MACADAM BOND

Typewriter Tablet

NUMBER	SIZE 8½ x 11	SHEETS
191	UNRULED	100

5500 gr
2700

15 ct. per Pf.
13 " " "

1½ X 3 X 17 inch
4½ Pf. $ 1.25 per Stück

Acheson

2 X 2 X 30 inch wiegt 7 Pf.
dichte 1.62 (120 cubic inch)

Grade 2301 1% Asche

4 X 10 X 48 inch platten

16.4 cc

265

National Carbide Carbon Co.
Mr. Brower
30 East 42nd
Rm. 1229

10 A. 1 Wr $\frac{1}{50}$ At $\frac{1}{15}$ $\frac{10}{200}$ $\frac{1}{20}$

~~2~~ metre bar Paraffin
wax

=

1 sheet 10 m^2
$\frac{1}{2}$ m/m thick
weight :

=

(7 m^2 in surface)

12,11 ~~Pfs~~ Pf. per anderer Preis

Mr. Ogden, Monsanto Chem. Co.

30 Rock. Plaza 0.03 Asche

Ci 7-6170 0.3 Benzol Extrakt

11 1/4 ¢ pro Pf.

Grade No 10 Lamp black

Trade specification
135-138 AMP
refined Para. wax.

Standard Oil Comp.
of N.Y.
Stand. Oil. Comp N.J.

take 4 metric tons

= 8800 lbs

= $ 2100 to $ 3100

for 24c/lbs for 35c/lbs

Graphite

density not less than
1.6

not more than
0.1 % ash
of which not more
than 50 % must be
Fe_2O_3 or V_2O_5

Form : slabs ~~not~~
~~not~~ thicker than 1"

amount

$\frac{3.4}{2}$ m^3 = 1.7 m^3 × density

1.7 m^3 × 1.7 =

2.9 metric tons = 3 metric tons

$100 + 80 = 2V$

$V = 90$ gr
$V = 100$ gr
$100 + 48 = 160$

$F_e = 80$ gr
$Fe = 100$ gr

12 gr

10×10^{-24}
9×10^{-24}

10×10^{-24}
for 8×10^{-24}

$10^{-3} \times 10^{-24}$

1000 gr

10

1 gr.

$\frac{1}{10}$

1/1000

$\frac{1}{1000}$

Asm

Sigmund Cohn -
Rolls cadmium sheet,

44 Gold St.
N. Y. C.

Barclay 7 - 1346

Udylite Co. 30 East 42 St. N.Y.C

Dupont & Masselli, Chem. Dept. 350 5th Ave N.Y.C

(Cadmium Metal)

INTERNATIONAL GRAPHITE & ELECTRODE CORPORATION

SAINT MARYS, PENNSYLVANIA

N. C. 7

After 5 Days, Return To
NATIONAL CARBON COMPANY, Inc.
Carbide and Carbon Building
30 East 42nd Street
NEW YORK, N. Y.

GRAND CENT. ANNEX N.Y. 7
JUL 21
6-PM
1939

BUY U.S. SAVINGS
BONDS
ASK YOUR POSTMASTER

PROFESSOR LEO SZILARD
Columbia University
Physics Dept. - Pupin Laboratories
120th Street & Broadway
New York, N. Y.

ATTENTION: Mr. Semyon E. Krewer.

104

219

$$\frac{d^2R}{dx^2} + \frac{1}{x}\frac{dR}{dx} + \mu^2 R = 0$$ p. 13 226

$$R = J_0(\mu x)$$

Byerly

Carslaw

Bateman

Murray

or Woodruff

Mr. Washburn
Karbate Nr 2

Dichte 1,86 bis 1,91
Preise?

Speer Carbon Co St. Marys Penn / Niagara
(Intl. Electrode Co
Charles E. Chapin Co)
Mr. Burris

208 Fulton St.

Dodge | lbs 180 / Year
Yale | 40 cent / gm

Union Carbon & Carbide
parent of the acheson Co

Carbide & Carbon Chemical

Gardener
0.1 Ash
sticks 2.5 cm ⌀ 30 cm long
density 1.65 to 1.7

N. F. Bowman
Madison Av & 117 Str. Cleveland Ohio
17 ½ cent / lb

1229 513

Wosberg, Brauer, Gordenson

30 E 42 Hudson Urban Cortland

3×10^{-27}

$\frac{1}{4 \times 5}$ 10^{-3}

20% Fe

12%

$\frac{1}{40{,}000}$ 10^{-24}

$\frac{1}{40}$

$\frac{1}{40}$

10%

...ES OCCUR only when the moon is full, for only ... on the opposite side of the earth from the sun, and ... on to pass through its parent planet's shadow. The sun ... mately 400 times as far from the earth as the moon is ... earth. The moon is farthest from the earth this month on ... 22, a matter of 251,600 miles.

An almost-total eclipse of the moon is the astronomical treat that awaits Americans and Canadians on the night of Oct. 27-28, if they want to stay up late enough to see it. So nearly total will the darkening be that only astronomers will be able to tell the difference, for only eight tenths of one per cent. of the moon's surface will fail to receive the obscuring shadow, as the earth gets between sun and moon.

The edge of the earth's shadow will first bite into the shining face of the full moon late on Friday night, Oct. 27, and a little more than three hours later, in the small hours of Saturday morning, the show will be over. Times will of course differ somewhat, according to location of the observer.

Ample U.S. Vanadium Assured; Mine 60 Miles From Railroad

URAVAN, Colo.—This neat little new city sounds as if it might be a Soviet settlement in the Urals, but it is instead a glowing achievement of American private enterprise, and a symbol of the reasons why the U. S. can never again be cut off from a supply of the essential silver-like alloy, vanadium—by this or any future war.

Uravan is almost as remote as if it were in the Urals, at that. It is 115 miles from the county seat, Montrose; 60 miles from the nearest railroad, at Placerville. It is just east of the Utah line in southwestern Colorado, as wild and lonely a section as there is in the U. S.

A few years ago Uncle Sam ranked a distant last among producers of vanadium, a strategic metal both in war and peace. In 1936 only 63 tons were produced here. By 1938 that production had leaped to 732 tons, an increase of more than 1100 per cent.

The U. S. has in this short time become by far the world's largest producer, and now originates one-third of the world supply.

This is especially important, because with the exception of Mexico, a minor producer, the centers of vanadium mining were in Northern Rhodesia, Southwest Africa and Peru—all far away.

Vanadium by increasing the toughness and "springiness" of steel has become well-nigh indispensable in the manufacture of autos and other vehicles, besides having many direct uses in war.

But because of the greatly increased supply, it has been demoted from the War-Navy list of "strategic" minerals and placed on the list of "critical" war materials. Molybdenum, of which Colorado is by far the largest producer, is also missing from these lists.

The Vanadium Corporation of America, a subsidiary of the Union Carbide and Carbon Corp., developed the mines and the town. It is said there is enough ore to keep the plant going for 100 years.

This is not the first mining in the area. Instead it was the scene of one of the most important and romantic ventures in the history of American mining. Here was found the world's first major supply of radium, only a few years after the amazing element was discovered. The Standard Chemical Co. and the Flannery interests of Pittsburgh worked thousands of tons of the brilliant-yellow carnotite ore for a thimbleful of radium. When the women of America gave Madame Curie a gram of the precious element, it came from Colorado. Then the rich deposits of the Belgian Congo were discovered and the American mines became unprofitable.

Those carnotites, and the vanadium ores which the radium miners threw over the dump, are among those now being worked at Uravan.

Both radium and uranium are being produced again, but now as by-products of the vanadium production. In 1938 the mines produced 7,811 milligrams of radium, against 3,141 in 1937.

As for vanadium, Colorado produced 1,382,000 pounds of concentrates in 1938. This was more than the whole U. S. production in 1937, and the total U. S. production in 1938 was only 1,613,000 pounds. Colorado produced more than 80 per cent., in other words.

The company payroll runs about $50,000 to $60,000 a month, there are between 200 and 250 working, and the production is about 250 tons of ore daily. The town is completely company-owned, and such necessities as coal are brought in—from its own mines—by the company. Beef and vegetables are raised in the nearby Paradox Valley—so called because the Dolores River takes its stubborn way right across the waist of the valley instead of flowing down it as a well-conducted river should—but staples must be trucked in from Montrose or Grand Junction.

Gait NOT Reliable As Clew to Personality

By MARJORIE VAN DE WATER
Science Service Writer

The way a man walks, like his ...er expressive gestures, ...

War Menaces Animals

WASHINGTON.—War may make fresh inroads on the already depleted wildlife of Europe, American naturalists fear. Severe los...

Science Service

tha... ern...

Col... trolle... anoth... yeste... sle... W... p... e... n... ji... th... lan... ish...

Nob... ple are ... experim... hobbyist... as well ... entists. ... of the U. ... culture a... thirty perso... drug.

Most of the... in Washingto... Department ... oratories at ... Arlington, V... Potomac. A ... afield in exp... far away as ... New York and... list of the pla... work includes:... tatoes, sugar be... peaches, gra... raspberries, ... onions, lespede...

Camou... N...

BY EMIL...
Science Se...

British Tommi... now with helme... ing, fitted wi... foliage—somew... in a vase for... place.

Seeing th... you will re... World War... ered thei... as best t... and th... tanks, ... practi...

Pr... you ... than ... haps ... for ...

Af... dian...

Dessverre at

Grøsslitte pinaller 45 lbs / 96 hunde

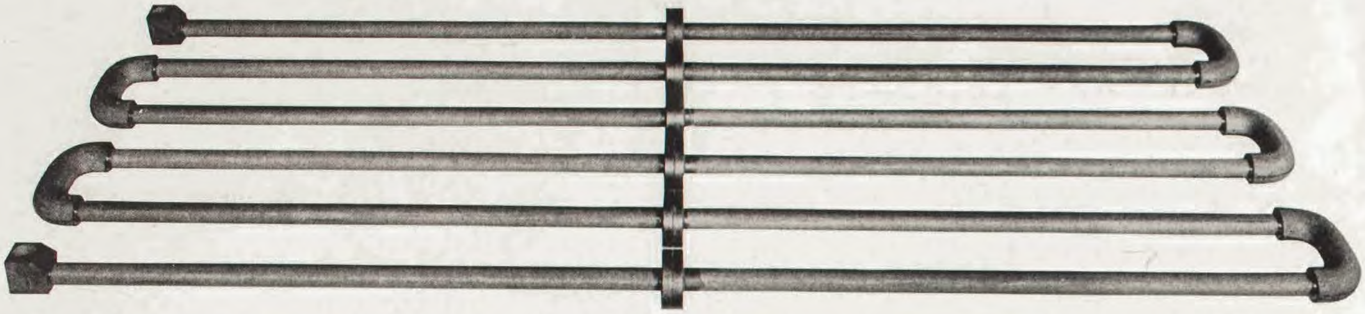
37 løber

Brower

Corleon / Corleade


NATIONAL
TRADE-MARK
Carbon and Graphite
CORROSION RESISTANT
PIPE *and* FITTINGS
KARBATE
TRADE-MARK
IMPERVIOUS
CORROSION RESISTANT
PIPE *and* FITTINGS
Although a comparatively new material, "Karbate" pipe and fittings have been thoroughly tested over a substantial period of time under actual service conditions. Many satisfactory installations are in constant use and have been for many months. We invite inquiries for carbon, graphite and "Karbate" pipe and fittings to meet the needs of your corrosion problems.

CARBON, GRAPHITE *and* "KARBATE" PIPE *and* FITTINGS



Carbon and Graphite Pipe

Carbon and graphite pipe, with the necessary fittings of the same composition, are adapted to many applications in the chemical and process industries. These products are immune to reaction with most of the materials encountered in chemical manufacturing plants at the concentrations and temperatures ordinarily employed. They resist the corrosive action of all acids, alkalies and salt solutions except those of a highly oxidizing character. Graphite is more resistant to oxidation than carbon in the amorphous form. This permits the use of graphite products, under oxidizing conditions, at somewhat higher temperature than is permissible for carbon. On the other hand, bromine may be destructive to graphite under conditions in which carbon has proved immune to attack.

Carbon and graphite pipe and fittings are mechanically strong and have high thermal conductivity together with low coefficient of thermal expansion. These latter properties make them highly resistant to thermal shock.

Carbon and graphite products, as ordinarily manufactured, are somewhat porous and, for this reason, are not entirely impervious to the seepage of liquids and gases when held or conveyed under pressure. However, there are many applications, where pressure sufficient to cause disturbing seepage is not involved, for which carbon or graphite pipe is well adapted. This is particularly true on applications involving high temperatures.

"Karbate" Pipe

To meet the need for a corrosion resistant material, impervious to the seepage of fluids under pressure, National Carbon Company, Inc., has developed the material which it sells under its trade-mark "Karbate." "Karbate" No. 1 is a carbon base material and "Karbate" No. 2 a graphite base product. Like carbon and graphite, "Karbate" is attacked only by the highly oxidizing agents, but it should not be used at a temperature above 170° C. (338° F.). It is light in weight, has low coefficient of thermal expansion, high heat conductivity, high resistance to thermal shock, good electrical conductivity and possesses greater mechanical strength than corresponding carbon and graphite products.

In the form of pipe, "Karbate" is satisfactory for pressures normally encountered in chemical process industries. The coefficient of heat transfer of "Karbate" No. 2 pipe is higher than that of many of the metals and alloys frequently employed in corrosion resistant equipment. Although "Karbate" materials should not be used at temperatures above 170° C., application of higher temperature to one side is permissible if provision is made to carry off the heat from the opposite surface, thus keeping the temperature in the body of the material below the critical point. Vessels of this material containing an aqueous solution have been placed in direct contact with a burner flame, the heat absorption of the water proving sufficiently rapid to prevent injury to the container.

While "Karbate" No. 1 and "Karbate" No. 2 have essentially the same characteristics with respect to corrosion, the rate of heat transfer through "Karbate" No. 2 is much higher than that through "Karbate" No. 1 and, for that reason, only "Karbate" No. 2 is recommended for heat exchange applications. "Karbate" No. 1 is recommended for applications which do not require the better heat conducting property of "Karbate" No. 2, or where "Karbate" No. 2 is unsatisfactory, and which do not call for too elaborate machining.

"Karbate" materials have been tested in various chemicals, as shown in the following table. In Group I are those chemicals which have no appreciable action on the "Karbate" material; in Group II are placed the chemicals which first attack the material and then have no further effect; and in Group III are those chemicals which seriously attack the material, and for which the use of "Karbate" materials is not recommended.

GROUP I. "Karbate" resistant to

REAGENT	CONCENTRATION	TEMPERATURE
Sulfuric acid	66° Be.—96%	Up to 80° C.
Sulfuric acid	Up to 50%	Boiling or 120° C.
Hydrochloric acid	All conc.	Boiling
Hydrobromic acid	40%	Boiling
Phosphoric acid	50%	Boiling . . . See also under Group II.
Sulphurous acid (SO_2)	7%	Room
Formic acid	90%	Boiling
Acetic acid	100%	Boiling . . . See also under Group II.
Boric acid	25%	Boiling
Oxalic acid	25%	Boiling
Citric acid	25%	Boiling
Lactic acid	25%	Boiling
Methyl alcohol	100%	Boiling
Ethyl alcohol	95%	Boiling
Isopropyl alcohol	100%	Boiling
Butyl alcohol	100%	Boiling
Amyl alcohol	100%	Boiling
Octyl alcohol	Technical	100-150° C. Poor grade; exact identity unknown.
Carbon tetrachloride	100%	Boiling
Ethylene dichloride	100%	Boiling
Acetone	100%	Boiling
Methyl isobutyl ketone	100%	Boiling
Isopropyl ether	100%	Boiling
Isopropyl acetate	100%	Boiling
Dioxan	100%	Boiling (1, 4—diethylene oxide)
Benzene	100%	Boiling
Manitol	25%	Boiling
Sodium chloride	25%	Boiling
Ferric chloride	15%	60° C. . . . See also under Group III.
Aluminum sulphate	Saturated	Boiling
Hydrofluoric acid	60%	Boiling
Fluosilicic acid	100%	Boiling
Alkalies (Sodium and potassium hydroxide)	All conc.	40° C.

GROUP II. "Karbate" at first attacked by and then resistant to

REAGENT	CONCENTRATION	TEMPERATURE
Acetic anhydride	100%	Boiling
Oleic acid	100%	Boiling
Stearic acid	100%	135°C.
Tartaric acid	25%	Boiling
Petroleum oil	100%	Boiling
Kerosene	100%	160° C.
Gasoline	100%	Boiling
Glycerine	100%	135° C.
Nitrobenzene	100%	135° C.
Phosphoric acid	Up to 85%	Room
Acetic acid	Up to 100%	Room

GROUP III. "Karbate" attacked seriously by

REAGENT	CONCENTRATION	TEMPERATURE
Bromine	100%	Boiling
Chlorine (wet)		
Sodium hypochlorite	5%	Room
Chromic acid	10%	Room
Nitric acid	1%	Room
Ferric chloride	15%	Boiling

While the list of chemicals here given is not complete, it serves to illustrate the corrosion-resistant properties of these materials. The Research Laboratory of the Company is constantly testing "Karbate" material in other chemicals to determine its resistance to them. If use of this material is contemplated in reagents not shown in the foregoing list, write for information in respect to its adaptability.

"Karbate" products, while impervious to the seepage of fluids, are not entirely non-porous, as may be seen from the table of physical properties. For this reason there may be some absorption of the liquid with which they are in contact. This absorption should not exceed 5% and in many instances will be less than 1%. After the saturation point has been reached there should be no further loss of the contacting fluid.

Heat Exchangers

"Karbate" No. 2 pipe and fittings provide an excellent material for the construction of heat exchangers to be used under corrosive conditions. For heat exchange applications "Karbate" No. 2 has a heat transfer coefficient of 50 BTU per hr. per sq. ft. per °F per ft. This means that a "Karbate" No. 2 pipe will trans-

COMPARATIVE OVERALL HEAT TRANSFER

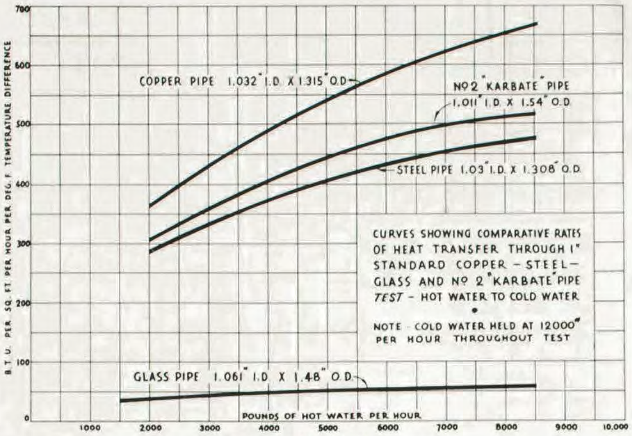


FIGURE 1

mit more heat than a steel pipe of corresponding size. A comparison of the heat transfer of "Karbate" No. 2, copper, steel and glass pipes is shown by the curves in Figure 1. The tests on which these curves are based were made with clean pipe. Due to the fact that no corrosion scale will form on the "Karbate" pipe, it is reasonable to assume that, over a period of time, the comparison with copper pipe will be even more favor-

STANDARD SIZES OF CARBON, GRAPHITE and "KARBATE" PIPE

Dimensions in Inches		Average Weight per Pipe in Pounds — Plain Ends					Mean Circum. Feet
I. D.	O. D.	Length	Carbon	Graphite	"Karbate" No. 1	"Karbate" No. 2	
½	¾	72	.96	1.07	1.13	1.20	0.164
¾	1	72	1.34	1.50	1.58	1.68	0.229
1	1½	72	3.83	4.28	4.50	4.80	0.327
1½	2	72	5.35	5.98	6.30	6.73	0.458
2	2⅝	72	8.85	9.90	10.4	11.1	0.605
2⅜	3	72	10.3	11.5	12.1	12.9	0.704
3	4	72	21.4	24.0	25.2	27.0	0.916
4	5¼	72	35.4	39.6	41.7	44.5	1.211
5	6¼	72	43.0	48.0	50.7	54.0	1.473
6	7½	72	62.0	69.2	73.0	78.0	1.767

All "Karbate" pipe is tested hydraulically at 125 lbs. per sq. in.

AVERAGE PHYSICAL PROPERTIES of CARBON, GRAPHITE and "KARBATE" PIPE

	Appar. Density	Pounds per Cu. Ft.	Porosity %	STRENGTH Pounds per Sq. In. Tensile	Compressive	Transverse	Modulus of Elasticity x 10^{-5} Lbs./In.^{2}	Specific Resist. Ohm-Inches	Thermal Conductivity*	K**
CARBON										
½" — 4" I. D.	1.51	94.2	24.3	885	10,200	2,700	21.0	.0014	3.0	14.
5" — 10" I. D.	1.49	93.	26.2	980	8,140	2,550	17.0	.0016	3.0	21.
GRAPHITE										
½" — 4" I. D.	1.68	104.7	19.7	780	4,550	2,820	14.0	.0003	94.	12.
5" — 10" I. D.	1.67	104.	21.7	870	5,100	2,980	13.0	.0003	84.	12.
"KARBATE" No. 1										
½" — 2" I. D.	1.77	110.4	1.2	1,700	10,500	4,170	29.0	.00164	3.0	26.
Over 2" I. D.	1.76	110.	3.2	2,000	10,500	4,640	26.0	.0016	2.8	32.
"KARBATE" No. 2										
½" — 2" I. D.	1.86	116.	.9	2,600	8,900	4,650	23.0	.00034	85.	23.
Over 2" I. D.	1.91	119.	.4	2,350	10,500	4,980	21.0	.00033	75.	24.

*BTU per Hr. per Sq. Ft. per °F. per Ft.
To convert to gram-cal. per sec. per sq. cm. per °C. per cm., multiply by 0.004134.

**Coefficient of Thermal Expansion per °F. to temperature t(°F.) = [K + .0039t(°F.)] x 10^{-7}
Coefficient of Thermal Expansion per °C. to temperature t(°C.) = [1.8K + .007t(°C.)] x 10^{-7}

OVERALL HEAT TRANSFER THRU No. 2 "KARBATE" PIPE

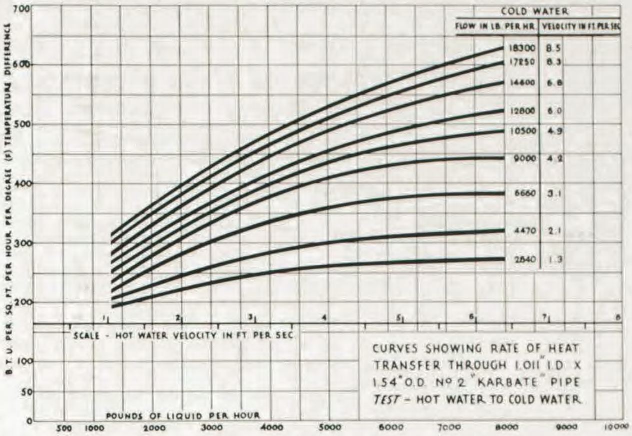


FIGURE 2

able. "Karbate" No. 1 is not recommended for heat exchanger construction since its heat transfer coefficient is much lower than that of "Karbate" No. 2.

The second series of curves, Figure 2, shows the overall heat transfer coefficient of "Karbate" No. 2 pipe at different velocities of the conveyed and surrounding water. This information can be used in designing heat exchanger equipment.

As an example, assume that it is desired to maintain a temperature of 90° F. in an electrolytic bath in which 24 KW is being dissipated as heat during 12 minutes of each quarter hour. The heat to be removed is

$$\frac{24 \times 12 \times 3412}{15} = 65{,}500 \text{ BTU per hr.}$$

If the cooling water is maintained at a mean temperature of 70° F. the heat exchanger must transfer $65{,}500 \div (90 - 70) = 3275$ BTU per hour per degree temperature difference. Assuming the cooling water to be flowing at a rate of 3.1 feet per second, and the circulation of the electrolyte to be equivalent to a flow of 2.6 feet per second over the outer surface of the cooling pipes, or 3250 pounds per hour, it may be seen from the series of curves in Figure 2 that a 1 inch "Karbate" No. 2 pipe will transfer 310 BTU per hr. per sq. ft. per °F. temperature difference. The required heat exchanger area will then be,

$$\frac{3275}{310} = 10.6 \text{ sq. ft.}$$

The mean circumference of a 1" x 1½" pipe is 3.927 in. or 0.327 ft., and the length of piping immersed in the electrolyte should be,

$$\frac{10.6}{.327} = 32.4 \text{ ft.}$$

If the heat transfer coefficient of the electrolyte to be used differs materially from that of water, the final result of the foregoing calculation will require modification based on the respective heat transfer coefficients of water and the electrolyte under consideration.

The following factors will be found convenient for use in heat transfer calculations:

1 KW Hr. = 860 Kg.-Cal. = 3,412 BTU = 1.34 H.P. Hr.

1 Kg.-Cal. = 3.968 BTU = 0.001163 KW Hr. = 0.00156 H.P. Hr.

1 BTU = 0.252 Kg.-Cal. = 0.000293 KW Hr. = 0.000393 H.P. Hr.

1 H.P. Hr. = 2,545 BTU = 641 Kg.-Cal. = 0.746 KW Hr.

1 in. = 2.54 cm. 1 sq. in. = 6.452 sq. cm. 1 lb. = 0.4536 kilogram

1 ft. = 30.48 cm. 1 sq. ft. = 929. sq. cm. 1 kg. = 2.2046 Pounds

A common form of "Karbate" pipe construction for heat interchange applications is the return bend construction illustrated in Figure 3. Center to center dimension on the block type return bends can be made to suit the requirements of the application. No special precautions need be taken in the operation of this type of heat exchanger except that, when raising the temperature of the bath by steam, the valve should be opened slowly to prevent hammer.

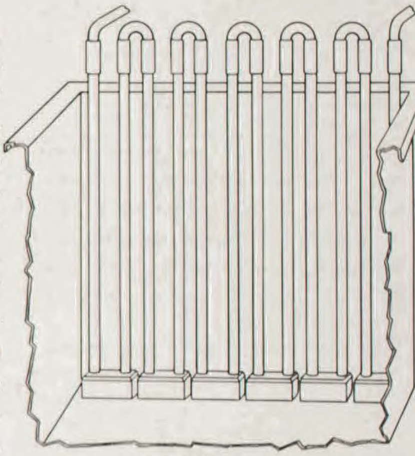


FIGURE 3

Another effective type of heat exchanger is the "bayonet" type, illustrated in principle by Figure 4. The outer, blind end tube, which is the only element making contact with the bath, is made from "Karbate" No. 2. The inner tube and fittings are of steel or iron. Types of fittings other than those illustrated may be adapted to this principle.

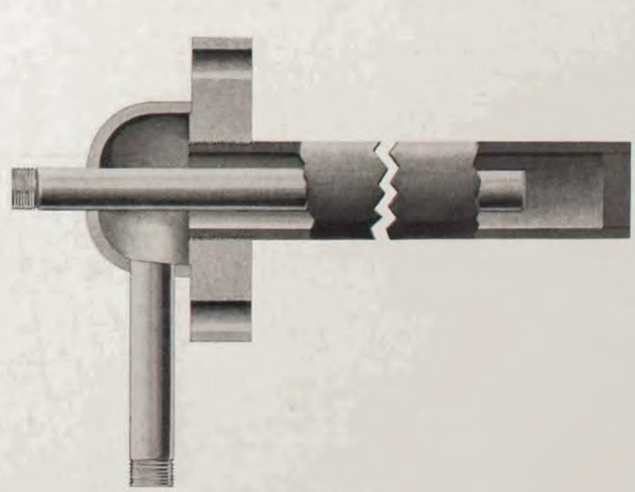
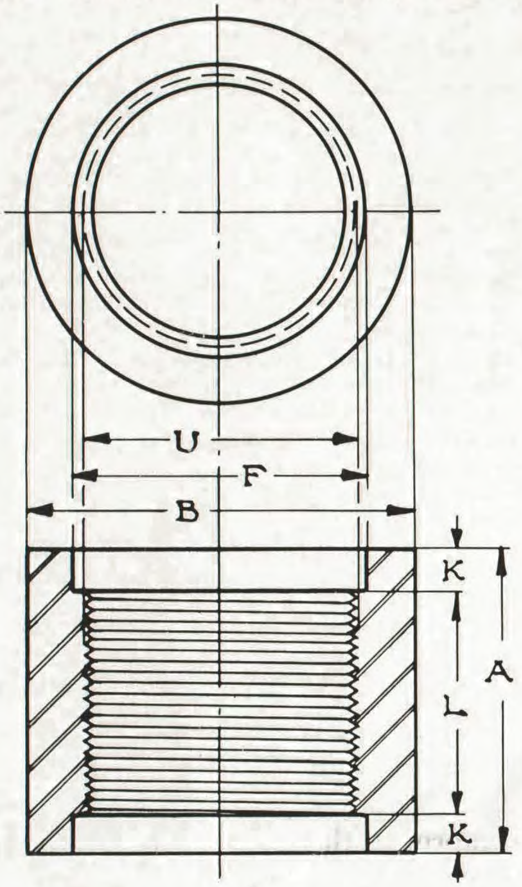


FIGURE 4

FITTINGS

Several forms of standard fittings are available in corresponding grades of material for connecting and assembling carbon, graphite and "Karbate" pipe. Both threaded type and flanged type fittings are manufactured. On threaded type fittings a thread of uniform diameter is used. The tapered thread, standard for iron pipe, is not used because of its wedging action. Some types of fittings are secured to the pipe by cement. Such connections are made only in the factory. Connections to be made in the field must be of the threaded or the flange and bolt type. Standard fittings available are shown in the following tables.



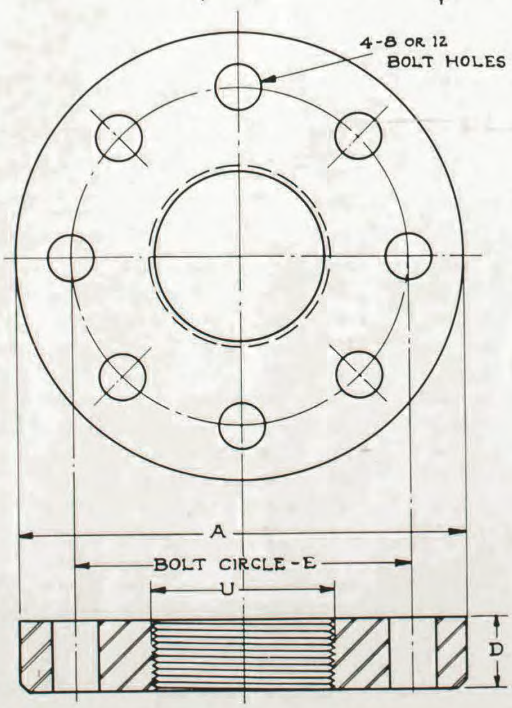
THREADED SLEEVE COUPLINGS

Nominal Size (I. D. Tube)	1/2″	3/4″	1″	1 1/2″	2″	2 3/8″	3″	4″	5″	6″
Dimension A	2.000	2.000	2.000	2.000	2.500	2.500	3.000	3.000	3.500	3.500
Dimension B	1.360	1.615	2.115	2.585	3.420	3.750	5.105	6.605	7.575	9.025
Dimension F	.860	1.115	1.615	2.085	2.795	3.125	4.105	5.355	6.325	7.525
Dimension U	.735	.990	1.490	1.960	2.670	3.000	3.980	5.230	6.200	7.400
Dimension L	1.500	1.500	1.500	1.500	2.000	2.000	2.500	2.500	3.000	3.000
Dimension K	.250	.250	.250	.250	.250	.250	.250	.250	.250	.250
Threads per Inch	14	14	12	12	8	8	8	8	8	8
Depth of Thread	.046	.046	.054	.054	.081	.081	.081	.081	.081	.081

CEMENTED FLANGE COUPLINGS

Cemented joints between pipe and fittings are assembled only at the factory. Pipe of all standard sizes can be supplied with flange couplings cemented to one or both ends. The flange dimensions are the same as those for threaded flange couplings.

Fittings are also available with short, flanged nipples cemented into them to permit connection to flanged pipe lines.

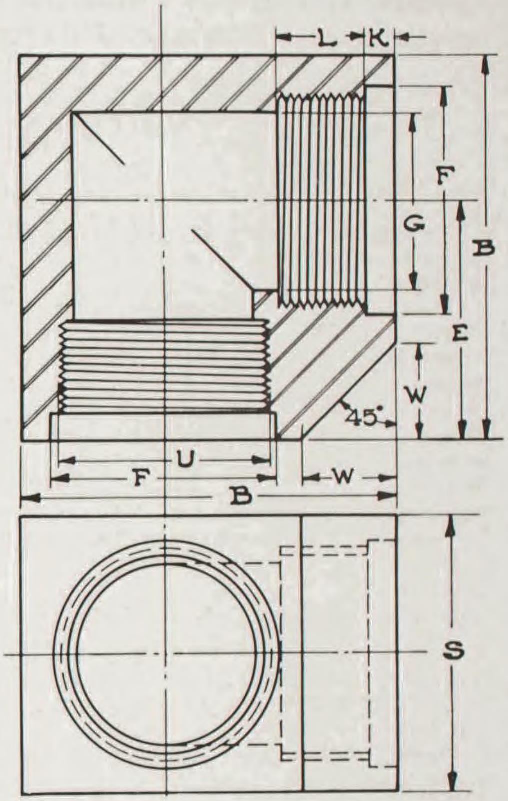


THREADED FLANGE COUPLINGS

Nominal Size (I. D. Tube)	1/2″	3/4″	1″	1 1/2″	2″	2 3/8″	3″	4″	5″	6″
Dimension A	3	4	4 7/8	6 1/8	6 1/2	7 1/2	8 1/4	10	11	12 1/2
Dimension D	1/2	3/4	7/8	1 1/8	1 1/4	1 7/16	1 9/16	1 3/4	1 7/8	2
Dimension E	1 7/8	2 3/4	3 1/2	4 1/2	5	5 7/8	6 5/8	7 7/8	9 1/4	10 5/8
Dimension U	.735	.990	1.490	1.960	2.670	3.000	3.980	5.230	6.200	7.400
Threads per Inch	14	14	12	12	8	8	8	8	8	8
Depth of Thread	.046	.046	.054	.054	.081	.081	.081	.081	.081	.081
No. of Bolts	4	4	4	4	8	8	8	8	8	12
Diam. of Bolts	3/8	1/2	5/8	3/4	5/8	3/4	3/4	3/4	3/4	3/4

BLOCK TYPE FITTINGS

Block elbows, return bends and tees are machined from solid blocks of carbon, graphite or "Karbate." The tables below show the dimensions of standard threaded fittings. These fittings can also be supplied with flanged nipples attached or can be attached to the pipe by means of cemented joints. Such assemblies, however, are made only at the factory. Overall dimensions of cemented fittings are the same as those shown for threaded fittings.

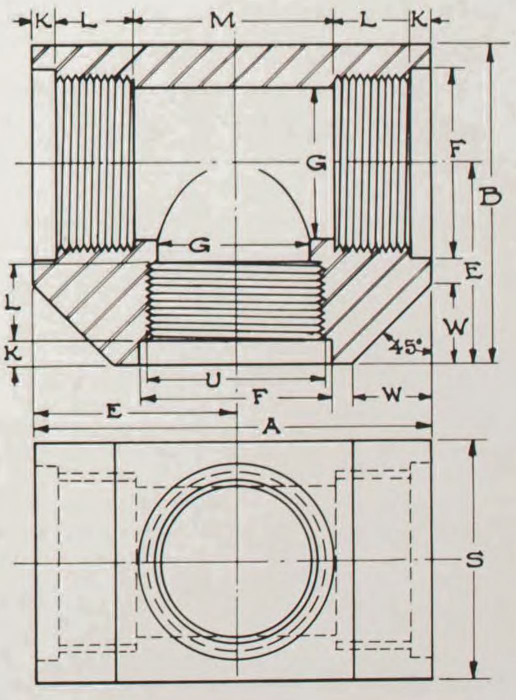


THREADED BLOCK ELBOWS

Nominal Size (I. D. Tube)	½″	¾″	1″	1½″	2″	2⅜″	3″	4″	5″	6″
Dimension B	2.180	2.432	3.057	3.542	4.397	4.750	6.177	7.552	8.787	10.137
Dimension E	1.500	1.625	2.000	2.250	2.687	2.875	3.625	4.250	5.000	5.625
Dimension F	.860	1.115	1.615	2.085	2.795	3.125	4.105	5.355	6.325	7.525
Dimension G	.500	.750	1.000	1.500	2.000	2.375	3.000	4.000	5.000	6.000
Dimension K	.250	.250	.250	.250	.250	.250	.250	.250	.250	.250
Dimension L	.750	.750	.750	.750	1.000	1.000	1.250	1.250	1.500	1.500
Dimension S	1.360	1.615	2.115	2.584	3.418	3.750	5.104	6.614	7.574	9.024
Dimension U	.735	.990	1.490	1.960	2.670	3.000	3.980	5.230	6.200	7.400
Dimension W	.820	.817	.942	.957	.978	1.	1.072	.942	1.212	1.112
Threads per Inch	14	14	12	12	8	8	8	8	8	8
Depth of Thread	.046	.046	.054	.054	.081	.081	.081	.081	.081	.081

BLOCK RETURN BENDS

Block type return bends are manufactured with center to center dimension conforming to the requirements of the assembly on which they are used. Other dimensions conform to those shown for block type elbows.



THREADED BLOCK TEES

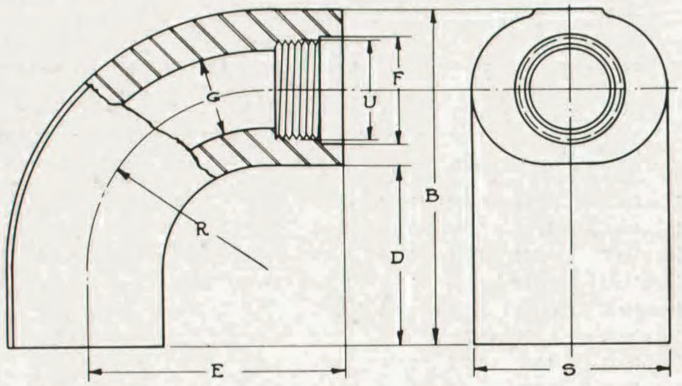
Nominal Size (I. D. Tube)	½″	¾″	1″	1½″	2″	2⅜″	3″	4″	5″	6″
Dimension A	3.000	3.250	4.000	4.500	5.375	5.750	7.250	8.500	10.000	11.250
Dimension B	2.180	2.432	3.057	3.542	4.397	4.750	6.177	7.552	8.787	10.137
Dimension E	1.500	1.625	2.000	2.250	2.687	2.875	3.625	4.250	5.000	5.625
Dimension F	.860	1.115	1.615	2.085	2.795	3.125	4.105	5.355	6.325	7.525
Dimension G	.500	.750	1.000	1.500	2.000	2.375	3.000	4.000	5.000	6.000
Dimension K	.250	.250	.250	.250	.250	.250	.250	.250	.250	.250
Dimension L	.750	.750	.750	.750	1.000	1.000	1.250	1.250	1.500	1.500
Dimension M	1.000	1.250	2.000	2.500	2.875	3.250	4.250	5.500	6.500	7.750
Dimension S	1.360	1.615	2.115	2.584	3.418	3.750	5.104	6.614	7.574	9.024
Dimension U	.735	.990	1.490	1.960	2.670	3.000	3.980	5.230	6.200	7.400
Dimension W	.820	.817	.942	.957	.978	1.000	1.072	.942	1.212	1.112
Threads per Inch	14	14	12	12	8	8	8	8	8	8
Depth of Thread	.046	.046	.054	.054	.081	.081	.081	.081	.081	.081

SWEEP TYPE FITTINGS

Sweep elbows and return bends are manufactured in carbon, graphite and "Karbate" materials for pipes of 1″, 1½″ and 2″ I. D. These fittings can be attached to the pipe by either threaded or cemented joints. Cemented joints are assembled only at the factory. Dimensions of standard threaded fittings are shown in the tables below. Overall dimensions of cemented fittings are the same as those shown for threaded fittings.

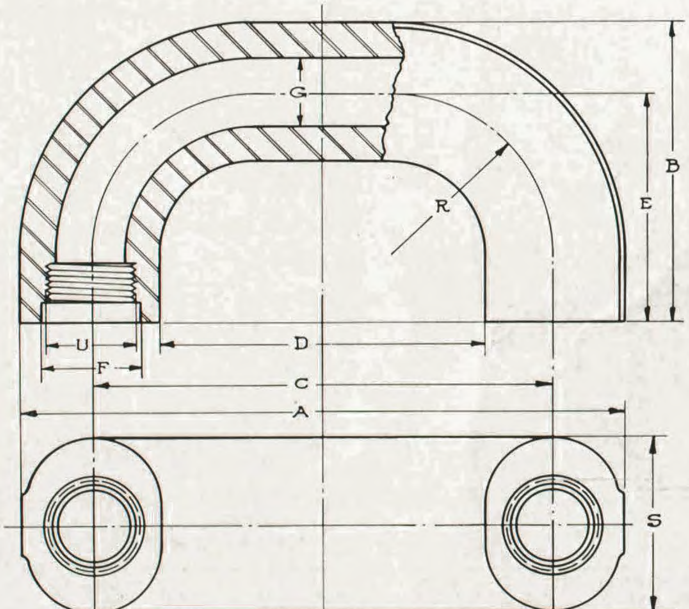
THREADED SWEEP ELBOWS

Nominal Size (I. D. Tube)	1″	1½″	2″
Dimension B	5 1/32	5 3/16	6 13/16
Dimension D	2 27/32	2 7/16	3 1/16
Dimension E	3 15/16	3 13/16	4 15/16
Dimension F	1.615	2.085	2.795
Dimension G	1⅛	1 9/16	2
Dimension R	2¾	2¾	3⅜
Dimension S	2⅞	3¼	4¼
Dimension U	1.490	1.960	2.670
Threads per Inch	12	12	8
Depth of Thread	.054	.054	.081



THREADED SWEEP RETURN BENDS

Nominal Size (I. D. Tube)	1″	1½″	2″
Dimension A	10 3/16	10½	13¾
Dimension B	5 1/32	5 3/16	6 13/16
Dimension C	8	7¾	10
Dimension D	5 13/16	5	6¼
Dimension E	3 15/16	3 13/16	4 15/16
Dimension F	1.615	2.085	2.795
Dimension G	1⅛	1 9/16	2
Dimension R	2¾	2¾	3⅜
Dimension S	2⅞	3¼	4¼
Dimension U	1.490	1.960	2.670
Threads per Inch	12	12	8
Depth of Thread	.054	.054	.081



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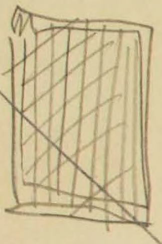

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