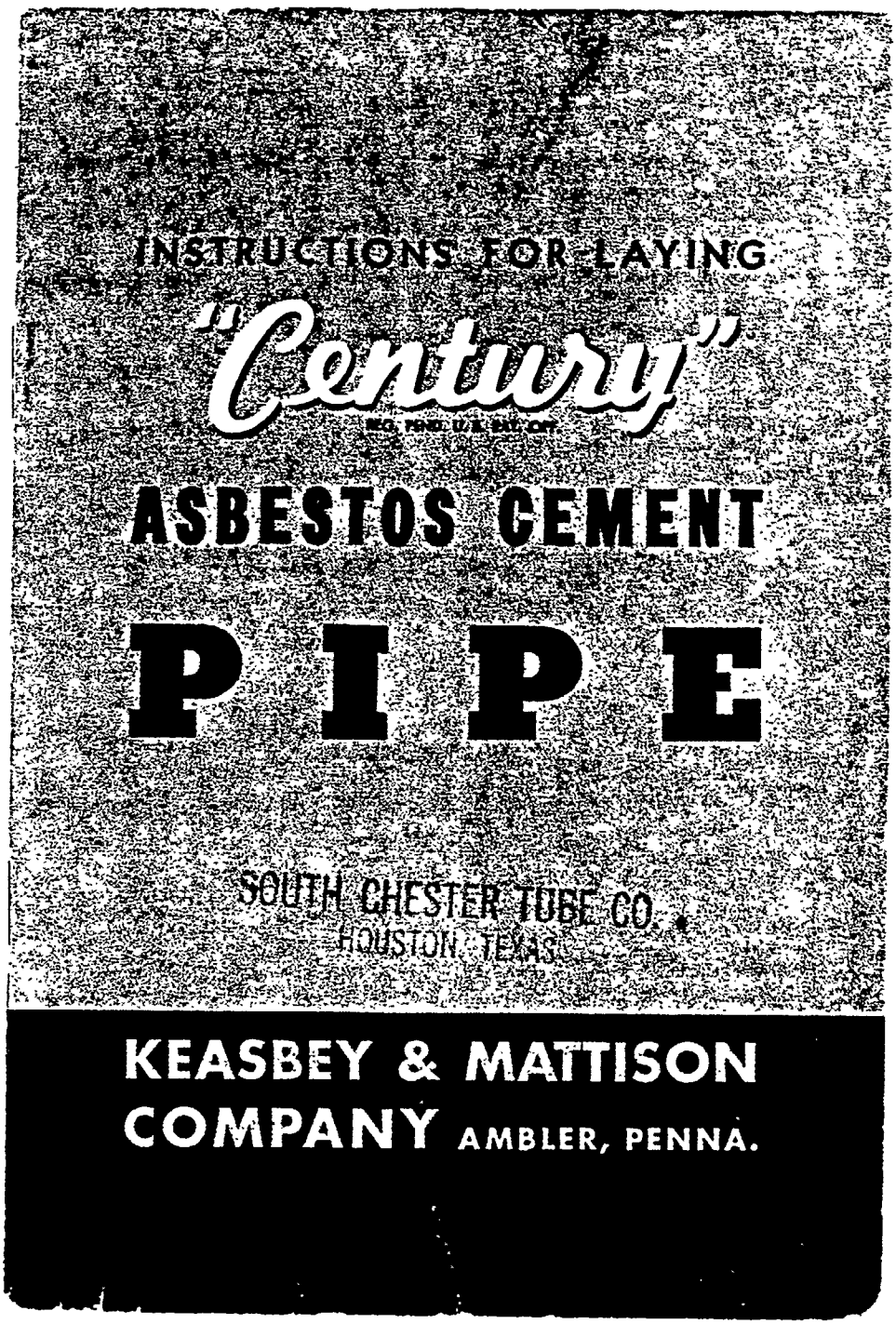


SOUTH CHESTER TUBE CO.
HOUSTON, TEXAS

INSTRUCTIONS FOR LAYING "CENTURY" ASBESTOS-CEMENT PIPE

Table of Contents

KEASBEY & MATTISON COMPANY AMBLER, Penna.

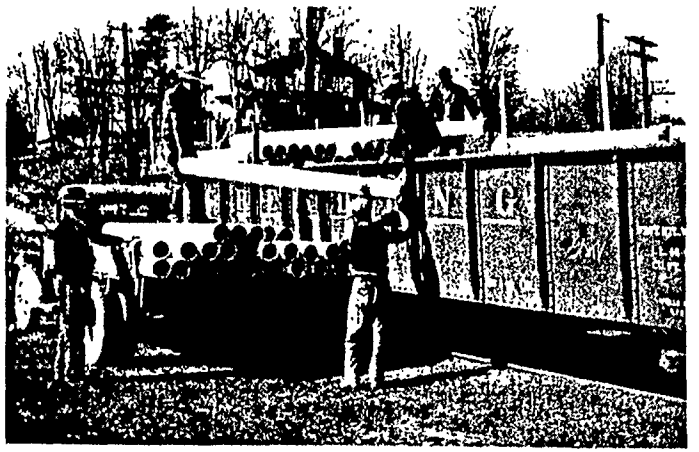
HANDLING

CHECK THE SHIPMENTS AGAINST THE PACKING TICKETS AND REPORT ANY ERROR OR DAMAGE TO THE TRANSPORTATION AGENT.

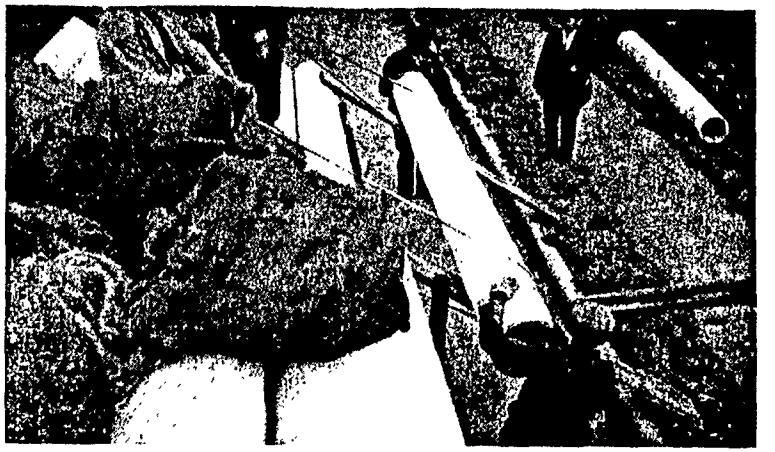
All pipe materials can be damaged by rough handling. "Century" Asbestos-Cement Pipe is no exception. However, its comparatively light weight makes handling easier and cuts down the possibility of mishap. Pipe should be rolled or lifted. It should not be thrown, slid, dropped, rolled together hard, or crashed.

For pipe sizes over 6″, rope or skids should be used in handling. Only in unusual cases will machinery be necessary.

Keep earth and foreign matter out of pipe interior. The coupling ends must be protected from damage and kept clean to assure quick assembly of permanently tight joints. When possible, distribute pipe along trench on side opposite from excavated earth.



Showing the ease with which this light-weight pipe may be handled



Distributing Pipe from Truck directly along trench.

ALIGNMENT AND GRADE

The pipe should be laid to the line and grade established by the engineer or other authority in charge of the installation.

TRENCHING

The trench should be 18″ wide for pipe sizes up to and including 8″. For larger size pipe the trench should be one foot (1′) wider than the diameter of the pipe.

The recommended minimum depth of cover is three and one-half (3½) feet. Due consideration must be given to frost line, surface and traffic loads and type of back fill.

Where conditions permit, the trench should be excavated to a flat bottom cut true and even at the established grade. The pipe should be laid upon firm trench bottom and shallow holes scooped out for the couplings, thereby providing a bearing for the barrel of the pipe along its full length.

Where excavation is below grade, correction should be made with suitable material carefully tamped.

Large boulders and rock should be removed to a depth of 6″ below grade and the holes filled with suitable material carefully tamped.

Trenching *(continued)*

Where trench conditions are rocky, or the manner of excavation leaves an uneven bearing for the full length of the barrel of the pipe, additional excavation should be made and the trench refilled to a flat bottom at the proper grade with suitable material carefully tamped to provide a bearing for the pipe.

When the use of blocks is insisted upon, two wooden blocks or two dirt pads should be placed under each pipe just one-fifth of the length from the pipe ends. For 13′ pipe this distance is 32″ and for 18′ pipe it is 45″. This spacing gives the pipe the best support and allows the backfill to be properly compacted under the pipe. The blocks should be on firm soil and leveled across the bottom of the trench. The blocks should project at least 1″ above the trench bottom. Block sizes should be as given in the following table:—

Pipe Size	Lumber
to 6"	2" x 4" x 10"
8" to 12"	2" x 6" x 12"

Support and protection should be provided for existing pipe-lines, electrical conduits, or other structures.

JOINING—Preparation:

"Century" Pipe is readily and speedily joined in the trench. For convenience and to obtain the greatest speed in laying, the parts of the "Century" Coupling should be placed on the pipe ends before lowering the pipe into the trench. This is done as follows:-

1. Raising

Block the pipe a few inches off the ground.

2. Cleaning

Clean off dirt or mud that may be sticking to the coupling area end of the pipe.

3. Follower Ring

Place the coupling follower on the pipe back from the end.

Joining *(continued)*

4. Locating the Gasket

**a—(Round Gaskets)*

Proper location of the gaskets will center the coupling over the joint. Place the gasket locator provided (Fig. 1) in the end of the pipe. Place a gasket against the shoulder on the locator as shown in Fig. 2, and roll it up the incline onto the pipe. Its first seat on the pipe should be its correct location. This is one of the most important points in the assembly of the "Century" Coupling, and care should be taken to be sure that the gasket is on straight. If the gasket does not seat in its correct position after rolling off the locator it is an easy matter to slide (not roll) the gasket the small distance necessary. The following table gives the correct distances of the nearest edge of the gasket from the pipe end:-

Pipe Size	Pipe End to Nearest Gasket Edge
2"	3/8"
3"	1/2"
4"	5/8"
6"	3/4"
8"	15/16"
10"	1"
12"	1 1/8"

Rolling Gasket into Place

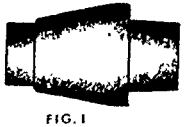


FIG. 1

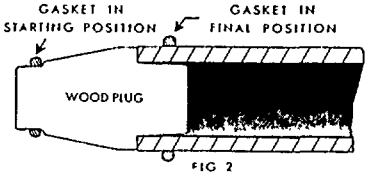


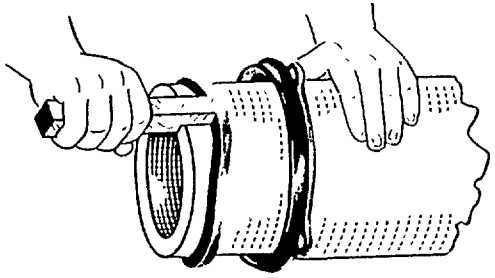
FIG 2

* Round gaskets will be furnished with certain pipe sizes until present stocks are exhausted after which time square gaskets will be supplied on all orders.

b—(Square Gaskets)

Square Cross-Section Gaskets are easily placed on the pipe ends by hand. They do not require the use of the gasket locator shown in Fig. 1. Correct location is the same as for round gaskets given in the table above.

Joining *(continued)*



Square Gasket Being Placed on Pipe With Aid of Special Wooden Gauge

To facilitate the accurate location of the square gaskets, special wooden gauges are furnished with each initial order. These gauges are made of hard wood, $\frac{3}{4}$" cross section and the end is recessed the correct distance to properly locate the gasket. Each gauge is stamped with the size pipe with which it is to be used. A complete turn around the pipe will locate the gasket. Round and square gaskets are interchangeable.

5. Repeating

Repeat all operations 1-4 on the other pipe end.

6. Middle Ring

Roll one gasket one turn back on the pipe in order to allow placing of the middle ring on the pipe end. Place the middle ring on this pipe end.

7. Bolts

Bolts should be placed in a bucket or other suitable container so that they may be moved along as joints are assembled. Now the top of trench preparation is complete and the pipe with all accessories is ready for lowering into the trench.

JOINING—Completion

After several lengths of pipe have been prepared in the manner described, lower the pipe with the coupling parts in position into the trench. The joint is then completed as follows:—

1. Bring the pipes together leaving $\frac{1}{2}$" clearance between the ends. This is easily done by holding any $\frac{1}{2}$" gauge piece over the end of one pipe, bringing the other pipe up against the gauge piece, and removing the gauge piece after the pipe has been brought up against it.

2. Slide the middle ring from its position on one pipe end over the joint until it rests against the gasket on the other pipe. The middle ring should be free to turn on both pipe ends and not bind on either.

3. The gasket which was rolled back to permit placing the middle ring on the pipe end should now be rolled up against the middle ring. Be sure that the gaskets whether square or round seat snugly against the middle ring (see Figures 3 and 4 below).

4. Bring the follower rings up against the gaskets, insert bolts through the followers and tighten bolts on opposite sides of the pipe alternately with a wrench. Draw the bolts tight, but do not force, so that all nuts are turned approximately the same number of threads on the bolts. This completes the joint.

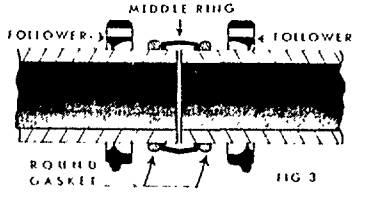


FIG 3

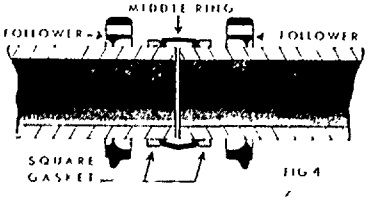


FIG 4

Table of Wrench Sizes

Pipe Size	Wrench Socket Size
2"	5/8"
3 to 6"	13/16"
8 to 12"	1"

Alternate Laying Method for Smaller Sizes of Pipe

Lowering three lengths at one time

Lengths of "Century" Pipe can be joined on the top of trench and then lowered together (see above).

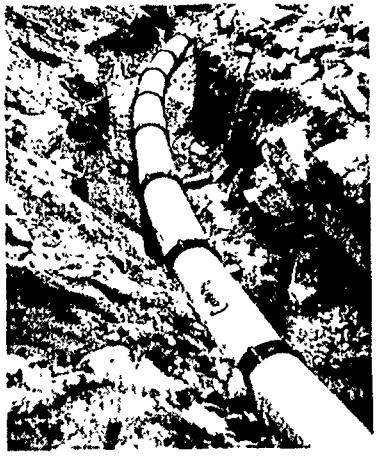
NOTES ON THE "CENTURY" COUPLING

It is possible that through rough handling an occasional middle ring of the "Century" Coupling may become "out of round" to the extent that it may not fit on the pipe. As these rings are made of malleable iron it is a simple matter to hammer them back into shape without damage.

The "Century" Coupling is a flexible one. It is designed and made to withstand far greater internal pressure than will be found in practice in the pipe lines in connection with which it is used. However, the "Century" Flexible Coupling is not a mechanical lockjoint. It is not designed or made to prevent the pipe from pulling apart under pressure. The recommended method of blocking dead ends and bends, and the weight of the backfill will hold the pipe in place. (See section head "Backfilling.")

When "Century" Couplings are used to connect "Century" Asbestos-Cement Pipe and other type pipe, they should fit on the plain pipe end so that not more than 1/8 of an inch clearance appears all around.

CURVED LINES

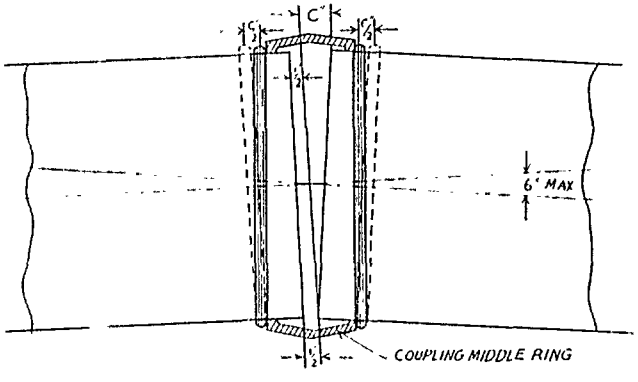


The "Century" Coupling is designed to permit from 4 to 6 degrees deflection from one pipe to the next (which means an offset of about 10" to 15" per 13' length) and still make a perfectly safe joint. This feature permits the installation of pipe lines on large radius curves without the use of special bends. In making such installations with deflected full length pipe, lay each pipe in its final deflected position before completing the joints. Be sure to obtain the 1/2" clearance between pipe ends where the edges of the pipe are nearest.

A correction on the gasket on each pipe must be made before completing the joint. This correction is determined in the following manner:

1. Determine the width of the opening at the widest point and subtract one-half inch from this. (C in sketch.) This gives you the extra space over normal on the outside edges.

2. The gasket on each pipe section is then moved, at the outer edge, one-half this distance toward the pipe edge. (C/2 in sketch.)



3. The gasket remains in its usual place on the inside edge. Then straighten the gasket by making a corresponding correction between these two points. (See sketch.)

4. This makes the gaskets parallel and will center the coupling middle ring over the opening and the coupling over the joint.

Remember that locating the gaskets correctly will center the coupling on the joint and facilitate and speed the assembly.

The following table shows the amount of offset in inches of subsequent pipe ends from a straight line for pipe lengths and degrees of deflection.

OFFSET IN INCHES OF PIPE ON CURVES

Degree of Deflection	Length of Pipe in Feet				
	5'	6½'	Standard for 2" and 3" 10'	Standard for 4" to 12" 13'	Optional for 6" and 8" Class 150 18'
1°	1.0"	1.3"	2.0"	2.7"	3.8
2°	2.1"	2.7"	4.2"	5.4"	7.5
3°	3.1"	4.0"	6.2"	8.1"	11.3
4°	4.1"	5.4"	8.3"	10.9"	15.1
5°	5.2"	6.8"	10.5"	13.6"	18.9
6°	6.2"	8.0"	12.5"	16.2"	22.8

The following table gives the radius of curvature possible with different pipe lengths and degrees of deflection at the joint.

RADIUS OF CURVATURE IN FEET

Degree of Deflection	Length of Pipe in Feet				
	5'	6½'	10'	13'	18'
1°	287	374	574	747	1030
2°	143	186	285	371	515
3°	96	124	191	249	343
4°	72	93	143	186	248
5°	57	74	114	149	206
6°	48	62	95	124	171

CUTTING PIPE IN THE FIELD

Cutting "Century" Pipe With Bucksaw

For field cutting, a buck saw with a "tuttle tooth" blade is recommended. This type of blade consists of two cutting teeth adjacent to two cleaning teeth throughout the length of the blade. The buck saw, including the blade, retails for approximately $1.50 and is, therefore, a very inexpensive tool which will cut asbestos-cement pipe smoothly and quickly.

In an emergency a coarse tooth back saw or a well sharpened wood saw may be utilized, but they will dull quickly due to the abrasiveness of the material to be cut.

All saws should be kept sharp and "set" wide.

Never cut Asbestos-Cement Pipe with a cold chisel or pipe cutter.

Using the Factory square cut end as a guide, it is a simple matter to mark the pipe for cutting in the field. To insure a straight cut, turn the pipe when saw has cut through wall.

All the pipe ends are accurately manufactured to fit "Century" Flexible Couplings. In addition, each shipment will contain a certain percentage of marked sections which fit the coupling at any point and which can also be easily identified by black painting on the ends.

If the project necessitates considerable field cutting, all of these specially marked sections or others suitable for cutting should be set aside until needed for this purpose. To determine whether a length of pipe can be cut at any point and joined with a "Century" Coupling, select one which appears to have the same O. D. throughout its entire length. If the coupling middle ring slides easily over the entire length, the pipe can be cut and joined at any point, just as in the case of the specially marked sections.

All short lengths are marked with the actual length in feet and inches.

CONNECTIONS TO CAST IRON PIPE AND FITTINGS

Connections to bell ends of Cast Iron pipe are made by yarning and pouring with a self-caulking compound, the same as in joining two lengths of bell and spigot cast iron pipe. Lead joints if properly caulked may be used.

Class D, standard cast iron bell end pipe and fittings can be readily adapted to all sizes of "Century" Pipe in Class 100; to all sizes in Class 150 up to and including 8" and 4" Class 200. Enlarged bell end cast iron fittings are used with sizes 10" and larger in Class 150 and for all sizes in Class 200, except 4".

When ordering enlarged bell end cast iron fittings the inside diameter of the bell end should be at least one (1) inch greater than the outside diameter of the "Century" Pipe as shown on Page 21. This will give a ½" spacing for pouring the joint compound.

Where "Century" pipe is joined to cast iron pipe with a rigid poured joint a short piece of "Century" pipe preferably 12" to 18" in length should be joined into the cast iron bell openings. In no case should this nipple be over 39" in length. This allows a "Century" Flexible Coupling to be used close to the poured joint to insure line's maximum flexibility.

Connections to spigot ends of cast iron pipe can be made with a "Century" Flexible Coupling provided outside diameter of the iron pipe approximates outside diameter of

Fitting "Century" Pipe to Cast Iron Connections

All work on surface | Lower into place | Bolt them together

"Century" Pipe. Test with middle ring as described on Page 13.

Coupling is assembled in same manner as when joining the lengths of "Century" Pipe. Clearance between coupling and pipe should not be more than ⅛" all around.

If outside diameter of Cast Iron pipe is such that a "Century" Coupling cannot be used, a cast iron bell and plain end adaptor having a bell for the outside diameter of the cast iron pipe and a plain end for the outside diameter of the "Century" Pipe, or an adaptor having a spigot end and a plain end of proper outside diameters can be used.

PROVIDING FOR FUTURE CUT-IN CONNECTIONS

To provide for future cut-in connections, use short lengths of coupling section pipe to eliminate unnecessary excavation when the future cross or tee is installed.

The length of the short piece inserted in the line is determined by the laying length of the future "special" to be inserted, plus a reasonable working distance between coupling and "special." Approximately 12" to 18" should be allowed between existing coupling and the inside of the bell of the special to be inserted.

To install a "special" in a "Century" line where provision for cut-ins has been made, the following steps are taken:

1. Uncover short length of pipe where "special" is to be placed.
2. Unbolt couplings and remove short length.
3. Lay "special" midway between existing pipe and measure the distance between the inside of the bell and the end of the existing pipe.
4. Cut the piece of "Century" pipe removed from the line to the proper lengths allowing ½" clearance at the joints when the line is reassembled.
5. Place "special" in position on good foundation, have bell holes dug to allow working room to yarn and pour joints.
6. Reassemble and tighten "Century" Flexible Coupling so there is no danger of not being able to assemble couplings after poured joints are made.

Future Connections *(continued)*

7. Yarn and pour joints of "special," with self-caulking compound.

Where conditions make it difficult to pour joints in the trench, this may be done on the surface and the entire unit with "Century" Coupling parts in place lowered into the trench and assembly completed in the usual manner as on original installations. Care must be used in cutting the short pieces of "Century" Pipe to the right length allowing for ½" clearance at the joints and to avoid damaging the unit when lowering into the trench.

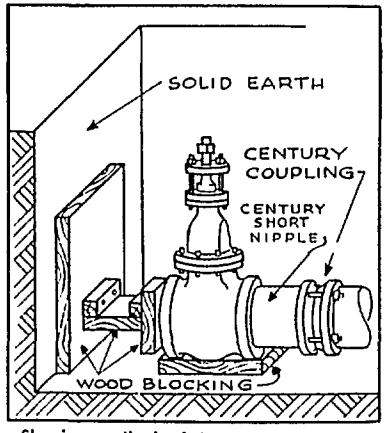
RAILROAD CROSSING These should be made in accordance with the recommendations of the railroad authorities.

THRUST BLOCKING

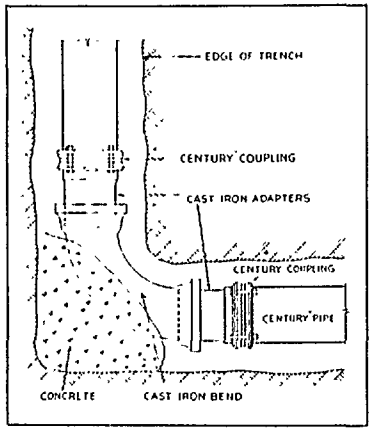
Line should be thrust blocked at bends, tees and caps to prevent movement of lines under pressure.

Place blocking between solid ground and fitting to be anchored, and in such manner that pipe and fitting joints will be accessible for repairs.

Blocking should be concrete, of a mixture calculated to have a compressive strength of not less than 2000 pounds per square inch. Other approved materials may be used.



Showing method of temporarily blocking dead end by use of timber.



Cast Iron All Bell Bend

SERVICE CONNECTIONS

"Century" Pipe is drilled and tapped for corporation stops with standard tapping equipment in the same manner as other kinds of pipe. Mueller type thread is recommended. The maximum size recommended is 3/4" on class 150 and over in sizes from 4" up; class 100 from 6" on up.

In tapping the pipe with the standard equipment do not force the drill through the pipe wall. Unless the drill is dull very little pressure will be sufficient to lead the drill into the pipe wall. If the drill is forced through the pipe wall a punching instead of a cutting action will result and chipping will occur. Water poured into the body of the tapping machine will act as a lubricant and will facilitate the drilling.

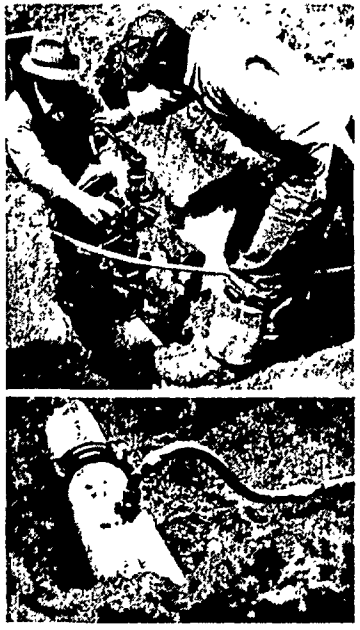
Drilling, tapping and inserting stops may be done either dry or under pressure.

Service clamps, saddles, tapping sleeves and similar accessories are available for use with "Century" Pipe for outlets larger than recommended above.

Copper or lead goose necks are recommended between corporation stop and service line. Swing ells should not be used.

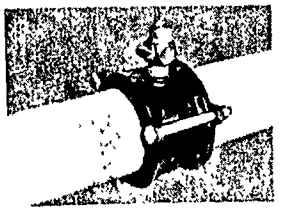
Drilling and tapping dry pipe for a corporation stop

Drilling and tapping pipe under pressure in trench for a corporation stop (below)



Corporation stop with goose neck (above)

SERVICE COUPLINGS

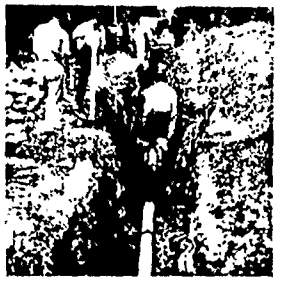

Tapped Service Coupling

"Century" Flexible Couplings with long middle rings are installed in the same manner as the standard coupling except that the space between pipe ends should be slightly greater than the tapped hole. The middle ring may be ordered drilled and tapped as desired at the factory. Their use permits service connections to be taken off at the coupling, eliminating the necessity of drilling and tapping the pipe proper. Service couplings are available on special order for use on 2", 3" and 4" Class 100 and 150, tapped ½" to 1", Mueller type tapered thread or standard iron pipe thread. They also can be obtained for sizes 4" and 6" Class 150 only, and from 1¼" to 2", iron pipe thread only. Orders should specify size of tap and type of thread. When desired for future services they are plugged, or a corporation stop in the "off" position is installed.

PARTIAL BACKFILLING FOR TEST

Before testing, the line should be backfilled in 4" layers directly over and on both sides of the pipe for the full width of the trench and not less than eight inches above the top of the pipe. Be careful to use earth free from rock, boulders, frozen lumps or other unsuitable material.

The backfill should be thoroughly tamped under and on each side of the pipe to provide solid backing. Leave joints exposed for examination under test. Balance of backfill may contain coarser materials, and should be thoroughly tamped or puddled. Flooding the trench may also be employed but be careful not to float the pipe.



EXPELLING AIR BEFORE TEST

Before filling the line with water, tap the line, if necessary, at the points of highest elevation to expel air. After releasing the air all taps shall be tightly plugged. At high points couplings may be loosened to expel air.

HYDROSTATIC TESTS

After partial backfilling, the line shall be slowly filled with water, taking care to expel air as mentioned before, and subjected to a hydrostatic pressure 50 per cent above normal working pressure or as otherwise specified

Make tests between valved sections if possible.

Pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner.

While test pressure is being maintained, thoroughly inspect all exposed pipes, fittings, valves, hydrants and joints for leaks. If all joints are tight and pressure gauge falls off slightly this is probably due to trapped air and gauge will hold steady after approximately 48 hours.

If leakage is evident at a coupling it has been improperly installed.

Disassemble the joint, inspect thoroughly for improper assembly or foreign matter lodged under the gasket or within the coupling.

Poured joints of a self-caulking compound will sometimes seep in the early stages of their life, but will "take up" as they age.

FINAL BACKFILL

After the test has been completed to the satisfaction of the authority in charge, the trench may then be backfilled in the usual manner, after the exposed sections, including the coupling, have been partially backfilled in the same manner as the barrel of the pipe. Large stones, debris or other objectionable material should not be thrown into the trench until sufficient protective covering of earth has been placed over the pipe.

SALVAGE

After a period of service "Century" Pipe and couplings can be reclaimed in entirety. It can be used again on the same pressure class installation as it was originally designed for. Its walls are not weakened by corrosion or decay. "Century" Pipe actually increases in strength with age.

INSTRUCTIONS FOR RETURNED MATERIAL

It is suggested that at least three lengths of Pipe and three complete Couplings of each size and class installed be retained for use in emergency extensions or repairs.

With the exception of wood Gasket Locators, returned materials will not be accepted for credit at our factory unless permission for their return has first been obtained from our district office nearest you.

ONLY STANDARD OR SHORT LENGTHS OF PIPE WITH BOTH COUPLING ENDS AND/OR COMPLETE COUPLINGS MAY BE RETURNED FOR CREDIT. CUT OR BROKEN PIPE OR PARTS OF COUPLINGS WILL NOT BE RECEIVED FOR CREDIT.

On receipt of permission from the Keasbey & Mattison District Office having jurisdiction the materials to be returned should be properly boxed, bagged or crated if necessary and shipped according to instructions, with freight prepaid.

We will not be responsible for damage suffered in transit.

Upon receipt at the factory returned materials will be inspected, and if found in salable condition credit will be issued, less 10% service charge. The report of the factory Inspection Department as to the acceptability of the returned material shall be final.

Dimensions and Weights of "Century" Asbestos-Cement Pipe

CLASS 100

Pipe Size Inches	Standard Length Feet	Wall Thickness Inches	Outside Diameter Inches	Wgt. Lb. per Lin. Ft. Pipe Only
2	10	.11	2.82	3.10
3	10	.14	3.88	4.70
4	13	.18	4.96	6.54
6	13	.51	7.02	10.89
8	13	.52	9.01	14.37
10	13	.59	11.18	21.05
12	13	.68	13.36	28.15

CLASS 150

Pipe Size Inches	Standard Length Feet	Wall Thickness Inches	Outside Diameter Inches	Wgt. Lb. per Lin. Ft. Pipe Only
2	10	.16	2.92	3.51
3	10	.19	3.98	5.26
4	13	.53	5.06	7.23
6	13	.62	7.21	13.00
6	18	.62	7.21	13.00
8	13	.69	9.38	18.80
8	18	.69	9.38	18.80
10	13	.85	11.70	29.80
12	13	.98	13.96	39.50

CLASS 200 (Not carried in stock. Supplied on special order)

Pipe Size Inches	Standard Length Feet	Wall Thickness Inches	Outside Diameter Inches	Wgt. Lb. per Lin. Ft. Pipe Only
2	10	.50	3.00	3.85
3	10	.53	4.06	5.74
4	13	.60	5.20	8.19
6	13	.75	7.50	15.73
8	13	.91	9.82	24.65
10	13	1.10	12.20	37.55
12	13	1.21	14.48	50.10

Unless otherwise specified, the following shall apply: Not less than 90 percent of the pipe furnished shall be within plus or minus 1 inch of the specified nominal length and the remaining 10 percent shall be not more than 3 feet under the nominal length.

Dimensions of "Century" Flexible Couplings

Size in Inches	Class	Overall Diameter (Outside of Lugs) — Inches	Diameter Center Line of Bolt Holes — Inches	Inside Diameter Coupling Parts — Inches	Width of Middle Ring — Inches	Distance From Nearest Edge of Gasket to Pipe End — Inches	No. of Bolts	Bolt Size — Inches	Shipping Weight of Complete Coupling — Pounds
2"	100	6.1	4.9	2.94	1.25	3/8"	3	3/8x2 3/4	3.0
	150	6.2	5.0	3.04					3.2
	200	6.3	5.1	3.12					3.4
3"	100	7.2	6.0	4.00	1.50	1/2"	3	1/2x3 1/2	7.0
	150	7.3	6.1	4.10					7.3
	200	—	—	—					7.6
4"	100	8.3	7.2	5.08	1.75	5/8"	3	1/2x3 1/2	8.2
	150	8.4	7.3	5.18					8.6
	200	8.6	7.4	5.32					8.8
6"	100	10.4	9.3	7.14	2.00	3/4"	4	1/2x4	13.7
	150	10.7	9.5	7.36					14.0
	200	10.9	9.8	7.62					15.0
8"	100	12.9	11.6	9.16	2.375	15/16"	4	5/8x4 1/2	20.6
	150	13.2	11.9	9.50					21.0
	200	13.7	12.4	9.94					22.5
10"	100	15.1	13.8	11.30	2.50	1"	5	5/8x4 1/2	27.4
	150	15.6	14.3	11.82					28.4
	200	16.1	14.8	12.32					30.0
12"	100	17.5	16.2	13.48	2.75	1 1/8"	6	5/8x5	37.0
	150	18.1	16.8	14.08					38.0
	200	18.6	17.3	14.60					39.5

Dimensions of "Century" Tapped Flexible Couplings

Size in Inches	Class	Tap Size	Overall Diameter (Outside of Lugs) — Inches	Diameter Center Line of Bolt Holes — Inches	Inside Diameter Coupling Parts — Inches	Width of Middle Ring — Inches	Distance From Nearest Edge of Gasket to Pipe End — Inches	No. of Bolts	Bolt Size — Inches	Shipping Weight of Complete Coupling — Pounds
2"	100	1/2 1"	6.1	4.9	2.94	3	3/8"	3	3/8x4 1/2	4.50
	150	1/2 1"	6.2	5.0	3.04	3	3/8"	3	3/8x4 1/2	4.60
3"	100	1/2 1"	7.2	6.0	4.00	3.250	1/2"	3	1/2x5	7.92
	150	1/2 1"	7.3	6.1	4.10	3.250	1/2"	3	1/2x5	8.12
4"	100	1/2 1"	8.3	7.2	5.08	3.50	5/8"	3	1/2x5 1/2	10.89
	150	1/2 1"	8.4	7.3	5.18	3.50	5/8"	3	1/2x5 1/2	11.0
	150	1 1/4 2"	8.4	7.3	5.18	4.75	5/8"	3	1/2x6 1/2	13.46
6"	150	1 1/4 2"	10.7	9.5	7.36	5.00	3/4"	4	1/2x7	20.6

Loss of Head in Pipe by Friction

Pipe Size Inches	Discharge in Gallons Per Minute	Discharge in Gallons Per 24 Hours	(c) Velocity in Feet Per Second	Loss of Head in Feet Per 1,000 Feet of Pipe (hf) C 140	C 120	C 100	C 80
2"	6	8,640	0.574	0.892	1.19	1.66	2.51
	8	11,520	0.765	1.52	2.02	2.83	4.28
	10	14,400	0.956	2.30	3.06	4.28	6.47
	12	17,280	1.147	3.22	4.28	6.00	9.07
	16	23,040	1.530	5.48	7.30	10.2	15.5
	20	28,800	1.912	8.29	11.0	15.5	23.4
	30	43,200	2.868	17.6	23.4	32.8	49.5
	50	72,000	4.781	45.2	60.2	84.3	128.0
	75	108,000	7.171	95.8	128.0	179.0	270.0
	100	144,000	9.561	163.0	217.0	304.0	460.0
	150	216,000	14.342	346.0	460.0	645.0	975.0
	200	288,000	19.122	589.0	784.0	1099.0	1661.0
3"	10	14,400	0.434	0.436	0.585	0.816	0.626
	15	21,600	0.651	0.911	0.816	0.916	1.38
	20	28,800	0.868	1.21	1.79	1.61	2.26
	25	36,000	1.085	1.83	2.40	2.44	3.41
	50	72,000	2.170	6.61	8.58	8.79	12.4
	100	144,000	4.340	24.9	32.4	44.5	44.5
	200	288,000	8.680	86.1	98.8	115.0	164.0
	300	432,000	14.020	182.0	209.0	244.0	100.0
	400	576,000	17.360	311.0	357.0	111.0	589.0
	500	720,000	21.699	170.0	539.0	625.0	876.0
4"	20	28,800	0.501	0.322	0.420	0.129	0.601
	25	36,000	0.630	0.485	0.559	0.648	0.909
	30	43,200	0.756	0.681	0.781	0.909	1.27
	40	57,600	1.008	1.16	1.33	1.55	2.17
	50	72,000	1.260	1.76	2.02	2.34	3.28
	100	144,000	2.520	6.15	7.28	8.15	11.0
	200	288,000	5.040	22.9	26.3	30.5	42.7
	300	432,000	7.561	48.6	55.7	64.6	90.6
	400	576,000	10,081	82.7	94.9	110.0	154.0
	500	720,000	12.601	125.0	143.0	166.0	233.0
	600	864,000	15.121	175.0	201.0	233.0	327.0
	800	1,152,000	20.162	299.0	343.0	397.0	557.0
6"	Cu. Ft. Per Second						
	0.0774	50,000	0.386	0.122	0.140	0.162	0.227
	0.0928	60,000	0.463	0.171	0.196	0.227	0.318
	0.124	80,000	0.617	0.291	0.333	0.385	0.542
	0.155	100,000	0.771	0.439	0.504	0.585	0.819
	0.309	200,000	1.542	1.59	1.82	2.11	2.96
	0.464	300,000	2.314	3.36	3.85	4.47	6.27
	0.619	400,000	3.085	5.72	6.57	7.62	10.7
	0.928	600,000	4.627	12.1	13.9	16.1	22.6
	1.238	800,000	6.170	20.7	23.7	27.5	38.5
	1.547	1,000,000	7.712	31.2	35.8	41.6	58.2
	2.321	1,500,000	11.568	66.2	75.9	88.1	124.0
	3.094	2,000,000	15.424	113.0	129.0	150.0	210.0
8"	0.309	200,000	0.891	0.416	0.478	0.554	0.777
	0.464	300,000	1.336	0.882	1.01	1.17	1.65
	0.619	400,000	1.781	1.50	1.72	2.00	2.80
	0.774	500,000	2.227	2.27	2.60	3.02	4.24
	1.160	750,000	3.340	4.82	5.52	6.41	8.98
	1.547	1,000,000	4.454	8.20	9.41	10.9	15.4
	2.321	1,500,000	6.680	17.4	19.9	23.1	32.4
	3.094	2,000,000	8.907	29.6	34.0	39.4	55.2
	4.642	3,000,000	13.361	62.7	72.0	83.5	117.0
10"	0.464	300,000	0.858	0.291	0.334	0.388	0.544
	0.619	400,000	1.144	0.496	0.569	0.660	0.926
	0.774	500,000	1.431	0.750	0.861	0.998	1.40
	1.160	750,000	2.146	1.59	1.82	2.12	2.96
	1.547	1,000,000	2.862	2.71	3.11	3.60	5.05
	3.094	2,000,000	5.724	9.78	11.2	13.0	18.2
	4.642	3,000,000	8.586	20.7	23.8	27.6	38.6
	6.189	4,000,000	11.302	35.1	40.5	47.0	65.8
	7.736	5,000,000	14.127	53.1	61.2	71.0	99.5
12"	0.464	300,000	0.591	0.121	0.139	0.161	0.226
	0.619	400,000	0.788	0.206	0.237	0.274	0.385
	0.774	500,000	0.985	0.312	0.358	0.415	0.581
	1.547	1,000,000	1.970	1.13	1.29	1.50	2.10
	2.321	1,500,000	2.955	2.38	2.74	3.17	4.45
	3.094	2,000,000	3.940	4.06	4.66	5.40	7.58
	4.642	3,000,000	5.910	8.61	9.87	11.50	16.1
	7.736	5,000,000	9.850	22.2	25.4	29.5	41.3
	11.60	7,500,000	14.775	47.0	53.9	62.5	87.6
	15.47	10,000,000	19.700	80.0	91.8	106.0	149.0

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INSTALLATION ENGINEERING

The purpose of this booklet is to give you all the necessary information for properly laying "Century" Pipe under the great majority of practical field conditions encountered.

If, however, there are special problems in your case, or other reasons for requiring the personal assistance of one of our installation engineers, just write your K&M representative or the District Office explaining the circumstances.

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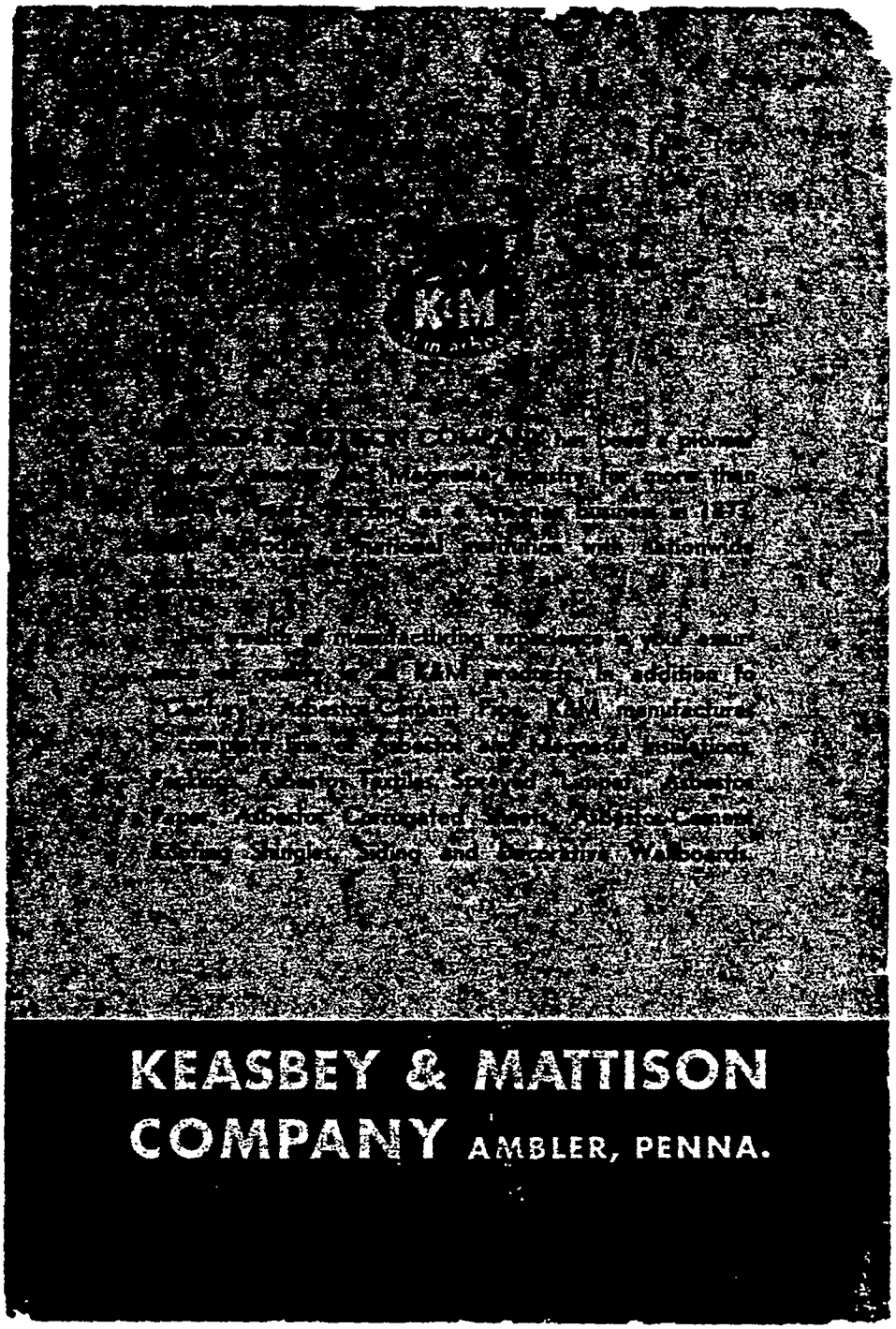

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