



شرکت ملی گاز ایران

امورتدوین استانداردها

IGS

مشخصات فنی خرید

شیرآلات پلی اتیلن

Polyethylene Valves



تاریخ: ۱۳۹۲/۳/۲۸
شماره: گ/۰/دب/۰-۱۷۳-۱۶۶۱۴

ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری و رئیس شورای استاندارد

باسلام،

به استحضار می‌رساند در جلسه ۱۵۳۸ مورخ ۱۳۹۱/۱۲/۲۷ هیأت مدیره نامه شماره گ/۹/۰۰۰/۱۸۱۴۵۳ مورخ ۱۳۹۱/۱۲/۱۹ مدیر پژوهش و فناوری و رئیس شورای استاندارد در مورد تصویب نهایی استاندارد تحت عناوین ذیل مطرح و مورد تصویب قرار گرفت:

ردیف	عنوان	شماره تقاضا
۱	لوله های فولادی بدون درز / درز جوش گرید B ، اندازه های ۱/۲ تا ۴ اینچ	IGS-M-PL-001-1(0)
۲	لوله های فولادی بدون درز / درز جوش گریدهای B تا X80 ، اندازه های ۶ تا ۵۶ اینچ	IGS-M-PL-001-2(0)
۳	شیرآلات پلی اتیلن	IGS-M-PL-015(1)
۴	دستگاه الکترونیکی تصحیح کننده حجم گاز کنتورهای گاز	IGS-M-IN-106(0)
۵	پوشش اپوکسی مایع برای تعویض و تعمیر پوشش سطوح خارجی خطوط لوله فولادی ، خم ها ، سر جوش ها ، شیرآلات و اتصالات مدفون	IGS-M-TP-027(0)
۶	شیرهای قفل شونده قبل از رگولاتور جهت انشعابات شبکه های گاز پلی اتیلن (بدون اتصال عایقی)	IGS-M-PL-012(1)
۷	شیرهای قفل شونده قبل از رگولاتور جهت انشعابات شبکه های گاز فولادی	IGS-M-PL-019(1)
۸	متیل دی اتانول آمین و نوع اکتیو آن برای استفاده در واحدهای شیرین سازی گاز طبیعی	IGS-M-CH-050(0)

ناصر آنگون
دبیر هیأت مدیره

رونوشت: مدیرعامل محترم شرکت ملی گاز ایران و نایب رئیس هیأت مدیره

اعضای محترم هیأت مدیره

مدیر محترم هماهنگی و نظارت بر تولید

مدیرعامل محترم شرکت انتقال گاز ایران

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FOREWORD

This standard is intended to be mainly used by NIGC and contractors, and has been prepared based on interpretation of recognized standards, technical documents, knowledge, backgrounds and experience in natural gas industry at national and international level.

Iranian Gas Standards (IGS) are prepared, reviewed and amended by technical standard committees within NIGC Standardization division and submitted to the NIGC's "STANDARDS COUNCIL" for approval.

IGS Standards are subject to revision, amendment or withdrawal, if required. Thus the latest edition of IGS shall be checked/inquired by NIGC employees and contractors.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation from normative references and / or well-known manufacturer's specifications must be reported to Standardization division.

The technical standard committee welcomes comments and feedbacks 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 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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MAHCO

1. Scope:

This standard specification provides NIGC's minimum requirements for polyethylene buried ball valves from 63 mm up to and including 225 mm sizes, for operating temperature range of -20 to 40°C and max. operating pressure of 4 bar in natural gas services. Material, manufacturing, testing, inspection, dimension, tolerances, marking, packing, handling, storage etc shall be in accordance with EN 1555, part 4 ver. 2008, unless otherwise noted in this standard. The valves are intended for use with polyethylene pipes conforming to IGS-M-PL-014-1 (2).

Note: *This specification supersedes IGS-M-PL-015(0):1999 "PE valve"*

2. References:

Throughout this standard specification the following standard and codes are referred to the edition of these standards and codes that are in effect at the time of issues of this standard specification.

The applicability of changes in standard and codes that occur after the date of standards that referred shall be mutually agreed upon by the purchaser and supplier and / or manufacturer.

2.1. Normative references

Following standard are min. references which are required and all of related standard (such as all referenced in case) also necessary references .

EN 1555-1:2008, Plastics piping systems for the supply of gaseous fuels-
Polyethylene (PE) - Part 1: General.

EN 1555-2:2008, Plastics piping systems for the supply of gaseous fuels-
Polyethylene (PE) - Part 2: pipe.

EN 1555-3:2008, Plastics piping systems for the supply of gaseous fuels-
Polyethylene (PE) - Part 3: fitting.

EN 1555-4:2008, Plastics piping systems for the supply of gaseous fuels-
Polyethylene (PE) - Part 4: valves.

EN 1555-5:2008, Plastics piping systems for the supply of gaseous fuels-
Polyethylene (PE) - Part 5: Fitness for the purpose of the system

EN 1555-7:2002, Plastics piping systems for the supply of gaseous fuels-
Polyethylene (PE) - Part 7: Guidance for the assessment of conformity

EN 682, Elastomeric Seals – Materials requirements for seals used in pipes and valve

carrying gas and hydrocarbon fluids.

EN 744:1995 , Plastics piping and ducting systems – thermoplastics pipes – test method for resistance to external blows by the round – the – clock method .

EN 917:1997, Plastics piping systems – thermoplastics valves – test methods for resistance to internal pressure and leak tightness.

EN ISO 1133:2005, Plastics – determination of the melt mass – flow rate (MFR) and the melt volume – flow rate (MVR) of thermoplastics).

ISO /FDIS 11357 – 6:2008, Plastics – differential scanning calorimetry (DSC)–part6 : determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) .

2.2. Informative references

EN ISO 3126:2005, plastics piping systems–plastics piping components – measurement and determination of dimensions).

3. Terms and definitions

3.1. 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).

3.2. Type testing (TT)

Testing performed to prove that the material, component, assembly is capable of conforming to the requirements given in the relevant standard. (Such as CEN 1555 part 7)

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 etc. In case of no changes in mentioned above items, every five years, the type tests certificate shall be renewed.

3.3. Audit Test (AT)

Test performed by or on behalf of a certification body which is accepted by NIGC to confirm that the material, components, assemblies continues to conform to the requirements give in a System Standard and to provide information to assess the effectiveness of the quality system.

3.4. Batch Release Test (BRT)

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

3.5. Process Verification Test (PVT)

Test performed by manufacturer on material, components, assemblies at specific interval to confirm that the process continues to be capable of producing components conforming to the requirements given in the relevant standard.

NOTE: Such tests are not required batches of components and are carried out as a measure of process control.

3.6. Production Batch

Clearly identifiable collection of units, manufactured consecutively or continuously under the same conditions, using material or compound conforming to the same specification.

3.7. Leak tightness test

Test for both of the following characteristics:

- a) The internal leak tightness of a valve's closing seat when closed and pressurized from either side,
- b) The external leak tightness of a valve when half open.

3.8. Initiating Torque

Torque required to initiate movement of the obturator.

3.9. Running Torque

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

3.10. Leakage

Emission of gas from a valve body, or any component of a valve.

3.11. Valve Body

Main part of a valve which contains the obturating device (rotating member , the seat , the packing seals and the operating stop) , as applicable and provides the ends for connection to the PE pipe / fittings .

3.12. Operating Cap

Part of a valve for connection with the operating key which allows the opening and closing of the valve.

4. Technical specification for P.E. Ball Valve

P.E. ball valve, black, minimum density 945 kg/m³, SDR11, PE100 suitable for operating pressure of 4 bar. The raw material, shall be complied with EN 1555-PART 1 (other than MFI & OIT which mentioned in this standard) and relevant certificate shall be submitted to purchaser.

Manufacturer shall design and produce the products so that guarantee them according to requirements of this standard.

5. PE Ball Valve aspect, geometry and dimension

5.1. General

Valve shall be capable of operation and sealing against natural gas that is flowing from either direction. The end connections of the valve shall be of the polyethylene spigot type. The production and application of valve shall be so that no maintenance is required. Valve shall be suitable for installation and operation below ground.

5.2. Valve body

The valve body shall be such that can not be dismantled on site without rendering it unusable. PE spigot end connections and valve bodies manufactured as separate item shall be permanently fused together during manufacturing process.

5.3. Dimensions of spigot ends for ball valves

The dimensions of spigot ends and valve port area shall conform to Table 3 of prEN 1555-3:2008 and table 1

5.4. Valve position indicator

All valves shall be furnished with a valve position indicator, showing open position in the direction of flow and close position perpendicular to the direction of flow, full open and close position shall be secured by stops.

Embossed shut and open marks (in English) shall be legibly provided on the valve body.

5.5. Operation cap

The operating cap shall be integral with or connected to the stem in such a way that disconnection is impossible without special equipment.

Valve shall be quarter turn and clock wise to close. They shall not be of the rising spindle type. The valve shall carry an operating top cap be turned by a (50.0 + 0.5) mm square socket 40±2 mm depth. Any how the effective height of operating cap shall be minimum 40 mm. This operating cap shall not be damaged by the metal socket during normal valve operation. The open and closed positions of the valve shall be clearly indicated on the top side of the operating cap. Stops shall be provided at the fully open and closed positions.

Table 1- valve dimensions

Valve size (mm)	Spigot outer diameter (mm)		Min. Wall thickness of spigot end (mm)	Max. out-of roundness (mm)	Min. Port Area % Internal Area of spigot
	Min.	Max.			
63	63.0	63.4	5.8	0.9	75
90	90.0	90.6	8.2	1.4	75
110	110.0	110.7	10.0	1.7	60
125	125.0	125.8	11.4	1.9	60
160	160.0	161.0	14.6	2.4	60
200	200.0	201.2	18.2	3.0	60
225	225.0	226.4	20.5	3.4	60

6. Required characteristics

Table 3

No.	Characteristic	Requirements	Test parameters		Test method	* Type of test
			Parameter	Value		
1	Hydrostatic Strength (20°C ,100h)	No failure during the test period of any test piece	Conditioning time ^a Free length Number of test pieces ^b Type of test Circumferential(hoop) PE 100 Test period Test temperature	Shall conform to EN 917:1997 2 d _n 3 Water – in –water 12,4 MP a 100 h 20°C	Method A of EN 917 :1997	TT PVT AT
2	Hydrostatic Strength (80°C ,165 h)	No failure during the test period of any test piece ^c	Conditioning time ^a Free length Number of test pieces ^b Type of test Circumferential (hoop) PE100 Test period Test temperature	Shall conform to EN 917:1997 2 d _n 3 Water – in –water 5,4 MP a 165 h 80°C	Method A of EN 917 :1997	TT BRT
3	Hydrostatic Strength (80°C ,1000 h)	No failure during the test period of any test piece	Conditioning time ^a Free length Number of test pieces ^b Type of test Circumferential (hoop) PE100 Test period Test temperature	Shall conform to EN 917:1997 2 d _n 3 Water – in –water 5,0 MP a 1000 h 80°C	Method A of EN 917 :1997	TT PVT AT
4	Leak tightness of seat and packing	No leakage during the test period	Test temperature Type of test Number of test pieces ^b Test pressure Duration of the test	23°C Air or nitrogen 1 25 mbar 24 h	ISO 5208	TT BRT
5	Leak tightness of seat and packing	No leakage during the test period	Test temperature Type of test Number of test pieces ^b Test pressure Medium (dependent on the rating) Duration of the test	23°C Air or nitrogen 1 1,5 MOP For 1,5 MOP ≤ 6 bar : air , or for 1,5 MOP <15 bar 30 s :water	ISO 5208	TT BRT

6	Operating torque ^d	Maximum value : -35 Nm for $d_n \leq 63\text{mm}$; -70 Nm for $63\text{mm} < d_n \leq 125\text{mm}$; -150Nm for $125\text{ Nm} < d \leq 225\text{mm}$	Test temperatures Number of test pieces ^b	-20 ⁰ C and +23 ⁰ C and +40 ⁰ C 1	EN 28233	TT BRT
7	Stop resistance	a)no failure stops , and b)no leakage at seat and packing	Torque Test temperatures Number of test pieces ^b	2 items the value of the max. measured operating torque with minimum 150Nm , during 15 s -20 ⁰ C and +40 ⁰ C 1	a) EN 28233, followed by b) ISO 5208	TT BRT PVT AT
8	Actuation mechanism resistance	Maximum value : 1,5 Times the value of the maximum measured operating torque (see this table)	Pressure number of test pieces ^b	6 bar 1	EN 28233	TT BRT PVT AT
9	Resistance to bending between supports	No leakage and maximum value for operating torque (see examination of operating torque)	Load applied for : $63\text{mm} < d_n \leq 125\text{mm}$ $125\text{mm} < d_n \leq 225\text{mm}$ Number of test pieces ^b	3,0 KN 6,0 KN 1	EN 12100	TT PVT AT
10	Thermal cycling resistance $d_n > 63\text{mm}$	No leakage and maximum value for operating torque (see examination of operating torque)	number of test pieces ^b	1	EN 12119	TT AT
11	Leak tightness under bending with thermal cycling $d_n \leq 63\text{mm}$	No leakage	Number of cycles Temperature of Cycling number of test pieces ^b	50 -20 ⁰ C /+40 ⁰ C 1	EN 1704	TT AT
12	Leak tightness under tensile loading	No leakage and maximum value for operating torque (see examination of operating torque)	Number of test pieces ^b	1	ISO 10933	TT PVT
13	Leak tightness under and after bending applied to the operating mechanism	No leakage	Number of test pieces ^b	1	EN 1680	TT
14	Impact Loading resistance	No leakage and maximum value for operating torque (see examination of operating torque)	Positions of sample Drop height Mass of the striker Type of the striker Test temperature Number of test pieces ^b	Vertical 2m 2,5 kg d_{90} conforming to EN 744:1995 -20 ⁰ C 1	EN 1705	TT PVT AT

15	Oxidation induction time (thermal stability)	≥ 25 min (T=210°C) ≥ 50 min (T=200°C)	Test temperature Number of test piece ^a	200°C 3	ISO/FDIS 11357-6	TT BRT
16	Conventional density conforming to EN ISO1872-1	≥ 945 kg /m3 (base polymer)	Test temperature Number of test pieces ^a	23°C Shall conform to ISO 1183	EN 1183-1/2	TT BRT
17	Melt mass – flow Rate (MFR)	$0.2 \leq \text{MFR} \leq 0.7$ g/10min After processing maximum deviation of $\pm 10\%$ of the value measured on the batch 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
18	Carbon black content	(2 to 2,5) % (by mass)	Shall conform to ISO 6964		ISO 6964	TT
19	Carbon black dispersion	Grade ≤ 3	Preparation of test pieces Number of test pieces ^b	Free Shall conform to ISO 18553	ISO 18553	TT BRT
20	Appearance	No scoring, cavities, or other surface defects. Internal and external surface shall be smooth and clean.			Visual inspection without magnification	TT BRT AT
21	Colour	black			Visual inspection	TT AT BRT PVT
22	Geometrical characteristics (dimension)	Spigot outer diameter Min. Wall thickness of spigot end Max. out-of roundness Min. Port Area (%)		Shall conform to Table 1 (this standard)		TT AT BRT PVT
23	Marking			Shall conform to Table 5 (this standard)	Visual inspection	TT BRT
Multiple test after the internal pressure test ^e						
24	1)Resistance to long – term internal pressure loading	The test piece shall fulfil the requirements of the following characteristics :	Conditioning time ^a Free length Type of test Number of test pieces ^b Test pressure for : PE 100 Test period Test temperature	Shall conform to EN 917 2 dn Water – in water 1 20,0 bar 1000 h 20 °C	Method A of EN 917 :1997	TT

25	2) Leak tightness of seat and packing	No leakage during the test period	Test temperature Type of test Number of test pieces b Test pressure Duration of the test	23 ⁰ C Air or nitrogen 1 25 mbar 24 h	ISO 5208	TT
26	2) Leak tightness of seat and packing	No leakage during the test period	Test temperature Type of test Number of test pieces b Test pressure Medium (dependent on the rating) Duration of the test	23 ⁰ C Air or nitrogen 1 1,5 MOP For 1,5 MOP ≤ 6 bar: air, or for 1,5 MOP <15 bar: water 30 s	ISO 5208	TT
27	3) operating torque	Maximum value : -35 Nm for dn ≤ 63mm, -70 Nm for 63mm < dn ≤ 125mm, -150Nm for 125mm < dn ≤ 225mm	Test temperatures Number of test pieces b	-20 ⁰ C and +23 ⁰ C and +40 ⁰ C 1	EN 28233	TT
28	4) Impact loading resistance	No leakage and maximum value for operating torque (see examination of operating torque)	Position of sample	Vertical	EN 1705	TT
			Drop height	2m		
			Mass of the striker	2,5 kg		
			Type of the striker	d 90 confirming to EN 744:1995		
			Test temperature	-20 ⁰ C		
			Number of test pieces b	1		

a- The valves shall not be pressurized within 24 h after fusion.

b- The number of test pieces given indicate the number s 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 .

c- Only brittle failures shall be taken into account if a ductile failure occurs before 165 h, the test may repeated at a lower stress. The stress and the associated minimum test period shall be selected from table 4 or from a line based on the stress / time points given in table 4.

d- Neither the initiating nor the running torque shall exceed the values given in this table. It shall not be possible to operate the valve by hand without the operating key .

e – As soon as possible after the completion of the internal pressure test the other three tests shall be carried out on the valve in the order stated.

*** sampling procedure and frequency and size grouping shall conform to en 1555 part 7**

7. Tests and Inspections

7.1 Manufacturer shall guarantee the full compatibility of sold products quality and QCP according to purchase order with NIGC'S standard criterion.

NIGC inspector shall check, carried out and control some important aspect as follows for each EPC contract consignment.

- 1) Letter of conformity which indicates the consignment clear approval(traceable batch No.) of manufacturer or its formal agent.
- 2) All possible NDT such as shell and seat test dimensional check and appearance control and operating torque test shall be done.

7.2. Circumferential (hoop) stress at 80°C and associated Min. test period

Table 4

PE 100	
Stress (Mpa)	Minimum test period (h)
5,4	165
5,3	256
5,2	399
5,1	629
5,0	1000
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8. Marking

8.1. The marking elements shall be embossed or engraved directly on the valve in such a way that after storage, weather, handling and installation legibility is maintained during use of the valve.

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

8.3. The size of the marking shall be such that it is legible without magnification.

8.4. Minimum required marking

All valves shall be marked with the data of table 5

Table 5 Marking elements

Aspects	Mark symbol
Batch No. & Serial No.	
Number of the system standard	EN 1555
Manufacturer's name and / or trademark	Name or symbol
Nominal outside diameter (s)of pipe ; dn	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	^b
Internal fluid ^a	Gas
Production date ^a	Year / month
NIGC symbol ^a	NIGC
Note: ^a These requirements may be appear on a label firmly fixed to the valve . ^b For providing traceability, the following details shall be given: - the production period, year and month, in figures or in code; - a name or code for the production site if the manufacturer is producing in different sites.	

9. Delivery conditions

- 1) The valve shall be packaged in bulk or individually protected where necessary in order to prevent deterioration.
- 2) They shall be placed in individual bags, in cardboard boxes or cartons.
- 3) 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.
- 4) Each carton or protective package shall clearly indicate its content.
- 5) Spigot end shall be protected by external cap.

10. Documentation

The technical bid and documents shall include the following items in English or Persian

- 1) Original technical catalogue and drawings showing parts materials , dimensions and valve specifications .
- 2) Material specification for PE 100 issued by granules manufacturer .
- 3) Approval test report including type test and latest. Process Verification Test required by this standard .
- 4) test report certificates for AT
- 5) BRT reports for each batch .



**11. ANNEX A (Normative)
Data Sheet for Polyethylene valve**

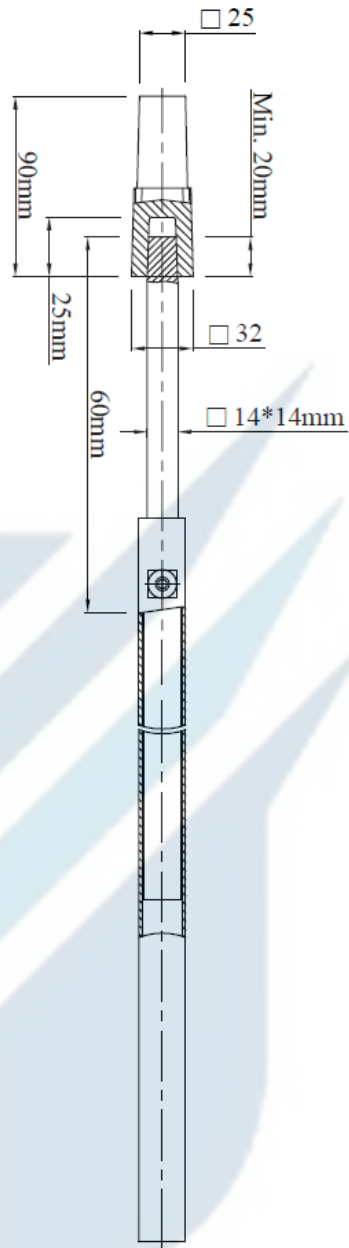
P.O. NO / Contract No.	
Manufacturer`s name and address	
Product	
Product designation	
Granule manufacturer & designation	

Raw Material

Item	Property	Unit	Test method	Requirement	Manufacturer's remarks
1	Density	g/cm ³	ISO 1183	> 0.945	
2	Oxidation induction time	Min.	ISO 11357-6	≥ 25(T= 210 ⁰ C) ≥ 50 (T=200 ⁰ C)	
3	Melt - Mass Flow Rate (MFR)	g/(10 min.)	ISO 1133	0.2 ≤ MFR ≤ 0.7	
4	Carbon black content	% (by mass)	ISO 6964	2 to 2.5	
5	Carbon black dispersion		18553	Grade ≤ 3	
6	Designation			PE 100	

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 requilified
- 4- Requirements for material, manufacturing, testing, inspection, packing, etc are in accordance with EN 1555: 2008 & IGS-M-PL-015(1)
- 5- Processed PE material (recycled) are not allowed
- 6- Design application series (SDR 11)



جنس مواد تشکیل دهنده	مشخصات	نام قطعه
ST37	به طول ۲۰۰	۱- چهار گوش ۱۴
ST37	به طول ۷۴۰	۲- قوطی ۲۰
GG25	به طول ۹۰ و آچار خور	۳- دسته
STD		۴- پیچ مفری
STD	DIN913-M8x10	۵- مهره چهار گوش
STD	DIN557-M8	

مجموعه تلمکوبی فازی

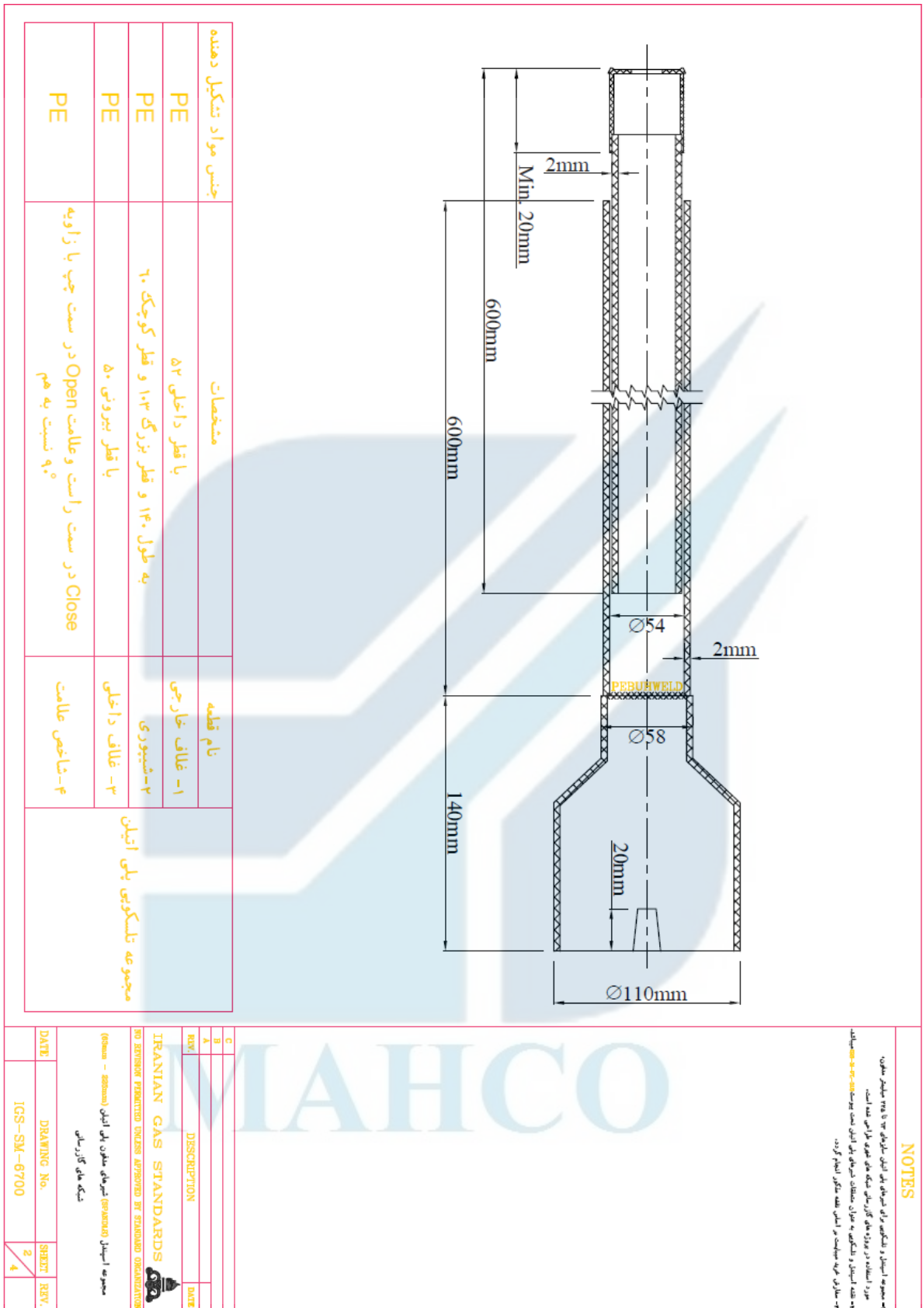
NOTES

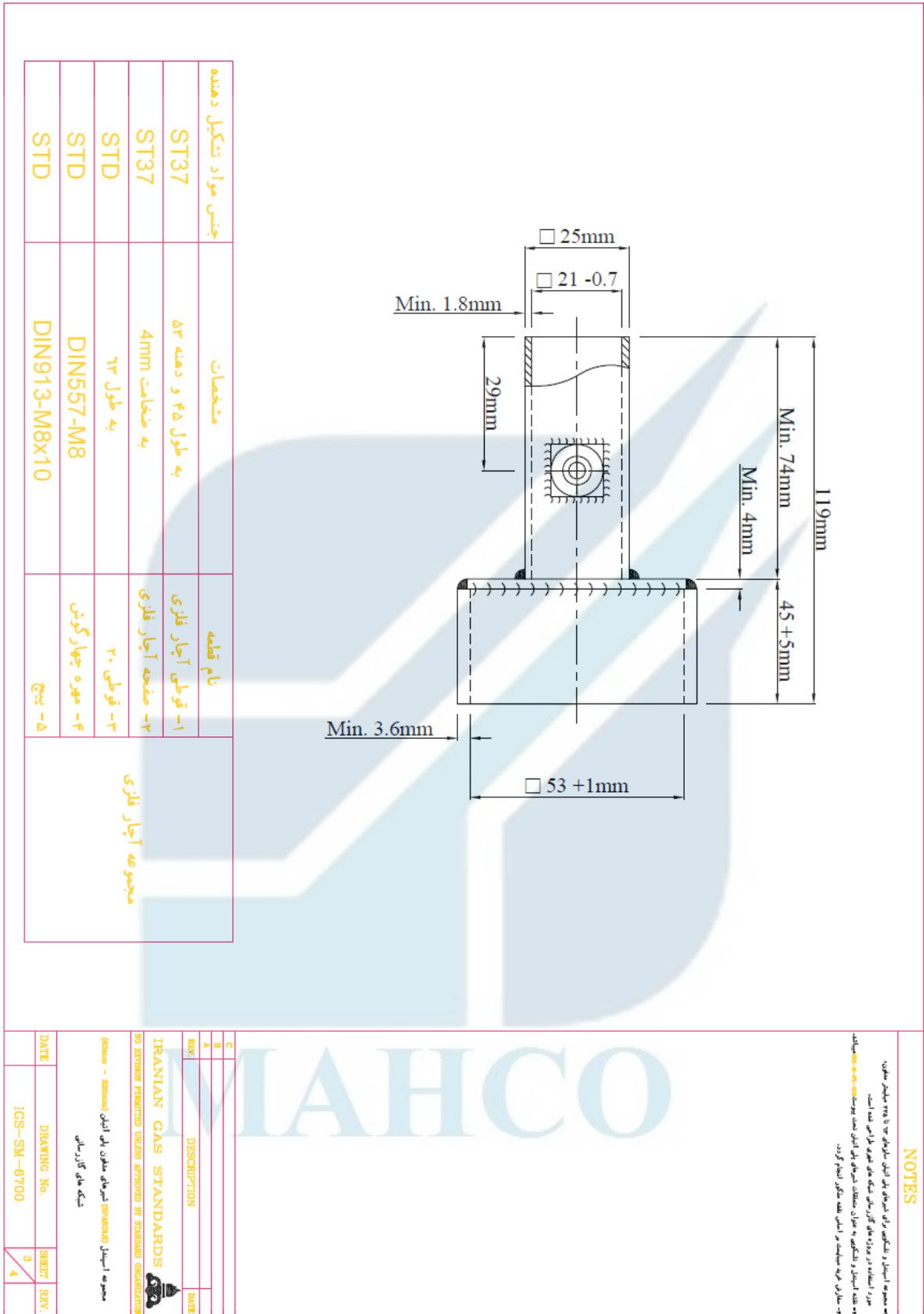
۱- مجموعه اسپند و تلمکوبی برای استفاده در گاز طبیعی است. در صورت استفاده در گازهای دیگر باید با تغییرات مشخصات فنی همراه باشد.
 ۲- قطعه اسپند و تلمکوبی به عنوان استاندارد ملی ایران شناخته می شود. شماره استاندارد ملی ایران: ۵۸۰۰-۱۳۸۵-۱
 ۳- مطابق با مشخصات فنی اسپند و تلمکوبی استاندارد است.

REV	DATE	DESCRIPTION
5		
4		
3		
2		
1		

IRANIAN GAS STANDARDS
 NO REVISION PROMPTED CHECKS APPROVED BY STANDARD ORGANIZATION
 (Form - 220000 - 220000)
 مهره اسپند (spindle) مهره مفری (nut) مهره آچار خور (wrench)
 شبکه های گاز شهری

DATE	DRAWING No.	SHEET	REV.
	IGS-SM-6700	1	4





نام قطعه	ردیف
مجموعه تلگونی فلزی	۱
مجموعه تلگونی پلی اتیلن	۲
آچار فلزی	۳

NOTES

۱- مجموعه استاندارد و تلگونی را که ضمیمه این دفتر استاندارد می باشد باید مطابق استاندارد
 مورد استفاده در پروژه های گاز رسانی طبق ضمیمه این دفتر استاندارد باشد.
 ۲- قطر اسپیندل و تلگونی به عنوان مشخصات ضمیمه این دفتر استاندارد می باشد.
 ۳- مطابق ضمیمه ضمیمه این دفتر استاندارد انجام گردد.

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IRANIAN GAS STANDARDS

ISO APPROVED PRODUCT DESIGN APPROVED BY STANDARD ORGANIZATION

مجموعه اسپیندل (Spindles) ضمیمه ضمیمه این دفتر استاندارد (Revise - 2008)

دفتر ملی گاز سانی

DATE	DRAWING No.	SHEET	REV.
	IGS-SM-6700	4	4