

RUBEROID
MEDIUM TEMPERATURE INSULATION

For Terms & Conditions and F.O.B. Points see Notes on page MT-8.

DISTRIBUTOR DISCOUNTS
CONFIDENTIAL — LIMITED DISTRIBUTION

0—$1,900 List	List Less 4%
$1,900—$4,999	List Less 20%
$5,000 List & Over	List Less 30%
Direct factory shipment of $1,900 list value or more to O.E.M. or metal building dealers	List Less 20% & 7%

MIXED CARLOADS

Mixed carloads of Superfine blanket and Pipe Insulation will be allowed under the following conditions when shipped at the same time to one destination.

1. Total order must exceed $5,000 list value.
2. At least $1,000 list value of Superfine blanket must be included.

450310

PLAINTIFF'S
EXHIBIT
GF-1986

RUBEROID MEDIUM TEMPERATURE INSULATION



FIBER GLASS PIPE COVERING

FIBER GLASS PIPE COVERING - ZONE I

	A		C		XS	
	CL	LCL	CL	LCL	CL	LCL
½" thick	49	43	43	35	20	11
¾" thick	26	16	19	6	14	2
1" thick and up	5	0+95	0+96	0+80	0+90	0+75

FIBER GLASS PIPE COVERING - ZONE II

	A		C		XS	
	CL	LCL	CL	LCL	CL	LCL
½" thick	46	38	48	30	17	6
¾" thick	24	16	17	4	12	0
1" thick and up	2	0+92	0+93	0+77	0+87	0+72

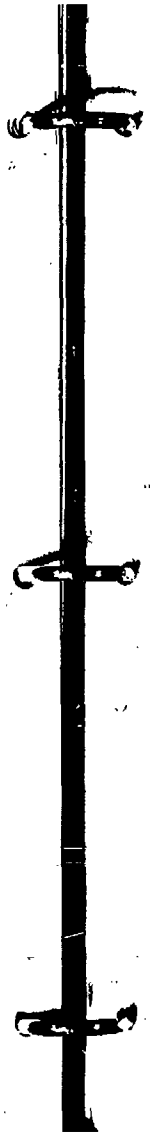
DUAL TEMPERATURE VAPOR BARRIER JACKET (Black or White) - ZONE I

	A		C		XS	
	CL	LCL	CL	LCL	CL	LCL
½" IPS through 12" IPS, inclusive	0+99	0+89	0+90	0+74	0+84	0+69
14" IPS and up	0+93	0+83	0+87	0+68	0+81	0+63

DUAL TEMPERATURE VAPOR BARRIER JACKET (Black or White) - ZONE II

	A		C		XS	
	CL	LCL	CL	LCL	CL	LCL
½" IPS through 12" IPS, inclusive	0+96	0+86	0+85	0+71	0+79	0+66
14" IPS and up	0+90	0+80	0+79	0+65	0+73	0+60

450311



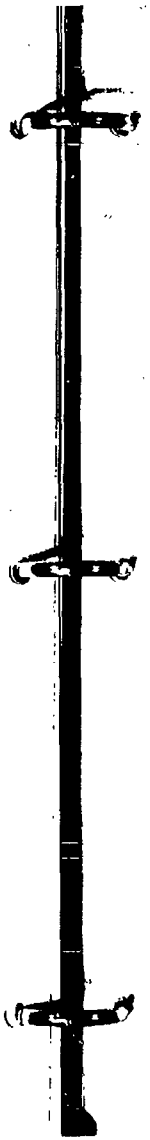
FIBER GLASS PIPE COVERING

NET UNIT PRICES
MANUAL TABLE NUMBER

THICKNESS & IPS	JACKET	ZONE 1 CL	ZONE 1 LCL	ZONE 2 CL	ZONE 2 LCL
½" Thick and	Plain-Std. Canvas-Lt. Duty	49	43	46	38
	Dual Temp. (Black or White)	43	37	40	32
½" IPS thru	Flame Retardant (FRJ)	43	37	40	32
	4 oz. canvas	47	41	44	36
10" IPS	6 oz. canvas	42	36	39	31
	8 oz. canvas	40	34	37	29
	33# Weatherproof	37	31	34	26
	45# Weatherproof	34	28	31	23
	55# Weatherproof	32	26	29	21
	6 oz. canvas over lt. duty	26	20	23	15
	8 oz. canvas over lt. duty	24	18	21	13
¾" Thick and	Plain-Std. Canvas-Lt. Duty	26	16	24	16
	Dual Temp. (Black or White)	20	10	18	10
½" IPS thru	Flame Retardant (FRJ)	20	10	18	10
	4 oz. canvas	24	14	22	14
8" IPS	6 oz. canvas	19	9	17	9
	8 oz. canvas	17	7	15	7
	33# Weatherproof	14	4	12	4
	45# Weatherproof	11	1	9	1
	55# Weatherproof	9	0 + 99	7	0 + 99
	6 oz. canvas over lt. duty	3	0 + 93	1	0 + 93
	8 oz. canvas over lt. duty	1	0 + 91	0 + 99	0 + 91
1" Thick and over	Plain-Std. Canvas	5	0 + 95	2	0 + 92
	Dual Temp. (Black or White)	0 + 99	0 + 89	0 + 96	0 + 86
and	Flame Retardant (FRJ)	0 + 99	0 + 89	0 + 96	0 + 86
	4 oz. canvas	3	0 + 93	0	0 + 90
½" IPS thru	6 oz. canvas	0 + 98	0 + 88	0 + 95	0 + 85
	8 oz. canvas	0 + 96	0 + 86	0 + 93	0 + 83
12" IPS	33# Weatherproof	0 + 93	0 + 83	0 + 90	0 + 80
	45# Weatherproof	0 + 90	0 + 80	0 + 87	0 + 77
	55# Weatherproof	0 + 88	0 + 78	0 + 85	0 + 75
	6 oz. canvas over dual temp.	0 + 76	0 + 66	0 + 73	0 + 63
	8 oz. canvas over dual temp.	0 + 74	0 + 64	0 + 71	0 + 61
1" Thick and over	Plain	5	0 + 95	2	0 + 92
	Standard Canvas	0 + 99	0 + 89	0 + 96	0 + 86
and	Dual Temp. (Black or White)	0 + 93	0 + 83	0 + 90	0 + 80
	Flame Retardant (FRJ)	0 + 93	0 + 83	0 + 90	0 + 80
14" IPS thru	4 oz. canvas	0 + 97	0 + 87	0 + 94	0 + 84
	6 oz. canvas	0 + 95	0 + 85	0 + 92	0 + 82
30" IPS	8 oz. canvas	0 + 93	0 + 83	0 + 90	0 + 80
	33# Weatherproof	0 + 89	0 + 79	0 + 86	0 + 76
	45# Weatherproof	0 + 86	0 + 76	0 + 83	0 + 73
	55# Weatherproof	0 + 84	0 + 74	0 + 81	0 + 71

List price for 12" IPS and over not shown in Manual of Unit Prices.
Above prices do not include bands. Add 1 point if bands are to be included.
4" wide strips of jacketing furnished to cover end joints on vapor barrier and weatherproof jackets are furnished at no charge.

450312



FIBER GLASS PIPE COVERING

LIST PRICES PER LINEAL FOOT
IRON PIPE SIZE

Nominal I.P.S.	Actual O.D.	Nominal ½" Thick	Nominal ¾" Thick	Nominal 1" Thick	Nominal 1½" Thick	Nominal 2" Thick
¼"	0.84"	$ .22	$ .22	$ .22	$ .46	
⅜"	1.05"	.24	.24	.24	.49	
1"	1.32"	.27	.27	.27	.52	
1¼"	1.66"	.30	.30	.30	.56	
1½"	1.90"	.33	.33	.33	.60	
2"	2.38"	.36	.36	.36	.64	$1.00
2½"	2.88"	.40	.40	.40	.70	1.05
3"	3.50"	.45	.45	.45	.76	1.16
3½"	4.00"	.50	.50	.50	.82	1.25
4"	4.50"	.56	.56	.56	.88	1.33
5"	5.56"	.70	.70	.70	1.00	1.55
6"	6.63"	.80	.80	.80	1.10	1.70
8"	8.63"	1.10		1.10	1.35	2.00
10"	10.75"	1.30		1.30	1.65	2.40
12"	12.75"			1.50*	1.85	2.70
14"	14.00"			1.70*	2.10	3.00
16"	16.00"			2.00*	2.35	3.30
18"	18.00"			2.20*	2.60	3.60
20"	20.00"			2.45*	2.85	4.00
22"	22.00"			2.70*	3.10	4.30
24"	24.00"			3.00*	3.30	4.50
26"	26.00"				3.55	4.85
28"	28.00"				3.75	5.15
30"	30.00"				4.00	5.50

* Not shown in Manual of Unit Prices — applicable discount to be applied to list.
Copper Tubing Sizes use same list except use 1¼ IPS price for 1½ CWT.

LIST PRICE PER LINEAL FOOT — COPPER WATER TUBING

Nominal Copper Tube Size	O.D. of Copper Tube	For Pricing, Use Following Iron Pipe Size	Nominal Copper Tube Size	O.D. of Copper Tube	For Pricing, Use Following Iron Pipe Size
½"	0.625"	½"	2½"	2.625"	2½"
⅝"	0.875"	¾"	3"	3.125"	3"
¾"	1.125"	1"	3½"	3.625"	3½"
1"	1.375"	1¼"	4"	4.125"	4"
1¼"	1.625"	1¼"	5"	5.125"	5"
1½"	2.125"	2"	6"	6.125"	6"

When ordering pipe insulation for copper tubing, show the nominal tube size, and that the insulation is for copper tubing.

450313



NOTES

1. FREIGHT ALLOWANCE: F.O.B. Shipping Point, Full Freight Allowed — Sellers Routing.

2. TERMS OF PAYMENT: 1% 10th Prox., Net 30th Prox.

3. CARLOAD DEFINITION: $5,000 list value of pipe insulation products.

   NOTE: Pipe insulation may be combined with fiber glass blanket insulation to obtain the carload discount providing the net invoice of both products is $4,000 or more.

4. ZONE DESCRIPTION:

   ZONE 1: All states east of and including North Dakota, South Dakota, Nebraska, Colorado, and New Mexico.

   ZONE 2: All states west of and including Montana, Wyoming, Utah, and Arizona.

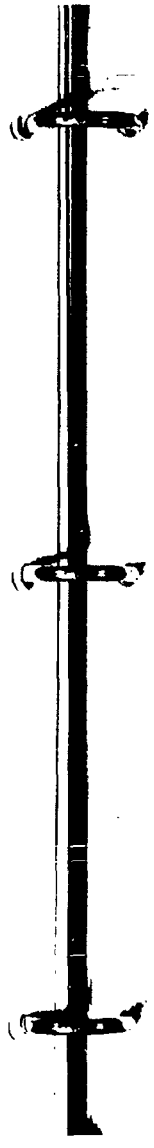
5. PRICING: List price as shown in the Manual of Unit Prices.

6. SPECIAL ACCESSORIES

ACCESSORY MATERIAL	EXTRA CHARGE — DEDUCT FROM BASE TABLE	
	12" I.P.S. or smaller	Over 12" I.P.S.
CANVAS JACKETS		
Standard Weight	No Charge	6
4 Oz.	2	8
6 Oz.	7	10
8 Oz.	9	12
VAPOR BARRIER JACKETS		
Dual Temperature (Black or White) ½" & ¾" Thickness	13	
WEATHERPROOF ROOFING JACKETS		
35 Lb.	12	16
45 Lb.	15	19
55 Lb.	17	21
LIGHT DUTY		
½" & ¾" Thickness Only	No Charge	

4" wide strips of jacketing furnished to cover end joints on vapor barrier and weatherproof jackets.

450314



RUBEROID MEDIUM TEMPERATURE INSULATION

7. PACKAGING DATA: Material is packaged in corrugated cartons. All pipe insulation products are furnished in 3-foot sections. No bands, adhesives, or staples furnished.

FIBER GLASS PIPE INSULATION FOR COPPER TUBING*

Nominal Copper Tube Size Inches	O.D. of Copper Tube	Lineal Feet per Carton ½" Thickness	¾" Thickness	1" Thickness	1½" Thickness
½	0.625"	108	147	108	75
⅝	0.875"	108	147	108	75
1	1.125"	147	108	108	75
1¼	1.375"	147	108	108	75
1½	1.625"	108	75	108	75
2	2.125"	75	75	75	48
2½	2.625"	75	75	75	48
3	3.125"	75	75	48	27
3½	3.625"	75	75	48	27
4	4.125"	48	48	27	27
5	5.125"	27	27	27	12
6	6.125"	27	27	12	12

* 3' Sections Only

FIBER GLASS PIPE INSULATION FOR IRON PIPE*

Nominal Pipe Size Inches	Lineal Feet per Carton ½" Thickness	¾" Thickness	1" Thickness	1½" Thickness	2" Thickness
½	108	147	147	75	—
¾	147	147	147	75	—
1	147	147	147	75	—
1¼	147	147	147	75	—
1½	147	147	147	75	—
2	147	108	75	48	27
2½	108	75	75	48	27
3	75	75	48	27	27
3½	75	48	27	27	27
4	48	48	27	27	27
4½	48	27	27	27	12
5	27	27	27	27	12
6	27	27	27	12	12
7	27	—	12	12	12
8	12	—	12	12	12
9	12	—	12	12	12
10	12	—	12	12	12
11	12	—	12	12	12
12	12	—	12	12	12
14	12	—	12	12	3
16	3	3	3	3	3
18	3	3	3	3	3
20	3	3	3	3	3
22	3	3	3	3	3
24	3	3	3	3	3

* 3' Sections Only. Other pipe sizes available on request.

450345



RUBEROID MEDIUM TEMPERATURE INSULATION

8. EFFICIENCIES AND HEAT LOSSES: Heat losses are given in BTU's per sq. ft. of pipe surface per hour per degree of temperature difference pipe to air.

TEMPERATURE DIFFERENCE			90°F		100°F		150°F		200°F		250°F	
PIPE SURFACE TEMP.			180°F		180°F		230°F		280°F		330°F	
Pipe Size	Surface Area Ft²/Ft	Wall Thickness	BTU Loss	Eff. %	BTU Loss	Eff. %	BTU Loss	Eff. %	BTU Loss	Eff. %	BTU Loss	Eff. %
½	.220	BARE	2.120	—	2.480	—	2.800	—	3.100	—	3.420	—
		½	.542	74.8	.580	76.8	.599	78.6	.630	79.6	.649	81.1
		¾	.473	77.7	.481	80.8	.500	82.2	.527	83.1	.543	84.1
		1	.413	80.5	.421	83.0	.438	84.4	.463	85.1	.478	86.0
		1½	.336	84.1	.343	86.1	.357	87.2	.377	87.9	.391	88.6
¾	.275	BARE	2.08	—	2.43	—	2.74	—	3.04	—	3.35	—
		½	.467	77.6	.477	80.4	.494	82.0	.520	83.0	.539	84.0
		¾	.396	81.0	.408	83.2	.420	84.8	.442	85.5	.457	86.4
		1	.341	83.5	.348	85.7	.362	86.8	.382	87.5	.396	88.2
		1½	.230	89.0	.318	87.4	.331	87.9	.269	88.6	.363	89.2
1	.344	BARE	2.040	—	2.38	—	2.69	—	2.99	—	3.30	—
		½	.492	75.8	.495	79.2	.519	80.7	.544	81.8	.562	83.0
		¾	.399	80.4	.406	82.9	.421	84.4	.443	85.2	.458	86.2
		1	.330	83.5	.346	85.4	.369	87.2	.380	87.3	.383	88.5
		1½	.271	86.7	.276	88.4	.288	89.4	.304	89.8	.315	90.6
1¼	.435	BARE	2.00	—	2.34	—	2.64	—	2.93	—	3.24	—
		½	.430	78.6	.438	81.4	.452	82.8	.476	84.1	.490	84.9
		¾	.336	83.2	.343	85.4	.355	86.6	.375	87.3	.387	88.1
		1	.336	83.2	.343	85.4	.355	86.6	.375	87.3	.387	88.1
		1½	.299	88.1	.244	89.5	.254	90.4	.268	90.9	.279	91.4
1½	.498	BARE	1.98	—	2.31	—	2.61	—	2.90	—	3.20	—
		½	.471	76.2	.480	79.2	.493	81.0	.518	82.2	.535	83.3
		¾	.350	82.3	.357	84.6	.371	85.8	.391	86.5	.407	87.3
		1	.297	85.0	.303	86.8	.315	88.0	.333	88.5	.345	89.3
		1½	.236	89.0	.241	89.6	.251	90.0	.265	90.0	.274	91.4
2	.622	BARE	1.95	—	2.27	—	2.56	—	2.85	—	3.15	—
		½	.436	77.7	.445	80.4	.460	82.0	.481	83.1	.496	84.3
		¾	.327	83.2	.332	85.4	.347	86.5	.365	87.2	.378	88.2
		1	.276	86.8	.282	87.6	.293	88.5	.309	89.2	.320	89.8
		1½	.215	89.0	.219	90.4	.228	91.1	.241	91.5	.249	92.1
2½	.753	BARE	1.92	—	2.23	—	2.52	—	2.81	—	3.11	—
		½	.405	79.0	.412	81.5	.428	83.0	.448	84.1	.462	85.1
		¾	.315	83.6	.320	85.6	.333	86.8	.350	87.6	.362	88.4
		1	.263	86.2	.269	88.0	.279	89.0	.294	89.6	.305	90.2
		1½	.226	88.2	.230	89.7	.236	90.6	.253	91.0	.263	91.6
3	.917	BARE	1.89	—	2.20	—	2.49	—	2.77	—	3.07	—
		½	.430	77.3	.438	80.2	.453	81.8	.473	82.9	.488	84.2
		¾	.317	83.2	.323	85.3	.336	86.5	.353	87.2	.363	88.1
		1	.253	86.6	.258	88.2	.267	89.2	.282	89.8	.292	90.6
		1½	.193	89.8	.197	91.0	.206	91.8	.217	92.3	.225	92.8
3½	1.047	BARE	1.87	—	2.18	—	2.46	—	2.74	—	3.04	—
		½	.416	77.7	.419	80.8	.433	82.3	.453	83.4	.468	84.7
		¾	.303	83.8	.309	85.8	.319	87.0	.336	87.8	.348	88.6
		1	.211	88.7	.214	90.2	.223	91.0	.236	91.4	.244	92.0
		1½	.212	88.7	.217	90.2	.225	91.0	.237	91.4	.246	92.0
4	1.178	BARE	1.85	—	2.16	—	2.44	—	2.72	—	3.01	—
		½	.386	79.1	.393	81.8	.406	83.3	.426	84.4	.438	85.5
		¾	.300	84.0	.307	85.8	.318	86.9	.334	87.8	.345	88.8
		1	.238	87.0	.244	88.8	.252	89.6	.266	90.3	.276	91.0
		1½	.181	90.1	.185	91.6	.193	92.0	.204	92.6	.211	93.0

450316

RUBEROID MEDIUM TEMPERATURE INSULATION

TEMPERATURE DIFFERENCE			50°F		100°F		150°F		200°F		250°F	
PIPE SURFACE TEMP.			130°F		180°F		230°F		280°F		330°F	
Pipe Size	Surface Area Ft²/Ft	Wall Thickness	BTU Loss	Eff. %	BTU Loss	Eff. %	BTU Loss	Eff. %	BTU Loss	Eff. %	BTU Loss	Eff. %
5	1.456	BARE	1.83	—	2.13	—	2.40	—	2.68	—	2.97	—
		½	.395	78.4	.403	81.1	.416	82.6	.436	83.8	.447	85.0
		¾	.300	83.6	.307	85.6	.317	86.8	.334	87.5	.344	88.4
		1	.239	87.0	.244	88.6	.253	89.4	.266	90.2	.275	90.8
		1½	.178	90.8	.182	91.8	.189	92.2	.200	92.6	.207	93.1
6	1.734	BARE	1.80	—	2.10	—	2.37	—	2.65	—	2.94	—
		½	.395	78.0	.402	80.9	.415	82.5	.435	83.6	.448	84.8
		¾	.279	84.5	.285	86.4	.295	87.6	.310	88.4	.321	89.0
		1	.236	86.8	.241	88.5	.250	89.5	.263	90.1	.272	90.7
		1½	.173	90.4	.177	91.6	.183	92.2	.194	92.6	.201	93.1
8	2.258	BARE	1.77	—	2.06	—	2.33	—	2.60	—	2.89	—
		½	.375	78.8	.384	81.4	.396	83.0	.415	84.0	.423	85.4
		¾	—	—	—	—	—	—	—	—	—	—
		1	.215	87.8	.219	89.5	.227	90.3	.239	90.9	.247	91.4
		1½	.161	90.8	.164	92.0	.171	92.8	.180	93.0	.186	93.5
10	2.814	BARE	1.75	—	2.03	—	2.30	—	2.57	—	2.85	—
		½	.416	70.5	.428	79.0	.438	81.0	.459	82.2	.473	83.4
		¾	—	—	—	—	—	—	—	—	—	—
		1	.206	88.2	.210	89.7	.218	90.5	.230	91.0	.237	91.7
		1½	.152	91.3	.155	92.4	.161	93.0	.170	93.4	.176	93.8
12	.338	BARE	1.73	—	2.01	—	2.27	—	2.54	—	2.83	—
		½	—	—	—	—	—	—	—	—	—	—
		¾	—	—	—	—	—	—	—	—	—	—
		1	.196	88.8	.200	90.0	.207	91.0	.218	91.4	.226	91.9
		1½	.149	91.4	.152	92.4	.158	93.0	.167	93.4	.173	93.8

Note: For pipe sizes in excess of 12" I.P.S. use efficiency figures shown for 12" I.P.S.

EXAMPLES TO SHOW USE OF THIS CHART:

1. What is the heat loss from a 100 ft. line when the pipe surface temperature is 330°F, the pipe is 6" IPS, air is 80°F, and 1½" of insulation is used?

   From the table, select 6" IPS, 1½" wall thickness, BTU loss of 0.201.

   Since the value of .201 is expressed in BTU per square foot of pipe surface, per hour, per degree of temperature difference pipe to air, it must be converted to lineal feet of pipe and multiplied by the temperature difference, and the length of the pipe.

   The conversion factor for 6" IPS is taken from the chart—1.734 sq. ft. of pipe surface per lineal foot of pipe.

   $Q_1 = .201 \times 1.734 \times (330\text{-}80) \times 100$ ft. = 8720 BTU/hr.

2. How much heat would have been lost if no insulation had been used in the example above?

   BTU loss for bare pipe is shown as 2.94, all other values remain the same.

   $Q_2 = 2.94 \times 1.734 \times (330\text{-}80) \times 100 = 127,500$ BTU/hr.

3. Using the value of heat loss from example 2, determine value of example 1 using efficiencies.

   From the chart, efficiency is 93.1%.

   There for the insulation is allowing 100-93.1 or 6.9% of the heat to escape.

   $Q_1 = Q_2 \times (100\text{-}93.1)\%$

   $Q_1 = 127,500 \times .069 = 8790$ BTU/hr.

4. At a value of $0.50 per 1,000,000 BTU, how much money is saved by using 1½" of insulation over 1" of insulation in 300 days? Use a 4" IPS, 280°F pipe surface temperature, and 1000 ft. of pipe.

   FROM THE CHART:

   BTU loss 1½" wall = .204
   BTU loss 1" wall = .266
   Conversion factor = 1.178

   Q saved is (.266-.204) × 1.178 × (280°-80) × 1000 = 14,600 BTU/hr.
   Q saved in 300 days is 14,600 × 24 × 300 = 100,700,000 BTU
   Money saved is $0.50 × 100.7 = $50.40

450317

