TIGERS POLYMER CORPORATION

Underground Cable Installation

TILEX

NONFLAMMABLE TILEX

TIGERS POLYMER CORPORATION

HANDLING OF TILEX

Always make sure to read the contents of "Matters of Attention in Transportation and Storage" and "Matters of Attention in Execution of Work" so that TILEX can be more safely used for a long time.

These matters of attention should be strictly observed by reason that we shall not be liable for any damages or losses resulting from the negligence of observing these matters of attention.

MATTERS OF ATTENTION IN TRANSPORTATION AND STORAGE

- TILEX should not be thrown nor dropped.
- TILEX should be placed on a flat and smooth surface. In particular, local forces should not be applied onto the coils of TILEX by reason of the risk of deformation.
- TILEX should not be stacked. TILEX should not be stacked high as well as heavy objects should not be placed on top of TILEX by reason of the risk of deformation, flattening and toppling over.
- Pay attention so that rainwater and dust do not ingress the hoses when stored outdoors.
- Moving of TILEX should be done carefully. Trucks and slings should be used. Care should be taken not to hook TILEX with the prongs of forklifts.
- TILEX should not be run over with vehicles nor be mounted.

MATTERS OF ATTENTION IN EXECUTION OF WORK

Work should be correctly executed by referring to the Method of Execution of Work explained in this catalog (outline is explained) or the separate Laying Manual (explained in detail). TTILEX should not be used in places subjected to the effect of high heat. Furthermore, the disposal of surplus pieces of TILEX and waste material should be done in accordance with the laws and the ordinances of the local government.

CONTENTS

Underground Conduit Line (FEP)

TILEX

●TILEX consisting of a corrugated polyethylene pipe (FEP) with spiral construction is a No.1 item for underground conduit lines which is endowed with considerably superior performance than conventional underground pipes in durability, workability and economy.

FEATURES

●Flattening Strength
The flattening strength is high being of spiral construction making it outstanding for underground laying.

●Flexibility
Can be freely bent being of corrugated construction making it superior in workability by the possibility to readily get around obstacles.

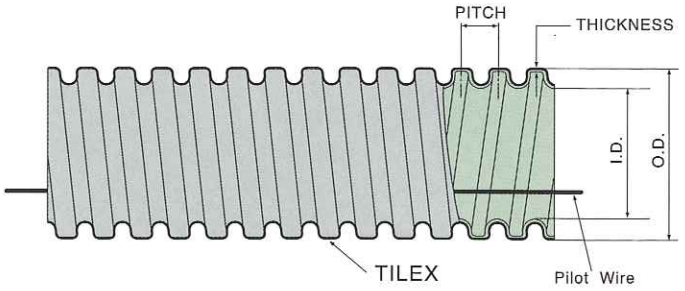
●Weatherability
Endowed with outstanding weatherability even when buried underground or exposed outdoors for a long time.

●Safety
Especially excels in flattening strength and pressure resisting strength making it tough against disasters such as earthquakes and ground sinking as well as outstanding in safety.

●Long Lengths
Joining places are less due to the availability of long lengths making it possible to reduce the labour cost required for laying work and shorten the work period.

●Labour Saving of Work Period
Light weight and endowed with suitable flexibility making it especially outstanding in working efficiency.

●Friction Properties
Cable pull-in is smooth due to its low frictional resistance as well as the pitch of handholes can be elongated to serve for the reduction of the work period and labour-saving.



- A pilot wire is drawn in beforehand for the convenience of cable pull-in, and TILEX is of coiled state as a standard. Furthermore, the allowable tensile strength of the pilot wire is a maximum of 490N {50kgf}.
- When cable pulling-in is not carried out for a long time, there is a case of corrosion of the pilot wire. Replace the wire with the nylon rope, etc depending on using conditions and situations.

●Sizes and Characteristics

Nominal Dia. (ϕ)	I.D. Abt. (mm)	O.D. Abt. (mm)	Pitch Abt. (mm)	Wall Thickness Abt.(mm)	Standard Weight (kg/m)	Standard Length (m)	Packing Dimensions (O.D.m × Wm)			
30	30	40	10	1.4	0.2	30/50/100/200/300	0.85×0.3/30m	0.95×0.3/50m	1.1×0.3/100m	1.4×0.4/300m
40	40	54	13	1.5	0.3	30/50/100/200	0.95×0.3/30m	1.1×0.35/50m	1.2×0.4/100m	1.5×0.5/200m
50	50	65	17	1.7	0.4	30/50/100/200	1.05×0.35/30m	1.2×0.4/50m	1.4×0.45/100m	1.6×0.5/200m
65	65	84	20	2.1	0.6	30/50/100	1.45×0.4/30m	1.5×0.45/50m	1.6×0.55/100m	
80	80	102	25	1.9	0.7	30/50/100	1.6×0.3/30m	1.9×0.3/50m	1.8×0.65/100m	
100	100	130	34	1.9	1.0	30/50/100	1.8×0.4/30m	2.0×0.4/50m	2.0×0.8/100m	
125	125	161	40	2.2	1.5	50		2.1×0.75/50m		
150	150	190	47	3.0	2.0	50		2.4×0.8/50m		
200	200	254	50	4.0	3.6	30/40	2.3×0.8/30m	2.3×1.1/40m		

Note: Nominal dia. of about 1.5 times the finished O.D. of the cable to be accommodated or about 1.5 times the circumscribed dia. in the case of more than 2 cables should be selected.

Material Characteristics and Product Characteristics of TILEX

Material Characteristics (Reference Values)

Item	Data	Test Method
Density	0.96g/cm³	JIS K-6760
Vicat softening point	127°C	JIS K-6760
Brittle temperature	<−80°C	ASTM D-746
Thermal expansibility	$1.5\times10^{-4}deg^{-1}$	ASTM D-696
Yield strength	27N/mm² {2.8kgf/mm²}	JIS K-6760
Yield elongation	9%	JIS K-6760
Breaking strength	>27N/mm² {2.8kgf/mm²}	JIS K-6760
Elongation at break	>700%	JIS K-6760
Hardness	69 (Shore D)	ASTM D-2240
Retention of heat aging resistance	>95%	JIS K-6723 90°C×96h
Retention of heat aging elongation	>85%	JIS K-6723 90°C×96h
Stress crack resistance	>250h	modified ASTM D-1693-60

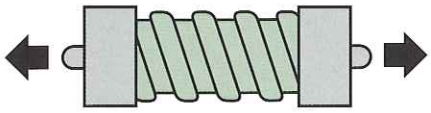
Chemical Resistance

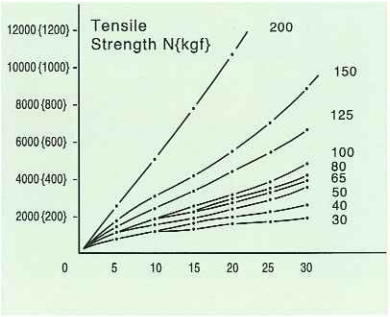
Chemical	Temperature		
	25°C	50°C	75°C
30% Hydrochloric Acid	◎	◎	◎
20% Sulfuric Acid	◎	◎	◎
10% Nitric Acid	◎	◎	◎
20% Acetic Acid	◎	◎	◎
20% Caustic Soda	◎	◎	◎
10% Ammonia Water	◎	◎	◎
JIS No.2 Insulating Oil	◎	◎	◎
Brine	◎	◎	◎
50% Formalin	◎	◎	／
Benzal	◎	○	／
Gasoline	◎	○	／
Ethanol	◎	◎	／

◎Not eroded at all ○Slightly eroded ／Not tested

●Tensile Strength

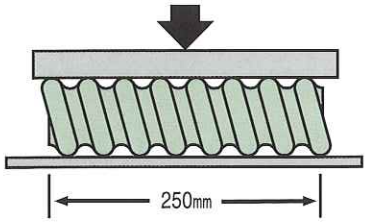
The graph on the right shows the tensile strength by size by providing specially fabricated end pieces on both ends of TILEX and pulling towards the axial direction. The strength of the joints is also strong similar to the pipe proper.





● Flattening Compression Properties

The deflection factor of the O.D. is below 3.5% for all sizes when tested in accordance with the compression test method of corrugated rigid plastic pipes stipulated in JIS C-3653 (Appendix 1 Method of Execution of Works of Underground Buried Power Cables).



Flattening Compression Properties

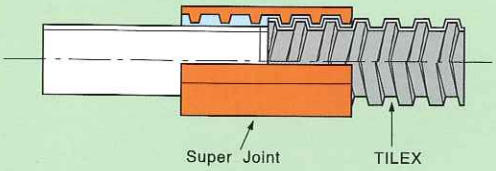
Nominal Dia (φ)	Test Load N {kgf}	Deflection Factor (%)
30	373 {38.0}	<3.5
40	501 {51.0}	<3.5
50	612 {62.4}	<3.5
65	793 {80.8}	<3.5
80	969 {98.7}	<3.5
100	1225 {124.8}	<3.5
125	1523 {155.2}	<3.5
150	1811 {184.5}	<3.5
200	2418 {246.3}	<3.5

JOINING OF TILEX AND ACCESSORY PARTS

● Super Different Type Pipe Joint Set

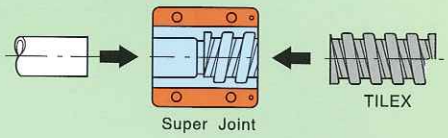
- **Troublesome epoxy putty work and taping work entirely unnecessary.**
- **Working efficiency greatly upgraded. (About 30% upgraded compared with our current efficiency.)**
- **Outstanding in water stopping performance.**
- **Type Ⅰ and Type Ⅱ can both be connected with one touch.**

Type Ⅰ (Rubber seal type)



Joining Method

1. Cleanly wipe off water and mud sticking onto TILEX and the different type pipe with a rag.
2. Open the Super Joint and set TILEX and the different type pipe with the side of the joint with the knockout pin (or the side with the hexagon headed bolt or screw) facing down.

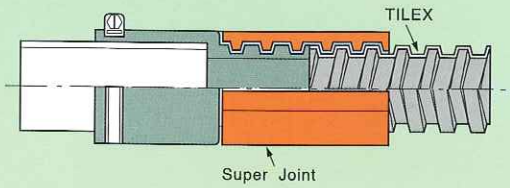


3. With the side marked Super Joint facing up, join by matching the male and female of the knockout pin.
4. Set the nuts and tighten evenly.
   ① Manually tighten the butterfly nuts of ϕ30, ϕ40 and ϕ50 with full force.
   ② Tighten the nuts of ϕ65 and ϕ80 with a spanner with a torque of 1960N·cm {200kgf·cm}

Care at time of tightening butterfly nuts.

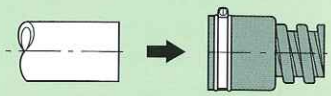
- Tighten to the extent that about 1~2 pitches of screw threads stick out from the butterfly nut.
- There are cases of breaking the thread when the butterfly nuts are tightened with the use of such as a spanner.

Type Ⅱ (30-S1~100-S1 / 30-S2·80-S3) Joint Method

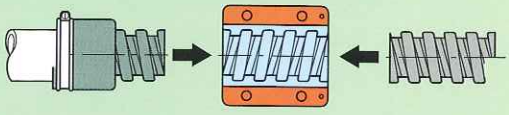


Joining Method

1. Cleanly wipe off water and mud sticking onto TILEX and the different type pipe with a rag.
2. Insert the different type pipe into the rubber joint for the different type pipe and secure by tightening the band. [The tightening torque should be 539N·cm {55kgf·cm}]



3. Open the Super Joint and set TILEX and the different type pipe with the side of the joint with the knockout pin(or the side with the hexagon headed bolt or screw) facing down.

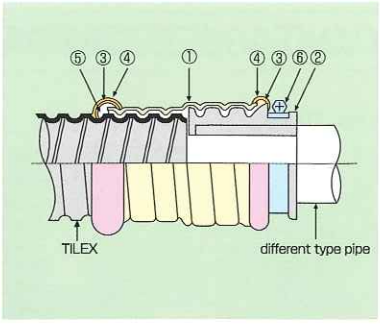


4. With the side marked Super Joint facing up, join by matching the male and female of the knockout pin.
5. Set the nuts and tighten evenly.
   ①Manually tighten the butterfly nut of ϕ30, ϕ40 and ϕ50 with full force.
   ②Tighten the nuts of ϕ65, ϕ80 and ϕ100 with a spanner with a torque of 1960N·cm{200kgf·cm}

Care at time of tightening butterfly nuts.

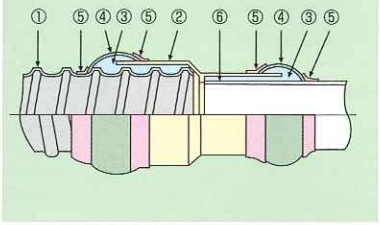
- Tighten to the extent that about 1~2 pitches of screw threads stick out from the butterfly nut.
- There are cases of breaking the thread when the butterfly nuts are tightened with the use of such as a spanner.

● Different Type Pipe Joint Set Model T-1



(1) Forcefully screw the rubber piece ② into the different type pipe joint ① until it stops.
(2) Tightly wrap adhesive rubber tape ③ onto the joint of the different type pipe joint ① and the rubber piece ② to prevent water leakage, and then wrap PVC tape ④ over adhesive rubber tape ③.
(3) Screw the different type pipe joint ① into TILEX.
(4) Wrap sealing tape ⑤ onto the TILEX side of the different type pipe joint ①, and then wrap adhesive rubber tape ③ securely over it to prevent water leakage followed with wrapping PVC tape ④ over adhesive rubber tape ③.
(5) Fit the different type pipe joint ① onto the different type pipe and secure by tightening the band ⑥.

● Different Type Pipe Joint Set (Connecting with Other Type Conduit Line)



Apply epoxy putty ③ onto the surface of the ends of TILEX ① and the different type pipe ⑥. Insert Tilex ① into the different type pipe joint ② until it hits the stopper of the different type pipe ⑥ and fully fill with epoxy putty ③ as shown in the sketch. Subsequently, wrap adhesive rubber tape ④ over the joined part and finally secure by wrapping with PVC tape ⑤.
Note : Always make sure to wear PE gloves ⑦ at time of using the epoxy putty ③

TABLE OF COMBINATION OF JOINING TILEX & DIFFERENT TYPE PIPE

TILEX (ϕ)	Nominal: Different Type Pipe I.D. in ( )(mm)			Gas Pipe (Steel pipe) (GP)	Mating Different Type Pipe Nominal Dia.O.D. in ( ) (mm)							
					Conduit Pipe		PVC Pipe		※1 Waterproof Cast Iron Pipe	※1 Asbestos Pipe	※1 Polycon Pipe	※1 Hume Pipe
	Super Different Type Pipe Joint	Type T-1	Different Type Pipe Joint		Thick Steel	Thin Steel	(VP)	(VE)				
30	30-S1 (38.2)	30-T1 (38.2)		25 (34.0)	28 (33.3)	31 (31.8) 39 (38.1)	25 (32) 30 (38)	28 (34)				
	30-S2 (48.2)			32 (42.7)	36 (41.9)		40 (48)	36 (42) 42 (48)				
	30-S3 (24.6)			20 (27.2)	22 (26.5)	25 (25.4)	20 (26)	22 (26)				
40	40-S1 (50.8)	40-T1 (51.5)		40 (48.6)	42 (47.8)	51 (50.8)	40 (48)	42 (48)				
	40-S2-A (36.6)					39 (38.1)	30 (38)					
	40-S2-B (41.4)			32 (42.7)	36 (41.9)			36 (42)				
	40-S3 (31.8)			25 (34.0)	28 (33.3)	31 (31.8)	25 (32)	28 (34)				
			40-4 (67)	50 (60.5)	54 (59.6)	63 (63.5)	50 (60)	54 (60)				
50	50-S1 (63.5)	50-T1 (61.5/64.0)		50 (60.5)	54 (59.6)	63 (63.5)	50 (60)	54 (60)				
	50-S2 (50.8)					51 (50.8)						
	50-S3 (47.8)			40 (48.6)	42 (47.8)		40 (48)	42 (48)				
	50-S4-A (36.6)					39 (38.1)	30 (38)					
	50-S4-B (41.4)			32 (42.7)	36 (41.9)			36 (42)				
	50-S5 (31.8)			25 (34.0)	28 (33.3)	31 (31.8)	25 (32)	28 (34)				
65	65-S1 (76.3)	65-T1 (77.0)		65 (76.3)	70 (75.2)	75 (76.2)	65 (76)	70 (76)				
	65-S2 (59.0)			50 (60.5)	54 (59.6)	63 (63.5)	50 (60)	54 (60)				
80	80-S1 (89.1)	80-T1 (91.0)		80 (89.1)	82 (87.9)		75 (89)	82 (89)				
	80-S2 (74.4)			65 (76.3)	70 (75.2)	75 (76.2)	65 (76)	70 (76)				
	80-S3 (102.0)			90 (101.6)	92 (100.7)				75 (99)			
			80-4 (130)						100 (124)	100 (122)	100 (120)	75 (125)
100	100-S1 (114.3)	100-T1 (116.0)		100 (114.3)	104 (113.4)		100 (114)					
			100-2 (130)						100 (124)	100 (122)	100 (120)	75 (125)
			100-3 (165)						130 (154)	130 (155)	125 (145)	100 (150)
			100-4 (85)	65 (76.3)	70 (75.2)	75 (76.2)	65 (76)	70 (76)				
			100-5 (100)	80 (89.1)	82 (87.9)		75 (89)	82 (89)				
			100-6 (110)	90 (101.6)	92 (100.7)				75 (99)			
125		125-T1 (146.0)		125 (139.8)			125 (140)				125 (145)	
			125-2 (165)						130 (154)	130 (155)		100 (150)
			125-3 (185)						150 (174)	150 (177)	150 (174)	130 (175)
			125-4 (125)	100 (114.3)	104 (113.4)		100 (114)					
150	150-T1 (171.0)			150 (165.2)			150 (165)					
			150-2 (186)						150 (174)	150 (177)	150 (174)	130 (175)
			150-3 (215)									150 (202)
200			200-1 (220)	200 (216.3)			200 (216)					
			200-2 (240)						200 (224)	200 (231)	200 (230)	
			200-3 (261)	225 (241.8)								200 (254)

How to read the above Table

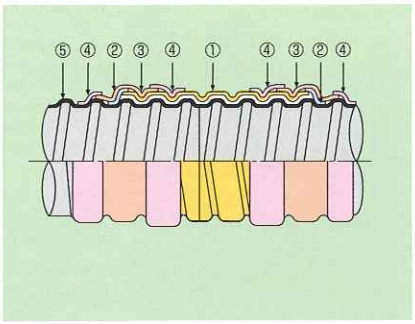
※1 mark indicates that the actual size may differ in spite of the nominal diameter being the same making it necessary to confirm with the customer at time of placing orders.

Please consult us in the case of joints of different type pipes other than the above.

Conventional different type pipe joints are available regarding ϕ30～ϕ80. (However, excluding Type 1 of each size.)

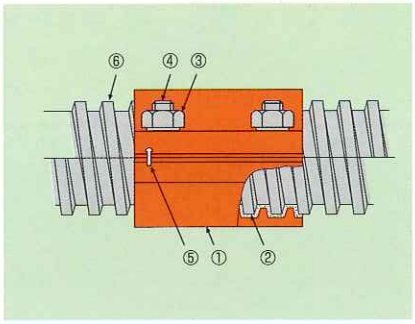
JOINING OF TILEX AND ACCESSORY PARTS

● Straight Pipe Joint Set (Joining of TILEX with TILEX)



- Tie the inserted pilot wire while turning the straight pipe joint of ① onto one end of TILEX to be joined followed with butting TILEX with the other length of TILEX, and join by turning the straight pipe joint of ① toward the counter-direction.(Join so that the butting ends are at the center as much as possible at this time.)
- Wind the sealing tape of ② onto the gap between both ends of the straight pipe joint and TILEX ⑤ followed with winding of the adhesive rubber tape of ③ on top of the wound sealing tape, and securely wind the end of the wound adhesive rubber tape with the vinyl tape of ④.

● Joining Method of Super Joint (Straight Pipe Joint)

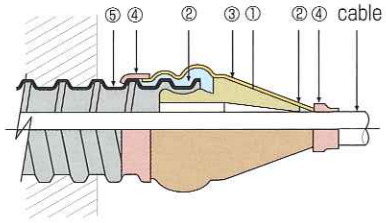


- When connecting of the pilot wire is finished, push the pilot wire into TILEX and tighten evenly with the side of the mark of the joint facing up and with the direction of the male and female of the knock pin matching. Manually tighten the butterfly nuts of ϕ30, ϕ40 and ϕ50 with full force. Tighten the nuts of ϕ65, ϕ80 and ϕ100 with a spanner with a torque of 1960N·cm {200kgf·cm}

Attention at time of butterfly nut tightening

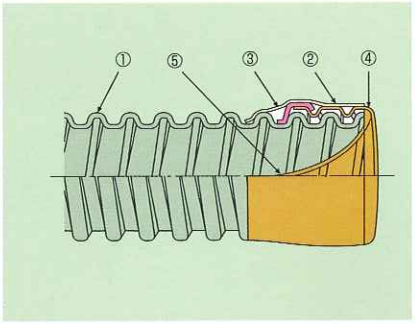
- Tighten up to the extent that 1~2 pitches of the thread stick out from the butterfly nut.
- There are cases of breaking the thread when tightening the butterfl nuts with spanners, etc.

● Terminal Waterproofing Material (Treatment of Conduit Line Mouth and Outdoor Terminal)



- Screw the waterproof seal of ① onto the end of ⑤ TILEX, seal with Ti-Seal ② or sealing tape, wind with the adhesive tape of ③ and wind and secure the end of the wound adhesive rubber tape with PVC tape of ④. (The end of the waterproof seal should be cut in advance to match the O.D. of the cable.) Furthermore, TILEX should be fitted with a margin sticking out for tape winding in the case of using with manholes.

● Waterproof Cap Set (Cap for spare conduit line)



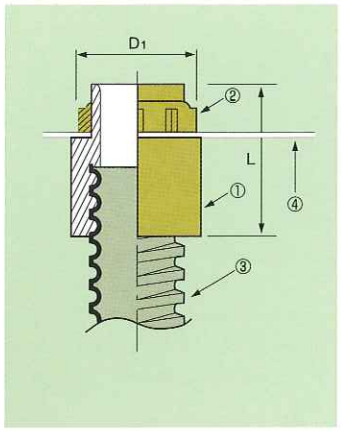
- Cleanly wipe off water and mud sticking onto TILEX ① with a rag.
- Pull out the pilot wire ⑤ from inside the hose and wind onto the root of TILEX.
- Wind sealing tape so as to fill the gap between TILEX and the cap ④.
- PVC tape ② onto the sealing tape ③.

● Bellmouth (Wall surface finishing of manhole)

● Dust-proof Cap (Cap for spare conduit line)

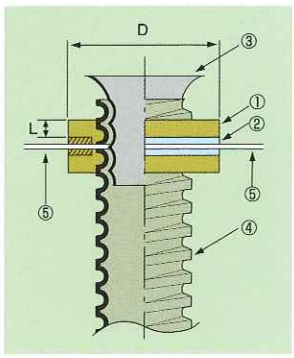
JOINING OF TILEX AND ACCESSORY PARTS

● Clamp Set (Fitting of terminal box)



Nominal Dia. (φ)	Clamp Bush D1 (mm)	Clamp Connector L (mm)
30	51	64
40	71	75
50	88	90
65	101	102
80	117	118
100	132	138

- Screw the clamp connector ① into TILEX ③. Insert the connector ① into the hole of the terminal box ④ and secure with use of the clamp bush. ②



Nominal Dia. (φ)	Clamp	
	D (mm)	L (mm)
125	191	41
150	228	47
200	290	50

- Insert in the order of the clamp ① and the rubber packing ② into TILEX ④ and insert TILEX ④ into the hole of the terminal box ⑤. Fit in the order of the rubber packing and the clamp onto TILEX from the inside of the terminal box ⑤ and finally fit the bellmouth ③.

● Hole Diameter of Terminal Box

Drill holes on the wall of the terminal box to fit TILEX in accordance with the nominal diameters shown in the table.

Nominal Dia. of TILEX (φ)	Hole Dia. of Wall (mm)
30	42.7(36)
40	60.4(54)
50	76.0(70)
65	88.7(82)
80	102.7(92)
100	115.4(104)
125	Abt. 170
150	Abt. 200
200	Abt. 265

The figures in ( ) are the sizes of thick steel electrical conuit cables.
The tool for drilling knockouts can be used for the hole diameters of φ30~φ100.

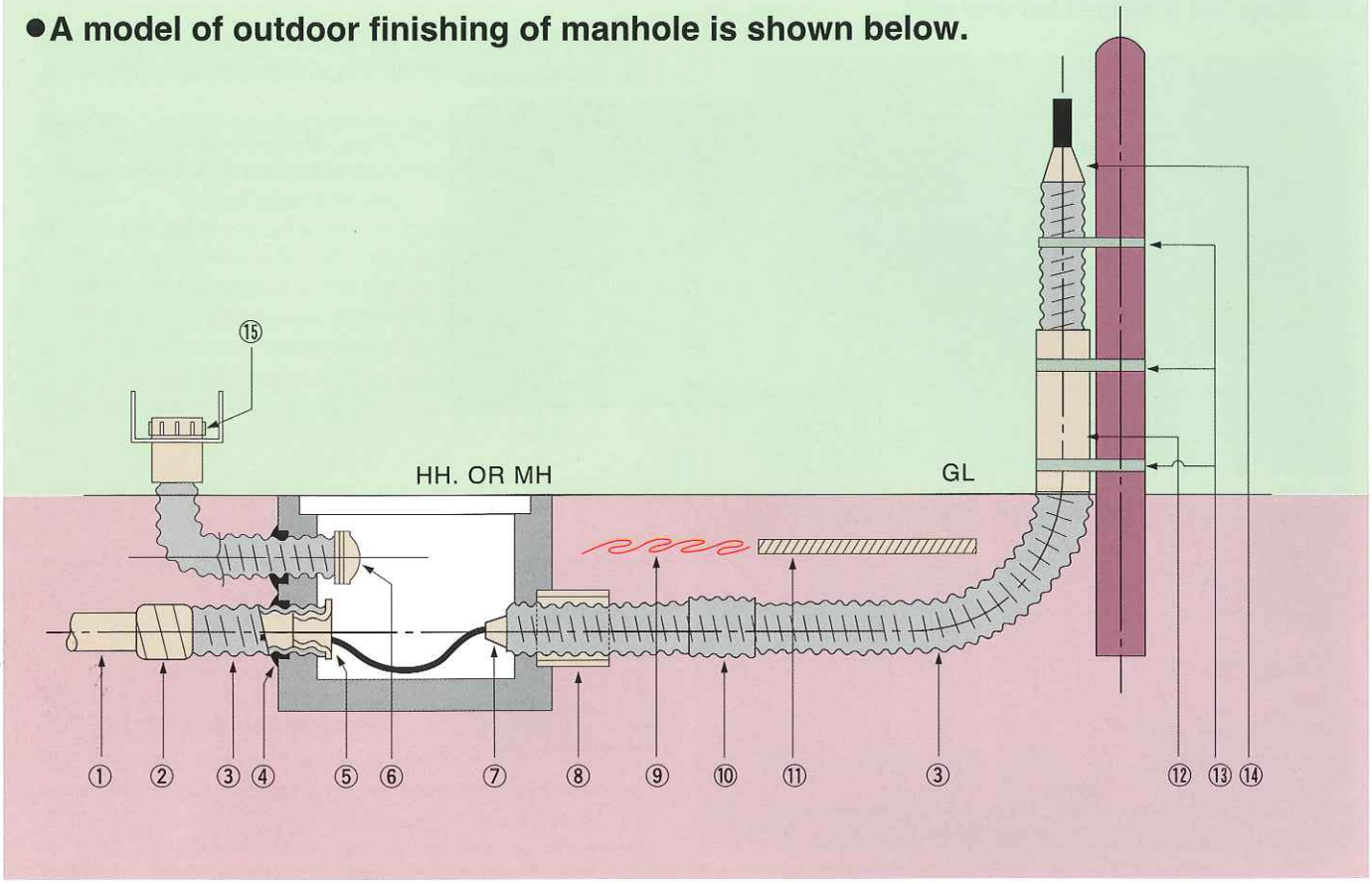
Cautions at time of installing the bush when screwing the clamp bush into the clamp connector. Be careful not to screw hard enough to skip the thread.

● Wall Waterstop Material (Waterstop of manhole wall)

- Hardener (red) and base material (green) are available as wall waterstop material (epoxy putty).
  Note: Use after carefully reading the instructions concerning use of the material. Also, always make sure to ventilate when working in cramped places.

PARTS & RELATED PRODUCTS 0f TILEX

● A model of outdoor finishing of manhole is shown below.



Names of Respective Parts

	Names of Parts / Respective Parts	Purpose of Use	Remarks
①	Other type conduit line	———	Hume pipe, other conduit line material
②	Different type pipe joint	Joining with other type conduit line	Various genuine parts depending on mating pipe
③	TILEX proper	———	———
④	Wall waterstop material	Waterstop of manhole wall	2 agent mixing type
⑤	Bellmouth	Handhole wall finishing	Various size genuine parts
⑥	Dustproof cap, waterproof cap	Joining of spare conduit line	〃
⑦	Conduit pipe opening waterproof material	Waterproofing at MH・HH wall	〃
⑧	Buffer pipe	MH・HH outside reinforcement	Various size PVC pipes
⑨	Marking tape	Accident prevention	Electric Installation Standard, Underground Conduit Line, Article 143 Item 4
⑩	Straight pipe joint	Joining of TILEX with TILEX	Various size genuine parts
⑪	Protection plate	Protection plate at time of excavating	Electric Installation Standard, Underground Conduit Line, Article 143 Item 5-1
⑫	Protection pipe	Prevention of external scratches	SGP, PVC pipes (available on market)
⑬	Swivel band	For attaching onto poles	Available on market
⑭	Outdoor terminal finishing material	Waterproofing of riser part	Various size genuine parts
⑮	Clamp	Fit onto terminal box	

NONFLAMMABLE TILEX

●Nonflammability of JIS Standard added to the high performance of TILEX.

FEATURES

●Nonflammability

Passed the nonflammability test stipulated in JIS C-3653. For such reason, laying can be done in the case of use of Nonflammable TILEX for underground protection conduit without maintaining the separation distance stipulated in Article 148 and Article 149 of the Electric Installation Technical Standard.

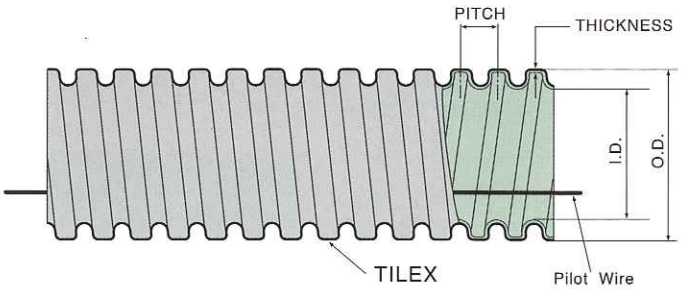
●Flattening Compression Strength

Endowed with excellent flattening compression strength due to consisting of the same corrugated construction as TILEX.

●Workability

Laying can be done in a minimum space by which working efficiency is improved. Serves for shortening of the work period and labor saving.

- Cable protection conduit in factories and power stations where nonflammability is demanded.
- Optimum for work sites where sparks fly about.



- A pilot wire is drawn in beforehand for the convenience of cable pull-in, and TILEX consists of coiled state as a standard. Furthermore, the allowable tensile strength of the pilot wire is a maximum of 490N {50kgf}.
- When cable pulling-in is not carried out for a long time, there is a case of corrosion of the pilot wire. Replace the wire with the nylon rope, etc depending on using conditions and situations

●Sizes and Characteristics

Nominal Dia. (ϕ)	I.D. Abt. (mm)	O.D. Abt. (mm)	Pitch Abt. (mm)	Wall Thickness Abt.(mm)	Standard Weight (kg/m)	Standard Length (m)	Packing Dimensions (O.D.m × Wm)		
30	30	39	10	1.4	0.2	50/100/200/300	0.95×0.3/50m	1.1×0.3/100m	1.4×0.4/300m
40	40	54	13	1.5	0.3	50/100/200	1.1×0.35/50m	1.2×0.4/100m	1.5×0.5/200m
50	50	65	17	1.7	0.4	50/100/200	1.2×0.4/50m	1.4×0.45/100m	1.6×0.5/200m
65	65	84	20	2.1	0.7	50/100	1.5×0.45/50m	1.6×0.55/100m	
80	80	102	25	1.9	0.9	50/100	1.9×0.3/50m	1.8×0.65/100m	
100	100	130	34	1.9	1.2	50/100	2.0×0.4/50m	2.0×0.8/100m	
125	125	161	40	2.2	1.7	50	2.1×0.75/50m		
150	150	189	47	3.0	2.4	50	2.4×0.8/50m		
200	200	254	50	4.0	4.4	30/40	2.3×0.8/30m	2.3×1.1/40m	

Note: Nominal dia. of about 1.5 times the finished O.D. of the cable to be accommodated or about 1.5 times the circumscribed dia. in the case of more than 2 cables should be selected.

MATERIAL PROPERTIES AND PRODUCT PROPERTIES OF NONFLAMMABLE TILEX

Material Properties of Nonflammable TILEX (Reference Values)

●Extract from JIS C-3653 (Nonflammability Test)

❶ Test piece of about 600mm long is taken from the conduit pipe.

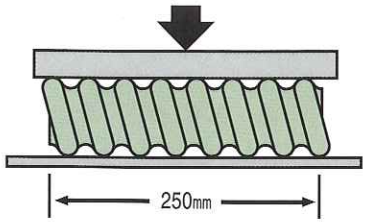
❷ The test piece is positioned vertically and the tip of the reducing flame of a Busen burner is applied to the part 100mm from the lower end of the test piece. However, the flame should be adjusted so that the length of the oxidizing flame is about 100mm and the length of the reducing flame is about 50mm as well as the burner should be tilted 45° from the water surface.

Material Properties

Test Item	Test Value
Density	1.03g/cm³
Tensile Strength at Yield	24N/mm² (2.4kgf/mm²)
Tensile Strength at Break	29N/mm² (3.0kgf/mm²)
Elongation at Break	800%
Hardness (Shore D)	75
Oxygen Index	Over 26

●Flattening Compression Strength

The deflection factor of the O.D. is less than 3.5% for all sizes when tested in accordance with the compression test method of corrugated rigid plastic pipes stipulated in JIS C-3653 (AppendiX1 Method of Execution of Works of Underground Buried Power Cables).



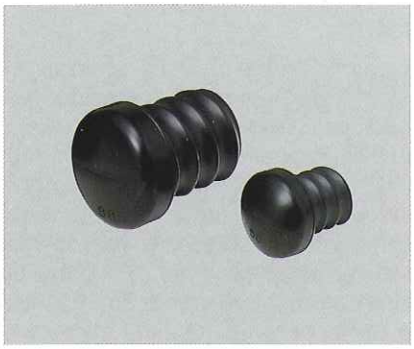
Flattening Compression Properties

Nominal Dia. (ϕ)	Test Load N{kgf}	Deflection Factor (%)
30	373 {38.0}	<3.5
40	501 {51.0}	<3.5
50	612 {62.4}	<3.5
65	793 {80.8}	<3.5
80	969 {98.7}	<3.5
100	1225 {124.8}	<3.5
125	1523 {155.2}	<3.5
150	1811 {184.5}	<3.5
200	2418 {246.3}	<3.5

NONFLAMMABLE TILEX ACCESSORIES

● Straight Pipe Joint Set

● Dustproof Cap



● Different Type Pipe Joint Set Type T-1

● Different Type Pipe Joint Set

● Clamp Set

● Bellmouth

※ The joining combination with different type is common with the combination for TILEX.

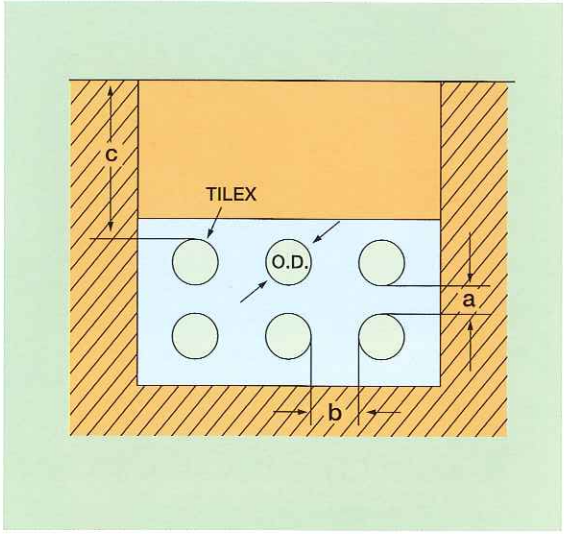
Note : The Super Different Type Pipe Joint Set cannot be used for Nonflammable TILEX.

EXECUTION OF WORK OF TILEX

The standard working procedure and techniques at the laying site are recommended to be executed as follows in accordance with matters stipulated in the Electric Installation Technical Standard and other laws and ordinances in the case of using TILEX for conduit lines.

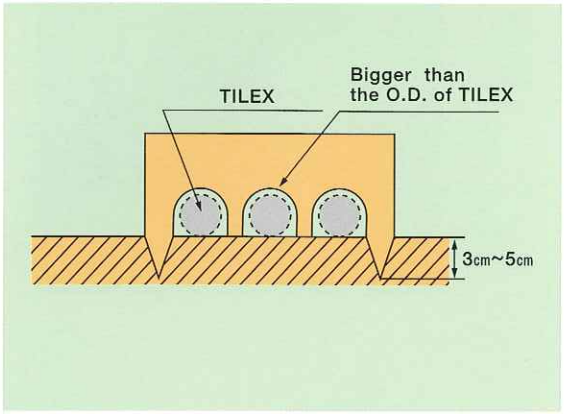
● Excavation

The earth covering on top of TILEX should be more than 1.2m in case of the risk of being subjected to be pressure of vehicles and other heavy objects or more than 0.6m in other cases in principle as well as the bottom should be flattened and spread with sand so that TILEX does not come in contact with rocks, debris, etc. Furthermore, the excavated width depends upon the number of lines of TILEX to be laid. In the case of cables of less than 7kV at the laying site, the earth covering can be more than 0.3m. Backfilling is done by compacting sand or equivalent earth above which common earth is backfilled and compacted.
(There is the risk of scratching and damaging the conduit line if backfilling is done with rocks and debris contained in the backfilling material.)



● Multiple Line Laying

Simple spacer gauges are prepared in the case of laying multiple lines and used every 3~4m in order to straighten and arrange by maintaining and fixing the mutual space between TILEX. At the same time, the surrounding of TILEX is compacted with sand or equivalent earth after which the spacer gauges are pulled out. TILEX is laid by repeating this operation. Furthermore, pipe beds used in the past for hume pipes should not be used.



Minimum Spacing

Hose I.D.(ϕ)	a b	c
30, 40, 50, 65	Over 50mm	Burial depth corresponding with laws and regulations
80, 100, 125, 150	Over 70mm	
200	Over 100mm	

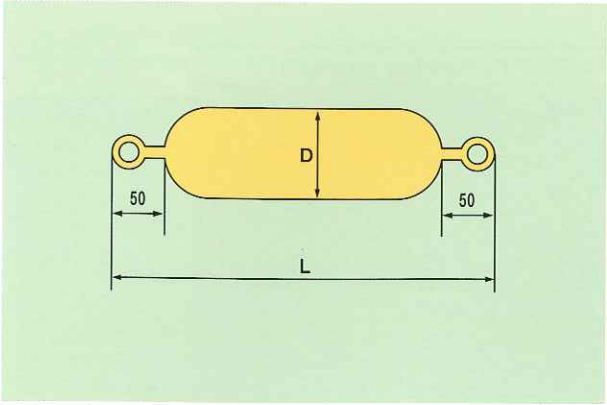
● Laying

TILEX is laid in the ditch while being careful so that sand, water, etc. do not ingress from the end of TILEX. TILEX is held with hands by 3~4 persons so that the coils do not collapse and is rolled along the laying ditch in the case of coiled rolls. Twists shall tend to take place every coil when attempted to stretch without rolling the coils, therefore, always make sure to roll the coils.

※ TILEX can be bent to 5 times the bending radius, however, laying should be done by placing consideration to the allowable bending radius and the tensile strength of the cable to be put through.

● Passing Through of Test Bar

A test bar such as shown on the figure below is passed through in order to confirm that nothing is abnormal inside TILEX before backfilling earth and sand.



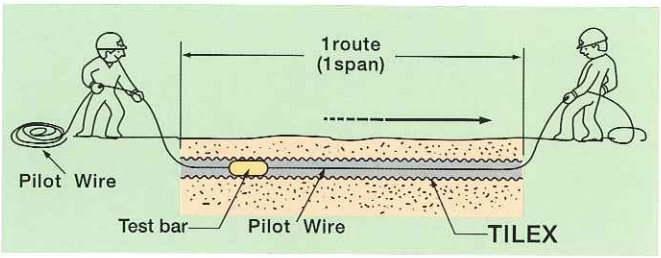
1. D and L are generally of the standard of the table below.

Nominal Dia.(ϕ)	D	L
Below 65	I.D.~10mm	400mm
Over 80	I.D.~20mm	600mm

2. The material consists of wood, steel, aluminum, etc. and should be free of sharp edges and protrusions.
3. How to pass through
   - Tie the pilot wire put through beforehand onto the joint on one end of the test bar.
   - Tie a pilot wire of length equivalent with the conduit line onto the joint on the other end of the test bar.
   - Position one person on each end of the conduit line of which one person pulls the pilot wire and the other person feeds so that the pilot wire does not twist.
   - Leave only the pilot wire inside the conduit line when the test bar passes through the conduit line.

● Cable Pull-in

Fit a Bellmouth onto the conduit line opening and carry out cable pull-in with the pilot wire inserted in TILEX beforehand so as to replace the wire rope for pulling with the cable.



● Backfilling

Backfill after confirming that nothing is abnormal by passing the test bar through the conduit line when fixing of TILEX in the laying ditch is completed.

SELECTION OF LAYING CONDUIT LINE

Selection of Size of Conduit Line (In the case of 1 cable per conduit)

Cable / Conduit						
Classification	Sectional Area (mm^2)	O.D. (mm)	TILEX (ϕ)	Carbon Steel Pipe (SGP) for piping PE Coated Steel Pipe (PLP)	Rigid PVC Electrical Conduit (VE) Impact Resistant Rigid PVC Electrical Conduit (HIVE)	Thick Steel Electrical Conduit
600V CV-2C	2.0	10.5	30	25A	28	28
	3.5	11.5				
	5.5	13.5				
	8	14.5				
600V CV-3C	2.0	11.0				
	3.5	12.5				
	5.5	14.5				
	8	15.5				
	14	17.5				
	22	21	50	32A	36	36
	38	25		40A	42	42
	60	31		50A	54	54
	100	40	80	65A	70	70
	150	46		80A	82	
	200	54	100	90A	(100)	82
	250	58				92
	325	65		100A		104
600V CVT	22	24	80	40A	42	36
	38	28		50A	54	42
	60	34				54
	100	42		65A	82	70
	150	47		80A		82
	200	55	100	90A	(100)	92
	250	60				
	325	66		100A		104
600V VVR-2C	2.0	10.5	30	25A	28	28
	3.5	11.5				
	5.5	13.5				
	8	15.5				
600V VVR-3C	2.0	11.0				
	3.5	12.5				
	5.5	14.5				
	8	16.5				
	14	20.0		32A	36	36
	22	24	50	40A	42	
	38	29		50A	54	54
	60	34	80			
	100	42		65A	70	70
	150	51		80A	82	82
	200	57	100	90A	(100)	92
	250	62				
	325	70		100A		104

SELECTION OF LAYING CONDUIT LINE ···CONT'D···

Selection of Size of Conduit Line (In the case of 1 cable per conduit)

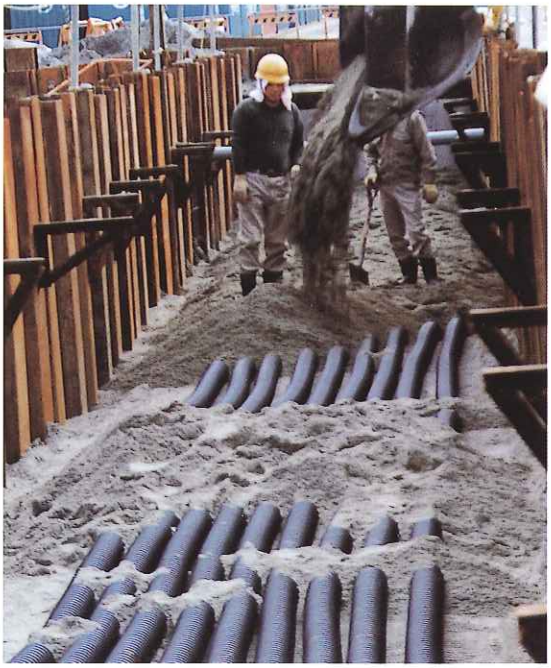
Cable \ Conduit						
Classification	Sectional Area (mm^2)	O.D. (mm)	TILEX (ϕ)	Carbon Steel Pipe (SGP) for piping PE Coated Steel Pipe (PLP)	Rigid PVC Electrical Conduit (VE) Impact Resistant Rigid PVC Electrical Conduit (HIVE)	Thick Steel Electrical Conduit
600kV CV-3C	8	32	50	50A	54	54
	14	34	80			
	22	37		65A	70	70
	38	41				
	60	46		80A	82	
600kV CVT	22	42	80	65A	70	70
	38	46		80A	82	
	60	50				82
CCP-0.5	– 30P	15	30	32A	36	36
	– 50P	17	50			
	–100P	22		50A	54	54
	–200P	28.5	80	65A	70	70
CPEV-0.65 CPEE-0.65	– 3P	9	30	25A	28	28
	– 5P	11				
	– 7P	12				
	– 10P	13				
	– 15P	14		32A	36	36
	– 20P	16	50			
	– 30P	17				
	– 50P	19		40A	42	42
	– 75P	23		50A	54	54
	–100P	30	80	65A	70	70
	–150P	37		80A	82	82
	–200P	42	100	90A	(100)	92

Note: Figures in ( ) indicate the case of rigid PVC pipe (VP) and impact resistant rigid PVC pipe (HIVP).
Remarks: Calculation conditions are as follows:
1) Pipe with I.D. of more than 1.5 times the cable O.D. for power cables. However, pipe with I.D. with 30mm added to the cable O.D. when the cable O.D. is more than 60mm.
2) Pipe with I.D. of more than 2 times the cable O.D. for communication cables.

- The values in the above table are reference values.
- Thorough study is recommended at time of selection of the size of the conduit line by reason that there are cases of the above values being nonconforming depending on the length of the laid conduit line and the condition of laying.

EXAMPLES OF EXECUTION OF WORK

Examples are introduced of underground electrical conduit work of TILEX which is light in weight and endowed with suitable flexibility making it especially outstanding in workability resulting in the realization of labour saving and economy of the work period.



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