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مشخصات فنی خرید

اتصالات پلی اتیلن ، زین اسبی الکتروفیوژن

P.E. Fittings , Electrofusion Saddles



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ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۹۹۶ مورخ ۱۴۰۱/۱۰/۱۸ هیأت مدیره، نامه شماره گ.دب/۰۰۰/۹۶۷۶۹۷ مورخ ۱۴۰۱/۱۰/۱۳ آن مدیریت درمورد تصویب نهایی مقررات فنی شرکت ملی گاز ایران به شرح زیر مطرح و مورد تصویب قرار گرفت.

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Foreword

This standard specification is intended to be mainly used by N.I.G.C. and contractors, and has been prepared base on interpretation of recognized standards and technical documents, as well as knowledge, backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Specification (IGS) are prepared, reviewed and amended by technical standard committees within NIGC standardization division of research and technology management and submitted to "the standards council of NIGC" for approval.

IGSs are subjected to revision, amendment or withdrawal, if required, and thus the latest edition of IGS shall be checked / inquired by NIGC'S users.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation or conflicts between this specification and other applicable standards, codes, procedure or well-known manufacturer's specifications must be resolved in writing by the user or its representative through Manager, Engineering Department or standardization division of NIGC.

The technical standard committee welcomes comments and feedbacks from concerned or interested corporate and individuals about this standard, and may revise this document accordingly based on the received feedbacks.

General Definitions

Throughout this standard the following definitions, where applicable, should be followed:

- 1- "STANDARDIZATION DIV." is organized to deal with all aspects of industry standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.
- 2- "COMPANY": refers to National Iranian Gas Company (NIGC).
- 3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to IGS specification whether as the prime producer or manufacturer or a trading firm.
- 4- "SHALL ": is used where a provision is mandatory.
- 5- "SHOULD": is used where a provision is advised only.
- 6- "MAY": is used where a provision is completely discretionary.

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1. Scope

This specification provides NIGC's minimum requirements of manufacturing, testing, inspection, dimension, tolerances, marking, packing, handling, storage etc., of polyethylene electrofusion tapping saddle with integral heating element in accordance with the **EN 1555-3:2021**, except otherwise have been specified in this standard, within an operating temperature range of -20 to 45°C and maximum operating pressure of 4 barg. These fittings are intended to be used with polyethylene pipes conforming to latest edition of **IGS-M-PL-14-1**

2. References

Throughout this specification, the following standards and codes are referred to. The edition of these standards and codes those are in effect at the time of issuing of this standard specification are noted in the references. Applicability of any changes in the standards and codes that may occur after issuing the current specification shall be mutually agreed upon by the purchaser and supplier and/or manufacturer.

2.1. Normative references

EN 1555-1:2021, Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - Part 1: General

EN 1555-2:2021, Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - Part 2: pipes

EN 1555-3:2021, Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - Part 3: fitting.

EN 1555-5:2021, Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - Part 5: Fitness for purpose of the system

EN 12117, Plastics piping systems – fittings, valves and ancillaries – determination of gaseous flow rate / pressure drop relationships.

EN 1716, Plastics piping systems – polyethylene (PE) tapping tees – test method for impact resistance of an assembled tapping tee.

EN ISO 1133, Plastics – determination of the melt mass – flow rate (MFR) and the melt volume – flow rate (MVR) of thermoplastics).

EN ISO 1167-1:2006, Thermoplastics pipes, fittings and assemblies for the conveyance of fluids – determination of the resistance to internal pressure– Part1: general method.

EN ISO 1167-2:2006, Thermoplastics pipes, fittings and assemblies for the conveyance of fluids – determination of the resistance to internal pressure – Part 2: preparation of pipe test pieces.

EN ISO 1167-3:2007, Thermoplastics pipes, fittings and assemblies for the conveyance of fluids – determination of the resistance to internal pressure – Part 3: preparation of components.

EN ISO 1167-4:2007, Thermoplastics pipes, fittings and assemblies for the conveyance of fluids – determination of the resistance to internal pressure – Part 4: preparation of assemblies.

GIS/PL2-4: 2019, “Polyethylene pipes and fittings for natural gas and suitable manufactured gas part 4: fusion fitting with integral heating element (s)”.

ISO 13955, “Plastics pipes and fittings – crushing De cohesion test for polyethylene (PE) electrofusion assemblies”.

ISO/ CD 13956, “Plastics pipes and fittings – De cohesion test of polyethylene (PE) saddle fusion Joints -Evaluation of ductility of fusion joint interface by tear test”.

ISO /FDIS 11357–6, “Plastics – differential scanning calorimetry (DSC) – part 6: determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)”

2.2. Informative references

EN ISO 3126, “Plastics piping systems–plastics piping components – measurement and determination of dimensions”.

ISO 228-1, “Pipe threads where pressure – tight joints are not made on the threads – part 1: dimensions, tolerance and designation”.

ISO 18553, “Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds”

3. Terms and definitions

3.1. Batch release test (BRT)

Test performed by the manufacturer on a batch of material or components which has to be satisfactorily completed before the batch can be released.

3.2. Electrofusion saddle fitting

Polyethylene (PE) fitting which contains one or more integral heating elements, that are capable of transforming electrical energy into heat to realize a fusion joint onto a pipe

3.3. Melt – mass flow rate (MFR)

Value relating to the viscosity of the molten material at a specified temperature and load, expressed in grams per 10 min (g/10 min)

3.4. Spigot end fitting

Polyethylene (PE) fitting where the outside diameter of the spigot end is equal to the nominal outside diameter, (dn), of the corresponding pipe

3.5. Standard dimension ratio (SDR)

Numerical designation of a pipe series, which is a convenient round number, approximately equal to the dimension ratio of the nominal outside diameter, dn, and the nominal wall thickness

3.6. Tapping tee

Electrofusion saddle fitting which contains an integral cutter, to cut through the wall of the main pipe. The cutter remains in the body of the saddle after installation

3.7. Type testing (TT)

Testing performed to prove that the material, component, assembly is capable of conforming to the requirements given in this specification.

In addition, relevant type tests shall be carried out and relevant certificate shall be submitted whenever there is a change in design, and /or in the production method other than routine in-process adjustment and any change in raw material such as brand, production designation, production location, production line etc.

In case of no changes in above mentioned items, the certificate of type tests (TT) shall be renewed every five years by an approved independent certification body.

3.8. Virgin material

Material in form of granules that has not been subjected to use or processing other than that required for its manufacturer and to which no reprocess able or recyclable materials have been added.

4. Technical specification for PE electrofusion tapping saddle

Electrofusion PE gas fittings, black, minimum density at least 945 kg/m³, SDR 11-13.6, PE 100 suitable for operating pressure of 4 bar_g. The employed PE material shall be compound (in the form of granules), virgin and relevant certificate shall be submitted to purchaser. Processed PE material not allowed.

Material, manufacturing, testing, inspection, dimension, tolerances, marking, packing, handling, storage, transportation etc. In accordance with EN specification 1555 part 1,3,5,7: 2021 edition and this standard.

Manufacturer shall design and produce its products so that guarantee on the requirements of this standard.

5. Saddle fitting aspect, geometry and dimension

5.1. General

Tapping tee shall be designed for connection by saddle fusion, to pressurized, main pipes and by electrofusion to outlet service pipe.

Tapping tees shall provide a means of cutting through the pressurized main pipe and allowing gas to flow into the outlet pipe. Leakage of gas to atmosphere shall not occur.

The pipe fixation device shall be an integral part of the body for all saddles (belt or under clamp).

An upper stop at the neck of the saddle shall be provided to prevent the cutter removing after tapping.

All saddles shall be equipped at least with a lower stop to prevent the cutter falling in to the pipe.

5.2. Indicator

Each tapping saddle shall have two indicators and to be operated simultaneously but for outlet sizes of 32 and 63 mm mentioned two indicators are preferable.

Indicators shall not operate if any wire becomes open circuit during the first 50% of the fusion cycle.

The fusion indicators shall be designed so as to prevent the escape of fusion melt.

5.3. Fusion zone area

Fusion zone area shall not be less than the values mentioned in table A.

Table A:

Outlet size (mm)	Minimum allowable Fusion zone area (mm ²)
25	3750
32	3750
63	9500

5.4. out let length

Outlet length shall not be less than the values are indicated in table B:

Table B:

Outlet size (mm)	Outlet (mm)
25	70
32	70
63	120

5.5. Cutter

The cutter design shall be so that hold the coupon and not produce swarf.

The integral cutter diameter shall not be less than the values are mentioned in table C:

Table C:

Saddle Outlet size (mm)	Cutter diameter (mm)
25	16
32	18
63	30

The cutter shall be operated with 10, 12 mm or 17mm AF hexagonal key and the depth of hexagonal shall not be less than 16 mm. A stop shall be provided to prevent the key penetrating through the cutter.

5.6. Cutter torque

The cutter operating torque shall not exceed values are given in table D.

Table D:

Saddle Outlet size (mm)	Maximum cutting torque(N.m)
25	30
32	45
63	100

5.7. Metallic part

Perforator set shall be corrosion resistant. The corrosion resistance of perforator set shall be assessed by immersing the fitting for minimum of 170 hrs. in an aqueous sodium chloride solution (30 g/l) at $230^{\circ}\text{C} \pm 20^{\circ}\text{C}$. On completion of the test period there shall be no evidence of rust spots and corrosion of exposed metal.

5.8. Tapping tee cap

The tapping tee cap shall be capable of passing all tests required of the fitting without additional fastenings or constraints to the cap.

Where an "O" ring is used as a gas seal, it shall remain in its position when the cap is removed.

6. Electro fusion fitting for gas distribution network

Only the P.E. saddles mentioned in **table D** allowed to be used in the natural gas distribution network.

Table D

TAPPING SADDLE	TAPPING SADDLE
63×25	125×32
63×32	125×63
90×25	160×25
90×32	160×32
110×25	160×63
110×32	200×63
125×25	225×63

7. Required characteristics *

Test characteristics, requirements and test methods for BRT and TT of PE saddles are given in table F.

Table F

Characteristics	Requirements	Test parameters		Test method	Type of test
		Parameter	Value		
Hydrostatic Strength (20°C , 100 h) [*]	No failure during test periods of any test piece	End caps Orientation Conditioning time Number of test pieces ^a Type of Test Circumferential(hoop) stress In pipe for : PE 80 PE 100 Test period Test temperature	Type a) of EN ISO 1167-1:2006 Free Shall conform to EN ISO 1167-1:2006 3 Water – in –water 10,0 MPa 12.4 MPa b 100 h 20°C	EN ISO 1167-1 and EN ISO 1167-2, EN ISO 1167-3, or EN ISO 1167-4, as applicable	TT
Hydrostatic strength (80°C , 165 h) [*]	No failure during test period of any test piece ^b	End caps Orientation Conditioning time Number of test pieces ^a Type of test Circumferential (hoop) stress In pipe for: PE80 PE100 Test period Test temperature	Type a) of EN ISO 1167-1:2006 Free Shall conform to EN ISO 1167-1:2006 3 Water – in –water 4,5 MPa 5,4 MPa 165 h 80°C	EN ISO 1167-1 and EN ISO 1167-2, EN ISO 1167-3, or EN ISO 1167-4, as applicable	BRT TT
Hydrostatic Strength (80°C , 1000 h) [*]	No failure during test period of any test piece	End caps Orientation Conditioning time Number of test pieces ^a Type of test Circumferential (hoop) stress in pipe for: PE80 PE100 Test period Test temperature	Type a) of EN ISO 1167-1:2006 Free Shall conform to EN ISO 1167-1:2006 3 Water – in –water 4,0 MPa 5,0 MPa 1000 h 80°C	EN ISO 1167-1 and EN ISO 1167-2, EN ISO 1167-3, or EN ISO 1167-4, as applicable	TT
Decohesive resistance	Surface of rupture \leq (total fusion area) /7 in brittle failure	Test temperature number of test pieces ^a	23°C Shall conform to ISO 13955	ISO 13955	BRT TT
Decohesive resistance (Strip bend test)	Surface of rupture \leq (total fusion area)/7 in brittle failure	Test temperature number of test pieces ^a	23°C Shall conform to ISO-TC 1381/SC 5/WG12 2007	ISO-TC 1381/SC 5/WG12 2007	BRT
Cohesive strength	Surface of rupture \leq 15% (brittle failure)	Test temperature Number of test pieces ^{a,d}	23°C Shall conform to ISO 13956	ISO 13956	BRT TT
Impact resistance	No failure, no leakage	Test temperature Falling height Mass of the striker Number of test pieces ^a	0°C 2 m 2,5 Kg 1	EN 1716	BRT TT

Table F - Continue

Characteristics	Requirements	Test parameters		Test method	Type of test
		Parameter	Value		
Pressure drop	Air flow rate (value indicated by the manufacturer)	Test medium Test pressure Pressure drop: For $d_n \leq 63$ mm For $d_n > 63$ mm Number of test piece ^a	Air source 25 mbar 0,5 mbar 0,1 mbar 1	EN 12117	TT
Oxidation induction time (thermal stability)	≥ 25 (T= 210°C) ≥ 50 (T=200°C)	Test temperature Number of test piece ^a	200°C ^c 3	ISO/FDIS 11357-6	TT BRT
Conventional density conforming to EN ISO 1872 -1	≥ 945 kg /m ³ (base polymer)	Test temperature Number of test pieces ^a	23°C Shall conform to ISO 1183	EN 1183-1/2	TT BRT
Melt mass – flow Rate (MFR)	$0.2 \leq \text{MFR} \leq 0.7$ g/10min. Maximum deviation of MFR of Manufactured saddle, shall be less than $\pm 10\%$ of the MFR measured and documented on the raw material used to manufacture the fitting.	Loading mass Test temperature Time Number of test piece ^a	5kg 190°C 10 min Shall conform to EN ISO 1133:2005	EN ISO 1133:2005	TT BRT
Carbon black content	(2 to 2.5)% (by mass)	Shall conform to ISO 6964		ISO 6964	TT BRT
Carbon black dispersion	Grade ≤ 3	Preparation of test pieces Number of test pieces ^a	Free shall conform to ISO 18553	ISO18553	TT BRT

a – The number of test pieces given indicate the numbers required to establish a value for the characteristic described in the table. The numbers of test pieces required for factory production control and process control should be listed in the manufacturer's quality plan. For guidance see pr EN 1555-7

b- Only brittle failures shall be taken into account. If a ductile failure occurs before 165 h, the test may be repeated at a lower stress. The stress and the associated minimum test period shall be selected from table G from a line based on the stress / time points given in table G.

c- Test may be carried out at 210°C providing that there is a clear correlation to the results at 200°C, in case of dispute reference temperature shall be 200°C.

d –At least one sample shall be prepared by welding fitting on pressurized pipe before Cohesive strength, the pressure shall be the MOP and in this case the pipe SDR shall be the max allowed by the IGS-M-PL-014-1 for that size. After cooling, the welded sample shall have no visual defect.

* All hydrostatic strength tests shall be carried out before cutting the main pipe by perforator, pressurizing process shall be performed via tapping saddle outlet. The same number of tests pieces is required.

8. Circumferential (hoop) stress at 80°C and associated minimum test period

Table G

PE 80		PE 100	
Stress Mpa	Minimum test period h	Stress Mpa	Minimum test period h
4,5	165	5,4	165
4,4	233	5,3	256
4,3	331	5,2	399
4,2	474	5,1	629
4,1	658	5,0	1000
4,0	1000	--	--

9. Marking

The marking elements shall be printed or formed directly on the fitting on such a way that after storage, handling and installation legibility is maintained during the use of the fitting.

Marking shall not initiate cracks or other types of defects which adversely influence the performance of the fitting.

9.1 Minimum required marking

All saddle shall be marked according to the data are mentioned in table H

Table H

ASPECTS	Mark symbol
Number of the system standard	EN 1555
Manufacturer's name and / or trademark	Name or Symbol
Nominal outside diameter (s)of pipe ; d	e.g. 110
Material and designation	e.g. PE 100
Design application series	e.g. SDR 11
Applicable SDR fusion range of pipe	e.g. SDR 11-13.6
Manufacturer's information	
Internal fluid/Service	Gas
Production date *	Year / month / day
Fusion voltage *	Volt
Fusion time *	Second
Cooling time *	Minute
NIGC symbol *	NIGC

* These requirements may be appearing on a label firmly fixed to the fitting.

10. Delivery conditions

The fitting shall be packaged in bulk or individually protected where necessary in order to prevent deterioration. Whenever possible, they shall be placed in individual bags, in cardboard boxes or cartons.

The cartons and/or individual bags shall bear at least one label with the manufacture's name, type and dimensions of the part, number of units in the box, and any special storage conditions and storage time limits.

Each carton or protective package shall clearly indicate its content.

11. Documentation

The technical bid shall include the following items.

- 1) Original technical catalogue showing materials, dimensions, fusion area, etc.
- 2) Material specification for PE 100 issued by granules manufacturer.
- 3) Approval test report required by this standard shall be issued by certification body which is accepted by NIGC. By the way these mentioned reports shall include following items:
 - a) hydrostatic strength (80°C, 1000h)
 - b) Cohesive strength.
 - c) Impact resistance.
 - d) Pressure drop.
 - e) Conventional density.
 - f) Oxidation induction time.
 - g) Melt mass – flow rate.

ANNEX A (Normative) – Data Sheet for Polyethylene electrofusion saddle

P.O. NO / Contract No.	
Manufacturer's name and address	
Product	
Product designation	
Granule manufacturer & designation	

Raw Material

Item	Property	Unit	Test method	Requirement	Manufacturer's remark
1	Density	g/cm ³	ISO 1183	> 0.945	
2	Oxidation induction time	Min	ISO 11357-6	≥ 25(T= 210°C) ≥ 50 (T=200°C)	
3	Melt mass flow rate (MFR)	g/10 min	ISO 1133	0.2 ≤MFR ≤0.7	
4	Carbon black content	% (bypass)	ISO 6964	2 to 2.5	
5	Carbon black dispersion		18553	Grade ≤ 3	
6	Designation			PE 100	
7	Volatile content	mg/kg	EN12099	≤350	

Finished product

Item	Property	Unit	Test method	Requirement	Manufacturer's remark
1	SDR	-		11	
2	All type of hydrostatic test	-	According to IGS-M-PL-014-4(1)	Conformity mentioned on test method and accepted results	
3	Minimum area of fusion zone for 25,32 and 63 mm outlet	mm ²		As per clause 5.3	
4	Minimum outlet length	mm		As per clause 5.4	
5	Melt mass flow rate (MFR)	g/10 min		After processing, maximum deviation of ±10% of the value measured on the raw material used to manufacture the fitting	

Notes:

- 1- This data sheet shall be filled, signed, and stamped by manufacturer / supplier.
- 2- Any deviation from this standard specification shall be clearly specified by manufacturer / supplier.
- 3- Any change in raw material shall be requalified

- 4- Requirements for material, manufacturing, testing, inspection, dimension, tolerances, marking, packing, handling, storage, transportation etc. In accordance with EN specification 1555 part 1,3,5,7: 2021 edition and latest version of standard (IGS-M-PL-014-4).
- 5- Processed(Recycled) PE material shall not be used for manufacturing of P.E. saddles.

ANNEX B – ITP for Polyethylene electrofusion saddle

	Inspection subject	Description	Criteria	Type of inspection		Remark
				D.R	W	
1	Visually	Appearance	<p>The internal and external surfaces of fittings shall be smooth, clean and shall have no scoring, cavities and other surface defects</p> <p>No component of the fitting shall show any signs of damage, scratches, pitting, bubbles, blisters, inclusions or cracks.</p> <p>Two fusion indicators shall be designed so as to prevent the escape of fusion melt</p>			
		Marking	<p>Manufacturer's name or trade mark, number of the system standard, nominal outside diameter of pipe, applicable SDR fusion range of pipe, design application series, material and designation, internal fluid, production date*, fusion voltage*, fusion time*, cooling time*, NIGC symbol* (shall be confirmed as table (G) IGS-M-PL-14-4</p>			
2	Dimensional	General dimension and parts	<p>An upper stop at the neck of the saddle shall be provided to prevent the cutter removing after tapping.</p> <p>All saddles shall be equipped at least with a lower stop to prevent the cutter falling into the pipe.</p> <p>Threads on metal ends shall conform to EN 10226-1, EN 10226-2 or EN ISO 228-1</p> <p>Top of body of tapping saddle and end cap shall be threaded. The tapping-tee cap shall be capable of passing all tests required of the fitting without additional fastenings to the cap.</p> <p>Where an O-ring is used as a seal, it shall remain in position in the cap when the cap is removed</p>			
		Outlet	Outlet length shall not be less values of Table B			
		Fusion zone area	According to clause 5.3			
		Cutter	Cutter diameter shall not be less than Values of Table C			
			The cutter shall be operated with 10, 12 mm or 17mm AF hexagonal key and the depth of hexagonal shall not be less than 16 mm			

3	Materials	Compound	The PE compound from which the fittings are made shall conform to EN 1555-1 The stress bearing parts shall only be made from virgin material conforming to EN 1555-1			
		Density	The measured value (ACC to ISO 1183) shall not be less than 0.945 g/cm ³			
		MFR	According to ISO 1133 with 5 kg loading mass and at 190°C in 10 min. Maximum deviation of MFR of Manufactured saddle, shall be less than ±10% of the MFR measured and documented on the raw material used to manufacture the fitting. Allowed MFR value is 0.2≤MFR≤0.7			
		Carbon black content	The measured value (ISO 6964) shall be 2-2.5% by mass.			
		Oxidation induction time	According to 11357-6, the required value shall be ≥25 (210°C) ≥50 (200°C)			
		Metallic part corrosion resistance	The corrosion resistance of part of perforator set shall be assessed by immersing the fitting for minimum of 170 hr in an aqueous sodium chloride solution (30 g/l) at 23°C±2°C. On completion of the test period there shall be no evidence of rust spots and corrosion of exposed metal.			
		Carbon black dispersion	Shall conform to ISO 18553, measured value shall be: Grade ≤ 3			
4	welding	Crush test	(According to ISO 13955 & IGS-C-DN-03(1)-part 2-5-2-2) Surface of rupture ≤ (total fusion area)/7 in brittle failure			
		Strip bend test	(according to IGS-C-DN-03(1)-part 1) Surface of rupture ≤ (total fusion area)/7 in brittle failure			
		Cohesive strength	Shall conform to ISO 13956- surface of rupture ≤15% in brittle failure			
		Welding stability & leakage(NDT)	According to IGS-C-DN-04 Using (Tapping saddle connector=TSC) By increasing pressure to 10 bar/145psi & t=5min			
5	Impact resistance	According to EN 1716	In the test environment with 0°C, by 2.5Kg striker falling from the height of 2m. there shall be no evidence of failure or leakage			
6	Hydrostatic strength ₍₃₎ (80°C,1000h)	According to: EN ISO 1167-1 & EN ISO 1167-2 EN ISO 1167-3, or EN ISO 1167-4	In pipe for: PE 80: 4 MPa PE100: 5 MPa Test period: 1000h Test Temperature: 80°C	In each method there shall be no failure during test period of any test piece		
	Hydrostatic strength ₍₃₎ (80°C,165)	According to: EN ISO 1167-1 & EN ISO 1167-2 EN ISO 1167-	PE 80: 4.5 MPa PE 100: 5.4 MPa Test period: 165h Test temperature: 80°C			

		3, or EN ISO 1167-4				
	Hydrostatic strength ₍₃₎ (80°C,100H)	According to: EN ISO 1167-1 & EN ISO 1167-2 EN ISO 1167-3, or EN ISO 1167-4	PE 80: 10MPa PE100: 12.4MPa Test period:100H Test temperature: 20°C			
7	performance	Coupon hold	According to IGS-M-P-014-4(part 5-5) The cutter design shall be so that to hold the coupon and not produce swarf			
		Cutter torque	According to IGS-M-P-014-4(part 5-6) The cutter operating torque shall not exceed 30Nm (applied at 5 rpm) for 25mm outlet.			
		Welding Under Pressure (60 psi)	At least one sample shall be prepared by welding fitting on pressurized pipe before Cohesive strength, the pressure shall be the MOP and in this case the pipe SDR shall be the max allowed by the IGS-M-PL-014-1 for that size. After cooling, the welded sample shall have no visual defect.			
		Pressure drop	Shall conform to EN 12117 With air flow rate at 2mbar pressure, the pressure drop shall be: DN≤63mm: 0.5mbar DN>63mm: 1 mbar			
8	Packing	-	The fitting shall be packaged in bulk or individually protected where necessary in order to prevent deterioration Whenever possible, they shall be placed in individual bags, in cardboard boxes or cartoons. The cartoons and/or individual bags shall bear at least one label with the manufacturer's name, type and dimensions of the part, number of units in the box, and any special conditions and storage time limits			
9	DE cohesive Resistance (B)	Surface Of rupture <total fusion Area/7 in brittle failure	Test Temperature 23 °C Number of Test piece shall conform to ISO 13955			
10	DE cohesive Resistance (B) Strip bend Test	Surface Of rupture <total fusion Area/7 in brittle failure	Test Temperature 23 °C Number of Test piece shall conform to ISO 1381			