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**TECHNICAL JOB
SPECIFICATION**

499/24

REVISION 0

DATE 05/04/2011

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

HIGH DENSITY POLYETHYLENE (H.D.P.E.) PIPE

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for which it is specially furnished

QUALITY ASSURANCE PAGE

CHANGES LOG

REVISIONS LOG

0	05-04-2011	FIRST ISSUE	PQ DPT	V.G.
Rev. No	Rev. Date	REASON FOR CHANGE	Made By	Approved By

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REFERENCE DOCUMENTS

Job Spec. No. 499/19
[P.O. Cable Conduit Installation]
Job Spec. No. 970/2
[Shop Inspection of Equipment and Materials for NGT Project]
Job Spec. No. 970/3
[Inspection and Test Instructions]
Standard Drawing No. STD-1-41-17
[Fiber Optic (F.O.) Cable Conduit Installation]
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]

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1.0 **SCOPE**

1.1 **ITEM**

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

1.2 **SCOPE**

The scope of this Job Specification is with regards the description of the technical requirements and the mechanical properties of the HDPE material, in which the Fiber Optic Cable shall be installed.

1.3 **ADDITIONAL INFORMATION**

Additional information may be given in Material Requisitions and these documents should be applied in conjunction with this Job Specification.

2.0 **GENERAL PROPERTIES**

2.1 **GENERAL**

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 to 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.

2.2 **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.

2.3 **TYPICAL PHYSICAL PROPERTIES**

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

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Property	Test method	Unit	Requirements
Density	ELOT ISO 1183 & ELOT ISO 1872/1	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 EN 728	min	>20
Volatile content	ELOT EN 12099	mg/kg	≤ 350
Water content	ELOT EN 12118	mg/kg	≤ 300
Carbon black content	ISO 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 EN 1555-2
Resistance to slow crack propagation	ISO 13479 & ISO 13480		See Table 4 ELOT EN 1555-2
Longitudinal reversion	ELOT EN 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

3.0 **TECHNICAL REQUIREMENTS**

3.1 HOPE technical requirements have to be in line with the following Job Specifications (latest valid revision considered):

Job Specification 499/19

Job Specification 970/2

Job Specification 970/3

3.2 **STANDARDS**

The applicable standard for the HDPE material dimensioning and testing have to be in accordance with **ELOT EN 1555-1** and **ELOT EN 1555-2**.

3.3 **INSTALLATION DRAWING**

The installation of HDPE on site has to be in accordance with the applicable **Standard Drawing STD-1-41-17**.

3.4 **TECHNICAL CHARACTERISTICS**

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

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

4.0 TESTING

The Supplier shall perform a series of required tests at manufacture facilities, in the presence of the Purchaser, according to the referenced Job 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 **Job Specification 970/2**.

5.0 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.

6.0 SHIPMENT

All H.D.P.E. pipe shall be clean internally / externally cleaned and all ends shall be protected / plugged with plastic covers prior to any delivery at Contractor's plant.

7.0 INSTALLATION

HDPE pipe installation and jointing is described in **Job Specification 499/19** for "P.O. Cable Conduit Installation" and in **Standard Drawing No. STD-1-41-17** for "Fibre Optic (P.O.) Cable Conduit Installation".

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8.0 TECHNICAL DOCUMENTATION

8.1 QUANTITY

Four (4) copies of all documents and certificates.

Also electronic files of all Documents and Certificates must be submitted by Contractor to the Owner.

8.2 DOCUMENT REQUIREMENTS

After award of contract (before production), Contractor shall provide Manufacturers detailed test and inspection plan. This clause is not applicable to "Stocklist Supplied Pipe".

On delivery

- Pipe certification package.

- Inspection Release Note (IRN) if not completed / included in Certification Package.