

# LAYING OF MDPE NETWORK AND GI/Cu INSTALLATION WORK FOR DOMESTIC, COMMERCIAL AND INDUSTRIAL CUSTOMERS FOR CUGL GA'S IN KANPUR, UNNAO, AND BAREILLY IN THE STATE OF UTTAR PRADESH

E-Tender ID -

Project No. P.014714

Document No. P.014714 G 11031 R006


Tender No. P.014714 G 11031 R006

**CENTRAL UP GAS LIMITED (CUGL)**  
KANPUR | INDIA

**PUBLIC**

**27 May 2021**

**TECHNICAL DOCUMENTATION**  
Technical, Vol II of II, Rev. 1

		<b>MAIN TABLE OF CONTENTS</b> <b>LAYING OF MDPE NETWORK AND GI / Cu INSTALLATION WORK FOR DOMESTIC, COMMERCIAL, AND INDUSTRIAL CUSTOMERS FOR CUGL GA'S IN KANPUR, UNNAO AND BAREILLY IN THE STATE OF UP</b>			<b>P.014714 G11031 R006</b>
SL.NO.	DESCRIPTION	DOCUMENT / DRAWING NO.	REV. NO	PAGE	PAGE Nos.
	<b>NIT</b>				
<b>I</b>	<b>SECTION A - COMMERCIAL (VOLUME I OF II)</b>				
1	SECTION-I INVITATION FOR BID (IFB)	P.014714 G11031 R006	1		1 to 99
2	SECTION - II INSTRUCTION TO BIDDERS (ITB)				
3	SECTION - III GENERAL CONDITIONS OF CONTRACT (GCC)				
4	SECTION - IV SPECIAL CONDITIONS OF CONTRCT (SCC)				
5	SECTION - V FORMS AND FORMAT				
6	SECTION - VI SCHEDULE OF RATES (SOR) - FOR KANPUR, UNNAO, BAREILLY & JHANSI GA IN THE STATE OF U.P				
<b>II</b>	<b>SECTION B - TECHNICAL (VOLUME II OF II)</b>				
1	PTS INTRODUCTION	P.014714 G 11031 040	0	3	1
2	PTS LAYING OF MDPE MAIN PIPELINE & SERVICE PIPELINE	P.014714 G 11031 041	0	25	4
3	PTS INSTALLATION OF ABOVE GROUND GI PIPING & FITTINGS	P.014714 G 11031 042	0	13	29
4	PTS ELECTROFUSION FOR PE PIPES & FITTINGS	P.014714 G 11031 043	0	8	42
5	PTS HEALTH, SAFETY & ENVIRONMENT	P.014714 G 11031 044	0	21	50
6	PTS SUPPLY OF MDPE FITTINGS, VALVES AND TRANSITION FITTINGS	P.014714 G 11031 045	0	7	71
7	PTS GI PIPES	P.014714 G 11031 046	0	5	78
8	PTS GI FITTINGS	P.014714 G 11031 047	0	5	83
9	PTS WARNING MAT	P.014714 G 11031 048	0	5	88
12	PTS POWDER COATING	P.014714 G 11031 049	0	4	93
13	PTS INSTALLATION GI, COPPER	P.014714 G 11031 050	0	14	97
14	PTS COPPER FITTINGS	P.014714 G 11031 051	0	4	111
15	PTS BRASS FITTINGS	P.014714 G 11031 052	0	5	115
16	PTS CORRUGATED FLEXIBLE METAL HOSE	P.014714 G 11031 053	0	5	120
17	PTS STEEL REINFORCED RUBBER HOSE	P.014714 G 11031 054	0	5	125
17.1	PTS COPPER TUBE	P.014714 G 11031 055	0	4	130
18	GTS PE ACCESSORIES FOR UNDERGROUND NETWORK FOR NATURAL GAS DISTRIBUTION (70000 / 740 / GTS / 0011)	70000_740_GTS_0011	0	25	134
19	GTS PE COMPOUNDS FOR MANUFACTURE OF PIPES AND FITTINGS FOR UNDERGROUND NETWORKS FOR NATURAL GAS DISTRIBUTION - ACCEPTANCE PROCEDURE (70000 / 740 / GTS / 0012)	70000 / 740 / GTS / 0012	0	11	159
20	GTS PE VALVES FOR NATURAL GAS DISTRIBUTION UNDERGROUND NETWORK (70000 / 740 / GTS / 0015)	70000 / 740 / GTS / 0015	0	19	170
21	QCT MDPE FITTINGS	P.014714 G 11031 056	0	1	189
22	QCT MDPE VALVES	P.014714 G 11031 057	0	1	190
23	QCT ELECTROFUSION FITTING & TRANSITION FITTINGS	P.014714 G 11031 058	0	2	191
24	QCT GI PIPES	P.014714 G 11031 059	0	2	193
25	QCT GI FITTINGS	P.014714 G 11031 060	0	1	195
26	QCT WARNING MAT	P.014714 G 11031 061	0	2	196
29	QCT COPPER TUBE	P.014714 G 11031 062	0	2	198
30	QCT COPPER FITTINGS	P.014714 G 11031 063	0	1	200
31	QCT BRASS FITTING	P.014714 G 11031 064	0	1	201
32	QCT CORRUGATED FLEXIBLE METAL HOSE	P.014714 G 11031 065	0	1	202
33	QCT STEEL REINFORCED RUBBER HOSE	P.014714 G 11031 066	0	2	203

34	RECOMMENDED VENDORS LIST	P.014714 G 11031 067	0	5	205
35	<b>STANDARD / PROJECT DRAWING</b>				
35.2	TYPICAL DETAILS OF CAUTION BOARD		0	1	210
35.1	TYPICAL DETAILS OF BARRICADING		0	1	211
35.3	TYPICAL DETAILS OF RCC ROUTE MARKER		0	1	212
35.4	POLE MARKER WITH FOUNDATION		0	1	213
35.5	POLE MARKER WITH FOUNDATION (INDIVIDUAL SOCIETIES & AREAS)		0	1	214
35.6	PLATE MARKER		0	1	215
35.7	TYPICAL TRENCH DIMENSIONS FOR PIPELINE		0	1	216
35.8	TYPICAL UNDERGROUND CABLE CROSSING DETAILS		0	1	217
35.9	ROAD/HIGHWAY CASED CROSSING FOR MDPE PIPE		0	1	218
35.1	SPECIFICATION FOR WOOD SCREWS		0	1	219
35.11	HALF ROUND CONCRETE SLEEVE		0	1	220
35.12	SCHEMATIC DIAGRAM OF SINGLE STREAM SERVICE REGULATOR		0	1	221
35.13	SCHEME FOR DOMESTIC CONSUMER CONNECTION		0	1	222
35.14	SCHEMATIC DIAGRAM OF HOUSING FOR SINGLE STREAM SERVICE REGULATOR		0	1	223
35.15	BRICK VALVE CHAMBER (1.5 M X 1.0 M)		0	1	224
35.16	BRICK VALVE CHAMBER (1.5 M X 1.5 M)		0	1	225
35.17	RCC VALVE CHAMBER (1.5 M X 1 M)		0	1	226
35.18	RCC VALVE CHAMBER (1.5 M X 1.5 M)		0	1	227
35.19	TYPICAL DETAILS OF FENCING		0	1	228
35.20	TYPICAL DETAILS OF GATE		0	1	229

<b>Tractebel</b> Engineering	GENERAL TECHNICAL SPECIFICATION	<b>70000 740 GTS/0011</b>
------------------------------	---------------------------------------	-----------------------------------

## PE ACCESSORIES

### for underground networks for natural gas distribution

<a href="#">C</a>	<a href="#">06/09/02</a>	<a href="#">Updated (see revision marks)</a>	<a href="#">MRT</a>	<a href="#">MRY</a>	<a href="#">MRT</a>
B	21/08/02	Updated	MRT	MRY	MRT
A	13/08/02	First Issue	MRT	MRY	MRT
Rev.	Date	Subject of revision	Author	Checked	Approved

TABLE OF CONTENTS

<b>1. SUBJECT AND AREA OF APPLICATION.....</b>	<b>1</b>
<b>2. REFERENCE STANDARDS AND SPECIFICATIONS .....</b>	<b>1</b>
<b>3. DEFINITIONS.....</b>	<b>2</b>
3.1. ELECTROFUSION ACCESSORY.....	2
3.2. ELECTROFUSION SADDLE.....	2
3.3. END TO END WELDING ACCESSORIES .....	3
<b>4. GENERAL SPECIFICATIONS .....</b>	<b>4</b>
<b>5. MATERIALS.....</b>	<b>5</b>
5.1. GENERAL INFORMATION .....	5
5.2. RAW MATERIAL SPECIFICATIONS .....	5
5.3. SPECIFICATIONS FOR COMPONENTS MADE OF MATERIALS OTHER THAN POLYETHYLENE .....	5
<b>6. GENERAL ACCESSORY CHARACTERISTICS .....</b>	<b>7</b>
6.1. TECHNICAL INFORMATION .....	7
6.2. APPEARANCE AND FINISH.....	8
6.3. COLOUR .....	8
6.4. JOIN APPEARANCE .....	8
6.5. ELECTROFUSION ACCESSORY ELECTRICAL CHARACTERISTICS .....	8
6.6. SUPPORT DRILLING EQUIPMENT .....	10
6.7. BRANCHING SUPPORT AND SADDLE LOAD LOSS UNDER LOW PRESSURE.....	10
6.8. ELECTROFUSION SLEEVE B LOCK.....	10
<b>7. GEOMETRICAL CHARACTERISTICS.....</b>	<b>11</b>
7.1. SIZE OF ELECTROFUSION SLEEVES.....	11
7.2. ELECTROFUSION SADDLE MEASUREMENTS .....	12

7.3. MEASUREMENTS OF ACCESSORY ENDS TO BE WELDED.....	13
<b>8. ACCESSORY MECHANICAL CHARACTERISTICS .....</b>	<b>14</b>
<b>9. PHYSICAL CHARACTERISTICS .....</b>	<b>14</b>
<b>10. PRODUCT APPROVAL .....</b>	<b>14</b>
<b>11. MARKING .....</b>	<b>15</b>
11.1. ACCESSORY MARKING .....	15
11.2. COMPLEMENTARY INFORMATION.....	15
<b>12. PACKAGING AND DELIVERY .....</b>	<b>16</b>
<b>13. QUALITY CONTROL .....</b>	<b>17</b>
13.1. GENERAL RULINGS .....	17
13.2. CONTROLS.....	17
13.3. ACCEPTANCE OR REFUSAL .....	19
<b>ANNEX 1 .....</b>	<b>20</b>

Σ Σ Σ

The information contained in this document should be treated as confidential and is to be considered as the exclusive property of Tractebel.

Direct or indirect use of this document or any part of it is only allowed for Tractebel productions.

## 1. 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. REFERENCE STANDARDS AND SPECIFICATIONS

<b>EN 682</b>	Air-tight rubber seals - specification for air-tight seal materials for gas and hydrocarbon fluid transfer piping
<b>EN 1555-1</b>	Plastic piping systems for combustible gas distribution. Polyethylene (PE). Part 1. General information
<b>EN 1555-3</b>	Plastic piping systems for combustible gas distribution. Polyethylene (PE). Part 3 . Accessories
<b>EN 1555-7</b>	Plastic piping systems for combustible gas distribution. Polyethylene (PE). Part 7. Conformity evaluation.
<b>ISO DIS 11413</b>	Preparation of test assemblies between a polyethylene (PE) pipe and an electrofusion fitting.

<b>ISO DIS 11414</b>	Preparation of test assemblies between a pipe/pipe or pipe/fitting polyethylene (PE) by butt fusion
<b>ISO DIS 12093</b>	Format for a technical brochure for electrofusion joint characteristics
<b>ISO TR 13950</b>	Electrofusion identification methods
<b>CEI 60335-1</b>	Safety standards for household appliances and similar equipment.
<b>CEI 364</b>	Electrical installations on buildings (including building sites and other temporary installations)
<b>CEI 449</b>	Voltage domains for building electrical installations.
<b>70000/740/GTS/0008 to 70000/740/GTS/0010</b>	Tractebel technical specification: polyethylene piping for underground networks for natural gas distribution
<b>70000/740/GTS/0012</b>	Tractebel technical specification: raw materials for manufacturing piping and accessories for underground networks for natural gas distribution.
<b>70000/740/GTS/0013</b>	Tractebel specification sheets: program execution. Polyethylene pipe laying.

### 3. 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:

<b>Wrap around</b>	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 (or blocking) 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:

<b>Model 1</b>	Supports whose maximum immediate external leak flow is practically equal to zero at 5 bar pressure in the piping.
<b>Model 2</b>	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. 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 these Tractebel specifications.

The accessories are destined for use in gas distribution networks in piping in compliance with Tractebel specification 70000/740/GTS/0008 to 70000/740/GTS/0010

The pipes are laid and welded as described in our specification sheet for pipe laying 70000/740/GTS/0013.

## **5. MATERIALS**

### **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 be 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 in Tractebel specification 70000/740/GTS/0012.

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. SPECIFICATIONS 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. Elastomers**

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

	GENERAL TECHNICAL SPECIFICATION	<b>70000</b> <b>740</b> <b>GTS/0011</b>
--	---------------------------------------	---

### 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. GENERAL ACCESSORY 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 standard 12093.

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 Tractebel specifications.

The accessories will be tested exclusively using piping in compliance with Tractebel specifications concerning PE piping (70000/740/GTS/0008 to 70000/740/GTS/0010).

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. JOIN 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 ACCESSORY 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 Tractebel 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. BRANCHING 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.

<b>Flow m<sup>3</sup> /hr</b>	<b>Saddle Type</b>	<b>Maximum load loss Mbar</b>
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 B LOCK**

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



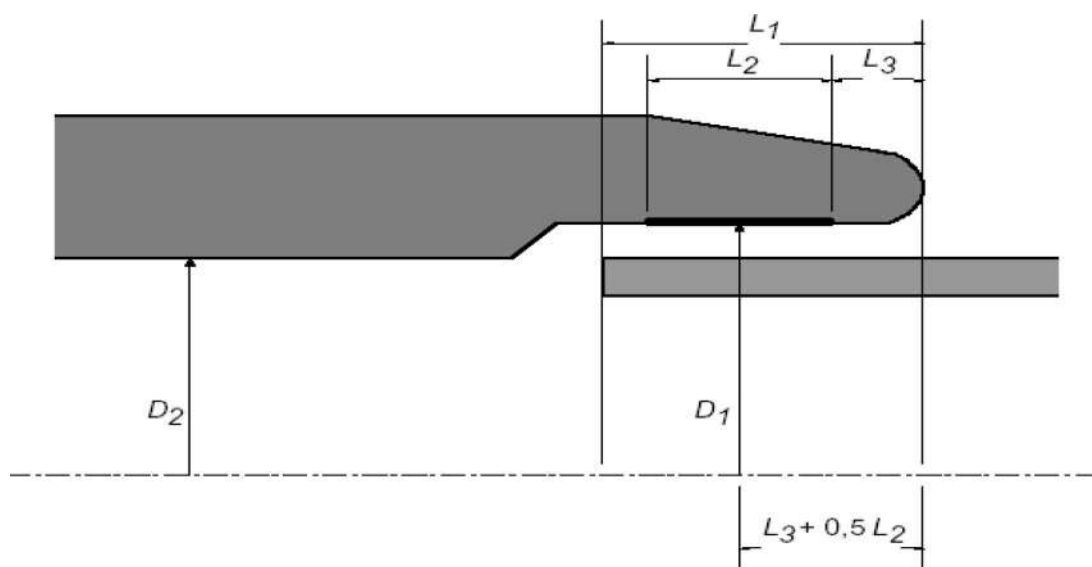
## 7. GEOMETRICAL CHARACTERISTICS

### 7.1. SIZE OF ELECTROFUSION SLEEVES

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:



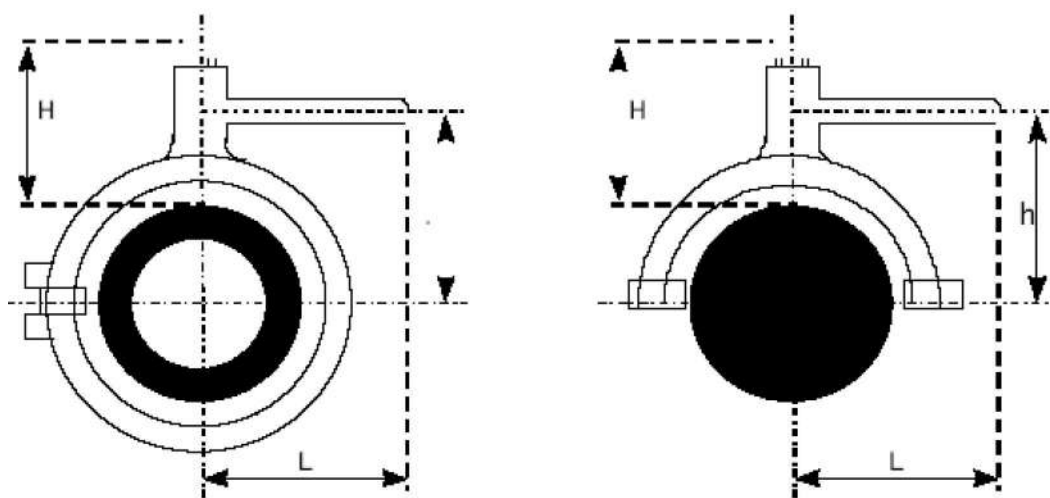
- D<sub>1</sub>** The “average internal diameter in the welding zone” – that is: the average internal diameter measured in a parallel plane to the opening plane, at a distance of  $L_3 + L_2/2$  of the latter.
- D<sub>2</sub>** “Minimum drilling/boring” – that is the minimum diameter of the draining canal through the body of the accessory.
- L<sub>1</sub>** “penetration depth” of the pipe or the inserted (male) end of the accessory
- L<sub>2</sub>** “Nominal length of the welding zone” that corresponds with the length subject to heating.
- L<sub>3</sub>** “Nominal non-heated entry/inlet length of the sleeve”. This refers to the distance between the tip of the accessory and the beginning of the welding zone.

## 7.2. ELECTROFUSION 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:



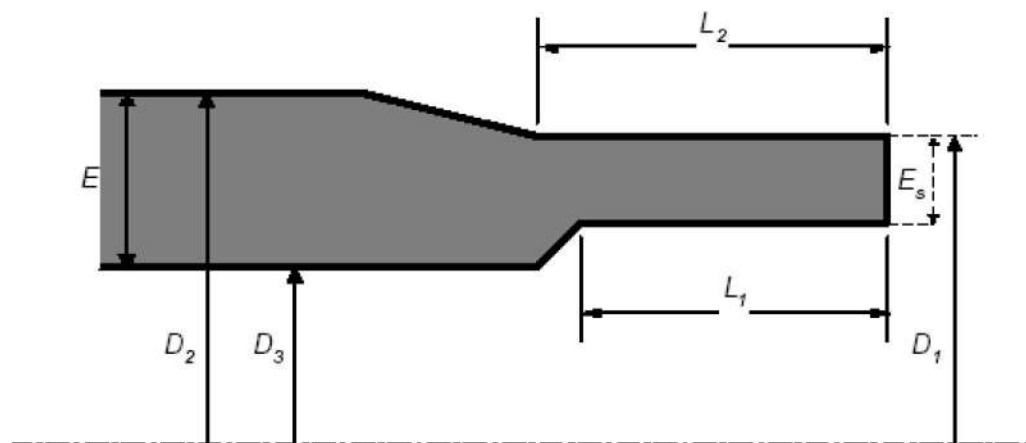
- H The “height of the saddle” – that is the distance between the upper generator of the main pipe and the top of the branch pipe saddle
- h The “height of the branch pipe” – that is the distance between the axis of the main pipe and the axis of the branch pipe
- L The “width of the branch pipe saddle”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

### 7.3. MEASUREMENTS OF ACCESSORY 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:



- D<sub>1</sub>** 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).
- D<sub>2</sub>** The “average external diameter of the body” of the tip of the accessory.
- D<sub>3</sub>** “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.
- E<sub>s</sub>** “Thickness of the end to be welded” measured at any point but where the distance does not exceed  $L_1$  (length that can be cut) compared to the inlet/ entry plane, must be equal to the thickness of the nominal pipe wall.
- L<sub>1</sub>** 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. 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. 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. 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. 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.

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

11.1.4. 11.1.4. 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

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. 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 documents, the Owner must be informed in writing at the time of the offer.

**13. 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 :

- Appearance / colour
- Measurements
- Hydraulic testing
- Electrical resistance
- Printing/markings.

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 N° 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.

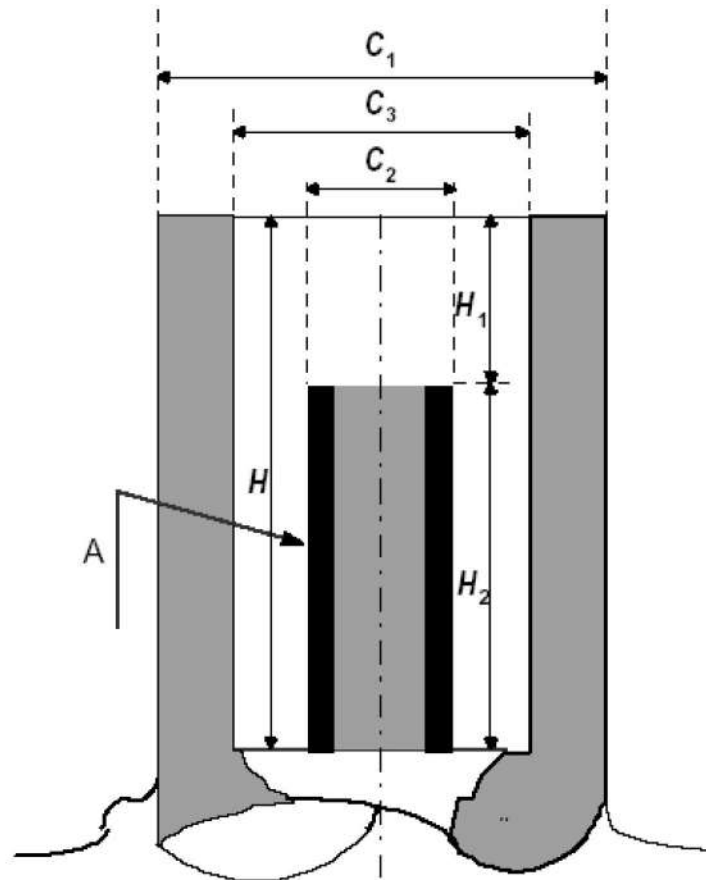
#### 13.3.2. Control check on characteristics

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**

<b>C<sub>1</sub></b>	External diameter of connector	$C_1 \geq 11,8 \text{ mm}$
<b>C<sub>2</sub></b>	Diameter of active part of connector	$C_2 = 4.0 \pm 0.03 \text{ mm}$
<b>C<sub>3</sub></b>	Internal diameter of connector	$C_3 = 9,5 \pm 1,0 \text{ mm}$
<b>C<sub>4</sub></b>	Max. Diameter of active part foot	$C_4 \geq 6,0$
<b>H</b>	Connector internal depth	$H \geq 12,0$ $H \geq H_1 + H_2$
<b>H<sub>1</sub></b>	Distance between upper part of connector and active part	$H_1 = 3,2 \pm 0,5$
<b>H<sub>2</sub></b>	Height of active part	$H_2 \geq 7,0 \text{ mm}$
<b>A</b>	Active zone.	

**RECEPTION AT MANUFACTURER'S PLANT.**

Characteristics	Reference EN 1555-3	Minimum drill tests / frequency	N° of samples	N° 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

Σ   Σ   Σ

<b>Tractebel</b> Engineering	GENERAL TECHNICAL SPECIFICATION	<b>70000 740 GTS/0012</b>
------------------------------	---------------------------------------	-----------------------------------

Polyethylene compounds for manufacture of pipes and fittings for underground networks for natural gas distribution

Acceptance procedure

<u>C</u>	<u>06/09/02</u>	<u>Updated (see revision marks)</u>	<u>MRT</u>	<u>MRY</u>	<u>MRT</u>
B	21/08/02	Updated	MRT	MRY	MRT
A	13/08/02	First Issue	MRT	MRY	MRT
Rev.	Date	Subject of revision	Author	Checked	Approved

. SWA/15/ \*70000/740/GTS/0012\*

**veez**

## TABLE OF CONTENTS

<b>1. SUBJECT .....</b>	<b>3</b>
<b>2. REFERENCES: STANDARDS AND SPECIFICATIONS .....</b>	<b>3</b>
<b>3. DEFINITIONS AND SYMBOLS .....</b>	<b>4</b>
3.1. LOWER CONFIDENCE LIMIT (LCL).....	4
3.2. MINIMUM REQUIRED STRENGTH (MRS 10) .....	4
3.3. PE 100.....	5
3.4. BATCH OF COMPOUND .....	5
3.5. BATCH OF PIPES .....	5
<b>4. GENERAL SPECIFICATIONS .....</b>	<b>5</b>
<b>5. SUMMARY OF THE PROCEDURE.....</b>	<b>5</b>
5.1. GENERAL .....	5
5.2. APPLICATION FOR APPROVAL .....	6
<b>6. TECHNICAL FILE .....</b>	<b>6</b>
6.1. EVALUATION.....	6
6.2. ADDITIONAL TESTS .....	7
<b>7. CONFIRMATION TESTS .....</b>	<b>8</b>
<b>8. FOLLOW-UP.....</b>	<b>9</b>
8.1. TECHNICAL DATA SHEET.....	9
8.2. CONTINUITY OF THE COMPOUND .....	9
<b>APPENDIX 1 .....</b>	<b>10</b>

Σ   Σ   Σ

The information contained in this document should be treated as confidential and is to be considered as the exclusive property of Tractebel.

Direct or indirect use of this document or any part of it is only allowed for Tractebel productions.

## 1. 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. REFERENCES: STANDARDS AND SPECIFICATIONS

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).

<b>EN ISO 13479: 1997</b>	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).
<b>EN 45001: 1990</b>	General criteria for the operation of testing laboratories.
<b>ISO 1133: 1997</b>	Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
<b>ISO 6964: 1996</b>	Polyolefin pipes and fittings - Determination of carbon black content by calcination and pyrolysis - Test method and basic specification.
<b>ISO/DIS 9080</b>	Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe from by extrapolation.
<b>ISO 11420: 1996</b>	Method for the assessment of the degree of carbon black dispersion in polyolefin pipes, fittings and compounds.
<b>ISO 13477: 1997</b>	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Small-scale-steady-state test (S4 test).
<b>TBL 70000/740/GTS/0008 to 70000/740/GTS/0010</b>	Polyethylene pipes for underground networks for natural gas distribution
<b>TBL 70000/740/GTS/0011</b>	PE Accessories for underground networks for natural gas distribution

### 3. 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. 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 Tractebel specification TBL 70000/740/GTS/0011.

## 5. SUMMARY OF THE PROCEDURE

### 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. TECHNICAL FILE

### 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:

**Table 1**

<b>Characteristic</b>	<b>Requirement</b>	<b>Standard</b>
Pc S4	DN 250 – SDR 11 0°C - > 3,5 BAR	ISO 13477
Pc FS	DN 250 – SDR 11 0°C - > 15 BAR	EN ISO 13478
SCG	DN 250 – SDR 11 80°C – $\sigma_{4,6}$ - > 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

### 6.2.1. 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 be 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. 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 Tractebel specifications for PE pipes (TBL 70000/740/GTS/0008 to 0010) and PE fittings (TBL 70000/740/GTS/0011). The materials will be included when the list is next published (around once every two year).

## 8. FOLLOW-UP

### 8.1. TECHNICAL DATA SHEET

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	Method D of ISO 1183	
min.		.... kg/m <sup>3</sup>
max.		.... kg/m <sup>3</sup>
MFR 190/5	ISO 1133	
min.		.... g/ 10 min
max.		.... g/ 10 min
Volatile content	prEN 12099	
max.		.... mg/kg
Water content	prEN 12118	
max.		.... mg/kg
Carbon black content	ISO 6964	
min.		.... %
max.		.... %
Carbon black dispersion	ISO 11420	
max.		≤ grade ...
OIT at 210°C	EN 728	
min.		... min

Company .....

Person responsible .....

Position .....

Signature .....

Σ Σ Σ

<b>Tractebel</b> Engineering	GENERAL TECHNICAL SPECIFICATION	<b>70000 740 GTS/0015</b>
------------------------------	---------------------------------------	-----------------------------------

## POLYETHYLENE VALVES FOR NATURAL GAS DISTRIBUTION UNDERGROUND NETWORK

A	22/08/02	First Issue	MRT	MRY	MRT
Rev.	Date	Subject of revision	Author	Checked	Approved

SN1/21/ **\*70000/740/GTS/0015\***

**svez**



TABLE OF CONTENTS

<b>1. SCOPE AND FIELD OF APPLICATION.....</b>	<b>1</b>
<b>2. NORMATIVE REFERENCES .....</b>	<b>1</b>
<b>3. DEFINITIONS.....</b>	<b>2</b>
3.1. NOMINAL SIZE DN/OD.....	2
3.2. NOMINAL OUTSIDE DIAMETER ( $D_N$ ) .....	2
3.3. NOMINAL WALL THICKNESS ( $E_N$ ) .....	2
3.4. COMPOUND .....	2
3.5. MAXIMUM OPERATING PRESSURE (MOP).....	2
3.6. VALVES.....	2
3.7. BASE PLATE.....	2
3.8. SPINDLE PROTECTION SLEEVE.....	3
3.9. EXTERNAL LEAK-TIGHTNESS.....	3
3.10. INTERNAL LEAK-TIGHTNESS.....	3
3.11. LEAK-TIGHTNESS TEST .....	3
3.12. INITIATING TORQUE.....	3
3.13. RUNNING TORQUE.....	3
3.14. LEAKAGE .....	3
<b>4. GENERAL SPECIFICATION .....</b>	<b>4</b>
<b>5. MATERIAL PARTICULARITIES.....</b>	<b>4</b>
5.1. GENERAL .....	4
5.2. PE COMPOUND FOR POLYETHYLENE VALVES BODIES.....	4
5.3. SEALS .....	5
5.4. LUBRICANTS .....	5

5.5. OPERATING CAP .....	5
<b>6. VALVES GENERAL PARTICULARITIES .....</b>	<b>5</b>
6.1. TECHNICAL FILE .....	5
6.2. DESIGN .....	6
6.3. APPEARANCE AND COLOUR .....	6
6.4. DIMENSIONS .....	7
<b>7. MECHANICAL CHARACTERISTICS FOR ASSEMBLED VALVES.....</b>	<b>7</b>
7.1. GENERAL .....	7
7.2. RUNNING TORQUE.....	7
7.3. INDIVIDUAL TEST (BATCH RELEASE TEST).....	7
7.4. PRESSURE DROP AT LOW PRESSURE .....	8
<b>8. MARKING .....</b>	<b>8</b>
<b>9. PACKAGING AND DELIVERY .....</b>	<b>9</b>
<b>10. GUARANTEE .....</b>	<b>9</b>
<b>11. QUALITY CONTROL .....</b>	<b>9</b>
11.1. GENERAL RULINGS .....	9
11.1.1. Manufacturer's responsibility .....	9
11.1.2. Quality assurance .....	9
11.2. CONTROLS.....	10
11.2.1. Control testing by the manufacturer.....	10
11.3. ACCEPTANCE OR REFUSAL .....	11
11.3.1. Appearance, measurements and marking.....	11
11.3.2. Control check on characteristics.....	11
<b>ANNEXE A.....</b>	<b>12</b>
<b>DIMENSIONS OF THE EXTENSION SPINDLE .....</b>	<b>12</b>

ANNEX B .....	13
DIMENSIONS OF THE OPERATING CAP TYPE A.....	13
ANNEX C .....	14
DIMENSIONS OF THE OPERATING CAP TYPE B.....	14
ANNEX D .....	15
DIMENSIONS OF THE OPERATING CAP TYPE C.....	15

Σ

Σ

Σ

## 1. SCOPE AND FIELD OF APPLICATION

This General Technical Specification specifies the requirements for valves and its component made from extruded or injected moulded polyethylene (PE) and which are intended to be used for the Natural gas distribution systems where the maximum operating pressure (MOP) is equal to 5 bar.

In addition, it specifies some general properties of the materials from which these valves are made.

It applies to bi-directional valves with spigot ends or electrofusion sockets intended to be fused with polyethylene pipes in accordance with the TBL 70000/740/GTS/0008-0009-0010 and 0012 PE pipe specification and with spigot fittings in accordance with the TBL 70000/740/GTS/0011.

This specification is limited to valves with a nominal diameter ( $d_n$ ) up to and including 225 mm.

## 2. NORMATIVE REFERENCES

prEN 1555-1	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 1 : General
prEN 1555-4	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 4 : Valves
prEN 1555-7	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 7 : Guidance for assessment of conformity
ISO CD 12176-4	Plastics pipes and fittings - Equipment for fusion jointing polyethylene system - part 4 : raceability coding
ISO TR 13950	Plastics pipes and fittings - Automatic recognition systems for electrofusions
TBL 7000/740/GTS/0008	Polyethylene pipes for underground networks for Natural gas distribution - General requirements
TBL 70000/740/GTS/0009	Polyethylene pipes for underground networks for Natural gas distribution - Technical data sheet
TBL 70000/740/GTS/0010	Polyethylene pipes for underground networks for Natural gas distribution - Quality control of pipes
TBL 70000/740/GTS/0011	PE accessories for underground network for natural gas distribution
TBL 70000/740/GTS/0012	Polyethylene components for manufacture of pipes and fittings for underground networks for natural gas distribution - Acceptance procedure
TBL 70000/740/GTS/0013	Execution of works. Installation of polyethylene pipes

**3. DEFINITIONS****3.1. NOMINAL SIZE DN/OD**

Nominal size, related to the outside diameter.

**3.2. NOMINAL OUTSIDE DIAMETER ( $d_n$ )**

Specified outside diameter, in millimetre, assigned to a nominal size DN/OD.

**3.3. NOMINAL WALL THICKNESS ( $e_n$ )**

Numerical designation of the wall thickness of a component, which is a convenient round number, approximately equal to the manufacturing dimension in millimetre (mm).

Note : For thermoplastics components conforming to prEN 1555, the value of the nominal wall thickness  $e_n$  is identical to the specified minimum wall thickness at any point,  $e_{min}$ .

**3.4. COMPOUND**

Homogenous mixture of base polymer (PE) and additives, i.e. anti-oxidants, pigments, UV-stabilisers and others, at a dosage level necessary for the processing and use of components conforming to the requirements of this standard.

**3.5. MAXIMUM OPERATING PRESSURE (MOP)**

Maximum effective pressure of the fluid in the piping system, expressed in bar, which is allowed in continuous use. It takes into account the physical and the mechanical characteristics of the components of a piping system.

Note : It is calculated using the following equation : 
$$MOP = \frac{(20 \times MRS)}{Cx(SDR - 1)}$$

**3.6. VALVES**

An obturating device designed to stop or restore the gas flow by operating the opening and closing mechanisms.

**3.7. BASE PLATE**

The valves are split into two models.

MODEL 1	Valve supply without base plate
MODEL 2	Valve supply with a base plate fixed or integrated

### 3.8. SPINDLE PROTECTION SLEEVE

A sleeve tube that protect the valve spindle. The protection sleeve exists in two models

VENTILATED	The sleeve is provided with opening and wrapped with textile fabric in order to let the gas escape and prevent the soil to go in.
NON VENTILATED	A normal sleeve tube without textile fabric.

### 3.9. EXTERNAL LEAK-TIGHTNESS

The tightness of the body enveloping the space containing the gas, with respect to the atmosphere.

### 3.10. INTERNAL LEAK-TIGHTNESS

The tightness between the inlet and the outlet of the valve, obtained by closing the operating mechanism.

### 3.11. LEAK-TIGHTNESS TEST

Test to determine

- the internal leak-tightness of the valve's closing seat when closed and pressurised from either side;
- the external leak-tightness of the valve when half open.

### 3.12. INITIATING TORQUE

Torque required to initiate movement of the obturator.

### 3.13. RUNNING TORQUE

Torque required to achieve full opening or closing of the valve at maximum allowable operating pressure.

### 3.14. LEAKAGE

Emission of gas through the body, sealing membrane or any other component of the valve.

#### 4. GENERAL SPECIFICATION

The present specification is based on the European Standards EN 1555 series prepared by technical committee CEN/TC 155 plastic technical and ducting system.

The requirements of this General technical specification are chosen in order to guarantee a high quality gas system which will respond to the European Standards for gas supply systems.

- the valves described in this General technical specification comply with the standard prEN1555-4 and the complementary particular requirements or options of the present GTS.
- the valves are intended to be use in gas distribution networks made of PE pipes and accessories complying with TBL 70000/740/GTS/0008-0009-0010-0011-0012.
- the valves are laid and welded as specified in the TBL 70000/740/GTS/0013

#### 5. MATERIAL PARTICULARITIES

##### 5.1. GENERAL

All parts of the valve in contact with the gas stream shall be resistant to the gas, its condensates and other occurring substances such as dust.

All metallic parts of the PE valve shall resist to both internal and external corrosion.

##### 5.2. PE COMPOUND FOR POLYETHYLENE VALVES BODIES

- The PE compound from which the valve body, with spigot end or electrofusion socket is made out, shall conform to prEN1555-1 and comply with the TBL 70000/740/GTS/0012 "acceptance procedure".
- The PE valves bodies are PE 100 class made from approved material as specified in the TBL 70000/740/GTS/0008 General requirements - appendix 1.

Are forbidden :

- use of recycled materials,
- mixture of different materials,
- addition of complementary materials.

### 5.3. SEALS

- The seals shall be homogeneous, without any inner crack, inclusion or impurities and cannot contain any component that can alter the properties of the materials they are in contact with, and prevent the non-conformity of those materials with the present specification.
- additives shall be distributed evenly.
- The rubber seal rings shall comply with standard EN 682.
- Other seals shall comply with the relevant standard and be suitable for gas service.

### 5.4. LUBRICANTS

Lubricants cannot have any adverse effects on the long-term performance of the valve parts.

### 5.5. OPERATING CAP

Operating cap are in plastic material or in metal, protected against corrosion.

## 6. VALVES GENERAL PARTICULARITIES

### 6.1. TECHNICAL FILE

The manufactures of the valves shall deliver for each type of valve a technical file which includes:

- Raw materiel used,
- drawings, dimensions and tolerances, including for the accessories,
- application range (temperature and pressure limits),
- running torque and initiating torque,
- pressure drop and flow diagram,
- test results and data proving the conformity of the valve in accordance with prEN1555-4 and prEN1555-7,
- the pipe elements used during valves testing have to be conform to the TBL 70000/740/GTS/0008,
- the assembly pipes/valves realised during testing shall be in conformity with the manufactures instructions and the extreme installation conditions.



At the helm of the Energy Transition, Tractebel provides a full range of engineering and advisory services throughout the life cycle of its clients' projects, including design and project management. As one of the world's leading engineering and advisory companies and with more than 150 years of experience, it's our mission to actively shape the world of tomorrow. With about 5,000 experts and presence in more than 70 countries, we are able to offer our customers multidisciplinary solutions in energy, water and urban.

**TRACTEBEL ENGINEERING PVT. LTD.**

GURGAON OFFICE  
Intec House, 37  
Institutional Area, Sector 44  
122002 - Gurgaon - INDIA  
[tractebel-engie.com](mailto:tractebel-engie.com)

NITISH NANDI  
tel. +91 124 469 8500  
fax +91 124 469 8586  
[nitish.nandi@tractebel.engie.com](mailto:nitish.nandi@tractebel.engie.com)

