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TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-019

Rev. 1

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

JUNE 2021

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REV	DESCRIPTION	DATE	PRPD	CHKD	APVD
1	Second Issue	30-06-2021	EK	KM	TPI
0	First Issue	05-04-2011	PQ DPT.		V.G.



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1. SCOPE AND OBJECTIVES

The item which is specified in this Technical Specification is the High Density Polyethylene (H.D.P.E.) pipe with an outside diameter of 40 mm.

2. REFERENCES

2.1 References Documents

- Tech. Spec. No. DSF-SPC-QAC-005 [Shop Inspection of Equipment and Materials for NGT Project]
- Tech. Spec. No. DSF-SPC-QAC-006[Inspection and Test Instructions]
- Tech. Spec. No DSF-SPC-CIV-019[High Density Polyethylene(H.D.P.E.) Pipes]

2.2 Reference Drawings

- STD-1-43-22[F.O. Conduit Cable - Manhole and Handhole]
- STD-4-41-17[Fiber Optic (F.O.) Cable Conduit Installation]

2.3 Reference Codes and Standards

- ELOT EN 1555-1[Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 1: General]
- ELOT EN 1555-2[Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 2: Pipes]
- DIN 16874[Pipes of High-Density Polyethylene (Pe-Hd) For Buried Telecommunication - Dimensions and Technical Delivery Conditions]

3. ACRONYMS

DN	Nominal Diameter
HDPE	High Density Polyethylene
IRN	Inspection Release Note

4. MATERIAL



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High Density Polyethylene is a versatile material having outstanding mechanical and chemical properties and is obtained by the polymerization of ethylene gas in varying densities ranging between 0.941 and 0.965 according to the international practice.

Usually, HDPE pipes are used in various other applications such as in water supply systems and industrial processes.

General Material Specification:

- Material HDPE Pipe
- Outside Diameter 40mm
- Inside Diameter 32.7mm
- Wall Thickness 3,7mm
- Outer structure Even
- Design Pressure 10bar
- Standard length 2m

4.1 Advantages of HDPE Pipes

The HDPE pipes must be featured by a particular set of advantages which have to be taken into consideration prior to any purchasing procedure. More specifically, HDPE pipes to be selected as follows:

- To withstand corrosion and biological attack and have to present low electrical conductivity.
- To be flexible, so it can fit to the contour of various environments, such as rough terrain without utilizing extra joints or fittings. HDPE pipe's radius of curvature is approximately 25-40 times the pipe diameter.
- To have low thermal conductivity and a low friction coefficient.

4.2 Physical Properties

Typical physical properties of HDPE pipes according to ELOT EN 1555-1 and ELOT EN 1555-2 are listed below:

Property	Test method	Unit	Requirements
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Density	ELOT ISO 1183 & ISO 17855/1	kg/m ³	≥ 0.930
Melt Mass-Flow Rate	ELOT ISO 1183	g/10 min	0.2 ≤ MFR ≤ 1.4
Oxidation Induction Time (Thermal Stability)	ELOT ISO 728	min	>20
Volatile Content	ELOT ISO 12099	mg/kg	≤ 350
Water Content	ELOT ISO 12118	mg/kg	≤ 300
Carbon Black Content	ISO/DIS 6964	% by mass	2 to 2.5
Carbon Black Dispersion	ISO 18553		Grade ≤ 3
Pigment Dispersion	Iso 18553		Grade ≤ 3
Hydrostatic Strength	EN 921	mpa	10
Resistance To Rapid Crack Propagation	ISO 13477		See Table 4 ELOT EN1555-2
Resistance to slow crack propagation	ISO 13479 & ISO 13480		See Table 4 ELOT EN1555-2
Longitudinal reversion	ELOT ISO 743	% by length	≤ 3
Resistance to weathering	ELOT EN 1056	gj/m ²	3.5
Elongation at break	ISO 6259- 1&3	mm/min	See Table 4 ELOT EN 1555-2

4.3 Technical Characteristics

The technical characteristics of the required HDPE pipes for the NGTS are the following:

Standard Length	2000m
Outside Pipe Diameter	40mm
Pipe Wall Thickness	3.7mm
SDR	11
Pipe Internal Wall Friction Coefficient with P.O. Cable	> 0.250
Pipe Design Pressure	10 bar
Pipe Colour	black



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5. TESTS

The Supplier shall perform a series of required tests at manufacture facilities, in the presence of the Purchaser, according to the referenced Technical Specifications. Appropriate certificates accompanied by the test results shall be provided to the Purchaser before the beginning of production. Certification of the raw materials and final product shall be according to the Technical Specification DSF-SPC-QAC-005.

6. TRANSPORTATION AND STORAGE

Special material precaution has to be taken while transporting and storing of HDPE pipes so that their technical characteristics to remain invariable.

The HDPE pipes should not be dragged, thrown or stacked on uneven surfaces. Whenever loading or unloading is carried out, it is recommended to be used cotton or nylon belts to avoid damage to the pipe surface. If metal slings are used, the pipe should be protected against scratches.

It is preferable to cover the pipes while transporting them over long distances involving exposure to the sun, to be avoided irregular heat distribution on the pipe circumference and therefore, in kinking or distortion.

Coils should be stored horizontally just as they are normally delivered by the factory. If it is necessary to transport them vertically and care should be taken to avoid any overloading or excess movement which may result in the deformation of the pipe.

Straight lengths of stacks should rest on a flat, clean surface, without being allowed to bend in any direction with a height not greater than 1.5 m and a width not greater than 2.0 m. In case that the pipes are delivered with ends already equipped with fittings such as flanges, couplings etc, then these pipe ends should protrude from the stack.

7. INSTALLATION



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HDPE pipe installation and jointing is described in Technical Specification DSF-SPC-CIV-017 for "P.O. Cable Conduit Installation" and in Standard Drawing No. STD-1-41-17 for "Fibre Optic (P.O.) Cable Conduit Installation".

8. QUALITY ASSURANCE

It is Contractor's responsibility to properly complete quality forms, which are applicable for the execution of said works, in accordance with the specifications and applicable standards.

Relevant quality forms and pipe certificates shall be submitted to the OWNER. IRN shall be completed/included in Certification package, where appropriate.

Electronic files of all Documents and Certificates (4 COPIES) must be submitted by Contractor to the Owner. After award of contract (before production), Contractor shall provide Manufacturers detailed test and inspection plan. This clause is not applicable to "Stocklist Supplied Pipe".