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شرکت ملی گاز ایران
مدیریت پژوهش و فناوری
امور تدوین استانداردها

IGS

مشخصات فنی خرید

دستگاه جداکننده ذرات از گاز طبیعی، نوع اسکرابر

Particle Separator From Natural Gas ,Scrubber Type



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شرکت ملی گاز ایران



دفتر مدیر عامل

ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۲۰۱۵ مورخ ۱۴۰۲/۰۴/۰۴ هیأت مدیره،
نامه شماره گ/۵۰۹۱۴/۰۰۰/۹ مورخ ۱۴۰۲/۰۳/۲۹ آن مدیریت در مورد تصویب نهایی مقررات فنی
شرکت ملی گاز ایران به شرح زیر مطرح و مورد تصویب قرار گرفت.
۱- مشخصات فنی خرید دستگاه جداکننده ذرات از گاز طبیعی نوع اسکرابر

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۲- مشخصات فنی خرید حوضچه و دریچه کامپوزیت پایه پلیمری برای تجهیزات گازرسانی

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سید محمد پیشوایی
دبیر هیأت مدیره

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

اعضای محترم هیأت مدیره

مشاور و رئیس دفتر محترم مدیرعامل

سرپرست محترم امور حقوقی

رئیس محترم حسابرسی داخلی

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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 supplier'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 IGS specification whether as the prime producer or supplier or a trading firm.
- 4- "INSPECTOR": The Inspector referred to in this specification is a person/persons or a body appointed in writing by the company for the inspection of fabrication and installation work.
- 5- "SHALL ": is used where a provision is mandatory.
- 6- "SHOULD": is used where a provision is advised only.
- 7- "MAY": is used where a provision is completely discretionary.

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

E-mail: igs@nigc.ir

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1. SCOPE

This standard covers the minimum requirements for the technical specification, materials, fabrication, and welding, testing, inspection, piping and packing for shipment of the natural gas scrubbers used in natural gas industry.

This specification is part of the enquiry and purchase order, it shall be the supplier's responsibility to clearly indicate any deviation from the specifications, otherwise it is understood that the equipment conforms to the requirements of this specification.

The specification does not supersede the accepted pressure vessel codes but only supplements them with regard to certain conditions not fully covered in the codes.

The equipment shall be designed for full load, unattended continuous operation without the provision of special housing or shelters etc.

The unit shall be completely assembled, tested and painted according to the standards, codes and specification quoted herein and shall require only pipe connections before being placed in to service.

2. REFERENCE

Throughout this standard specification the following standards are referred to. For all references, the latest edition of the following referenced documents shall be applied. The applicability of changes in standards that occur after the date of this standard specification shall be mutually agreed upon by the purchaser and the supplier.

2.1. Normative References

IGS-M-PL-002-3	"Flanged/Welded End Ball Valves 2" to 24" Class 150,300, And 60"
IGS-M-PL-040	"Carbon Steel Flanges, Class 150 up to 900"
IGS-M-PL-002-1	"Flanged/Welded End Plug Valves 2" to 24" Class 150,300, and 60"
IGS-O-CH-042	"Painting Procedure for Gas Industry"
IPS-G-GN-210	"Packing & Packages"
IPS-D-ME-100	"Nameplate for Pressure Vessel"
IPS-G-ME-150(1)	"Towers, Reactors, Pressure vessel and internals"
IPS-D-ME-010	"Vertical Vessel Support"
IPS D-ME-104	"Saddle Details for Horizontal Vessels"
IPS-E-PR-850(1)	"Process Requirements of Vessels and Scrubbers"
API 12J	"Specification for Oil and Gas Separators"
ASME Sec. VIII	"Rules for Construction of Pressure Vessels" Div. I
ASME Sec. VIII	"Alternatives Rules for Construction of Pressure Vessels" Div. II
ASME Sec. II	"Materials and Specifications"

ASME Sec. IX	"Welding Procedure and performance qualification"
ASME B16.5/B16.47	"Pipe Flanges and Flanged Fittings"
ASME B16.9	"Factory-Made Wrought Butt welding Fitting"
ASME B16.11	"Forged Fittings, Socket-Welding and Threaded"
ASME B16.20	"Metallic Gaskets for Pipe Flanges"
ASME B18.2.1	"Square and Hex Bolts and Screws (Inch Series)"
ASME B18.2.2	"Square and Hex Nuts (Inch Series)"
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"
ISO 4572	"Hydraulic Fluid Power Filter Elements"
Osha 1926.1053	"ladders"
Ludwig's applied process design for chemical and petrochemical plants	

2.2. Informative References

2.2.1. Shell Design and Engineering Practice "Gas/Liquid scrubbers Type selection and design rules" DEP 31.22.05.11-Gen December 2007 and DEP 31.22.20.31 Gen February 2011.

2.2.2. Gas Processors Suppliers Association (GPSA) Engineering Data book -12th Edition

2.2.3. Pressure vessel handbook tenth edition F. megyesy

3. Definitions

Scrubber(multi cyclone scrubber)

Scrubber (multi cyclone scrubber) is a vertical vessel in which an array of parallel small cyclones is fitted between a top and bottom plate. In this way, a chamber is created which is shielded from the top and bottom compartment of the vessel. The feed flows directly into this compartment and enters the cyclones via their tangential inlets. Solid or liquid separation takes place in these cyclones. Subsequently the cleaned gas flows to the upper vessel compartment and the separated liquid is drained to the bottom compartment.

Cyclones

A cyclone is a device without moving parts in which the velocity of an inlet gas stream is transformed into a confined vortex from which centrifugal forces tend to drive the suspended particles against the wall of the cyclone body.

Separation (Filtration) Efficiency

The rate at which solids / Liquids in the feed are retained by the filter. It depends on the characteristics of the filter, the particle size distribution and nature of the solids or liquid droplets.

Design Pressure

The maximum operating pressure used for vessel mechanical calculations. Design pressure shall be selected based on ASME Sec. VIII Div. I.

It is recommended to design a vessel and its parts for a higher pressure than the operating pressure. A design pressure higher than the operating pressure with 30 psi or 10 percent, whichever, is the greater, will satisfy this requirement.

M.A.W.P (Maximum Allowable Working Pressure)

Maximum pressure for selected material, thickness, weld quality, etc. calculated from ASME Sec. VIII Div. I for each specific part or nozzle. M.A.W.P of complete package is the minimum allowable working pressure of all vessel parts.

4.Materials

4.1. Scrubbers furnished to this specification shall conform to the material requirements stipulated in the latest edition of the ASME Sec. II, as follows:

4.1.1. Pressure-containing parts

4.1.2. Attachments subject to stress not induced by pressure (e.g. supporting skirts, lugs, baffles, reinforcement pads, etc.).

4.2. Material selection for corrosive fluids should be selected based on a review of related API or NACE publications for materials. Consideration should be given to material selection as it relates to weight loss, sulfide stress cracking, chloride stress cracking, or other forms of corrosion. It is the responsibility of the user to determine what consideration for corrosion should be made to the vessel during its intended life.

4.3. Minimum corrosion allowance of 1.6 mm (0.0625 inch) shall be provided for all carbon steel and low alloy steel vessels, unless otherwise noted.

4.4. For carbon steel scrubbers, all steel plates for scrubber's supports shall have weldability to shell.

4.5. All external attachments material to shell such as pads, wear plates, and materials for supporting lugs, skirts, baffles and similar non-pressure parts welded directly to a pressure component, shall be established identically and shall be compatible with the material to which they are attached and shall have the same material as shell.

4.6. All materials used in the fabrication of parts under pressure shall have a material certificate issued by the steel mill, specifying chemical analysis and mechanical tests, in

accordance with appropriate specifications. Certificates relating to additional examinations and tests requested by the Company shall also be submitted. In the case of materials used in the fabrication of components that are not under pressure, material certificates issued by the steel mills or a declaration of conformity issued by the vessel fabricator shall be submitted. Supplier shall keep original copies of the above- mentioned certificates, which shall specify the identification code marked on semi-finished products. A copy of these certificates shall be submitted to the company.

4.7. Materials of construction for scrubber's components shall be selected to produce an economical design for the specified design service conditions.

4.8. External bolting shall be continuous-thread alloy steel bolt studs in accordance with ASTM A193, Grade B7 and Carbon and Alloy Steel Nuts ASTM A194 Grade 2H.

4.9. Flanges shall be forged and hot formed and shall comply with IGS-M-PL-040.

5. Technical specification

5.1. General

5.1.1. Gas velocity

5.1.1.1. To ensure protecting of all parts against erosion, maximum gas velocity in all section of scrubbers shall be calculated and compared with each part erosion critical velocity. Type and amount of liquid/solid particles in gas may decrease the critical gas velocity and shall be calculated by designer.

5.1.1.2. Minimum gas velocity in cyclones shall be calculated in which all of impurities removes from gas stream at the end of centrifugal part according to 5.1.1.3

5.1.1.3. Due to the usual conditions of limiting pressure drop, entrance velocity range shall be from 5 m/s to 20 m/s. The average of velocity should be 15 m/s.

5.1.2. Pressure drop in a cyclone with collection efficiency is important in evaluating its cost, and it shall be up to $\Delta P=0.360$ psi.

5.1.3. Liquid efficiency

The scrubber shall generally remove 90% of 10 microns (μm) and larger liquid particles.

5.1.4. Solids efficiency

The scrubber shall generally remove 70% of 10 microns (μm) and larger solid particles.

5.1.5. The diameter of the scrubber shall be large enough to hold sufficient cyclones in order to meet the gas handling capacity criterion.