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**REN-GASODUTOS, S.A.**

REDE NACIONAL DE TRANSPORTE DE GÁS NATURAL - PORTUGAL

WELDING NECK FLANGES, BLIND FLANGES, GASKETS, STUD BOLTS AND NUTS

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## 1.0 SCOPE

This Specification covers the design, fabrication and marking of welding neck flanges, blind flanges, gaskets, stud bolts and nuts for use in natural gas transmission lines and stations designed for a pressure rating ANSI class 600 and class 150 at an operating temperature range between - 10° and + 50 °C.

All welding neck flanges, blind flanges, gaskets, stud bolts and nuts shall be fit for service under site conditions and shall be designed, fabricated, tested and marked in accordance with the following requirements :

- a) This specification
- b) ANSI B16.5 "Pipe Flanges and Flanged Fittings" (last edition)
- c) ANSI B31.8 "Gas Transmission and Distribution Piping System" (last edition)
- d) MSS SP 44 "Steel Pipe Line Flanges" (last edition)
- e) ASME Guide for "Gas Transmission and Distribution Piping Systems" (last edition)
- f) Specification Doc. N°. M-00000-SPC-MG-0002 "Gas Properties"

## 2.0 FLANGES

All welding neck flanges under this Specification shall be forged or die forged and shall be hot-worked and shall be of the raised face type. The welding ends of said flanges shall be made from unalloyed steel. Thickness of welding neck flanges ends shall be calculated according to ASME or DIN codes. In case the calculated thickness is lower than the thickness of the connecting pipe, as listed in BOQ, then the thickness of the pipe shall be used.

The material used for flanges covered by this Specification shall be ASTM A 105 II or ASTM A 694 Grade F 42 to F 65.

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All butt-welding ends of fittings covered by this Specification shall be machined consistent with the ends of adjacent pipes or fittings of dimensions specified in the Contract Order (“Bill Of Quantities”). All such fittings shall be beveled for welding in accordance with Figure I4 or I5 of ANSI B 31.8 (last edition), Appendix - I.

## 2.1 Chemical properties

The chemical composition shall meet the following requirements for steel grades with specified yield strength :

Composition	SMYS ≤ 360 N/mm <sup>2</sup> Max. %	SMYS > 360 ≤ 460 N/mm <sup>2</sup> Max. %
C	0.18	0.20
Si	0.40	0.60
Mn	1.50	1.70
P	0.030	0.030
S	0.030	0.025
Nb	0.05	0.06
V	0.05	0.15
Ti	-	0.04
C <sub>eq</sub> max. 1)	0,47	
Max. total % allowed for the combination of the elements V, Nb and Ti.	≤ 0.12	≤ 0.18

$$1) \text{ Carbon Equivalent } C_{eq} = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15} \text{ in}\%$$

2) Al min. 0.02 % when other nitrogen binding elements do not exist.

## 3.0 BLIND FLANGES

The dimensions and the design of all blind flanges, apart from the requirements of code ANSI B 16.5, shall be suitable to resist the field hydrostatic test with a maximum pressure of 1,4. MAOP (Maximum Allowable Operating Pressure) and environmental conditions in Portugal.

#### **4.0 GASKETS**

The dimensions and the design of all gaskets supplied under this Specification shall be suitable for welding neck RF flange connection.

All gaskets supplied under this Specification shall be spiral wound gaskets (in accordance with API 601) with sealing zone of chambered graphite, with outer ring and inner ring.

The centering of the gasket shall be made of stainless steel material AISI 316 SS and PTFE or graphite filler.

#### **5.0 STUD BOLTS AND NUTS**

All bolts and nuts supplied under this Specification shall be threaded and shall be in accordance with ANSI B 16.5 as specified in the Contract (“Bill Of Quantities”).

The material used for the fabrication of threaded stud bolts under this Specification shall be ASTM A 193 grade B7 and the material used for the fabrication of nuts shall be ASTM A 194 grade 2H.

All bolts and nuts shall be electro-zinc plated.

#### **6.0 MARKING, DOCUMENTATION AND SHIPMENT**

##### **6.1 Marking**

Each component accepted shall be marked visibly and permanently in a suitable position. The marking process shall be done in accordance with requirements of specification Doc. N°: G-00000-SPC-PG-0007 “Marking of Components “.

##### **6.2 Documentation**

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The Documentation to be provided by the Manufacturer during the process of manufacturing until final release shall be in accordance with document G-00000-SPC-PG-0008 “Documentation to be provided by Manufacturer”.

Before starting any proceeding activity the manufacturer shall achieve the REN-Gasodutos approval of the documents submitted for the relevant production step.

### **6.3 Shipment**

All components shall be ready for installation upon delivery. The components shall be packed, transported and stored as to prevent damage prior to delivery. The Manufacturer shall warrant that the components will remain clean and dry during transportation and storage until installation.

Packing and Shipping shall be in compliance with documents P-00000-SPC-PG-0001 “Packing” and P-00000-SPC-PG-0002 “Shipping”.

### **7.0 INSPECTION CERTIFICATES**

The Manufacturer shall cause inspection certification to be issued and certified by an inspector of his own quality assurance department or an independent third inspector, in accordance with certification requirements laid down in document G-00000-SPC-Q-0001E “General Quality Assurance Requirements”.

Each such certificate shall show the results of tests made under this Specification and shall be in compliance with the standard certification contained in that specification.

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