



NEW PRODUCTS INDUSTRIES CO. LTD

Polyethylene Corrugated Duct (PEC) and HDPE Ducts

for Power & Telecommunication



Distributed by
National Marketing Est. Co. Ltd.

Certificate of Registration

Intertek

This is to certify that the quality management system of

New Products Industries Co. Ltd. (NEPROPLAST)

Jeddah Industrial City Phase 3, Jeddah – Kingdom of Saudi Arabia

has been assessed and registered by Intertek as conforming to the requirements of:

ISO 9001:2008

The quality management system is applicable to

The Manufacture of UPVC & CPVC Plastic Pipes & Fittings and HDPE Plastic Pipes.

Certificate Number: QMS 27050-03
Issue Date: 12 September 2015
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Certificate Expiry Date: 19 September 2018



Calin Moldoveanu

Authorized Signature: Calin Moldoveanu – President, Business Assurance
Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZF, United Kingdom

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CT-ISO 9001:2008-UKAS-EN-A1-P-20 Jun.13



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APPROVAL REPORT

Project No: 0003052068
Class: 1613
Product Name: Polyethylene Pipe
Product Type: Polyethylene Pipe
Name of Listing Company: New Products Industrial Co., Ltd.
Address of Listing Company: Industrial Area
PO Box 460
Jeddah, 21411
Saudi Arabia
Customer ID: 148015-1
Customer website: www.neproplast.com

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Technical Team Manager

Authorized by

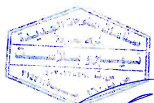
Richard Dunne

Richard Dunne
Manager of Fire Protection

April 24, 2015

Date of Approval

FM Approvals
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Norwood, MA 02062



MOODY INTERNATIONAL CERTIFICATION

New Product Industries Co.Ltd

NEPROPLAST

P.O.Box-460, Jeddah - 21411

Kingdom of Saudi Arabia

BS EN ISO 9001:2000

SCOPE OF REGISTRATION:

The Manufacture of uPVC and CPVC Plastic Pipes and Fittings

CERTIFICATE NO: 27050

Subject to continued compliance with ISO 9001 and the Moody International Certification Scheme Rules and Regulations, your certificate of which scope of Registration document is part is valid indefinitely

Further Clarification regarding the scope of this certificate and the applicability of ISO 9001:2000 requirements may be obtained by consulting the above Organisation

While all due care and skill was exercised in carrying out this audit, Moody International Certification Ltd. accepts responsibility only for proven gross negligence.

Confirmed that this is a copy of the original certificate issued by Moody International



(See annex)

FOREWARD

NEPROPLAST (New Products Industries) was established in the 1969 as the first manufacturing facility to introduce the uPVC piping systems to the market in Saudi Arabia. Since its establishment, NEPROPLAST has followed a strict policy in producing high quality pipes. Using state of the art equipment and tools in its production facilities, hiring a highly trained professional staff, and working with a very experienced team of consultants in the industry. The initial production of NEPROPLAST uPVC pipes were manufactured according to British Standard Specifications BS 3505/3506. At a later stage, NEPROPLAST started to manufacture pipes and fittings according to International Specifications ISO. NEPROPLAST actively participated with Saudi Arabia Standard Organization SASO to set the Saudi Arabian Standard SAS 14/15/1396. In the mid 80s, NEPROPLAST started the production of PVC pipes and fittings according to ASTM standards for schedule 40, schedule 80, and CPVC pipes for sch80. By producing a wide range of pipes and fittings according to different standards, NEPROPLAST has established for itself a strong position in the market to serve the construction industry in the fields of water network pressure lines, sewerage and drainage non-pressure lines, and electrical & telecommunication conduits . NEPROPLAST made its pipes and fittings available in both options of Rubber Ring or Solvent Cement jointing systems.

In 2009, NEPROPLAST made a significant move into modern, heavy metal free stabilizers for all its uPVC & cPVC products. A move which ensured total elimination of toxicological content throughout the entire NEPROPLAST product range. Organic stabilizers pipes and fittings ensure a safe drinking water supply, free of any possible toxic traces which can develop through the use of heavy metal uPVC stabilizers.

All NEPROPLAST drinking water products are now accredited through NSF, proof of its excellent health safety factor.

NEPROPLAST added to its products portfolio the production of Polyethylene pipes (HDPE) in 2009. NEPROPLAST HDPE products range covers pipes and ducts to serve the water, gas, electrical, and telecommunication applications. NEPROPLAST recently introduced to the market the Polyethylene Corrugated-Optic-Ducts (COD) as a unique product for fiber optic and electrical cabling installations.

All NEPROPLAST products are marketed and sold through National Marketing Est. Co LTD. which has more than 25 branches covering all cities and urban areas across the Kingdom of Saudi Arabia. National Marketing has an export department responsible for exporting NEPROPLAST products to Middle East and North African (MENA) markets. In addition to NEPROPLAST products, National Marketing Est. Co. imports a wide range of fittings, valves, solvent cements, and other accessory components. Nowadays, National Marketing Est. Co LTD. is considered the largest trading company in Saudi Arabia that has all kinds of plastic pipes, fittings, valves, and cements available in its stocks for all traders and contractors in the Saudi market.

Both NEPROPLAST and NATIONAL MARKETING strive to be the largest quality leader in the supply of plastic piping systems to serve the water, gas, electrical & telecommunication sectors across the Middle East.

Isam K.Kabbani
Chairman
IKK Group of Companies



INTRODUCTION

COD stand for Corrugated Optical Duct, specialized products, COD is a Multiple channel cable duct with plain surface, specially coated inner pipe and corrugated outer pipe as an integrated single body. both are manufactured from high Density Polyethelene(PE) materials. Possible combinations of inner pipe sizes can be done upon customer,s reuest. Hence, Combination is flexible, resistance enabling a rolled-on spool regardless of numbers of subduct built-in which can be coiled over 500m. COD is possible to transport easily and therefore reduce labour cost as well as faster installation and lower the construction cost.

COD open the new era of the telecommunication back bone with its built-in multiple sub ducts inside of the corrugated duct, with very distinctive differencec from the conventional telecommunication PVC ducting System. Telecommunication companies agree on the proven benifets of this product with its great economics and convenient installation than any other system.

COD application services include Construction of underground ducts for High Speed Internet Superhighway networks Cable Television CCTV on the express highway, high & low voltage power cables, Video Phone Communication Downtown / Business quarters infrastructure Undersea's infrastructure.

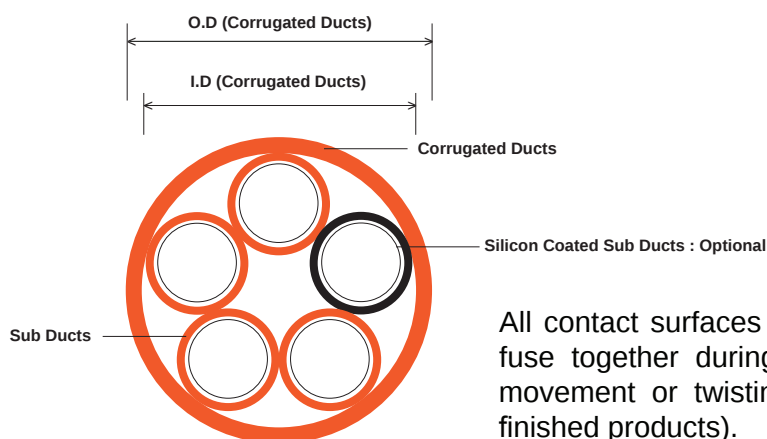


Fig: 1.c - COD Pipes

All contact surfaces between main duct and built-in sub-ducts shall fuse together during extrusion process. This fusion shall prevent movement or twisting of subducts inside the main COD duct (in finished products).

COD ducts are used to provide a single and continuous duct laying operation from one point to another between manhole to manhole, without any cut. It can be laid directly into trench at standard depths even without sand bedding. Concrete encasement is normally not required.

Product Range:

NEPROPLAST COD is available from diameter 90 mm to diameter 160 mm in coils and bars

Table 1:

Model	Design	Corrugated Duct		Sub Duct			No.Sub Duct	Application
		O.D (mm)	I.D (mm)	O.D (mm)	THK (mm)	I.D (mm)		
28 x 3 Lines		90.0	70.0	33.0	2.5	28.0	3	FOC installations
28 x 4 Lines		100.0	80.0	33.0	2.5	28.0	4	FOC installations
28 x 5 Lines		110.0	90.0	33.0	2.5	28.0	5	FOC installations
32 x 4 Lines		110.0	90.0	38.0	3.0	32.0	4	FOC installations
36 x 3 Lines		110.0	90.0	42.0	3.0	36.0	3	FOC installations
36 x 4 Lines		120.0	100.0	42.0	3.0	36.0	4	FOC installations
50 x 3 Lines		160.0	125.0	59.0	4.5	50.0	3	FOC installations

Standards

NEPROPLAST corrugated pipes for cable protection are produced according to EN50086 2-4 (DIN 16961, NFC 68-171), i.e. EN 13476 standards

Color

The standard color is orange and is offered in a variety of other colors.

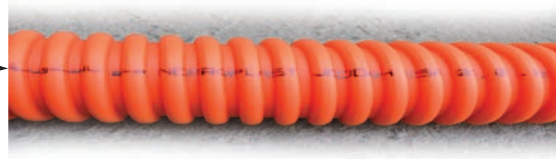


INTRODUCTION

Marking

NEPROPLAST COD are marked with NEPROPLAST "COD" O.D.110 MM. with 5 Built-in SUBDUCT O.D. 33 MM. (Arabic logo) (Arabic Origin) JEDDAH KSA (date) (shift no) (time) (line no.) xxx M. (sequential)

NEPROPLAST "COD" O.D.110 MM. with 5
Built-in SUBDUCT O.D. 33 MM. (Arabic logo)
(Arabic Origin) JEDDAH KSA 27/08/12 1
12.00.00 L1



COD Specification

The following international and/or national standards are integral part of this specification:

ASTM F 405 Standard Specification for Corrugated Polyethylene Pipe and Fittings

ASTM D 2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe By Parallel-Plate Loading

ASTM D 1505 Standard Test Method for Density of Plastics

ASTM D 882 Standard Test Method for Tensile Properties of Plastics

ASTM D 1693 Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics

ASTM D 1603 Test Method for Carbon Black in Olefin Plastics

ASTM D 2122 Test Method for Determining Dimensions of Thermoplastic Pipes & Fittings

Long Term Performance Requirements

The above specification require COD ducts and its accessories be

1- capable of withstanding the typical service conditions of the Kingdom of Saudi Arabia for a minimum period of fifty (50) years without detriment to the operation and maintenance of the product.

2- Designed, manufactured and packaged so that its physical or operation and maintenance characteristics shall not degrade when exposed to the environmental conditions of Saudi Arabia, and the expected environmental conditions during storage and transportation outside of the Kingdom.(The environmental conditions of Saudi Arabia may include ambient air temperature variations from -10° to +50°C.

Technical Requirements

COD should be compatible with the latest installation standards and operation and maintenance practices for the telecommunication's duct system.

COD should be free of blisters, shrinkholes and inhomogeneities, that might impair the service performance. COD should to be acceptably round. Supplied with its ends cut cleanly at right angles to the axis of the duct. COD deemed to have accessories easily connectable, e.g., connector, for connecting the duct to manholes/handholes; and joint closure, for enclosing COD joints.

ADVANTAGES OF COD

Better Flexibility

Due to the spiral formation of the product, COD bends easily without special bending efforts, and is easy to by-pass or over pass hurdles along with the duct line.

Lengthy pipe

The lengthy and coiled-on drum reduces considerable labor cost as well working period of installation by waving numerous connections in between two manholes in a one-time installation. On top of this, COD never requires inserting of sub duct into corrugated outer duct owing to the built-in production of multiple sub ducts.

Lighter in weight

Compared to the conventional duct, COD is considerably lighter which offers benefit while transporting and handling in the work site.

Stronger

The readily built-in multiples numbers of sub ducts perfectly eliminates any loose space inside of spiral corrugated duct, allowing COD to offer considerable advantage in terms of compressive load.



ADVANTAGES OF COD

Safety

COD stands safe in Earthquakes and Land Subsidence owing to its strong compressive load and flexibility.

Easy insertion of optic fiber cables

COD facilitates easy insertion of cables up to the maximum-coiled length owing to perfect alignment of inner ducts and less friction, as it has no connections. In addition, it enables to extend the manhole distance.

High Reliability

COD is non-conductive of electricity and therefore, it is ideal to apply for power cable ducts.

Cost Efficiency

COD offers cost efficiency throughout all consecutive work stages and dururances.

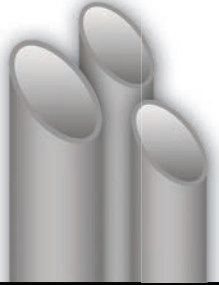
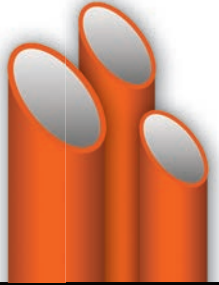
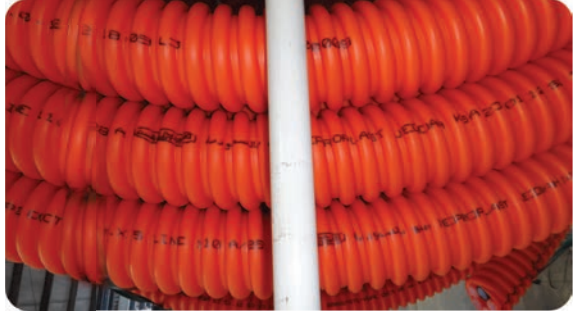
Better resistance against chemicals

COD lasts semi-permanently, having resistance against chemicals and corrosion from salt water or wetland.

The HDPE-COD shall comply with the test requirements of Table 2.

Clause	Properties	Values	Test Method
1.	Compound Density @ 25°C	0.95 g/cm ³ , min	ASTM D 1505
2.	Pipe Stiffness @ 5% Deflection, average: – HDPE-CD (with 7-29 mm OD sub-ducts) – HDPE-CD (with 5-33 mm OD sub-ducts) – HDPE-CD (with 3-42 mm OD sub-ducts) – HDPE-CD 110 mm OD (Empty main duct) – HDPE-CD (with 3-27 mm Outside Dia. sub-ducts) – HDPE-CD 77 mm OD (Empty main duct)	> 27 kgf/cm ² 27 kgf/cm ² 21 kgf/cm ² 15 kgf/cm ² 27 kgf/cm ² 24 kgf/cm ²	ASTM D 2412
3.	Compressive Strength @ 5% Deflection, average: – HDPE-CD (with 7-29 mm OD sub-ducts) – HDPE-CD (with 5-33 mm OD sub-ducts) – HDPE-CD (with 3-42 mm OD sub-ducts) – HDPE-CD 110 mm OD (Empty main duct) – HDPE-CD (with 3-27 mm OD sub-duct) – HDPE-CD 77 mm OD (Empty main duct)	> 1,200 kgf/m 1,200 kgf/m 950 kgf/m 660 kgf/m 770 kgf/m 668 kgf/m	ASTM D 2412
4.	Tensile Strength @ Yield (film properties)	30 MPa	ASTM D 882
5.	Elongation @ Break (film properties)	400%	ASTM D 882
6.	Carbon Black Content (for black color)	2% minimum	ASTM D 1603
7.	Water Absorption	0.03% maximum	ASTM D 570 24 hrs immersion
8.	Voltage Resistance	2,000 Vac, >15 min	
9.	Insulation Resistance	> 200 Mohm	

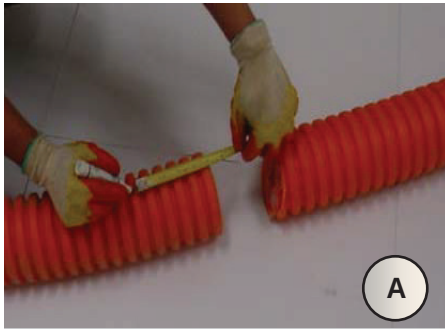
COMPARISON BETWEEN CONVENTIONAL PRODUCT & COD

Description	Conventional system		New system
	PVC & FC duct	PE duct	COD
			
Material	①PVC	High Density polyethylene	High Density polyethylene
	②Foamed polyvinyl chloride		
Shape	①Duct made of PVC	①One piece duct made of polyethylene	①Corrugated concavo-convex shape.
	②PVC + foamed vinyl chloride + PVC duct	②Flat surface of inside and outside duct	②Multiple sub ducts are readily built-in
	③Flat surface of inside and outside duct		③The inside of sub duct is protruded connecting
Connection	in every 6 meters	none	none
Length	6m (At Maximum)	No Limit	Up to 500 to 1000m
Weight	medium	light	light
Insertion of Inner Duct	Insert	Insert	No Need
Excavation Depth	100%	60%	60%
Working condition	medium	medium	fine
Flexibility	medium	fine	fine
Coefficient of friction	high	medium	low
Tension	high	high	low
Strength	weak	strong	strong
Use of inner space	-	low	high
Torsion of the inner duct	-	occur	free from torsion
Breakage	-	may occur	free from crash
Damage Rate	Over 90%	0 %	0 %



COD INSTALLATION

Stripping Outer duct



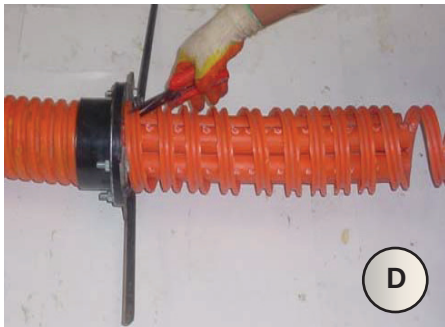
Set the two ends of the ducts to be joined. Mark each end of the duct to 13 cm from duct end.



Put the cutter into the outer duct



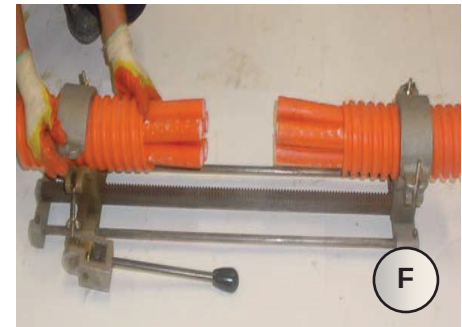
Pill off the skin of COD spinning right



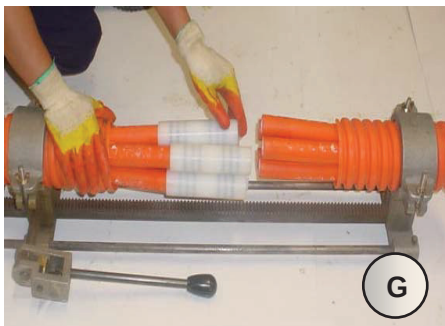
Cutting Skin of COD and remove COD cutter spinning left



Trimming Sub-duct and complete



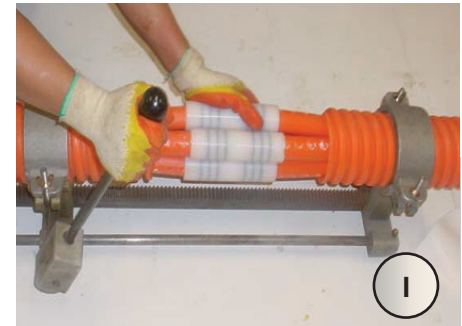
To clamp and secure both ends of the COD ducts.



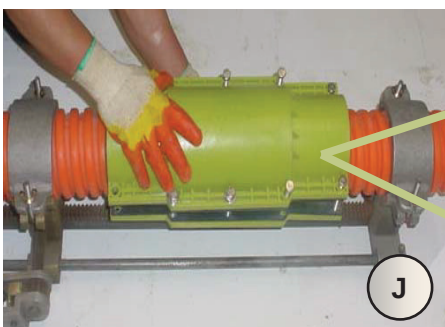
Insert Couplings in each sub duct clamped beside the tool's lever arm.



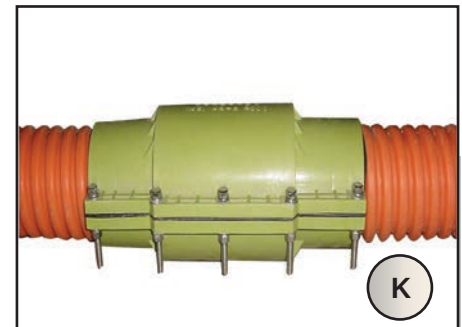
Operate the lever arm of the Jointing Tool to move the duct towards the opposite duct.



Guide the Sub duct Couplings until they mate with the opposite sub-ducts.

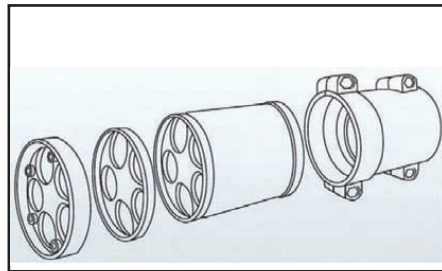
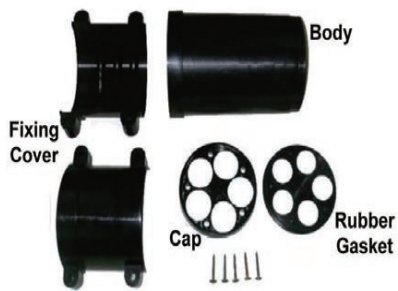


To close and cover the joint. One part below the joint, covering 2 grooves of the duct and the other part to mate with the other half.

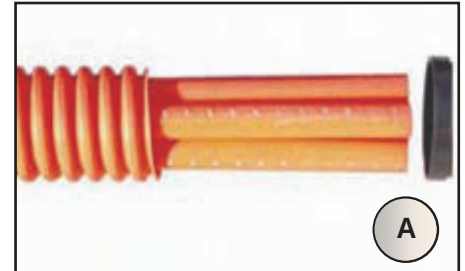


Tighten the bolts of the closure. The completed PECD jointing is as shown.

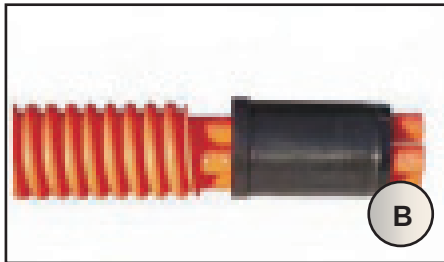
COD MANHOLE CONNECTORS TYPE I:



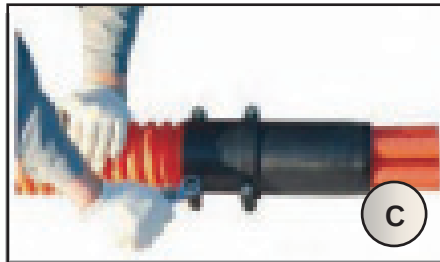
COD Manhole connector M,L Body: PE-
Cap: PP(PP 90% + PE 10%) - Fixing
cover:(PP 90%+PE 10%) -Rubber gasket



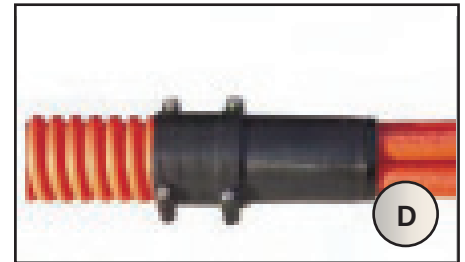
Remove outer layer: use the outer layer
remover to remove about 50cm of outer
layer.



Insert Body of Manhole Connector, Place
the Body in the correct position.

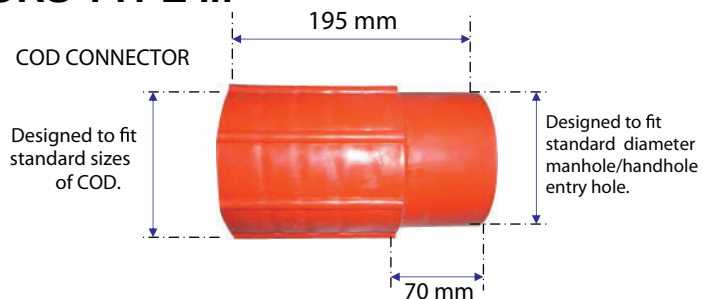


use bolts and nuts to connect the body
with the upper and lower fixing covers



Complete The Installation

COD MANHOLE CONNECTORS TYPE II:



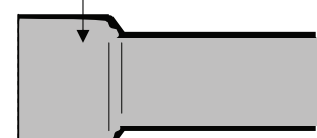
Jointing COD to PVC:



COD Duct



COD Connector.



PVC Duct



COD Connector connected to COD duct,
and for connection to the PVC Coupling.



PVC Plain Coupling, 112mm I.D



PVC Duct, 110mm O.D.

Jointing COD to Manhole:



Pull the COD duct up to the manhole or
hand-hole wall.



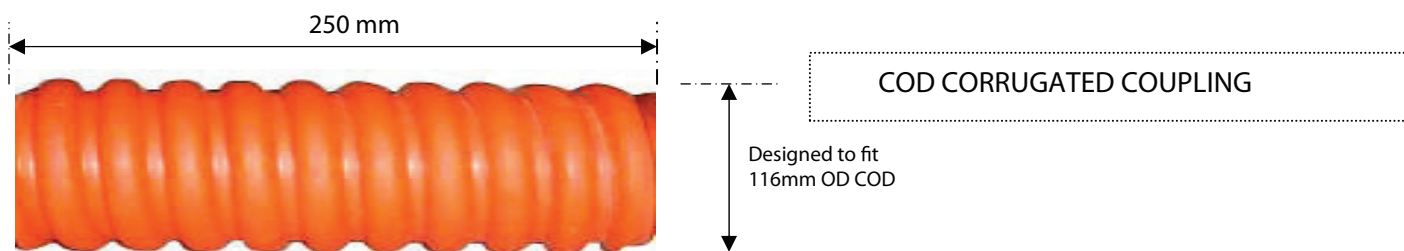
Use COD CONNECTOR to connect COD
duct into MH or HH entry hole. Apply duct
solvent cement



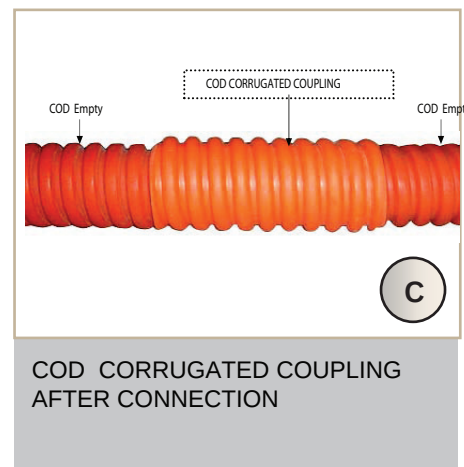
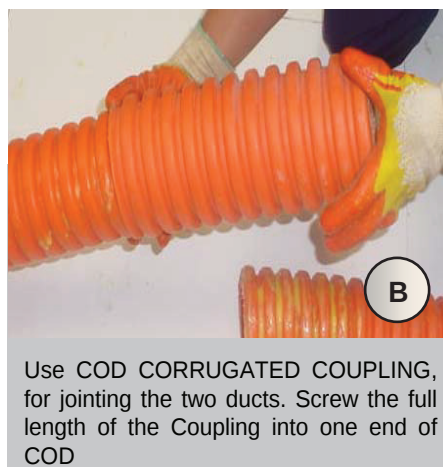
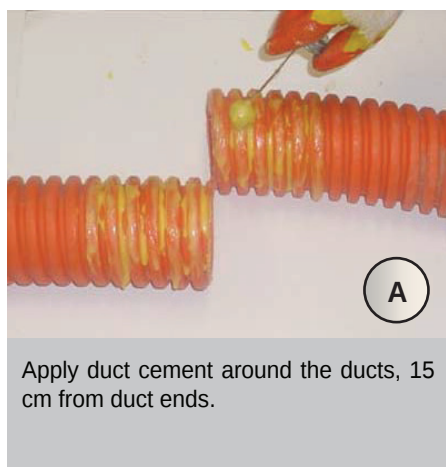
Insert the COD duct into the MH or HH
entry hole.



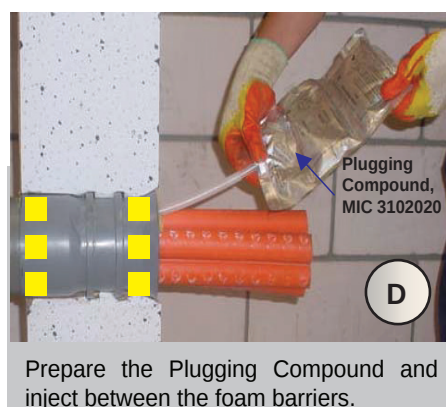
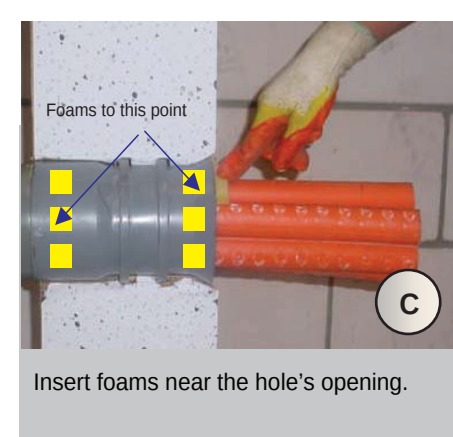
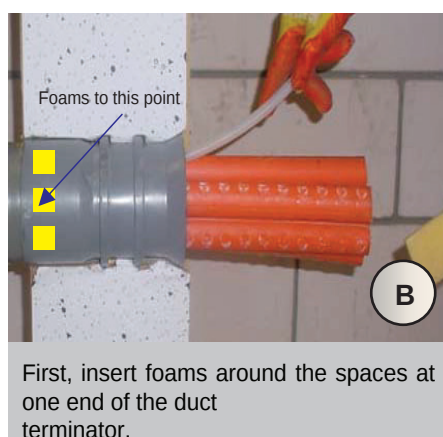
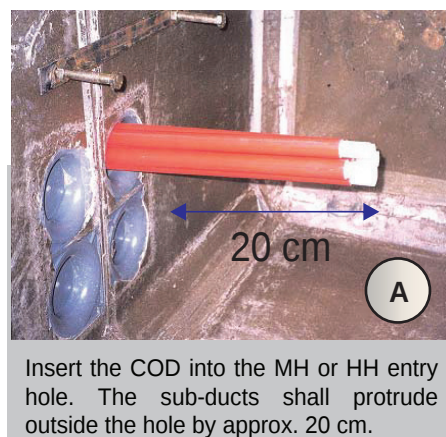
COD CONNECTOR TYPE III FOR EMPTY DUCT



COD Corrugated Coupling	Dimension (mm)			
	Inside Dia.	Wall Thickness	A	B
For 110 mm COD	94	2.5 +/-0.5	116	250

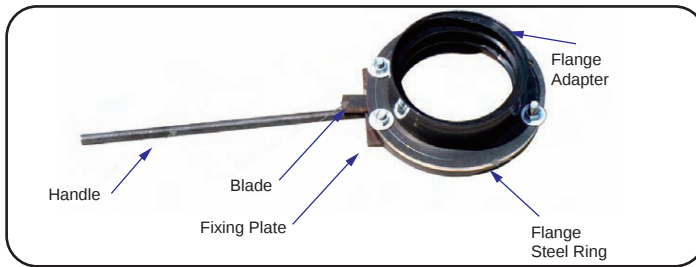


SEALING OF INSTALLED COD DUCT



COD ACCESSORIES

COD Cutter:



COD Cutter:

Material of COD Cutter

- Flange Adapter : ABS
- Steel ring/Handle/Fixing plate/Blade 90 degree Steel
- Bolt, Nut and Washer : Steel or SUS

COD Connecting Jig:



COD Cutter:

Material of COD Connecting Jig

- Steel ring/Handle/Fixing plate/Locking Mechanism

Minor tools

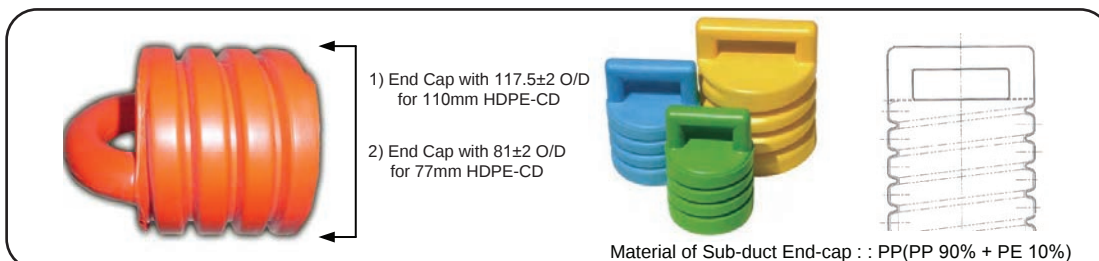


A set of minor tools installation of COD

COD Connectors



COD End Caps

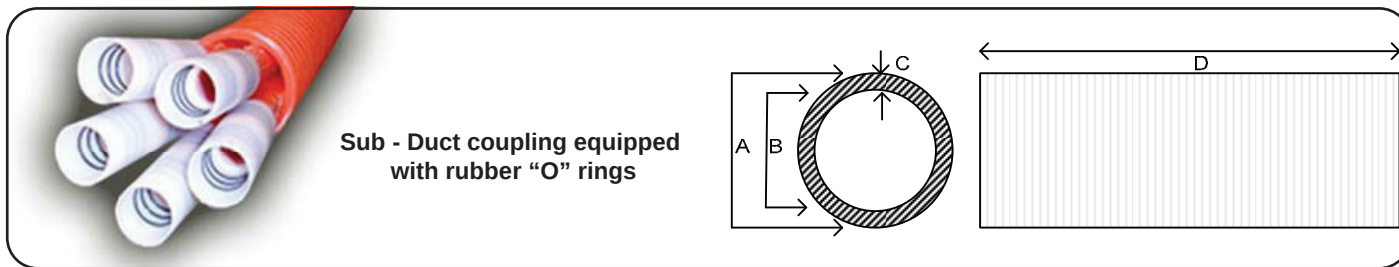


Sub-duct End-cap

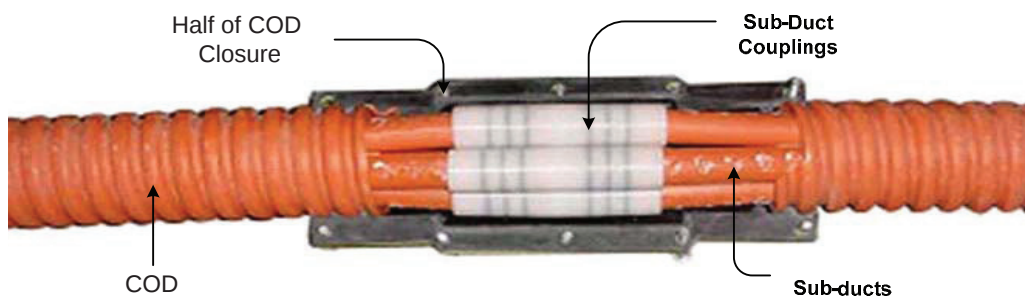


COD ACCESSORIES

Sub-Duct Coupling:



Sub-Duct Coupling	Dimension (mm)			
Type	A	B	C	D
Sub-Duct Coupling , for 29 mm OD sub-ducts, Type 1	39	31	4 +/- 0.5	170
Sub-Duct Coupling , for 33 mm OD sub-ducts, Type 2	43	35	4 +/- 0.5	170
Sub-Duct Coupling , for 42 mm OD sub-ducts, Type 3	52	44	4 +/- 0.5	170
Sub-Duct Coupling , for 27.2 mm OD sub-ducts, Type 4	37.2	29.2	4 +/- 0.5	170



Sub-Duct Coupling after Connection



SSD (SILICONE SUB DUCT) - Protecting fiber optical cable

NEPROPLAST SSD is made from virgin, flexible HDPE and is used for Optic Fiber and copper cable networks. It can easily be swept to make gradual bends without special forming equipment.. It has Superior resistance to natural or mechanical damage. The inner wall of the duct is with silicone coated.

Silicone coated internal wall is a solid slick lubricant insulator. Silicone Sub Duct has 80% reduction of co-efficient of friction than non-silicone coated internal ducts, and provides complete cable protection before, during and after installation.

Advantages:

Silicone lasts as long as the Duct itself

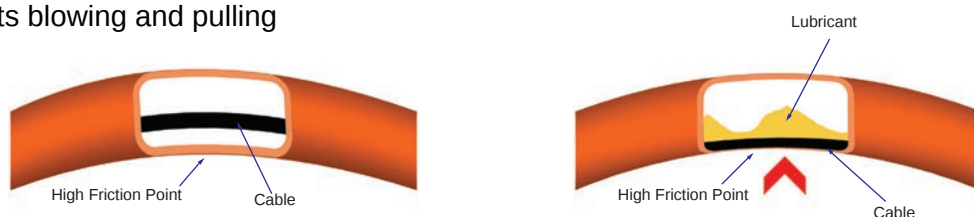
Silicone does not evaporate or burn out due to heat or friction

Silicone does not dry by high volume of air nor reduce its efficiency

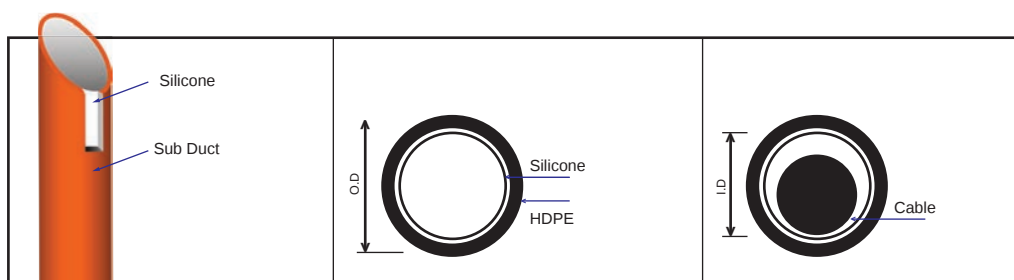
Silicone is preferred by all Network Builders of the world and is the Industry standard for duct lubrication

Silicone co-efficient of friction does not change with time

Silicone supports blowing and pulling



Inside Dia. (mm)	Thickness of silicone coated wall (mm)
22	0.4±0.1
25	0.5±0.1
29	0.5±0.1
35	0.5±0.1



Long Term Performance Requirements

	Test Name	Performance			Related Materials
Mechanical Properties	Tensile strength	180kgf/cm2			KS M 3006
	Coefficient of friction	0.30 Below			Bellcore Spec
		Division	5% strain (kgf or higher)	Inner contact (kgf or higher)	KS M 3413
	Compressive strength (flat)	22mm	4	33	
		25mm	7	50	
		29mm	10	100	
		35mm	14	130	
	Compression resilience	Recovery rate more than 10.0%			KS C 8454
	Heat deformation	Strain 3.0%			KS M 3408
impact	Balance shall be free from cracks			KS C 8454	
Chemical Properties	Chemical resistance	HCL aqueous solution: change in weight 12g/m²			KS M 3407
		NaOH aqueous solution: change in weight 12g/m²			
		Polyethylene Glycol: 12g/m2 or less			
		Should be no change in the surface of the sample and Delamination.			



SSD (SILICONE SUB DUCT) - Protecting fiber optical cable

Sub-duct wall design

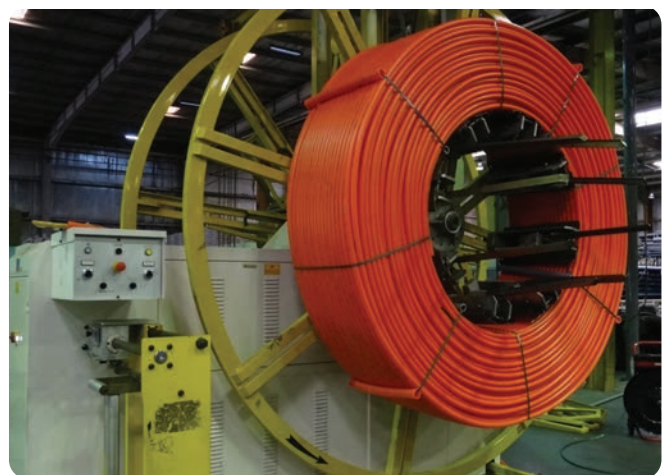
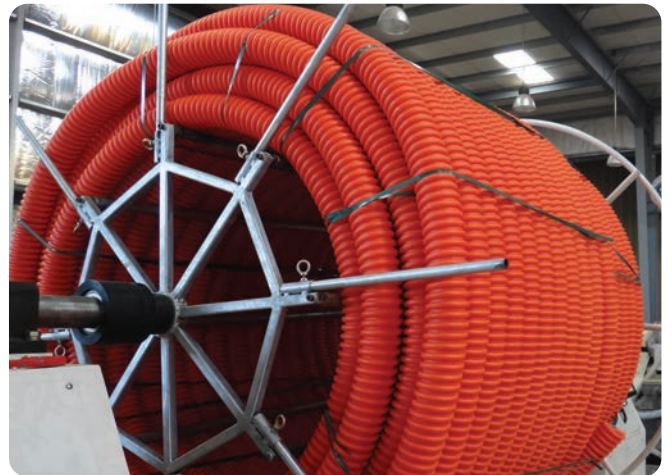
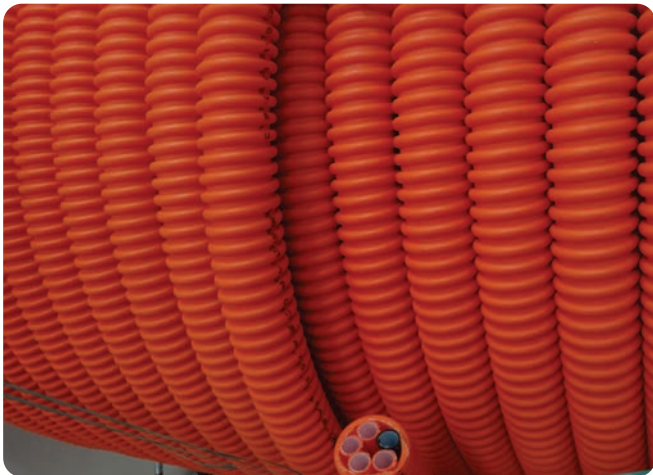
Outer and inner walls shall be plain and smooth. Inner wall shall have low coefficient of friction to facilitate cable installation by blowing technique.

Fusion of main duct and Subducts

All contact surfaces between main duct and built-in subducts shall fuse together during extrusion process. This fusion shall prevent movement or twisting of sub-ducts inside the main COD (in finished products).

Color of Sub-ducts:

Sub Duct shall have the same color as that of the main duct, except that one sub-duct should always have a distinct color separate from the other. So, if one sub-duct is black the remaining shall be orange. Likewise, if one sub-duct is orange the remaining shall be black.



HDPE SUB-DUCT AND MINI DUCT

For Telecommunication Networks

NEPROPLAST HDPE Sub - Duct meets the requirements of Telecommunication industry as housing of small diameter fiber optical cables. Upto 4 Sub-Ducts of size. 1" are normally installed in 110mm/4" main duct. Sub-Ducts are available with optional pre-installed rope to facilitate hauling of fiber optic cables. HDPE pipes are normally manufactured in black color, other color is available upon request. HDPE pipes size from 20 mm upon 110 mm are available in coils, alternatively larger size are available in any length.

MATERIAL

HDPE Ducts are manufactured from piping grade compound fully meeting the material requirements of DIN 8075, also meets the requirements of ASTM D 3350 for class PE 345444C/E designated as PE 3408.

STANDARDS

HDPE Sub-Duct manufacturing is in accordance to

- 1) German Standard DIN 8074 and 8075 conforming to the STC material specification. TC 4111
- 2) American Standard ASTM D3035 / ASTM F2160

Table 14: Dimensions based on DIN 8074 SDR 11

Nominal Duct Size	Nominal Out Diameter	Nominal Wall Thickness	Nominal Weight
mm	mm	mm	kg/m
32	32	3.0	0.279
40	40	3.7	0.430
50	50	4.6	0.666

Table 15: Dimensions based on STC.TS 4111 and DIN 8074

Duct Type	Nominal Out Diameter	Nominal Wall Thickness	Nominal ID	SDR
	mm	mm	mm	
Main Duct	110	5.0	100	22
	75	3.4	68.2	22
Mini Duct	50	3.0	44	17
	40	2.4	35.2	17
	32	1.9	28.2	17
Micro Duct	20	1.8	16.4	13.6
	14	1.5	11	9

Table 16: Dimensions based on ASTM D3035 F2160 SDR 11

Nominal Duct Size	Nominal Out Diameter	Nominal Wall Thickness	Nominal Weight
inch	mm	mm	kg/m
1	33.40	3.05	0.299
1 1/4	42.16	3.84	0.465
1 1/2	48.26	4.39	0.610
2	60.33	4.49	0.952



Material Properties

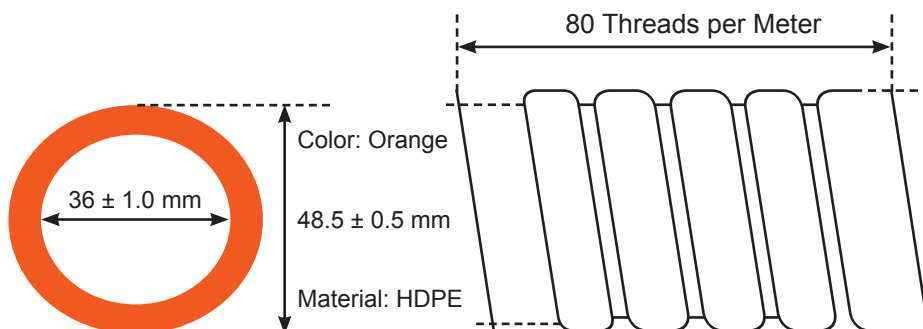
NEPROPLAST HDPE ducts are made from high density polyethylene compound fully meeting the material requirements of DIN8075. Also meets the requirements of ASTM D3350 for Class:345444 C/E

NEPROPLAST HDPE ducts shall meet all the material properties and test requirements as specified in ASTM F2160 with customized sizes and dimensions to metric measurements (DIN 8074) and inch measurements (ASTM D3035 and F2160 SDR11)

All values at 23°C unless specified otherwise.

Properties	Requirements	Test Method
Density (compound)	0.941 to 0.955 g/cc, >0.955 g/cc (Cell 3 or 4 as per ASTM D3350)	ASTM D 792
Melt Flow index at 190°C/2.16 Kg	< 0.15 g/10 min	ASTM D 1238 E
Flexural Modulus	552 - < 1103 Mpa	ASTM D 790
Tensile Strength	21 - < Mpa	ASTM D 638
Slow Crack Growth Resistance (10% Igepal)	F20 > 600 Hours ESCR per ASTM D 1693 condition C; or > 10 hours per ASTM F 1473 PENT	ASTM D 1693; ASTM F 1473
Color and UV Resistance	C-Black with 2% min. Carbon Black. E-Colored with UV Stabilizer Note that Carbon Black content, 2.25 +0.25% as per ASTM D1603	ASTM D 3350
Physical Properties		
Induction temp (DSC)	220°C	ASTM D 3350
Poisson Ratio	0.45	–
Izod Impact (Notch)	> 2.5 ft. lb/in	ASTM D 256
Co - efficient of friction	<=0.15	Telcordia GR-356
Ovality (Prior to building or coiling)	< 5%	ASTM D 2160
Mechanical Properties		
Tensile Strength (Break) (50 mm/min)	38 MPa	ASTM D 638
Tensile Strength (Yield) (50 mm/min)	25 MPa	ASTM D 638
Elongation at Break (ultimate)	> 600%	ASTM D 638
Hardness	> 60 Shore “D”	ASTM D 2240
Thermal Properties		
Brittle Temperature	< -100°C	ASTM D 746
Vicat Softening Temp	127°C	ASTM D 1525
Co-efficient of linear thermal expansion	0.2 mm/m°C	ASTM D 696
Specific Heat	2.7 - 2.9 kJ/kg°k	Calorimetric
Thermal Conductivity	0.38 W/m. °C	DIN 52612
Chemical Properties		
Chemical Resistance	Resistance to hydrous solution of acids, alkalis and salts as well as to a large number of organic solvents	DIN 8075 Supplement 1 ISO/TR 10358

Product Data Sheet: PEC - COD 50 mm. Empty HDPE Duct



DIMENSIONAL REQUIREMENTS

Specifications

	Description	Max.	Min.
Outer Diameter	50 mm	49.0 mm	48.0 mm
Inside Diameter		37.0 mm	35.0 mm
Wall Thickness		1.90 mm	1.40 mm
Corrugated Depth (O.D. to I.D.)		8.00 mm	7.00 mm

Product Weight 0.300 kg/meter

QUALITY REQUIREMENTS

Appearance

Product shall be free from surface defects that will impair product characteristics, diminish its function or result to customer rejection.

Marking on Outer Duct (1.0 meter interval)

HDPE PEC - DUCT 50 mm (Arabic logo) (Arabic Origin)
NEPROPLAST Jeddah, K.S.A. (date) (shift no.) (time)

Note: Marking can be as per customer requirements.

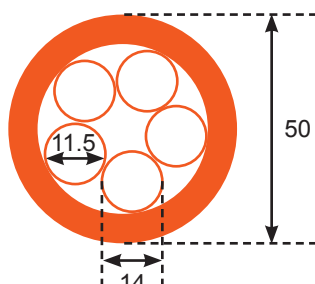
Test

Flattening Test (50% of Outside Diameter)

Material Class

435500 as defined in ASTM D3350 standard

Product Data Sheet: Micro PEC - COD 5 Lines, 50mm O.D. HDPE



Color:
Orange for Outer Duct 50 mm
Orange for 4 Inner Ducts (14 mm)
Black for 1 Inner Duct (14mm)

Material:
HDPE

DIMENSIONAL REQUIREMENTS

Specifications

For Outer Duct	(mm)	For Inner Duct	(mm)
Outer Diameter	48.5 ± 0.5	Outer Diameter	14.0 ± 0.5
Inside Diameter	36.0 ± 1.0	Inside Diameter	11.5 ± 0.5
Wall Thickness	1.35 ± 0.15	Wall Thickness	1.25 ± 0.25
-	-	Ovality	5% max.

Ovality % = $\frac{\text{Maximum O.D.} - \text{Minimum O.D.}}{\text{Maximum O.D.} + \text{Minimum O.D.}} \times 200\%$

Product Weight

Total Weight (Outer Duct and 5 Inner Ducts = 0.5360 kg./1.0 meter each with Silicon Insulation)

Component Weights
Weight of Outer Duct Only = 0.3000 kg/ 1.0 meter
Weight of Individual Inner Duct = 0.0472 kg/ 1.0 meter
Total Weight of 5 Inner Ducts w/silicon insulation = 0.236 kg/ 1.0 meter

QUALITY REQUIREMENTS

Appearance

Product shall be free from surface defects that will impair product characteristics, diminish its function or result to customer rejection.

Tests

Oven Test for Inner Duct Only

Acceptance Criteria : Maximum 3.0% change in length
: No blistering and scaling

Flattening Tests for PEC - COD with Inner Ducts

Acceptance Criteria : No crack at 50% flattening

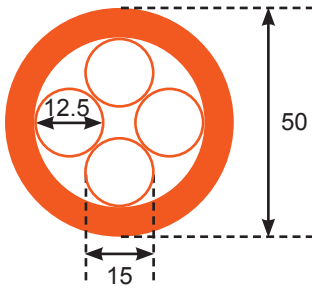
Marking on Outer Duct (1.0 meter interval)

NEPROPLAST MICRO PEC - COD 50mm O.D. with 5 built-in SUB-DUCT O.D. 14mm (Arabic logo) (Arabic origin) Jeddah K.S.A. (date) (shift no.) (time) (line no.)xxx M. (sequential)

Note: Marking can be as per customer requirement.



Product Data Sheet: MICRO PEC - COD 4 Lines, 50 mm. O.D. HDPE



Color:
 Orange for Outer Duct 50 mm
 Orange for 3 Inner Ducts (15 mm)
 Black for 1 Inner Duct (15mm)

Material:
 HDPE

DIMENSIONAL REQUIREMENTS

Specifications

For Outer Duct	(mm)	For Inner Duct	(mm)
Outer Diameter	48.5 ± 0.5	Outer Diameter	15.0 ± 0.5
Inside Diameter	36.0 ± 1.0	Inside Diameter	12.5 ± 0.5
Wall Thickness	1.35 ± 0.15	Wall Thickness	1.25 ± 0.25
-	-	Ovality	5% max.

Ovality % = $\frac{\text{Maximum O.D.} - \text{Minimum O.D.}}{\text{Maximum O.D.} + \text{Minimum O.D.}} \times 200\%$

Product Weight

Total Weight (Outer Duct and 5 Inner Ducts each with Silicon Insulation) = 0.5036 kg./1.0 meter

Component Weights
 Weight of Outer Duct Only = 0.3000 kg/ 1.0 meter
 Weight of Individual Inner Duct = 0.0509 kg/ 1.0 meter
 Total Weight of 4 Inner Ducts w/silicon insulation = 0.2036 kg/ 1.0 meter

QUALITY REQUIREMENTS

Appearance

Product shall be free from surface defects that will impair product characteristics, diminish its function or result to customer rejection.

Tests

Oven Test for Inner Duct Only

Acceptance Criteria : Maximum 3.0% change in length
 : No blistering and scaling

Flattening Tests for PEC - COD with Inner Ducts

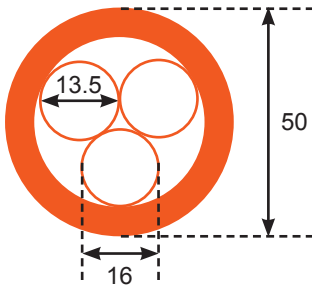
Acceptance Criteria : No crack at 50% flattening

Marking on Outer Duct (1.0 meter interval)

NEPROPLAST MICRO PEC - COD 50mm O.D. with 4 built-in SUB-DUCT O.D. 15mm (Arabic logo) (Arabic origin) Jeddah K.S.A. (date) (shift no.) (time) (line no.)xxx M. (sequential)

Note: Marking can be as per customer requirements.

Product Data Sheet: Micro PEC - COD 3 Lines, 50mm O.D. HDPE



Color:
 Orange for Outer Duct 50 mm
 Orange for 3 Inner Ducts (16 mm)
 Black for 1 Inner Duct (16 mm)

Material:
 HDPE

DIMENSIONAL REQUIREMENTS

Specifications

For Outer Duct	(mm)	For Inner Duct	(mm)
Outer Diameter	48.5 ± 0.5	Outer Diameter	16.0 ± 0.5
Inside Diameter	36.0 ± 1.0	Inside Diameter	13.5 ± 0.5
Wall Thickness	1.35 ± 0.15	Wall Thickness	1.25 ± 0.25
-	-	Ovality	5% max.

Ovality % = $\frac{\text{Maximum O.D.} - \text{Minimum O.D.}}{\text{Maximum O.D.} + \text{Minimum O.D.}} \times 200\%$

Product Weight

Total Weight (Outer Duct and 5 Inner Ducts each with Silicon Insulation) = 0.4707 kg./1.0 meter

Component Weights
 Weight of Outer Duct Only = 0.3000 kg/ 1.0 meter
 Weight of Individual Inner Duct = 0.0569 kg/ 1.0 meter
 Total Weight of 3 Inner Ducts w/silicon insulation = 0.1707 kg/ 1.0 meter

QUALITY REQUIREMENTS

Appearance

Product shall be free from surface defects that will impair product characteristics, diminish its function or result to customer rejection.

Tests

Oven Test for Inner Duct Only

Acceptance Criteria : Maximum 3.0% change in length
 : No blistering and scaling

Flattening Tests for PEC - COD with Inner Ducts

Acceptance Criteria : No crack at 50% flattening

Marking on Outer Duct (1.0 meter interval)

NEPROPLAST MICRO PEC - COD 50mm O.D. with 4 built-in SUB-DUCT O.D. 16mm (Arabic logo) (Arabic origin) Jeddah K.S.A. (date) (shift no.) (time) (line no.)xxx M. (sequential)

Note: Marking can be as per customer requirements.

NEPROPLAST

Micro Duct Overview



Ways	Shape	OD mm	ID mm	Material	Type	Colors	Pictogramm
2	Flat	10	6	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	12	8	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	14	10	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	16	12	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	18	14	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	20	16	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	25	20	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
2	Flat	28	24	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	10	8	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	12	10	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	14	12	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	16	14	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	18	16	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	20	18	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	25	20	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
3	Triangle	28	24	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	10	6	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	12	8	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	14	10	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	16	12	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	18	14	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	20	16	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	25	20	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
4	Square	28	24	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	10	6	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	12	8	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	14	10	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	16	12	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	20	16	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	25	20	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	
7	Hexagon	28	24	HDPE	Direct Buried	red, orange, green, gray, blue, white, black, yellow	

Note:
Other sizes and shapes on request

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شركة صناعات المنتجات الجديدة المحدودة

انابيب نيبرولاست المموجة من البولي اثيلين للقنوات البصرية الرئيسية و الفرعية



التوزيع من قبل
شركة المؤسسة الوطنية للتسويق المحدودة

