Cut Cable Subway Costs with



TRANSITE DUCTS



Made of Asbestos-Cement

J-M History
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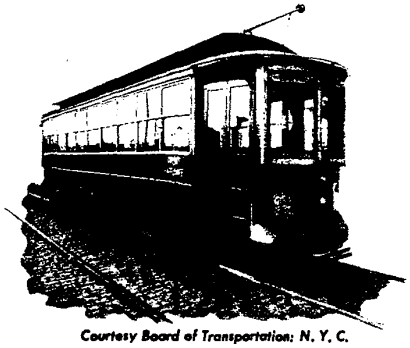
This Asbestos Cement Material Formed a *Fire Safe* Barrier for Electrical Equipment in 1902

The registered copyright name, "TRANSITE," originated early in the century, shortly after Brooklyn was absorbed into the city of New York. The people of Brooklyn were then humorously called, "Trolley Dodgers," an unwitting compliment to the Brooklyn Rapid Transit Company whose service contributed to the phenomenal growth of the community. The trolley cars of that era required a nonconductive fire barrier between the electrical apparatus underneath and the passenger carrying body. This was first made



Courtesy Board of Transportation: N. Y. C.

of wooden boards which proved unsuitable. To overcome the fire hazard, the Johns-Manville Company developed safer and more serviceable asbestos-cement sheets, known as "Transit Boards." A more distinctive name was coined by simply adding an "E"—hence "TRANSITE."

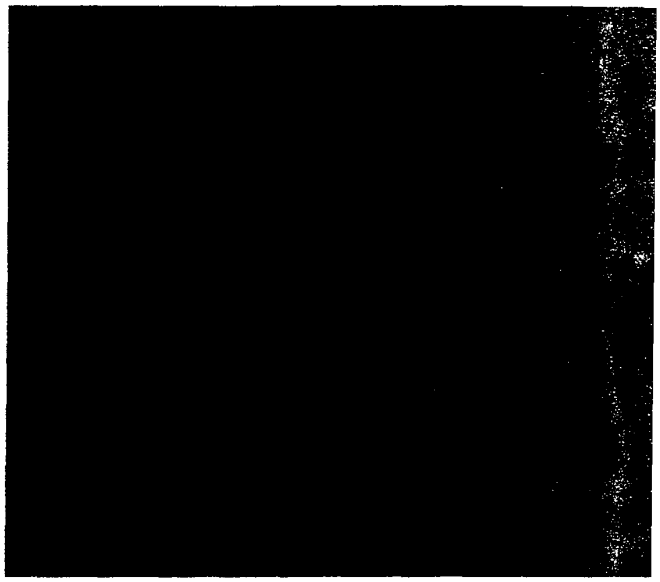
Transite Adapted To Other Uses

Since then, flat TRANSITE has been developed for such purposes as switch barriers and enclosures, bus ducts and cell structures, movable partitions, curtain walls, foundry boards, laboratory hoods and vents. These asbestos-cement sheets have also been corrugated to form TRANSITE walls and roofs.

A process for making Asbestos-Cement tubes, developed by an Italian inventor, was acquired by Johns-Manville in 1927. Using American materials as well as Yankee ingenuity and skill, Johns-Manville began improving the process and making available a whole new family of additional TRANSITE products to serve water, sewer and flue pipe requirements as well as public utility underground cable subway needs. The latter became the unique modern materials now known as TRANSITE Conduit (for underground cable subways without concrete encasement) and TRANSITE Korduct (for concrete encased cable subways).

Desirable Properties of Transite Ducts

Several new and desirable properties are provided by TRANSITE ducts. They do not rot or deform with age, heat or immersion. Under fire or arc, they neither burn nor fume. For a completely inorganic material, they are relatively light. Yet they perform like stone materials in their rapid dissipation of I^2R Heat. Unlike



ducts made of ceramic materials, they are supplied with a wide variety of fittings. And, with proper tools, Transite Ducts may be field-machined to length or other requirements. These asbestos-cement ducts may be stored outdoors in tropical sunshine or arctic weather without deterioration.

The unique properties of TRANSITE duct materials are due to their unusual composition and methods of manufacture:

1. Increased strength reinforcement is attained by the inclusion of millions of asbestos fibers thoroughly mixed and of random orientation throughout the wet

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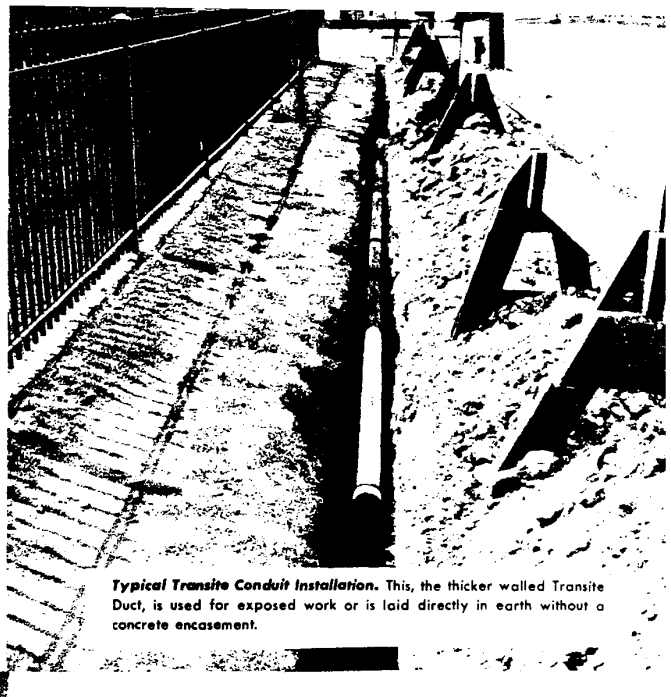
cementitious mass from which the duct is formed. These silky, stone fibers are only a fraction of the diameter of a human hair—but in tensile strength they are nearly comparable to equivalent sections of steel.

2. This mix is formed and compacted under uniformly constant pressure so that the tensile strength of the resultant cement bonded product is increased at least six fold over that of conventional concrete products.

3. The tube is formed of layers deposited from a uniform, accurately controlled slurry under hydraulic pressure around a highly polished steel mandrel.

4. The curing method used is one that achieves an insoluble calcium silicate bond equivalent to that of concrete exposed for many years to the elements.

In all, the product that results is strong, light, has long, easily handled sections. It is immune to deformation, rotting, rusting, fire, fumes, electrolysis and either acids or alkalies occurring naturally in the earth. In underground construction, no other material offers quite so much promise of permanence as does stone—TRANSITE products are made from several stone ingredients chosen, combined and cured to provide a cable subway which will last indefinitely, will not injure cable sheaths, and will insure low operating costs by keeping cables cooler.



Typical Transite Conduit Installation. This, the thicker walled Transite Duct, is used for exposed work or is laid directly in earth without a concrete encasement.

TRANSITE

Available in 2 Duct Types

Transite Conduit for exposed work and installation underground without concrete encasement.

Transite Korduct for installation in concrete.

TRANSITE MEETS EVERY REQUIREMENT OF THE IDEAL DUCT MATERIAL

Permanent · Fireproof · Corrosion-Resistant
Strong · Light in Weight
Smooth Bore · Long Lengths
Non-Inductive · Rapid Heat Dissipation



Typical Transite Korduct Installation. Designed especially for installation in concrete, Transite Korduct is thinner walled than Transite Conduit.

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TRANSITE CONDUIT

Eliminates Concreting-in

Transite Conduit, the thicker-walled asbestos-cement duct, is designed for installation underground without concrete reinforcement. Through the elimination of concrete, it enables the installer to make substantial savings in time, labor and materials. This duct may also be installed in exposed locations, indoors and out.

It has the combination of strength factors necessary to withstand all normal soil stresses. These strengths result from the construction of Transite in which millions of asbestos fibers dispersed throughout the structure reinforce the cement in much the same manner as steel. Consequently, Transite has six times the tensile strength and three times the compressive strength of first quality ordinary concrete.

Millions of feet have been installed without concrete envelope as laterals under many streets, rights of way, airfields, airports and heavy industrial yards, etc.

Reduces Joints in Line

Each section of the popular sizes of Transite Conduit is 10 feet long—longer than other non-metallic conduit. This means fewer joints in the completed line . . . and those joints are rapidly assembled, using the Transite Tapered Coupling. Thus, men can often work directly behind the trencher as in the middle photo below. The savings in time that result from the use of Transite Conduit are reflected in lower labor costs and lessened interference with traffic.



No Expensive Special Fittings Needed

Johns-Manville supplies a wide range of standard fittings for use with Transite Conduit. These fittings are made of the same asbestos-cement material as the ducts themselves and are machined to the same standard taper. These standard fittings provide maximum flexibility in laying out or constructing duct systems.

Additional information covering these fittings is given on page 10 and in brochure EL-45A.

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Installation and Maintenance Costs

Easily Cut and Machined

Common tools such as a six point rip saw or a large hack saw with a chrome-moly blade will cut Transite Conduit easily and rapidly. The fastest and most efficient tools, however, are those developed by Johns-Manville especially for cutting and tapering asbestos-cement ducts on the job. These tools are stocked at convenient points ready for shipment. Folders giving complete descriptions are available from any Johns-Manville industrial products sales office.

Confines Arc Damage

When arcing occurs, incombustible Transite protects adjacent cables against heat and flame. The impinging arc will not cause the duct to sag or to adhere to the cable sheath—up to the point where the heat is intense enough to fuse the surrounding mass. Moreover, the fusion products are soft and incapable of harming the lead cable sheath when cables are thereafter drawn in or out. Furthermore, Transite cannot contribute to the formation of explosive or toxic gases.



Needs No Protective Coating Outdoors

Where Transite Conduit is used in exposed locations, it may be painted for decorative purposes. However, it needs no paint or periodic maintenance to protect it against the weather even along the coast, in railroad yards or in similar areas where it is subject to corrosive atmosphere or gases. In exposed locations, it often outlasts competing duct materials many times over.

Transite Conduit is attractive in appearance, stays attractive and may easily be cleaned.

Minimizes Replacements in Corrosive Soils

The asbestos-cement composition of Transite Ducts is highly resistant to corrosive attack whether from alkaline or acid soils. These ducts stand up in corrosive cinder fills, salt marshes and other troublesome soils. Being non-metallic they are immune to galvanic action, or electrolysis. Transite Ducts outlast other types of duct materials even when corrosive action is accentuated by shock and vibration.

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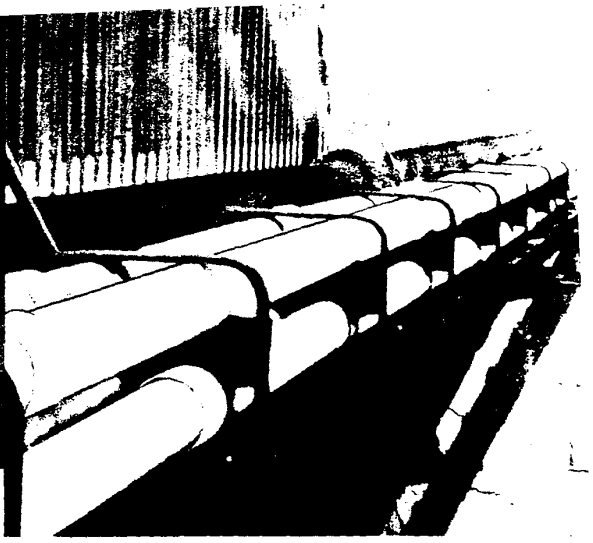
ECONOMICAL



At last report, these Transite Ducts were still on the job after 18 years exposure to smoke, corrosive fumes, and vibration.

Transite Reduces Replacements in Railroad Applications

Shown above is an example of how Transite Conduit outlasted ferrous duct materials several times over. In this exposed installation, the Transite Conduit is subject to flame, sparks, corrosive gases, and weather. The effects of the vibration and shock from traffic on the bridge are cushioned on resilient rubber rings provided by J-M Transite Conduit expansion couplings for such constructions as this. The duct requires no painting or maintenance.

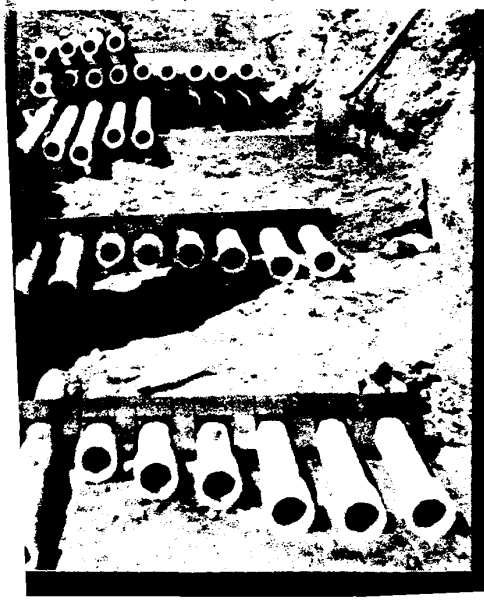
Utilities Obtain Superior Arc Protection

A well known public utility installed this Transite Conduit bank (below left) without concrete encasement. If cable failure occurs, the non-combustible Transite will safeguard adjacent cables against heat and flame. The damaged cable can be withdrawn conveniently because Transite Conduit cannot sag and will not adhere to the cable. Transite cannot contribute to the formation of explosive or toxic gases.

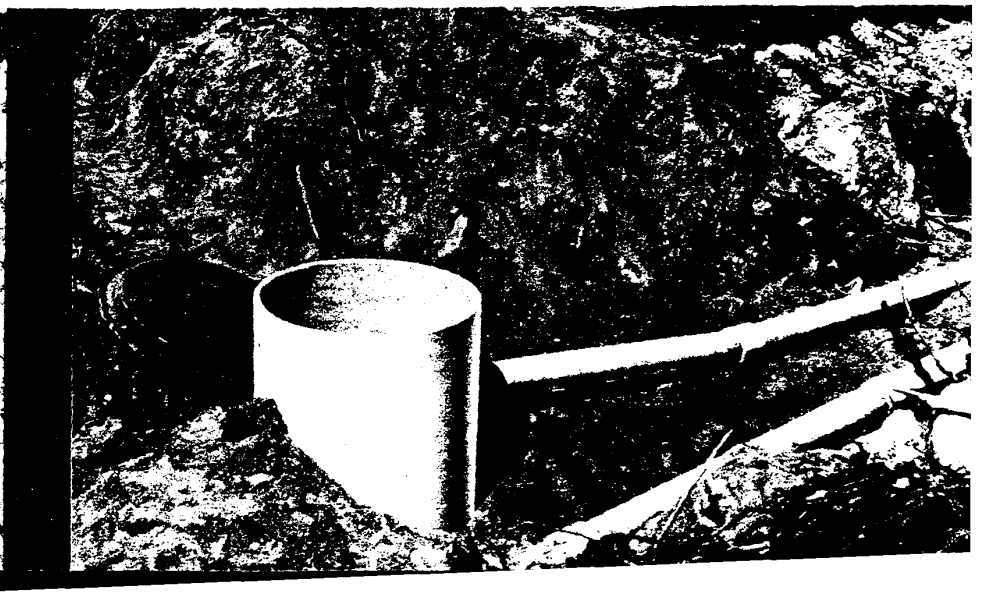
Simple Transite Systems in Residential Areas Afford Underground Service with Moderate Installation Cost

A Transite Conduit System (shown below right) with large diameter Transite Service boxes provides most of the flexibilities and conveniences of a conventional cable subway and eliminates unsightly and vulnerable overhead wires. Particularly in suburban or other areas of uncrowded land occupancy, such a system provides a single 4″ Transite Conduit for power service cable to surprisingly large areas at reasonable cost.

A large Transite Conduit bank laid directly in earth by a public utility in the Far West.



Transite Conduit and a Transite Service Box during installation in an Eastern Residential Community.



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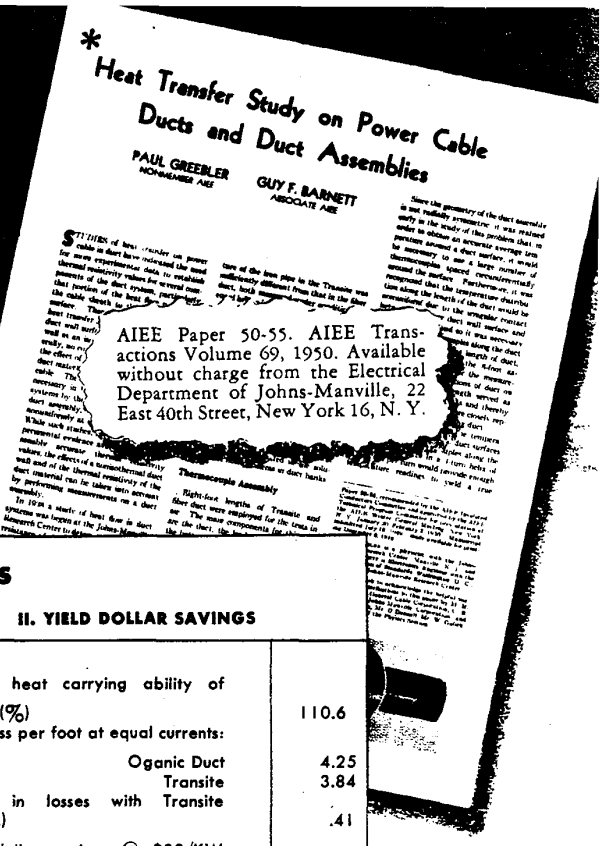
CABLES RUN COOLER



HOW TRANSITE DUCTS

I. INCREASE CURRENT CARRYING CAPACITY	TRANSITE INORGANIC DUCTS	ORGANIC DUCTS
1. Total Therm. Res. to Dielectric Loss (thermal ohms)	5.61	6.03
2. Total Therm. Res. to Copper Loss (thermal ohms)	4.21	4.62
3. Temp. rise from Dielectric Loss (°C)	1.9	2.1
4. Allowable rise for Copper Loss (°C)	59.1	58.9
5. Allowable watts for Copper Loss per ft. cable	4.70	4.25
6. Allowable Current—(Amps per cdr)	398	378
7. Allowable Current—(Relative %)	105.1	100

II. YIELD DOLLAR SAVINGS	
8. Greater heat carrying ability of Transite (%)	110.6
9. Watts loss per foot at equal currents: Oganic Duct	4.25
Transite	3.84
10. Savings in losses with Transite (watts/ft.)	.41
11. Annual dollar savings @ $20/KW per M ft.	$8.20
12. Annual greater charges for Transite per M ft. on basis: 1⅓ ducts per cable Diff. mat. cost—$.04/ft. Carry. Chgs.—Int. 6%, Taxes 2½% Depr. 1%; Total 9½%	$5.06
13. Net annual savings with Transite $ per M ft.	$3.14

CONDITIONS: *Cable*—3 Cdr. 500 MCM Compact Sector, 175 mils paper, 125 mils lead 15 KV grounded neutral (8th Edition AEIC Spec.) Theoretical Cable Diam.—2.52". *Duct*—2 x 2 bank, 3 loaded, 4" ducts, 6½" spacing, 30" earth cover, 3" Concrete around ducts. Concrete-Soil Resistivity—84 (watt-cm). Load Factor 75%—Loss Factor 62½%. Earth ambient 20C.

Lower I^2R Losses, Increased System Capacity Longer Insulation Life Usually Result

The figures given in the table above should interest every distribution engineer because system losses are still a major expense of the electrical power industry. This sum is estimated to be more than four hundred million dollars annually for the United States. It is generally agreed that system losses can be reduced by improving the dissipation of heat from conductors under load.

The figures in the table are based on a paper approved for presentation by the AIEE Insulated Conductor Committee*. This paper reports test conducted for many years by the Johns-Manville Research Center to determine accurately how Transite Ducts improve the dissipation of heat by conductors under load.

The results of these tests prove that Transite Ducts will carry heavier current loads than organic ducts when the sheath temperatures are the same. This means that cables installed in Transite Ducts can carry heavier loads at peak conditions than the same cables installed in organic ducts.

It also means that when a conductor is under a given load, its temperature will be lower when it is installed in a Transite Duct than when it is installed in an organic duct. The lower temperature of the conductor results in a lower electrical resistance with correspondingly lower I^2R losses. The economic result of the reduction in I^2R losses depends, of course, on the monetary value per KW. The one selected for the table is considered reasonable. Lower operating temperatures can also prolong insulation life, resulting in more reliable service and longer cable life.

All these savings—plus the other advantages of Transite Ducts—furnish more than ample economic justification for their use.

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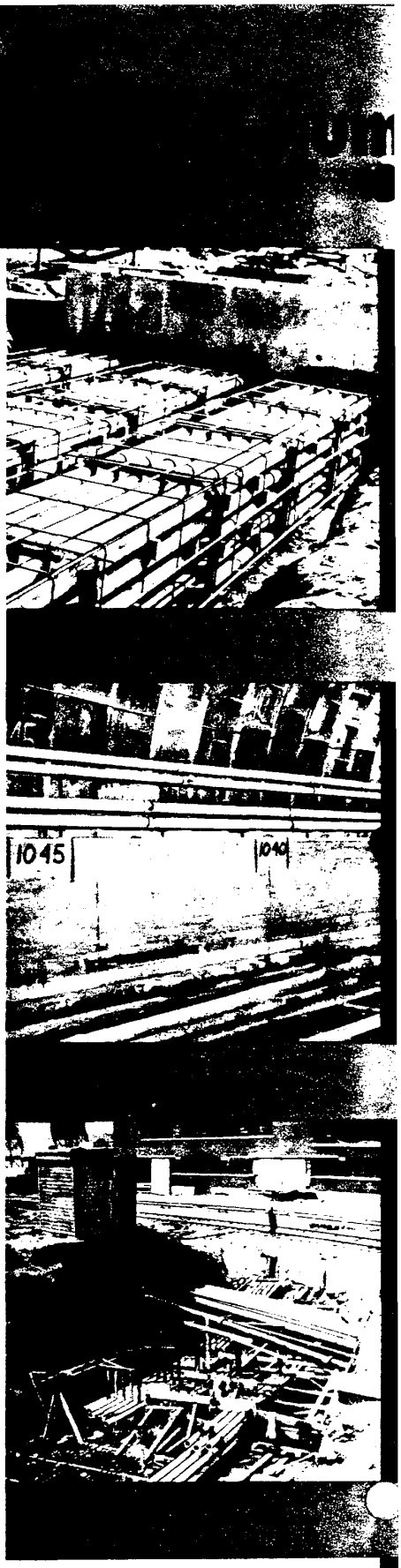
TRANSITE KORDUCT



Transite Korduct Protection Can Outlast Amortization Period

Transite Korduct, the thinner walled Transite Duct was developed particularly for installations where concreting-in is required—in main line cable subways and in masonry structures.

Transite Korduct is proportionately as strong as Transite Conduit and maintains its strength in service. Transite Korduct is also corrosion-resistant, immune to electrolysis and galvanic action. It cannot rot or rust. It is as permanent as stone because its ingredients are stone in origin—asbestos, cement and silica. No other duct material offers so much promise of permanence. Therefore, Transite Korduct can normally be expected to protect cables long after its cost has been amortized.

Can Carry More Cable Per Cross-Sectional Unit

As shown at right above, Transite Ducts are unlike other ducts in that the wall itself is a fireproof barrier because of its asbestos-cement construction. This property of Transite can be utilized to reduce the separation between ducts. The closer spacing accomplishes two things: (1) it provides a saving in concrete, (2) it permits the bank to be designed so that a greater number of cables are carried per unit of cross-sectional area. This desirable property of Transite Korduct has been utilized advantageously by many designers of cable subways.

Affords Greater Protection Against Fire

Despite modern precautions, the burn-out is still a potential hazard. Consequently, cables should have the protection that Transite Ducts provide. Transite Korduct, like Transite Conduit, confines burn-outs, safeguards adjacent cables from damage and reduces the possibility of panic and explosion.

Made of incombustible asbestos and cement, Transite Korduct will not burn, smoulder or generate smoke or fumes. This duct material cannot contribute to the formation of explosive gases. The fireproof protection of Transite's asbestos-cement construction is vitally necessary in locations such as subways, tunnels, and power plants.

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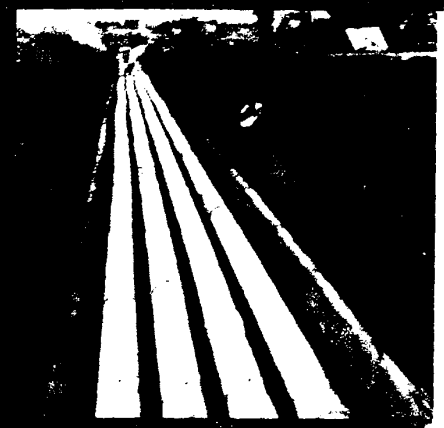



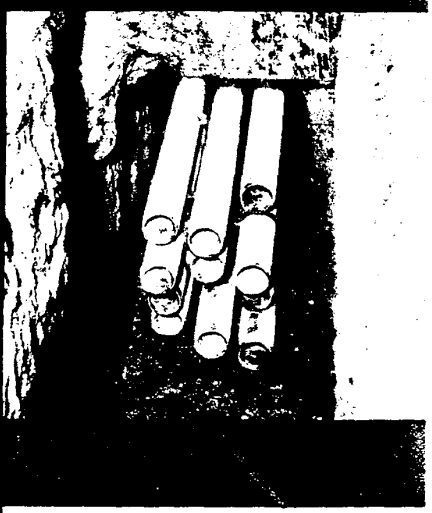

Lower Installation Cost Results From Longer Lengths

Like Transite Conduit, this asbestos-cement duct is available in 10 ft. long sections—longer than those of any non-metallic duct. These extra long lengths require fewer joints. Hence installation is faster because less time is required for joining successive lengths.

Also, in the case of the tier-by-tier method there is a reduction in the time for positioning and removing separators. Furthermore, in the monolithic method, fewer spacers are needed.

Instructions for installing Transite Ducts are given in folder EL-43A, available from the nearest Johns-Manville Sales Office.

Cables Move Freely in Transite Korduct

The unusually smooth bore of Transite Ducts prevents injury to the cable sheath, either in natural movement under load or when pulling cables. Furthermore, the interior of the duct remains smooth in service because Transite resists heat and flame. The heat of an arcing cable cannot cause the interior of Transite Korduct to adhere to the cable sheath. Nor will it slag under the heat and flame of an impinging arc though some slight flaking may occur. This however will not damage the cable sheath or interfere with the pulling of cables.

Used By Both Power and Communication Systems

While Transite Korduct is widely used by large power plants to shield power and control cables and for utility installations in urban areas, its use is by no means limited to this class of conductors. It is employed throughout the United States by telephone companies and by municipalities for communication and signaling systems.

CRMC-SBGAB-ConduitPipe-000045

TRANSITE FITTINGS

time and expense

Standard Transite Fittings are available in wide variety to provide maximum flexibility in laying out or constructing a duct system. These fittings are made of the same asbestos-cement material as the ducts themselves and are machined to a standard taper so that they can be used with Transite Conduit, Transite Korduct or with other Transite Fittings.

Many unusual radii bends or sweeps can be made by using standard Transite fittings. For instance, the new 5 degree Bend Segment alone can form a wide variety of different curvatures in any multiple of 5 degrees. Used with other Transite curved fitting in various combinations, it can form curvatures of odd degrees. Thus, users can clear unexpected obstructions, accommodate layout revisions and simplify cross-overs and transformations.

In addition to the many fittings for facilitating direction changes, other fittings are available. There are fittings for making terminal connections, for joining Conduit, Korduct and other types of ducts in same or different sizes . . . to provide for movement due to expansion, contraction or vibration . . . to join duct runs . . . to facilitate cable pulling at various points in the line. These fittings are covered more fully in Folder EL-43A, *Instructions for installing Transite ducts* and EL-45A *Dimensions and fittings for Transite ducts.*



TRANSITE TAPERED COUPLINGS (left) make it easy to rapidly assemble successive lengths of Transite Ducts. Machined on the inside to fit the standard taper of the duct end, they form a silt-tight joint and assure correct duct alignment. These couplings also permit slight changes in direction.

Ask for instructions for INSTALLING

TRANSITE DUCTS

TRANSITE FITTINGS

For joining ducts

Tapered Coupling joins tapered ends of duct. One furnished with each duct length.

Duplex Adaptor joins a tapered end to an untapered end of same duct size and type.

Double Duplex Adaptor joins two untapered ends of same duct size and type.

Straight Adaptor joins various or same types of duct of same size.

Reducing Adaptor joins various types of ducts of different sizes.

Expansion Coupling provides for movement due to expansion, contraction or vibration.

For making terminal connections

End Bells (Standard, Junior and Expansion) designed to protect cables from abrasion.

Terminal Box Bell and Flanged Connector for terminating duct lines at metal or wood boxes.

Flexible Connection to protect ducts attached to fixed structures from undue shear.

For directional changes

Bends—45°, 90°, and offset; **Curved Segments** 11¼° and 22½°; **Sweeps**—12' 6" R; **Deflection Couplings**—5⅝°; 5° **Bend Segments** (male taper on one end, female taper on other).

Miscellaneous fittings

Center Make-Up Connector joins two duct runs laid from opposite directions.

Conduit Pull Sleeve provides an open space in a Transite Conduit run.

Also: Pole Riser Cap, Cap, Plug, Elbows, Tees and Laterals.

CRMC-SBGAB-ConduitPipe-000046

There is a Johns-Manville Sales Office Near You . . .

Nearly every city of substantial size has a Johns-Manville Sales Office, which in turn is serviced by a District Office located in the major city of its industrial area. This means that you get personal service from sales representatives and engineers who can help you obtain better cable protection.

Akron
Albany
Atlanta
Baltimore
Birmingham
Boston
Buffalo
Charleston, W. Va.
Charlotte
Chicago
Cincinnati
Cleveland
Columbus
Corpus Christi
Dallas
Dayton
Denver
Detroit
Erie
Fort Wayne
Grand Rapids
Honolulu, T. H.
Houston
Indianapolis
Jacksonville
Kansas City, Mo.
Knoxville
Lake Charles
Los Angeles
Louisville
Milwaukee
Minneapolis
Newark (East Orange)
New Orleans
New York
Oakland
Omaha
Philadelphia
Pittsburgh
Portland, Me.
Portland, Ore.
Providence
Richmond
Rochester
Saginaw
Salt Lake City
San Antonio
San Francisco
Seattle
South Bend
St. Louis
St. Paul
Syracuse
Toledo
Tulsa
Washington
Wilkes-Barre
Youngstown

JOHNS-MANVILLE JM PRODUCTS

Other Booklets Covering J-M Electrical Products Available

TRANSITE DUCT UNDERGROUND INSTALLATION SHEET — EL-43A. A 6-page folder which tells how to assemble Transite Tapered Couplings; cut, machine and install Transite Ducts. Contains "Hints and Aids," Table of Offsets and illustrations of various Transite Fittings.

FITTINGS AND DIMENSIONS OF TRANSITE DUCTS—EL-45A. Contains all available dimensional data required by the designer laying out a duct line. Also contains a Table of Offsets for various Transite Fittings.

PLASTIC SPACERS SHEET—EL-41A. Describes and gives dimensions of new lightweight plastic spacers developed to position Transite Korduct in monolithic concrete encasements.

J-M PLASTIC, FRICTION AND RUBBER TAPES—EL-35A. Our new all-purpose JOMANCO PLASTIC TAPE and other high value electrical tapes are described in this folder.

TRANSITE CABLE TRAYS folder. Dimensional and installation data including types of supports and fastenings.

HOW TO INSTALL TRANSITE CONDUIT IN EXPOSED LOCATIONS. In preparation.

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Montreal • Toronto • Vancouver • Winnipeg

Johns-Manville International Corp.
New York • London • Buenos Aires

Printed in U. S. A.

CRMC-SBGAB-ConduitPipe-000047

AFFIDAVIT

STATE OF COLORADO)
) ss.
COUNTY OF ADAMS)

I, Margaret J. Baumgardner, being of full age and first duly sworn do hereby state:

1. I am not a party to this action. I have personal knowledge of the facts set forth in this affidavit, and if called as a witness, I could and would competently testify as to the truth of the matters set forth herein.

2. I am the Research Coordinator for the Claims Resolution Management Corporation ("CRMC"), a wholly owned subsidiary of the Manville Personal Injury Settlement Trust ("Trust"). The CRMC was created in December 1998 and is staffed by former Trust employees. On January 1, 1999, CRMC began providing claims resolution facility services to the Trust.

3. In this position, I manage the Asbestos Claims Research Facility ("Facility"), a document and records repository located at 3390 Peoria Street, Suite 304, Aurora, Colorado. The Facility contains the business records including but not limited to correspondence, memoranda, reports, records and data compilations ("record") of Manville Corporation or related entities ("Manville"), generally, as well as Manville records relevant to litigation of asbestos liability. The Trust has managed and operated the Facility from November 28, 1988, the date on which the Manville bankruptcy plan was consummated.

4. My experience and familiarity with the documents at the Facility began in 1983 while working for Manville. In my work as a paralegal for Manville, I assisted in locating, indexing and packing many of the records which became the foundation documents for the Facility. I continued to work for Manville until September 1987. From March 1988 to September 1988, I was hired to supervise and assist in the indexing of the first 20,000 boxes which were turned over to the Trust in November 1988. From September 1988 to January 1989, I assisted in the privilege review of documents to be given to the Trust. From November 1988 to April 1994, I worked for Freeborn & Peters and was put in charge of the Facility, managing all productions and "new" acquisitions. In September 1995, I was hired by the Trust to manage the Facility. In December 1998, I was hired by

the CRMC to manage the Facility for the Trust. Accordingly, I am personally familiar with many of the records stored at the Facility, as well as how the records have been gathered.

5. To the best of my knowledge, information and belief, I certify that these records were made at or near the time by, or from information transmitted by, a person with knowledge, were kept in the course of the regularly conducted business activity of Manville, and it was the regular practice and the business activity of Manville to make the records.

6. Attached are documents found among the file and microfilm box collections at the Facility. These documents, bates labeled CRMC-SBGAB-ConduitPipe-000001 through CRMC-SBGAB-ConduitPipe-000092, are true and correct copies of documents found at the Facility.

Margaret J. Baumgardner

Subscribed and sworn to before
me this 16th day of May, 2014.

AMY W BENHAM
NOTARY PUBLIC
STATE OF COLORADO
MY COMMISSION EXPIRES 05-23-2016

Notary Public