

IGS-M-PM-106(1)	Jan. 2018
Approved	مصوب



شرکت ملی گاز ایران
مدیریت پژوهش و فناوری
امور تدوین استانداردها

IGS

مشخصات فنی خرید

تجهیزات گرم کننده گاز (غیر مستقیم-آبی)، نوع مشعل دمنده دار

Forced Draught Indirect Water Bath Heater



Documents
Document Sharing Hub

برای استفاده از استانداردها فقط به آخرین نسخه منتشر شده در سایت استانداردها مراجعه گردد
<http://igs.nigc.ir>

igs@nigc.ir

9821)-8487-5032

Full document details: IGS M-PM-106 2016



تاریخ: ۱۳۹۶/۱۲/۲۷

شماره: ک.ب.۵۱۹/۰-۱۸۲۵۹



شرکت ملی گاز ایران

دفتر مدیر عامل

ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۷۷۲ مورخ ۱۳۹۶/۱۲/۱۹ هیأت مدیره، نامه شماره گ.۱۶۶۷۰.۱/۰۰۰/۹ مورخ ۹۶/۱۲/۱۴ مدیر پژوهش و فناوری در مورد تصویب نهایی استاندارد به شرح زیر مطرح و مورد تصویب قرار گرفت:

۱. مشخصات فنی تجهیزات گرم کننده گاز (غیرمستقیم - آبی) نوع مشعل دمنده دار

IGS-M-PM-106(1)

۲. مشخصات فنی خرید اتصالات فولاد به پلی اتیلن IGS-M-PL-014-3(2)

۳. دستورالعمل بازرسی ساید بوم IGS-I-GN-007(0)

۴. مشخصات فنی گوگرد دانه بندی IGS-M-CH-060(0)

۵. مشخصات فنی کود گوگرد بنتونیتی IGS-M-CH-061(0)

این مصوبه در حکم مصوبه مجمع عمومی شرکت‌های تابعه محسوب و برای کلیه شرکت‌های تابعه لازم الاجرا می‌باشد.

الهام ملکی

مدیر هیأت مدیره

رونوشت: مدیر عامل محترم شرکت ملی گاز ایران و رئیس هیأت مدیره

اعضای محترم هیأت مدیره

مشاور و رئیس دفتر محترم مدیر عامل

رئیس کل محترم امور حسابرسی داخلی

رئیس محترم امور حقوقی

رئیس محترم امور منابع



Documents

Document Sharing Hub

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.

-

Website: <http://igs.nigc.ir>

E-mail: igs@nigc.ir

Content

<u>Title</u>	<u>Page</u>
1. Scope.....	2
2. References.....	2
3. Definitions.....	6
4. Technical Specification.....	8
5. Welding.....	19
6. Tests.....	21
7. Inspection.....	24
8. Marking.....	25
9. Packaging.....	25
10. Guarantee.....	26
11. Installation.....	26
12. Drawings and Data.....	27
 APPENDIXES	
APPENDIX A: Heater Data Sheet.....	28
APPENDIX B: Heater Nominal Capacity and Duty.....	32
APPENDIX C: Informative EG/ W sol vol. %.....	33
APPENDIX D: Carbon Monoxide Concentration.....	34
APPENDIX E: Heat Balance and Thermal.....	35
APPENDIX F: Informative P &ID.....	37

1. Scope

This specification covers the minimum requirements for designing, material, fabrication, testing, inspection, marking, packing and shipment of indirect water bath heaters with forced draught burner to be used in natural gas pressure reducing stations.

Each deviation of this specification, shall be clearly stated on the technical information submitted by the supplier/manufacturer.

The supplier/manufacturer shall furnish unit completely, including all necessary parts to insure satisfactory, economical and safe operation.

2. References

Supplier shall refer to the latest editions of all the following mentioned standards.

All heaters shall be in design and fabrication in accordance to:

2.1. Normative References

ANSI/ASME-V ASME Boiler and Pressure Vessel Code “Nondestructive Examination”

ANSI /ASME-VIII-D1 ASME Boiler and Pressure Vessel Code “Rules for Construction of Pressure Vessels” for Coil Tubes

ANSI/ASME-VIII-D2 ASME Boiler and Pressure Vessel Code, “Rules for Construction of Pressure Vessels - Alternative Rules

ANSI/ASME-IX ASME Boiler and Pressure Vessel Code “INTERPRETATIONS”

ANSI/ASME B1.20.1 “Pipe Threads, General Purpose (Inch) Revision and Redesignation of ASME/ANSI B2.1”

ANSI/ASME B16.5 “Pipe Flanges and Flanged Fittings, NPS ½ through NPS 24”

ANSI/ASME B16.9 “Factory Made Wrought Butt Welding Fittings”

ANSI/ASME B.16.11 “Forged Steel Fittings, Socket Welding & Threaded”

ANSI/ASME B16.25 “Butt Welding Ends”

ANSI/ASME B16.28 “Wrought Steel Butt Welding Short Radius Elbows and Returns”

ANSI/ASME B16.34 “Valves – Flanged, Threaded and Welding End”

ANSI/ASME B16.47 “Large Diameter Steel Flanges NPS 26 through NPS 60”

ANSI/ASME B18.2.2 “Square and Hex Nuts (Inch Series)”

ANSI/ASME B31.3 “Process Piping, ASME Code for Pressure Piping, B31”

ANSI/ASME B36.10 “Welded and Seamless Wrought Steel Pipe”

API RP 500C “Classification of Location for Electrical Installation at Pipeline Transportation Facilities”

ASTM A36M “Specification for Carbon Structural Steel”.

ASTM A105M “Standard Specification for Carbon Steel Forgings for Piping Applications”

ASTM A182 “Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service”

ASTM A193 “Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service”

ASTM A194 “Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service”

ASTM A234M “Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service”

ASTM A350M “Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components”

ASTM A370 “Standard Test Methods and Definitions for Mechanical Testing of Steel Products”

ASTM A751 “Standard Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products”

DIN 580 “Lifting eye bolts”

DIN 4788-1 “Gas Burners without Blowers June; Superseded in Parts by DIN EN 298”

EN 50156-1 “Electrical Equipment for Furnaces and Ancillary Equipment, Requirements for Application Design and Installation”

EN 676 “Amd 1 Automatic Forced Draught Burners for Gaseous Fuels AMD 9857”

ISRI 7595 “Automatic forced draught burners for gaseous fuels- specification and test methods”

EN 837 “Pressure Gauges”

EN 60529 “Amd 2 Degrees of Protection Provided by Enclosures (IP Code) AMD 10931”

EN 303-1 “Heating Boilers with forced draught burners”

EN161 “Automatic shut off valves for gas burners and gas appliances”

IEC 60034 “Rotating Electrical Machines”

IEC 60079 “Exclusive Atmosphere”

IEC 60529C “Degrees of protection provided by enclosures (IP Code)”

IEC 60770 “Transmitters for Use in Industrial-Process Control Systems”

IEC 61520 “Metal Thermo Wells for Thermometer Sensors - Functional Dimensions”

IEC/EN 60204-1(ISO/IEC/EN 81346:2010) “Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements”

IPS-C-EL-115 “Electrical Installation”

IPS-C-TP-101 “Surface Preparation”

IPS-C-TP-102 “Painting”

IPS-G-GN-210 “Packing & Packages”

IPS-M-PM-115 “Material & equipment standard for centrifugal pumps for general services”

TEMA “Standards of the tubular exchanger manufacturers association”

BS EN 303-3 “Heating boilers. Gas-fired central heating boilers. Assembly comprising a boiler body and a forced draught burner”

EN 12953-11 “Shell boilers. Acceptance tests”

IGS-O-CH-042 "دستورالعمل رنگ آمیزی تأسیسات صنعت گاز با رنگ های مختلف"

IGS-R-CH-055 "پایش وضعیت سیال گرمکن های آبی غیر مستقیم ایستگاه های تقلیل فشار گاز"

IGS-M-CH-033(1) "Specification for Iranian Natural Gas Quality"

IGS-M-IN-103 "Domestic 2-PSI gas"

IGS-M-IN-102(2) "Turbine meters"

IGS-E-EL-032(0) "Explosion proof electrical equipments layout in risk areas for pressure reduction stations (TBS,CGS) and measuring stations (MS)"

2.2 Informative References

API 5L "Standard Specification for Line Pipes"

API 1104 "Welding of Pipelines and Related Facilities"

ASTM A53 "Standard Specification for Pipe, Steel, Zinc-Coated, Welded and Seamless"

ASTM A106 "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service"

BS 5345 "Installation and maintenance of electrical apparatus for use in potentially explosive atmospheres"

EN 12067-1, 2 "Gas/Air Ratio for Gas Burners and Gas Burning Appliances, Pneumatic/Electrical Type"

IEC 60146 "Semiconductor Convectors"

IEC 60622 "Secondary Cells and Batteries"

IEC 60896 "Stationary Lead-Acid Batteries"

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

IGS-M-IN-302 "Relief Valves"

IGS-M-PL-002-1 "for Plug Valves, part 1, 2 to 24 Inches"

IGS-M-PL-002-2 "for Plug Valves, part 2, 1/2 to 1,1/2 Inches"

IGS-M-PL-010-1 "for Ball Valves, Class 150"

IGS-M-PL-010-2 "for Ball Valves, Class 300"

IGS-M-PL-010-3 "for Ball Valves, Class 600"

IGS-M-PM-105 "Dry Gas Filters"

IPS-E-GN-100 "Engineering Standards for Units"

IPS-C-IN-110 “Pressure instruments”

IPS-E-IN-120 “Temperature Instruments”

IPS-G-IN-160 “Engineering and Material Standard for Control Valve”

IPS-M-EL-131 “Material and Equipment Standard for Low Voltage Induction Motors”

IPS-M-EL-132 “Three Phase Squirrel Cage Induction Motors”

IPS-M-EL-174 “Battery and Battery Charger”

IPS-M-EL-176 “Uninterruptible Power System (UPS)”

IPS-M-GN-130 “Metric Type Fasteners”

IPS-E-EL-115 “Construction standard for electrical installation”

MS-SSP-97 “The Integrally Reinforced Forged Branch Outlet Fittings, Socket Welding, Threaded and Butt welding Ends”

NFPA 85 “Boiler and Combustion Systems Hazards Code Errata”

NFPA 87 “Recommended Practice for Fluid Heaters”

3. Definitions

3.1 Ambient Temperature

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

3.2 Burner Turn Down

An important function of burners is turndown. This is usually expressed as a ratio and is based on the maximum firing rate divided by the minimum controllable firing rate.

3.3 Forced Draft Indirect Water Bath Heater

Indirect Water bath heater that equipped with burner in which the total air for combustion is supplied by means of a fan.

3.4 Instrumentation

Any system or combination for measurement and control.

3.5 Fail – Safe

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

3.6 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.

3.7 Primary Gas Pressure Regulator

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

3.8 Inlet Pressure

Pressure at the inlet of the regulator.

3.9 Outlet Pressure

Pressure at the outlet of the regulator.

3.10 Heater Capacity

The rate of flow through station under standard condition with minimum inlet pressure.

3.11 Burner Capacity

Heat input range of the burner the maximum and minimum heat inputs shall be measured under the standard conditions and shall be in accordance with the values stated by the manufacturer within $\pm 5\%$.

3.12 Shut off device

An ancillary designed to quickly shut off the gas flow in the event of an abnormal pressure being detected within system it protects.

3.13 Burner System

System for firing the heater designed for the specific fuel to be used.

3.14 Coil Area

Heat transfer area and is normally calculated using the outside surface area of the pipe.

3.15 Heater Bath

Indirect heating medium, limited to water or water solutions.

3.16 Shell

The vessel which contains the coil, fire-tube and heater bath.

3.17 Stack Rain Shield

Device attached to the top of the stack to prevent rain from falling directly into the stack. It may also serve as a stack downdraft diverter.

3.18 Expansion Tank

A chamber that may be directly connected to the heater shell to permit the shell to be completely filled with water.

3.19 Forced Draught Burner

Burner in which the total air for combustion is supplied by means of a fan.

3.20 Fire Tube

Part of the appliance in which the combustion takes place. it consists of combustion chamber and flue gas return.

3.21 Filter

Device that enables foreign elements, which might otherwise cause failures in the system, to be collected.

3.22 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 (14.696 psi).

3.23 Natural Gas

The natural gas Specification is according to IGS-M-CH-033(1).

4. Technical Specification

4.1 Heater Shell

Shell material may be ASTM A36 or equivalent. All bolt and nuts materials used in shell flanges shall be ASTM A193 & ASTM A194 respectively. Heater shell shall provide in normal operation a homogenate temperature in the water bath. Therefore the unit should be equipped with mixers, circulation pumps or other temperature homogenizing devices.

4.1.1 An expansion tank shall be provided on top of heater shell.

4.1.2 A ladder including platform, if any, with handrail and back protection, shall be provided for easy access to the expansion tank.

4.1.3 A 2" gate valve (class 150) with blind flange shall be provided at the bottom of shell for drain purposes.

4.1.4 The shell and heads shall be insulated with 50mm thickness fiber glass insulation or equivalent having an aluminum cladding with min. thickness 0.8 mm.

4.1.5 Before insulation, shell shall be painted according to painting procedure in this standard (sec.8).

4.1.6 Shell permissible out of roundness after welding shall be according to ASME sec. VIII, Div.1 part UG-80.

4.1.7 Insulating gaskets used in the shell flanges shall be suitable in high temperature services and durability specification in outdoor conditions. It shall have good characteristics in water and ethylene glycol mixtures.

4.1.8 All T joints welds shall be 100% tested by radiography. 100% of nozzle welded connections to shell shall be tested by LPT (liquid penetrate test) method.

4.1.9 Tightening procedure shall be considered by manufacturer for flanges bolt & nuts fastening.

4.1.10 Shell shall be reinforced enough to prevent any deformation because of coils, fire-tubes and water-ethylene glycol mixture weight.

4.1.11 Heater shell shall include permanent lifting lugs.

4.1.12 Shell shall be equipped with suitable threadolet for measuring water temperatures. for performance test calculations according to ANNEX (E, 1-14)(or some

methods that will be approved in related future standards), That should be between coil and fire tube and not to be near the shell. Additionally equipped with 1/2" thermo well with 1/2" NPT male, stainless steel temperature gauges, 100mm dial an appropriate stem length with safety glass and red and black lettering, dual scale in centigrade and Fahrenheit, adjustable pointer. (Gauge range (-20~ +100)°C).

4.1.13 Shell shall be equipped with 1/2" threadolet and 1/2" thermo well with 1/2" NPT male temperature sensor (by transmitting capability), also an appropriate stem length for controlling of shell high temperature. Thermometer shall be installed on shell via adequate thermowell and threadolet.

4.1.14 Construction of heater shall be such that the removal of the coil and fire tube/firebox shall be from opposite ends of the shell.

4.1.15 If pump is utilized for homogenizing temperature, it shall be as follow:

- Single-stage in line centrifugal casing pump according to IPS-M-PM-115
- Preferred canned rotor type, without shaft seal and with bearings lubricated by the pump liquid.

4.2 Expansion Tank

4.2.1 Expansion tank material may be ASTM A36 or equivalent. All bolts and nuts materials used in expansion tank flanges shall be ASTM A193 & ASTM A194 respectively.

4.2.2 The expansion tank is designed to reduce internal corrosion within the heater shell by keeping the heater shell liquid packed and moving the wet dry interface of the expanding bath media from the heater shell into the expansion tank.

4.2.3 The expansion tank is designed to contain 100% of the expanded bath media from a temperature of 40°C to the maximum operating temperature. Whereas manufacture an client agreement is preferred.

4.2.4 Bath media expansion reservoir designed to hold 6% of the total bath media. whereas manufacturer and client agreement is preferred.