INDRAPRASTHA GAS LIMITED

TENDER DOCUMENT
FOR
SUPPLY OF MDPE FITTINGS

TENDER DOCUMENT NO. IGL/ET2/CP/CP18456

SECTION I

INTRODUCTION

OPEN DOMESTIC TENDER E-TENDER

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1.0 INTRODUCTION

Indraprastha Gas limited (IGL) (hereinafter referred as "*Purchaser*") is a leading natural gas retailing and distribution company and is a joint venture of GAIL India Ltd., BPCL and Govt. of NCT of Delhi. It is supplying Piped Natural Gas (PNG) to domestic, commercial and Industrial consumers and Compressed Natural Gas (CNG) to automobiles through steel / PE pipeline networks in NCT of Delhi & NCR along with geographical areas in UP, Haryana and Rajasthan state.

2.0 PURPOSE

The present document covers the technical specifications for the procurement of PE Fittings.

3.0 SCOPE

The brief scope of work includes Manufacture, Testing, Inspection and supply of PE Fittings to IGL's designated stores located in NCT of Delhi, NCR, UP, Rajasthan and Haryana.

SECTION II

MATERIAL REQUISITION OF MDPE FITTINGS

1.0 GENERAL

This document along with the referred and attached Technical Specifications for PE Fittings and other referred specifications, codes and standards describes the minimum requirements for design, manufacturing, inspection, testing, supply, and performance guarantee, packing & shipment for PE Fittings.

The VENDOR shall provide a statement of compliance with his technical offer, confirming that the product offered complies with the specification and documents referred to therein. It is the VENDOR's sole responsibility to highlight any deviation/exception made to this MR and its attachments in a separate and complete list of all discrepancies (if any), and deviations in his technical offer for COMPANY review. All deviations subsequently must be agreed by the COMPANY in writing.

2.0 SCOPE

Indraprastha Gas Ltd (IGL) intends to augment the PNG Network. Therefore, Vendor scope shall include, but not limited to the design, manufacturing, inspection, testing, supply, packing & shipment for PE Fittings.

PE Fittings shall be supplied, as per IGL specification for supply of PE Fittings.

VENDOR shall be responsible to meet the requirements of this material requisition with its attachments, and the documents referred to within, in order to ensure safe and trouble free operation.

In case of conflicting requirements amongst any of the specified standards, the standard having the most stringent requirement shall be governing. It is the VENDOR's responsibility to resolve these conflicts before proceeding with design, manufacturing, inspection, testing, supply, and packing & shipment for PE Fittings. All deviations/ conflicts shall be subjected to IGL review and approval.

3.0 DESCRIPTION OF GOODS AND/OR SERVICES

This document covers supply of PE Fittings to be used in City Gas Distribution Project in NCT of Delhi, U.P., Haryana and Rajasthan by IGL.

The scope of supply covers design, manufacturing, inspection, testing, supply, packing & shipment and documentation requirements of these items in accordance with the requirements of this Requisition.

Sr. No.	Material Description	Quantity (Nos.)
1	MDPE COUPLERS OF SIZE 63 MM OD PE 100 SUITABLE TO SDR 11 PIPE SUPPLIED WITH EF END.	18,200
2	MDPE TAPPING SADDLES (WRAP AROUND TYPE) OF SIZE 63 MM WITH BRANCH END OF 20 MM OD PE 100 SUITABLE TO SDR 11 PIPE SUPPLIED WITH BRANCH EF END OR WITH 20 MM COUPLER IN A SINGLE PACKAGE.	75,400
3	MDPE TAPPING SADDLES (WRAP AROUND TYPE) OF SIZE 63 MM WITH BRANCH END OF 32 MM OD PE 100 SUITABLE TO SDR 11 PIPE SUPPLIED WITH BRANCH EF END OR WITH 32 MM COUPLER IN A SINGLE PACKAGE.	26,800
4	MDPE REDUCERS OF SIZE 63 MM OD ON ONE END WITH 32 MM OD ON THE OTHER END PE 100 SUITABLE TO SDR 11 PIPE SUPPLIED WITH EF ENDS OR WITH 63 MM & 32 MM COUPLERS FOR BOTH THE ENDS IN A SINGLE PACKAGE.	76,000
5	MDPE EQUAL TEE OF SIZE 63 MM OD PE 100 SUITABLE TO SDR 11 PIPE SUPPLIED WITH EF ENDS OR WITH 63 MM COUPLERS FOR SIDES WHERE IT IS NOT EF END IN A SINGLE PACKAGE.	72,300
6	MDPE END CAPS OF SIZE 63 MM OD PE 100 SUITABLE TO SDR 11 PIPE SUPPLIED WITH EF ENDS OR WITH ONE 63 MM COUPLER IN A SINGLE PACKAGE.	9,200

NOTE:

- The above quantities are indicative and for evaluation purpose only. Purchase order/ Release order will be released considering consumption rate and stock position.
- Bidder shall quote for materials PE 100.
- Bidder shall quote for SDR 11 for the materials.
- EF – Electro Fusion End
- Cost of Third Party Inspection Agency shall be in bidder/supplier scope.

4.0 VENDOR'S COMPLIANCE

Vendor shall submit his bid in full compliance with the requirements of this MR and attachments.

Compliance with this material requisition in any instance shall not relieve the Vendor of his responsibility to meet the specified performance.

5.0 COMPLIANCE WITH SPECIFICATION

The VENDOR shall be completely responsible for the design, manufacturing, inspection, testing, supply, and packing & shipment for Polyethylene (PE) Fittings shall strictly be in accordance with the Material Requisition and all attachments thereto.

Any exception must be highlighted by the Bidder at bid stage and will be considered accepted only after written approval.

6.0 INSPECTION AND TESTING

VENDOR shall carryout various tests as per applicable codes and standards, specifications, other attachments to the bid package and as per the VENDOR's approved QA and QC plan. Tests certificates shall be submitted for IGL review and approval.

IGL / Its authorized representative or certifying agency shall have access to inspect the material at any stage during manufacture.

For all inspections and tests specified to be witnessed or observed, bidder shall ensure that a written notification reaches the purchaser at least 5 days prior to the date of Material getting ready for inspection and testing.

During inspection material certificates, shop test data, certificates for raw material and other relevant information shall be furnished for purchaser's perusal so as to ascertain that the specifications and quality are complied with.

Witnessing of inspection and testing by Third Party Inspector are required as per VENDOR's Quality Assurance System. VENDOR shall obtain approval of their quality Assurance System from IGL prior to commencement of manufacturing activities.

7.0 PACKING AND FORWARDING

VENDOR shall ensure proper support and packaging of the items to avoid any damage during shipment. All exposed parts shall be protected against physical damage and weather conditions.

The packaging shall be suitable for outdoor storage.

Packed material shall have a detailed duplicate packing list clearly identifying the packed items with respective material. One packing list shall be placed inside the material package and other shall be properly secured on the outside.

VENDOR shall dispatch and transport the items to IGL designated places.

8.0 LIST OF ATTACHMENTS

The table below lists the documents which are integral part of this Material Requisition. The applicable revision index of each document is mentioned in the column below the current Material Requisition revision index.

S.NO	DESCRIPTION	DOCUMENT NO.	REVISION
1	Technical Specifications of PE Fittings		
2	Quality Assurance Plan		

9.0 DOCUMENTS & DATA REQUIREMENTS

BIDDER shall submit documents as per ANNEX - A, standard specifications and other attachments to the bid package. However, following is the broad list of documents required as a minimum.

a. GA drawings.
b. Coupling Drawings.
c. Fittings Drawings.
d. Installation manuals
e. Inspection and test procedures and records
f. List of spares
g. Test certificates
h. As built drawings
i. Manufacturing data book

Documents listed in the bid document are the minimum requirement. VENDOR shall submit all documents required to complete design and engineering and to establish that pipe shall be suitability during supply / Dispatch of the product.

Annual trainings (as per IGL requirement across all Geographical Areas of IGL) of PE Fittings for at least 40 nos. of employees, explaining the salient features including procedure during installation will also be covered in scope of vendor without any additional financial implication to IGL. Further, the space for physical training will be arranged by IGL.

ANNEXURE A

- The table hereunder specifies the quantities and the nature of the documents to be submitted by the VENDOR to the ENGINEER.
- The documents required at the inquiry stage and to be included in the bid are listed under column A.
- The documents required after award of the AGREEMENT and subject to the written approval of the ENGINEER are listed under column B.
- The final and certified documents are listed under column C.

- Any document, even when preliminary, shall be binding and therefore duly identified and signed by the VENDOR. It shall bear the ENGINEER's Project reference, the Material Requisition number and the identification number.
- The documents are fully part of the supply which shall be complete only if and when the documents complying fully with the material requisition requirements are received by the engineer.

SL. NO	DOCUMENTS & DATA REQUIRED	WITH BID (A)	AFTER NOTIFICATION OF AWARD (B)		DURING FINAL DOCUMENTATION (C)	
		Nos (Copy)	Nos (Copy)	Weeks	Nos (Copy)	Weeks
1	List of Raw Material Manufacturer	2	2	2		With Final Technical document
2	QA/QC program	2				
3	ISO 9001:2008 (or Latest) Certification	2				
4	Compliance Certificate to Tender Inspection Test Plan (ITP)	2				
5	Inspection & Test Plan (ITP)		2	2		
6	Manufactured Test Certificate		2	Before Dispatch		
7	Material certificate EN 10204 Cert.3.2		2	Before Dispatch		
8	Final technical file (Consisting of above document)				2	Before claim of final payment.

NOTES

1) Duration in column B (required date) are weeks after purchase order date.
2) Duration in column C (required date) are weeks after document approval.
3) Due date of each document may be proposed.
4) Final technical file shall be supplied in hard copy as indicated, and in electronic format (pdf acrobat) to owner.
5) All documents shall be supplied in English language.
6) Documents listed in the bid document are the minimum requirement. VENDOR shall submit all documents required to complete design to establish material suitability during supply / Dispatch of the product.
7) Latest submittal time for:
   Test Procedure : 2 Weeks before test
   Test report : 2 weeks after test

10.0 OTHERS

1. VENDOR shall furnish in his offer the complete details, data, and documents required as per the enquiry and as per the standard practice.
2. VENDOR shall ensure that all the items supplied are new and free from defects. Vendor shall adhere to the Particular Technical Specification for the supply of materials specified in section 3 of this document.

3. The VENDOR shall be completely responsible for the design, materials, fabrication, testing, inspection, preparation for shipment and transport of the above pipe shall strictly be in accordance with the Material Requisition and all attachments thereto.

SECTION III

PARTICULAR TECHNICAL SPECIFICATION (PTS) OF PE FITTINGS

1.0 SCOPE

The scope of work shall cover design, manufacturing, inspection, testing, supply, packing & shipment and transportation for the PE Fittings as per technical requirements / specification for City Gas Distribution Project in NCT of Delhi, U.P., Haryana and Rajasthan.

2.0 DEFINITIONS

Subject to the requirements of the context, the terms (hereafter listed in alphabetical order) used in this specification are given the following meaning:

Agreement	Designates the agreement concluded between the Client and the Vendor, under which the latter undertakes to the former the Goods and/or Services according to the stipulations which are agreed and specified in the form of an order.
Client / Owner	Designates the purchaser of the Goods and/or Services, which are the subject of the Agreement.
Vendor/Supplier	Designates the individual or legal entity with whom the order has been concluded by the Client. The term "Vendor / Supplier" may be used in differently for a Supplier, a Manufacturer, an erection Vendor/Supplier, etc.
Days - Weeks – Months	Specify the number of calendar days, weeks or months and not of working days, weeks or months.
Client's representative	designates the individual or legal entity to which the Client has entrusted various tasks in relation with the carrying out of his project.
Goods and/or Services	Designate, depending on the case, all or part of the drawings or documents, substances, materials, materiel, equipment, structures, plant, tools, machinery, to be studied, designed, manufactured, supplied by the Vendor/Supplier under the agreement, including all the studies, tasks, works and services specified by the order. The terms Goods or Services may by indifferently used one for the other as required by the context.
Project	Designates the aggregate of Goods and/or Services to be provided by one or more Vendor / Supplier.
TPIA	Third Party Inspection Agency

3.0 MATERIAL GRADE

The material grade of polyethylene (PE) Fittings shall be PE 100. The bidder shall submit the details by clearly indicating the make, country of origin, part nos. Product codes and catalogue number along with catalogues written in English for the Items quoted, in the Unpriced Bid.

The bidder shall provide approvals of internationally recognized authorities for their products along with their un-priced bids.

4.0 APPROVED MANUFACTURER FOR RAW MATERIAL

1. INEOS (Formerly SOLVAY)
2. BOROUGE
3. TOTAL PETROCHEMICALS
4. DOW
5. ELENAC
6. BOREALIS

7. SABIC
8. LYONDELLBASELL

5.0 MDPE PIPE MATERIAL

The raw material of MDPE pipe shall be PE 80, thick as per SDR11. The MDPE pipe shall confirm standards for polyethylene pipes for supply of gaseous fuels IS 14885 (latest edition).

6.0 PE FITTINGS

The requirement for manufacturing, inspection, testing, packaging, transportation and dispatch of "MDPE FITTINGS" is specified in General Technical Specification for PE Accessories- for Underground networks for natural gas distribution.

7.0 MATERIAL REQUISITION

The quantities of items are mentioned in Material Requisition.

8.0 QUALITY ASSURANCE

Manufacturer to submit their Inspection and Test Procedure (ITP)/QAP for the approval of Owner.

9.0 DEFECT LIABILITY PERIOD

Defect liability period shall be as per the GCC/SCC.

10.0 MARKING

Atleast following information shall be embossed/engraved onto the fitting. However, Minimium thickness shall be maintained as per tender in the Fittings:

a) Manufacturer’s name and/or trademark
b) Material and Designation
c) Design Application Series
d) The size of the fitting in mm
e) Number of the system standard. This information can be printed/formed directly on the fitting or on a label associated with the fitting or on an individual bag
f) Production period, year and month

The marking shall stay legible during normal manipulation, storage and installation.

The marking shall not adversely influence the performance of the fitting and prevent the nonconformity of the fitting.

Bidder shall provide the sticker confirming the name of client as "IGL" along with all items.

Following necessary information can be provided on Barcode Sticker:

a) Fusion time in seconds
b) Cooling time in minutes
c) Fusion parameters in BAR code
d) Traceability code (fittings) as per standard ISO 12176-4.

11.0 PACKAGING

All the PE fittings of more than one piece shall be kept in single box/packets according to type and size during packaging.

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Bidder shall submit the packaging details during offer and also complied with at the time of delivery. The material for each SOR Item is essentially required to be packed in one case/packet /box.

AMENDMENT TO GTS-01/IGL/ET2/CP/CP18456

3.2 ADD

Branch piping/tapping saddle shall be wrap around type (i.e. to be supplied along with integral PE Clamp (equipped with bottom part) which is to ensure sufficient pressure welding and is to be left in place after the welding.) Further, the upper shell of the Tapping Tees shall be a single piece to avoid dual welds.

5.2 ADD

The raw material PE, used for accessory production, is in compliance with all prescription in EN 1555- 1 standards.

The raw material shall be virgin material belonging to class PE100. The following are strictly forbidden:

- Use of recycled raw materials
- Mixing of different raw materials
- The addition of supplementary additives to the raw material.

6.3 REPLACE

All accessories shall be of yellow or black colour.

6.5.2 REPLACE

Classification

Electrofusion accessories are divided into three classes according to the voltage and/or current characteristics.

Class A Electrical supply based on voltage set between 8V and 42 V
Class B Electrical supply based on voltage set between 42 V and 220 V
Class C Electrical supply based on power supply settings.

All supplies, unless otherwise stipulated in the order, concern Class A accessories.

Unless stipulated otherwise in the order, only "wrap-around" saddles, Electrofusion and Transition fittings with integral pipe fixation device to be supplied upto 180 mm dia

Unless otherwise agreed between IGL and the supplier, all electrofusion accessories must be "single wire" type.

6.5.3 REPLACE

Connector (terminal pin) 4.0 mm/4.7mm shall be required.

6.6 REPLACE

The support drilling equipment to be designed so that during drilling the maximum immediate leak flow will never exceed 200 litres per hour at 5 bar pressure, in the main pipe. According to this flow rate, the supports are divided into two categories:- models 1 and 2 (refer to par. 3.2.) The required model will be specified when ordered.

The bell drill is equipped with a maneuver opening for the insertion of a requisite (range may vary from 5 mm to 21mm) hexagonal spanner/Allen Key.

The bell drill path is limited at the top by a limit block.

The drill mechanism is designed so that no additional tools (except the hexagonal spanner/Allen Key) are required for carrying out drilling operations. On placement of order the proposed sizes of hexagonal spanner/Allen Key required for various sizes of Tapping Saddle shall be informed by the bidder alongwith drawing of particular saddle for approval of IGL.

6.7 REPLACE

Flow M3/hr	Saddle type	Maximum load loss Mbar
10	32x20	1.0
10	63x20	1.0
10	63x32	1.0
10	125x32	1.0
10	180x32	1.0
40	125x63	1.0
40	180x63	1.0

12.0 REPLACE

All electro fusion accessories must be printed with a bar code or bar code with an individual magnetic card (manual setting information for data transfer purposes must be supplied in bar code). The magnetic card contains the welding parameters that have been encoded in the magnetic track, as well as the bar code printed on the card. Coding must be carried out according to prescriptions included in ISO TR 13950 standards. The bar codes shall be laminated to ensure that the details are not damaged or erased.

AMENDMENT TO GTS-02/IGL/ET2/CP/CP18456

1.0 REPLACE

The Compounds that meet this specification must be PE 100.

The colour shall be yellow or black in accordance with the local requirements.

3.2 ADD

Minimum Required Strength (MRS 10)

Standardized class of compounds for which the LCL is equal to 10.

3.3 ADD

PE 100

Standard designation for PE compounds in class MRS 10

4.0 ADD

The PE compounds that are acceptable according to the requirements of this specification must conform to the requirements for PE 100 described in prEN 1555-1.

SECTION IV

GENERAL TECHNICAL SPECIFICATION (GTS) OF PE ACCESSORIES FOR UNDERGROUND NETWORKS FOR NATURAL GAS DISTRIBUTION

1.0 SUBJECT AND AREA OF APPLICATION

This specification has been established to define the requirements that must be met by injected moulded polyethylene accessories (PE) destined for the construction or the maintenance of underground networks for natural gas distribution where the maximum operating pressure (MOP) is equal to 5 bars.

It also defines some of the more general characteristics of materials used for accessory manufacturing and includes the appropriate classification model.

The specification also includes testing method parameters for the material in question. All accessories included in these specifications are listed as follows:

- Electrofusion welded accessories
- Electrofusion welded saddles
- Accessories equipped with insertion connection for end to end welding and assembly using electrofusion-welded sleeve coupling.

This specification is limited to accessories with a nominal diameter of 225 mm and a working temperature between -20°C and +40°C.

PE and steel accessories with a tapered section and front section connections are not included in these specifications.

2.0 REFERENCE STANDARDS AND SPECIFICATIONS

EN 682	Air-tight rubber seals - specification for air-tight seal materials for gas and hydrocarbon fluid transfer piping
EN 1555-1	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 1: General
EN 1555-3	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 3: Fittings
EN 1555-7	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 7: Guidance for assessment of conformity
ISO DIS 11413	Preparation of test assemblies between a polyethylene (PE) pipe and an electrofusion fitting.
ISO DIS 11414	Preparation of test assemblies between a pipe/pipe or pipe/fitting polyethylene (PE) by butt fusion
ISO DIS 12093	Format for a technical brochure for electrofusion joint characteristics
ISO TR 13950	Electrofusion identification methods
CEI 60335-1	Safety standards for household appliances and similar equipment.
CEI 364	Electrical installations on buildings (including building sites and other temporary installations)
CEI 449	Voltage domains for building electrical installations.

3.0 DEFINITIONS

3.1 ELECTROFUSION ACCESSORY

This term covers all injected moulded polyethylene accessories equipped with a heated element designed to transform electrical energy into heat to create self-welding.

In certain exceptional cases, an accessory can present one or more smooth ends. In this case the accessory will provide for the requirements of each connection end as regards shape, measurement, and technical characteristics.

3.2 ELECTROFUSION SADDLE

This term covers a saddle shaped injection moulded PE accessory that is equipped with one or several heating elements that convert electrical energy into heat. The released heat provides a fusion surface sufficiently large to ensure correct saddle-pipe assembly.
Electrofusion saddles can be subdivided into two categories:

Wrap around Electrofusion saddle whose upper shell is brought against the pipe during welding using a fastening stirrup located on the lower part of the accessory to guarantee that the welding pressure is sufficient. Generally the stirrup is left in place after welding.

Top load Electrofusion saddle where the welding pressure is obtained by pressing down on the saddle head using a fixing system (clamp) that is removed after welding is completed.

There are four different saddle types:

Support This is an accessory designed for joining branch pipes and is equipped with a drill bit made to pierce the wall of the pipe; this bit remains in the saddle body after installation.

Branch piping saddle This accessory is designed for joining branch piping where an additional bit is necessary to pierce the wall of the main pipe next to the branch

Ballooning saddle This accessory provides the positioning of a sealing (orblocking) balloon and that can be filled again after work completion.

Repair saddle This accessory will seal/block any leaks on the pipe or will reinforce piping in the case of localised deterioration.

According to their leakage flow, the supports are divided into two model categories:

Model 1	Supports whose maximum immediate external leak flow is practically equal to zero at 5 bar pressure in the piping.
Model 2	Supports whose maximum immediate external leak flow never exceed 200 litres an hour at 5 bar pressure in the piping.

3.3 END TO END WELDING ACCESSORIES

This term describes injection moulded polyethylene accessories with smooth ends but not equipped with integrated heating elements. These are connected to the network by end-to- end welding using electrofusion sleeves.

In certain exceptional cases, an accessory can also present one or more electrofusion ends. In this case the accessory will provide for the requirements of each connection end in shape, measurement, and technical characteristics

4.0 GENERAL SPECIFICATIONS

This specification is based on the series of EN 1555 standards, which standardise all the gas distribution network plastic piping systems.

The accessories described in this document comply with all prescriptions included in EN standard 1555-3, as well as all complementary requirements and/or options described in the specifications attached with this technical bid package.

5.0 MATERIAL

5.1 GENERAL INFORMATION

The materials used for the manufacturing of the accessories must conform to the requirements demanded for components used in gas fuel distribution networks.

The accessory material that is in contact with the PE piping must not be composed of any material that will provoke a reduction in pipe performance, nor must it provoke cracking under stress.

All equipment will marked with inscription/description and specification in English language

5.2 RAW MATERIAL SPECIFICATIONS

The raw material PE, used for accessory production, is in compliance with all prescriptions in EN 1555-1 standards. It must be approved according to the prescriptions mentioned in this tender.

The raw material belongs to class PE100. The following are strictly forbidden:

- use of recycled raw materials
- mixing of different raw materials
- The addition of supplementary additives to the raw material.

5.3 SPECIFICATION FOR COMPONENTS MADE OF MATERIALS OTHER THAN POLYETHYLENE

5.3.1 METAL PARTS

All metal parts subject to corrosion must be protected in an adequate manner

Metal parts must conform to prescribed standards of that particular material for gas distribution, for quality levels, size/gauge and measurements.

Cast iron, aluminium and its alloys are not authorised for use.

5.3.2 ELASTOMER

Elastomer air and watertight seals, like all other elements manufactured in this material, must comply with the prescriptions of EN 682 standards.

5.3.3 OTHER MATERIALS

All other materials used are in compliance with the prescriptions described in paragraph 5.1. The accessories included in the paragraph comply with the requirements of this specification and are adapted for all general use for natural gas distribution.

6.0 GENERAL ACCESSORIES CHARACTERISTICS

6.1 TECHNICAL INFORMATION

The manufacturer must supply a technical information dossier composed and including the same material and presented in the same manner, in compliance with the prescriptions of the ISO DIS standard12093. This dossier must mention all of the following information for each accessory:

- PE raw material used
- Measurements and tolerances
- Domain of application (temperature and pressure limits, SDR and ovalisation)
- Assembly instructions
- Welding instructions (welding parameters and limits)
- Test results attesting to the accessory conformity standard: c.f. EN standard 1555-3 for test descriptions.

For electrofusion accessories, the manufacturer must also supply the SDR series for the pipes, which will be used together with their accessory, according to their thickness.

In addition, for the saddles:

- The attaching method (tools necessary and/or lower shell)
- saddle category (refer to 3.2)
- Maximum saddle height (H in figure 2)
- the height of the branch pipe for supports (h in figure 2)

For all smooth ended accessories, the manufacturer must also supply the SDR series of connections; the accessory must be guaranteed for use on piping of the same class.

In the case of welding parameter modification, size or raw material changes, the manufacturer must include a new technical dossier providing proof that the accessory in question is still compliant with the specification prescriptions.

Testing assemblies will take into consideration manufacturing tolerance, assembly tolerance and the variations in environmental temperature corresponding with the conditions where the accessories will be in use. The manufacturer must observe all methods recommended for polyethylene accessory installation as shown in the technical specification attached in volume II of the bid package.

The assembly of piping and accessories manufactured and used in the tests must be in compliance with the manufacturer's technical instructions and the limits of use conditions. When the test assemblies are carried out, the manufacturing and assembly tolerances must be taken into consideration. Samples destined for assembly testing with electrofusion accessories must be prepared according to standard ISO DIS 11413. End - to-end welded samples must be prepared according to standard ISO DIS 11414.

6.2 APPEARANCE AND FINISH

The internal and external surfaces of the accessories must be smooth, clean and free of all scratching, pitting and other surface faults that can possibly reduce accessory and assembly performance.

No element of any accessory must show any signs of damage: scratching, scraping, piercing, blisters, bloating, denting, holes, cracks or other faults that can reduce required performance.

It must be possible to place the accessory on the pipe or on another accessory without moving the electric winding or the air/water tight seals etc. and this must respect the tolerance permitted for piping and accessories.

6.3 COLOUR

All accessories will be black. If agreed previously, they can also be coloured yellow or orange.

6.4 JOINT APPEARANCE

After welding, when examined visually without a magnifying glass, the internal and external surfaces of the pipes and accessories must appear free of welding exudation outside the accessory limits (unless identified by the accessory manufacturer as normal, or carried out deliberately as a welding test, but on condition that there is no wiring position change inside the electrofusion accessories that could provoke a short-circuit). Internal surfaces of all adjacent piping must remain identical to the previous condition before welding.

6.5 ELECTROFUSION ACCESSORIES ELECTRICAL CHARACTERISTICS

6.5.1 General information

The accessories include an electrical system as described in the standards CENELEC 60335-1, CEI 364 and CEI 449. This system is equipped with an appropriate electrical protection for the voltage and intensity of the current in use, and adapted to the characteristics of the electrical supply line.

For voltage over 24 V protection is essential against direct contact with the active parts (conductors on line). The type of protection in question depends on the local site conditions.

6.5.2 Classification

Electrofusion accessories are divided into three classes according to the voltage and/or current characteristics.

Class A Electrical supply based on voltage set between 8V and 42 V

Class B Electrical supply based on voltage set between 42 V and 220 V

Class C Electrical supply based on power supply settings.

All supplies, unless otherwise stipulated in the order, concern Class A accessories.

The power required for electrofusion accessory welding must not exceed 3kW during welding operations. Unless stipulated otherwise in the order, only “wrap-around” saddles can be supplied (refer to par. 3.2.)

Unless otherwise agreed between Client and the supplier, all electrofusion accessories must be “single wire” type.

6.5.3 Connectors

Electrical connectors installed on electrofusion accessories must comply with the diagram included in Annex 1 with these specifications, also including constant current supply where this is the case. The state of the connector terminal surface must offer the minimum possible contact resistance during voltage cable joining.

6.5.4 Protection against overheating

Electrofusion accessories that can only be welded once are equipped with a lock system which prevents re-welding.

Electrofusion accessories that cannot be re-welded immediately after initial welding are equipped with an incorporated security system in their welding program: that is they cannot weld while the wire is still hot.

If the welding program does not possess this lock system, the electrofusion accessory must absolutely be protected against a second or several welding cycles whatever the temperature of the winding wire.

6.6 SUPPORT DRILLING EQUIPMENT

The support drilling equipment has been designed so that during drilling the maximum immediate leak flow will never exceed 200 litres per hour at 5 bar pressure, in the main pipe. According to this flow rate, the supports are divided into two categories:- models 1 and 2 (refer to par. 3.2.) The required model will be specified when ordered.

The bell drill is equipped with a manoeuvring opening for the insertion of a 17 mm hexagonal spanner.

The bell drill path is limited at the top and bottom by a limit block.

The drill mechanism is designed so that no additional tools (except the hexagonal spanner described above) are necessary for carrying out drilling operations.

6.7 BRANCH SUPPORT AND SADDLE LOAD LOSS UNDER LOW PRESSURE

The maximum load loss measured with natural gas at an inlet pressure of 20 mbar must not exceed the values listed below.

Flow m^3 /hr	Saddle Type	Maximum load loss (Mbar)
10	63 x 32	1.0
10	110 x 32	1.0
10	160 x 32	1.0
10	200 x 32	1.0
40	63 x 63	2.0
40	110 x 63	1.0
40	160 x 63	1.0
40	200 x 63	1.0

6.8 ELECTROFUSION SLEEVE BLOCK

All electrofusion sleeves are equipped with an immovable block in the centre of the sleeve.

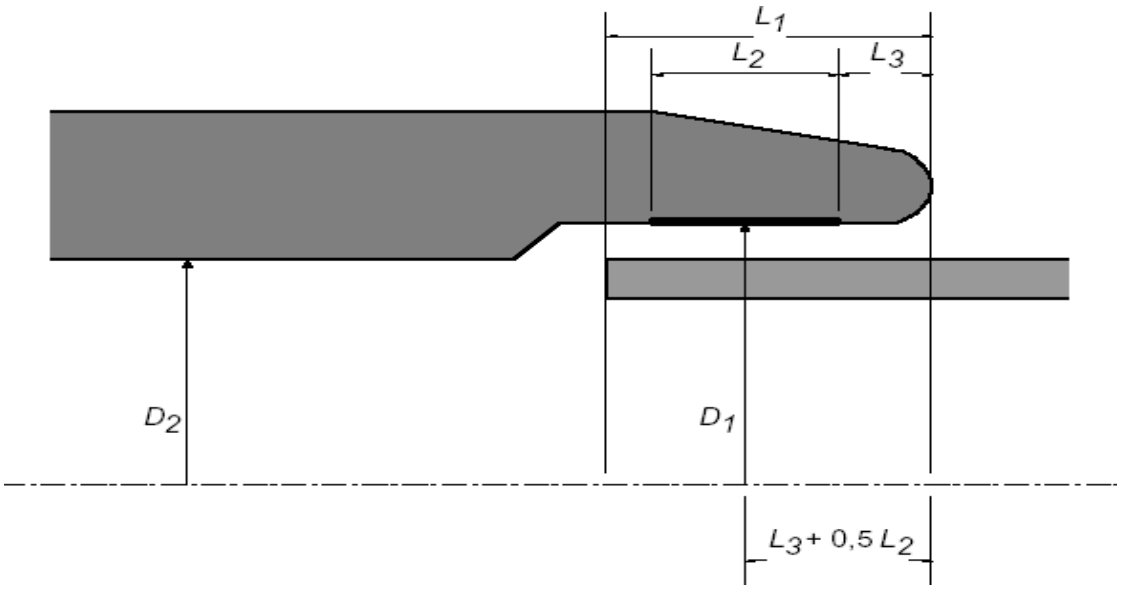
7.0 GEOMETRICAL CHARACTERISTICS

7.1 SIZE OF ELECTROFUSIONSLEEVES

The sizes of the electrofusion accessory sleeves and their tolerance limits are described in chapter “geometrical characteristics” of EN standard 1555-3.

They are controlled according to the method described in the specification standard. Any possible sealing plugs are removed from the sleeve 4 hours before the size control check. Measurements are controlled without the plugs inserted.

The main symbols are shown in the figure 1 below:



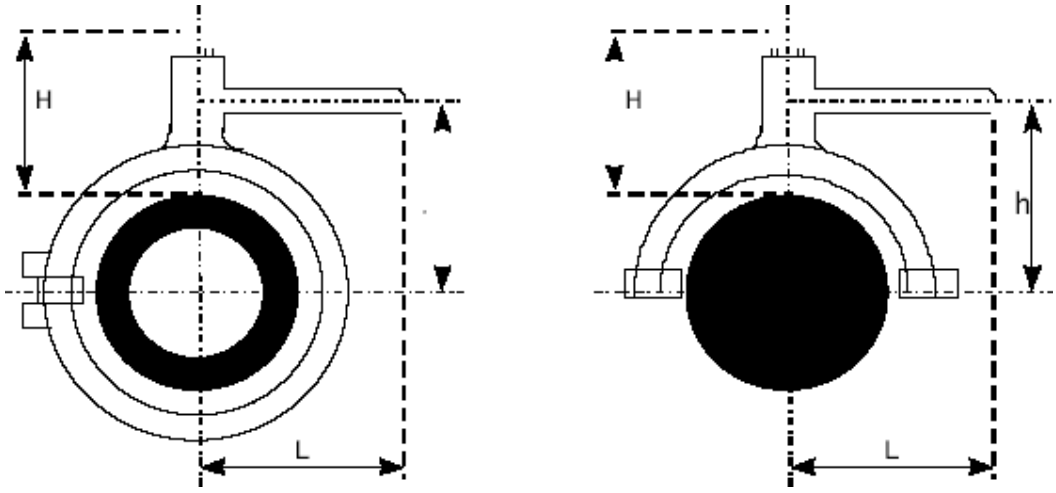
D1	The "average internal diameter in the welding zone" – that is: the average internal diameter measured in a parallel plane to the opening plane, at a distance of L3 + L2/2 of the latter.
D2	"Minimum drilling/boring" – that is the minimum diameter of th draining canal through the body of the accessory.
L1	"penetration depth" of the pipe or the inserted (male) end of th accessory
L2	"Nominal length of the welding zone" that corresponds with th length subject to heating.
L3	"Nominal non-heated entry/inlet length of the sleeve". This refer to the distance between the tip of the accessory and th beginning of the welding zone.

7.2 ELCETROFUSION SADDLE MEASUREMENTS

The measurements of the electrofusion saddles and their tolerance limits are described in EN standard 1555-3

They are controlled according to the method described in the specification standard. Any possible sealing plugs are removed from the sleeve 4 hours before the size control check. Measurements are controlled without the plugs inserted.

The main symbols are shown in the figure 2 below:



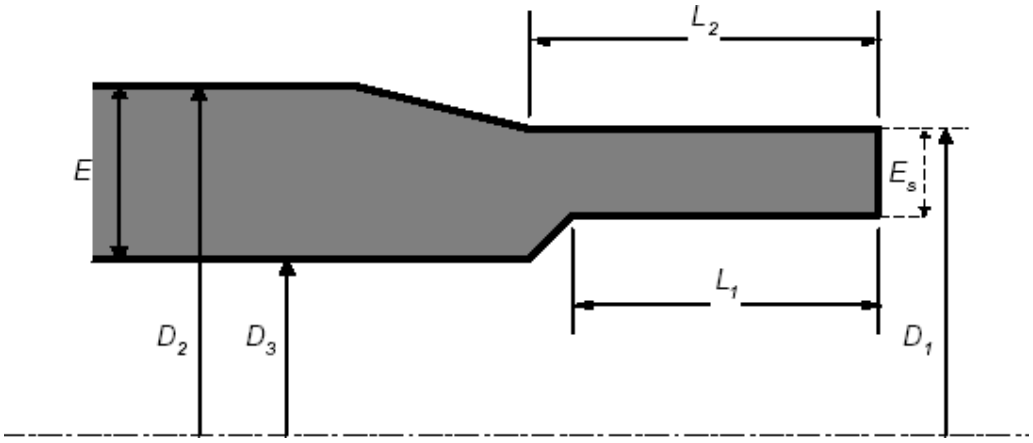
H	The "height of the saddle" – that is the distance between the upper generator of the main pipe and the top of the branch pipe saddle
h	The "height of the branch pipe" – that is the distance between the axis of the main pipe and the axis of the branch pipe
L	The "width of the branch pipe saddle" – that is the distance between the axis of the pipe and the surface plane of the branch pipe opening

7.3 MEASUREMENT OF ACCESSORIES ENDS TO BE WELDED

The measurements of the ends and their tolerance limits are described in EN standard 1555 -3.

They are controlled according to the method described in these specification standards. Any possible sealing plugs are removed from the sleeve 4 hours before the size control check. Measurements are controlled without the plugs inserted.

The measurements and main symbols used in this specification are shown in the figure 3 below:



D1	The "average external diameter of the end to be welded measured on any plane parallel to the inlet/entry plane at a distance where this plane does not exceed L_2 (tubular section).
D2	The "average external diameter of the body" of the tip of the accessory.
D3	"Minimum drilling/boring" – that is the minimum diameter of the passage through the body of the accessory. Measuring of the diameter must not include any ribbing due to welding.
E	"Thickness of the accessory body wall" – that is: the thickness measured at any point of the accessory wall.
Es	"Thickness of the end to be welded" measured at any point but where the distance does not exceed L1 (length that can be cut) compared to the inlet/ entry plane, must be equal to the thickness of the nominal pipe wall.
L1	The "cuttable section" of the end to be welded – that is the initial depth of the tip of the insertion section, necessary for end-to-end welding or for starting an end-to end weld again
L2	The "tubular section" of the end to be welded – that is the initial length of this section. This tubular section permits the following in all types of combination : Use of the clamp stirrups, as is essential for end-to-end welding, or for electrofusion. Assembly using electrofusion sleeves.

8.0 ACCESSORY MECHANICAL CHARACTERISTICS

All accessories must obey the requirements and tests described in the chapter concerning the mechanical characteristics of EN standard 1555-3. They must also comply with the hydrostatic test conditions described in the same standard.

They must be controlled as described in the same standard.

9.0 PHYSICAL CHARACTERISTICS

All accessories must obey the requirements and tests described in the chapter concerning the mechanical characteristics of EN standard 1555-3

They must be controlled as described in the same standard

10.0 PRODUCT APPROVAL

The product will be approved by the owner if all results of the tests, controls and checking prescribed by this specification are satisfying.

The manufacturer will provide a complete approval dossier including all the product characteristics specified in 6.1. (technical dossier) and the results of tests prescribed in these specifications. The number

of tests run on the product must comply with EN standard 1555 -7. The results of these tests described in the approval dossier must be confirmed by the owner authorised laboratory. Hydraulic testing must be continued until the rupture of at least two test samples for each set of tests. (max. 2000 hours).

All changes made to the approved product must be communicated to the owner, and this entails further control checks for approval.

Any requirement not observed or test missing from this specification will result in the withdrawal of the product approval and can even result on annulment of contract.

11.0 MARKING

11.1 ACCESSORY MARKING

11.1.1 Identification marking will be made directly on the accessory. The system used to make the product must not provoke cracking or other faults. All marking must be permanently legible for the product life under standard stocking conditions, exposure to external weather conditions, treatment, installation, and use.

11.1.2 Where the products are printed, the colour of the printed identification mark must be different from that of the basic product colour.

11.1.3 Marking quality and size must be of a standard that can be read with the naked eye without magnification.

11.1.4 No marking must be printed on the minimum length of the insertion section of accessories.

11.1.5 Each accessory must be marked with at least the obligatory details required by EN standard 1555-3. The marking must be printed on the accessory itself or on a label as shown in the standard described above

11.1.6 The SDR pipe range that are to be fitted with these accessories must be clearly marked on the fitting. Details must include: each SDR value, or the upper and lower value of the permitted SDR range.

11.2 COMPLEMENTARY INFORMATION

All complementary information on welding conditions (welding time and cooling time) can also be described on a label affixed to the accessory or delivered with the accessory.

12.0 PACKAGING AND DELIVERY

Normally all accessories are packed separately in plastic sheeting and/or cardboard boxes.

Sometimes they can be loosely packed together where there is no danger of damage or deterioration or loss of loose parts.

All boxes and plastic sheeting must be marked with at least one label showing the manufacturer's name, the product type, part measurements, and number of single parts contained in the box or bag, plus all details necessary for stocking and stock expiry dates.

All electrofusion accessories must be printed with a bar code and an individual magnetic card. The magnetic card contains the welding parameters that have been encoded in the magnetic track, as well as the bar code printed on the card. Coding must be carried out according to prescriptions included in ISO TR 13950 standards.

With regard to stocking guarantee, accessories must correspond with the prescriptions of the local laws & regulations if any. If the guarantee period decided by the manufacturer is shorter than that in these document, the owner must be informed in writing at the time of the offer.

13.0 QUALITY CONTROL

13.1 GENERAL RULINGS

13.1.1 Manufacturer's responsibility

The manufacturer is entirely responsible for the quality of the PE accessories manufactured by his firm.

All control checks prescribed above do not relieve him of this responsibility.

To ensure that all PE accessories are in compliance with the specification in all aspects, they must be controlled by the plant control service, which must be independent from the manufacturing department.

All PE accessories supplied are guaranteed for a one-year period after application for use, that is a maximum of three years after the date of production.

13.1.2 Quality assurance

The manufacturer must have some form of quality control to ensure that products comply with EN standards 29001 or 29002. The quality assurance manual must be made available to the owner control service or an external control laboratory appointed by him.

The system of quality assurance must be certified by an authorised body.

13.2 CONTROLS

13.2.1 Control testing by the manufacturer

13.2.1.1 By material batch.

The manufacturer demands a certificate from the raw material manufacturer including the following:

- Fluid index
- Water content
- Volume mass
- Carbon black or yellow stabilising agent content
- Carbon black or yellow stabilising agent quality
- Oit value (thermal stability)

13.2.1.2 By accessory batch

The manufacturer must run control checks as follows :

Control checks and the number of tests must be carried out according to the prescriptions of the EN standard 1555-3

Also refer to table No. 8, paragraph 4.2.3. “lot release tests” of EN standard 1555 -7.

The results must be written out in documents that contain the complete identification of the accessory batch.

These documents must be made immediately available for the owner representative.

13.2.2 Plant Reception by the Owner Control Service representative

13.2.2.1 General information

All quality controls must be run in the presence of the owner control service representative.

All tests and control checks must comply with appropriate standard prescriptions and with the specific specifications established with the order.

At each visit by the owner representative, the manufacturer must provide, free of charge, all means and personnel necessary for running the established control checks.

While the order is under production, the owner representative must have access to stocking installations of all raw materials before manufacturing, manufacturing and control installations, as well as the accessory stocking areas for any control checks he is responsible for.

During his visits, the owner representative will receive a certificate as soon as he reaches the plant for each batch of accessories presented for reception.

Each time this is requested by the owner representative, the manufacturer must provide recent reports of all control checks and measuring instrument results and testing results.

13.2.2.2 Convocation for reception

Convocation instructions for reception are to be defined with the order.

13.2.2.3 Reception control checks

For each accessory batch or any fractions of the batch, minimal batch sampling is established in annexed enclosure 3. These control checks and tests are to be run according to the prescriptions of EN standard 1555-3

13.3 ACCEPTANCE OR REFUSAL

13.3.1 Appearance, measurements and marking

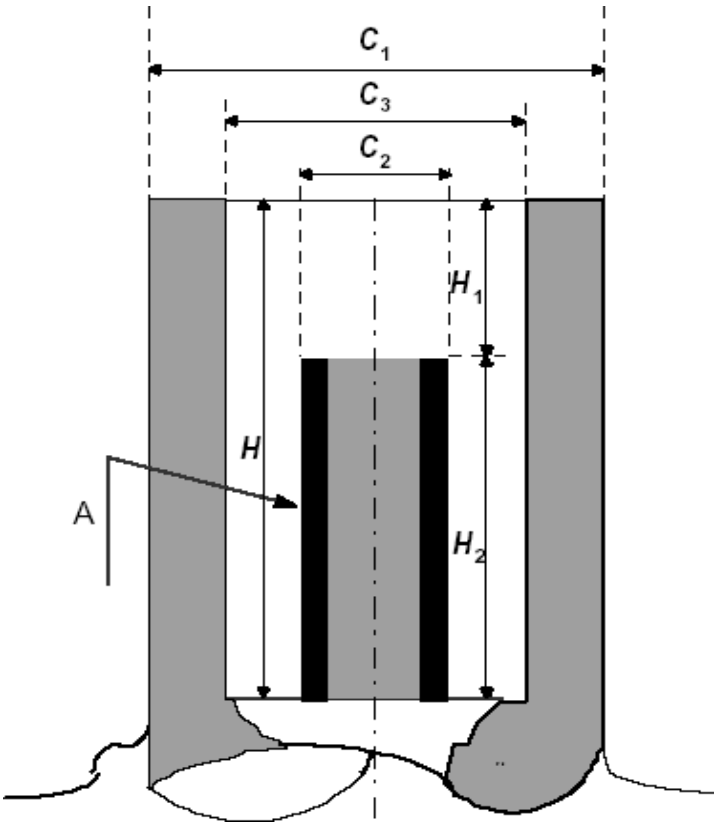
Any requirements not supplied will lead to the refusal of the complete batch. However in the case where a batch is refused, it can be presented for approval again after a control check, on agreement with the owner control service.

13.3.2 Control check on characteristics

All results that do not comply with the specification prescriptions and the particular specifications requested with the order, demand counter-testing on at least double the number of the samples previously tested. If the undesirable result is confirmed, then the batch is refused permanently. If the result is positive, then the batch will be accepted.

As a complementary control check, other analyses and/or tests can be run after common agreement, and at the manufacturer's cost.

ANNEX-1
CONNECTOR FOR ELECTROFUSION ACCESSORIES



Symbols

C_1	External diameter of connector	C1≥ 11,8 mm
C_2	Diameter of active part of connector	C2 = 4.0 ±0.03 mm
C_3	Internal diameter of connector	C3 = 9,5 ± 0.1 mm
C_4	Max. Diameter of active part foot	C4 ≥ 6,0
H	Connector internal depth	H ≥ 12,0 H ≥ H1 + H2
H_1	Distance between upper part of connector and active part	H1 = 3,2 ± 0.5
H_2	Height of active part	H2 ≥ 0.7 mm
A	Active zone	

RECEPTION AT MANUFACTURER'S PLANT

Characteristics	Reference EN 1555-3	Minimum drill tests / frequency	No. of samples	No. of measure/ samples
Appearance /colour	5.2 /5.3	1 x /size / product type / internal space	10	1
Measurements	6	1 x /size / product type / internal space	10	1
Thermal stability (OIT)	8.2	1 x batch	1	1
Meltmass/flow rate (MFR)	8.2	1 x batch	1	1
Electrical resistance	5.6	1 x /size / product type / internal Space	5	1
Cohesion resistance	7.2	1 x /size / product type	2	1
End-to-end seam resistance to traction (cohesion resistance)	7.2	1 x /size / product type	2	1
Shock resistance	7.2	1 x /size / product type	1	1
Load loss	7.2	1 x /size / product type	1	1
Marking	10.2	1 x /size / product type	1	1

SECTION V

GENERAL TECHNICAL SPECIFICATION (GTS)

ACCEPTANCE PROCEDURE-POLYETHYLENE COMPOUNDS FOR MANUFACTURE OF PIPES AND FITTINGS FOR UNDERGROUND NETWORKS FOR NATURAL GAS DISTRIBUTION

1.0 SUBJECT

This specification describes the procedure to be followed for acceptance of a polyethylene (PE) compound for manufacture of natural gas underground distribution systems.

This specification also gives the minimum requirements which have to be met by PE compounds for manufacture of pipes, fittings and valves and for the construction of underground distribution systems for natural gas.

The compounds that meet this specification must at the minimum be PE 100. The colour shall be black or orange in accordance with the local requirements.

2.0 REFERENCES: STANDARDS AND SPECIFICATION

This section contains the list of standards and specifications referred to in this specification.

EN 728: 1997	Plastics piping and ducting systems – Polyolefin pipes and fittings - Determination of oxidation induction time.
prEN 1555-1	Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 1: General
EN 1555-3 prEN 1555-7	Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 7: Assessment of conformity
prEN 12099	Plastics piping systems - Polyethylene piping materials and components - Determination of volatile content.
prEN 12118	Plastics piping systems - Determination of moisture content in plastics by coulometry.
EN ISO 12162:1995	Thermoplastics materials for pipes and fittings for pressure applications Classification and designation - Overall service (design) coefficient.
EN ISO 13478:1997	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Full-scale test (FST).
EN ISO 13479:1997	Thermoplastics pipes for the conveyance of fluids -Determination of resistance to crack propagation (RCP) -Test method for slow crack growth on notched pipes (notch test).
EN 45001: 1990	General criteria for the operation of testing laboratories.
ISO 1133: 1997	Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
ISO 6964: 1996	Polyolefin pipes and fittings - Determination of carbon black content by calcination and pyrolysis -Test method and basic specification.
ISO/DIS 9080	Plastics piping and ducting systems -Determination of the long-term hydrostatic strength of thermoplastics materials in pipe from by extrapolation.
ISO 11420: 1996	Method for the assessment of the degree of carbon black dispersion in polyolefin pipes, fittings and compounds.
ISO 13477: 1997	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Small- scale-steady-state test (S4 test).

3.0 DEFINITIONS AND SYMBOLS

3.1 LOWER CONFIDENCE LIMIT (LCL)

A quantity with the dimensions of stress, in megapascal, which can be considered as a property of the material under consideration and represents the 97.5% lower confidence limit of the predicted long-term hydrostatic strength at a temperature of 20°C for 50 years with internal water pressure.

3.2 MINIMUM REQUIRED STRENGTH (MRS 10)

Standardised class of compounds for which the LCL is equal to 10.

3.3 PE 100

Standard designation for PE compounds in class MRS 10.

For such PE compounds, the long-term hydrostatic strength – calculated and classified according to the standardised method (ISO 9080 and ISO 12162) for a temperature of 20°C, a period of 50 years and a reliability of 97.5 % – must be at least 10 MPa.

3.4 BATCH OF COMPOUND

By batch of compound is meant a homogeneous quantity of PE compound of the same origin and of a particular brand.

The batch must be registered under a single identification number (batch number) which leaves no doubt as to the origin, identity and date of manufacture of the compound.

3.5 BATCH OF PIPES

By batch of pipes is meant a homogenous lot of pipes with identical dimensions, made in a continuous process by the same extrusion machine and from the same batch of compound.

4.0 GENERAL SPECIFICATIONS

The PE compounds that are acceptable according to the requirements of this specification must conform to the requirements for PE 100 described in prEN1555-1.

If the proposed compound is destined for manufacture of pipes, then the acceptance procedure is carried out as described in this specification.

If the proposed compound is destined for manufacture of fittings, then the first stage (section 6) of this acceptance procedure is carried out, after which type tests are carried out on the fittings manufactured from the material concerned. An independent laboratory appointed by Owner will then evaluate whether conformity with the characteristics mentioned in the technical file has been proved, on the basis of the provisions of prEN 1555-7 and specification attached in volume II of this bid package.

5.0 SUMMARY OF PROCEDURES

5.1 GENERAL

The acceptance procedure for PE compounds comprises two stages, namely the evaluation of the technical file and the confirmation tests. The different steps are carried out in the order described below.

The tests which form part of the technical file are carried out on pipes or samples supplied by the compounds manufacturer. In principle, all tests mentioned in the technical file are carried out on pipes from the same batch.

The tests mentioned in chapter 7 are carried out on pipes manufactured by a pipe manufacturer chosen by Owner.

The tests mentioned in chapter 6.1 (table 1), 6.2 and 7 are carried out in a laboratory appointed by Owner.

5.2 APPLICATION FOR APPROVAL

A manufacturer that wishes to have a certain PE compound classified for the manufacture of PE gas components must submit a written application to Owner.

This application must be accompanied by a clear description of the compound concerned, including the technical characteristics.

All correspondence must be in English.

6.0 TECHNICAL FILES

6.1 EVALUATION

If the application is taken into consideration by Owner, the compound manufacturer must submit a technical file to a laboratory appointed by Owner.

This technical file must include the following information:

- name and class of the PE compound;
- technical characteristics of the compound, with reference to the standard;
- a dossier with test results, from an independent laboratory, showing that the proposed compound meets the requirements of prEN 1555-1 for a PE 100 compound. The dossier must also state which tests have been carried out on the same batch of pipes or test samples, including the identification of their origin.

The laboratory chosen by Owner will also evaluate the conformity of this dossier, taking the following rules into account:

a) If the tests mentioned in the technical file have been carried out by a laboratory accredited according to EN 45001, and if the tests have been carried out on the same batch of pipes for the required diameter and wall thickness, then the evaluation will be limited to an examination of the dossier in accordance with the provisions of prEN 1555-1 and the quantity of test samples laid down in 1555-7;

b) If the tests mentioned in the technical file have been carried out by a laboratory that is not accredited according to EN 45001 and/or on different batches of pipes for the same diameters/wall thickness, then the evaluation will be done on the basis of further tests in order to confirm the characteristics mentioned in the technical file.

c) The characteristics for rapid crack propagation (RCP) and slow crack propagation (SCG), as mentioned in the technical file, must comply with the requirements of the standard. Furthermore, the requirements of table 1 must be met:

Characteristic	Requirement	Standard
Pc S4	DN 250 – SDR 11 0^{O}c - > 3,5 BAR	ISO 13477
Pc FS	DN 250 – SDR 11 0^{O}c - > 15 BAR	EN ISO 13478
SCG	DN 250 – SDR 11 80^{O}c – σ4,6 - > 500 h	EN ISO 13479

The tests mentioned in table 1 must be carried out by an independent laboratory appointed by Owner. The three series of tests must be carried out on the same batch of pipes.

If it emerges from the evaluation of the technical file that conformity with prEN 1555 -1 is guaranteed, then the next stage of the procedure can commence, as described in section 7.

6.2 ADDITIONAL TESTS

6.2.2 General

If from the evaluation it emerges that the dossier submitted is incomplete or does not offer the necessary guarantees of conformity with the standard, then additional tests will be carried out by the laboratory appointed by Owner, at the cost of the compound manufacturer.

The same procedure will be followed if the technical file has been drawn up by a laboratory that is not accredited and/or if several batches of pipes have been used for each diameter/wall thickness in carrying out the tests.

6.2.2 Delivery of the pipes

The required batch of pipes must be delivered by the compound manufacturer, the pipes having been produced by a pipe manufacturer who at that moment is a Owner supplier.

The number of pipes must be based on the numbers and frequencies mentioned in prEN 1555-7.

If the technical file is based on tests carried out by a non-accredited laboratory and/or carried out on several batches of pipes per diameter/wall thickness, then the tests will repeated on at least half of the required test samples; if the number thus calculated is not a whole number, the number of test samples taken will be equal to the next whole number.

6.2.3 Test results

If from the additional tests it appears that conformity with prEN 1555-1 is guaranteed, then the next phase of the procedure can commence, as described in section 7.

If despite the additional tests no unambiguous decision can be taken regarding the conformity of the compound, then further additional tests will be carried out, until the number of test samples is at maximum equal to the number specified in the standard concerned. For this purpose, the manufacturer must keep sufficient pipes of the same batch in reserve.
If the evaluation is still not positive after the maximum number of samples has been tested, then the compound will be considered as not accepted.

7.0 CONFIRMATION TESTS

The second stage of the acceptance covers the industrial production of pipes, the verification of the characteristics, the laying of the pipes and the fusion to existing PE systems.

This second stage of the acceptance is carried out by Owner.

Before this stage can commence, the manufacturer must provide Owner with a technical data sheet (see appendix 1) showing the limit values for the characteristics of the compound concerned.

For the purpose of carrying out this part of the procedure, Owner will order a batch of pipes from one of its pipe manufacturers. After verification of the characteristics in the factory and confirmation by an independent laboratory, the pipes will be installed in the Owner gas distribution network, taking into account the following aspects:

- Any problems with delivery and with extrusion of the compound will be noted.
- The limits of the characteristics mentioned in the technical data sheet.
- For characteristics not included in the technical data sheet, the measured value may
- deviate by max. 30% from the average values mentioned in the technical file, to the extent that these are relevant and not in conflict with the requirements of the standard.
- Any problems with laying or welding or connecting the pipes; these will be noted.

If from the test results it appears that the characteristics of the compound and/or pipes do not comply with the requirements, or if anomalies are found in laying and/or welding of the pipes, then the acceptance procedure will be provisionally suspended. The problems found will be analysed in consultation with the compound manufacturer, and an attempt will be made to find solutions which are acceptable to both parties. If this turns out to be impossible, then the compound will be considered as not accepted.

In such a case, the costs of the second stage could be charged to the compound manufacturer.

If the second stage of the procedure is successfully completed, then the compound is accepted and will be included in the list of "Approved PE Compounds". This list is published in the Technical specifications attached in Volume II of this bid package. The materials will be included when the list is next published (around once every two year).

8.0 FOLLOW -UP

8.1 TECHNICAL DATASHEET

The manufacturer must supply Owner with a technical data sheet, as described in Appendix 1, with permission for Owner to publish this technical data sheet in the specifications for PE pipes and fittings, for as long as the compound is included in the list of approved compounds.

The data entered on this data sheet apply as limit values for the compound concerned. Whenever one or more characteristics of a batch of compounds falls outside these limits, then the batch will be automatically refused for production of components destined for our gas network.

8.2 CONTINUITY OF THE COMPOUND

No alterations may be made to the compound without prior permission from Owner.

As mentioned in 8.1, the limits mentioned in the technical data sheet must be respected. Furthermore, in the case of characteristics not included in the technical data sheet, the measured values may not deviate by more than 30% from the average value mentioned in the technical file, to the extent that these are relevant and not in conflict with the requirements of the standard.

Each change that affects the final characteristics of the compound can result in additional tests being carried out by the compound manufacturer in accordance with the provisions of prEN 1555-7 appendix A. The procedures for the test shall correspond to those described in section 6.1 of this specification.

APPENDIX 1
TECHNICAL DATA SHEET

Characteristics of (name of PE compound) as per prEN 1555-1

Characteristics	Standard	Specification
MRS	EN ISO 12162	> …. MPa
Density min. max.	Method D of ISO 1183	 …. kg/m3 …. kg/m3
MFR 190/5 min. max.	ISO 1133	 …. g/ 10 min …. g/ 10 min
Volatile content max.	prEN 12099	 …. mg/kg
Water content max.	prEN 12118	 …. mg/kg
Carbon black content min. max.	ISO 6964	 …. % …. %
Carbon black dispersion max.	ISO 11420	 ≤ grade …
OIT at 210°C min.	EN 728	 … min

SECTION VI

QUALITY ASSURANCE PLAN (QAP) OF ELECTROFUSION PE FITTINGS

	QUALITY ASSURANCE PLAN(QAP)/ INSPECTION TEST PLAN (ITP) FOR ELECTROFUSION PE FITTINGS	Document No : QAP/IGL/ET2/CP/CP18456 Rev No : 0 Date: Project : SUPPLY OF PE FITTINGS Client : INDRAPRASTHA GAS LTD

SR.NO	COMPONENTS / OPERATIONS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	VENDOR	TPI	CA	REMARK
1	Review of test certificate for raw material		Each Batch certificate	Raw Material manufacturer's test certificate	Raw Material manufacturer's test certificate	Test Certificate	R	R	R	
2	Hydrostatic strength									
2.1	At 20˚C	Strength test	As per EN 1555-7	EN 1555 - 3/ IS0 1167 / EN 921 / PTS GTS	No leakage through the fittings during the test	Inspection report	P	R	R	
2.2	At 80˚C	Strength test	As per EN 1555-7	EN 1555 - 3/ IS0 1167 / EN 921 / PTS GTS	No leakage through the fittings during the test	Inspection report	P	R	R	
3	Cohesive Resistance									
3.1	Length of Initial rupture ≤ L2/3 in brittle failure	Mechanical properties	As per EN 1555-7	ISO 13954 / ISO 13955 / PTS / GTS	EN 1555 - 3	Inspection report	P	R	R	This test is applicable only for Electrofusion socket fittings (Type test)
3.2	Surface of rupture ≤ 25% brittle failure	Mechanical properties	As per EN 1555-7	ISO / IS0 13956 / PTS /GTS	EN 1555 - 3	Inspection report	P	R	R	This test is applicable only for Electrofusion socket fittings (Type test)
4	Tensile strength for butt fusion	Mechanical properties	As per EN 1555-7	ISO 13953 /PTS / GTS	EN 1555 - 3	Inspection report	P	R	R	This test is applicable only for butt fusion fitting (Type test)
5	Impact strength	Mechanical properties	As per EN 1555-7	EN 1716 /PTS / GTS	EN 1555-3 / PTS / GTS / EN 1716	Inspection report	P	R	R	This test is applicable only for Electrofusion saddle fittings (Type test)
6	Pressure Drop	Mechanical properties	As per EN 1555-7	EN 12117 / PTS	EN 1555 - 3 / EN 12117 / PTS	Inspection report	P	R	R	Type Test
7	Electrical Resistance test		05 NO's. FROM LOT	EN 1555 - 3 / PTS / GTS	EN 1555 - 3 / PTS	Inspection report	P	W	R	
8	Oxidation induction time(Thermal stability)		01 NO's. FROM LOT	EN 1555 -3/ EN 728 / PTS /GTS / ISO 11357-6	> 20 min	Review & Approval of Certificate	P	W	R	Test will be performed on coupler d20 only.

9	Meltmass/ Flow rate (MFR)		01 NO's. FROM LOT	EN 1555 - 3 / ISO 1133 /ISO 4440 /PTS / GTS	(0.2 ≤ MFR ≤ 1.4) g / 10 min and after processing maximum deviation of ± 20 % of the value measured on the batch used to manufacture the fitting	Inspection report	P	W	R	
10	Dimensional Check	Dimensions	05 NO's. FROM LOT	As per EN 1555 - 3 / PTS / GTS	As per EN 1555 -3 / PTS /GTS	Inspection report	P	W	R	
11	Storage	Visual	All materials		Manufacturer Recommendation	Packing List	P	M	R	
12	Marking	Visual	05 NO's. FROM LOT / SIZE	EN 1555 -3 / PTS /GTS	EN 1555 -3	Inspection report	P	W	R	
13	Documentation	All Inspection Reports and	–	EN 1555	All Inspection Reports and Certificates	Inspection Report	P	R	R	
LEGENDS:		P-PERFORM, R- REVIEW W-WITNESS, M- MONITOR, TPI -THIRD PARTY INSPECTION AGENCY, CA - OWNER / OWNER REPRESENTATIVE								

Notes:

1. The Above Testing and acceptance criteria are minimum requirements. However, manufacturer shall ensure that the product shall also comply to the additional requirements as per Particular Technical specifications (PTS)
2. The supplier shall submit their own detailed ITP/QAP prepared on the basis of above / Technical specification for approval of Owner.
3. Vendor shall in coordination with supplier issue detailed Production and inspection schedule indicating the dates and the locations to facilitate Owner/ Owner's representative and TPIA to organize inspection.
4. Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.
5. All fittings/saddles in a consignment shall constitute a lot.
6. Only calibrated instruments shall be used for inspection.
7. Before dispatch of the materials to the IGL designated stores/sites, manufacturer/supplier shall submit copy of all related document of inspection along with release note and MTC to the owner for the dispatch clearance.
8. Sampling frequency of the testing shall be done as per EN 1555-3 / manufacturer’s specifications/plan.