INTERNATIONAL INDUSTRIES LTD.

Promising Reliability, For Now and Tomorrow

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ThinkTank

Company Profile

International Industries Limited (IIL) is Pakistan's largest manufacturer of steel, stainless steel and plastic pipes with an annual manufacturing capacity of 750,000 tons and annual revenues of almost PKR 25 billion (USD 203 million).

IIL was incorporated in Pakistan in 1948, is quoted on the Pakistan Stock Exchange and has an equity of over PKR 8.8 billion and has featured on the listing of Pakistan's Top 25 Companies consecutively for more than 11 years.

IIL is a part of a group of Companies that includes:

International Steels Limited (ISL): Pakistan's largest manufacturer of galvanized, cold rolled and color coated steel sheets and coils. ISL has an annual manufacturing capacity of over 1 million tons and annual revenues of over PKR 47 billion (USD 381 million).

Pakistan Cables Limited (PCL): Pakistan's premium manufacturer of electrical cables, wires, copper rod, PVC compound and aluminum sections with annual revenues in excess of PKR 10 billion (USD 77 million).

IIL Australia Pty Limited: IIL's wholly owned Australian subsidiary which represents the Group's interest in the Asia Pacific region.

IIL is a proud recipient of numerous accolades including the Management Association of Pakistan's "Corporate Excellence Award" for the Industrial Metals & Mining Sector, the National Forum for Environment & Health's "Environment Excellence Award" and the Employers Federation of Pakistan's "OHSE award".

IIL also has a credible export pedigree with an ever-expanding footprint in 60 countries across 6 continents.

As a result, IIL has been awarded the "FPCCI Export Performance Award" consecutively for 19 years. With an unshakeable focus on health, safety & environment, IIL is a reputable corporate citizen. The Company is ISO 9001, ISO 14001, ISO 45001, API 5L, PSQCA, UL and CE certified and manufactures its products according to international standards and specifications.

ISO 9001:2015 ISO 14001:2015 ISO 45001

Member of the Member of

International Presence

Having exported over 800,000 tons to date, IIL has a credible export pedigree, an ever-expanding footprint in 60 countries across 6 continents and has won several export awards at various highly prominent forums.

Keeping in view the growing demand in Australia, IIL has incorporated a wholly owned subsidiary based in Australia which enables IIL to service this developed market as well as the Oceania region at large.

National Recognition

IIL is a proud recipient of numerous accolades including the “FPCCI Export Performance Award” and the Management Association of Pakistan’s “Corporate Excellence Award” for the Industrial Metals & Mining Sector. Additionally, IIL has featured on the Karachi Stock Exchange’s listing of the “Top 25 companies” consecutively for 11 years.

IIL was also awarded the 2015 “Environment Excellence Award” by the National Forum for Environment & Health and the 2nd position in a nationwide OSH&E Best Practices Competition organized by the Employers Federation of Pakistan in 2015.

IIL's Market Edge

- Internationally certified
- Over 50 years of pipe making experience
- Premium quality product
- Stringent compliance with international standards
- State-of-the-art manufacturing process
- In house testing facilities
- Highly skilled work force
- Short lead time
- Highly responsive sales force
- Nationwide dealers network
- International recognition as preferred pipe manufacturer

Quality and Reliability

Our Corporate Slogan - *"Promising Reliability, For Now and Tomorrow"* reflects the fact that International Industries Limited (IIL) is firmly committed to quality. By adhering to globally recognized standards and regulations, IIL ensures that each of its products stand up to the quality expectations of its valued customers.

A comprehensive quality assurance and control system is employed throughout the production process; from production planning and raw material inventory control all the way through production, packing, storage and shipping.

IIL uses the highest quality raw materials and state-of-the-art machinery, operated by fully trained and highly skilled professionals in an environment of continuous improvement backed by R&D.

Furthermore, our fully capable in-house testing & quality control labs ensure that the dimensional, physical and chemical elements of our products meet and exceed the most stringent of global quality standards.

Certifications

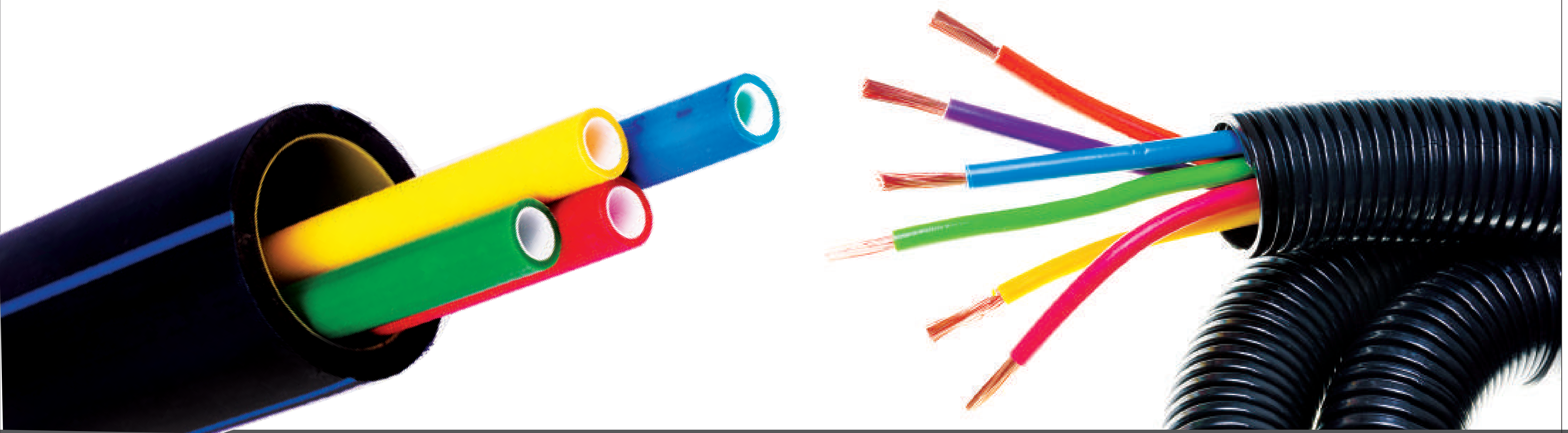
International Industries Limited is ISO 9001, ISO 14001, ISO 45001, API 5L, PSQCA, CE & UL certified. The company manufactures according to international standards and specifications (ASTM, AS/NZ, BS, EN, SLSI, DIN)

STANDARD	DESCRIPTION	CERTIFIED BY
ISO 9001	Quality Management System	Lloyds Register Quality Assurance
ISO 14001	Environment Management System	
ISO 45001 (Old Standard OHSAS 18001)	Occupational Health & Safety Management Systems	
API Specification Q1 ® & 5L	Manufacturer of Line Pipe Plain End, HFW, PSL 1	American Petroleum Institute (USA)
	Manufacturer of Line Pipe Plain End, HFW, PSL-1 & PSL-2	
BS EN 10255 & 10226	CE Mark for Hot Dip Galvanized ERW Carbon Steel Pipes	CNC Services (Germany)
BS EN 10296-1, BS EN 10305-5 & BS 1717	CE Mark for ERW Tubes from Cold Rolled Carbon Steel Pipes	
BS EN 39, 10219, 10240 ASTM A-500, A252, A53 AS/NZS 1163, 4792	CE Mark for Cold Formed Welded Hollow Structural Sections (HSS)	
UL-852 ASTM 795	UL certification (ERW & Galvanized Pipes for Fire Sprinkler System)	Underwriters Laboratories, UL
UL-852 (UAE)	UL UAE certification (Metallic Sprinkler Pipes for Fire Protection Service)	
PS:4533-34/1999 (R)	License for the use of Pakistan Standard Mark for PPRC Pipe	Pakistan Standards & Quality Control Authority (PSQCA)
DIN:16962 / 1980	License for the use of Pakistan Standard Mark for PPRC Fittings	
PS:3580-2014 (R)	Polyethylene Pipe for water supply “MEGAFLO” Brand	
ASTM:A53/2012	MS Pipe (Mild Steel Pipe) - FACTORY-1	
ASTM:A53/2018	MS Pipe (Mild Steel Pipe) - FACTORY-2	

Product Overview

The general purpose of a duct is to provide a clear, protected pathway for a cable, or for smaller conduits, sometimes called innerducts. Advances in cable technologies, as well as the expense of repairing sensitive cable materials like fiber optic cable, have driven a preference for protective conduit over that of direct burial. IIL FlexFlo Duct & IIL CorruDuct provides mechanical protection to fragile cable materials like fiber optic and coaxial cables, as well as protection from moisture or chemicals and even animals. Furthermore, the permanent pathway provided by conduit also facilitates replacement projects or future installations of additional cable or duct.

Buried conduit evolved from terracotta tile, cast concrete and transited to plastics in the 1960s. Originally, PVC was utilized, but ultimately, PE has emerged as the material of choice due to its distinct advantages in installation options, versatility and toughness. PE conduit can be installed below ground by a variety of methods, including open trench, plowing, continuous trenching and directional drilling. Also, its flexibility and availability in continuous coiled lengths facilitates installation into existing conduits or ducts as innerduct. In addition, PE conduit provides many above ground or aerial options.



Applications

IIL FlexFlo Duct & IIL CorruDuct serves two primary industries: communications (telephone, CATV, data transmission) and electrical (power transmission).

In the communications industry, the advent of fiber optic cable has had a tremendous impact due to its significantly higher data-carrying capacity, particularly due to the explosion of the Internet. In telecommunications service (phone, data transmission), fiber optic cable is used, along with traditional copper cable. In cable television service (CATV), fiber optic is also growing rapidly in addition to (or replacing) coaxial cable. This progression toward fiber optic cable has made the need for protection more critical, since these materials are highly sensitive to moisture and mechanical stress. Damage can be very expensive in terms of interrupted service and replacement costs. Also, these cables are installed in very long, continuous runs which require a clear, protected pathway, as well as a leak-free system for air-assisted (“blow-in”) installations. In addition to fiber optic, coaxial cables have seen improvements to increase bandwidth, making these materials more mechanically sensitive.

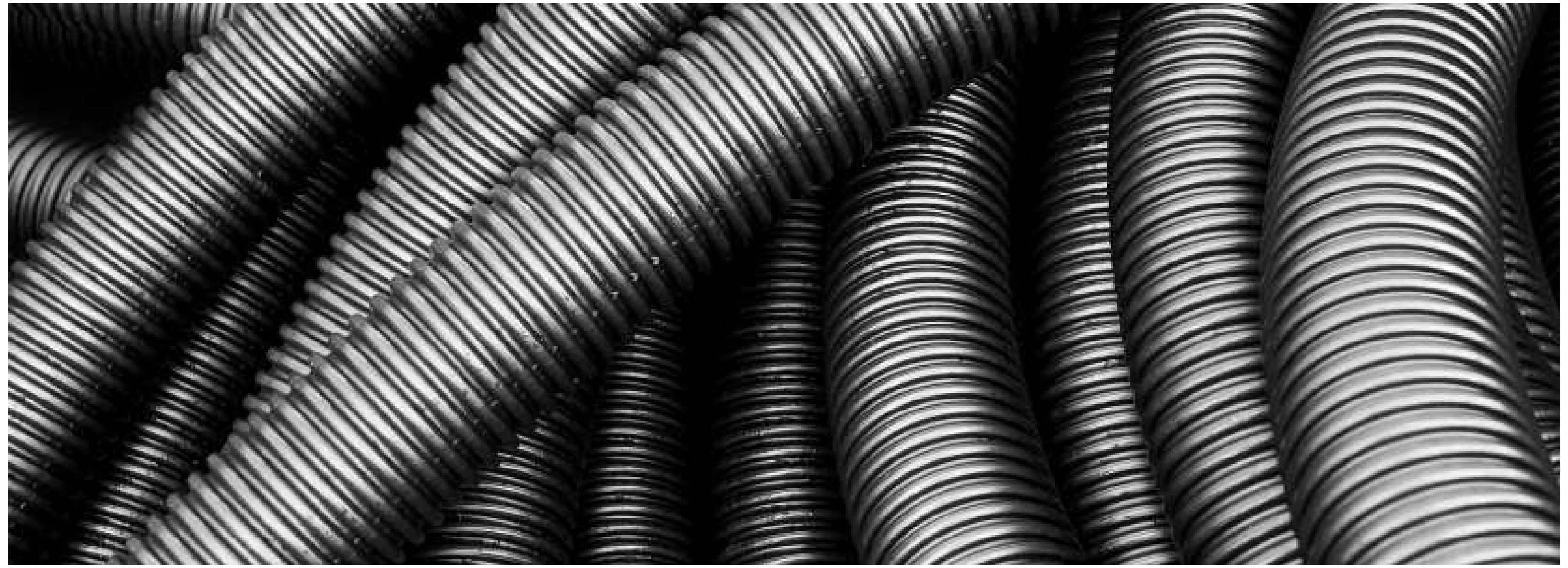
In the electrical industry, a critical requirement is on maintaining uninterrupted service, as consumers and businesses are even less tolerant of power outages than they are of phone or CATV service interruptions. Although many direct-buried power cable systems are designed for 30- or 40-year lifetimes, they are susceptible to external influences like rock impingement and often require frequent repairs.

Conduit is finding favor over direct burial in these applications due to improved protection, but it must be continuous and facilitate quick repair operations. PE conduit is used to carry both primary (substation to transformer) and secondary (transformer to end-user) cables. Some of these installations also contain fiber optic cables placed alongside the power cables to connect with load-monitoring sensors located throughout the network.

Characteristics

High Density Polyethylene (PE) is the most commonly used PE material for conduit. PE conduit delivers significant physical property advantages over other conduit materials:

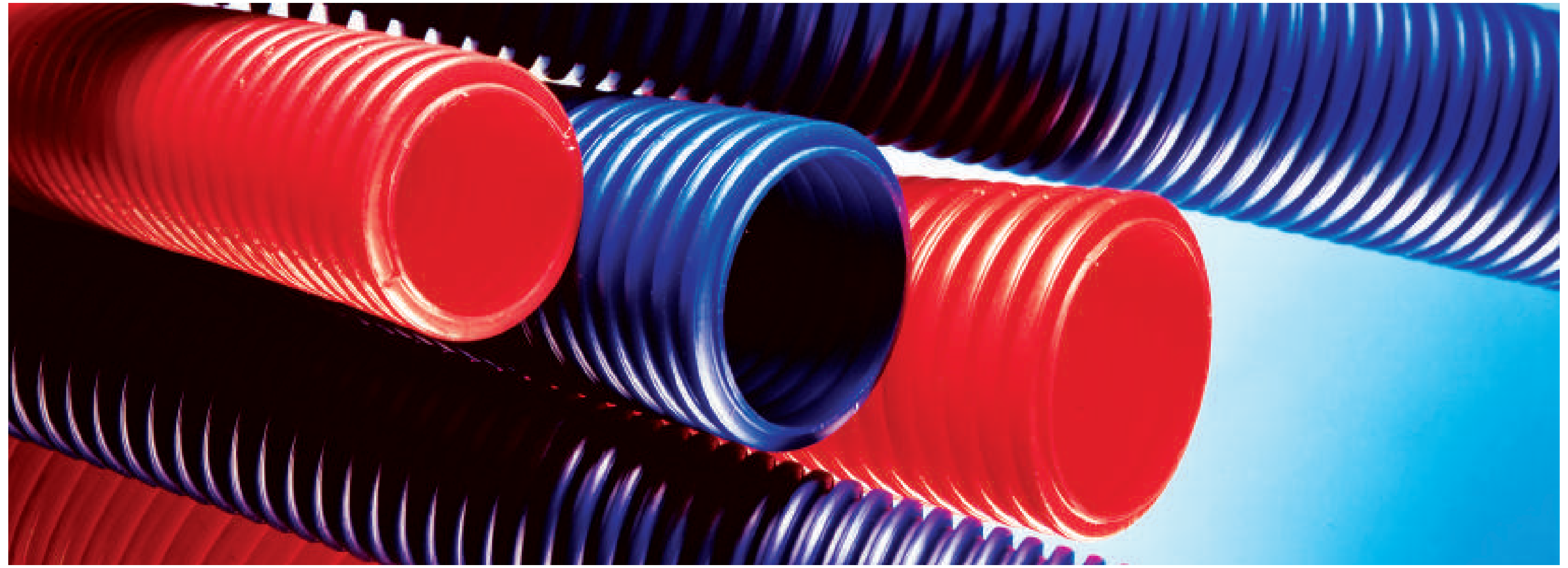
- **Ductility** - tough, PE conduit will better resist brittleness with age or cold weather.
- **Low temperature impact resistance** – PE withstands low temperature impact better than any other material. This is illustrated by impact testing on PE conduit conditioned at -15.5°C as compared to other materials conditioned at 23°C.
- **Permanent flexibility** – PE conduit bends and flexes without breakage, even with ground heaves or shifts, over a wide range of temperatures.
- **Temperature versatility** – PE conduit can be installed over an ambient temperature range of -34°C to 82°C. Power conductors rated at 90°C and medium voltage cable rated at 105°C are permitted for use with PE Conduit.



Product Specifications

A variety of IIL HDPE conduit products are available for special applications.

- Permanent Lubricated Duct (PLD) is available for advanced cable installation techniques like cable jetting and blowing. The duct is permanently coated with silicone to reduce friction.
- Multiple mini ducts of different color/stripe combinations and sizes can be delivered for a more efficient installation.
- Pre-installed Rope-in-Conduit (RIC) saves time and labor by allowing one-step placement of both cable and duct.
- Corrugated Duct & Inner Duct is flexible, lightweight with a low coefficient of friction.
- Ribbed conduit (longitudinally) provides friction reduction in cable installation.



Product Specifications

IIL FlexFlo Duct

IIL FlexFlo Duct is smooth solid wall duct available with or without silicone lubrication & internal ribs.

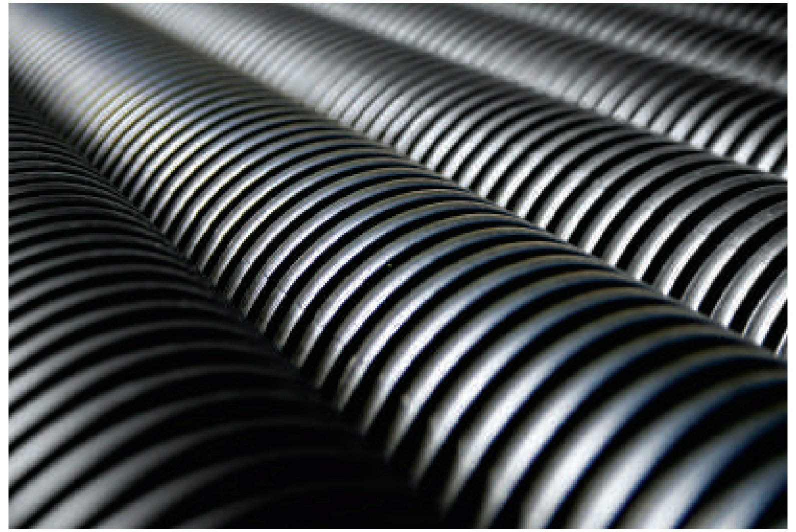
SIZE	Minimum Outer Diameter	Maximum Outer Diameter	Minimum Wall Thickness	Maximum Wall Thickness	Max. Length
mm	mm	mm	mm	mm	meters
12	11.90	12.10	1.90	2.10	2000
32	32.00	32.30	2.40	2.90	2000
40	40.00	40.40	3.30	3.70	2000
40	40.00	40.40	3.00	3.60	2000
40	40.00	40.40	3.40	3.80	2000
50	49.75	50.25	5.70	6.30	500
50	50.00	50.50	3.00	3.50	500
57	56.70	57.30	3.25	3.75	200
63	63.00	63.60	4.70	5.40	200
90	90.00	90.90	5.40	6.20	200
90	90.00	90.90	7.35	8.65	200
90	90.00	90.90	9.00	10.30	200

Note: Special sizes can be produced upon request.

IIL CorruDuct

IIL CorruDuct is corrugated structural wall duct with advantage of light weight & high flexibility.

SIZE	External Diameter	Internal Diameter	Wall Thickness	Total Wall Thickness	Center to Center	Upper Curve Width	Lower Curve Width	Coil Length
mm	mm	mm	mm	mm	mm	mm	mm	meters
20	20.0 ± 0.3	15.0 ± 0.3	0.4	2.50	3.768	2.646	0.898	100
25	25.0 ± 0.3	19.2 ± 0.3	0.4	2.90	4.037	2.896	0.847	100
32	32.0 ± 0.4	25.0 ± 0.4	0.5	3.50	4.347	3.052	0.990	100
40	40.0 ± 0.4	34.0 ± 0.4	1.0	3.00	4.347	2.963	1.171	100
50	50.0 ± 0.4	43.4 ± 0.4	1.0	3.30	4.347	2.963	1.089	100

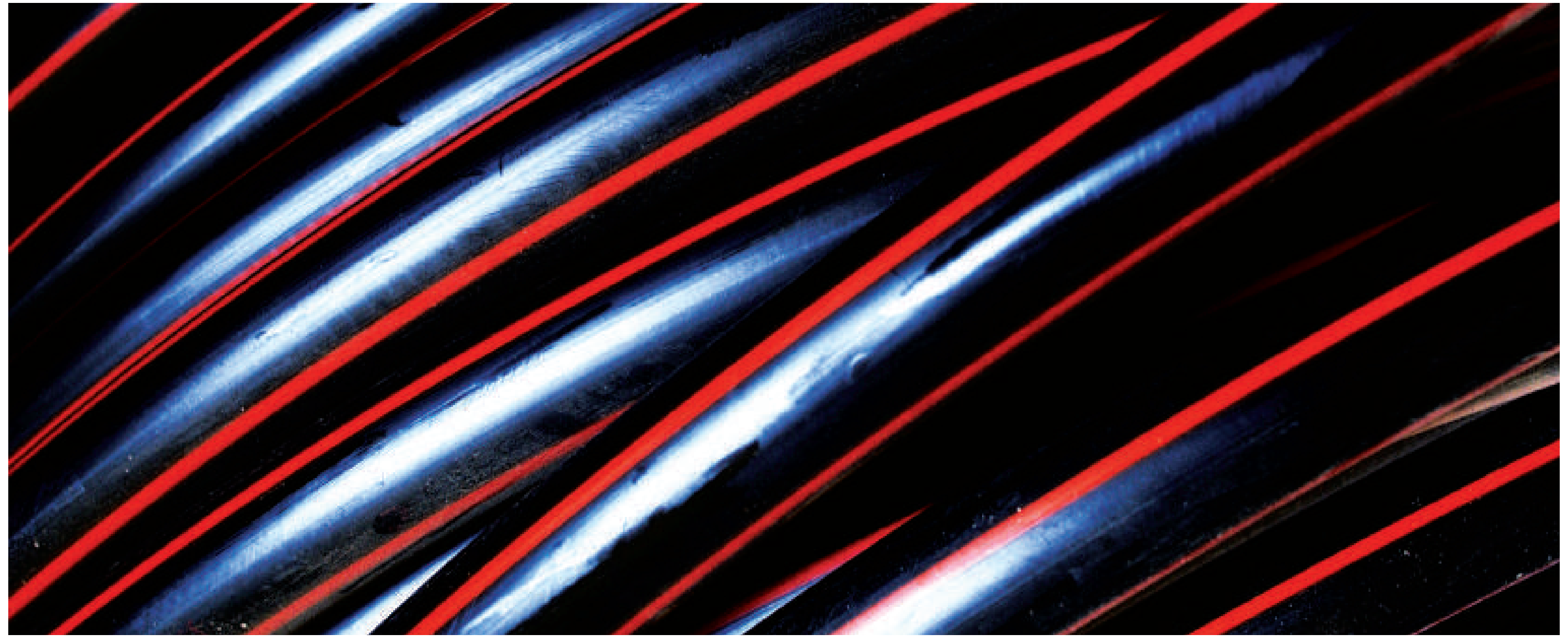


Design Considerations

Conduit vs. Pipe

In general, plastic conduits and plastic pipes are very similar in structure and composition, but deployment is where they differ.

- Conduits do not have long-term internal pressure. External forces are unchecked; if ovalized during installation, it may not recover during service. Long-term stress rupture is not a factor. (Hydrostatic Design Basis is not required in material selection)
- Conduit ID is chosen by cable occupancy, where internal clearances are critical; whereas, for piping applications, ID is based on volumetric flow requirements.
- Path of installation for conduit is very important – radius of curvature, vertical and horizontal path deviations (undulations) and elevation changes all significantly affect cable placement.



Cable Dimension Considerations

Determination of a conduit's dimensions begins with the largest cable, or group of cables or innerducts, intended for occupancy. From a functional viewpoint, selection of diameter can be broken down into the following general considerations:

- The inside diameter of the conduit is determined by the cable diameter and placement method (pulling or air-assisted pushing).
- Pulling cables into underground conduits requires sufficient free clearance and is typically further distinguished by classifying the cables into two groups: power & coax (short lengths) and fiber (long lengths). Additionally, electrical cable fill is controlled by the National Electric Code USA (Chapter 9), whereas, dielectric, or fiber optic cables, are not.
- Long pulling lengths require low volume fill, i.e. 36% max.
- Short pulling lengths may be filled up to 53%, or up to the latest NEC limitations for groups of cables.
- Push-blow installation methods for long length fiber cables utilize higher volume fills, i.e. up to 70% max.
- Innerducts are smaller diameter conduits, intended for placement into larger conduits or casings. Their purpose is to subdivide the larger conduit space into discrete continuous pathways for incorporation of fiber optic cables. Diameters of conduits and innerducts are often specially designed to maximize the conduit fill.

Using these guidelines, one can determine the minimum ID of the conduit or innerduct. When over sizing a conduit for power, coaxial or multi-pair telecom cables, the more room the better. This rule does not necessarily apply for push-blow methods of installation. Here, it is found to be more difficult to push a cable with additional clearance since a cable tends to form a helix, which transfers some of the axial load laterally into the wall causing friction. The air velocity moving over the cable can also be maximized with a minimum volume of air when the free volume is low. Higher air velocities result in improved drag forces on the cable, thus aiding with its placement.

Product Standards

The IIL FlexFlo duct and IIL CorruDuct pipes are manufactured as per ASTM F-2160 standard. In addition to this, customer specified standards can be adapted to fulfil customized requirement.

Testing Standards

- Melt Flow Index/Melt Flow Rate Test.
- Density Test.
- Heat Reversion Test.
- Tensile and Elongation Test.
- Impact Test.

IIL Technical Sales Department

Our technical department with experienced polymer engineers, is readily available to facilitate any customer inquiries.

We offer free information service, including:

- Project specific advice and guidance by our highly experienced and knowledgeable technical experts
- Selection of the appropriate product
- Information about Standards
- Product applications
- Specification assistance (such as equivalents of foreign specifications and trade names)
- Chemical properties of polymers
- Supply of technical literature published by International Industries Limited and other International Associations, Institutions & Bodies

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