

July 9, 2012

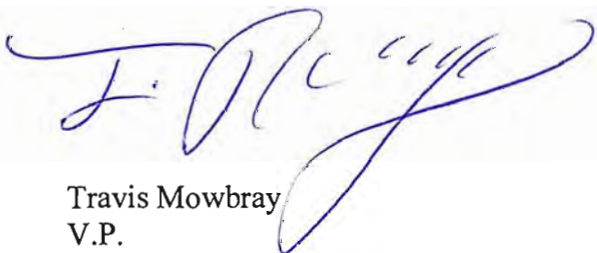
To: Department of Energy  
Attn: Andrea Poniecki  
RE: Minot State University Dome Geothermal Conversion Project  
ARRA Provisions for Aquatherm Polypropylene Piping

We are the installing mechanical contractor for the MSU Dome Geo Conversion project and have been asked thru MSU and the project design engineers to outline a couple points concerning the use of Aquatherm polypropylene piping on this ARRA project.

- 1) Aquatherm is a unique proprietary polypropylene product made in Germany and competitively priced and marketed but not yet currently manufactured in the United States by Aquatherm or any other manufacturer. Because of this, Aquatherm does comply with the “Buy American Act” as outlined in their attached letter.
- 2) Aquatherm was directly specified on this project and intended to match the existing Aquatherm piping system that was used in the newly constructed and adjoined Wellness Center facility for consistency. The Wellness Center mechanical room also serves as the mechanical room for the Dome project where each building is directly tied to the same existing Aquatherm piping system.
- 3) We have purchase orders to date for up to \$63,400 worth of Aquatherm pipe and fittings for the MSU Dome Geothermal Project.
- 4) We understand that because Aquatherm is compliant with the “Buy American Act” it doesn’t necessarily guarantee acceptance under ARRA provisions. With the information stated above and attached, we hope that the University may be able to obtain a waiver of for acceptance under the ARRA provisions due to its uniqueness and necessity for consistency between the two adjoined buildings.

If you have any questions, please feel free to call.

Sincerely,



Travis Mowbray  
V.P.

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To whom it may concern:

The "Buy American Act" is designed to help encourage American purchasing agents to support domestic manufacturers when given the choice of comparable domestic and foreign products. It is not intended to stop consumers from acquiring new products and technology simply because such materials are not manufactured in the United States.

In regards to whether or not it is acceptable to purchase Aquatherm pipe instead of a domestic product, the answer is simply yes, due to the fact that no comparable products are produced in the United States. Aquatherm's products are unique in their technology and performance, placing them outside the normal restrictions of this act. The exemption is drawn from parts two and three of section 25.103 B of the Buy American act, due to non-availability in the domestic market.

### *25.103 Exceptions.*

*When one of the following exceptions applies, the contracting officer may acquire a foreign end product without regard to the restrictions of the Buy American Act:*

*(b) Nonavailability. The Buy American Act does not apply with respect to articles, materials, or supplies if articles, materials, or supplies of the class or kind to be acquired, either as end items or components, are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.*

The first ground for exemption requires written determination from the head of the contracting activity. It is based on the fact that no other piping material produced in the United States matches the quality of the PP-R (polypropylene random) material for physical durability and chemical stability. Currently, no US manufactured polypropylene systems meets the ASTM F2389 standard regarding PP-R. If an engineer specifies that he wants PP-R pipe that meets ASTM F2389, insufficient quantities of this material are produced in the United States and the contractor is free to purchase and use Aquatherm piping systems.

#### *(2) Individual determinations.*

*(i) The head of the contracting activity may make a determination that an article, material, or supply is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.*

The second and somewhat simpler exemption bypasses the written determination by requiring a PP-R piping material with integrated expansion control. If no offers for an acceptable domestic product are received, the head of the contracting activity is free to purchase Aquatherm piping systems for the job. Currently, no offers will be received because no domestic company uses integrated expansion control technology.

#### *(3) A written determination is not required if all of the following conditions are present:*

- (i) The acquisition was conducted through use of full and open competition.*
- (ii) The acquisition was synopsisized in accordance with 5.201.*
- (iii) No offer for a domestic end product was received.*

If an acceptable domestic product becomes available, it must also be priced competitively with the Aquatherm pipe or it can be rejected on the grounds of unreasonable cost.

*(c) Unreasonable cost. The contracting officer may determine that the cost of a domestic end product would be unreasonable, in accordance with 25.105 and Subpart 25.5.*

It is certainly not favoring the Aquatherm brand to require polypropylene random over other polypropylene varieties, as PP-R has much higher pressure, temperature, and performance ratings than other variations of polypropylene. Nor is it unfair to require a system with integrated expansion control. Rather, this specification is needed to ensure lasting performance. The benefits of PP-R as a piping material are unmatched, and it is simply good engineering to request it over metals or other plastics. The integrated expansion is also a good judgment call from the engineer. Polypropylene random without integrated expansion control has a reduced performance and does not hold up nearly as well to external abuse as it would otherwise.

In summary, whenever an engineer specifies polypropylene random that meets ASTM F2389 or has integrated expansion control, unrestricted quantities of the Aquatherm piping systems may be used if no equivalent and acceptable domestic product is reasonably available.

Best regards,

Steve Clark P.E.

Extracted from  
Project Specification from MSU Dome

2.8 POLYPROPYLENE PP-R PIPING SYSTEM – HOT AND CHILLED WATER SYSTEM

- A. Pipe shall be manufactured from a PP-R resin meeting the short-term properties and long-term strength requirements of ASTM F 2389 or CSA B137.11. The pipe shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipe shall be made in a three layer extrusion process. Domestic hot water and heating piping shall contain a fiber layer (faser) to restrict thermal expansion. All pipe shall comply with the rated pressure requirements of ASTM F 2389 or CSA B137.11. All pipe shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.
  - 1. Pipe shall be Aquatherm® Advanced 5/8" (wrapped and insulated) available from Aquatherm, Inc.
- B. Pipes, fittings, and valves shall be Climatherm® Faser®, available from Aquatherm, Inc.
- C. Fittings shall be manufactured from a PP-R resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The fittings shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All fittings shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.
- D. Valves shall be manufactured in accordance with the manufacturer's specifications and shall comply with the performance requirements of ASTM F 2389 or CSA B137.11. The valves shall contain no rework or recycled thermoplastic materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. Valves 2-1/2 inches and larger shall be standard lug style ferrous-alloy butterfly valves.
- E. Where indicated on the drawings that a Plenum-rated Piping System is needed, then the pipe shall be pre-insulated or field insulated, and when tested with standard un-insulated fittings per CAN/ULC-S102.2-03 or ASTM E84, the system consisting of wrapped pipe and bare fittings shall have a Flame Spread Classification of less than 25 and Smoke Development rating of less than 50.
- F. Manufacturer shall warrant pipe and fittings for 10 years to be free of defects in materials or workmanship.
  - 1. Warranty shall cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of the piping system due to defects in the materials or workmanship.



# Aquatherm Specifications

1 23 21 00 HYDRONIC PIPING AND PUMPS

2

3

23 21 13 HYDRONIC PIPING

4

5 PART 1 – GENERAL

6

7 1.01 SUMMARY

8

A. This Section specifies the hydronic piping system, including associated fittings, and specialties within the building.

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10 1.02 RELATED SECTIONS

11

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Section XXXXXX and Division 1 Specification sections apply to work of this section.

12

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16 1.03 REFERENCE DOCUMENTS

17

A. ASTM F 2389-07 - Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems

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B. CSA B137.11 - Polypropylene (PP-R) Pipe and Fittings for Pressure Applications

21

22

23

C. NSF/ANSI 14 – Plastic Piping System Components and Related Materials

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26 1.04 DEFINITIONS

27

A. Definitions shall be in accordance with local mechanical codes and ASTM F 2389.

28

29

30 1.05 SUBMITTALS

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A. Material list naming each product to be used identified by manufacturer and product number, in accordance with Section 01 30 00.

32

33

34 1.06 QUALITY ASSURANCE

35

A. Material shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.

36

37

38

B. Material shall comply with manufacturers specifications.

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40

C. Special Engineered products shall be certified by NSF International as complying with NSF 14.

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43 PART 2 – PRODUCTS

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45 2.01 PIPE AND PIPING PRODUCTS



1 A. Pipe shall be manufactured from a PP-R resin meeting the short-term  
2 properties and long-term strength requirements of ASTM F 2389 or CSA  
3 B137.11. The pipe shall contain no rework or recycled materials except  
4 that generated in the manufacturer's own plant from resin of the same  
5 specification from the same raw material. All pipe shall be made in a  
6 three layer extrusion process. Domestic hot water and heating piping  
7 shall contain a fiber layer (faser) to restrict thermal expansion. All pipe  
8 shall comply with the rated pressure requirements of ASTM F 2389 or  
9 CSA B137.11. All pipe shall be certified by NSF International as  
10 complying with NSF 14, and ASTM F 2389 or CSA B137.11.  
11

12 B. Pipe shall be Aquatherm® Climatherm® or Climatherm® Faser®,  
13 available from Aquatherm, Inc. Piping specifications and ordering  
14 information are available at [www.aquathermpipe.com](http://www.aquathermpipe.com).  
15

16 **2.02 FITTINGS**

17 A. Fittings shall be manufactured from a PP-R resin meeting the short-term  
18 properties and long-term strength requirements of ASTM F 2389. The  
19 fittings shall contain no rework or recycled materials except that  
20 generated in the manufacturer's own plant from resin of the same  
21 specification from the same raw material. All fittings shall be certified  
22 by  
23 NSF International as complying with NSF 14, and ASTM F 2389 or CSA  
24 B137.11.

25 B. Fittings shall be Aquatherm® Climatherm® available from Aquatherm,  
26 Inc. Fittings specifications and ordering information are available at  
27 [www.aquathermpipe.com](http://www.aquathermpipe.com).  
28

29 **2.03 WARRANTY**

30 A. Manufacturer shall warrant pipe and fittings for 10 years to be free of  
31 defects in materials or workmanship.  
32

33 B. Warranty shall cover labor and material costs of repairing and/or  
34 replacing defective materials and repairing any incidental damage  
35 caused by failure of the piping system due to defects in materials or  
36 workmanship.  
37

38 **2.04 VALVES**

39 A. Valves shall be manufactured in accordance with the manufacturers  
40 specifications and shall comply with the performance requirements of  
41 ASTM F 2389 or CSA B137.11. The valves shall contain no rework or  
42 recycled thermoplastic materials except that generated in the  
43 manufacturer's own plant from resin of the same specification from the  
44 same raw material.  
45  
46

1 C. Valves shall be Aquatherm® Climatherm® available from Aquatherm,  
2 Inc.. Valve specifications and ordering information are available at  
3 www.aquathermpipe.com.  
4

5 2.05 SMOKE AND FIRE RATINGS

6 A. Where indicated on the drawings that a Plenum-rated Piping System is  
7 needed, then the pipe shall be pre-insulated or field insulated, and when  
8 tested with standard un-insulated fittings per CAN/ULC-S102.2-03 or  
9 ASTM E84, the system consisting of wrapped pipe and bare fittings shall  
10 have a Flame Spread Classification of less than 25 and Smoke  
11 Development rating of less than 50.  
12

13 B. Pipe shall be Aquatherm® Advanced (wrapped and insulated) available  
14 from Aquatherm, Inc. Piping specifications and ordering information are  
15 available at www.aquathermpipe.com.  
16

17 2.06 UV PROTECTION

18 A. Where indicated on the drawings that the pipe will be exposed to direct  
19 UV light for more than 30 days, it shall be provided with a Factory  
20 applied, UV-resistant coating or alternative UV protection.  
21

22 2.07 INTEGRAL THERMAL AND VAPOR BARRIER Where insulation is

23 indicated on the drawings or in these specifications, Aquatherm  
24 Advanced pipe with thermal (radiant, conductive, and convective) and  
25 vapor barrier insulation shall be provided. The thick wall, self insulating  
26 fittings do not require an additional vapor barrier for the piping system to  
27 meet this performance level. The thermal barrier is UV resistant, CFC-  
28 free, non-porous, non-fibrous, and resist mold growth. The pipe with the  
29 integral thermal barrier with standard unprotected fittings shall meet the  
30 ASTM E84 and the CAN/ULC S102.2 requirements for a Flame Spread  
31 Rating of 25 and Smoke Development rating of 50.  
32  
33

34 PART 3 - EXECUTION

35  
36 3.1 PIPING APPLICATIONS

37 A. Install listed pipe materials and joining methods below in the following  
38 applications:  
39

40 1. Underground Piping: Polypropylene (PP-R) piping in SDR 7.4, 9,  
41 11, or 17.6 per manufacturer's instructions and ASTM D2774.  
42

43 2. Aboveground: Polypropylene (PP-R) piping in SDR 7.4, 9, 11, or  
44 17.6 based on the required minimum pressure rating and use  
45 temperature, in accordance with manufacturer's instructions and  
46 ASTM F2389.

1 3.2 FUSION WELDING OF JOINTS

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- A. Install fittings and joints using socket-fusion, electrofusion, or butt-fusion as applicable for the fitting or joint type. All fusion-weld joints shall be made in accordance with the pipe and fitting manufacturer's specifications and product standards.
- B. Fusion-weld tooling, welding machines, and electrofusion devices shall be as specified by the pipe and fittings manufacturer.
- C. Prior to joining, the pipe and fittings shall be prepared in accordance with F 2389 and the manufacturer's specifications.
- D. Joint preparation, setting and alignment, fusion process, cooling times and working pressure shall be in accordance with the pipe and fitting manufacturer's specifications.

3.3 VALVE APPLICATIONS

- A. Install gate valves close to main on each branch and riser serving 2 or more equipment connections and where indicated.
- B. Install gate or ball valves on inlet to each equipment item and elsewhere as indicated.
- C. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain hydronic piping system.
- D. Install swing check valve on discharge side of each pump and elsewhere as indicated.
- E. Install ball valves in each hot-water circulating loop and discharge side of each pump.

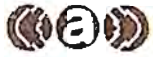
3.4 PIPING INSTALLATIONS

- A. Install hangers and supports at intervals specified in the applicable Plumbing or Mechanical Code and as recommended by pipe manufacturer.
- B. Support vertical piping at each floor and as specified in the applicable Plumbing or Mechanical Code.
- C. Fire stopping shall be provided to both be compatible with the Aquatherm Piping and meet the requirements of ASTM E 814 or ULC S115 , "Fire Tests of Through-Penetration Firestops". Pipe insulations or fire resistive coating shall be removed where the pipe passes through

- 1 a fire stop and, if required by the firestop manufacturer, for 3 inches  
2 beyond the firestop outside of the fire barrier.  
3
- 4 D. When installed in systems with pumps in excess of 7.5 HP, piping shall  
5 be protected from excessive heat generated by operating the pump at  
6 shut-off conditions. Where the possibility exists that the pump will  
7 operate with no flow, the protection method shall be a temperature relief  
8 valve or comparable level of protection, set to a maximum temperature  
9 of 185°F.  
10
- 11 E. If heat tracing is specified for the piping, it should be installed on the  
12 pipe interior or exterior, and it must be suitable for use with plastic piping  
13 and self-regulating to ensure the surface temperature of the pipe and  
14 fittings will not exceed 70°C (158°F).  
15
- 16 3.5 INSPECTING AND CLEANING
- 17 A. The pipes should be flushed with cold water after finishing the  
18 installation. Inspect and test piping systems following procedures  
19 of  
20 authorities having jurisdiction and as specified by the piping system  
21 manufacturer.  
22
- 23 END OF SECTION 23 21 13







**aquatherm**

# Submittal for Hydronic Piping System

**aquatherm**  
500 S 500 W  
Lindon UT, 84042  
801-805-6657

Project Name: \_\_\_\_\_

Date: \_\_\_\_\_

Project Location: \_\_\_\_\_

\_\_\_\_\_

To whom it may concern,

We are proposing to use the Climatherm® polypropylene piping systems manufactured by Aquatherm, on the above project. The advantages to the owner of this project are as follows:

- Clean piping system that will not alter the chemistry of the water and resists corrosion and scaling.
- Tough, impact resistant.
- A leak free one-piece fused piping system.
- 10 year warranty that covers not only the piping system and labor, but also incidental property damage.

Specifically, we are proposing to use distribution piping as follows:

Nominal Size	Climatherm® faser
½"	½" -- 20 mm SDR 7.4/11
¾"	¾" -- 25 mm SDR 7.4/11
1"	1" -- 32 mm SDR 11
1 ¼"	1 ¼" -- 40 mm SDR 11
1 ½"	1 ½" -- 50 mm SDR 11
2"	2" -- 63 mm SDR 11
2 ½"	2 ½" -- 75 mm SDR 11
3"	3" -- 90 mm SDR 11
3 ½"	3 ½" -- 110 mm SDR 11
4"	4" -- 125 mm SDR 11

Nominal Size	Climatherm® faser
6"	6" -- 160 mm SDR 11/17.6
8"	8" -- 200 mm SDR 11/17.6
10"	10" -- 250 mm SDR 11/17.6
12"	12" -- 315 mm SDR 11/17.6
14"	14" -- 355 mm SDR 11/17.6
16"	16" -- 400 mm SDR 11/17.6
18"	18" -- 450 mm SDR 11/17.6
20"	20" -- 500 mm SDR 17.6
22"	22" -- 560 mm SDR 17.6
24"	24" -- 630 mm SDR 17.6

For more information, please see attached specification sheets and catalog sheets or visit our website at [www.aquatherm.com](http://www.aquatherm.com). If you have questions please call us at 801-805-6657 or email at [technical@aquatherm.com](mailto:technical@aquatherm.com).

Reviewed and Approved by: \_\_\_\_\_

Company: \_\_\_\_\_

Date: \_\_\_\_\_



**aquatherm**

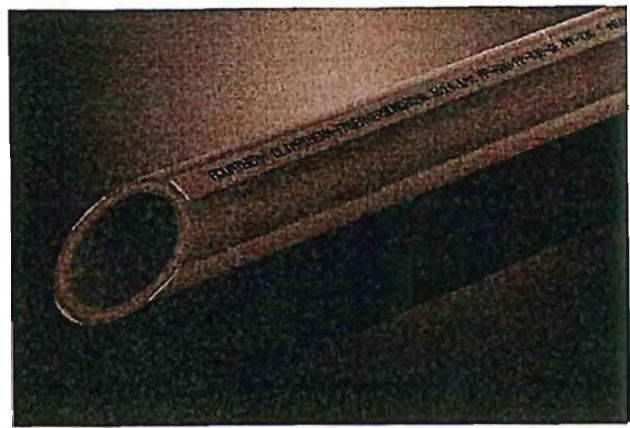
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[www.aquatherm.com](http://www.aquatherm.com)

climatherm® faser-composite pipe  
SDR 7.4/11

Material: Fusiolen® PP-R faser-composite

In accordance with:

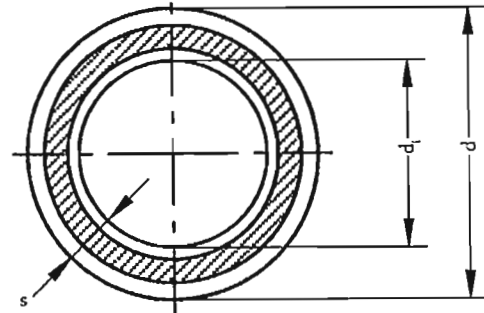
- NSF-14
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389



Appearance: Blue with light green stripe.

NSF System Certification: Including fittings, connection pieces, and connection techniques.

Fields of Application: Heating and cooling applications, industrial applications, compressed air.



Pipe <sup>1</sup>			Diameter <sup>2</sup>	Wall thickness	Internal diameter	Water capacity	Weight <sup>3</sup>
Part No.	Dimension ND – OD	Packing unit	d (mm)	s (mm)	d <sub>i</sub> (mm)	gal/ft	lb/ft
2670708	½" – 20 mm SDR 7.4	25	20	2.8	14.4	0.013	0.107
2670710	¾" – 25 mm SDR 7.4	25	25	3.5	18	0.024	0.167
2670112	1" – 32 mm SDR 11	10	32	2.9	26.2	0.043	0.189
2670114	1 ¼" – 40 mm SDR 11	10	40	3.7	32.6	0.067	0.292
2670116	1 ½" – 50 mm SDR 11	5	50	4.6	40.8	0.105	0.454
2670118	2" – 63 mm SDR 11	5	63	5.8	51.4	0.167	0.716
2670120	2 ½" – 75 mm SDR 11	5	75	6.8	61.4	0.237	0.996
2670122	3" – 90 mm SDR 11	3	90	8.2	73.6	0.343	1.441
2670124	3 ½" – 110 mm SDR 11	2	110	10	90	0.512	2.134
2670126	4" – 125 mm SDR 11	1	125	11.4	102.2	0.661	2.767
2670130	6" – 160 mm SDR 11	1	160	14.6	130.8	1.082	4.521
2670134	8" – 200 mm SDR 11	1	200	18.2	163.6	1.692	7.042
2670138	10" – 250 mm SDR 11	1	250	22.7	204.6	2.646	10.953
2070142	12" – 315 mm SDR 11	1	315	28.6	257.8	4.201	17.256
2070144	14" – 355 mm SDR 11	1	355	33.3	290.5	5.387	21.906
2670146	18" – 400 mm SDR 11	6	400	36.3	327.6	6.787	27.62
2670148	18" – 450 mm SDR 11	6	450	40.9	368.2	8.573	35.21
The following items are supplied in coils (non-faser)							
2610308	½" – 20 mm SDR 11	328 ft	20	1.9	16.2	0.017	0.107
2610310	¾" – 25 mm SDR 11	328 ft	25	2.3	20.4	0.026	0.164
2610312	1" – 32 mm SDR 11	164 ft	32	2.9	26.2	0.043	0.261

<sup>1</sup> ½" - 4" pipes come in standard 13 ft lengths (4 m). 6" - 14" pipes come in standard 19 ft lengths (5.8 m).  
<sup>2</sup> To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.  
<sup>3</sup> To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.



climatherm<sup>®</sup> Faser-composite pipe  
SDR 17.6

Material: Fusiolen<sup>®</sup> PP-R faser-composite

In accordance with:

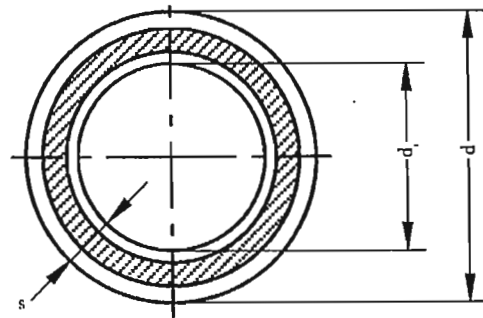
- NSF-14
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389



Appearance: Blue with light green stripe.

NSF System Certification: Including fittings, connection pieces, and connection techniques.

Fields of Application: Heating and cooling distribution, industrial applications.



Pipe <sup>1</sup>		Packing unit	Diameter <sup>2</sup>		Internal diameter d (mm)	Water capacity gal./ft	Weight <sup>3</sup> lb./ft
Part No.	Dimension ND – OD		d (mm)	s (mm)			
2570130	6" – 160 mm	6	160	9.1	141.8	1.272	2.93
2570134	8" – 200 mm	6	200	11.4	177.2	1.986	4.57
2570138	10" – 250 mm	6	250	14.2	221.6	3.105	7.11
2570142	12" – 315 mm	6	315	17.9	279.2	4.930	11.25
2570144	14" – 355 mm	6	355	20.1	314.8	6.267	14.25
2570146	16" – 400 mm	11.8	400	22.7	354.6	7.952	18.10
2570148	18" – 450 mm	11.8	450	25.5	399.0	10.068	22.86
2570150	20" – 500 mm	11.8	500	28.4	443.2	12.422	28.27
2570152	22" – 560 mm	11.8	560	31.7	496.6	15.596	35.31
2570154	24" – 630 mm	11.8	630	35.7	558.6	19.793	44.71

<sup>1</sup> Pipes come in standard 19 ft lengths (5.8 m).

<sup>2</sup> To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

<sup>3</sup> To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.