



شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

مشخصات فنی خرید

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مترمکعب استاندارد بر ساعت

Specification for Measuring/ Reducing and Measuring
Cabinet Type Stations with Max. Capacity up to 10,000
SCM/H



شرکت ملی گاز ایران

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به استحضار می‌رساند شماره کد استاندارد بند اول ابلاغ مصوبه شماره گ/دب/۰-۲۳۹/۰-۱۷۱۰۷ مورخ ۹۳/۷/۹ مربوط به ایستگاه‌های تقلیل فشار / اندازه گیری نوع کابینتی با حداکثر ظرفیت ۱۰۰۰۰ متر مکعب استاندارد بر ساعت بصورت ذیل اصلاح می‌گردد :

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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 experiences in natural gas industry at national and international levels.

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 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 NIGC 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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پیشگفتار

- ۱- این استاندارد / دستورالعمل به منظور استفاده خصوصی در شرکت ملی گاز ایران و شرکتهای فرعی وابسته تهیه شده است .
- ۲- شرکت ملی گاز ایران در مورد نیازهای عمومی از استانداردهای وزارت نفت (IPS) و در مورد نیازهای اختصاصی از استانداردهای اختصاصی خود (IGS) استفاده می نماید.
- ۳- استانداردهای شرکت ملی گاز ایران (IGS) توسط کمیته های تخصصی استاندارد متشکل از کارشناسان بخش های مختلف و یا مشاور تهیه می شود و توسط شورای استاندارد (منتخب هیئت مدیره شرکت ملی گاز ایران) به تصویب می رسند.
- ۴- در تنظیم متن استانداردهای (IGS) از کلیه منابع شناخته شده استاندارد، اطلاعات فنی - تخصصی مربوط به صنایع گاز دنیا، مشخصات فنی تولیدات سازندگان معتبر جهانی و نیز از نتیجه تحقیقات و تجربیات کارشناسان و متخصصان داخلی برحسب مورد استفاده می شود. همچنین به منظور استفاده از هر چه بیشتر از تولیدات داخلی قابلیت های سازندگان داخلی نیز مورد توجه قرار می گیرد.
- ۵- استانداردها از طریق پایگاه اینترنتی شرکت * و یا لوح فشرده (CD) در اختیار واحدها و کاربران قرار می گیرد.
- ۶- استانداردها به طور متوسط هر ۵ سال یکبار و یا در صورت ضرورت زودتر ، مورد بازنگری و بروز رسانی قرار میگیرند. بنابراین کاربران باید همیشه آخرین نگارش را مورد استفاده قرار دهند.
- ۷- هر گونه نظر و یا پیشنهاد اصلاح در مورد استانداردها مورد استقبال و بررسی قرار خواهد گرفت و در صورت تأیید ، استاندارد مربوطه نیز مورد تجدید نظر قرار خواهد گرفت.

تعاریف عمومی

در متن استانداردهای (IGS) از تعاریف و اصطلاحات زیر استفاده می شود .

- ۱- "شرکت" (COMPANY): منظور از شرکت " شرکت ملی گاز ایران " و یا شرکتهای فرعی وابسته می باشد.
- ۲- "فروشنده" (PUPPLIER / VENDOR): به فرد یا موسسه ای اطلاق می گردد که تعهدی را نسبت به شرکت تقبل نموده است .
- ۳- "خریدار" (PURCHASER): منظور از خریدار " شرکت ملی گاز ایران " و یا شرکتهای فرعی وابسته می باشد.
- ۴- "SHALL": در مواردی بکاربرده می شود که انجام خواسته مورد نظر اجباری است.
- ۵- "SHOULD": در مواردی بکاربرده می شود که انجام خواسته مورد نظر ترجیحی و در عین حال اختیاری است .
- ۶- "MAY": در مواردی بکار برده می شود که انجام کار به شکل مورد بحث نیز قابل قبول می باشد.

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1. SCOPE

This specification together with the Appendices there to covers the minimum requirements for design, material, construction, testing, inspection, painting, marking, packing and packaging of cabinet type stations to be used for measuring, pressure reducing and measuring of natural gas (as per composition in (IGS-M-CH-033)) with inlet working pressure of (10-17.2) bar (150-250) psig and maximum capacity of 10,000 scm/h.

For specific requirements see Appendix B (data sheet). In case of any exception to this specification, it shall be clearly stated on the technical quotation submitted by supplier. In this specification, cabinet type station will be referred as station.

2. REFERENCES

Throughout this standard specification the following standards, codes and reports are referred to. The editions of these standards and codes that are in effect at the time of publication of this standard specification shall, to the extent specified herein, form a part of this standard specification. The applicability of changes in standards and codes that occur after the date of this standard specification shall be mutually agreed upon by the purchaser and supplier and/or manufacturer.

2.1 Normative References

ANSI/ASME B1.20.1 "Pipe Threads, General Purpose (inch)"

API 5L "Standard Specification for Line Pipe"

API RP 500 "Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I , Division 1 and Division 2 First Edition"

API 1104 "Welding of Pipelines and Related Facilities"

ASTM A 53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"

ASTM A 105/A 105M "Standard Specification for Carbon Steel Forgings for Piping Applications"

ASTM A 106/A 106 M "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service"

ASTM A 193 "Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service"

ASTM A 144 "Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or both"

ASTM A 216/ A126 M "Standard Specification for Steel Casting, Carbon, Suitable for Fusion Welding, for High Temperature Service"

ASTM A 283 "Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates"

ASTM A 403 "Standard Specification for Wrought Austenitic Stainless Steel Piping, Fittings"

ASTM B 117 "Standard Practice for Operating Salt Spray (FOG) Apparatus"

ANSI B16.5 "Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24"

ANSI B31.8 "Gas Transmission and Distribution Piping Systems"

BS 381 C "Specification for Colours for Identification, Coding and Special Purposes"

BS 4368 "Metallic Tube Connectors for Fluid Power and General Use Split Collect Compression Fittings"

BS 4800 "Paint Colours for Building Purpose"

BS EN 1776 "Gas Supply – Natural Gas Measuring Stations - Functional Requirements"

BS EN 12186 "Gas Supply Systems – Gas Pressure Regulating Stations for Transmission and Distribution - Functional Requirements"

EN 837-1 "Pressure Gauges - Bourdon Tube, Pressure Gauge - Dimensions, Metrology, Requirements and Testing"

IGS-M-CH-033(0) "Specification for pipeline quality natural gas"

IGS-CH-041(0) "Specification for Painting Procedure for Gas Pressure Reducing Stations"

IGS-0-CH- 042 (2006) "Painting-procedure for Gas Industry Installation"

IGS-IN-302(0) "Specification for Relief Valves"

IGS-M-1N-102 "Specification for Turbine Meters"

IGS-M-IN-202(0) "Specification for Gas Pressure Regulators for Nominal Inlet Pressure.5 to 100 bar (72-1450 psig)"

IGS-M-PL-002-1(2) "Specification for Plug Valves Size 2" to 24" Part (1)"

IGS-M-PL-010-1(1) "Specification for Ball Valves Class Rating: 150 Part (1)"

IGS-PL-003(2) "Specification for Needle and Gauge Valves"

IGS-PL-005 (1) "Specification for Sensing Tube Lines"

IGS- PL-006(1) "Specification for Insulating Joints"

IGS-PL-005(1) "Specification for Gaskets"

IGS-PL-018(0) "Specification for Welding Consumables"

IGS-PL-022-1(0) "Specification for Butt Welding Ends, Carbon Steel Fitting Size: 1/2 in. to 12 in. Part (1)"

IGS-PM-105(0) "Specification for Dry Gas Filter"

ISO 9000 (2005) "Quality Management and Quality Assurance Standards Guidelines for Selection and Use"

ASTM A 193 grade B7 (Bolts) and ASTM A194 grade2H (Nuts)

pr EN 50154 "Electrical Installations in Explosive Gas Atmospheres (other than Mines)"

EN 60079-10 "Electrical Apparatus for Explosive Gas Atmospheres - Part10 : Classification of Hazardous Areas.(IEC 60079-10 :1995) "

IPS-G-GN-210 "Packing and Packaging"

IGS-M-PM-111 "Dry Gas Filter Cartridge"

3. DEFINITIONS

For the purpose of this standard, the following definitions apply:

3.1 Measuring Station

An installation comprising all the equipment including the inlet and outlet pipework as far as the isolating valves and any structure within which the equipment is housed, used for gas measurement in custody transfer.

3.2 Pressure Reducing Station

The station consists of equipment installed for the purpose of automatically reducing and regulating the pressure in the downstream pipeline or main to which it is connected. Included are piping and auxiliary devices such as valves, control instruments, control lines, the enclosure, and ventilation equipment.

3.3 Pressure Reducing and Measuring Station

The combination of a pressure reducing station and measuring station. It consists of equipment installed for the purpose of automatically reducing and regulating the pressure in the downstream pipeline or main to which it is connected and also measuring it.

3.4 Pressure

The gauge pressure of the fluid inside the system, measured in static conditions.

3.5 Design Pressure (DP)

Design pressure is the maximum pressure permitted by code, as determined by the design procedures applicable to the material and locations involved.

3.6 Operating Pressure (OP)

The pressure which occurs within a system under normal operating conditions.

3.7 Maximum Operating Pressure (MOP)

The maximum pressure at which a system can be operated continuously under normal operating conditions.

Note: Normal operating conditions are: no fault in any device or stream.

3.8 Maximum Incidental Pressure (MIP)

The maximum pressure which a system can experience during a short time, limited by the safety devices.

3.9 Temporary Operating Pressure (TOP)

The pressure at which a system can be operated temporarily under control of regulating devices.

3.10 Maximum Operating Temperature ($T_{\max}$)

The maximum temperature at which a system can be operated continuously under normal conditions.

Note: Normal conditions are: no fault in any device or stream.

3.11 Minimum Operating Temperature ($T_{\min}$)

The minimum temperature at which a system can be operated.

3.12 Measuring System

Complete set of measuring instruments and other equipment assembled to carry out specified measurements.

3.13 Measuring Instrument

Device intended to be used for measurements, alone or in conjunction with supplementary device(s).

Measuring instruments are e.g. gas meter, pressure sensor, density sensor.

3.14 Instrumentation

Any system or combination of equipment for measurement and control.

3.15 Accuracy of Measurement

Closeness of the agreement between the result of a measurement and a true value of the measurand.

3.16 Maximum Permissible Error (of a Measuring Instrument)

Extreme values of an error permitted by specifications, regulations, etc. for a given measuring instrument.

3.17 Flow Computer

Flow calculating device which indicates the flowrate as integrated volume or mass or energy base conditions.

3.18 Conversion Device

A device consisting of a flow computer and sensors used for converting the volume (flowrate) at operating conditions into a volume (flowrate) at standard conditions or to mass (flowrate) or to energy (flowrate) at base conditions, based on either pressure, temperature and gas composition, or on density, or on calorific value.

3.19 Installation Effect

Any difference in performance of a measuring instrument or of the measuring system between the calibration under reference and operating conditions.

3.20 Systematic Error

Mean that would result from an infinite number of measurements of the same measurand carried out under repeatability conditions minus a true value of the measurand.

3.21 Fail - Safe

Characteristic of a device to go to a safe operating condition when a failure occurs.

3.22 Overpressure Protection

Overpressure protection is provided by a device or equipment installed for the purpose of preventing the pressure in a pressure vessel, a pipeline, or a distribution system from exceeding a predetermined value. This protection may be obtained by installing a pressure relief device or a pressure shut off device.

3.23 Pressure Relief Device

A device which is installed to vent gas from a system being protected in order to prevent the gas pressure from exceeding a predetermined limit by venting the gas into atmosphere.

3.24 Ambient Temperature

Usually used to refer to the temperature of the air in which a structure or a device operates.

3.25 Block Valve

A gate, plug or ball valve that prevents flow or leakage into the down stream conduit when in the closed position. Valve shall be single or double seated, bidirectional or unidirectional. Unidirectional valve shall be marked with a flow direction arrow.

3.26 Turbine Gas Meter

Measuring device in which the dynamic forces of the flowing gas cause a turbine wheel to rotate with a speed as a function of the volume flowrate. The number or revolutions of the turbine wheel is the basis for the indication of the volume passed through the meter.

3.27 Measured Quantity

Volume in cubic meters, at metering conditions.

3.28 Volume Flow Rate

Volume at metering conditions divided by time.

3.29 Rangeability

The ratio between Q_{min} and Q_{max} , i.e. the minimum and maximum flow rate respectively for which the meter performs within the maximum permissible errors.

3.30 Metering Pressure (PM)

Absolute gas pressure to which the indicated volume of gas is related.

3.31 Metering Conditions

Conditions of the gas prevailing at the point of the measurement (e.g. temperature and pressure of the measured gas in the meter).

3.32 DN- Designation

Numerical designation of size for components of a pipework system, which is used for reference purposes.

It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimeters, of the bore or outside diameter of the end connections.

3.33 PN- Designation

Alphanumeric term used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system with regard to pressure. It comprises the letters PN followed a dimensionless whole number.

3.34 Gas Pressure Regulator

Device which maintains the outlet pressure constant independent of the variation in inlet pressure and / or flow rate within defined limits.

3.35 Cabinet Station

An enclosed space (apart from any necessary ventilation apertures), which is used exclusively to house gas pressure-regulating and/or metering equipment and ancillaries.

3.36 Enclosed Installation

Plant installed in an enclosed space (apart from any necessary ventilation aperture).

3.37 Open Air Installation

A plant installed in the open air, which may or not be protected by a canopy.

3.38 Hazardous Area

An area in which an explosive or flammable gas atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of apparatus.

3.39 Hazardous Area Zones

Hazardous areas are classified in zones based upon the frequency of the occurrence and the duration of a flammable atmosphere.

3.40 Component

Any item from which a gas supply system or installation pipework is constructed. A distinction is drawn between the following groups of components:

- Ancillaries (pressure regulators, valves, safety devices, expansion joints, insulating Joints)
- Pipes (including bends made from pipe)
- Instrumentation pipework
- Fittings

3.41 Inlet Pipework

Connecting pipework through which gas enters the station.

3.42 Outlet Pipework

Connecting pipework through which gas leaves the station.

3.43 Standard Condition

The conditions to which a volume of gas is converted (i.e. base gas temperature 15.56 °C (60°F) base pressure 1013.25 mbar absolute (14.696 psi) .

3.44 Strength Test

Specific procedure to verify that the pipework and /or station meets the requirements for mechanical strength.

3.45 Tightness Test

specific procedure to verify that the pipework and / or station meets the requirements for tightness.

3.46 Instrumentation Pipework

Pipework required for the proper functioning of the ancillaries installed within the pressure regulating station. such as sensing, auxiliary and sampling lines.

3.47 Safety Shut - Off Device

Device designed to shut off the gasflow which responds slower dynamically than a slam shut device in the event of an unacceptable pressure being detected within the system it protects.

3.48 Safety Slam - Shut Device

Device designed to quickly shut off the gasflow in the event of an unacceptable pressure being detected within the system it protects.

3.49 Pressure Control System

Combined system including pressure regulating, pressure safety and possibly pressure recording and alarm systems.

3.50 Pressure Regulating System

System which ensures that a pressure is maintained at the outlet system within required limits.

3.51 Pressure Safety System

System which, independent of the pressure regulating system, ensures that the outlet pressure of that system does not exceed the safety limits.

4. REQUIREMENTS

4.1 Design and Service Conditions

The cabinet type station shall be constructed of quality components and materials in a workmanlike manner in order to attain gas tightness, stability of performance and sustained accuracy over the range of operating conditions with minimum of maintenances, when reducing and measuring and measuring natural gas. Such stations shall have the general characteristics listed below:

4.1.1 All design aspects and criteria for these stations shall be according to ANSI B 31.8.

4.1.2 The normal inlet pressure, outlet pressure and capacity of the station shall be as Table 1.

TABLE 1 - Station Type and Classification

Type No.	Station	Inlet Pressure bar (psig)	Outlet Pressure Bar (psig)	Capacity (scm/h)
1	Metering	3-4(45-60)	3-4(45-60)	400.1
				400.2
				1000
				2500
				4000
		10-17.2(150-250)	10-17.2(150-250)	1000
				2500
				5000
				10000
2	Reducing & Metering	10 -17.2(150-250)	3-4(45-60)	400.1
				400.2
				1000
				2500
				5000
				10000

4.1.3 The ambient temperature range for the station is -29 °C to 60 °C (-20 °F to 140 °F).

4.1.4 The stations shall be designed, constructed and located such that the risk and nuisance to the environment of the stations and its operation are kept within acceptable limits.

4.1.5 Usually, gas delivery is a continuous process. If an unintended cessation of gas flow can cause a safety hazard or operational problems, the station shall be such that a failure of the measuring and reducing station will not stop the gas flow. Extra equipment may be added to improve the security of supply.

4.1.6 The manufacturer shall confirm that the environmental noise levels during operation of station shall be according to Appendix A.
In addition no design changes or modifications shall be undertaken which cause the established noise limits to be exceeded.

4.1.7 The reference standards and specifications for the main components of station shall be as per Appendix B (data sheet) and the manufacturer/supplier shall verify the compliance of them with the related standards and specifications.

4.1.8 The design and operation of the station shall be such that the venting of gas to the atmosphere is kept to a minimum. This shall be assessed during the design stage.

4.1.9 the station shall be designed such that the correct functioning is ensured for all specified pressure and temperature ranges (i.e. MOP , TOP , MIP , minimal pressure at station entrance , T_{min} , T_{max} , ambient temperature) as well as impurities, dusts or condensates present in the gas.

4.1.10 Health and safety warning notices shall be positioned and maintained on, or adjacent to, the station and, additionally, to call attention to any special features of the system.

An easily visible notice shall be positioned and maintained on /or near the station to indicate the action to be taken in the event of an escape of gas.

Note: see legal requirements, if any.

4.1.11 The manufacture shall submit the safety procedures for the operation and maintenance of the station.

4.1.12 During the design and construction phases, quality assurance is essential to ensure the basic integrity of the installation. During operation basic integrity shall be preserved until the installation is de - commissioned.

Any party involved in design, construction, commissioning, operation and maintenance should maintain an appropriate quality management system considering the presence of hazardous areas. Such a system should be agreed on between the parties and may be based e.g. on the EN ISO 9000 series.

Inspection and testing of the installation are responsibilities of the operator of the station. National regulations may require that the inspection and testing have to be witnessed and accepted by independent experts.