W = total insulation width (m) F = design frost depth (m)
D = pipe diameter (m) X = insulation depth (m)

UTILITY LINE INSULATION SUMMARY

Insulation type*: _____

Total width of insulation (m): _____

Insulation thickness (mm): _____

Insulation depth (m): _____

Backfill depth*(m): _____

*When backfill over the insulation is less than 0.6 metres, contact your Dow representative to help determine the proper choice of insulation type. Surface loading may influence strength of insulation required.

For Technical Information: 1-866-583-BLUE (2583) (English) 1-800-363-6210 (French)
For Sales Information: 1-800-232-2436 (English) 1-800-565-1255 (French)
DOW CHEMICAL CANADA ULC . Dow Building Solutions . 450 – 1st St. SW . Suite 2100 . Calgary, AB T2P 5H1
www.dowbuildingsolutions.com

CAUTION: This product is combustible. Protect from high heat sources. A protective barrier or thermal barrier may be required as specified in the appropriate building code. For more information, consult MSDS, call Dow at 1-866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 1-519-339-3711.

Building and/or construction practices unrelated to building materials could greatly affect moisture and the potential for mould formation. No material supplier including Dow can give assurance that mould will not develop in any specific system.

Republished November 2008

Form No. 178-00874-1108P&M