Aquatherm Technical Bulletin

201210B-AQTTB

Aquatherm and Pipe Insulation

Date Issued: 25 October 2012

Aquatherm pipe has a high thermal resistance value, giving a level of natural insulation to the pipe. With this high level of thermal resistance many have supposed that Aquatherm pipe can be installed in many instances without thermal insulation. While this may indeed be true in some instances, most of the time and according to local and national energy codes, thermal insulation may be required to be installed.

The following table indicates where thermal insulation may be required.

Condition	**Pipe Thermal insulation Required (Commercial)**	**Pipe Thermal insulation Required (Residential)**	Fitting Insulation Recommended	
Domestic Cold Water	No	No	No	Note 1
Domestic Hot Water and Recirculating Hot Water	Yes	No	No	Note 2
Heating Hot Water and Hot Water Return	Yes	Yes	No	Note 2
Chilled Water, Condenser Water Above Grade	Yes	Yes	Yes	Note 3
Chilled Water, Condenser Water, Below Grade	No	No	No	Note 4

Note 1- There is no energy savings from insulating Domestic Cold Water and Aquatherm's experience from around the world is that Green Pipe does not have a condensation issue in this application. Note that some jurisdictions may require insulation be installed on domestic cold water piping.
Note 2 – When main heating runs are over-insulated to code required thicknesses on socket fusion fittings 4" and down, the heat loss savings typically offsets the small amount of heat loss from un-insulated fittings. This approach may require approval by Local Code Authority.
Note 3 – With uncontrolled humidity, chilled water pipes may sweat. Since most buildings go through a startup period where chilled water is operational before indoor humidity is in control, we generally recommend insulating chilled water fittings.
Note 4 - Aquatherm chilled water piping may be direct buried. The codes do not require direct buried chilled water piping be insulated. ASHRAE 90.1 and IECC govern the required thickness of insulation. Also, consult with the local authority having jurisdiction before deciding to delete or decrease required insulation. Please see Aquatherm technical bulletin 201408D – AQTTB – "Direct Burial of Aquatherm Pipe" for more information.

825 W 600 N | Lindon UT, 84042
801-805-6657 aquatherm.com

With the natural insulation of Aquatherm pipe it may be possible to decrease the required thickness of the insulation. The tables in ASHRAE 90.1 and IECC were developed around steel pipe. "For non-metallic pipe having thermal resistance, reduced insulation thicknesses are permitted if documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot than a steel pipe of the same size with the insulation thickness shown in the table." (ASHRAE 90.1, Table 6.8.3A, note e). The reduced insulation cannot be less than 1" thick. In most cases, the calculated reduction is not quite enough to warrant a reduction in insulation thickness. For example, a certain application requires 1-½" insulation. The calculations indicate that we can reduce the insulation thickness to 1-¼". Since pipe insulation is not sold in 1 ¼" thickness we would still have to use 1 ½"-insulation. If desired, we can do the calculations here at Aquatherm for you and help you determine if the insulation thickness may be reduced.

Fittings – The pipe wall at socket fittings is over twice as thick as the pipe itself, so heat loss is minimal. Plus fittings are more expensive to insulate than straight pipe. So, in general, the cost of insulating fittings on heating system piping does not pay back in energy savings. Note however, that chilled water systems will require the fittings to be insulated to prevent condensation issues.

Given the fact that Aquatherm pipe is made in metric sizes, most American made pipe insulations may not correlate directly with Aquatherm pipe. Therefore, Owens Corning Insulation, in cooperation with Aquatherm, has begun to manufacture insulation to fit Aquatherm's metric outside dimensions up through 12" (315 mm). The following table gives the exact thickness of Owens Corning insulation on Aquatherm Pipe and the outside diameter of the pipe and insulation together.

Owens Corning Pipe Insulation

Dimensional Data

Aquatherm	*Insulation Wall Thickness*			*Outside Diameter*		
Pipe Size	1"	1-1/2"	2"	1"	1-1/2"	2"
1/2" (20mm)	1.06	1.6	-	2.88	4.00	-
3/4" (25 mm)	0.87	1.43	-	2.88	4.00	-
1" (32 mm)	1.12	1.62	-	3.50	4.50	-
1-1/4" (40 mm)	0.91	1.66	-	3.50	5.00	-
1-1/2" (50 mm)	1.04	1.54	-	4.00	5.00	-
2" (63 mm)	1.05	1.58	2.10	4.50	5.56	6.62
2-1/2" (75 mm)	1.05	1.86	2.36	5.00	6.62	7.62
3" (90 mm)	1.02	1.55	2.05	5.56	6.62	7.62
4" (125 mm)	1.95	1.85	2.30	7.62	8.62	9.62
6" (160 mm)	1.125	1.625	2.188	8.63	9.625	10.75
8" (200 mm)	-	1.400	1.900	-	10.750	11.75
10" (250 mm)	0.916	1.416	2.041	11.75	12.75	14.00
12" (315 mm)	1.254	1.754	2.254	15.00	16.00	17.00

See Owens Corning for further information

[1]Revised 17 Sept. 2015 – Revised Best Fit Insulation Table
[2] Revised 22 October 2015 – Revised various portions of the bulletin

825 W 600 N | Lindon UT, 84042
801-805-6657 aquatherm.com