



Raising the standard. At a lower cost.

“This is my insulation.”[®]



1 0 0 0 ° P I P E I N S U L A T I O N

KNAUF

FACTS AT A GLANCE

- For all applications from 0°F to 1000°F
- Superior compressive strength
- Consistent density and smoothness

DESCRIPTION

Knauf 1000° Pipe Insulation is a molded, heavy-density, one-piece insulation made from inorganic glass fibers bonded with a thermo-setting resin. It is produced in 3' lengths with or without a factory-applied jacket. The jacket is a white-kraft paper bonded to aluminum foil and reinforced with glass fibers, and the longitudinal lap of the jacket is available with or without a self-sealing adhesive. A butt strip is furnished for each section.

APPLICATION

Knauf 1000° Pipe Insulation is used in power, process and industrial applications and in commercial and institutional buildings where maximum fire safety, resistance to physical abuse and a finished appearance are desired. Additional weather protection is needed outdoors.

FEATURES AND BENEFITS

Energy Conservation

- Offers excellent resistance to heat loss or gain, which saves energy and lowers operating costs.
- A low thermal conductivity of .23 at 75°F (24°C).

Low-Cost Installation

- Available with self-sealing lap, which eliminates need for staples, additional material and tools.
- Fast, easy installation reduces labor costs.

Condensation Control

- Installed properly, the foil vapor retarder and pressure-sensitive lap assure a positive vapor seal.

UL Classified

- All Knauf Pipe Insulation, plain or jacketed, meets the fire and smoke safety requirements of most federal, state and local building codes.

Easy Size Identification

- Pipe size, wall thickness and Proto 25/50 Rated PVC fitting cover size are printed in a repeat pattern along the longitudinal lap.
- Easy identification at job site.
- Simplifies restocking.
- After application, print is covered by the lap for a neat appearance.

SPECIFICATION COMPLIANCE

In U.S.:

- ASTM C 547; Type I, Grade A; Type IV, Grade A
- ASTM C 585
- ASTM C 795
- ASTM C 1136 (jackets); Type I, II, III, IV
- HH-B-100B (jackets); Type I and II
- HH-I-558C; Form D, Type III, Class 12; Class 13 (to 1000°F, 538°C)
- MEA 325-83-M (City of New York Dept. of Buildings)
- MIL-I-22344D
- MIL-I-24244C (ships)
- NFPA 90A and 90B
- NRC Reg. Guide 1.36
- USCG 164.109/4/0 (plain, unjacketed only)

In Canada:

- CAN 4-S102
- CCG 100/F1-304 (plain only)

- CGSB 51-GP-9M
- CGSB 51-GP-52M (jacket)

TECHNICAL DATA

Surface Burning Characteristics

- UL Classified.
- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN 4-S102, NFPA 255 and UL 723.

Temperature Range (ASTM C 411)

- Pipe operating temperatures from 0°F to 1000°F (-18°C to 538°C).

Water Vapor Transmission (ASTM E 96, Procedure A)

- Jacket has a water vapor permeance of 0.02 perms or less.

Corrosiveness (ASTM C 665)

- No greater than sterile cotton.

Stress Corrosion

- Complies with ASTM C 795, MIL-I-24244C and NRC 1.36.

Puncture Resistance (TAPPI Test T803) (Beach Units)

- Jacket minimum rating of 50 units.

Alkalinity (ASTM C 871)

- Less than 0.6% as Na₂O.
- pH between 7.5 and 10.0.

Microbial Growth (ASTM C 1338)

- Does not promote microbial growth.

Water Vapor Sorption (ASTM C 1104)

- Less than 0.2% by volume.

Linear Shrinkage (ASTM C 356)

- Negligible.

PRODUCT FORMS AND SIZES

Produced in 3' (914 mm) sections:

- For iron pipe from ½" to 24" nominal pipe size (13 mm to 610 mm).
- For copper tube from ⅝" to 6 ⅛" (16 mm to 156 mm).
- Wall thicknesses from ½" to 6" (13 mm to 152 mm) in single layer (for most sizes).
- All insulation inner and outer diameters comply with ASTM C 585.

PACKAGING

- Four convenient carton sizes for easy ordering, inventory tracking and storage.
- Reinforced carton handles for strength and easy lifting.
- Bar-coded cartons for accurate shipments and tracking.
- Full product range stocked at distributors for fast availability.

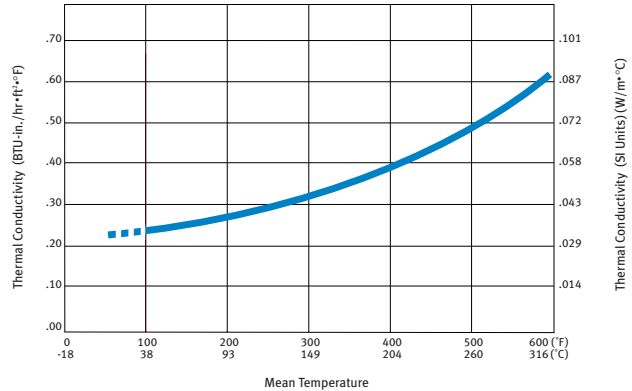
PERFORMANCE CALCULATIONS

The table on the next page is based on the North American Insulation Manufacturers Association (NAIMA) 3E Plus Computer Program v.2.12.

The calculations are based on the following:

- Cost of fuel: \$6.00/mmBtu.
- Interest rate: 15%.
- Effective tax rate: 46%.
- Economic life of insulation: 20 years.
- Average ambient temperature: 65°F (18°C).
- Average annual wind speed: 7.5 mph.
- Labor rate: \$25/hour.

THERMAL EFFICIENCY (ASTM C 335)*



Mean Temperature	k	k (SI)
75°F (24°C)	.23	.033
100°F (38°C)	.24	.035
200°F (93°C)	.28	.040
300°F (149°C)	.34	.049
400°F (204°C)	.42	.061
500°F (260°C)	.51	.074
600°F (316°C)	.62	.089

* **Hot Performance.** Knauf 1000° Pipe Insulation offers the best thermal performance of any standard fiber glass pipe insulation. Even at high mean temperatures, it offers a more economical insulating solution than mineral wool and provides several performance advantages.

MINIMUM PIPE INSULATION (IN.)^a (TO MEET ASHRAE 90.1 REQUIREMENTS)

Insulation Conductivity			Nominal Pipe Diameter (in.)					
Fluid Design Operating Temperature Range, °F	Conductivity Range Btu-in./ (hr·ft²·°F)	Mean Temperature Rating, °F	Runouts ^b up to 2	1 and less	1½ to 2	2½ to 4	5 & 6	8 & up
Heating Systems (Steam, Steam Condensate, and Hot Water)								
Above 350	.32-.34	250	1½	2½	2½	3	3½	3½
251-350	.29-.31	200	1½	2	2½	2½	3½	3½
201-250	.27-.30	150	1	1½	1½	2	2	3½
141-200	.25-.29	125	½	1½	1½	1½	1½	1½
105-140	.24-.28	100	½	1	1	1	1½	1½
Domestic and Service Hot Water Systems^c								
105 and Greater	.24-.28	100	½	1	1	1½	1½	1½
Cooling Systems (Chilled Water, Brine, Refrigerant)^d								
40-55	.23-.27	75	½	½	¾	1	1	1
Below 40	.23-.27	75	1	1	1½	1½	1½	1½

^a For minimum thicknesses of alternative insulation types, see 9.4.8.2, ASHRAE 90.1.

^b Runouts to individual terminal units not exceeding 12 ft. in length.

^c Applies to recirculating sections of service or domestic hot water systems and first 8 ft. from storage tank for non-recirculating systems.

^d The required minimum thicknesses do not consider water vapor transmission and condensation.

Additional insulation, vapor retarders, or both, may be required to limit water vapor transmission and condensation.

RECOMMENDED THICKNESSES

Nominal Pipe Size		Process Temperature, Degrees F (Degrees C)								
		150 (66)	250 (121)	350 (177)	450 (232)	550 (288)	650 (343)	750 (399)	850 (454)	1000 (538)
½	Thickness (in.)	1	1	1½	2½	2½	2½	3	3	3
	Heat Loss (Btu/ft•hr)	8	20	27	31	44	60	73	94	133
	Surf. Temp. (deg. F)	70	76	76	74	76	80	81	85	91
	Savings (\$/ft/yr)	7	18	29	41	55	71	89	110	147
1	Thickness (in.)	1	1	1½	2½	3	3	3	3	4
	Heat Loss (Btu/ft•hr)	10	25	34	40	52	70	92	119	148
	Surf. Temp. (deg. F)	70	76	77	76	77	80	84	89	89
	Savings (\$/ft/yr)	10	24	39	56	75	98	124	154	209
1½	Thickness (in.)	1	1½	2	2½	3	3	3	3	4
	Heat Loss (Btu/ft•hr)	14	25	34	46	60	81	107	137	169
	Surf. Temp. (deg. F)	71	74	74	76	77	81	85	90	90
	Savings (\$/ft/yr)	13	30	50	72	98	128	163	204	280
2	Thickness (in.)	1	1½	2½	3	3	3	3	4	4
	Heat Loss (Btu/ft•hr)	16	29	37	50	70	95	126	138	195
	Surf. Temp. (deg. F)	71	74	74	76	79	83	88	86	93
	Savings (\$/ft/yr)	15	35	58	84	115	151	193	243	337
3	Thickness (in.)	1	1½	2½	3	3	4	4	4	5
	Heat Loss (Btu/ft•hr)	22	38	47	63	90	102	134	172	212
	Surf. Temp. (deg. F)	72	75	75	77	81	80	84	89	90
	Savings (\$/ft/yr)	19	45	75	111	152	202	261	332	464
4	Thickness (in.)	1½	2	3	3	3	4	4	4	5
	Heat Loss (Btu/ft•hr)	19	38	49	74	104	118	155	199	244
	Surf. Temp. (deg. F)	70	73	74	77	82	81	86	90	92
	Savings (\$/ft/yr)	22	54	90	133	181	245	319	408	575
6	Thickness (in.)	1½	2	3	3	4	4	4	5	6
	Heat Loss (Btu/ft•hr)	28	51	65	98	111	151	198	219	283
	Surf. Temp. (deg. F)	71	74	75	79	79	83	87	87	91
	Savings (\$/ft/yr)	28	68	116	173	249	334	438	564	804
8	Thickness (in.)	1½	2½	3	4	4	4	4	5	6
	Heat Loss (Btu/ft•hr)	33	51	77	95	134	181	238	264	336
	Surf. Temp. (deg. F)	71	72	75	76	80	84	89	89	93
	Savings (\$/ft/yr)	34	83	141	212	299	406	537	767	1014
10	Thickness (in.)	1½	2	3	4	4	4	5	6	6
	Heat Loss (Btu/ft•hr)	39	74	93	115	160	216	242	277	390
	Surf. Temp. (deg. F)	71	75	76	77	81	85	86	87	94
	Savings (\$/ft/yr)	40	98	167	253	358	488	648	844	1219
12	Thickness (in.)	1½	2½	3	4	4	4	6	6	6
	Heat Loss (Btu/ft•hr)	45	72	107	129	182	247	243	313	441
	Surf. Temp. (deg. F)	71	73	76	77	81	86	83	88	95
	Savings (\$/ft/yr)	45	111	192	290	413	564	751	981	1423
14	Thickness (in.)	1½	2½	3	4	4	4	6	6	6
	Heat Loss (Btu/ft•hr)	53	81	119	139	196	266	261	335	472
	Surf. Temp. (deg. F)	72	74	77	77	82	86	84	88	96
	Savings (\$/ft/yr)	48	120	206	313	446	611	814	1066	1549
16	Thickness (in.)	1½	2½	4	4	4	4	6	6	6
	Heat Loss (Btu/ft•hr)	59	91	103	155	218	296	288	371	523
	Surf. Temp. (deg. F)	72	74	74	78	82	87	84	89	97
	Savings (\$/ft/yr)	54	133	250	350	499	685	916	1201	1750
18	Thickness (in.)	1½	2½	4	4	4	4	6	6	6
	Heat Loss (Btu/ft•hr)	66	101	113	171	241	326	316	406	572
	Surf. Temp. (deg. F)	72	74	74	78	82	87	84	89	97
	Savings (\$/ft/yr)	59	146	253	386	552	759	1017	1336	1951
20	Thickness (in.)	1½	3	4	4	4	4	6	6	6
	Heat Loss (Btu/ft•hr)	73	95	124	186	263	356	343	441	622
	Surf. Temp. (deg. F)	72	73	74	78	82	88	85	89	97
	Savings (\$/ft/yr)	64	159	276	421	604	833	1118	1470	2150
24	Thickness (in.)	2	3	4	4	4	4	6	6	6
	Heat Loss (Btu/ft•hr)	67	111	145	218	307	416	398	511	721
	Surf. Temp. (deg. F)	70	73	74	78	83	88	85	90	98
	Savings (\$/ft/yr)	74	187	328	504	725	1001	1317	1736	2547

NOTE: Some thicknesses may exceed a listed product's maximum allowable thickness and should be used for information purposes only. Please consult product descriptions regarding thickness and temperature limitations that may apply at or below the maximum operating temperatures listed for each product. See page 4 for calculation assumptions.