



شرکت ملی گاز ایران

امور تدوین استانداردها

IGS

مشخصات فنی خرید

دستگاه گرم کننده گاز (غیر مستقیم - آبی) ، نوع مشعل اتمسفریک

Indirect Water Bath Heater , Natural Draught Type



ابلاغ مصوبه هیأت مدیره

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باسلام،

به استحضار می‌رساند در جلسه ۱۵۱۷ مورخ ۱۳۹۱/۷/۱۶ هیأت مدیره، نامه شماره ۹۲۴۶۲/۰۰۰/۹.گ مورخ ۱۳۹۱/۷/۵ مدیر پژوهش و فناوری و رئیس شورای استاندارد در مورد تصویب نهایی استاندارد تحت عنوان «دستگاه گرم کننده گاز (غیرمستقیم - آبی) نوع مشعل اتمسفریک به شماره تقاضای (2) IGS-M-PM-104» مطرح و مورد تصویب قرار گرفت. این مصوبه به عنوان مصوبه مجمع عمومی شرکتهای تابعه محسوب و برای کلیه شرکتهای تابعه لازم الاجراء می‌باشد.

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1- SCOPE

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

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

The supplier/manufacturer shall furnish complete unit including all necessary parts to insure satisfactory, economic and safely operation.

2- REFERENCE

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:

API 12K : Specification for Indirect Type Oil-Field Heaters R(1999)

IPS-C-TP-101 & 102 for Surface Preparation and Painting

TEMA, standards of the tubular exchanger manufacturers association

ASTM A105, Standard Specification for Carbon Steel Forgings.

ASTM A350, Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components

ASTMA182, Standard Specification for Forged or Rolled Alloy-Steel.

ASTM A193 B7, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

ASTM A194 2H, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Temperature Service.

ASTM A234 Gr. WPB,

ASTM A751,

ASTM A370,

ASTM SA36.

ASME sec VIII div1 for coil tube

ASME, Boiler and Pressure Vessel Code, Sec. VIII Div.1 & Section II

ASME, Boiler and Pressure Vessel Code, Section V

ASME, Boiler and Pressure Vessel Code, Sec. IX

ASME, B16.5 for Pipe flanges and flanged fittings, NPS ½ through NPS 24

ASME, B16.47 for Large diameter steel flanges NPS 26 through NPS 60

ASME/ANSI B18.2.2 for Square hex nuts

ASME/ANSI B 1.20.1 for Pipe threads, general purpose

ASME/ANSI B16.25 Butt welding ends

ASME/ANSI 36.10 for Welded and seamless wrought steel pipe

ASME/ANSI B16.9 for Factory made wrought butt welding fittings

ASME/ANSI B16.28 wrought steel butt welding short radius elbows and returns

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

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

2.2. Informative:

IGS-M-PM-105 for Dry Gas Filters

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

IGS-M-PL-010-1,2 & 3 for Ball Valves, Class 150, 300 & 600

IGS-M-PL-002-1 & 2 for Plug Valves, 1/2 to 24 Inches.

IGS-M-IN-302 for Relief Valves

IPS-M-EL-174 for Battery and Battery Charger

IPS-M-EL-176 for Uninterruptible Power System (UPS)

IPS-M-GN-130 for Metric Type Fasteners

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

IPS-C-IN-110 for Pressure instruments

IPS-E-IN-120 for Temperature instruments

IEC 60146 for Semiconductor Convectors

IEC 60896 for Stationary lead-acid batteries

IEC 60622 for Secondary cells and batteries ,Third Edition

NFPA 85, Boiler and Combustion Systems Hazards Code Errata

NFPA 87, Recommended Practice For Fluid Heaters

MSS SP-97 for the Integrally Reinforced Forged Branch Outlet Fittings, Socket Welding, Threaded and Butt welding Ends

ASTMA53, Standard Specification for Pipe, Steel, Zinc-Coated, Welded and Seamless

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

API 5L, Standard Specification for Line Pipes

API 1104 for Welding of Pipelines and Related Facilities

3- DEFINITIONS :

- Indirect Water Bath Heater:

Heating of gas streams close to preventing hydrate or wax formation. Heating may also be done to prevent liquids from condensing in the gathering line or to facilitate subsequent fluid separations.

An indirect type oilfield heater employs a water solution, maintained below the boiling point, as the heating medium for the purpose of heating the process fluids in the coils. entitled Typical Indirect Heater Assembly,

showing general arrangement of heater components, piping and instrumentation (Appendix 15.4)

- Instrumentation :

Any system or combination for measurement and control.

-Fail – safe:

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

- 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.

- Ambient temperature:

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

-Gas pressure regulator:

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

- Inlet pressure:

Pressure at the inlet of the regulator of station.

- Outlet pressure:

Pressure at the outlet of the regulator.

- Capacity:

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

- Slam shut:

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

- Burner system

System for firing the heater designed for the specific fuel to be used (either natural draft design).

- Coil area

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

- Firebox

Complete assembly consisting of the fire tube, mounting flange, intake and stack adaptors.

- Fire tube

Consisting of one or more U-tubes fired, normally by natural gas, at one end and exhausting through a vertical stack.

- Heat density

Heat released through the cross section of the fire tube, expressed as BTU/hr.in^2 of cross sectional area.

-Heat flux

Applied to the average transfer rate through the firetube, expressed as BTU/hr.ft^2 of exposed area.

- Heater bath

Indirect heating medium, limited to water or water solutions.

-Intake flame arrestor

Device placed on the air intake of the fire tube to prevent propagation of flame from inside the fire tube to the outside atmosphere.

- Shell

Normally a horizontal vessel which contains the coil, fire-tube and heater bath.

- Stack downdraft diverter

Device attached to the top of the stack designed to reduce the effects of wind currents on the burner system.

- Stack flame arrestor

Device placed on the exhaust of the stack to prevent propagation of flame from inside the fire

tube to the outside atmosphere.

- **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.

- **Water saver**

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

- **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 electrical apparatus.

- **Hazardous area zones:**

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

- **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)

- **Natural Gas :** The natural gas Specification is according to IGS-M-CH-033(0) 2004

4- TECHNICAL SPECIFICATION

4.1. HEATER SHELL

Shell and expansion tank material may be ASTM A36 or any other carbon steel material recommended by manufacturer. All bolt and nuts materials used in shell flanges shall be ASTM A193 & ASTM A194 respectively.

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 must be insulated with 50mm thickness fiber glass insulation or equivalent having an aluminum cladding with min. thickness 0.8 mm (The mineral wool shall have specific weight of 100kg/m³ and a thermal conductivity less than 0.7 W/°K.m at an average temperature of 200°C).

4.1.5. Before insulation, shell shall be painted according to painting procedure in this standard (Ref.Clause8).

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 1" threadolet and 1"×1/2" thermo well with 1/2" NPT male, stainless steel temperature gauge, 100mm dial an appropriate stem length with safety glass and red and black lettering, dual scale in centigrade and Fahrenheit, adjustable pointer. Gauge ranging (-30 ~ +100)°C. Thermometer shall be installed on shell via adequate thermowell and threadolet.

4.1.13. Shell shall be equipped with 1" threadolet and 1"×1/2" thermo well with 1/2" NPT male temperature transmitter PT100 type, 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.

4.2. Expansion Tank

- 4.2.1. 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.
- 4.2.2. 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 manufacturer and client agreement is preferred.
- 4.2.3. Bath media expansion reservoir designed to hold 6% of the total bath media. Whereas manufacturer and client agreement is preferred.
- 4.2.4. Expansion tank shall be insulated same as main shell insulation instruction. Shell heads shall be insulated same as main shell insulation instruction(mass loss should be consider).
- 4.2.5. Expansion tank shall be equipped with low level alarm and filling connection. Also for prevention of mass lost, the roof of expansion tank shall be always closed.

4.3. SKID

- 4.3.1. Heater skid material may be ASTM SA36 or any other carbon steel material recommended by manufacturer.
- 4.3.2. Lifting lugs shall be provided with sufficient strength to allow lifting the entire assembly without causing any damage to the shell and the other parts.
- 4.3.3. The heater should be self-contained and skid mounted.
- 4.3.4. Structural strength of skid shall be sufficient to withstand forces due to shipping and handling as well as support the vessel and equipment. Skid shall be self supporting rigid steel assemblies having adequately sized members to permit handling of the unit without deformation of the skid members.
- 4.3.5. Before insulation, skid shall be painted according to painting procedure in this standard. (Ref.Clause8).

4.4. COIL

- 4.4.1. Coil shall be seamless pipe, ASTM A53 Gr. B or ASTM A106 Gr. B/C or API 5L Gr.B, Schedule No.80.