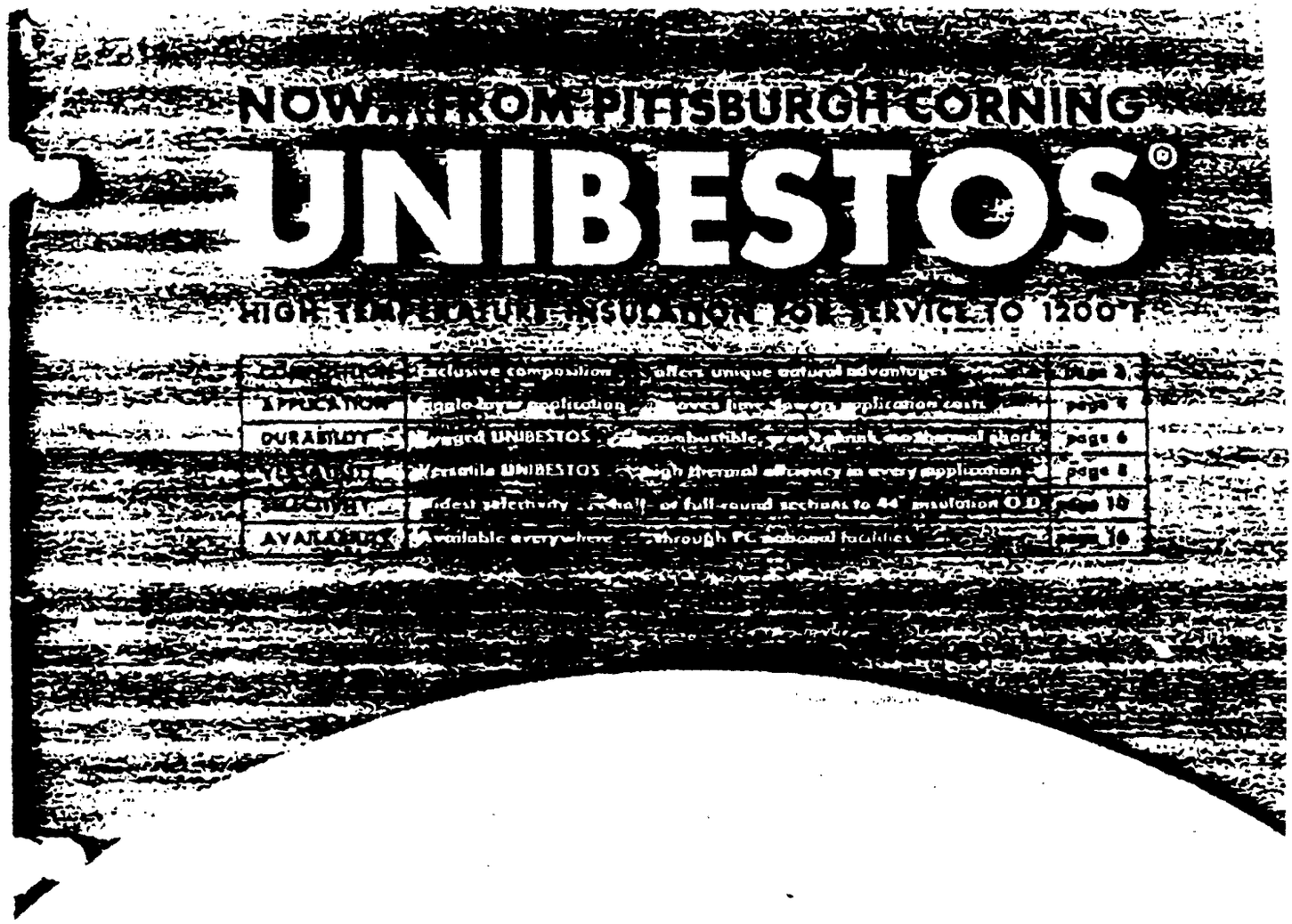
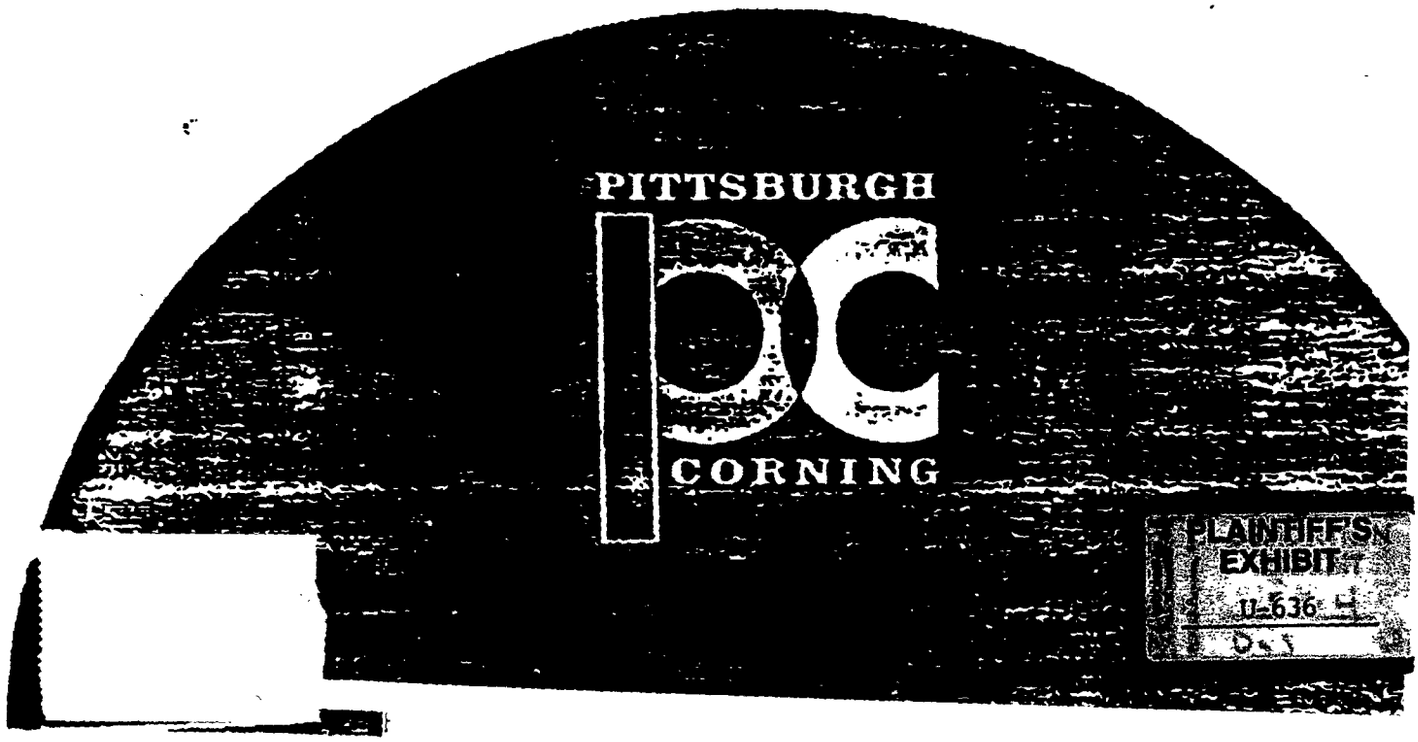
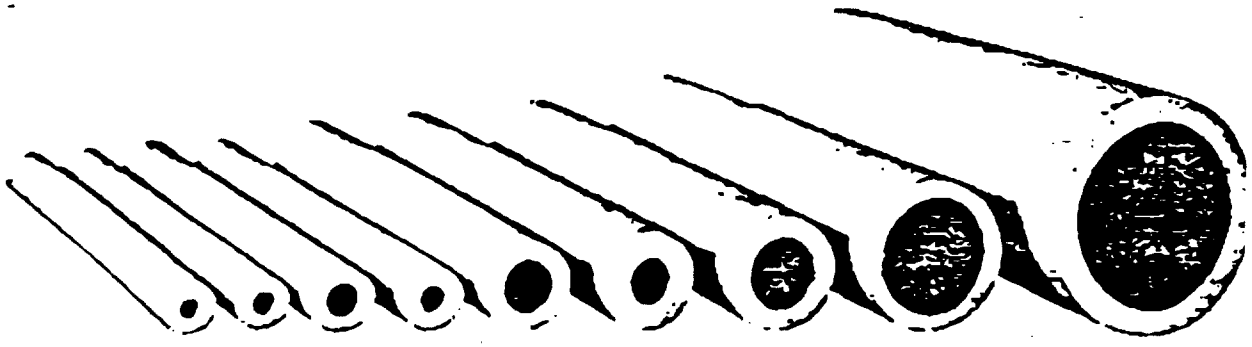

NOW... FROM PITTSBURGH CORNING
UNIBESTOS®
HIGH TEMPERATURE INSULATION FOR SERVICE TO 1200°F
Exclusive composition ... offers unique natural advantages
Versatile UNIBESTOS ... high thermal efficiency in every application
Widest selectivity ... half- or full-round sections to 44" insulation O.D.
Available everywhere ... through PC national facilities


PITTSBURGH
CORNING
PLAINTIFF'S
EXHIBIT
11-636

COMPOSITION [C UNIBESTOS]

UNIBESTOS is available up to 4" thickness for any size pipe or tubing from ½" tubing through 36" O.D. pipe. Pipe sizes above 36" through 44" insulation O.D. available on request.



UNIBESTOS®... the only industrial insulation made in the United States composed of unique long-fibered Amosite asbestos... is now manufactured by Pittsburgh Corning. Rugged and durable, UNIBESTOS has proved itself an ideal high temperature insulation in the marine, refining, chemical, power, and petrochemical fields.

EXCLUSIVE COMPOSITION... offers unique natural advantages

UNIBESTOS is a sectional pipe-insulation material made up of approximately 95% long-fibered Amosite asbestos, combined with an inert silicate binder and diatomaceous earth.

Amosite asbestos offers a host of unique *natural* insulation advantages which stem from:

(1) Unusually long, fine, tough fibers.
(2) Inert chemical make-up.
(3) High degree of resistance to moisture.

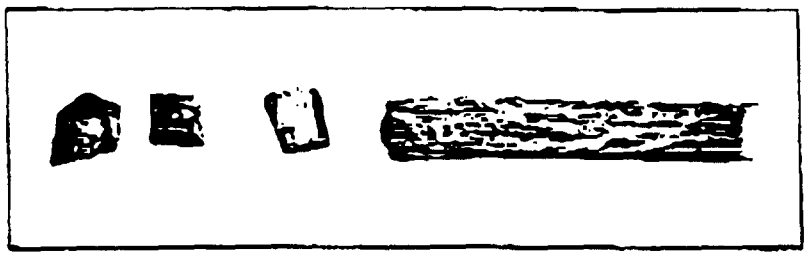
The Amosite asbestos is processed by a special Pittsburgh Corning production technique called *fiberizing*, designed to exploit the full natural advantages of the long-fibered material. In this process, the Amosite is carefully screened, air blown, and brushed to "open up" the long, fine asbestos fibers into an interlaced fibrous mass which entraps millions of insulating air spaces. UNIBESTOS is produced by carefully forming this exclusive base material into sections of precise thicknesses, then applying a smooth, chemically-inert refractory coating.

The photographs on the opposite page graphically illustrate why UNIBESTOS is unique among insulations in its make-up and manufacture: the pages following will demonstrate that . . .

for economy, efficiency, long service and re-usability UNIBESTOS is your best buy in high temperature pipe insulation.

The photograph below gives a vivid demonstration of the natural difference between long-fibered Amosite asbestos and ordinary asbestos. These long, thin fibers have an amazing degree of resilience. Not only does each fiber offer a high resistance to forces that tend to bend it, but groups of fibers . . . properly processed and "opened" . . . form an interlaced fibrous mass with unusual structural strength, as well as high insulating efficiency.

Amosite asbestos is found chiefly in the north central Transvaal, a province in the Union of South Africa, where uniform, graded Amosite is produced by modern facilities of the Cape Asbestos Company for export to Pittsburgh Corning plants.



This picture shows the difference between equal weights of long-fibered Amosite asbestos and an ordinary asbestos material. The pile of Amosite on the right, "opened" to almost three times the volume by the PC fiberizing process, will retain its original fluffy mass indefinitely. Ordinary asbestos, with its short, more brittle fibers, tends to pack down.



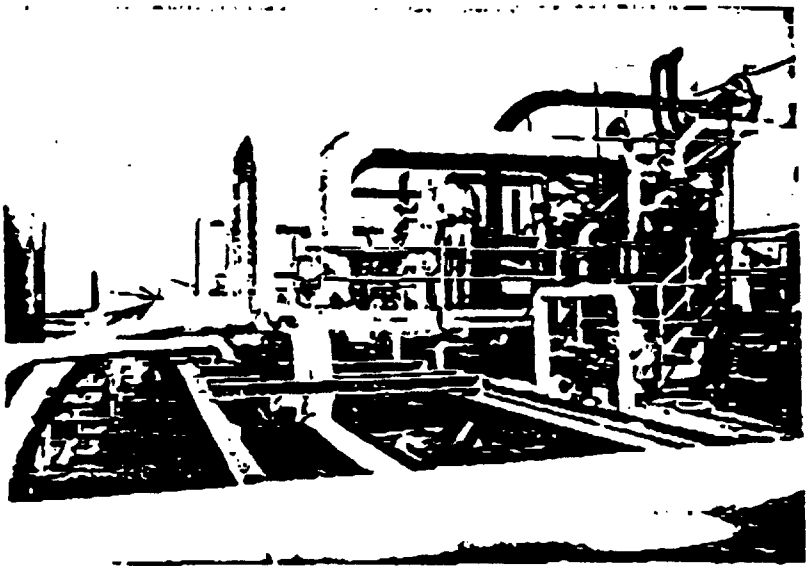
APPLICATION of UNIBESTOS

SINGLE-LAYER INSULATION . . . saves time, lowers application costs

Because of its unique combination of properties, UNIBESTOS offers many advantages in both thermal efficiency and reduced installation costs.

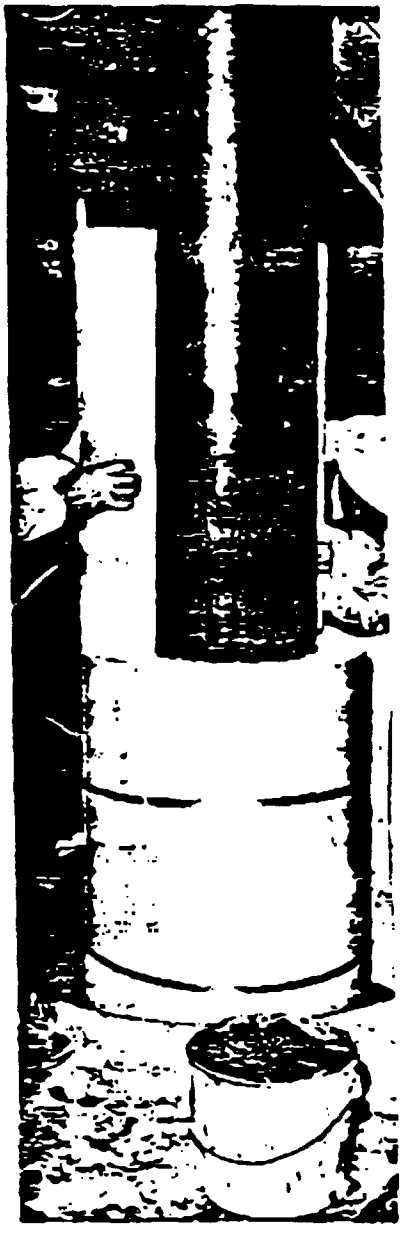
UNIBESTOS has high insulation value. UNIBESTOS is composed of Amosite, a superior grade of asbestos. One pound of Amosite will bulk to two or three times the volume of common short asbestos fibers, such as white Chrysotile or blue asbestos. The PC fiberizing process produces a mass of dead-air cells that result in low thermal conductivity. This positive thermal efficiency eliminates "guesswork" in specifying excessive safety factors, reduces over-all application costs.

UNIBESTOS needs no additional layers. With UNIBESTOS, butted joints form natural heat seals themselves. The long, tough fibers . . . which project from the butt end of sections by the thousands . . . tend to interlace when two sections are butted together. This forms a heat-tight joint and eliminates the need for additional layers required with other insulation materials. Tests show that, for equal thicknesses, a single layer of UNIBESTOS loses considerably less heat at the joint than the outside joint of a double thickness of other kinds of insulation.



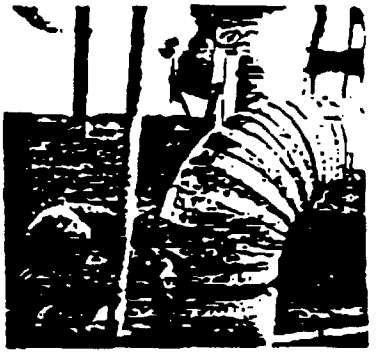
JOINT HEAT-LOSS TEST RESULTS Test Results of Surface Temperatures and Heat-Loss at Joints	UNIBESTOS Pipe Insulation (Single Layer)	"B" Insulation (Single Layer)	"B" Insulation (Double Layer)
Thickness of covering, inches	2.50	2.48	2.45
Density of covering, lbs. /cu. ft.	14.00	12.95	12.24
Energy supplied to heating coil, watts	580	650	610
Energy supplied to heating coils, Btu's/hr.	1979	2218	2081
Temperature of pipe, °F	600	600	597
Temperature of test room, °F	75	75	75
Temperature difference (pipe minus room), °F	525	525	522
Average surface temperature (not including joint), °F	114	122	116
Average joint temperature, °F	134	152	143
Average rise in temperature at joint, °F	20	30	27
Heat-loss through end caps, Btu's/hr.	244	246	244
Heat-loss through covering, Btu's/hr.	1735	1972	1837
Unit heat loss through covering, Btu's/hr. per sq. ft. of pipe surface per degree (F) of temperature difference	0.244	0.278	0.260

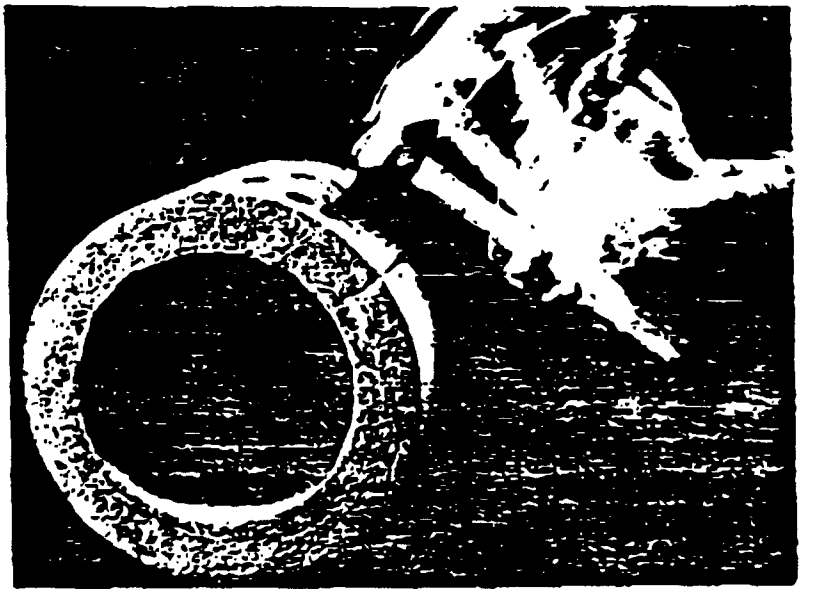
Test results from an independent laboratory.



UNIBESTOS is easy to handle, speeds installation. UNIBESTOS is a firm, *easy-to-handle* material not subject to breakage. This lowers installation, shipping, and materials handling cost. Single-layer UNIBESTOS can be installed in much less time than required for double-layer insulation. Fewer number of insulation pieces requires less space in storage and shipment. Fewer pieces must be handled in all operations, reducing labor time and costs all along the line.

UNIBESTOS is easily shaped to irregular contours. UNIBESTOS can be cut, mitered, or grooved with ordinary tools. It can be neatly adapted to bends, elbows, tees, expansion joints, flanges, valves, and other irregular shapes. Here, too, the joints form heat seals through the interlacing effect of the long fibers. And, since UNIBESTOS will not shrink at high temperatures, joints stay tight and efficient. This inherent heat sealing eliminates the need for special insulating treatment of joints and seams. Shop fabrication is simple . . . just cut UNIBESTOS to size and join with sodium silicate adhesive.





Practically no loss through breakage. ***UNIBESTOS need not be handled delicately!*** It is so rugged it will not crack or shatter on impact, even when struck with a hammer. In addition to permitting faster work, shock resistance saves money because breakage replacement costs are practically nil. It does not break in transit, thus excess quantities need not be ordered to compensate for in-transit breakage.

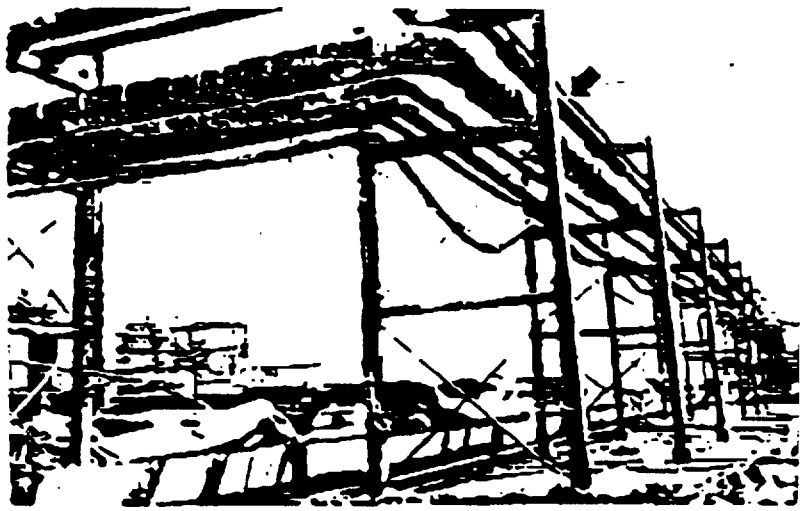
Independent laboratory tests prove superiority of *single-layer* UNIBESTOS insulation system.

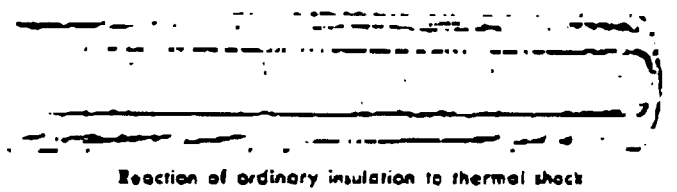
The chart illustrates results arrived at by an independent testing laboratory when testing for heat losses at insulation joints. Single-layer UNIBESTOS was tested against double-layer applications of competitive materials.

DURABILITY OF UNIBESTOS

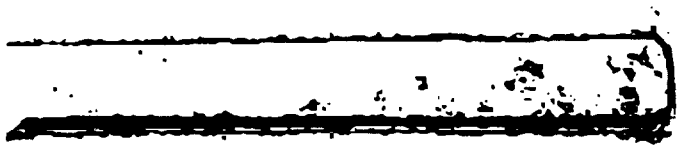
RUGGED UNIBESTOS . . . incombustible, won't shrink, no thermal shock

UNIBESTOS protects piping against costly damage from fire. UNIBESTOS is incombustible because it is a stable, inorganic iron silicate, and cannot burn. Further, its high insulation value and ability to withstand violently sudden temperature changes protect piping against excessive and rapid heat gain. Where non-insulated or poorly insulated piping buckles and melts in industrial fires. UNIBESTOS-insulated piping stays in place and is ready to function when the fire is brought under control. (See arrow in photograph of actual plant fire.)





Reaction of ordinary insulation to thermal shock

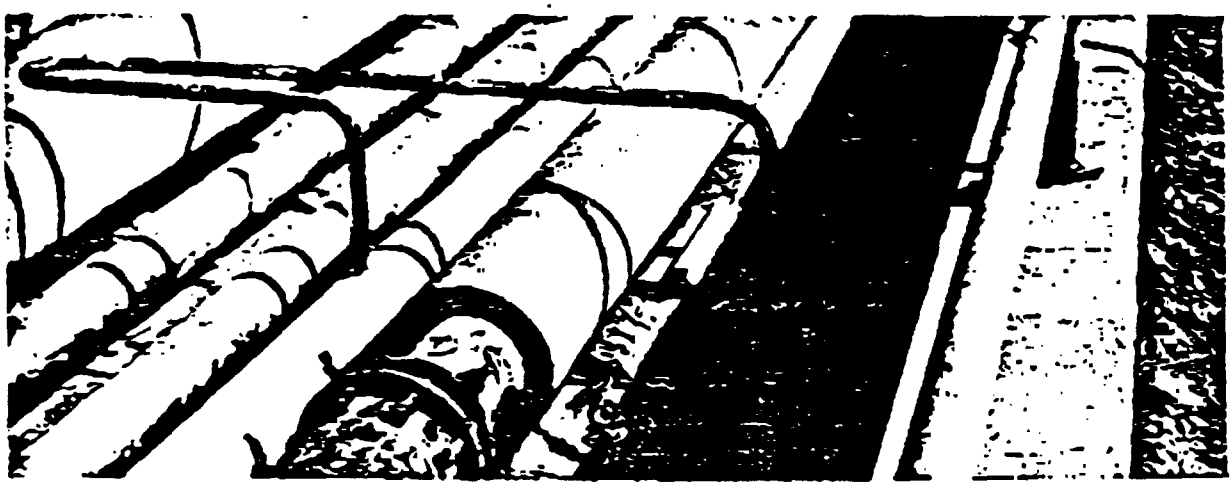


UNIBESTOS sample did not crack

No thermal shock problem: Even at temperatures higher tha the 1200°F service temperatu recommended for UNIBESTO it will not thermal shock . . . r cracks or leaks will occur to in pair insulation efficiency.



UNIBESTOS has exceptional stability—won't shrink. Because UNIBESTOS is extremely heat stable . . . it does not decompose or react chemically under high temperatures. Even more important, it is dimensionally stable . . . it does not shrink! With UNIBESTOS then, section joints stay closed, and keep heat in.



UNIBESTOS resists water, moisture, acids, fumes. UNIBESTOS is chemically stable: it is not affected by water, moisture, acids, fumes or other corrosive substances. Submerged under water for weeks, UNIBESTOS dries to its original characteristics: continuous exposure to chemicals and chemical fumes does not change its insulating capacity.

UNIBESTOS for stainless steel applications. Many industrial users of UNIBESTOS have expressed satisfaction with the insulation performance of UNIBESTOS on stainless steel applications.

UNIBESTOS can be re-used. Because of its durability, UNIBESTOS can be re-used many times. Maintenance costs are reduced because new replacement insulation is not required when a line is repaired. As is shown in the illustration at right, even flange, valve and coupling coverings can be easily fabricated right on the job for later removal, when necessary.

VERSATILITY
UNIBESTOS

VERSATILE UNIBESTOS . . . high thermal efficiency in every application

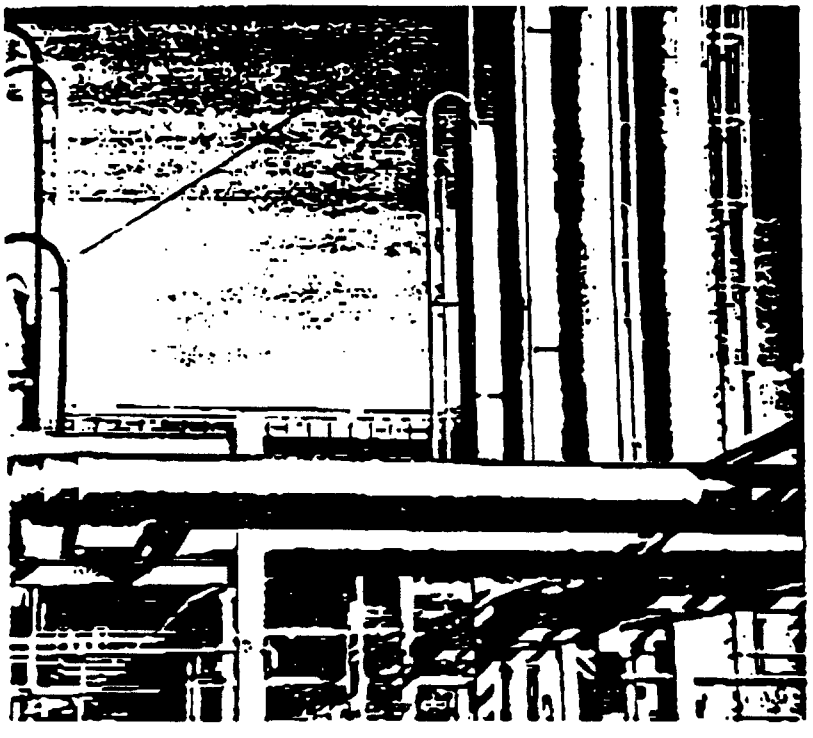
UNIBESTOS has proved itself in use in the widest range of industrial, commercial, and government installations to be the most versatile high-temperature insulation available.

■ Its high thermal efficiency means plus-profits in the form of major, long-term operational economies.

■ Its inert composition, and resistance to moisture, acids and chemical fumes assure long life in the most contaminated industrial surroundings.

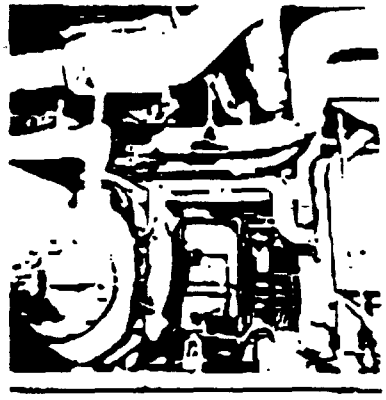
■ Its resistance to shock and abuse, and its ease of removal and reapplication not only simplifies maintenance, but cuts maintenance expenses sharply.

■ Its compact, trim, single-layer application offers the ultimate in labor-saving, without sacrifice of insulation value.



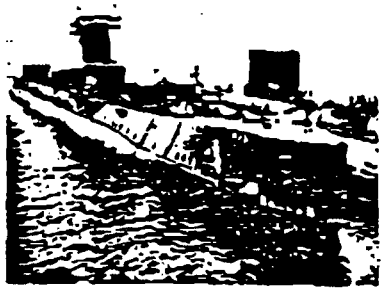
UNIBESTOS is proven best for petroleum refineries and petrochemical plants. UNIBESTOS offers superior insulation performance in corrosive atmospheres, and protects against pipe destruction in sudden and violent fires. Of particular importance is its application to heat-traced lines where its ability to conform to irregular shapes eliminate any cracking or breakage of the material. UNIBESTOS will also bridge the unsupported void between the line and tracer without breakage.

UNIBESTOS is proven best for the utility industries. For power plants with high temperature steam lines, for commercial steam heat systems, for exposed critical-temperature lines of all types, UNIBESTOS excels in insulation performance. Tough and resilient, it won't crack or thermal shock, keeping thermal efficiency high and reducing heat losses over longer piping runs.

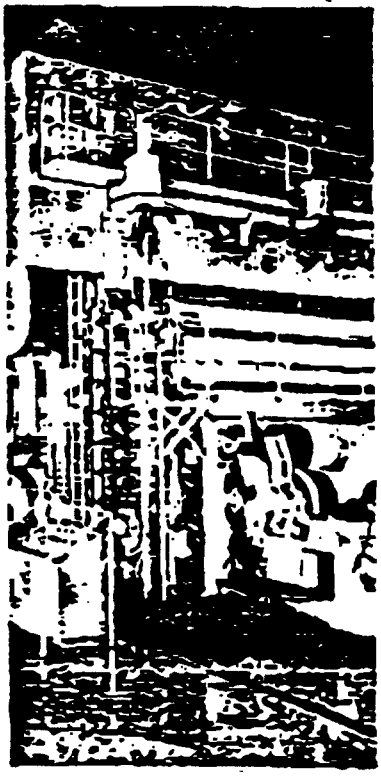




UNIBESTOS is proven best for pulp and paper mills. In the wet, corrosive atmospheres of pulp mills and paper mills, UNIBESTOS performs at peak efficiency. Continuous exposure to chemical-laden fumes does not affect it; even after being totally submerged in water for weeks, it will quickly dry to its original characteristics.



UNIBESTOS is proven best for marine use and atomic-energy applications. The *single-layer* concept of the UNIBESTOS insulation system makes it ideal for the demanding conditions of cramped shipboard piping, particularly on atomic-powered vessels. Its fibrous structure withstands the rigors of heavy vibration which could cause granular insulations to break and crumble. The combination of unique advantages in UNIBESTOS are proving equally effective in the atomic energy field.



UNIBESTOS saves on underground lines. Because UNIBESTOS is available in full cylindrical shapes up to 44" insulation O.D., it has gained widespread acceptance as the time-saving way to insulate underground lines. Requiring less handling and no special banding, these full cylinders provide an ideal way to insulate a line for conduit application.

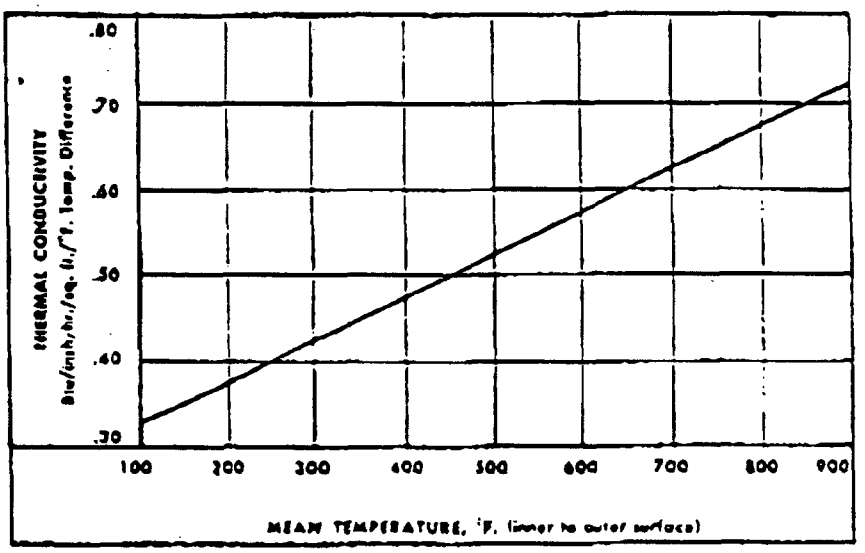
Installation is simple: the insulation is slid onto the pipe; the transverse joints are taped and insulated pipe is ready for the casing. The casing is then sealed to make a strong, efficient and economical assembly for the distribution of steam or fluids underground.

This system has become increasingly popular where heat is supplied from a central heating station. In situations like these, UNIBESTOS has supplied superior underground insulation for everything from schools, churches and colleges to hospitals, utilities and railroads as well as for processing lines for industrial plants.

SELECTIVITY
UNIBESTOS

WIDEST SELECTIVITY... half sections or full-round sections up to 44" insulation O.D.

PHYSICAL PROPERTIES OF UNIBESTOS	
Density	16 lb.. ft.³
Compressive Strength	1600 lb./ft.² (dry; at 5% deformation)
Shrinkage	0.00% to 1200°F. (one surface) exposed to operating temperature for 24 hours
Hygroscopicity	3.5% 70°F. @ 90% R.H. 24 hours
Combustibility	Will not burn
pH	10.5
Thermal Shock	Will not thermal shock
Acid Resistance	Negligible effect on physical characteristics from common industrial acids and caustics
Noncorrosive	Will not contribute to stress corrosion of stainless steel



UNIBESTOS complies with:
Federal Specification HH-I-558c Type 4
Mil. Spec. MIL-I-2781
Grade II Class C (750°F.)
Grade III Class F (1050°F.)

Tables of suggested thicknesses. UNIBESTOS pipe insulation is manufactured in thicknesses that conform to accepted industrial and manufacturer's standards known as *simplified dimensional standards*. In order to conform to these standards, the outside diameters of all UNIBESTOS sections closely approximate those of iron pipes.

By conforming to these standards the installation of UNIBESTOS is further simplified and any dimensional confusion or adjustment is eliminated. These uniform manufacturing standards are particularly useful in the fabrication of valve and fitting covers, etc., where nesting layers of UNIBESTOS are required.

You will note that four tables of suggested thicknesses are supplied. These range from the minimum requirements (personnel protection) to the maximum thicknesses (for commercial work).

PERSONNEL PROTECTION

RECOMMENDED MINIMUM THICKNESS, NOMINAL INCHES
UNIBESTOS PIPE INSULATION FOR PERSONNEL PROTECTION ONLY

(Surface Temperature less than 161°F., Ambient Temperature 80°F.)

Nominal Pipe Size	Temperature Hot Pipe, °F.										
	200	300	400	500	600	700	800	900	1000	1100	1200
	Temperature Difference Pipe to Air										
	120	220	320	420	520	620	720	820	920	1020	1120
1" and Less	1	1	1	1	1	1	1½	1½	1½	2	2
1½"	1	1	1	1	1	1½	1½	1½	2	2	2
2"	1	1	1	1	1	1½	1½	1½	2	2	2½
3"	1	1	1	1	1	1½	1½	2	2	2½	2½
3½"	1	1	1	1	1	1	1½	1½	2	2	2½
4"	1	1	1	1	1	1½	1½	2	2	2½	2½
5"	1	1	1	1	1	1½	2	2	2½	2½	3
6"	1	1	1	1	1½	1½	2	2	2½	3	3
8"	1½	1½	1½	1½	1½	1½	2	2	2½	3	3
10"	1½	1½	1½	1½	1½	1½	2	2½	2½	3	3½
12"	1½	1½	1½	1½	1½	1½	2	2½	2½	3	3½
14" to 18"	1½	1½	1½	1½	1½	1½	2	2½	3	3	3½
20"	2	2	2	2	2	2	2	2½	3	3½	3½

COMMERCIAL, INDUSTRIAL

RECOMMENDED THICKNESSES—UNIBESTOS

Pipe Temp.	300°F				400°F				500°F				600°F				700°F			
Temp. Diff.	120°F				220°F				320°F				420°F				520°F			
Pipe Size	ET	HL	ST	E	ET	HL	ST	E	ET	HL	ST	E	ET	HL	ST	E	ET	HL	ST	E
½	1	16.5	93.5	76.1	1	32.8	104	79.3	1½	40.2	104	85.2	1½	57.3	109	86.7	2	67.0	108	90.2	2	85.0	114	90.4
¾	1	19.7	95.8	74.7	1	38.1	108	80.1	1½	45.8	104	86.5	1½	64.4	114	87.9	2½	64.4	101	91.7	2½	82.2	106	92.5
1	1	20.2	93.6	80.6	1	39.2	104	83.2	1½	50.8	104	87.8	1½	71.2	113	89.1	2½	73.1	103	92.4	2½	92.1	109	93.2
1¼	1	25.6	97.3	79.9	1	50.8	111	82.5	1½	57.5	104	89.0	1½	80.1	113	90.2	2½	85.8	104	92.9	2½	108	113	93.6
1½	1	26.3	95.8	82.0	1	52.3	108	84.4	2	51.4	98.9	91.3	2	72.0	104	92.2	3	79.5	100	94.3	3	99.1	104	94.8
2	1	30.7	96.2	83.3	1	58.0	109	85.6	2	61.5	101	91.5	2	86.2	108	92.5	3	91.2	103	94.6	3	115	108	95.1
2½	1	34.8	96.8	83.8	1	67.5	110	86.1	2	65.1	99.0	92.5	2	89.9	106	93.4	3	98.2	103	95.2	3	122	107	95.7
3	1	40.7	97.8	84.3	1	80.3	112	86.4	2½	70.3	98.7	93.3	2½	97.2	103	94.1	3½	105	101	95.7	3½	131	106	96.2
4	1	49.0	98.0	85.2	1	95.6	112	87.2	2½	82.4	100	93.8	2½	115	106	94.8	3½	121	103	96.1	3½	152	108	96.5
5	1	60.0	99.0	85.1	1	116	114	87.2	2½	95.8	101	94.1	2½	132	108	94.8	3½	138	105	96.4	3½	173	110	96.8
6	1½	52.7	93.9	88.8	1½	103	105	90.4	2½	110	103	94.2	2½	152	109	94.9	4	145	102	96.8	4	182	107	97.1
7	1½	57.6	93.9	89.0	1½	114	105	90.7	2½	123	103	94.4	2½	171	110	95.0	4	160	103	96.9	4	200	108	97.2
8	1½	64.4	94.2	89.3	1½	127	105	90.8	2½	130	103	94.7	2½	179	109	95.4	4	175	104	97.0	4	219	109	97.3
9	1½	70.1	94.4	89.2	1½	139	106	90.8	2½	143	102	94.8	2½	197	110	95.4	4	185	103	97.1	4	231	108	97.4
10	1½	74.4	94.1	89.7	1½	147	105	91.2	3	139	101	95.4	3	193	106	95.9	4½	193	105	97.3	4½	259	110	97.4
12	1½	86.1	94.3	89.9	1½	170	106	91.4	3	160	100	95.5	3	221	107	96.1	4½	220	103	97.4	4½	274	109	97.7
14	1½	89.0	93.4	89.3	1½	196	107	90.9	3	177	101	95.4	3	245	108	96.0	4½	235	104	97.4	4½	296	109	97.7
16	1½	115	93.6	89.4	1½	218	108	91.0	3	197	101	95.5	3	273	109	96.1	5	243	102	97.7	5	302	106	97.9
18	1½	138	93.9	89.5	1½	240	108	91.0	3	218	102	95.6	3	301	109	96.1	5	266	102	97.7	5	333	107	98.0
20	1½	141	96.3	89.6	1½	271	109	91.1	3½	210	99.0	96.1	3½	293	105	96.6	5	290	103	97.8	5	363	107	98.0
24	1½	153	96.6	89.7	1½	302	109	91.1	3½	246	99.6	96.2	3½	343	106	96.7	5½	309	101	98.0	5½	391	105	98.2

ET = Recommended Thickness. HL = Heat Loss. ST = Surface Temperature. E = Efficiency.

SELECTIVITY ECONOMICS

PROCESS INDUSTRIES

RECOMMENDED THICKNESSES

Pipe Temperature	200°F				300°F				400°F				500°F				600°F			
Temperature Difference	120°F				220°F				320°F				420°F				520°F			
Pipe Size	RT	HL	ST	E	RT	HL	ST	E	RT	HL	ST	E	RT	HL	ST	E	RT	HL	ST	E
½	1	16.5	93.5	76.1	1	32.8	104	79.3	1	50.5	116	81.6	1	70.8	128	83.4	1	93.5	140	86.3
¾	1	19.7	95.8	76.7	1	38.1	108	80.1	1	60.9	122	82.1	1	85.1	135	84.0	1½	84.8	123	89.2
1	1	20.2	93.6	80.6	1	39.2	104	83.2	1	62.4	117	85.1	1	87.1	128	86.7	1½	94.1	122	90.3
1¼	1	25.6	97.3	79.9	1	50.8	111	82.5	1	80.5	126	84.6	1	112	141	86.2	1½	106	123	91.2
1½	1	26.3	95.8	82.0	1	52.3	108	84.4	1	81.3	122	86.2	1	113	135	87.7	1½	118	128	91.4
2	1	30.7	96.2	83.3	1	58.0	109	85.6	1	92.6	123	87.3	1	128	136	88.7	1½	133	128	92.1
2½	1	34.8	96.8	83.8	1	67.5	110	86.1	1	106	124	87.7	1	149	138	89.1	1½	135	123	93.3
3	1	40.7	97.8	84.3	1	80.3	112	86.4	1	126	127	88.0	1	173	141	89.4	1½	175	133	92.8
4	1	49.0	98.0	85.2	1	95.6	112	87.2	1	149	128	88.7	1	209	143	90.0	1½	210	136	93.2
5	1	60.0	99.0	85.1	1	116	114	87.2	1	182	130	88.8	1	254	146	90.0	1½	251	139	93.6
6	1	71.1	100	84.9	1	139	116	87.1	1½	162	117	91.5	1½	227	129	92.5	2	237	127	94.7
7	1½	57.6	93.9	89.0	1½	114	105	90.7	1½	178	117	91.9	1½	250	129	92.8	2	264	128	94.9
8	1½	64.4	94.2	89.3	1½	127	105	90.8	1½	198	118	92.0	1½	276	130	92.9	2	290	129	95.0
9	1½	70.1	94.6	89.2	1½	139	106	90.8	1½	219	119	91.9	1½	306	131	92.9	2	303	127	95.3
10	1½	74.4	94.1	89.7	1½	147	105	91.2	1½	230	119	92.3	1½	323	130	93.2	2	343	129	95.2
12	1½	86.1	94.3	89.9	1½	170	106	91.4	1½	267	118	92.5	1½	375	130	93.4	2	395	130	95.3
14	1½	89.0	95.4	89.3	1½	196	107	90.9	1½	307	121	92.0	1½	430	134	93.0	2	445	133	95.1
16	1½	115	95.6	89.4	1½	218	108	91.0	1½	345	122	92.1	1½	480	135	93.1	2	500	134	94.5
18	1½	128	95.9	89.5	1½	240	108	91.0	1½	385	122	92.2	1½	540	135	93.1	2	555	135	95.3
20	1½	141	96.3	89.6	1½	271	109	91.1	1½	406	123	92.3	1½	605	136	93.2	2½	510	126	96.1
24	1½	153	96.6	89.7	1½	302	109	91.1	1½	451	124	92.4	1½	652	136	93.2	2½	600	126	96.1

POWER, UTILITY

RECOMMENDED THICKNESSES

Pipe Temperature	200°F				300°F				400°F				500°F				600°F			
Temperature Difference	120°F				220°F				320°F				420°F				520°F			
Pipe Size	RT	HL	ST	E	RT	HL	ST	E	RT	HL	ST	E	RT	HL	ST	E	RT	HL	ST	E
½	1	16.5	93.5	76.1	1	32.8	104	79.3	1	50.5	116	81.6	1	70.8	128	83.4	1½	75.2	111	89.9
¾	1	19.7	95.8	76.7	1	38.1	108	80.1	1	60.9	122	82.1	1	85.1	135	84.0	1½	84.8	123	89.2
1	1	20.2	93.6	80.6	1	39.2	104	83.2	1	62.4	117	85.1	1	87.1	128	86.7	1½	94.1	122	90.3
1¼	1	25.6	97.3	79.9	1	50.8	111	82.5	1½	57.5	105	89.0	1½	80.1	113	90.2	1½	106.0	123	91.2
1½	1	26.3	95.8	82.0	1	52.3	108	84.4	1½	64.3	108	89.1	1½	90.1	118	90.3	2	94.8	111	93.1
2	1	30.7	96.2	83.3	1	58.0	109	85.6	1½	72.7	109	90.0	1½	101	118	91.1	2	113	116	93.3
2½	1	34.8	96.8	83.8	1	67.5	110	86.1	1½	74.8	104	91.5	1½	106	113	92.4	2	119	114	94.1
3	1	40.7	97.8	84.3	1	80.3	112	86.4	1½	95.6	112	90.9	1½	134	122	91.9	2	147	120	94.0
4	1	49.0	98.0	85.2	1	95.6	112	87.2	1½	115	113	91.3	1½	161	126	92.3	2	175	123	94.4
5	1	60.0	99.0	85.1	1	116	114	87.2	1½	137	115	91.6	1½	192	126	92.5	2½	175	116	95.4
6	1	71.1	100	84.9	1	139	116	87.1	1½	162	117	91.5	1½	227	129	92.5	2½	203	118	95.5
7	1½	57.6	93.9	89.0	1½	114	105	90.7	1½	178	117	91.9	1½	250	129	92.8	2½	226	119	95.6
8	1½	64.4	94.2	89.3	1½	127	105	90.8	1½	198	118	92.0	1½	276	130	92.9	2½	237	117	95.9
9	1½	70.1	94.6	89.2	1½	139	106	90.8	1½	219	119	91.9	1½	306	131	92.9	2½	260	118	95.9
10	1½	74.4	94.1	89.7	1½	147	105	91.2	1½	230	119	92.3	1½	323	130	93.2	2½	290	120	95.9
12	1½	86.1	94.3	89.9	1½	170	106	91.4	1½	267	118	92.5	1½	375	130	93.4	2½	339	122	96.0
14	1½	89.0	95.4	89.3	1½	196	107	90.9	2	343	112	93.7	2	360	122	94.5	3	323	116	96.3
16	1½	115	95.6	89.4	1½	218	108	91.0	2	272	112	93.8	2	380	122	94.5	3	360	117	96.1
18	1½	128	95.9	89.5	1½	240	108	91.0	2	301	113	93.9	2	420	123	94.6	3	400	118	96.6
20	1½	141	96.3	89.6	1½	271	109	91.1	2	335	113	93.9	2	468	124	94.6	3	439	118	96.6
24	1½	153	96.6	89.7	1½	302	109	91.1	2	398	114	93.8	2	560	125	94.6	3	517	119	96.7

RT = Recommended Thickness. HL = Heat Loss. ST = Surface Temperature. E = Efficiency.

—UNIBESTOS

700°F				800°F				900°F				1000°F				1100°F				1200°F			
620°F				720°F				820°F				920°F				1020°F				1120°F			
RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E
1	119	149	86.5	1½	116	134	90.3	1½	140	143	91.1	2	146	135	92.8	2	171	142	93.5	2	196	150	94.0
1½	107	133	90.1	1½	130	142	91.1	1½	159	151	91.9	2	165	141	93.5	2	193	149	94.1	2½	189	136	95.4
1½	118	131	91.2	2	126	125	93.1	2	149	133	93.8	2½	157	127	95.0	2½	185	133	95.4	2½	212	140	95.8
1½	133	132	92.1	2	150	133	93.5	2	181	141	94.1	2½	186	134	95.3	2½	217	141	95.7	3	228	136	96.4
1½	150	138	92.2	2	146	125	94.4	2	176	132	94.9	2½	185	128	95.9	2½	214	134	96.3	3	229	131	96.8
1½	169	138	92.9	2	174	132	94.6	2	210	140	95.1	2½	216	135	96.1	2½	253	142	96.5	3	265	139	97.1
1½	172	132	94.0	2	182	125	95.3	2	221	136	95.7	2½	231	133	96.6	2½	269	139	96.9	3	282	137	97.4
1½	221	144	93.5	2	227	139	95.1	2	274	148	95.6	2½	279	142	96.6	2½	326	150	96.9	3	335	146	97.5
1½	268	147	93.9	2	270	142	95.5	2	325	151	95.9	3	291	134	97.2	3	338	141	97.5	3½	354	139	97.9
1½	318	150	94.1	2½	270	133	96.3	2½	322	141	96.7	3	338	138	97.4	3	394	145	97.6	3½	400	141	98.1
2	299	137	95.3	2½	313	135	96.4	2½	376	143	96.8	3	389	141	97.4	3	455	148	97.7	3½	451	142	98.2
2	333	138	95.4	2½	346	136	96.5	2½	419	145	96.9	3½	380	132	97.8	3½	443	139	98.0	3½	508	147	98.2
2	366	139	95.5	2½	365	134	96.7	2½	438	142	97.1	3½	416	134	97.9	3½	484	140	98.1	4	510	140	98.4
2	385	137	95.8	2½	400	135	96.8	2½	483	144	97.1	3½	446	134	98.0	3½	520	141	98.2	4	537	139	98.5
2	435	140	95.7	2½	450	138	96.8	2½	541	147	97.1	3½	498	137	97.9	3½	579	144	98.2	4	601	143	98.5
2	500	141	95.8	2½	520	140	96.8	2½	629	149	97.1	3½	568	138	98.0	3½	661	145	98.2	4	684	145	98.5
2	565	144	95.7	3	498	133	97.2	3	600	141	97.3	3½	622	141	98.0	3½	724	148	98.2	4½	685	140	98.7
2	635	145	95.7	3	556	134	97.3	3	669	146	97.3	4	623	134	98.2	4	725	141	98.4	4½	758	141	98.7
2	705	146	95.8	3	616	135	97.3	3	742	149	97.6	4	690	135	98.3	4	803	142	98.5	5	771	136	98.8
2½	649	135	96.5	3	678	135	97.3	3	815	144	97.6	4	755	136	98.3	4	880	143	98.5	5	843	137	98.8
2½	761	136	96.5	3	797	136	97.4	3	959	145	97.6	4	879	137	98.3	4	1024	144	98.5	5	980	139	98.9

—UNIBESTOS

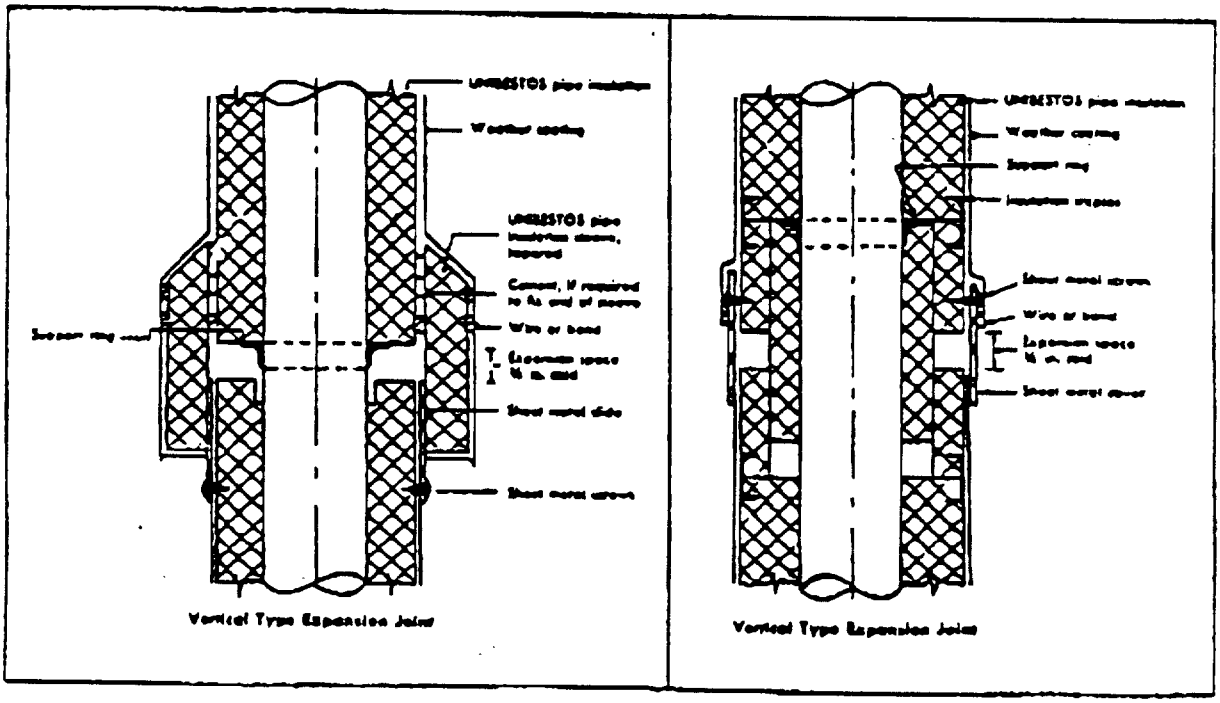
700°F				800°F				900°F				1000°F				1100°F				1200°F			
620°F				720°F				820°F				920°F				1020°F				1120°F			
RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E	RT	ML	ST	E
1½	94.6	125	89.2	2	104	119	91.3	2	125	128	92.1	2½	127	117	93.8	2½	148	123	94.3	3	160	121	95.1
1½	107	133	90.1	2	117	126	92.1	2	141	133	92.8	2½	142	122	94.4	2½	165	127	96.9	3	176	125	95.7
1½	118	131	91.2	2	126	125	93.1	2	151	132	93.8	3	147	118	95.3	3	172	123	95.7	3	197	129	96.1
2	123	124	92.8	2½	132	120	94.2	2½	159	127	94.8	3	170	124	95.7	3	198	130	96.1	3½	211	127	96.7
2	120	117	93.7	2½	132	116	95.0	2½	158	121	95.4	3	171	120	96.2	3	199	125	96.6	3½	213	124	97.1
2	142	123	94.0	2½	134	121	95.2	2½	186	128	95.7	3	198	126	96.4	3	231	132	96.8	4	229	122	97.5
2	150	120	94.7	2½	164	119	95.8	2½	197	125	96.2	3	211	124	96.9	3	246	130	97.1	4	245	122	97.7
2	186	128	94.6	3	178	119	96.2	3	214	125	96.6	3½	227	125	97.2	3½	265	129	97.5	4	282	128	97.9
2	220	132	95.0	3	206	120	96.6	3	248	127	96.9	3½	263	126	97.4	3½	309	132	97.7	4½	312	126	98.2
2½	220	123	95.9	3	240	123	96.7	3	289	130	97.0	4	276	121	97.8	4	320	126	98.0	4½	353	129	98.3
2½	256	126	96.0	3½	241	117	97.2	3½	288	123	97.5	4	316	124	97.9	4	368	130	98.1	5	372	126	98.5
2½	284	127	96.1	3½	270	119	97.3	3½	324	125	97.6	4½	328	121	98.1	4½	381	126	98.3	5	408	127	98.6
2½	302	125	96.4	3½	295	120	97.4	3½	355	126	97.6	4½	356	122	98.2	4½	415	128	98.4	5½	416	124	98.7
2½	329	126	96.4	3½	316	120	97.5	3½	381	126	97.7	4½	386	124	98.2	4½	450	129	98.4	5½	450	125	98.7
2½	366	128	96.4	3½	353	122	97.5	3½	424	129	97.7	4½	420	125	98.3	4½	488	130	98.4	5½	484	126	98.8
2½	427	130	96.4	4	364	118	97.8	4	437	124	98.0	5	441	122	98.5	5	514	127	98.6	5½	550	128	98.8
3	407	123	96.9	4	398	120	97.8	4	478	126	98.0	5	473	123	98.5	5	551	127	98.6	5½	589	129	98.9
3	456	125	96.9	4	443	121	97.8	4	532	127	98.1	5	535	123	98.5	5	612	129	98.7	5½	650	130	98.9
3	503	126	97.0	4	440	121	97.9	4	589	127	98.1	5½	535	120	98.7	5½	624	125	98.8	5½	716	131	98.9
3	555	126	97.0	4	535	122	97.9	4	643	128	98.1	5½	585	122	98.7	5½	681	125	98.8	5½	781	132	98.9
3	650	127	97.0	4½	565	118	98.1	4½	681	124	98.3	5½	673	122	98.7	5½	719	127	98.9	5½	904	133	99.0

SELECTIVITY EQUIPMENT

Expansion joints and fitting covers are easy to fabricate on the job. Typical expansion joints and fitting coverings are shown on these two pages; the number and spacing of expansion joints can be determined from the table at right.

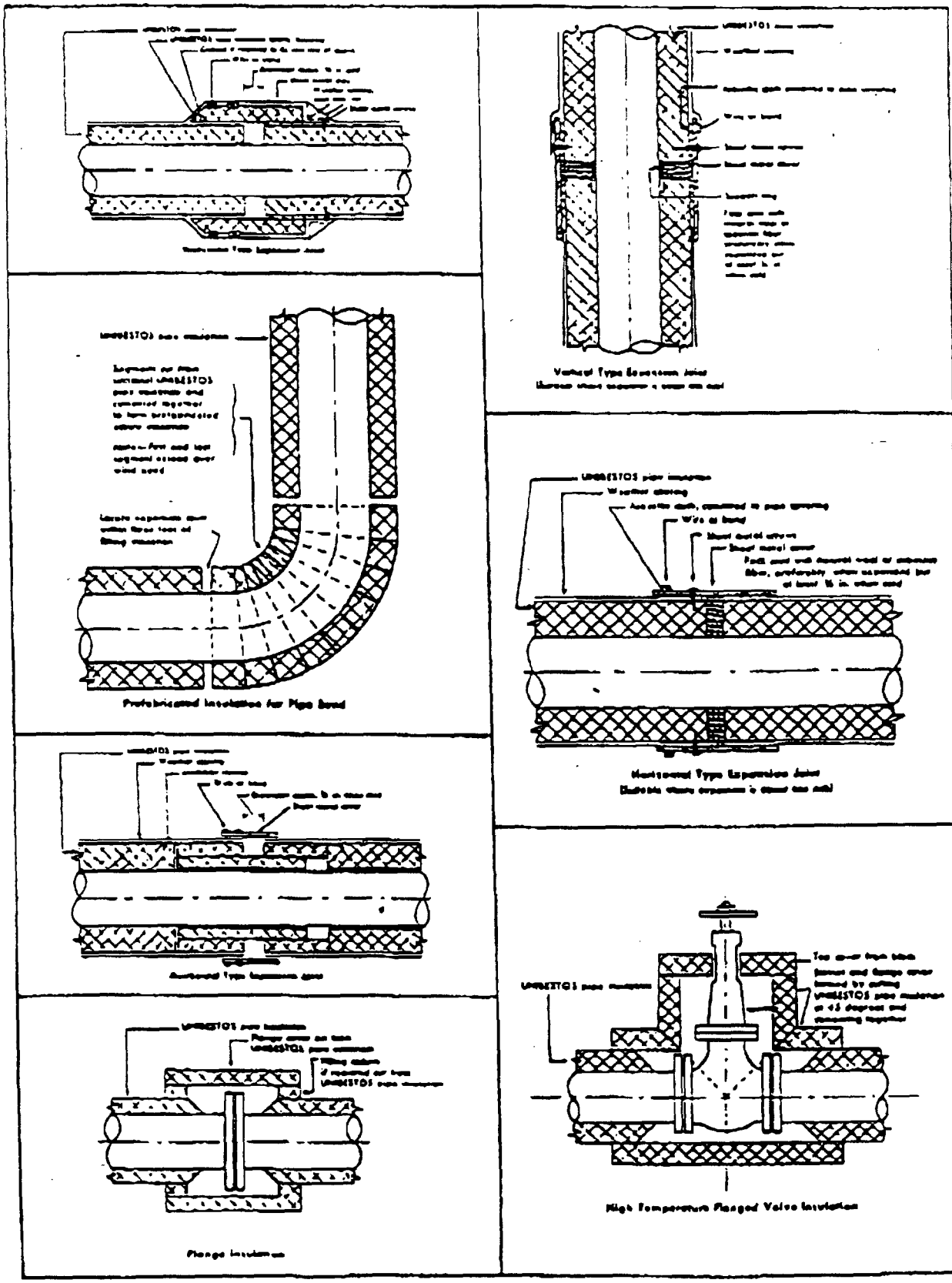
EXPANSION CONTROL

Operating Temp. F.	Linear Expansion of Pipe per 100 Ft.	Expansion Joint Spacing	Average Expansion Per Joint
1000	9.4"	12'	One Inch
950	8.8"	12'	One Inch
900	8.3"	12'	One Inch
850	7.7"	15'	One Inch
800	7.3"	15'	One Inch
750	6.7"	15'	One Inch
700	6.2"	18'	One Inch
650	5.7"	18'	One Inch
600	5.3"	18'	One Inch
550	4.7"	21'	One Inch
500	4.3"	21'	One Inch



Vertical Type Expansion Joint

Vertical Type Expansion Joint



TYPICAL SPECIFICATION FOR UNIBESTOS

1. Temperature Range. UNIBESTOS shall be used on piping operating from +100°F. to +1200°F.

2. Thickness Required. Thickness shall be determined from the table of suggested thicknesses or the most economic thickness may be calculated using the NIMA Guide for determining economic thickness.

3. Material. All piping shall be insulated with UNIBESTOS as manufactured by Pittsburgh Corning Corporation.

4. Application. UNIBESTOS shall be applied over clean, dry surfaces. Adjoining sections shall be butted firmly together using single-layer applications. Circumferential and longitudinal joints do not require pointing with finishing cement to conserve heat.

Insulation under 12" Pipe Size shall be wired in place using 16 gauge soft annealed wire; on pipe sizes over 12" use 14 gauge wire. The wiring shall be spaced no greater than 9" on centers.

Fittings, flanges and valves shall be insulated with fabricated mitered segments of UNIBESTOS equal to the thickness of the insulation of the adjoining pipe.

5. Finishes.

Indoor: On indoor lines, UNIBESTOS does not require a finish. If a finish is desired, a 6 oz. canvas shall be secured to the insulation with a lagging adhesive.

Outdoor: Outdoor piping shall be finished with a 45 lb. roofing felt lapped not less than 2". Felt jacket shall be secured with 16 gauge copper wire banded on 9" centers. Other finishes such as glass fabric and breathing-type mastic and metal jacketing may be used. Flanges, valves and fittings may be finished in the same manner as the adjacent pipe covering.

Note: The above specifications are general in nature and final specifications shall meet with the approval of the design engineer.

AVAILABLE NATIONALLY

Pittsburgh Corning provides national distribution for UNIBESTOS. More than 100 distributors stand ready to serve your insulation requirements. The PC authorized UNIBESTOS distributor is highly trained and he is well equipped to survey your job, make recommendations and estimates, and to install UNIBESTOS to meet your requirements. For your next high temperature job: select the insulation most suited to single-layer applications; select the distributor most experienced with the high temperature installations.

Call or write your nearest Pittsburgh Corning District office listed below for the name of your local authorized UNIBESTOS distributor.

Pittsburgh Corning Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania—261-2900.

