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उत्पाद मैन्युअल
गैसीय ईंधन की आपूर्ति के लिए पॉलीथीन पाइप के साथ उपयोग के लिए पॉलीथीन फिटिंग - भाग 3 इलेक्ट्रो फ्यूजन फिटिंग आई एस 15927 (Part 3): 2011 के अनुसार

PRODUCT MANUAL FOR POLYETHYLENE FITTINGS FOR USE WITH POLYETHYLENE PIPES FOR THE SUPPLY OF GASEOUS FUELS- PART-3- ELECTRO FUSION FITTINGS ACCORDING TO IS 15927 (Part 3):2011

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	**मानक संख्या** IS No.	:	IS 15927 (Part 3):2011
	शीर्षक **Title**	:	Polyethylene Fittings for Use with Polyethylene Pipes for the Supply of Gaseous Fuels-Electro fusion fittings
	संशोधनों की संख्या **No. of Amendments**	:	Nil
2.	**नमूना दिशानिर्देश** **Sampling Guidelines:**		
a)	**कच्चा माल** **Raw material**	:	• The polyethylene compound used in the manufacture of fittings shall confirm to Clause 6 of IS 15927 (Part 3): 2011

			• All exposed metallic components shall confirm to Clause 6.9 of IS 15927 (Part 3): 2011 • Elastomeric seals shall confirm to IS 15430.
b)	**समूहीकरण दिशानिर्देश** **Grouping guidelines**	:	Please refer **ANNEX A**
c)	**नमूने का परिमाण** **Sample quantity**	:	8 Fittings & 4 electro-fused test assemblies
3.	**परीक्षण उपकरणों की सूची** **List of Test Equipment**	:	Please refer **ANNEX B**
4.	**निरीक्षण और परीक्षण की स्कीम** **Scheme of Inspection and Testing**	:	Please refer **ANNEX C**
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day:**		
	Visual Appearance Fittings (Clause 7.1), Dimensions of Fittings (Clause 9.2, 9.3 & 9.4), Melt Flow Rate (Clause 10.2), Density (Clause 10.3), Thermal Stability (Clause 10.4), Carbon Black Content (Clause 6.4), Carbon Black Dispersion (Clause 6.5), Pigment Dispersion (Clause 6.6) (For Non-Black compounds only), Operation of Fusion Indicator (Clause 7.3), Heating Element Resistance (Clause 8.2), End Reversion Test for Spigot Outlet (Clause 10.10)		
6.	**लाइसेंस का दायरा / Scope of the Licence :**		

Licence is granted to use Standard Mark as per IS 15927 (Part-3) 2011 with the following scope:

Name of the product	Polyethylene Fittings for use with Polyethylene Pipes for the Supply of Gaseous Fuels - Part 3 - Electro Fusion Fittings
Type	• Coupler • Electro Fusion Tapping Tee • Electro Fusion Saddle fittings • Reducer • Electro fusion End Cap assemblies
Material Grade	PE 80/ PE 100
Standard Dimension Ratio (SDR)	SDR 11.0/ SDR 17.6
Sizes (Nominal Diameter), mm	

ANNEX A
Grouping Guidelines

1. Polyethylene Fittings of supply of gases fuels as per IS 15927 (Part-3): 2011 are categorized as given below:
2. Fittings are classified into following types:
    a) Coupler
    b) Electro Fusion Tapping TEE
    c) Electro Fusion Saddle fittings
    d) Reducer
    e) Electro fusion End Cap assemblies

3. Further, Fittings are categorized as given below:
    A) Grade of material – PE 80 and PE 100
    B) SDR classification – SDR 17.6/SDR 11.0
    C) Nominal diameter (DN), mm – 16/ 20/ 25/ 32/ 40/ 50/ 63/ 75/ 90/ 110/ 125/ 140/ 160/ 180/ 200/ 225/ 250/ 280/ 315

4. Nominal diameter (DN) covered are further sub-grouped as given below:

Size	Group I	Group II
Nominal diameter (DN) (mm)	16 - 110	125 -315

5. Considering the above, grouping guidelines given below shall be followed for GoI/CSoL:

    (i) One sample of each type of Fitting for each material grade and each SDR classification shall be tested for all requirements to cover that particular type, material grade and SDR classification.

    (ii) Lowest and highest sizes from each size group shall be tested for all requirements to cover all intermediate sizes including the sizes tested in that particular group.

6. The Firm shall declare the varieties of polyethylene fittings they intend to cover in the Licence. The Scope of Licence may be restricted based on the manufacturing and testing capabilities of the manufacturer.

7. During the operation of the Licence, BO shall ensure that all varieties covered in the Licence are tested in rotation, to the extent possible.

ANNEX B
List of Test Equipment

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sl No.	Tests used in with Clause Reference	Test Equipment
1	Dimensions of Fittings (Clause 9.2, 9.3 & 9.4)	- Vernier calliper - Ball ended Micrometre/Dial vernier - Continuous wall thickness measurement arrangement during production - Measuring scale/tape
2	Hydrostatics Resistance Test (Clause 10.7)	- Hydraulic pressure testing equipment with timer and pressure gauges - End pugs of required sizes - Thermostatically controlled water bath with low and high temperature arrangement - Apparatus as per Annex of IS 14885: 2001
3	End Reversion Test (Clause 10.10)	- Hot air Oven - Vernier calliper - Thermometer - Timer
4	Density (Clause10.3)	- Digital weighing balance - Distilled water - Butyl Acetate - Hydrometer - Glass beaker of 250ml capacity - Thermometer - Air conditioner - Heated press (Electrically) heated steam water cooled, digital temperature controller, with spacer frame 100 x 120 mm
5	Melt Flow Rate (Clause 10.2)	- Melt flow rate Apparatus with digital temperature controller and timer and load of 5 kgf

6	Thermal stability (Clause 10.4)	- Differential Thermal Analyzer (DTA) - Pure indium and pure tin for calibration - Aluminium pans - Microtome cutter and scalpel - Analytical/digital weighing balance - Nitrogen gas cylinder with flow meter - Oxygen gas cylinder with flow meter - Timer
7	Volatile Matter Content (Clause 10.5)	- Drying oven. - Weighing cup with diameter of 35 mm with lid of cup - Desiccators - Analytical/digital weighing balance
8	Pigment Dispersion (Clause 6.6)	- Microtome capable of cutting microtome section of10 µm to 20 µm. - Microscope of at least X 100 linear magnification and circular field of view of 0.7 ± 0.07 mm diameter set for transmitted light - Microscope Slides and Cover slips
9	Branch Saddle Fusion Pull off test (Clause 10.8)	- A joint assembly of Saddle - Universal Tensile Testing machine
10	Decohesion Crush Test (Cl. 10.6.1)	- Decohesion crush test arrangement
11	Decohesion Peel test (Cl. 10.6.2)	- Universal Tensile testing machine - Air conditioner to maintain temperature of 27±2°C - Loading Clamp - Decohesion Peel test assembly
12	Electro fusion Tapping Tee Impact test (Cl. 10.9)	- Deep freezer for conditioning test piece for -5±2°C - Impact testing assembly - Falling weight of mass 5±0.1Kg and a hemispherical striking face of 25mm diameter made of hardened steel - Pneumatic test set up - Stop watch
13	Electro fusion tapping tee cap pressure leak test (Cl. 10.11)	- Water bath or air chamber for maintaining temperature within ±1°C and pressure within ±2% - Torque wrench - Pressure gauge
14	Electro fusion tapping tee pressure drop test (Cl. 10.12)	- Test rig as per Fig. 12 containing Pressure controller, flow meter, Inclined manometer of Class 0.6 & Class 0.25, Outlet valve and source of air

15	Resistance to Tensile load (Cl. 10.13)	- Universal Tensile testing machine of sustaining constant test speed of 5mm/min ±25% - Air conditioner to maintain 27±2°C
16	Corrosion resistance (Cl 6.9)	- Water bath (thermally controlled) - Salt (Sodium Chloride)
17	General	- Electro-fusion arrangement

ANNEX C
SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 **RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT**:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is : Each type of fitting of same size, same SDR & Same material Grade from one machine manufactured from same batch of raw material in a day shall constitute one control unit.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively,the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as "R" or other tests which can be subcontracted as "S". Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 <u>For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as "R" in Column 2 of Table 1) is also optional.</u>

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 **Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as "R" in Column 2 of Table 1)**, where different tests given in the specification shall be carried out in accordance with the method given in the specification**.** They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 **TEST RECORDS**- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. PACKING AND MARKING - The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly marked on each fitting provided always that the product so marked conforms to each requirement of the specification.

3.1 Packing and Marking shall be done as per the Indian Standard IS 15927 (Part 3): 2011

3.2 **Additional Marking requirements**: Each fitting/ label attached to fitting, shall also be marked with the following additional requirement:

a) "For BIS certification details please visit www.bis.gov.in"

4. REJECTION - All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act,2016.

TABLE 1

(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		
Test Details				**Test equipment requirement R: required (or) S: Sub-contracting permitted**	**Levels of Control**		
Cl.	**Requirement**	**Test Methods**			**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**				
6	**MATERIAL**						
6.1	Polyethylene compound	6.1	IS 15927 (Part-3) IS 14885	S	One	Each consignment	No further testing is required, if material received with test certificate or ISI Marked.
6.2	Anti-oxidant	6.2	IS 15927 (Part-3) IS 2530				
6.3	UV stabilizer	6.3	IS 15927 (Part-3)				
6.7	Effect of Gas constituents on the Hydrostatic strength	6.7	IS 15927 (Part-3) IS 14885				
6.9	Corrosion resistance	6.9	IS 15927 (Part-3)				
6.10	Elastomeric seals	6.10	IS 15927 (Part-3) IS 15430				

7.1	Appearance of the Fitting	7.1	IS 15927 (Part-3)	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity.
7.3	Fusion Indicator	7.3	IS 15927 (Part-3)		
7.4	Appearance of the Joint	7.4	IS 15927 (Part-3)		
7.5	Joint Reheating	7.5	IS 15927 (Part-3)		
5.3	Colour	5.3	IS 15927 (Part-3)		
9.2	Couplers	9.2	IS 15927 (Part-3)		
9.3	Reducers	9.3	IS 15927 (Part-3)		
9.4	Electro Fusion Tapping Tee	9.4	IS 15927 (Part-3)		
9.5	Electro Fusion Saddle Fittings	9.5	IS 15927 (Part-3)		
9.6	Electro Fusion End Cap Assemblies	9.6	IS 15927 (Part-3)		

6.4	Carbon Black Content (For Black Compounds only)	6.4	IS 15927 (Part-3) IS 2530	R	One	Each Control Unit	-
6.5	Carbon Black dispersion (For Black Compounds only)	6.5	IS 15927 (Part-3) IS 2530				
6.6	Pigment dispersion (For Non-Black Compounds only)	6.6	IS 15927 (Part-3) IS 14885				
8.2	Heating Element Resistance	8.2	IS 15927 (Part-3)				
10.4	Thermal Stability	10.4	IS 15927 (Part-3) IS 14885				
10.6	Decohesion Test	10.6	IS 15927 (Part-3)				
10.10	End Reversion Test	10.10	IS 15927 (Part-3) IS 15927 (Part-2)				
10.2	Melt Flow rate (MFR)	10.2	IS 15927 (Part-3) IS 2530	R	One composite sample of minimum three fittings drawn at regular interval	Each Control Unit	-
10.3	Density	10.3	IS 15927 (Part-3) IS 7328				

10.7	Hydraulic Pressure test characteristics - Acceptance test at 20^0C for failure time ≥ 100h	10.7, Table 6	IS 15927 (Part-3) IS 14885	R	One	One sample of the lowest and highest size from each variety of fittings (i.e. type, grade of material and SDR) produced in a month	
	Hydraulic Pressure test characteristics - Acceptance test at 80^0C for failure time ≥ 165h	10.7, Table 6	IS 15927 (Part-3) IS 14885				
10.8	Branch Saddle fusion pull off test	10.8	IS 15927 (Part-3)	S	One	Once in six months	Fittings of the lowest and highest size from each variety of fittings (i.e. type, grade of material and SDR), manufactured during the period shall be tested. This test shall be also be carried out whenever a change is made in composition or method of manufacturing or a new size of a fitting is to be introduced.
10.9	Electro fusion tapping tee Impact test	10.9	IS 15927 (Part-3)				
10.13	Resistance to Tensile Load	10.13	IS 15927 (Part-3)				
10.11	Electro fusion tapping tee; cap leakage test	10.11	IS 15927 (Part-3)	S	One	Once in a year	
10.12	Tapping Tee; Pressure Drop Test	10.12	IS 15927 (Part-3)				
10.5	Volatile Matter Content	10.5	IS 15927 (Part-3) IS 14885	S	One	Once in two years	
10.7	Hydraulic Pressure test characteristics - Type test at 80^0C for failure time ≥ 1000h	10.7, Table 6	IS 15927 (Part-3) IS 14885	S	One	Once in four years	