

1.7 Sub-Duct

Clause/Section	Sub Clause/Sub Section	Compliance Statement	Reference to Alternative Proposal
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	1.2./Intended use		
	1.3./Type approval		
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2/Associated specifications			
3/Definitions			
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5/Material properties and test requirements	5.1./General		
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	8.3./Routine quality control test reports		
9/Packing and marking	9.1./Packing		
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10/Compliance statement	10.1./Compliance		
	10.2./Non-compliance		

9.2. MARKING

All 6 m sections of duct shall be clearly marked at 1.5 m-intervals with the following information.

- Steel duct - RL-MoT
- Manufacturer's name or trademark
- Month and year of manufacture

9.2.2 The marking shall be in an easily readable color and a minimum of 3 mm high lettering

9.2.3 The marking shall not decrease the thickness of the materials.

10. COMPLIANCE STATEMENT

The Tenderer must indicate his compliance or non-compliance with all clauses of this specification in a side by side format. There are three statements to describe compliance or non-compliance with each clause, as detailed in clauses 10.1, 10.2 and 10.3.

10.1. COMPLIANCE

The Tenderer agrees to the stated requirements without any reservation.

10.2. NON-COMPLIANCE

The Tenderer does not meet the respective item or clause. The reason for non-compliance shall be stated.

10.3. NON-COMPLIANCE WITH ALTERNATIVE PROPOSAL

The Tenderer does not meet the provisions of the clause but offers an equivalent alternative which shall be fully documented with supporting evidence.

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SUB-DUCT

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REVISION REFERENCE SHEET

CLAUSE	DATE	COMMENTS
1		GENERAL
1.1		SCOPE
1.2		INTENDED USE
1.3		TYPE APPROVAL
1.4		RESERVED RIGHTS

This specification covers the minimum standards and requirements for the construction, properties, testing and packing of sub-duct for use in the telecommunications network of the Republic of Lebanon.

1.2 INTENDED USE

Sub-duct, which is 32 mm outside diameter, is used in the underground duct network as a liner for 100 mm outside diameter main conduit. Compliant with MAT 2201. The sub-duct allows the placement of a number of small diameter cables in the one duct. Up to 3 sub-ducts may be placed in the one duct.

1.3 TYPE APPROVAL

Tenders who have not previously supplied under this specification (or who have made changes to prior supplied products) shall submit a product sample if available for approval. An interim type approval may be granted on the basis of a compliance statement and other information from the manufacturer. Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

The Ministry can not guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copy right or patent of a third party.

The Ministry reserves the right to make changes to the Specification without further notice.

End of Section

2 ASSOCIATED SPECIFICATIONS

The following unattached international and/or national standards shall be applied, and deemed to be an integral part of this specification.

DIN 8074	High Density Polyethylene (HDPE) pipes Dimensions
DIN 8075	High Density Polyethylene (HDPE) Pipes - General Quality Requirements - Testing
ASTM D 792	Standard test method for specific gravity (relative density) and density of plastics by displacement
ASTM D 1603	Standard test method for carbon black in olefin plastics
ASTM D 2444	Standard test method for impact resistance of thermoplastic pipe and fittings by means of a Falling tup (falling weight)
ASTM D 3350	Standard specification for polyethylene plastics pipe and fittings materials
ISO 9002	Quality systems - Model for quality assurance in production and installation
MAT 2201	Polyvinylchloride (PVC) ducts
MAT 2202	Polyvinylchloride (PVC) duct fittings

End of Section

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3 DEFINITIONS

The following definitions shall apply throughout the specification:

The MoT The Ministry of Telecommunications of the Republic of Lebanon
The Tenderer The individual or establishment submitting an offer or offers to supply subduct
Manufacturer The organization responsible for the actual production of sub-duct. Not a trading company or other intermediary.
Supplier The successful individual or establishment who is awarded a contract to supply materials and equipment
The Inspector(s) The officer(s) acting on behalf of the MoT for the inspection and testing of materials during manufacture and at the time of receiving materials
Main Duct Polyvinylchloride (PVC) duct of 100 mm outer diameter compliant to MAT 2201.
HDPE High density polyethylene, i.e. Polyethylene with a density greater than 0.94 g/cm ³ .

End of Section

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4 DESIGN REQUIREMENTS

4.1 GENERAL

This section describes the sub-duct and mini duct

4.2 LONG TERM PERFORMANCE REQUIREMENTS

Sub-Duct shall be designed, manufactured and packaged so that exposure to the environmental conditions of Lebanon during storage, transport, installation and operation and the environmental conditions to be expected during storage and transport outside Lebanon shall not degrade the physical or operation and maintenance characteristics of the sub-duct.

The environmental conditions of Lebanon may include ambient air temperature variations from -15°C to $+37^{\circ}\text{C}$. In addition direct solar radiation is known to increase the temperature of some outside plant to $+52^{\circ}\text{C}$.

4.3 MANUFACTURING STANDARD

The sub-duct shall be manufactured according to the requirements detailed in this specification, DIN 8074 and DIN 8075 or equivalent. In the event of a conflict the requirements of this specification shall take precedence.

4.4 RAW MATERIAL

The polyethylene used in the manufacture of the sub-duct and shall be HDPE complying with the requirements of clause 5.3.

4.5 DIMENSIONS

4.5.1 The sub-duct shall have a wall thickness of 2 mm and an outer diameter of 32mm

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4.6 BORE DESIGN

4.6.1 The inner walls of the sub-duct can be either smooth or, if agreed to by the MoT, longitudinally ribbed to improve the frictional properties of the bore.

4.6.2 If ribbed, the ribs shall not protrude into the bore by more than 0.4 mm unless written permission has been received from the MoT.

4.6.3 The ribs shall be rounded and shall reduce the frictional forces between the cable and the sub-duct

4.7 ALTERNATIVE DESIGN

Tenderers may submit for approval multi tube designs, i.e. designs where more than one sub-duct are joined by a flexible web.

4.8 SUPPLY LENGTHS

Sub-duct shall generally be supplied in lengths of 300 \pm 5 m, unless otherwise requested or agreed.

End of Section

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5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

5.1.1 This section specifies the sub-duct material, physical, chemical, environmental and mechanical requirements and the tests to be applied for the determination of these requirements.

5.1.2 The requirements of this section refer to completed sub-duct, or material removed from completed sub-duct unless identified otherwise.

5.1.3 All materials used in the sub-duct shall be non-toxic and dermatologically safe.

5.2 TEST AND REPORT REQUIREMENTS

5.2.1 In order to assure the quality of purchased sub-duct tenders are required to supply type approval and routine quality control test results and reports.

5.2.2 TYPE APPROVAL TESTING

5.2.2.1 Type approval test results, samples and reports are required for acceptance of new designs and materials and following modifications to existing designs and materials. These test results are intended to assure the MoT that products have been designed to provide fault free service for the required life of the sub-duct.

5.2.2.2 Type approval shall not be granted until a type approval sample has been evaluated by the MoT. In the event that appropriate samples are not available until manufacture an interim type approval may be granted on the basis of a compliance statement and other information from the manufacturer. However a sample must be submitted and approved by the MoT for type approval prior to delivery.

5.2.2.3 Tenderers are advised not to proceed with manufacture until written type approval or interim type approval has been given by the MoT for all type approval requirements of this specification.

5.2.2.4 Tenderers are required to ensure that supplied sub-duct complies fully with the type approval requirements. Although the MoT may designate tests as type approval the tenderer may find it necessary to perform some of the tests on a regular Quality Control basis.

5.2.2.5 Type approval tests and measurements are identified by (TA).

5.2.2.6 Type approval samples shall be 5m of sub-duct.

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are the tests used on a regular basis, such as every delivery length, to assure the MoT that manufactured items conform to specification and that the manufacturing process is under control. Routine Quality Control tests are identified by (QC). Testing frequencies are detailed in Section 8. Unless stated otherwise sample sizes shall be at least 5 samples.

5.3 POLYETHYLENE RAW MATERIAL

5.3.1 The polyethylene shall be a HDPE complying with the raw material requirements of DIN 8075.

5.3.2 The tenderer shall state the name of the manufacturer of the basic compounds and the types and quantities of additives. In addition the tenderer shall supply a copy of the manufacturer's data sheet and a statement from the supplier that the polyethylene is acceptable for the manufacture of pipe and suitable for transportation, storage and service in the Republic of Lebanon.

5.4 FINISHED PRODUCT

5.4.1 LONG TERM STABILITY

The sub-duct shall be able to pass all the tests prescribed or referred to by this specification following one year of external storage in the conditions of Lebanon.

5.4.2 DENSITY (TA)

Polyethylene density shall be greater than 0.94 g/cm³ when measured according to the methods of ASTM D 792.

5.4.3 CARBON BLACK (TA)

The polyethylene shall contain 2.5 ± 0.5 % well dispersed carbon black, when tested according to ASTM D 1603.

5.4.4 INDUCTION TEMPERATURE (TA)

Polyethylene removed from finished sub-duct shall have an induction temperatures of at least 220°C when tested according to the method detailed in ASTM D 3350. Tenderers may use alternative methods to verify the stabilisation of the sub-duct if agreed to by the MoT.

5.4.5 IMPACT TEST (TA)

The sub-duct shall be tested for impact resistance according to the method detailed in ASTM D 2444. The test parameters shall be:

Weight = 9 kg Typ Type B
Height of drop = 1.5 meters.

5.4.5.2

The sub-duct shall be rejected if two or more samples out of ten have cracks which can be seen with the naked eye.

5.4.6 STRESS CORROSION CRACKING (TA)

The resistance to stress corrosion cracking shall be tested according to the following method or an alternative method agreed to by the MoT.

Five samples shall be formed into a U shape around a mandrel 10 times the outside diameter of the sample. The bent portion of the U shall be placed in a solution of 10% Igepal CO-630 at $50 \pm 2^\circ\text{C}$ for seven days.

The specimen shall have adequate stress corrosion cracking resistance if there are no cracks visible in the five samples on removal from the solution.

5.4.7 COMPLIANCE WITH DIN 8074 AND DIN 8075 (TA, QC)

The tenderer shall submit test results to verify that the sub-duct complies with all requirements of DIN 8074 and DIN 8075.

End of Section

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

7.1.1 Manufacturers of sub-duct conforming to this specification may be required to show evidence that the product has been manufactured according to a Quality System preferably conforming to ISO 9002, ISO 9003 or a national equivalent which has been approved by MoT.

7.1.2 Manufacturers may be required to supply a copy of the Quality Manual at the time of tender, which shall be utilised for the manufacture and delivery of sub-duct complying to this specification.

7.1.3 The MoT may require the manufacturer to be accredited to the above standards either by MoT personnel or assessors acting on behalf of the MoT.

7.2 INSPECTION

7.2.1 The MoT or its authorised representatives(s) may inspect the Tenderer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.

7.2.2 If requested by MoT the tenderer shall supply evidence of the quality of raw materials and components used in the manufacturing process.

7.2.3 All sub-duct manufactured to this specification may be inspected and tested by MoT to check compliance.

7.2.4 The inspector reserves the right to request proof of compliance with this specification, either by witnessing actual performance of this specification's prescribed tests and/or the provisioning of documented test results at the discretion of the inspector.

7.2.5 In the case of a dispute, testing shall be performed by an independent authority at the expense of the tenderer.

End of Section

8 SUMMARY OF REPORTS AND TESTING OF FREQUENCY**8.1 GENERAL**

8.1.1 The two categories of test reports required, i.e. Type Approval and Quality Control, are detailed in clause 5.2.

8.1.2 REPORT FORMAT

8.1.2.1 All reports submitted shall include the following details:

Manufacturers name
Project number

Quality Control reports shall also include

Date of delivery

Identification of sub-duct and mini duct included in the report

8.1.2.2 The report shall detail all results in the same order and shall refer to the relevant clause of Section 8.

8.2 FREQUENCY OF TYPE APPROVAL TESTS, SAMPLES AND REPORT REQUIREMENTS

8.2.1 Type Approval test results and samples shall be submitted as follows:

1. At the time of tender for each type and size of sub-duct which has not been given Type Approval, or
2. Prior to delivery of any sub-duct and mini duct which does not have Type Approval and
3. At least once every 12 months, unless agreed otherwise.

8.2.2 COMPLIANCE STATEMENT

Tenderers shall supply a clause by clause compliance statement, with the complete specification, in a side by side format as required by section 10.

8.2.3 Manufacturers data sheet for raw material, clause 5.3.2

8.2.4 Statement by the manufacturer to verify the suitability of the raw material, clause 5.3.2.

8.2.5 Density test, clause 5.4.2

8.2.6 Carbon black content, clause 5.4.3.

8.2.7 Results of induction temperature, clause 5.4.4.

8.2.8 Results of impact test, clause 5.4.5.

8.2.9 Results of stress corrosion cracking, clause 5.4.6.

8.3 ROUTING QUALITY CONTROL TEST REPORTS

8.3.1 The manufacturer shall submit the following Quality Control test reports with each delivery.

8.3.2 Results of tests to confirm compliance with DIN 8074 and DIN 8075, clause 5.4.7.

End of Section

9 PACKING AND MARKING

9.1 PACKING

9.1.1 Each length of sub-duct shall be delivered on individual coils, with minimum internal coil diameter 30 times the sub-duct outside diameter or, if requested, on individual drums with minimum barrel diameter 30 times the duct outside diameter.

9.1.2 The drums or coils shall be sufficient to protect the sub-duct from damage during handling, storage and transportation by land, sea and air.

9.2 MARKING

9.2.1 The drums and coils shall be tagged with 2 aluminium marking plates with the following information in both Arabic and English:

MINISTRY OF T. (MoT)
HDPE SUB-DUCT SIZE (Inside/Outside diameters in mm)
LENGTH
MANUFACTURERS NAME OR TRADEMARK
DATE OF MANUFACTURE

9.2.2 The mini duct only shall be marked at 1 m intervals with:

- Meters (length)
- RL-MoT

9.2.3 The marking shall be in an easily readable colour with 3 mm high lettering.

9.2.4 The marking shall not decrease the thickness of the materials by more than 0.3 mm.

End of Section

10 COMPLIANCE STATEMENT

The tenderer must indicate his compliance or non-compliance with all clauses of this specification in a side by side format. There are three statements to describe compliance or non-compliance with each clause, as detailed in clauses 10.1, 10.2 and 10.3.

10.1 COMPLIANCE

The tenderer agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

The tenderer does not meet the respective item or clause. The reason for the non-compliance shall be stated.

10.3 NON-COMPLIANCE WITH ALTERNATIVE PROPOSAL

The tenderer does not meet the provisions of the clause but offers an equivalent alternative which shall be fully documented with supporting evidence.

End of Specification