



DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

MANILA, PHILIPPINES

GENERIC SPECIFICATION REV. 01

DICTEM - 1005

DUCT FITTINGS AND ACCESSORIES

Volume NBP OSP 07

DUCT FITTINGS AND ACCESSORIES

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REVISION AND ADDENDUM REFERENCE SHEET

SECTION	PARAGRAPH	DATE	COMMENTS
			Initial Issue

1 GENERAL

1.1 SCOPE

1.1.1 This specification covers the minimum standards and requirements for the construction, properties, testing and packing of PVC duct fittings and accessories.

1.1.2 The fittings included in this specification are:

Bend (90° - 2000mm radius)

Bend (45° - 2000mm radius)

Bend (90° - 1000mm radius)

Bend (45° - 1000mm radius)

Double Bell Coupling (0°)

Double Bell Coupling (5°)

Socket Bank (Terminator)

Sleeve

Split Duct

1.1.3 The accessories included in this specification are:

Duct plug

Sub duct anchor

Sub duct joint sleeve

Mini duct joint sleeve

Duct sealing putty

Duct Draw Cord

1.2 INTENDED USE

The fittings and accessories included in this specification shall be used with ducts compliant with DICTEM-1003 and DICTEM-1004.

1.3 TYPE APPROVAL

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

1.4 RESERVED RIGHTS

- 1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.
- 1.4.2 DICT reserves the right to make changes to the specification without advance notice.

2 ASSOCIATED SPECIFICATIONS

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

DICTEM-1003	Polyvinylchloride (PVC) ducts.
DICTEM-1004	Sub-duct and mini duct.
SAS 14	Pipes for potable water of unplasticized plastic.
SAS 15	Methods of testing of pipes for potable water of unplasticized plastic.
ISO 9002	Quality systems - Model for quality assurance in production and installation.

3 DEFINITIONS

The following definitions shall apply throughout the specification:

DICT

Department of Information and Communications Technology.

The Bidder

The individual or establishment submitting an offer or offers to supply PVC duct fitting.

Manufacturer

The organization responsible for actual production of PVC duct fitting. 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 DICT for the inspection and testing of materials during manufacture and at the time of receiving materials.

4 DESIGN REQUIREMENTS

4.1 GENERAL

This section describes the design of the duct fittings and accessories.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

4.2.1 The PVC duct fittings and accessories supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines for a period of thirty years without detriment to the operation and maintenance characteristics.

4.2.2 PVC duct fittings and accessories shall be designed, manufactured and packaged so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation and the environmental conditions to be expected during storage and transport inside the country shall not degrade the physical or operation and maintenance characteristics of the PVC duct fittings and accessories.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30° to 38°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 DESIGN OF FITTINGS

4.3.1 GENERAL

4.3.1.1 The joining of two ducts with duct bends or with bell couplings shall provide a water tight joint.

4.3.1.2 All PVC duct fittings shall comply with all relevant requirements of SAS 14.

4.3.1.3 The fittings shall be produced to fit the PVC duct described in DICTEM-1003.

4.3.2 DUCT BENDS

4.3.2.1 The following bends shall be supplied:

Bend (90° - 2000mm radius)

Bend (45° - 2000mm radius)

Bend (90° - 1000mm radius)

Bend (45° - 1000mm radius)

4.3.2.2 The bends shall be provided with bell and spigot ends and have a 150mm straight extension on the ends. The spigot end shall be chamfered to produce a 15° beveled edge along the outer circumference. The length of the straight part of the bell shall be at least 80 mm.

4.3.2.3 The 90° bends shall bear a mark where they can be cut into two equivalent 45° bends.

4.3.3 DOUBLE BELL COUPLING

4.3.3.1 Double Bell Coupling (0°)

The Double Bell Coupling (0°) is used to connect two spigot ended ducts straight through.

4.3.3.2 Double Bell Coupling (5°)

The Double Bell Coupling (5°) is used to connect two spigot ended ducts and also to provide a 5° directional change to the duct run.

4.3.3.3 The Double Bell Couplings shall be at least 200mm total length with an inner ridge in the middle to act as a stopper for the duct.

4.3.4 SOCKET BANK

4.3.4.1 The Socket Bank is used for manhole and hand-hole entries. The Socket Bank will be encased into the manholes and the hand-holes to allow for later connection of the PVC ducts to the manholes and the hand-holes.

4.3.5 SLEEVE

4.3.5.1 The Sleeve is used to provide a repair sleeve over a damaged PVC duct. It can also be used to provide a strong straight coupling between two straight (spigot) ends of ducts.

4.3.5.2 The Sleeve is a straight PVC tube at least 3000mm of length with an inner diameter to fit over the outer diameter of the PVC duct (i.e. 110mm).

4.3.6 SPLIT DUCT

4.3.6.1 The split duct is a suitable length of two fabricated half duct sections where the two halves are tongued and grooved on the edges. The split duct is used as a repair kit for damaged duct sections. The two halves are placed outside the normal ducts and clamped together by use of cable strips or steel band.

4.4 DESIGN OF ACCESSORIES

4.4.1 DUCT PLUG

4.4.1.1 The duct plug shall be a mechanical device used to seal the duct from the entry of water. It shall be able to be installed and removed by simple hand tools.

4.4.1.2 The plugs shall be designed so as to accommodate the tolerances of manufacture of the PVC duct types into which they shall be installed, The dimensions are described in DICTEM-1003 (PVC duct) and DICTEM-1004 (Sub-duct and Mini-duct).

4.4.1.3 The method of installation shall not be hazardous to either personnel or adjacent cables.

4.4.1.4 It shall be possible to remove any plug without damage to either duct or cable.

4.4.1.5 An 'eye' shall be provided on the inner side of the plug, to which a draw cord can be attached.

4.4.2 SUB-DUCT ANCHORAGE

4.4.2.1 The sub-duct anchorage shall anchor sub-ducts in the ends of the PVC ducts.

4.4.2.2 It shall be possible to secure four sub-ducts in the anchorage. The sub-duct dimensions are described in DICTEM-1004.

4.4.2.3 The anchorage shall form an effective water tight seal to sub-ducts and the PVC duct in which the anchorage shall be installed.

- 4.4.2.4 The anchorage shall be removable without major effort to permit the sub-duct to be re-installed.
- 4.4.2.5 The anchorage shall be easily installed using standard tools.
- 4.4.3 SUB DUCT JOINT SLEEVE
- 4.4.3.1 The sub duct joint sleeve shall be used for jointing the sub ducts specified in DICTEM-1004. Different models shall be provided for different sub ducts.
- 4.4.3.2 The joint sleeve shall be made of plastic material. The inside dimensions of the sub duct shall not be decreased and the joint shall maintain 80% of the pulling strength of the sub duct.
- 4.4.4 MINI DUCT JOINT SLEEVE
- 4.4.4.1 The mini duct joint sleeve shall be used for jointing the mini duct specified in DICTEM-1004.
- 4.4.4.2 The joint sleeve shall be made of plastic material. The inside dimensions of the mini duct shall not be decreased and the joint shall maintain 80% of the pulling strength of the mini duct.
- 4.4.5 DUCT SEALANT
- 4.4.5.1 The duct sealant is used to seal ducts which have cables installed. The duct sealant shall be capable of sealing more than one cable per duct.
- 4.4.5.2 The installation shall require the minimum of preparation of duct and cable to produce the sealing requirement.
- 4.4.5.3 The sealant shall be a suitable putty and be easily removable to allow the installation of additional cables.
- 4.4.5.4 The installed sealant shall effectively seal the duct from the entry of water.
- 4.4.6 DUCT DRAW CORD
- 4.4.6.1 The duct draw cord shall be installed in unoccupied ducts and sub-ducts and be of sufficient strength to enable pulling in of pulling ropes for the maximum manhole or hand-hole span length of up to 450m.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

- 5.1.1 This section specifies the PVC duct fitting material, physical, chemical, environmental and mechanical requirements and the tests to be applied for the determination of compliance to these requirements.
- 5.1.2 The requirements of this section refer to completed PVC duct fitting, or material removed from completed PVC duct fitting unless identified otherwise.
- 5.1.3 All materials used in the PVC duct fitting shall be non-toxic and dermatologically safe.

5.2 TEST AND REPORT REQUIREMENTS

- 5.2.1 In order to assure the quality of purchased PVC duct fitting, Bidders 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 DICT that products have been designed to provide fault free service for the required life of the PVC duct fitting.
- 5.2.2.2 Type Approval shall not be granted until a Type Approval sample has been evaluated by DICT at the factory. In the event that appropriate samples are not available from the manufacturer, 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 approved by DICT for Type Approval prior to delivery.
- 5.2.2.3 Bidders are advised not to proceed with manufacture until written Type Approval or interim Type Approval has been given by DICT for all Type Approval requirements of this specification.
- 5.2.2.4 Bidders are required to ensure that supplied PVC duct fitting complies fully with the Type Approval requirements. Although DICT may designate tests as Type Approval, the Bidder 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

Type Approval samples shall include, unless agreed otherwise:

- One sample of each fitting and accessory

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are the tests used on a regular basis to assure DICT 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.

5.3 RAW MATERIAL

The PVC duct fitting shall be made of virgin unplasticized, polyvinylchloride (PVC).

5.4 TESTS

The duct fittings shall comply with all test requirements of SAS 15.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required in this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

- 7.1.1 Manufacturers of PVC duct fittings 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 or a national equivalent which has been approved by DICT.
- 7.1.2 Manufacturers may be required to supply a copy of the Quality Manual at the time of tender, which shall be utilized for the manufacture and delivery of PVC duct fittings complying with this specification.
- 7.1.3 DICT may require the manufacturer to be accredited to the above standards either by DICT personnel or assessors acting on behalf of DICT.

7.2 INSPECTION

- 7.2.1 DICT or its authorized representatives(s) may inspect the Manufacturer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.
- 7.2.2 If requested by DICT, the Bidder shall supply evidence of the quality of raw materials and components used in the manufacturing process.
- 7.2.3 All PVC duct fittings manufactured to this specification may be inspected and tested by DICT 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 Bidder.

8 SUMMARY OF REPORTS AND TESTING 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:

Manufacturer's name
Project number

Quality Control reports shall also include:

Date of delivery

Identification of fittings and accessories 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 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 fittings and accessories which has not been given Type Approval or
2. Prior to delivery of any fitting and accessory that does not have Type Approval.

8.2.2 COMPLIANCE STATEMENT

Bidders 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 Evidence that the fittings will be manufactured according to SAS 14.

8.2.4 Complete installation instructions and description of the accessories.

8.3 ROUTINE QUALITY CONTROL TEST REPORTS

Evidence to verify compliance with SAS 14 & 15 for the fittings shall be submitted with each delivery unless agreed otherwise.

Unless stated otherwise there is no requirement for Quality Control test reports for accessories.

9 PACKING AND MARKING

9.1 PACKING

The fittings and accessories shall be sufficiently packaged to prevent damage during normal handling and storage.

All fittings and accessories packaged for manual handling may be multi-packed to a maximum weight of 25kg.

Each package shall be marked as below with the following information in English:

DICT, Department of Information and Communications Technology

Duct fittings or Duct accessories (whatever applies)

Manufacturer's Name or trademark

Month and year of manufacture

10 **COMPLIANCE STATEMENT**

The Bidder 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 Bidder agrees to the stated requirements without any reservation.

10.2 **NON-COMPLIANCE**

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



DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

MANILA, PHILIPPINES

GENERIC SPECIFICATION REV. 01

JOINT ENCLOSURES FOR OPTICAL FIBER CABLES

Volume NBP OSP 02

JOINT ENCLOSURES FOR OPTICAL FIBRE CABLES

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REVISION AND ADDENDUM REFERENCE SHEET

SECTION	PARAGRAPH	DATE	COMMENTS
N/A	N/A	11 February 2020	First Issue

UNCONTROLLED WHEN PRINTED OR EMAILED

1 GENERAL

1.1 SCOPE

1.1.1 This specification covers the minimum standards and requirements for the construction, properties, testing and packing of joint enclosures to be used on the backbone and access optical fiber cable network of DICT.

1.1.2 Two materials of enclosure are included in this document for testing purposes:

1.1.2.1 Material S - small enclosure with at least 3 splice organizers, intended for up to 4 cables and a total of up to 36 fibers.

1.1.2.2 Material L - large enclosure with up to 12 splice organizers, intended for up to 4 cables of up to 48 fibers each.

1.2 INTENDED USE

Joint enclosure systems purchased in compliance with this specification shall be installed either in manholes, hand-holes, in wooden or steel poles or in cable vaults. The joint enclosure may be exposed to severe environmental conditions such as high temperatures and corrosive ground water.

1.3 MATERIAL APPROVAL

1.3.1 Vendors who have not previously supplied under this specification (or who have made changes to prior supplied products) shall submit a product sample for approval.

1.3.2 An interim Material Approval may be granted on the basis of a compliance statement and other information from the manufacturer.

1.3.3 Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.

1.4.2 DICT reserves the right to make changes to the specification without advance notice.

2 ASSOCIATED SPECIFICATIONS

The following unattached international and national standards shall be applied and deemed to be an integral part of this specification:

ASTM D1603	Standard test method for carbon black in olefin plastics.
ASTM D1693	Standard test method for environmental stress cracking of ethylene plastics.
ASTM E 390	Standard reference radiographs for steel fusion welds.
DIN 53495	Testing of plastics; determination of water absorption.
IEC 68	Environmental Testing
IEC 68-2-6	Test Fc and guidance: Vibration (sinusoidal)
ISO 62	Plastics - Determination of the water absorption
ISO 175	Plastics; determination of the effects of liquid chemicals, including water.
ISO 527	Test method to determine the tensile elongation properties of plastic materials.
ISO 846	Plastics-Determination of behavior under the action of fungi and bacterial evaluation by visual examination or measurement of change in mass or physical properties.
ISO 868	Plastics and ebonite - Determination of indentation hardness by means of a durometer (shore hardness)
ISO 1133	Determination of the melt flow rate of thermoplastics
ISO 1431	Rubber vulcanized or thermoplastic - resistance to ozone cracking
ISO 1653	Vulcanized rubbers - Determination of compression set under constant deflection at low temperatures.
ISO 4587	Adhesives - Determination of the tensile lap-shear strength of high strength adhesive bonds
ISO 9002	Quality systems - Model for quality assurance in production and installation.
VDE 0303	Test methods for DC resistance or conductance of insulating materials.



3 DEFINITIONS

The following definitions shall apply throughout this specification:

DICT

Department of Information and Communications Technology

Inspector(s)

The officer(s) acting on behalf of DICT, with regards to the inspections and tests of materials during manufacture and at the time of receiving materials.

Vendor

The individual or establishment submitting an offer to supply joint enclosures.

Manufacturer

The organization responsible for the actual production of joint enclosures and not a trading company or other intermediary.

Supplier

The successful individual or establishment, who is awarded a contract to supply materials and equipment.

Joint Enclosure

An enclosure or sleeve which provides mechanical and environmental protection to the jointed fibers and restores completely the sheath integrity of the optical fiber cable.

Bond Clamp

A screen connecting clip which is attached to the moisture barrier sheath to make an electrical connection.

Organizer

A tray, cassette or similar system designed to neatly contain fiber splices and spare fiber lengths for possible future splicing requirements.

Fiber Splice Protection

The splice protector is a metal or plastic sleeve which protects the exposed fiber on both sides of the fusion splice.



Fiber

The drawn coated optical fiber.

Loose Tube

The loose tube which surrounds the primary coated fiber; may also be referred to as secondary containment.

Moisture Barrier

The metallic tape or non metallic barrier which surrounds the cable core.

Strength Member

The component of assembled cable which is designed to withstand all forces to which the cable is likely to be subjected.

4 DESIGN REQUIREMENTS

4.1 GENERAL

4.1.1 The optical joint enclosure shall:

- completely restore the sheath integrity of the cables
- provide a hermetically sealed interior environment
- provide secure storage for the fiber splices
- be re-enterable several times and replaceable without interrupting service and by the use of standard joiner tools

4.1.2 The enclosure system shall include all necessary parts to complete the joint. This will comprise all components to protect and store the spliced fiber, store excess fibers, provide sheath continuity, anchor the strength member(s) and secure the cable sheath. If support is required to install the enclosure on manhole cable bearers, this shall also be included in the kit.

4.1.3 The design of the joint enclosure shall be such that one skilled technician can safely manage the installation of it.

- 4.1.4 The design of the joint enclosure shall allow minor deviations from the described installation procedure without any harm to the fibers and the long term performance of the installation.
- 4.1.5 The enclosure should be compatible with relevant existing DICT installation standards and practices.
- 4.1.6 The enclosure shall be sufficiently sturdy to withstand typical installation and operation and handling without damage.
- 4.1.7 The humidity inside the joint enclosure shall not exceed 75% relative humidity within the expected lifetime of thirty years.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

- 4.2.1 The environmental conditions of The Philippines may include ambient air temperature variations from 30°C to 38°C. In addition, direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 JOINT ENCLOSURE COMPONENTS

4.3.1 ENCLOSURE

- 4.3.1.1 The enclosure may be of one of the following designs:

- a) A one or two piece shell, clamping around circular end plates. The end plates shall separate along the cable entry line. The end plates may have pre drilled holes or be drilled during installation. The cable entries and the shell shall be sealed with heat shrink sleeves or a gasket material. The shell and its end plates shall be made of non-metallic material.
- b) A butt splicing enclosure of dome base Material. The enclosure shall be sealed by use of heat shrink sleeve or a clamp device with a rubber gasket. The cable entries shall be sealed with heat shrink sleeves. The enclosure shall be made of non-metallic material.
- c) A square metallic enclosure sealed by a rubber gasket and screws. The cable entries shall be sealed with heat shrink sleeves.
- d) A circular metallic enclosure sealed with a rubber gasket and a clamp device. The cable entries shall be sealed with heat shrink sleeves.

- 4.3.1.2 For all the enclosure designs, it shall be possible to make a butt joint, i.e. all the cables shall enter the enclosure in one end.

4.3.1.3 Enclosures of non metallic material shall preferably be of polypropylene conforming to the requirements of paragraph 5.3.

4.3.1.4 Enclosures of metallic material shall be of stainless steel conforming to the requirements of paragraph 5.4.

4.3.2 FIBER ORGANIZER CASSETTES

4.3.2.1 Each cassette shall have the capacity to secure at least ten fiber splices. Fibers shall be completely retained within the cassette, with no possibility of trapping, pinching or other damage to the fibers during assembling.

4.3.2.2 The cassettes shall accommodate at least 1.5m of spare fiber on either side of the splice. The design of the cassette shall ensure that the fiber shall not be bent to a radius $\leq 35\text{mm}$.

4.3.2.3 The cassette shall include a mechanism to secure the loose tubes. The connection shall ensure that no movement or strain is induced in the fibers when the cassette is handled.

4.3.2.4 The cassettes shall allow for the connection of fibers, in loose tubes, between the cassettes.

4.3.2.5 A retaining mechanism shall be provided to secure the splice protection without movement within the confines of the cassette. The retaining mechanism shall be resistant to vibration.

4.3.2.6 It shall be possible to remove splices from the cassette without affecting the remaining splices or fibers.

4.3.3 FIBER SPLICE PROTECTORS

4.3.3.1 The protector shall restore the mechanical integrity of the fiber and shall not create any residual forces in the fiber.

4.3.3.2 The protectors may be a suitable plastic heat shrinkable material with an internal stainless steel rod for tension relief.

4.3.4 SECURING MECHANISM AND ELECTRICAL CONTINUITY

4.3.4.1 The enclosure shall be able to secure all optical fiber cables which are compliant with the relevant DICT cable specifications.

4.3.4.2 Electrical continuity of metallic moisture barriers shall be provided by the use of suitable bond clamps and earth wires or the enclosure chassis.



4.4 TOOLS AND ACCESSORIES

- 4.4.1 No special tools shall be required for the opening and closing of the enclosures.
- 4.4.2 Details of any special tools required for installing or maintaining the enclosures shall be provided to DICT.
- 4.4.3 The joint enclosure shall be provided with sufficient drying agent to ensure that the relative humidity of the enclosure shall not exceed 75% for the required life time of the enclosure.

4.5 ALTERNATIVE DESIGNS

Vendors may submit details of joint enclosures with alternative designs and materials to those specified in this specification, for consideration by DICT. The submission shall be supported by evidence to verify the enclosures suitability and full details of all Material Approval and Quality Control test which the manufacturer would apply.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

- 5.1.1 This section specifies the joint enclosure and its material physical, chemical environmental and mechanical requirements and the tests to be applied for the determination of compliance to these requirements.
- 5.1.2 The requirements of this section refer to the finished product, or material removed from the finished product unless specifically identified otherwise.
- 5.1.3 Vendor shall then submit proposals for Material Approval and Quality Control tests to be evaluated by DICT.
- 5.1.4 The materials of the enclosure system shall be compatible with all cable components and splicing materials.

5.1.5 WORKMANSHIP

- 5.1.5.1 All components of the enclosure shall be of high quality design, workmanship, and finish.



- 5.1.5.2 All components shall be free of pinholes, cracks, sharp edges or other defects which may detract from the service requirements of the enclosure.
- 5.1.5.3 All metal and plastic welds shall be of high standard of workmanship. In accordance with ASTM E390, no ungraded defects nor graded defects greater than grade 1 shall be permitted.

EXTERNAL PLASTIC MATERIALS

- 5.1.5.4 All external plastic materials shall be colored black and shall be resistant to petroleum and soil micro organisms.
- 5.1.5.5 All external plastic and sealing materials shall be inhibited against ultraviolet degradation.
- 5.1.5.6 The components of the enclosure exposed to the environment shall be resistant to petroleum distillates, soil fungi and micro organism.

5.1.6 MATERIAL TOXICITY

The components of enclosure and its accessories shall not contain any hazardous or toxic materials.

5.2 TEST REQUIREMENTS

In order to assure the quality of purchased product, vendors are required to supply results of two materials tests, Material Approval and Routine Quality Control.

5.2.1 MATERIAL APPROVAL TESTING

- 5.2.1.1 Material approval test results are required for acceptance of new designs and materials and following modifications to existing designs and materials. These test results are intended to ensure DICT that products have been designed to provide fault free service for the required service life.
- 5.2.1.2 Material approval shall not be granted until a material approval sample has been evaluated by DICT.
- 5.2.1.3 Vendors are advised not to proceed with the manufacturing until written Material Approval has been given by DICT for all Material Approval requirements of this specification.

5.2.1.4 Vendors are required to ensure that supplied products fully comply with the material approval requirements. Although DICT may designate tests as material approval, the vendor may find it necessary to perform some of these tests on a regular Quality Control basis.

5.2.1.5 Material approval tests and measurements are marked (TA).

5.2.2 MATERIAL APPROVAL SAMPLES

Material approval samples shall include at least 2 complete kits for each material, one with cables fitted and the other unused, and the manufacturers assembly instructions.

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are those performed on a regular basis to ensure DICT that the manufactured items conform to specification and the manufacturing process is under control.

5.3 PLASTIC MATERIAL

5.3.1 Enclosure of plastic shall preferably be made of high quality polypropylene conforming to the properties and shall be tested according to Table 5.1.

5.3.2 If other materials are used, adequate documentation shall be submitted to verify that the materials are at least equivalent to polypropylene.

Properties	Requirement	Test Method	Notes
Tensile Strength	25 MPa	ISO 527	Specimen cut from freely recovered material with die 4#. Jaw separation rate: 50 mm/min.
Ultimate Elongation	500%	ISO 527	
Thermal Aging - Tensile Strength - Elongation	14 MPa 300%	ISO 527	Specimens conditioned for 168 hrs @ 150° C ± 2° C in circulating air oven, air velocity 30 to 60 m/min.
Soil Chemical Resistance - Tensile Strength - Elongation	14 Mpa 300%	ISO 527	Specimens conditioned in the following test solutions for 24 hrs @ 23° C + 2° C. Na ₂ SO ₄ , NaOH, H ₂ SO ₄ , NaCl: Strength 0.1 N Fuel Oil. (Min. fluid volume: 20% test sample).
Water Absorption	< 0.1%	DIN 53495	Method C. Immersion for 24 hrs @ 23° + 2° c.
Fungus Resistance	Pass rating 1	ISO 846 Method A	
Environmental Stress Cracking	No Cracking	ASTM D 1693	Initiator: 10% Igepal CO-630. Immersion for 30 days @ 50° + 2° C.
Carbon Black Content	2.5% ± 0.5	ASTM D 1603	

Table 5.1 Material Approval Tests on Enclosure Plastic Material.



5.4 METAL COMPONENTS

- 5.4.1 All external metal components shall be Type 316 stainless steel or metal with equivalent corrosion resistance.
- 5.4.2 All internal metal components shall be suitably protected against corrosion.
- 5.4.3 The Vendor shall give full documentation on relevant tests for the metal material used in the proposed joint enclosure.

5.5 SEALING MATERIAL

- 5.5.1 All gaskets shall be of material suitable for the application. Evidence shall be submitted at type approval to verify the suitability of the gasket.
- 5.5.2 Materials used for the cable entry seals, e.g. butyl putties, twin component epoxies, shrink down polyolefins, adhesives etc. shall not adversely affect the cable sheaths.
- 5.5.3 HEAT SHRINK MATERIAL

Heat shrink materials shall be tested according to Table 5.2.

Properties	Requirement	Test Method	Notes
Tensile Strength	20 MPa	ISO 527	Specimen cut from freely recovered material with die 4#. Jaw separation rate: 50 mm/min.
Ultimate Elongation	500%	ISO 527	
Thermal Aging - Tensile Strength - Elongation	18 MPa 450%	ISO 527	Specimens conditioned for 168 hrs @ 150° C ± 2° C in circulating air oven, air velocity 30 to 60 m/min.
Soil Chemical Resistance - Tensile Strength - Elongation	15 MPa 400%	ISO 175 ISO 527 ISO 527	Specimens conditioned in the following test solutions for 24 hrs @ 23° C ± 2° C. Na ₂ SO ₄ NaOH, H ₂ SO ₄ , NaCl, Oil (ASTM D 471), Gasoline (ISO 1817).
Water Absorption	< 0.1 %	ISO 62	Procedure A. Immersion for 24 hrs @ 23° + 2° C.
Fungus Resistance	Class 1	ISO 846 Method A	Incubation: 30° C, RH> 90%, for 4 weeks.
Environmental Stress Cracking	No Cracking	ASTM D 1693	Initiator: 10% Igepal CO-630. Immersion for 30 days @ 50° ± 2° C.
Corrosive Effect	No Corrosion	ASTM D 543	Method A. Test parameters: 16 hrs @ 120° C, 25 x 6 mm samples.
Carbon Black Content	2.5% ± 0.5	ASTM D 1603	

Table 5.2 Type Approval Tests on Heat Shrink Materials

5.5.4 HEAT SHRINK ADHESIVE

Heat shrink adhesive shall be tested according to Table 5.3.

Properties	Requirement	Test Method	Notes
Peel Strength to Heat shrink.	100 N/25mm		Rolling Cylinder method.
Water Absorption	<0.1%	ISO 62 - A	Immersion for 24 hours @ 23° C.
Fungus Resistance	Class 1	ISO 846 Method A	Incubation: 30° C, RH> 90% for 4 weeks.

Table 5.3 Type Approval Tests on Heat Shrink Adhesive.

5.5.5 RUBBER MATERIAL

Rubber based materials shall be subjected to the tests of Table 5.4 for type approval. The specimen shall be prepared from molded sheets 150mm x 150mm x 2mm thick.

Properties	Requirement	Test Method	Notes
Ozone Test Critical Elongation	40%	ISO 1431	Duration: 96 hrs @ 30° C. Ozone content: 0.5 ppm.
Tightness Test: Permanent Deformation	μ 30%	ISO 1653	Duration: 24 hrs @ -10° C.

Table 5.4 Type Approval Tests on Rubber Materials.

5.6 TESTS OF ASSEMBLED JOINT ENCLOSURE

5.6.1 PREPARATION OF SPECIMENS FOR TESTING (TA)

Two cables each of the minimum and maximum diameters able to be installed in the enclosure shall be connected according to the manufacturer's instructions. The cables shall withstand a tensile force of 1000 N without deformation. The minimum length of cable external to the enclosure shall be 1.5m. The cable ends shall be air tight. Fibers shall be arranged as in a finished installation. The samples for the following tests shall be prepared in this manner.

5.6.2 TIGHTNESS TEST (TA)

The tightness tests shall be performed according to IEC 68-2-17 Q. The sample shall be pressurized to 0.4 bar, and immersed in a water bath at 23°C ± 2°C, for a period of 15 minutes. There shall be no pressure drop nor continuous stream of bubbles from the closure.

5.6.3 TEMPERATURE CYCLING (TA)

The sample shall be subjected to 20 continuous test cycles. Each test cycle shall be:

-20°C for 4 hours

-20° to +80°C for 2 hours

+80°C for 4 hours

+80° to -20°C for 2 hours

On completion of the test the sample shall be subjected to the tightness test of 5.6.2.

5.6.4 COLD TEST (TA)

The sample shall be placed in water so that at least 100mm surrounds all sides. The sample shall be subjected to 10 continuous cycles. Each cycle shall be:

- +23°C for 24 hours
- +23° to -10°C for 12 hours
- 10°C for 24 hours
- 10° to +23°C for 12 hours

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.5 IMPACT (TA)

The specimen shall be positioned so that the enclosure is perpendicular to the line of impact. A cylindrical steel weight of 500 grams, with a diameter of 22mm and a flat striking face, shall be dropped freely and vertically from a height of 1m onto the joint enclosure. The point of impact shall be in the center at the apex of the shell. This shall be repeated with the sample rotated through 90°.

After completion, the specimen shall be visually examined for cracking of the outer sleeve and subjected to the tightness test of paragraph 5.6.2.

5.6.6 AXIAL PULL-OUT TEST (TA)

A load of 1000 N shall be applied to each cable in the longitudinal axis of the cable for 8 hours.

On completion the specimen shall be subjected to the tightness test of 5.6.2.

5.6.7 COMPRESSION TEST (TA)

A compressive force of 500 N shall be applied in the axial direction of each cable for a period of 8 hours.

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.8 STATIC LOAD TEST (TA)

A compressive load of 1000 N shall be applied to the center of the upper part of the shell for 15 minutes. The force shall be applied by a suitable die with a surface area of approximately 25cm². After 15 minutes the load shall be removed, and reapplied on the opposite face for 15 minutes.

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.9 BENDING TEST (TA)

The sample shall be rigidly mounted in a horizontal position. A force shall be applied to one of the cables at a point of 250mm from the end of the case assembly with a mandrel of 10mm radius to deflect the cables through a minimum angle of 45° in the vertical direction. The cable shall be held in the deflected position for a period of 5 minutes, returned to the normal position and then deflected 45° in the opposite direction. The above cycle shall be repeated 5 times for each cable.

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.10 TORSION TEST (TA)

The sample shall be rigidly mounted in a horizontal position. The cables shall be rotated about their longitudinal axis through a minimum angle of 90° at a distance equivalent to 20 times the cable outside diameter, from the end of the splice case. The twisted cable shall be maintained in this position for a period of 5 minutes, after which the cable shall be returned to its initial position. The cable shall then be rotated through 90° in the opposite direction, retained in that position for an additional 5 minutes and again returned to its original position. The procedure shall be repeated twice with each cable protruding from the splice case. The torque applied should not exceed 50 Nm.

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.11 VIBRATION TEST (TA)

The vibration test shall be performed according to IEC 68-2-6. The cables connected to the sample shall be rigidly clamped 500mm from the enclosure. The enclosure shall be vibrated at a frequency of 10Hz and an amplitude of 3mm for a period of 72 hours.

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.12 WATER PERMEATION TEST (TA)

The sample shall be assembled as described in clause 5.8.1. In addition a fitting for the introduction and removal of the carrier gas shall be installed.

The sample shall be placed in water at 15°C and nitrogen, suitably dried to give a steady moisture content reading, shall be passed through the sample and at a constant rate between 20 - 50ml/min. The exiting gas shall be monitored by a coulometric hygrometer. The test shall be continued for 20 days. The measured water permeation rate shall not exceed 50 and 80 µg/hour for the Type S and the Type L enclosures respectively.

5.6.13 ENVIRONMENTAL STRESS CRACKING (TA)

The specimen shall be immersed in a 10% Igepal solution for 165 hours at 50° ± 2°C.

On completion the sample shall be subjected to the tightness test of 5.6.2.

5.6.14 SUMMARY OF TESTS ON ASSEMBLED ENCLOSURES

Clause	Property	Condition	Requirement
5.6.2	Tightness	0.4 bar @ 23° C	No leakage
5.6.3	Temperature cycling	20 cycles -20° C to + 80° C.	No leakage
5.6.4	Cold test	10 cycles -10° C to +23° C.	No leakage.
5.6.5	Impact	500 g dropped freely from 1m	No visible cracking, no leakage.
5.6.6	Axial pull-out	Load of 1000 N applied to individual cable	No leakage.
5.6.7	Compression	Load of 500 N applied to individual cable	No leakage.
5.6.8	Static load	1000 N at 55 cm ² for 15 minutes	No leakage
5.6.9	Bending	Cable bend 5 times	No leakage
5.6.10	Torsion	Cable rotated	No leakage
5.6.11	Vibration	10 Hz, 3 mm for 72 hours	No leakage
5.6.12	Water permeation	20 days, 20 - 50 m/min.	Small type: 50 µg/h large type: 80 µg/h.
5.6.13	Environmental stress cracking	165 hours @ 50° C, 10% Igepal solution	Free from cracks, no leakage.

Table 5.5 Summary of Type Approval Tests on Assembled Enclosure.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required for this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

7.1.1 Manufacturers of joint enclosures conforming to this specification may be required to show evidence that the product has been manufactured according to a Quality System conforming to ISO 9002 or a national equivalent which has been approved by DICT.

7.1.2 Manufacturers may be required to supply a copy of the Quality Manual which shall be utilized for the manufacture and delivery of products complying to this specification, in case DICT set a time for a tender.

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

7.2 INSPECTION

7.2.1 DICT or its authorized representatives may inspect the Manufacturer's facilities at any time for the purpose of Quality Assurance surveillance.

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

7.2.3 All products manufactured to this specification may be inspected and tested by DICT 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 vendor.

8 SUMMARY OF REPORTS AND TESTING FREQUENCY

8.1 GENERAL

8.1.1 The two categories of test reports required, i.e. Material Approval and Quality Control, are detailed in clause 5.2.1, 5.2.2. and 5.2.3.



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 Joint Enclosure 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 MATERIAL APPROVAL TESTS, SAMPLES AND REPORT REQUIREMENTS

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

1. At the time of tender for each type and size of Joint Enclosure which has not been given Material Approval.
2. Prior to delivery of any Joint Enclosure that does not have Material Approval.
3. At least once every 12 months, unless agreed otherwise.

8.2.2 COMPLIANCE STATEMENT

Vendors 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 Vendors shall submit evidence, for consideration by DICT to verify the suitability of any alternative designs or materials which are not covered by this specification.

8.2.4 Evidence of compliance of the Shell with all tests of Table 5.1.

- 8.2.5 Evidence of compliance of the Heat Shrink material with all tests of Table 5.2.
- 8.2.6 Evidence of compliance of the heat shrink adhesive with all tests of Table 5.3.
- 8.2.7 Evidence of compliance of any rubber materials with all the tests of Table 5.4.
- 8.2.8 Evidence of compliance of the assembled enclosure with all tests of Table 5.5.
- 8.2.9 Details of quality control tests and procedures which the manufacturer intends to apply to the enclosures.

8.3 QUALITY CONTROL TEST REPORTS

- 8.3.1 Test results etc. of the manufacturer's Quality Control program as required by clause 8.2.9, shall be submitted with each delivery unless agreed otherwise.
- 8.3.2 The tests shall be done according to clause 5.2.3.

As a minimum test results according to table 5.1 (Tensile Strength and Ultimate Elongation) and paragraph 5.6.2 and 5.6.3 shall be submitted.

- 8.3.3 The test reports shall clearly show which production batch is included.

8.3.4 FREQUENCY OF QUALITY CONTROL REPORTS

The frequency of quality control tests required by DICT shall be categorized as follows:

1. Every production batch.
2. Otherwise as agreed at time of order.

- 8.3.5 In addition to the test results required by DICT, vendors are responsible to ensure that the Joint Enclosure complies with this specification. Therefore vendors shall perform all additional tests necessary at appropriate frequencies to ensure the delivery of compliant joint enclosure.

9 PACKING AND MARKING

9.1 PACKING

- 9.1.1 The enclosures, shall be packed as a complete kit containing all components necessary for installation, including auxiliary components such as drying agents, cleaning materials etc., and installation instructions.
- 9.1.2 Each component shall be sufficiently protected to prevent damage during normal handling.
- 9.1.3 The final shipping cartons shall be of sufficient strength and durability to protect the contents from handling during storage and shipping by land, sea, or air. The shipping carton design shall be capable of sustaining a drop of 500mm on to a solid concrete floor with no damage to the individually packaged unit(s).
- 9.1.4 All instructions shall be provided in English.

9.2 MARKING

- 9.2.1 The details given below shall be distinctively marked in English, with a weather proof material, on at least two sides of the individual boxes and shipping carton
- Department of Information and Communications Technology (DICT)
 - O.F. Joint Enclosure
 - Size of O.F. Joint Enclosure
 - Country of Origin
 - Manufacturer's Name and/or Trademark
 - Month and Year of Manufacture
 - Maximum Stacking Height
- 9.2.2 Each major component shall be marked with DICT, the month and year of manufacture and the trademark and/or name of manufacturer.
- 9.2.3 The method of marking plastic material shall not decrease the thickness of the material by more than 0.3mm.



10 COMPLIANCE

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

10.1 COMPLIANCE

The vendor agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

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



DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

MANILA, PHILIPPINES

GENERIC SPECIFICATION REV. 01

MANHOLE AND HANDHOLE ACCESSORIES

Volume NBP OSP 04

MANHOLE AND HANDHOLE ACCESSORIES

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REVISION AND ADDENDUM REFERENCE SHEET

SECTION	PARAGRAPH	DATE	COMMENTS
		12 Feb. 2020	Initial Issue.

UNCONTROLLED WHEN PRINTED OR EMAILED

1 GENERAL

1.1 SCOPE

This specification covers the minimum standards and the requirements for the construction, properties, testing and packing of manhole hardware including sump covers, pulling eyes, cable brackets and bracket supports, marking plates, ladders and ladder supports.

1.2 INTENDED USE

- 1.2.1 Manhole and Hand-hole Accessories are used in manholes and hand-holes.
- 1.2.2 Pulling eyes are installed in manholes and hand-holes opposite the duct entry face as an anchor for cable installation.
- 1.2.3 Cable bracket supports and cable brackets are installed at 500mm intervals along the manhole walls to support cables and cable joints.
- 1.2.4 Sump covers are installed over the sump in manhole and hand-hole floors.
- 1.2.5 The ladders shall provide a secure and easy entry and exit of the manhole.
- 1.2.6 Ladder supports are installed in the manhole entrance to support the ladder.
- 1.2.7 Marking plates are installed in the manhole entrance and at the side wall of the hand-hole for identification purposes.

1.3 TYPE APPROVAL

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



1.4 RESERVED RIGHTS

- 1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.
- 1.4.2 DICT reserves the right to make changes to the specification without advance notice.

2 ASSOCIATED SPECIFICATIONS

- 2.1 THE FOLLOWING UNATTACHED INTERNATIONAL AND/OR NATIONAL STANDARDS SHALL BE APPLIED, AND DEEMED TO BE AN INTEGRAL PART OF THIS SPECIFICATION:

ASTM A36	Specification for Structural Steel.
ASTM A 123	Standard specification for zinc (Hot-Dip Galvanized) Coatings on Iron & Steel.
NBP OSP 3	Manhole and Hand-Holes Structures.
ISO 9002	Quality systems - model for quality assurance in production and installation.

3 DEFINITIONS

The following definitions shall apply throughout the specification:

DICT

Department of Information and Communications Technology.

The Vendor

The individual or establishment submitting an offer or offers to supply manhole hardware.

Manufacturer

The organization responsible for actual production of manhole hardware. 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 DICT for the inspection and testing of materials during manufacture and at the time of receiving materials.

4 DESIGN REQUIREMENTS

4.1 GENERAL

This section describes the manhole and hand-hole hardware.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

- 4.2.1 The manhole and hand-hole accessories supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines for a period of thirty years without detriment to the operation and maintenance characteristics.

4.2.2 The accessories shall be designed, manufactured and packaged so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation and the environmental conditions to be expected during storage and transport outside the Philippines shall not degrade the physical or operation and maintenance characteristics of the manhole hardware.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30°C to 40°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 MATERIALS

4.3.1 The steel used in the manhole and hand-hole hardware shall comply with ASTM A 36 or an equivalent.

4.3.2 The steel manhole and hand-hole hardware shall be galvanized according to ASTM A123 or equivalent.

4.4 PULLING EYES

4.4.1 Pulling eyes shall be of the approximate dimensions shown in appendix 5. Alternative designs may be considered provided they are of equivalent strength etc.

4.4.2 The installed pulling eye shall be capable of withstanding a pulling force of 30 kN.

4.5 SUMP COVER

4.5.1 The sump cover shall fit the manhole sump and shall not rock when installed.

4.5.2 The dimensions of the cover are shown in Appendix 1. The hole diameter shall be approximately 10mm. A smaller number of holes than shown in Appendix 1 may be allowed, if approved at Type Approval.

4.6 LADDERS AND LADDER SUPPORTS

4.6.1 The manhole ladder shall be compliant with Appendix 4.

4.6.2 The hooks shall fit onto the ladder support.

4.6.3 The ladder shall be manufactured from steel and galvanized. The rungs shall be steel bars 15mm in diameter.

- 4.6.4 Ladders shall be of appropriate length for the type of manhole in which they are installed, according to table 4.1. Ladders shall be of sufficient length so that they are properly seated with sufficient inclination for easy climbing.

Ladder type	1	2
Manhole height (mm)	1500	1800
Support length (mm)	1725	2025
Number of steps	4	4

Table 4.1

- 4.6.5 The ladder support shall be designed to support a load of 400kg located at the center of the support.
- 4.6.6 The support shall be free from brittle steel. Any part when struck vigorously and sharply with a 0.9kg hammer shall not fracture.

4.7 CABLE BRACKETS AND CABLE BRACKET SUPPORTS

- 4.7.1 The supports shall be manufactured from steel channel 50mm wide and 40mm deep. The thickness of the steel across the bottom part of the channel shall be approximately 5mm. The dimensions of the supports are shown in Appendix 2.
- 4.7.2 The support shall include a spacer, such as a large washer, to keep the installed support no more than 5mm off the manhole wall. The spacer shall be galvanized steel or a suitable non-corrosive material.
- 4.7.3 The support shall be available in the following nominal effective length, 1400 for use in height of manhole. Other lengths may be required for non standard manholes.
- 4.7.4 The slots for the attachment of the cable brackets shall be spaced to allow adjustment of the brackets in steps of 76mm.
- 4.7.5 The slots on the support shall be dimensioned as shown in Appendix 2.

- 4.7.6 Cable brackets shall be manufactured from approximately 4mm thick steel. Cable brackets shall be available in the following nominal effective lengths: 250, 350, and 500mm.
- 4.7.7 The slots along the length of the cable bracket shall be according to the dimensions shown in Appendix 3.
- 4.7.8 The bracket shall fit into the support by means of a T-hook as shown in Appendix 3.
- 4.7.9 The tolerances of the dimensions of the slot on the support and the bracket T hook and lug shall be such that the two fit together firmly.
- 4.7.10 The brackets shall be able to withstand a vertical downward load of 1.5kN, with the load positioned at the end of the bracket away from the support.
- 4.7.11 The brackets shall be able to withstand a horizontal load of 1kN in either direction, with the load positioned at the end of the bracket away from the support.

4.8 MARKING PLATE

The marking plate shall be 1 mm thick aluminum. An example with dimensions is shown in Appendix 6.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

- 5.1.1 This section specifies the manhole and hand-hole accessories material, physical, chemical, environmental and mechanical requirements and the tests to be applied for the determination of compliance to these requirements.
- 5.1.2 The requirements of this section refer to completed manhole and hand-hole accessories, or material removed from completed manhole and hand-hole hardware unless identified otherwise.

5.2 TEST AND REPORT REQUIREMENTS

- 5.2.1 In order to assure the quality of purchased manhole and hand-hole accessories, vendors 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 DICT that products have been designed to provide fault free service for the required life of the manhole and hand-hole accessories.

5.2.2.2 Type Approval shall not be granted until a Type Approval sample has been evaluated by DICT at the factory. In the event that appropriate samples are not available from the 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 approved by DICT for Type Approval prior to delivery.

5.2.2.3 Vendors are advised not to proceed with the manufacturing until written Type Approval or interim Type Approval has been given by DICT for all Type Approval requirements of this specification.

5.2.2.4 Vendors are required to ensure that supplied manhole and hand-hole hardware complies fully with the Type Approval requirements. Although DICT may designate tests as Type Approval the vendor 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 include, unless agreed otherwise:

One sample of each item.

5.2.3 ROUTINE QUALITY CONTROL

5.2.4 Routine Quality Control tests are the tests used on a regular basis, such as every manhole or hand-hole, to assure DICT 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.

5.3 TESTS (QC)

The manufacturer shall submit evidence to verify that the galvanizing conforms to ASTM A 123.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required in this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

7.1.1 Manufacturers of manhole and hand-hole accessories 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 or a national equivalent which has been approved by DICT.

7.1.2 Manufacturers may be required to supply a copy of the Quality Manual at the time of tender, which shall be utilized for the manufacturing and delivery of manhole and hand-hole accessories complying to this specification.

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

7.2 INSPECTION

7.2.1 DICT or its authorized representatives(s) may inspect the Manufacturer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.

7.2.2 If requested by DICT, the vendor shall supply evidence of the quality of raw materials and components used in the manufacturing process.

7.2.3 All manhole and hand-hole hardware manufactured to this specification may be inspected and tested by DICT 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 vendor.

8 SUMMARY OF REPORTS AND TESTING 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 5.2.2. and 5.2.3.

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 manhole or hand-hole accessories covered by 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 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 manhole or hand-hole hardware which do not have been given Type Approval and
2. Prior to delivery of any manhole or hand-hole accessories which do not have Type Approval.

8.2.2 COMPLIANCE STATEMENT

Vendors 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 The manufacturer shall submit design drawings of each item.

8.3 QUALITY CONTROL TEST REPORTS PER BATCH

Test reports to verify compliance with ASTM A 123 shall be submitted with each delivery unless agreed otherwise.

9 PACKING AND MARKING

9.1 PACKING

9.1.1 Each item of manhole and hand-hole hardware shall be packaged in quantities which can be handled without mechanical support. The package shall be of adequate construction to protect the items during storage and transportation, and be packed as complete kits for each of the particular manhole or hand-hole designs.

9.1.2 Packages may be multi-packaged to a maximum weight of 50kg.

9.2 MARKING

9.2.1 The bundles or kits shall be labeled clearly and permanently marked with the following information in English:

DICT, Department of Information and Communications Technology

Manhole or Hand-hole Hardware

Manufacturer's Name or trademark

Month and year of manufacture

10 COMPLIANCE STATEMENT

THE VENDOR SHALL 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 vendor agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

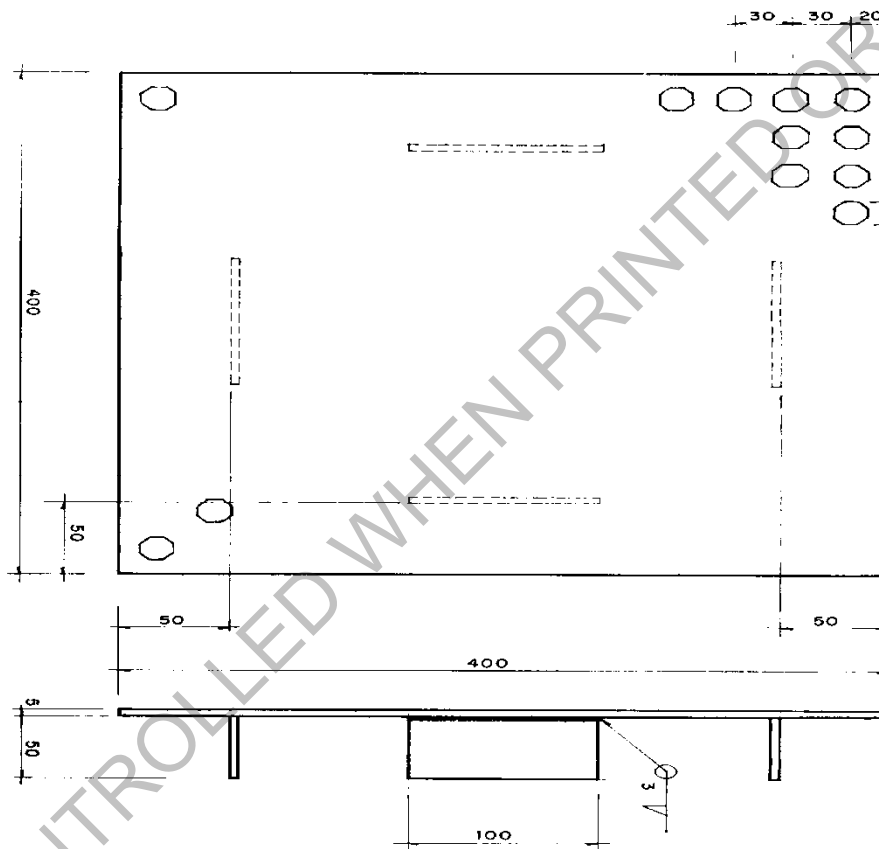
The vendor does not meet the respective item or clause. The reason for the non-compliance shall be stated.

10.3 NON-COMPLIANCE WITH ALTERNATIVE PROPOSAL

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

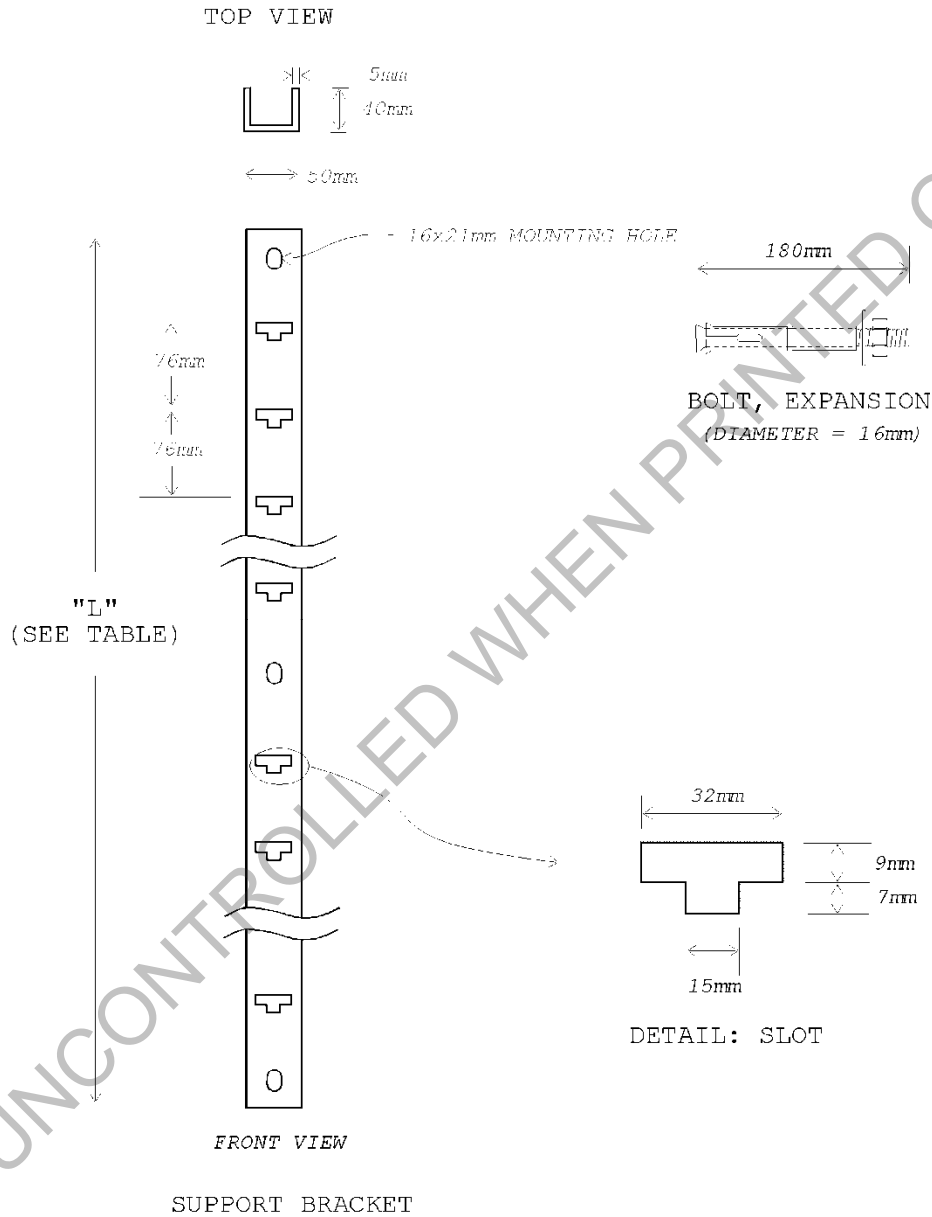
11 APPENDIXES

11.1 APPENDIX 1 - SUMP COVER



All measurements are in millimeters.

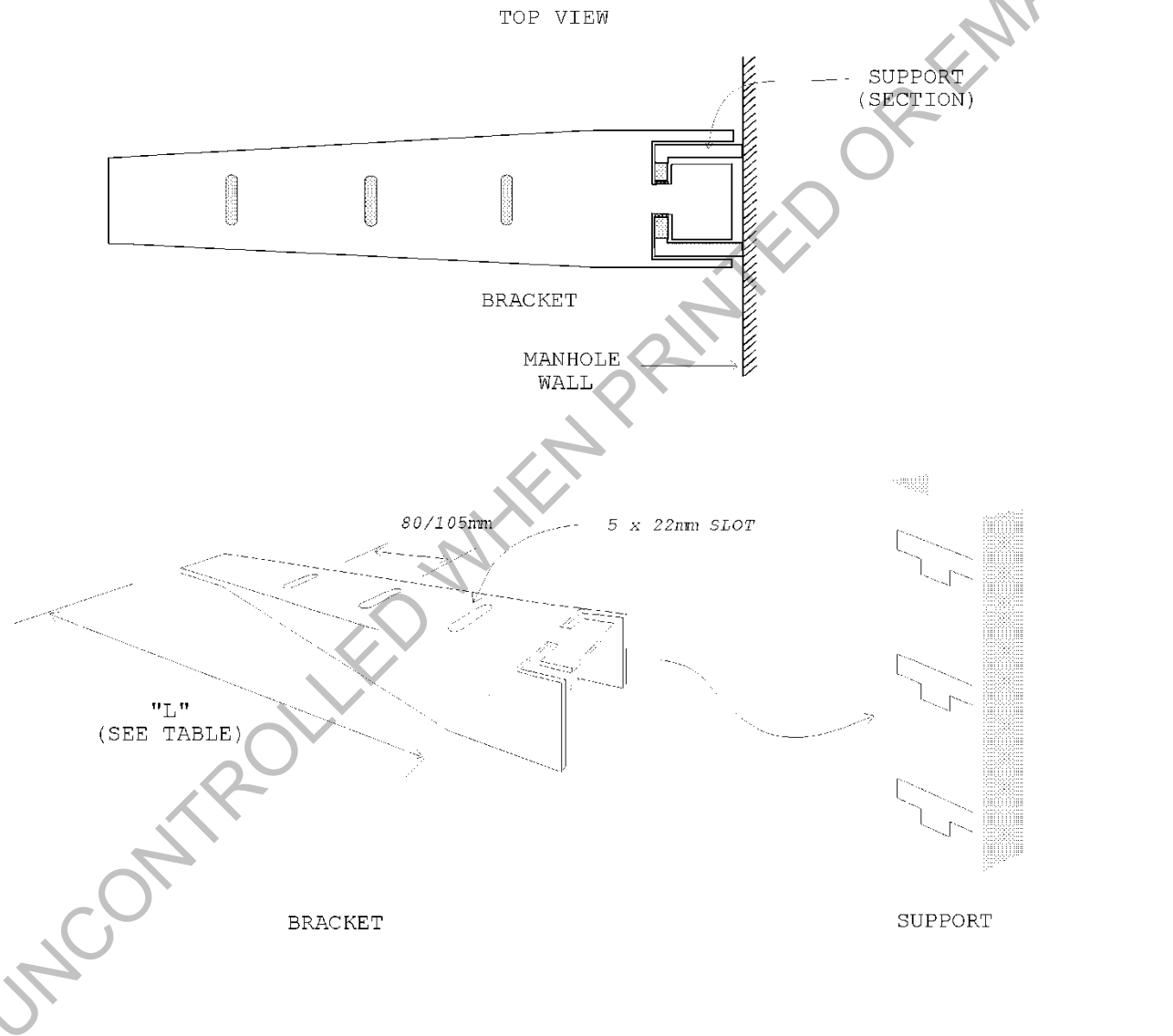
11.2 APPENDIX 2 - BRACKET SUPPORTS



Manhole Type (Size: L x W X H)	Support Length "L" meters"	Quantity
A (1.6m x 1.6m x 1.8m)	1.5	6
B (1.4m x 1.4m x 1.8m)	1.5	4
C (1.2m x 1.2m x 1.5m)	1.0	4

Bracket Support Dimensions

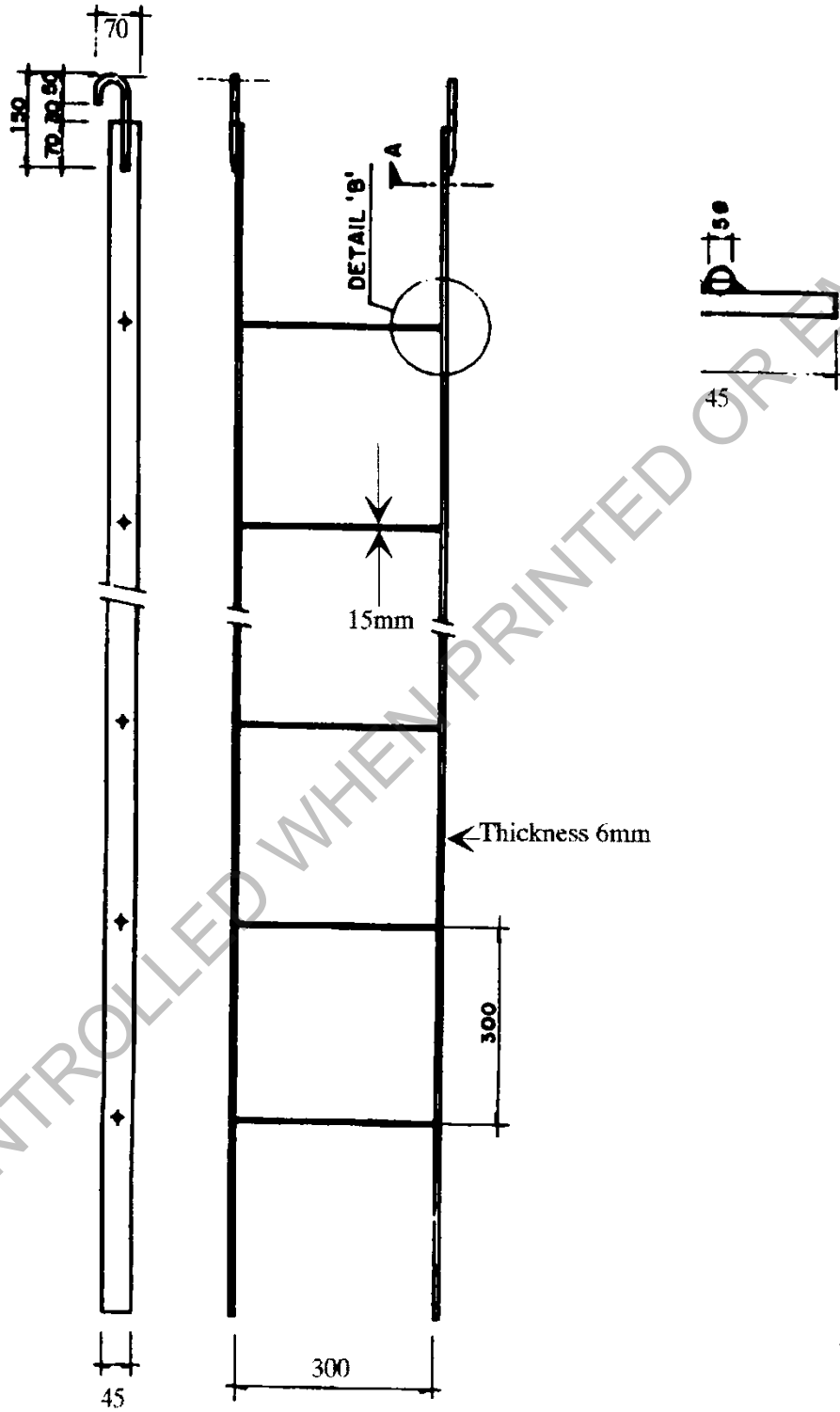
11.3 APPENDIX 3 - CABLE BRACKETS



Manhole Type (Size: L x W X H)	Bracket "L" (mm)	Quantity (per support)
A (1.6m x 1.6m x 1.8m)	350 - 360	8
B (1.4m x 1.4m x 1.8m)	250 - 260	4
C (1.2m x 1.2m x 1.5m)	250 - 260	4

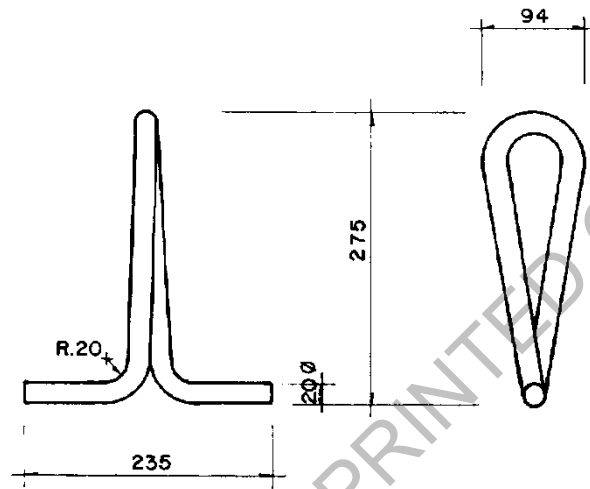
Cable Bracket Provision

APPENDIX 4 - STEEL MANHOLE LADDER



All measurements are in millimeters

11.4 APPENDIX 5 - PULLING EYE



All measurements are in millimeters



11.5 APPENDIX 6 - MARKER PLATE

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DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

MANILA, PHILIPPINES

GENERIC SPECIFICATION REV. 02

MANHOLE AND HANDHOLE



Volume NBP OSP 03

MANHOLE AND HANDHOLE STRUCTURES

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REVISION AND ADDENDUM REFERENCE SHEET

SECTION	PARAGRAPH	DATE	COMMENTS

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1 GENERAL

1.1 SCOPE

This specification covers the minimum standards and requirements for the construction and supply of manholes and hand-holes that are to be used in the fiber backbone and access network of DICT. Initially, there are only three types of manhole and two types of hand-holes that have been identified and included in this specification.

1.2 INTENDED USE

- Manholes are used as a working area for cable pulling, splicing and for storing cable.
- Hand-holes have the same uses as manholes for cable pulling, splicing and for storing cables. Though it is smaller in size compared to manholes. It is also used to access underground fiber or copper cable.

1.3 TYPE APPROVAL

1.3.1 Vendors who have not previously supplied under this specification (or who have made changes to prior supplied products) shall submit a product sample for approval.

1.3.2 An interim Type Approval may be granted on the basis of a compliance statement and other information from the manufacturer.

1.3.3 Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.

1.4.2 DICT reserves the right to make changes to the specifications without advance notice.

2 ASSOCIATED SPECIFICATIONS



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

ASTM C478-14	Concrete Reinforced
ASTM A615 Grade 60	Steel Reinforcement
BS 1452	Grey Iron Castings.
ASTM A-48 Class 30/35	Cast Iron Casting
ISO 9002	Quality systems - Model for quality assurance in production and installation.

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3 DEFINITIONS

The following definitions shall apply throughout the specification:

DICT

Department of Information and Communications Technology.

The Vendor

The individual or establishment submitting an offer or offers to supply manholes and hand-holes.

Manufacturer

The organization responsible for actual prefabrication of manholes and hand-holes. 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 DICT for the inspection and testing of materials during manufacture and at the time of receiving materials.



4 DESIGN REQUIREMENTS

4.1 GENERAL

4.1.1 This section describes the design of manholes and hand-holes.

4.1.2 It is the intention of DICT, that the majority of the manholes and hand-holes supplied to this specification are pre-cast, manufactured under the controlled conditions of a fabrication yard.

4.1.3 Site-Cast construction of manholes or hand-holes may take place where economies of scale can be shown to favor such methods, as required for reconstruction purposes, or due to local conditions on a specific site.

4.1.4 Manholes and Hand-holes shall be fully equipped with the full complement of accessories such as pulling eyes, ladder, ladder support, cable brackets, earthing system, cover, etc., unless agreed otherwise.

4.1.5 The strength of the manhole and hand-hole shall be sufficient for the intended use and shall be 37.9 Mpa at 7days, and shall conform to ASTM C478 and ASTM A615 Grade 60. Structural calculations and detailed design drawings to verify the strength of each size of manhole and hand-hole shall be submitted for Type Approval.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

4.2.1 Manholes and Hand-holes supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines for a period of thirty years without detriment to the operation and maintenance characteristics.

4.2.2 Manholes and Hand-holes shall be designed and manufactured so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation shall not degrade the physical or operation and maintenance characteristics of the manhole and hand-holes.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30° to 38°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 RAW MATERIAL

Manholes and Hand-holes shall be constructed from reinforced concrete complying with an appropriate grade from "The General Specification for Building Constructions" or an equivalent approved by DICT at Type Approval.

4.4 DESIGN

4.4.1 The manhole and hand-hole sizes and number of ducts installed at each end and side walls shall comply with Tables 4.1A and 4.1B respectively.

MANHOLE TYPE	DIMENSION (INTERNAL)			NUMBER OF DUCTS	
	LENGTH (MM)	WIDTH (MM)	HEIGHT (MM)	END WALLS - A	END WALLS - B
TYPE A	1600	1600	1800	7	7
TYPE B	1400	1400	1800	5	5
TYPE C	1200	1200	1500	5	5

Table 4.1A. Manhole Inside Dimensions and Duct Numbers.

HAND-HOLE TYPE	DIMENSION (INTERNAL)			NUMBER OF DUCTS	
	LENGTH (MM)	WIDTH (MM)	HEIGHT (MM)	END WALLS	SIDE WALLS
TYPE 1	1100	700	800	5	2
TYPE 2	900	600	800	5	2

Table 4.1B. Hand-Hole Inside Dimensions and Duct Numbers.

4.4.2 If more than 4 and 7 duct entries are required, the manhole or hand-hole shall be bored for the additional duct entry requirement as shown in tables 4.1A and 4.1B.

- 4.4.3 Manholes shall have a round opening in the roof with a diameter of not less than 680mm and up to 732mm. A concrete collar of the same diameter shall be provided as support for the manhole cover frame. Likewise, Hand-hole shall have a rectangular opening in the roof, and a rectangular concrete collar shall also be provided for its rectangular or square cover frames.
- 4.4.4 Manhole and Hand-holes access with heights greater than 1800mm, 1500mm and 800mm respectively shall be purposely designed, and submitted to DICT for final approval.
- 4.4.5 The duct entrance formation as shown in Table 4.2A shall be at the manhole end walls, i.e. the ends on the square axis of the manhole. The ducts in each layer shall be distributed at the middle section of the manhole end wall.
Duct entrance formation as shown in Table 4.2B shall be at the hand-hole's end and side walls respectively, i.e the ends on the long axis and side walls of the hand-hole. The ducts in each layer shall be distributed at the middle section of the manhole and hand-hole's end walls.

Number of ducts entering the manhole	Number of ducts in each layer	Number of Layers	Type of Manhole
Up to 7	Up to 3 + 1x110mm	Up to 2	A
Up to 5	Up to 2 + 1x110mm	Up to 2	B
Up to 5	Up to 2 + 1x110mm	Up to 2	C

Table 4.2A Duct entrance formation.

Number of ducts entering the hand-hole		Number of ducts in each layer	Number of Layers	Type of Hand-hole
End Walls	Side Walls			
Up to 5	2	Up to 3 – End side Up to 2 – Side wall	2 – End 1 – Side	Type 1
Up to 5	2	Up to 3 – End side Up to 2 – Side wall	2 – End 1 – Side	Type 2

Table 4.2B Duct entrance formation.

4.5 MANHOLE AND HAND-HOLE ACCESSORIES

4.5.1 All manholes and hand-holes shall be provided with a sump approximately 300 x 300mm placed directly below the manhole opening, and at the center of the rectangular floor shape of the hand-hole. The floors shall slope slightly towards the sump. The sump shall be covered with a sump cover.

4.5.2 Manhole = two pulling eyes shall be installed opposite each duct face at 300mm above and below the top and bottom ducts and on the vertical center line of the duct face.

Hand-hole = two pulling eyes shall also be installed opposite each vertical duct face (end and side walls) at 200mm from the rectangular flooring of the hand-hole.

The installed pulling eyes shall be able to withstand a hauling tension of 30kN.

4.5.3 The cable support system as described shall be installed at 400mm intervals along both walls of the manhole, and one side wall for the hand-hole.

4.5.4 The manhole grounding system shall be installed around the top inside walls of the manhole. The ribbons shall be joined by soldering. The ribbon shall be attached to the manhole reinforcement in at least 2 places. The method of joining shall not create a potential site for galvanic corrosion i.e. the steel reinforcement shall not be joined directly to the copper ribbon. The ribbons shall be fastened to the walls by an appropriate means at every 500mm.

4.5.5 Ladder support shall be installed in the manhole collar at an appropriate height for the attachment of the manhole ladder. The access collar shall also include a suitable number of steps for entry and exit.

4.5.6 The manhole and hand-hole marker plate shall be marked with the manhole and hand-hole identification numbers and installed at the side walls.

4.6 MANHOLE AND HAND-HOLE COVER ASSEMBLY

4.6.1 The manhole and hand-hole covers and frames shall be manufactured from cast iron compliant with an appropriate grade of iron from ASTM A-48 Class 30/35 or BS 1452 or equivalent, or an appropriate spheroidal graphite cast iron. The cover and frames shall comply with the dimensions of Appendix 1 and Appendix 2.

- 4.6.2 Manhole covers shall have a diameter of 680mm or 732mm. The frames and covers shall be designed so they are interchangeable and fit together in such a way that the cover does not rock on the frame.
Hand-hole covers shall be flange type and shall be 545mm x 700mm, two cover for Type 1, and 445mm x 600mm two cover for Type 2.
- 4.6.3 The cover and frames shall include a locking bolt system which fastens the cover onto the frame. The bolt shall be approximately 10mm in diameter and have a unique head design to minimize unauthorized access to the manhole and hand-holes or stealing of manhole and hand-hole cover. Manufacturers shall submit details of the locking bolt system for Type Approval.
- 4.6.4 Manhole and Hand-hole frames shall have four evenly spaced holes with a diameter of approximately 20mm, and is sufficient to accommodate a shackle for lifting purposes.
- 4.6.5 Manhole and hand-hole cover and frames shall be designed to withstand the maximum traffic loads to be expected in the Philippines.
- 4.6.6 Manholes and hand-holes shall be designed to withstand an evenly distributed load of refill and road surfacing of 12kPa.
- 4.6.7 Two slots shall be provided for lifting of manhole cover as shown in Appendix 1. And one slot (center) for hand-hole cover as shown in Appendix 2.
- 4.6.8 The cover and frames shall be completely coated with a bituminous material to reduce corrosion.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

- 5.1.1 This section specifies the Manhole and Hand-hole material, physical, chemical, environmental and mechanical requirements and the tests to be applied for the determination of compliance to these requirements.
- 5.1.2 The requirements of this section refer to completed manholes and hand-holes, or material removed from completed manholes and hand-holes unless identified otherwise.
- 5.1.3 All materials that shall be used shall be non-toxic and dermatologically safe.



5.2 TEST AND REPORT REQUIREMENTS

5.2.1 In order to assure the quality of manholes and hand-holes, vendors 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 DICT that products have been designed to provide fault free service for the required life of the manhole and hand-holes.

5.2.2.2 Type Approval shall not be granted until a Type Approval sample has been evaluated by DICT. In the event that appropriate samples are not available from the manufacturer, 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 approved by DICT for Type Approval prior to delivery.

5.2.2.3 Vendors are advised not to proceed to manufacture until written Type Approval or interim Type Approval has been given by DICT for all Type Approval requirements of this specification.

5.2.2.4 Vendors are required to ensure that manholes and hand-holes complies fully with the Type Approval requirements. Although DICT may designate tests as Type Approval the Vendor 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 DICT shall examine an installed manhole or hand-hole for Type Approval, unless agreed otherwise. A sample of the locking bolt and a sample of the cover and extensions shall be submitted.

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are the tests used on a regular basis, such as every manhole or hand-hole, to assure DICT that manufactured items conform to specifications and that the manufacturing process is under control. Routine Quality Control tests are identified by (QC). Testing frequencies are detailed in Section 8.



5.3 TESTS (QC)

- 5.3.1 All test requirements or the approved equivalent, shall be performed at appropriate frequencies.
- 5.3.2 All tests required by BS 1452 or ASTM A-48 Class 30/35, or the approved equivalent, shall be performed at appropriate frequencies.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required for this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

- 7.1.1 Manufacturers of manholes and hand-holes conforming to this specification may be required to show evidence that the products has been manufactured according to a Quality System preferably conforming to ISO 9002 or a national equivalent which has been approved by DICT.
- 7.1.2 Manufacturers may be required to supply a copy of the Quality Manual at the time of tender, which shall be utilized for the manufacturing and delivery of manholes and hand-holes complying with this specification.
- 7.1.3 DICT may require the manufacturer to be accredited to the above standards either by DICT personnel or assessors acting on behalf of DICT.

7.2 INSPECTION

- 7.2.1 DICT or its authorized representatives(s) may inspect the Manufacturer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.
- 7.2.2 If requested by DICT the vendor shall supply evidence of the quality of raw materials and components used in the manufacturing process.
- 7.2.3 All manholes and hand-holes manufactured to this specification may be inspected and tested by DICT 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 vendor.

8 SUMMARY OF REPORTS AND TESTING 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 5.2.2. and 5.2.3.

8.1.2 REPORT FORMAT

8.1.2.1 All reports submitted shall include the following details:

Manufacturer's name

Project number

Quality Control reports shall also include:

Date of delivery

Identification of Manholes 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 TYPE APPROVAL TESTS, SAMPLES AND REPORT REQUIREMENTS

8.2.1 Type Approval test results shall be submitted as follows:-

1. At the time of tender for each type of manhole and hand-hole which has not been given Type Approval.
2. Prior to delivery of any manhole or hand-hole which does not have Type Approval.

8.2.2 COMPLIANCE STATEMENT

Vendors 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 Structural calculations and detailed design drawings for all manhole and hand-hole sizes, clause 4.1.5.

8.2.4 Full details of concrete i.e. grade, referenced standard etc. and full details of reinforcement.

8.2.5 Details of the grade of cast iron to be used for the cover and extension, clause 4.6.1.

8.2.6 Details of the locking bolt system, clause 4.6.3.

8.2.7 Structural calculations or other evidence to verify that the strength of the cover and frame are suitable for the maximum traffic loads to be expected, clause 4.6.5.

8.2.8 Details of all Quality Control tests to be applied to the concrete during manufacture shall be submitted for Type Approval.

8.3 QUALITY CONTROL TEST REPORTS

8.3.1 Results of Quality Control tests on the concrete, as required by the specification used for manufacturing and detailed in clause 8.2.8, shall be submitted for each production batch of manholes and hand-holes, clause 5.3.1.

8.3.2 Evidence to verify compliance of the cover and extension to BS 1452 or ASTM A-48 Class 30/35 or equivalent, clause 5.3.2.

9 PACKING AND MARKING

9.1 PACKING

The package shall be of adequate construction to protect the items during storage and transportation.



9.2 MARKING

9.2.1 Not required.

10 COMPLIANCE STATEMENT

The vendor shall 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 Vendor agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

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

10.3 NON-COMPLIANCE WITH ALTERNATIVE PROPOSAL

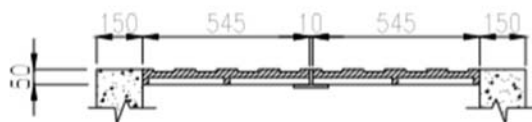
The Vendor does not meet the provisions of the clause but offers an equivalent alternative which shall be fully documented with supporting evidence.

11 APPENDIXES

11.1 APPENDIX 1 – MANHOLE COVER

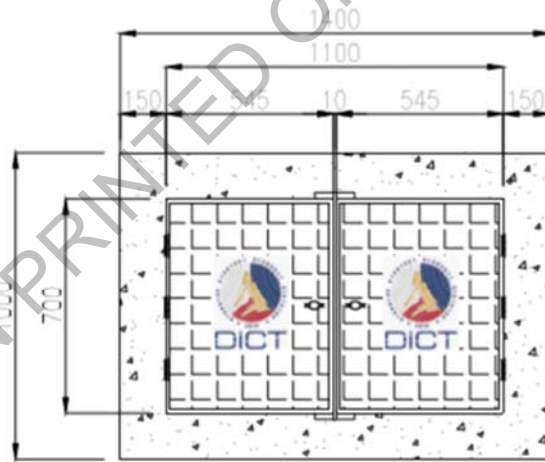


11.2 APPENDIX 2 – HANDHOLE COVER



SECTION VIEW

SCALE: NTS



PLAN VIEW

SCALE: NTS

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**DEPARTMENT OF INFORMATION AND
COMMUNICATIONS TECHNOLOGY**
MANILA, PHILIPPINES

GENERIC SPECIFICATION
REV. 01

**SINGE MODE OUTDOOR
OPTICAL FIBER CABLE**



Volume NBP OSP 01

SINGLE MODE OUTDOOR OPTICAL FIBRE CABLE

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REVISION AND ADDENDUM REFERENCE SHEET

SECTION	PARAGRAPH	DATE	COMMENTS

UNCONTROLLED WHEN PRINTED OR EMAILED

1 GENERAL

1.1 SCOPE

This specification covers the minimum standards and requirements for the construction, properties, testing and packing of outdoor single mode optical fiber cables to be used in the backbone and access networks of DICT.

1.2 INTENDED USE

Cable purchased in compliance with this specification is to be used in the fiber optical cable network of DICT on backbone, long distance and access routes. The cable may be hauled into HDPE or PVC ducts or sub-ducts of 20 or 28mm internal diameter, direct buried by trenching or aerial installation. Except for the blown mini fiber cable which is installed by air blowing on a 16/12mm to 25/21mm mini blown tube. The cable shall incorporate a metal moisture barrier, unless ordered as metal free. DICT may require some lengths of metal free cable for installation in areas of high lightning activity or where adequate separation from power cables is difficult.

1.3 MATERIAL APPROVAL

1.3.1 Vendors 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.

1.3.2 An interim Material Approval may be granted on the basis of a compliance statement and other information from the manufacturer.

1.3.3 Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.

1.4.2 DICT reserves the right to make changes to the specification without advance notice.

2 ASSOCIATED SPECIFICATIONS

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

ASTM B 736	Standard specification for aluminum, aluminum alloy and aluminum clad steel cable shielding stock
ASTM D 92	Standard test method for flash and fire points by Cleveland open cup
ASTM D 566	Standard test method for dropping point of lubricating grease
ASTM D 974	Standard Test method for acid and base number by color indicator titration
ASTM D 1248	Standard specification for polyethylene plastics moulding and extrusion materials
ASTM D 1603	Test Method for Carbon Black in Olefin Plastics
CCITT G652	Characteristics of single-mode optical fibers
IEC 304	Standard colors for low frequency cables and wires
IEC 708	Low Frequency Cables with Polyolefin Insulation and Moisture Barrier Polyolefin Sheath.
IEC 793	Optical Fibers Part 2 - Product Specification
IEC 794	Optical Fiber Cables, Part 1 Generic specification
ISO 9002	Quality systems - Model for quality assurance in production and installation
Federal Test	Oil Separation from Lubricating Grease - Method 321.1 (Static Technique)



3 DEFINITIONS AND STANDARD, DICT CABLE CODES

3.1 DEFINITIONS

The following definitions shall apply throughout this specification :

DICT

Department of Information and Communications Technology.

The Vendor

The individual or establishment submitting an offer or offers to supply fiber optic cables

Manufacturer

The Organization responsible for the actual production of the cable. 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 DICT for the inspection and test of materials during manufacture and at the time of receiving materials.

Fiber

The drawn coated optical fiber.

Single Mode

The transmission mode of the modulated light signal. May be used interchangeably within this document with the term "Mono Mode".

Primary Coating

The first layer of plastic material applied to the fiber immediately after being drawn from a preform.

Loose Tube

The loose tube which surrounds the primary coated fiber. May also be referred to as secondary containment.

Strength Member

The component of the assembled cable which is designed to withstand all forces to which the cable is likely to be subjected.

Cable Core

The assembled cable components which are normally contained within the moisture or oil barrier.

Filler Units

Components of the cable which are included to give the cable a circular cross section.

Moisture Barrier

The non metallic barrier or metallic tape which surrounds the cable core.

HDPE

High density Polyethylene.

MDPE

Medium density polyethylene

LDPE

Low density polyethylene.

PVC

Polyvinyl Chloride

Fiber Core

The central region of the optical fiber through which most of the optical power is transmitted.

Cladding

The dielectric material of an optical fiber surrounding the core with a different refractive index from the core.

Cladding Surface

The outer surface of the glass which comprises the optical fiber.

Non-circularity of the Cladding Surface

The difference between the maximum cladding surface diameter D_{max} & minimum cladding surface diameter D_{min} divided by the nominal cladding diameter D .

Core/Cladding Concentricity Error

The distance between the core center and the cladding center divided by the core diameter.

Refractive Index Profile

The distribution of the refractive index along the diameter of an optical fiber.

Attenuation Coefficient

The attenuation of the fiber per unit length.

Chromatic Dispersion

The spreading of a light pulse per unit source spectrum width in an optical fiber caused by the different group velocities of different wavelengths composing the source spectrum.

Cut-off Wavelength

The cut-off wavelength is the wavelength at which the second order LP₁₁ mode ceases to propagate in the fiber.

Chromatic Dispersion Coefficient

The chromatic dispersion per unit source spectrum width and unit length of fiber. It is expressed in ps/nm·km.

Zero Dispersion Wavelength

The wavelength at which the chromatic dispersion vanishes.

Zero-Dispersion Slope

The slope of the chromatic dispersion coefficient versus wavelength curve at the zero-dispersion wavelength.



3.2 STANDARD DICT OPTICAL FIBRE CABLE CODES

3.2.1 FIRST LETTER

F Optical fiber.

3.2.2 SECOND LETTER = FIRST SHEATH MATERIAL.

E Polyethylene (polyolefin).

R Halogen-free flame retardant.

3.2.3 SUBSEQUENT LETTERS = OTHER KEY CHARACTERISTICS.

F Filled cable.

S Metallic vapor (moisture) barrier/screen.

B Indoor (building) cable.

M Self supporting (catenary) for aerial cable.

E Polyethylene outer protective sheath.

D Tape Armor (Double).

W Wire Armor (Light/Single).

N Non metallic cable

3.2.4 TRAILING NUMBER

Number Of Fibers/Core Diameter/Cladding Diameter.

3.2.5 EXAMPLES

FEFN/12/10/125 Polyethylene sheathed, filled, non metallic cable with 12 fibers with 10 μ m core diameter and 0.125mm cladding diameter.

FEFSE/8 Polyethylene inner sheathed, filled, metallic moisture barrier, polyethylene outer sheathed cable with 8 fibers.

FRBN/8 Halogen free sheath, non metallic indoor cable with 8 fibers.

4 DESIGN REQUIREMENTS

4.1 GENERAL

4.1.1 This section describes the cable design.

4.1.2 All cables shall be compatible with current DICT installation standards and operation and maintenance practices.

4.1.3 CABLE SIZES

Cable sizes shall generally be standardized to 4, 8, 12, 16, 20, 24, 36, 48, 60, 72, 84, 96, 144 or 288 fibers.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

4.2.1 All cable supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines or ASEAN countries for a period of thirty years without detriment to the transmission or operation and maintenance characteristics of the cable.

4.2.2 Cable shall be designed, manufactured and packaged so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation and the environmental conditions to be expected during the storage and transport of cable outside the Philippines shall not degrade the physical, transmission or operation and maintenance characteristics of the cable.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30°C to 38°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 CABLE CONFIGURATION

4.3.1 The cable shall be a loose tube design, i.e. the fibers are contained in loose tubes. The cable design from the center to the outer sheath shall conform to the following configuration :

1. A central strength member (CSM) or an anti-buckling element if a sheath strength member is used.

2. A sheath over the CSM, if necessary, to increase the diameter.
3. Color coded loose tubes containing filling compound and one or more optical fibers.
4. The loose tubes are assembled around the CSM in a single layer. This layer may also incorporate filler units, if required. The filler units shall be colored differently to the loose tubes.
5. Cable configuration shall generally be configured using tubes with 1, 2, 4, 6, 8 or 12 fibers.
6. A filling compound which shall fill all interstices of the core.
7. A wrapping around the core.
8. A longitudinal identification tape.
9. A sheath strength member, if required.
10. A moisture barrier which may be metallic or non metallic. If metallic it shall bond to the first sheath, to form a moisture barrier sheath.
11. A first sheath of LDPE or MDPE.
12. A second sheath of polyethylene for cables which are to be directly buried, with a viscous flooding compound or water swellable tape between the two sheaths.

4.3.2 Vendors may submit alternative sheath designs for consideration by DICT with supporting evidence that the alternative design is at least of equivalent standard to the design detailed above.

4.4 STRENGTH MEMBER

4.4.1 The primary function of the strength member is to provide the cable with stress and strain characteristics which will prevent the optical fibers from being stressed during installation, in service and during operation and maintenance procedures. Two designs of strength member are allowed; a central strength member or a sheath strength member. A combination of the two designs is also allowed.

4.4.2 The strength members shall be non metallic and shall comply with the requirements of clause 5.3.

4.5 CENTRAL STRENGTH MEMBER SHEATH

If the central strength member is required to be a minimum diameter a sheath which conforms to the requirements of clause 5.4, may be extruded over the central strength member.

4.6 CORE FILLING COMPOUND

4.6.1 All interstices of the cable core shall be completely filled with a cable filling compound complying with the requirements of clause 5.5.

4.6.2 The compound shall be capable of halting the ingress of water to the cable core and the transport of water along the cable core.

4.7 LOOSE TUBES

4.7.1 The loose tubes protect the optical fibers from axial or radial stresses by allowing free movement of the fibers within the tube.

4.7.2 The containment shall consist of plastic loose tubes conforming to the requirements of clause 5.6.

4.8 FILLING COMPOUND WITHIN THE LOOSE TUBES

The space around the primary coated fiber shall be completely filled with a filling compound which shall allow free movement of the fibers within the tubes. The compound shall comply with the requirements of clause 5.7.

4.9 OPTICAL FIBRES

The optical fibers shall conform to the requirements of clause 5.8.

4.10 OPTICAL FIBRE PRIMARY COATING

The optical fiber primary coating shall conform to the requirements of clause 5.9.

4.11 FIBRE IDENTIFICATION

- 4.11.1 Loose tubes shall be color coded so that the first and second tubes are colored blue and orange respectively; all remaining tubes shall be natural color. The Vendor may propose alternative color coding with individual colors for each loose tube.
- 4.11.2 For cables containing more than one fiber per tube each fiber shall be color coded according to Table 4.1. The colors shall comply with IEC 304. Single fibers per tube shall be natural color.

Fiber Number	Color	Fiber Number	Color
1	Blue	7	Red
2	Orange	8	Black
3	Green	9	Yellow
4	Brown	10	Violet
5	Grey	11	Rose
6	White	12	Aqua

Table 4.1 Color code for fiber identification.

- 4.11.3 The fiber coloring shall not interfere with light injection and detection systems used in fusion splicing machines.

4.12 CORE WRAPPING

The assembled filled core shall be completely covered with one or more continuous layers of a material conforming to the requirements of clause 5.10.

4.13 INTERNAL IDENTIFICATION

- 4.13.1 Internal identification of the cable shall be repeated at maximum intervals of 300mm.

- 4.13.1.1 An identification tape placed longitudinally within the cable shall be durably marked with DICT, the manufacturer's name or trademark and the year of manufacture of the cable.

4.14 MOISTURE BARRIER

- 4.14.1 A moisture barrier conforming to the requirements of clause 5.11 shall be applied over the wrapping. The barrier may be metallic or if requested non metallic.

4.14.2 METALLIC TAPE MOISTURE BARRIER

- 4.14.2.1 The tape shall be aluminum of thickness 0.2 ± 0.025 mm. It shall be coated on both sides with a polymer film.

- 4.14.2.2 The tape shall be bonded to the first sheath to form a moisture barrier sheath.

- 4.14.2.3 The tape shall be applied longitudinally with a minimum overlap of 3mm. The polymer shall bond and effectively seal the overlap. Alternatively manufacturers may use additional suitable adhesives to seal the overlap.

- 4.14.2.4 The tape shall be electrically continuous for the cable length.

- 4.14.2.5 All joints in the tape shall be welded. Any section of tape containing a joint shall have a breaking strength not less than 80% of non-jointed tape. The electrical resistance of a 1.0 meter tape section containing a joint shall not exceed 110% of an equivalent length without a joint. The area of the joint shall be recoated with polymer, on both sides of the tape. No more than two joints are permitted per 500 meter length of cable. The joints shall have the same resistance to water penetration as non-jointed tape.

4.15 FIRST (INNER) SHEATH

- 4.15.1 The first , or inner, sheath shall be LDPE or MDPE, conforming to the requirements of clause 5.12.

- 4.15.2 Duct and Aerial cables shall have this sheath.

- 4.15.3 The sheath shall be circular, free from pinholes, joints, repairs and other defects.

4.16 DIRECT BURIED AND AERIAL CABLES ADDITIONAL PROTECTION

Direct buried and aerial cables shall be the same construction as duct cable with additional protection of a second sheath of polyethylene and a viscous flooding compound or water swellable tape between the two sheaths as detailed in clauses 4.17 and 4.18.

4.17 INTER-SHEATH WATER BLOCKING MATERIAL

4.17.1 The inter-sheath material shall be applied between the inner and outer sheath to prevent adhesion and to block the migration of water between the sheaths.

4.17.2 The material shall comply with the requirements of clause 5.13.

4.18 SECOND (OUTER) SHEATH

4.18.1 The second sheath shall consist of polyethylene conforming to the requirements of clause 5.14.

4.18.2 The sheath shall be circular free from pinholes, joints repairs and other defects.

4.19 CABLE SHEATHS FOR AGGRESSIVE ENVIRONMENTS

Various sheath constructions for aggressive environments in addition to the requirements already specified may be requested at the time of tender.

4.20 MECHANICAL REQUIREMENTS

4.20.1 DIRECT BURIED CABLE

When tested according to the method detailed in clause 5.15.3 direct buried cable shall be able to withstand a tension of 1.0 kN.

4.20.2 DUCT AND AERIAL CABLES

4.20.2.1 When tested according to the method detailed in clause 5.15.3 cable for duct and aerial installations shall be able to withstand a tensile force of at least 2.0kN.

- 4.20.2.2 All cable intended for duct installation shall be capable of being field fitted with a pulling eye. Vendors shall submit full instructions for field fitting a pulling eye.

4.21 CABLE LENGTHS

4.21.1 DUCT CABLE

Duct and Aerial cables shall be supplied in nominal lengths of 2, 4 or 6 km, unless agreed otherwise. Vendors shall state the maximum continuous length of cable that they are able to deliver. Other lengths may be ordered at tender.

4.21.2 DIRECT BURIED CABLE

It is the intention of DICT to utilize direct buried cable in the areas where aerial or duct cables are not possible to be installed. Vendors shall state the maximum continuous length of cable that they are able to deliver. Specific lengths may be ordered at tender.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

5.1.1 This section specifies the cable and its 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 cable, or material removed from completed cable unless specifically identified otherwise.

5.1.3 All materials used in the cable shall be nontoxic and dermatologically safe.

5.1.4 HYDROGEN GENERATION

The materials and design of cable conforming to this specification shall be such that there is no possibility of the production or presence of hydrogen within the cable in sufficient quantities to degrade the transmission properties of the fibers.

5.2 TEST AND REPORT REQUIREMENTS

5.2.1 In order to assure the quality of purchased cable, Vendors are required to supply Material Approval and routine quality control test results and reports.

5.2.2 MATERIAL APPROVAL TESTING

5.2.2.1 Material 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 DICT that products have been designed to provide fault free service for the required life of the cable.

5.2.2.2 Material Approval shall not be granted until a Material Approval sample has been evaluated by DICT. In the event that appropriate samples are not available until manufacture, an interim Material 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 DICT for Material Approval prior to delivery.

5.2.2.3 Vendors are advised not to proceed with the manufacturing until written Material Approval or Interim Material Approval has been given by DICT for all Material Approval requirements of this specification.

5.2.2.4 Vendors are required to ensure that supplied cable complies fully with the Material Approval requirements. Although DICT may designate tests as Material Approval the Vendor may find it necessary to perform some of the tests on a regular Quality Control basis.

5.2.2.5 Material Approval tests and measurements are identified by (TA).

5.2.2.6 Material Approval samples shall include:

- a 5 meter length of each Material of cable

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are the tests used on a regular basis, such as every cable drum, to assure DICT 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 STRENGTH MEMBER

5.3.1 Sheath Material strength members shall be manufactured from aramide cords or similar non-conductive, high tensile strength, high Young's modulus and low elongation material.

5.3.2 Central strength members shall be fiberglass or an alternative non-metallic material.

5.4 CENTRAL STRENGTH MEMBER SHEATH

The central strength member sheath shall consist of polyethylene or other suitable material which shall neither be affected by nor affect the filling compound or any other components or materials of the cable.

5.5 CORE FILLING COMPOUND

5.5.1 MATERIAL

The filling compound shall be a synthetic cable filling compound suitable for use in tropical climates. It shall be neutral in color.

5.5.2 DROP POINT (QC)

The drop point when measured in accordance with the test method of ASTM D 566 shall be at least 85°C.

5.5.3 FLASH POINT (QC)

The flash point when measured in accordance with the method of ASTM D 92 shall be at least 200°C.

5.5.4 TOTAL ACID VALUE (QC)

The permissible value of acid when tested in accordance with ASTM D 974 shall be no more than the equivalent of 0.1mg of potassium hydroxide per gram of filling compound.

5.5.5 OIL SEPARATION (QC)

When tested according to Federal Test Method 321.3 for 7 days at $60 \pm 2^{\circ}\text{C}$ the oil separation shall not exceed 6%. The loss by evaporation shall not exceed 0.1%. The values obtained shall be reported. Alternative test methods may be proposed for approval by DICT.

5.5.6 COMPATIBILITY

The filling compound shall be compatible with all other components of the cable which it contacts and shall not affect the long term stability of any of the other cable components.

5.6 LOOSE TUBES

5.6.1 The loose tube secondary containment shall consist of polyamide or an alternative material which is equivalent or superior to polyamide. Vendors shall submit documentary evidence for alternative materials for approval by DICT.

5.6.2 The loose tubes shall be easily removable for a length of 2.0 meters by the standard tools and techniques used by DICT without causing damage to the fibers or primary coating.

5.7 FILLING COMPOUND WITHIN THE LOOSE TUBES

5.7.1 The filling compound shall be compatible with the primary coating, the loose tubes and any other components or materials of the cable which it may contact.

5.7.2 The compound shall allow free movement of the fiber in the tube.

5.7.3 The filling compound shall not be silicon based.

5.8 OPTICAL FIBRE PROPERTIES

5.8.1 The fibers shall consist of single-mode, step index, glass core, glass clad fibers complying fully with CCITT Recommendation G.652, unless stated otherwise. Test methods shall comply with the tests detailed in CCITT G.652. The following tests may be performed by either the fiber manufacturer or the cable manufacturer.

5.8.2 MODE FIELD DIAMETER (QC)

The value of the mode field diameter at 1300nm shall be within the range of 9-10 μ m. The mode field diameter deviation shall not exceed the limits of \pm 10% of the specified value.

5.8.3 MODE FIELD CONCENTRICITY ERROR (QC)

The mode field concentricity error shall not be more than 1.0 μ m measured at 1300nm.

5.8.4 CLADDING DIAMETER (QC)

The cladding diameter shall be 125 \pm 3 μ m.

5.8.5 CLADDING NON-CIRCULARITY (QC)

The cladding non-circularity shall not exceed 2.0%.

5.8.6 FIBRE TENSILE TEST (TA)

The tensile strength of the primary coated fibers shall be a minimum of 400 MPa.

5.8.7 FIBRE STRAIN PROOF TEST (QC)

The coated fiber, prior to cabling, shall be tested according to the constant strain method of IEC 793 Part 2. Vendors may submit details of alternative proof tests to DICT for approval.

5.8.8 MACRO BENDING PERFORMANCE

5.8.8.1 Macro Bending Loss (TA)

Macro bending loss shall be measured by forming 100 turns of fiber on a mandrel of 75mm diameter. The attenuation increase shall not exceed 0.5 dB at 1550nm.

5.8.8.2 Long Term Minimum Bending Radius (TA)

Vendors shall state the minimum bending radius that their fiber can sustain consistent with a 40 year life. The minimum bending radius shall be at least 35 mm.

5.8.8.3 Loss at Small Bending Radii (TA)

In order to gain further information about the fiber's bending characteristics Vendors shall also provide graphs of bending diameter in mm versus attenuation (dB/loop) for loop diameters of 100mm to 10mm in 5mm steps, at 1300nm and 1550nm wavelengths. These results are for information only and shall not be used for acceptance or rejection.

5.8.9 Unless previously agreed by DICT in writing, no jointed fibers are allowed in cable purchased to this specification.

5.8.10 All fibers in any cable supplied under the same contract shall be of the same Material from the same manufacturer.

5.9 OPTICAL FIBRE PRIMARY COATING

5.9.1 The fiber coating may consist of one or more coatings.

5.9.2 The coating, or coatings, shall consist of a heat or ultra violet cured acrylic material or a suitable alternative which is compatible with all components and materials of the cable.

5.9.3 The diameter of the coating shall be $250 \pm 15\mu\text{m}$ (QC).

5.9.4 The coating shall be easily removable without damage to the fiber. If the Vendor recommends a mechanical removal method the tensile force exerted on the fiber during removal shall not exceed the tensile force exerted during proof testing.

5.9.5 If chemicals are required to soften the coating they shall be non-toxic and dermatologically safe.

5.10 CORE WRAPPING

5.10.1 The wrapping shall be a fully dielectric material such as polyethylene or polypropylene.

5.10.2 The wrapping shall act as a heat barrier to prevent deformation, adhesion or damage to the components and materials of the core.

5.10.3 The wrapping shall not adhere to the cable components.

5.11 MOISTURE BARRIER

5.11.1 The metal tape shall comply with the requirements for Material 1, Class 1 tape as detailed in ASTM B736.

5.11.2 NON-METALLIC BARRIER

5.11.3 The barrier shall be compatible with the core filling compound.

5.11.4 METALLIC MOISTURE BARRIERS

Peel Test: Adhesion of Aluminum Tape to the Sheath (QC)

Median peel strength of 5 samples shall exceed 1.5 N/mm width when tested according to the method detailed in IEC 708-1.

5.12 POLYETHYLENE FIRST SHEATH

5.12.1 The nominal thickness of the first sheath shall be a minimum of 1.5mm.

5.12.2 The average thickness at any cross section shall not be less than 90% of the nominal thickness. The minimum spot thickness shall not be less than 80% of the nominal thickness.

5.12.3 POLYETHYLENE CLASSIFICATION (QC)

5.12.3.1 The first sheath shall consist of tough weather resistant polyethylene conforming to the following classification from ASTM D 1248. The following classification tests shall be performed on raw material.

5.12.3.2 Material 1 or 2, corresponding to low or medium density polyethylene with density ranging from 0.910 to $0.940 \times 10^3 \text{ kg/m}^3$.

5.12.3.3 Class C, corresponding to black weather resistant polyethylene containing 2.5 ± 0.5 % of well dispersed carbon black, and other additives.

5.12.3.4 Category 4 or 5, i.e. polyethylene with a melt flow index less than or equal to 1.0%.

5.12.3.5 Polyethylene which has the physical properties of Grade J3, i.e polyethylene which has the properties of grade J3 as detailed in Table 3 of ASTM D 1248.

5.12.4 ELONGATION OF SHEATH AFTER AGING (QC)

Samples removed from completed cable shall comply with the requirements of IEC 708-1.

5.12.5 MECHANICAL PROPERTIES OF SHEATH

Sheath removed from cable shall be tested according to the method of ASTM D2633 and shall satisfy the mechanical properties for the material of polyethylene used as shown in Table 5.1.

5.13 INTER-SHEATH WATER BLOCKING MATERIAL (Direct Buried and Aerial Cables)

The inter-sheath compound shall prevent adhesion between the sheaths and shall not adversely affect the sheaths.

5.14 POLYETHYLENE SECOND SHEATH (Direct Buried and Aerial Cables)

5.14.1 The nominal thickness of the sheath shall be a minimum of 1.0mm.

5.14.2 The sheath thickness variations shall comply with the requirements of clause 5.12.2.

5.14.3 POLYETHYLENE CLASSIFICATION (QC)

The second sheath shall be a tough weather resistant sheathing grade of polyethylene conforming to the requirements of clause 5.11 except that the material shall at the discretion of the manufacturer. The Vendor shall state the material to be used. Vendors may submit alternative materials which are at least equivalent to sheathing grade polyethylene. Sufficient supporting evidence must also be submitted.

5.14.4 MECHANICAL PROPERTIES OF SHEATH

Sheath removed from cable shall be tested according to the method of ASTM D 2633 and shall satisfy the mechanical properties for the Material of polyethylene used as shown in Table 5.1.

	LDPE	MDPE	HDPE
Tensile Strength (MPa)	12	16.5	16.5
Percent Elongation	400	300	300

Table 5.1 Mechanical properties of sheath

5.15 PHYSICAL REQUIREMENTS OF ASSEMBLED CABLE

5.15.1 LONGITUDINAL WATER PENETRATION (QC)

The cable shall comply with the requirements of IEC 794-1- F5.

5.15.2 TEMPERATURE CYCLING TEST (TA)

5.15.2.1 The temperature cycling test shall be performed according to IEC 794-1-F1. The sample length shall be at least 500 meters. The following test parameters shall be used :

Preconditioning : 24 hours at 23 ± 5 °C

Temperature TA : -10 °C

Time t1 : 24 hours

Temperature TB : 70 °C

Number of cycles : 10

5.15.2.2 Attenuation shall be measured at 1300 and 1550nm on six randomly selected fibers. Attenuation increase for any fiber at the temperature extremes or on return to the preconditioning temperature shall be less than 0.1dB/km.

5.15.3 TENSILE TEST (TA)

5.15.3.1 A report shall be provided of the cable's attenuation/load characteristics when tested according to IEC 794-1-E1.

5.15.3.2 The tensile force shall be applied at a jaw speed of 40mm per minute, in increments of 100N. The resultant plot shall include tensile force and cable elongation as test parameters.

5.15.3.3 The test shall be halted at 3kN or when a cable element fails.

5.15.3.4 Vendors shall also provide graphs of:

- a) cable tension versus cable strain
- b) cable strain versus fiber strain

5.15.3.5 Direct buried shall withstand a minimum tensile load of 1kN, and aerial & duct cables of 2kN, unless DICT has given written approval for a cable with a lower maximum hauling tension. In addition aerial and duct cables shall withstand a load equivalent to the weight per km of the cable. Attenuation increase at 1550nm and 1300nm shall be less than 0.1 dB/km at full load and on removal of the load. There shall be no evidence of damage to any cable component.

5.15.4 CRUSH RESISTANCE TEST (TA)

5.15.4.1 Cable shall be tested according to IEC 794-1-E3, a load of 2000N shall be gradually applied and maintained for a period of two hours for direct buried cable and ten minutes for aerial and duct cables.

5.15.4.2 The increase in attenuation under load and on removal of the load shall be less than 0.1 dB at 1300 and 1550nm.

5.15.4.3 There shall be no permanent damage to any of the cable components.

5.15.5 IMPACT TEST (TA)

Cable shall be tested according to IEC 794-1-E4. The mass of the weight shall be 2kg and the height shall be 1 meter. The increase in attenuation shall be less than 0.1dB at 1300 and 1550nm. There shall be no damage to any of the cable components.

5.15.6 REPEATED BENDING TEST (TA)

5.15.6.1 Cable shall be tested according to IEC 794-1-E6. The bending radius shall be 15 times the outside diameter of the cable. The mass of the weight shall be 3kg. The cable shall be tested for 50 cycles at a frequency of 12 cycles per minute.

5.15.6.2 There shall be no damage to any of the cable components. The increase in loss shall be less than 0.1dB at 1300 and 1550nm.

5.15.7 BENDING REQUIREMENTS (TA)

5.15.7.1 Cable shall be capable of meeting the following minimum bending radii without cable or fiber damage. Attenuation increase under full load and on removal of the load shall be less than 0.1dB/km at 1300 and 1550nm. vendors shall supply full details of the test used to confirm the bending properties of the cable.

Minimum Bending Radii: 10 x Cable diameter (No load)

20 x Cable Diameter (Full Load)

5.15.7.2 Cable shall be able to be formed into a loop to pass through the standard DICT manhole entry of 680mm and 730mm diameter, with no attenuation increase or damage to cable components.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

6.1 GENERAL

6.1.1 This section details the transmission requirements of the finished cable.

6.1.2 The information detailed in clause 5.2 regarding Material Approval and routine quality control also applies for the transmission requirements.

6.1.3 Inspection of the transmission properties shall be carried out in accordance with the test procedures specified in CCITT G.652.

6.2 ATTENUATION PROPERTIES

The attenuation properties of the cables shall conform to the maximum values specified in Table 6.1.

Design Parameter	Maximum Values @ 20 °C	
	1285 - 1330	1550
Wavelength of Light (nm)	1285 - 1330	1550
Attenuation for individual fibers (dB/km)	0.5	0.4
Average attenuation for the fibers (dB/km)	0.4	0.3

Table 6.1 Attenuation properties.

6.3 CUTOFF WAVELENGTH

The effective cable cut-off wavelength shall be between 1100 and 1280nm.

6.4 DISPERSION (QC)

6.4.1 The zero dispersion slope shall not exceed 0.095 ps/nm².km. The zero dispersion wavelength shall be between 1295 and 1322nm.

6.4.2 Chromatic dispersion shall not exceed 3.5 ps/nm.km between 1285 and 1330 nm and 18 ps/nm.km at 1550 nm.

6.5 ATTENUATION UNIFORMITY (QC)

The attenuation of the fiber shall be distributed uniformly along the fiber length such that there are no localized discontinuities in excess of 0.1dB at any of the design wavelengths.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

- 7.1.1 Manufacturers of cable conforming to this specification must show evidence that the cable has been manufactured according to a Quality System conforming to ISO 9002 or a national equivalent which has been approved by DICT.
- 7.1.2 Manufacturers may be required to supply a copy of the Quality Manual which shall be utilized for the manufacture and delivery of cable complying to this specification, at the time of tender.
- 7.1.3 DICT may require the manufacturer to be accredited to the above standards either by DICT personnel or assessors acting on behalf of DICT.

7.2 INSPECTION

- 7.2.1 DICT or its authorized representatives may inspect the Manufacturer's facilities at any time for the purpose of Quality Assurance surveillance.
- 7.2.2 If requested by DICT, the vendor shall supply evidence of the quality of raw materials and components used in the manufacturing process.
- 7.2.3 All cable manufactured to this specification may be inspected and tested by DICT 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 vendor.

8 SUMMARY OF REPORTS AND TESTING FREQUENCY

8.1 GENERAL

The two categories of test reports required, i.e. Material Approval and Quality Control, are detailed in clauses 5.2.2 and 5.2.3 respectively.

8.2 FREQUENCY OF MATERIAL APPROVAL TESTS AND SAMPLES

Material Approval test results and samples shall be submitted as follows:-

1. At the time of tender for each Material and size of cable which has not been given Material Approval.
2. Prior to delivery of any cable which does not have Material Approval.
3. At least once every 12 months, unless agreed otherwise.

8.3 QUALITY CONTROL TEST REPORTS

8.3.1 Quality Control test reports shall be submitted and approved in writing by DICT prior to each delivery of cable.

8.3.2 The test reports shall clearly show which cable drums are included.

8.3.3 REPORT FORMAT

8.3.3.1 All reports submitted shall include the following details:

1. DICT cable code.
2. Manufacturers name.
3. Vendors name.
4. Project number.
5. Date of delivery.
6. Identification of cable drums.

8.3.3.2 The report shall detail all results in the same order as presented in this section and shall be cross referenced to the relevant clause of section 8.

8.3.4 QUALITY CONTROL TESTING FREQUENCY

8.3.4.1 The frequency of Quality Control tests required by DICT may be categorized as follows:

1. According to the Manufacturers Sampling Plan

2. Every production batch or 10 drums.

3. Every cable drum.

8.3.4.2 In addition to the test results required by DICT, vendors are responsible to ensure that the cable complies with this specification. Therefore vendors shall perform all additional tests necessary, at appropriate frequencies to ensure the delivery of compliant cable.

8.4 MATERIAL APPROVAL TEST AND REPORT REQUIREMENTS

8.4.1 Vendors shall supply the following reports, results etc. for Material Approval.

8.4.2 COMPLIANCE STATEMENT

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

8.4.3 EFFECT OF HYDROGEN

Evidence to verify that the properties of the fibers will not be degraded by the presence of hydrogen. Clause 5.1.4.

8.4.4 STRENGTH MEMBER

Full details of the strength member including materials used, ultimate breaking strength and Young's modulus. Clause 5.3.

8.4.5 CENTRAL STRENGTH MEMBER SHEATH

Material of central strength member sheath, clause 5.4.

8.4.6 CORE FILLING COMPOUND

Vendors shall supply full details of the filling compound used including, dermatological hazards and evidence of compatibility. Clause 5.5.

8.4.7 LOOSE TUBES

Vendors shall give full details of the loose tubes, including material, manufacturer and manufacturer's data sheet. Clause 5.6.

8.4.8 FILLING COMPOUND WITHIN LOOSE TUBES

Vendors shall supply full details of the filling compound including manufacturer and evidence to verify the compatibility of the compound with other components of the cable which it contacts. Clause 5.7

8.4.9 FIBRE PROPERTIES

8.4.9.1 Fiber tensile test, clause 5.8.6.

8.4.9.2 Macro bending loss, clause 5.8.9.1.

8.4.9.3 Long term minimum bending radius, clause 5.8.9.2.

8.4.9.4 Loss at small bending radii, clause 5.8.9.3.

8.4.9.5 The Vendor shall supply full details of the optical fiber including the manufacturer, numerical aperture, refractive index profile, effective group refractive index at 1300nm and 1550nm, a plot of the chromatic dispersion coefficient versus wavelength over the range 1285nm to 1600nm and a plot of attenuation versus wavelength from the cut off wavelength to 1600nm.

8.4.10 PRIMARY COATING

The vendor shall supply full details of the materials used for the fiber coating including recommended removal techniques. In addition complete toxicological information for any chemicals required for removal shall be supplied to DICT. If a mechanical removal method is recommended the vendor shall supply evidence that the force exerted on the fiber during removal does not exceed the force applied during proof testing. Clause 5.9.

8.4.11 CORE WRAPPING

Vendors shall state the material of wrapping used, thickness and the number of layers. Clause 5.10.

8.4.12 MOISTURE BARRIER

8.4.12.1 Vendors shall supply evidence to verify the effectiveness of non metallic barriers.

8.4.12.2 Evidence to verify the compatibility of the non metallic barrier with filling compound, clause 5.11.2.

8.4.12.3 Material of additional adhesive copolymer used on metallic tape moisture barrier, clause 4.14.2.3.

8.4.12.4 Manufacturers data sheet for the tape.

8.4.12.5 Moisture barrier resistance.

8.4.13 FIRST AND SECOND SHEATH

Manufacturer's data sheet of the raw material(s).

8.4.14 INTER-SHEATH WATER BLOCKING MATERIAL

Details of the water blocking material including manufacturer's data sheet shall be supplied.

8.4.15 PHYSICAL REQUIREMENTS OF ASSEMBLED CABLE

8.4.15.1 Temperature cycling, clause 5.15.2.

8.4.15.2 Tensile test, clause 5.15.3.

8.4.15.3 Crush resistance test, clause 5.15.4.

8.4.15.4 Impact test, clause 5.15.5.

8.4.15.5 Repeated bending test, clause 5.15.6.

8.4.15.6 Bending requirements, clause 5.15.7.

8.4.16 SAMPLING PLAN FOR FIBRE PROPERTIES

The sampling plan for the testing of fiber properties as detailed in clause 8.5 shall be submitted for Material Approval.

8.5 TEST SHEETS FOR QUALITY CONTROL TESTS

8.5.1 TEST RESULTS TO BE PROVIDED ACCORDING TO THE MANUFACTURERS SAMPLING PLAN:

- a. The fiber manufacturer shall be identified.
- b. Unless agreed otherwise the following fiber tests shall be performed on a sampling basis. The sampling plan shall be submitted to DICT as part of the Material Approval process.

- c. Mode field diameter, clause 5.8.3.
- d. Mode field concentricity error, clause 5.8.4.
- e. Cladding diameter, clause 5.8.5.
- f. Cladding non circularity, clause 5.8.6.
- g. Coating diameter, clause 5.9.3.
- h. Zero dispersion slope and zero dispersion wavelength, clause 6.4.1.
- i. Chromatic dispersion, clause 6.4.2.

8.5.2 TEST RESULTS TO BE PROVIDED FOR EACH DELIVERY OR TEN (10) DRUMS:

8.5.2.1 Core filling compound properties

Core filling compound tests shall only be provided per delivery.

- a. Drop point, clause 5.5.2.
- b. Flash point, clause 5.5.3.
- c. Total acid value, clause 5.5.4.
- d. Oil separation, clause 5.5.5.

8.5.2.2 Sheaths

- a. First sheath classification, clause 5.12.3.
- b. Second sheath classification, clause 5.14.3.
- c. Elongation after aging, clause 5.12.4.

8.5.2.3 Assembled Cable

Longitudinal water penetration, clause 5.15.1.

8.5.3 TEST RESULTS TO BE PROVIDED FOR EACH DRUM:

8.5.3.1 Sheath Properties

8.5.3.2 Sheath thicknesses at either end of the cable length, clauses 5.12, 5.14.

8.5.3.3 Transmission Tests on Assembled cable

- a. Attenuation for all fibers in each drum. Clause 6.2.
- b. Average attenuation for each drum length. Clause 6.2
- c. Cut off wavelength for all fibers in each cable drum. Clause 6.3.
- d. For each fiber in each cable drum vendors shall supply an Optical Time Domain Reflectometer (OTDR) trace at 1550 nm. If there are any irregularities or point losses then a 1300nm trace shall also be provided, clause 6.5.

8.6 RECORDS

The manufacturer shall ensure the ready availability of suitable summary records for a period of not less than 5 years of all tests required by this specification in a format which identifies individual drums and batches and is easily readable.

9 PACKING AND MARKING

9.1 SHEATH MARKING

9.1.1 The method of marking shall not locally decrease the thickness of the sheath. The markings shall be durable and colored white.

9.1.2 LENGTH MARKING

9.1.2.1 Continuous sequentially numbered length markers shall be placed at regular longitudinal intervals of one meter on the outside sheath.

9.1.2.2 The numbers shall not be less than 3.0mm in height and shall be spaced to produce good legibility.

9.1.2.3 The accuracy of the length marking shall be within 1%.

9.1.2.4 An occasional illegible marking is permissible if there is a legible reading on either side of it.

9.1.2.5 The high count length marker shall be on the outer end of the cable when drummed.

9.1.3 APPLICATION MARKINGS : OUTER SHEATH

9.1.3.1 Fiber Optical Cable

The letters "SM" (abbreviation for single-mode) shall also be durably marked on the outer sheath.

9.1.3.2 Metal Free Cable

Should the cable not contain any metallic elements, additional text shall be durably marked as follows:

"M-FREE", on the outer sheath at intervals of 1 m.

9.2 CABLE DRUM LENGTHS

9.2.1 Cable shall be supplied either in nominal lengths of 2000, 4000 or 6000m or in alternative lengths specified prior to delivery.

9.2.2 The delivered lengths may not be shorter than the nominal or specified length.

9.2.3 Each length of cable shall be wound on a separate drum.

9.3 CABLE DRUMS

9.3.1 The drums shall be substantial and constructed so as to prevent damage to the cables during shipment and handling.

9.3.2 The diameter of the drum barrel shall be large enough to prevent damage to the cables during reeling and unreeling. The diameter of the barrel shall not be less than 40 times the outside diameter of the cable.

9.3.3 Lags or other suitable means of protection shall be applied to the drums to prevent damage to the cables during shipment and storage.

9.3.4 Nails and staples used in the construction of the drums must not be placed in a position where they can damage the cables.

9.3.5 The drums shall be non-returnable, unless agreed otherwise.

9.3.6 The drum size shall be suitable for the size and length of the cable.

- 9.3.7 The spindle hole shall allow the use of a 75mm diameter spindle without binding.
- 9.3.8 The drum size, including lags, shall not exceed 2.72m in diameter and 1.5m in width.
- 9.3.9 For testing purposes, the inner end of the cable shall be recessed into a slot in the drum flange and protected by a metal cover firmly secured to the flange. Alternatively, the inner end may protrude through the inside of the drum via a suitably constructed slot on the outside of the drum flange.
- 9.3.10 A minimum length of 1m of cable at the inner end shall be accessible.
- 9.3.11 The cable ends shall be securely fastened so as not to protrude beyond any portion of the drum and to prevent the cable from becoming loose during transport.

9.4 DRUM MARKINGS

9.4.1 FLANGE MARKING

Details given below shall be distinctly marked in a weather-proof material on both outer sides of the drum flanges :

- i) DICT, Department of Information and Communications Technology
- ii) Arrow showing the direction the drum shall be rolled
- iii) Country of origin
- iv) The label, "CAUTION - OPTICAL FIBRE CABLE - NOT TO BE LAID FLAT".
- v) Manufacturer's name or trade mark
- vi) A mark indicating the location of the inner end of the cable if located internally (see clause 8.2.5).

9.4.2 MARKING PLATES

- 9.4.2.1 Marking plates showing the following information in English shall be securely attached to the outer side of each drum flange.

9.4.2.2 The numerals shall be punched.

- A : Material specification number i.e. NBP OSP 1, plus DUCT or DIRECT BURIED and M-FREE if non-metallic.
- B : Number of fibers
- C : Fiber Material i.e. mode field diameter, cladding diameter
- D : Nominal cable length in meters
- E : Gross weight in kilograms
- F : Maximum rated tension
- G : Reel number
- H : Manufacturer's name
- I : Year of manufacture
- J : Project name or number

9.4.2.3 Appendix 1 shows the layout of the outside marking plate.

10 COMPLIANCE STATEMENT

The Vendor shall 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 Vendor agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

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



10.3 NON-COMPLIANCE WITH AN ALTERNATIVE PROPOSAL

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

UNCONTROLLED WHEN PRINTED OR EMAILED

11 APPENDIXES

11.1 APPENDIX 1 – MARKING PLATE

DICT DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY		Duct	
Mat. Spec	A		a
No. of Core	B		b
Core Diameter.	C	mm.	c
Length.	D	m.	d
Gross Weight	E	Kg.	e
Drum Number.	F		f
Manufacturer	G		g
Year.	H		h
Project.	I		j

Appendix 1: Example of marking plate.



DEPARTMENT OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

MANILA, PHILIPPINES

GENERIC SPECIFICATION REV. 01

POLYVINYLCHLORIDE (PVC)

DUCTS

Volume NBP OSP 05

POLYVINYLCHLORIDE (PVC) DUCTS

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REVISION AND ADDENDUM REFERENCE SHEET

SECTION	PARAGRAPH	DATE	COMMENTS
			Initial Issue

1 GENERAL

1.1 SCOPE

This specification covers the minimum standards and requirements for the construction, properties, testing and packing of PVC ducts to be used in the fiber optical cable network of DICT.

1.2 INTENDED USE

PVC ducts are used for conduit constructions and will be laid in sand bed or be encased in concrete at depths of approximately 600mm to 800mm.

1.3 TYPE APPROVAL

1.3.1 Vendors who have not previously supplied under this specification (or who have made changes to prior supplied products) shall submit a product sample for approval.

1.3.2 An interim Type Approval may be granted on the basis of a compliance statement and other information from the manufacturer.

1.3.3 Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.

1.4.2 DICT reserves the right to make changes to the specification without further notice.

2 ASSOCIATED SPECIFICATIONS

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

ASTM D 883	Standard Definitions of terms relating to plastics.
SAS 14	Pipes for potable water of unplasticized plastic.
SAS 15	Methods of testing of pipes for potable water of unplasticized plastic.
ISO 9002	Quality systems - Model for quality assurance in production and installation.

3 DEFINITIONS

The following definitions shall apply throughout the specification :

DICT

Department of Information and Communications Technology.

The Vendor

The individual or establishment submitting an offer or offers to supply PVC duct.

Manufacturer

The organization responsible for actual production of PVC 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 DICT for the inspection and testing of materials during manufacture and at the time of receiving materials.

4 DESIGN REQUIREMENTS

4.1 GENERAL

This section describes straight PVC duct for direct burial (DB) as per SAS 14, Class III.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

4.2.1 The PVC duct supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines for a period of thirty years without detriment to the operation and maintenance characteristics.

4.2.2 PVC duct shall be designed, manufactured and packaged so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation and the environmental conditions to be expected during storage and transport within the country shall not degrade the physical or operation and maintenance characteristics of the PVC duct.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30° to 38°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 MANUFACTURING STANDARD

4.3.1 The PVC duct sections shall be as shown in Appendix 1:

Outside diameter : 110 mm

Effective length : 3000 mm ± 25 mm

Wall thickness : 3.2 ± 0.2 mm

4.3.2 The ducts shall be compliant with all applicable requirements of SAS 14 and 15 or an approved equivalent.

4.3.3 Each 3m section of duct shall be provided with bell and spigot ends, as shown in Appendix 1. The spigot end shall be chambered to produce a 15° leveled edge along the outer circumference, the bell end shall be preformed into a plain bell socket suitable for coupling with the chambered spigot end of an adjacent duct.

- 4.3.4 The joining of two ducts shall provide a water tight joint.
- 4.3.5 In the spigot end a circumference marking line shall be placed 70mm from the end to make it more easy for installers and inspectors to control that the PVC ducts are properly joined during the installation.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

- 5.1.1 This section specifies the PVC duct material, physical, chemical, environmental and mechanical requirements and the tests to be applied for the determination of compliance to these requirements.
- 5.1.2 The requirements of this section refer to completed PVC duct, or material removed from completed PVC duct unless identified otherwise.
- 5.1.3 All materials used in the PVC 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 PVC duct, vendors 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 DICT that products have been designed to provide fault free service for the required life of the PVC duct.
- 5.2.2.2 Type Approval shall not be granted until a Type Approval sample has been evaluated by DICT at the factory. In the event that appropriate samples are not available from the manufacturer, 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 approved by DICT for Type Approval prior to delivery.
- 5.2.2.3 Vendors are advised not to proceed with manufacture until written Type Approval or interim Type Approval has been given by DICT for all Type Approval requirements of this specification.

5.2.2.4 Vendors are required to ensure that supplied PVC duct complies fully with the Type Approval requirements. Although DICT may designate tests as Type Approval the Vendor 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

Type Approval samples shall include, unless agreed otherwise:

- One length of the PVC duct.

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are the tests used on a regular basis to assure DICT 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.

5.3 RAW MATERIAL

The PVC duct shall be made of virgin unplasticized, polyvinylchloride (PVC).

5.4 TESTS

All tests required by SAS 15 shall be performed.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required in this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

7.1.1 Manufacturers of PVC ducts 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 or a national equivalent which has been approved by DICT.

- 7.1.2 Manufacturers may be required to supply a copy of the Quality Manual at the time of tender, which shall be utilized for the manufacture and delivery of PVC ducts complying to this specification.
- 7.1.3 DICT may require the manufacturer to be accredited to the above standards either by DICT personnel or assessors acting on behalf of DICT.

7.2 INSPECTION

- 7.2.1 DICT or its authorized representatives(s) may inspect the Manufacturer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.
- 7.2.2 If requested by DICT the vendor shall supply evidence of the quality of raw materials and components used in the manufacturing process.
- 7.2.3 All PVC ducts manufactured to this specification may be inspected and tested by DICT 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 vendor.

8 SUMMARY OF REPORTS AND TESTING 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 PVC ducts included in 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 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 PVC duct which has not been given Type Approval or
2. Prior to delivery of any PVC duct which does not have Type Approval.

8.2.2 COMPLIANCE STATEMENT

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

8.2.4 Evidence that the items shall be manufactured according to SAS 14.

8.2.5 Evidence that the ducts shall be manufactured according to SAS 14 and 15.

8.3 ROUTINE QUALITY CONTROL TEST REPORTS

Results of tests to confirm compliance with SAS 14 and SAS 15, must be submitted with each delivery, unless agreed otherwise.

9 PACKING AND MARKING

9.1 PACKING

9.1.1 The PVC duct shall be crated. There shall be 24 duct sections per crate in a 4 by 6 configuration. The crating shall be suitable to protect the ducts from damage during shipping by land or sea, and during storage.

9.1.2 Each crate shall be marked with the following information in English:

DICT, Department of Information and Communications Technology

PVC duct

Manufacturer's Name or trademark

Month and year of manufacture

9.2 MARKING

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

PVC duct - DICT

Manufacturer's Name or Trademark

Month and year of manufacture

9.2.2 The marking shall be in an easily readable color with 3mm high lettering.

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

10 COMPLIANCE STATEMENT

The Vendor shall 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 Vendor agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

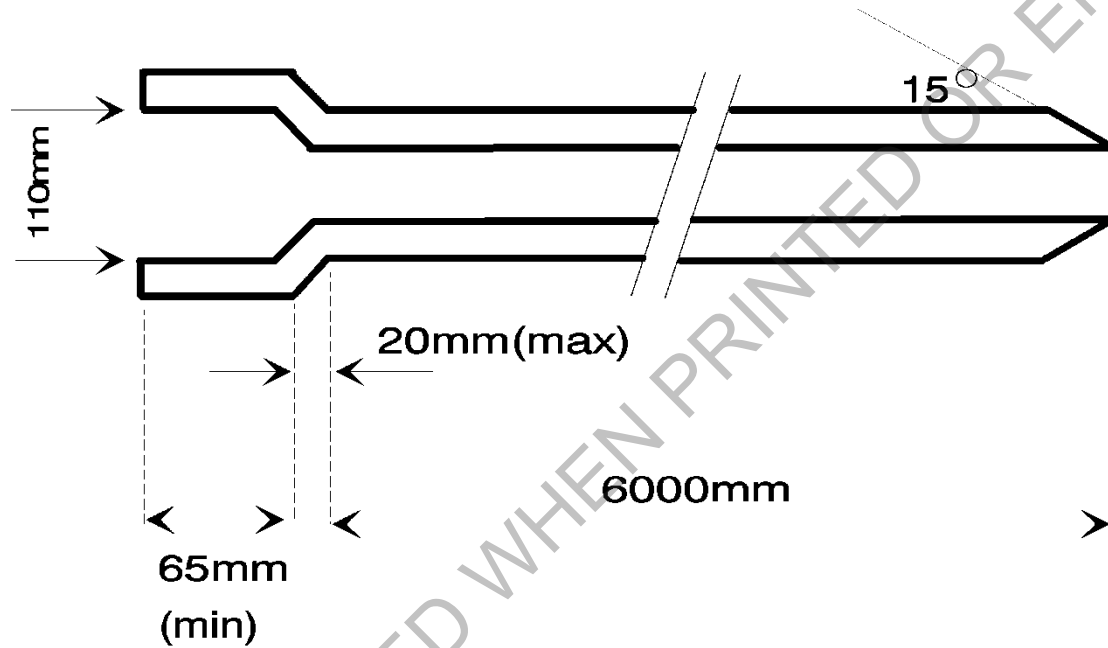
The Vendor does not meet the respective item or clause. The reason for the non-compliance shall be stated.

10.3 NON-COMPLIANCE WITH ALTERNATIVE PROPOSAL

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

11 APPENDIXES

11.1 APPENDIX 1 – PVC DUCT





**DEPARTMENT OF INFORMATION AND
COMMUNICATIONS TECHNOLOGY**
MANILA, PHILIPPINES

GENERIC SPECIFICATION
REV. 01

STEEL DUCTS



Volume NBP OSP 08

STEEL DUCTS

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GENERAL

1.1 SCOPE

This specification covers the minimum standards and requirements for the construction, properties, testing and packing of Galvanized Steel Ducts.

1.2 INTENDED USE

Galvanized steel ducts purchased in compliance with this specification are used to protect underground telecommunications cable in applications such as bridges and the road crossings in the fiber optical cable network of DICT.

1.3 TYPE APPROVAL

1.3.1 Bidders who have not previously supplied under this specification (or who have made changes to prior supplied products) shall submit a product sample for approval.

1.3.2 An interim Type Approval may be granted on the basis of a compliance statement and other information from the manufacturer.

1.3.3 Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

1.4.1 DICT cannot guarantee that any of the requirements, standards, regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.

1.4.2 DICT reserves the right to make changes to the specification without advance notice.

2 ASSOCIATED SPECIFICATIONS

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

ASTM A53	Standard specification for pipe steel, black and hot-dipped, zinc-Coated welded and seamless.
ASTM A700	Standard practices for packaging, marking, and loading methods for steel products for domestic shipment.
ASTM A865	Standard specification for threaded couplings, steel, black or zinc-coated (Galvanized) welded or seamless, for use in steel pipe joints.
ISO 9002	Quality systems - Model for quality assurance in production and installation.

3 DEFINITIONS

The following definitions shall apply throughout the specification:

DICT

Department of Information and Communications Technology.

The Bidder

The individual or establishment submitting an offer or offers to supply steel duct.

Manufacturer

The organization responsible for actual production of steel duct. Not a trading company or other intermediary.

Supplier / Vendor

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 DICT for the inspection and testing of materials during manufacture and at the time of receiving materials.

4 DESIGN REQUIREMENTS

4.1 GENERAL

This section describes the design of the Galvanized Steel duct.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

4.2.1 The steel duct supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines for a period of thirty years without detriment to the operation and maintenance characteristics.

4.2.2 Steel duct shall be designed, manufactured and packaged so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation and the environmental conditions to be expected during storage and transport outside the country shall not degrade the physical or operation and maintenance characteristics of the duct.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30° to 38°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 STEEL DUCT DESIGN

4.3.1 The steel duct shall comply with the requirements for an NPS 4, seamless, galvanized pipe of ASTM A53.

4.3.2 Both ends of the duct shall be threaded.

4.3.3 Each length of duct shall be fitted with 1 NPS 4 seamless, galvanized coupling compliant with ASTM A865.

4.3.4 The duct shall be supplied in 6m lengths.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

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

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

5.1.3 All materials used in the steel 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 steel duct, bidders 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 DICT that products have been designed to provide fault free service for the required life of the duct.

5.2.2.2 Type Approval shall not be granted until a Type Approval sample has been evaluated by DICT at the factory. In the event that appropriate samples are not available from the 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 approved by DICT for Type Approval prior to delivery.

5.2.2.3 Manufacturer are advised not to proceed with manufacture until written Type Approval or interim Type Approval has been given by DICT for all Type Approval requirements of this specification.

5.2.2.4 Bidders are required to ensure that supplied steel duct complies fully with the Type Approval requirements. Although DICT may designate tests as Type Approval the bidder or vendor 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 If requested, Type Approval samples shall be one length of steel duct fitted with a coupling.

5.2.3 ROUTINE QUALITY CONTROL

Routine Quality Control tests are the tests used on a regular basis, such as every delivery, to assure DICT 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.

5.3 STEEL DUCT

5.3.1 The steel duct shall comply with all the test requirements for a galvanized, seamless NPS 4 pipe of ASTM A53.

5.3.2 The couplings shall comply with all test requirements for a galvanized, seamless NPS 4 coupling of ASTM A865.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required for this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

7.1.1 Manufacturers of galvanized steel ducts 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 or a national equivalent which has been approved by DICT.

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

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

7.2 INSPECTION

- 7.2.1 DICT or its authorized representatives(s) may inspect the Manufacturer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.
- 7.2.2 If requested by DICT, the bidder shall supply evidence of the quality of raw materials and components used in the manufacturing process.
- 7.2.3 All steel ducts manufactured to this specification may be inspected and tested by DICT 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 bidder.

8 SUMMARY OF REPORTS AND TESTING 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 ducts included in the reports.

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 TYPE APPROVAL TESTS, SAMPLES AND REPORT REQUIREMENTS

8.2.1 Type Approval test results and samples shall be submitted,

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

8.2.2 COMPLIANCE STATEMENT

Bidders 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 Certification to verify that the duct and couplings comply with ASTM A53 and ASTM A865.

8.3 ROUTINE QUALITY CONTROL REPORTS

8.3.1 Quality Control test reports shall be submitted to DICT with each delivery.

8.3.2 In addition to the test results required by DICT, bidders are responsible to ensure that the steel duct complies with this specification. Therefore bidders shall perform all additional tests necessary at appropriate frequencies to ensure the delivery of compliant steel duct.

8.3.3 The manufacturer shall submit evidence that the duct and couplings have been manufactured, sampled, inspected and tested in accordance with the requirements of ASTM A53 and ASTM A865.

9 PACKING AND MARKING

9.1 PACKING

- 9.1.1 Each galvanized steel duct shall be protected from damage to the threads by a covering of sufficient design and strength.
- 9.1.2 A maximum of ten (10) pieces shall be bundled into one package in accordance with ASTM A700.
- 9.1.3 The bundle shall be secured together with strapping of sufficient number and size to maintain the bundle through handling, storage and transportation by land, sea, or air.
- 9.1.4 Each bundle shall be marked with the following information in English:

DICT, Department of Information and Communications Technology

Galvanized steel duct

Quantity of pieces (In the bundle)

Manufacturer's name or trademark

Month and year of manufacture

9.2 MARKING

- 9.2.1 All 6m sections of the steel duct shall be clearly marked at 1.5 m intervals with the following information.
- Steel duct - DICT
- 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 3mm high lettering.
- 9.2.3 The marking shall not decrease the thickness of the materials.

10 COMPLIANCE STATEMENT

The bidder shall 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 bidder agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

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



**DEPARTMENT OF INFORMATION AND
COMMUNICATIONS TECHNOLOGY**
MANILA, PHILIPPINES

GENERIC SPECIFICATION
REV. 01

SUB-DUCT AND MINI DUCT

Volume NBP OSP 06

SUB DUCT AND MINI DUCT

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SECTION	PARAGRAPH	DATE	COMMENTS
			Initial Issue

1 GENERAL

1.1 SCOPE

This specification covers the minimum standards and requirements for the construction, properties, testing and packing of sub-duct and mini duct for use in the fiber optical cable network of DICT.

1.2 INTENDED USE

1.2.1 Sub-duct, which is 20mm and 32mm outside diameter respectively, are used in the underground duct network as a liner for 110 mm outside diameter main conduit, compliant with DICTEM-1003. The sub-duct allows the placement of a number of small diameter cables in the one duct. Up to 4 sub-ducts may be placed in one 110mm duct.

1.2.2 Mini duct, which is 50mm outside diameter, is used for direct buried constructions to give additional protection to cables when required by difficult soil conditions or for applications such as river crossings.

1.3 TYPE APPROVAL

1.3.1 Bidders 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.

1.3.2 An interim type approval may be granted on the basis of a compliance statement and other information from the manufacturer.

1.3.3 Approval of a sample shall not be construed as waiving any requirements of this specification.

1.4 RESERVED RIGHTS

1.4.1 DICT cannot 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.

1.4.2 DICT reserves the right to make changes to the specification without advance notice.

2 ASSOCIATED SPECIFICATIONS

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

DICTEM-1003	Polyvinylchloride (PVC) ducts
DICTEM-1005	Polyvinylchloride (PVC) duct fittings and accessories
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 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.

3 DEFINITIONS

The following definitions shall apply throughout the specification:

DICT

Department of Information and Communications Technology.

The Bidder / Vendor

The individual or establishment submitting an offer or offers to supply sub-duct.

Manufacturer

The organization responsible for the actual production of sub-duct and mini 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 DICT for the inspection and testing of materials during manufacture and at the time of receiving materials.

Main Duct

Polyvinylchloride (PVC) duct of 110 mm outer diameter compliant to DICTEM-1003.

HDPE

High density polyethylene, i.e. polyethylene with a density greater than 0.94 g/cm³.

4 DESIGN REQUIREMENTS

4.1 GENERAL

This section describes the sub-duct and mini duct.

4.2 LONG TERM PERFORMANCE REQUIREMENTS

4.2.1 The Sub-Duct and mini duct supplied in compliance with this specification shall be capable of withstanding the typical service conditions of the Philippines for a period of thirty years without detriment to the operation and maintenance characteristics.

4.2.2 The Sub-Duct and mini duct shall be designed, manufactured and packaged so that exposure to the environmental conditions of the Philippines during storage, transport, installation and operation and the environmental conditions to be expected during storage and transport within the country shall not degrade the physical or operation and maintenance characteristics of the Sub-Duct and mini duct.

4.2.3 The environmental conditions of the Philippines may include ambient air temperature variations from 30° to 38°C. In addition direct solar radiation is known to increase the temperature of some outside plant to 42.2°C.

4.3 MANUFACTURING STANDARD

The sub-duct and mini 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 mini duct 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 2mm and an outer diameter of 20mm and 32mm respectively.

4.5.2 The mini duct shall have a wall thickness of 2.9 mm and an outer diameter of 50mm.

4.6 BORE DESIGN

4.6.1 The inner walls of the sub-duct can be either smooth or longitudinally ribbed to improve the frictional properties of the bore, allowing installation of longer cable lengths.

4.6.2 If ribbed, the ribs shall not protrude into the bore by more than 0.4mm.

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

Bidders 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 and mini duct shall generally be supplied in lengths of 300, 600, 900 and 1200m (± 5 m), unless otherwise requested or agreed.

5 MATERIAL PROPERTIES AND TEST REQUIREMENTS

5.1 GENERAL

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

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

- 5.1.3 All materials used in the sub-duct and mini 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 and mini duct, bidders 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 DICT that products have been designed to provide fault free service for the required life of the sub-duct and mini duct.

- 5.2.2.2 Type approval shall not be granted until a type approval sample has been evaluated by DICT. In the event that appropriate samples are not available, 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 DICT for type approval prior to delivery.

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

- 5.2.2.4 Bidders are required to ensure that supplied sub-duct and mini duct complies fully with the type approval requirements. Although DICT may designate tests as type approval the bidder 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 and mini 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 DICT 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 bidder shall state the name of the manufacturer of the basic compounds and the types and quantities of additives. In addition the bidder 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 Philippines.

5.4 FINISHED PRODUCT

5.4.1 LONG TERM STABILITY

The sub-duct and mini 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 the Philippines.

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 and mini duct shall have an induction temperature of at least 220°C when tested according to the method detailed in ASTM D 3350. Bidders may use alternative methods to verify the stabilization of the sub-duct and mini duct if agreed to by DICT.

5.4.5 IMPACT TEST (TA)

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

Weight : 9 kg - Tup Type B

Height of drop : 1.5 meters.

5.4.5.2 The sub-duct and mini 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 DICT.

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 $50^{\circ} \pm 2^{\circ}\text{C}$ 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 bidder shall submit test results to verify that the sub-duct and mini duct complies with all requirements of DIN 8074 and DIN 8075.

6 ELECTRICAL AND TRANSMISSION REQUIREMENTS

Not required in this specification.

7 QUALITY ASSURANCE

7.1 QUALITY SYSTEM ACCREDITATION

- 7.1.1 Manufacturers of sub-duct and mini 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 DICT.
- 7.1.2 Manufacturers may be required to supply a copy of the Quality Manual at the time of tender, which shall be utilized for the manufacture and delivery of sub-duct and mini duct complying with this specification.
- 7.1.3 DICT may require the manufacturer to be accredited to the above standards either by DICT personnel or assessors acting on behalf of DICT.

7.2 INSPECTION

- 7.2.1 DICT or its authorized representatives(s) may inspect the Manufacturer's facilities for the purpose of Quality Assurance surveillance, at any time during the term of the contract.
- 7.2.2 If requested by DICT, the bidder shall supply evidence of the quality of raw materials and components used in the manufacturing process.
- 7.2.3 All sub-duct and mini duct manufactured to this specification may be inspected and tested by DICT 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 bidder.

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

8.1.3 All reports submitted shall include the following details:

Manufacturer's name

Project number

Quality Control reports shall also include:

Date of delivery

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

8.1.3.1 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 and mini-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

Bidders 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 Manufacturer's 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.

9 PACKING AND MARKING

9.1 PACKING

9.1.1 Each length of sub-duct and mini duct shall be delivered on individual coils, with minimum internal coil diameter 30 times the sub-duct or mini 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 and mini 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 aluminum marking plates with the following information in English:

- Department of Information and Communications Technology.
- HDPE Sub-Duct or Mini 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 1m intervals with:

- Meters (length)
- DICT

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

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

10 COMPLIANCE STATEMENT

The bidder shall 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 bidder agrees to the stated requirements without any reservation.

10.2 NON-COMPLIANCE

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