

# Anatomy of the materials selection tables for CRAs in NACE MR0175 / ISO 15156 -3



ANSI / NACE MR0175 / ISO 15156 gives requirements and recommendations for the selection and qualification of carbon and low-alloy steels and corrosion-resistant alloys (CRAs) for equipment in oil and gas production in H<sub>2</sub>S-containing environments. When selecting a material that will be exposed to H<sub>2</sub>S, the user can select CRAs from NACE MR0175 Part 3 Annex A using the materials selection tables. This infographic analysis the information shown in the material selection tables.



## HEADER:

Table A.N Environmental and material limits for “material group” used in “equipment or component type”

CRAs are classified in material groups (*ref: NACE MR0175 Part 3 A.1.1*).

“equipment or component type” a material group can be used for different equipment or components e.g. downhole tubular components, instrumentation etc. each equipment or component type will have different environmental limits and metallurgical requirements. (*ref: NACE MR0175 Part 3 Table A.1*).

In this column different alloys within a material group are listed based on their chemical composition, UNS number or other characteristic such as PREN. Chemical compositions are listed by material groups using UNS number. NACE MR0175 Part 3 Annex D.

This column indicates if the material is resistant to elemental sulphur (Yes) or not (NO). If it states NDS it means no data has been submitted to determine if the material is acceptable for use in the presence of elemental sulfur.

This column shows the maximum exposure temperature for the specific material. (*ref: NACE MR0175 Part 3 A.1.3*). The equipment user shall define the exposure temperature (*ref: NACE MR0175 Part 3 Clause 5*).

This section indicates the limits of pH, i.e. the pH shall be less acidic than the shown value i.e. larger than or equal to the shown value. To calculate the pH the user can refer to NACE MR0175 Part 2 Annex D and NACE Corrosion Conference paper No. 10371.

This column shows the maximum H<sub>2</sub>S partial pressure or equivalent dissolved concentration in the water phase for the specific material. The equipment user shall define the partial pressure of H<sub>2</sub>S (*ref: NACE MR0175 Part 3 Clause 5*). The user can also refer to NACE MR0175 Part 2 Annex C “Determination of H<sub>2</sub>S Partial Pressure”.

This column presents the maximum content of chloride expressed as mg/l which the equipment user shall define (*ref: NACE MR0175 Part 3 Clause 5*). EFC Publication 17 provides valuable information regarding chloride content of produced water in oil and gas production.

Material type / individual alloy UNS number	Temperature Max °C (°F)	Partial pressure H <sub>2</sub> S Max kPa (psi)	Chloride conc. mg/l	pH	Sulfur resistant	Remarks
Example (NOT A REAL MATERIAL)  S12345 <sup>a</sup>	121 (250)	10 (1,5)	60,000	≥ 3.5	NDS	pCO <sub>2</sub> + pH <sub>2</sub> S ≤ 100 kPa

The heat treatment of this non-real material shall be special and the material shall have a special microstructure.

a) The material shall be free of cold work

Material requirements:  
In this section the tables include material requirements such as hardness limits, processing requirements (e.g. process route, heat treatment), microstructural requirements as well as any footnotes in the main body of the table

This section is reserved for any remarks indicated in the temperature, partial pressure, chloride, pH or sulfur resistance.

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