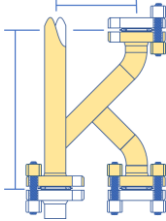


<b>Kearns Technical Solutions Ltd</b>	PROJECT SPECIFICATION PIPING MATERIAL SPECIFICATION		
	OWNER Doc. No.:		
FEED	KTS Doc. No.: 10001-000-KTSL-SPEC-0001	REV. 0	Page 1 of 3

## PIPING MATERIAL PIPE CLASS AND TECHNICAL SPECIFICATION

### CL150, Carbon Steel, Sour Service

#### 1. Scope

This specification provides the baseline for a CL150 carbon steel piping system for sour service, requiring compliance with NACE MR0175 / ISO 15156 to prevent sulphide stress cracking (SSC). This is a general guide; detailed specifications must be developed for defined operating conditions (partial pressure of H<sub>2</sub>S, pH, temperature, chloride content, etc.).

#### 2. General requirements


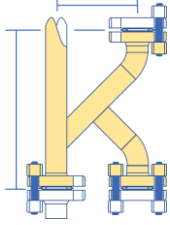
• Design code	ASME B31.3 Process Piping
• Sour Service standard	NACE MR0175 / ISO 15156 and NACE MR0103 for refinery environments
• Material standard	All materials must meet the metallurgical and hardness requirements of NACE MR0175, including the base material, weld metal, and heat affected zones.
• Corrosion allowance	3.0 mm
• Heat treatment	PWHT

#### 3. Pipe Specifications

• Material	ASTM A106 Grade B, or API 5L, killed and melted per fine grain practice for enhanced resistance to hydrogen-induced cracking (HIC).
• Grades	For API 5L, Annex H applies and HIC testing is required.
• Standard	ASME B36.10M
• Manufacturing	Seamless pipe. For larger diameters, Electric Resistance Welded (ERW) pipe may be acceptable if specifically treated and tested for sour service. Project specification restrictions apply, where relevant.

#### 4. Fittings Specifications

• Material	ASTM A234 Grade WPB, NACE MR0175.
• Type and standard	<ul style="list-style-type: none"> <li>○ Butt-weld fittings (2.5" and above): API B16.9.</li> <li>○ Socket-weld fittings (2" and below): API B16.11</li> </ul>
• Welding	All fittings must be compatible with the specified pipe material for sour service welding procedures.

	<b>PROJECT SPECIFICATION</b> <b>PIPING MATERIAL SPECIFICATION</b>		
	OWNER Doc. No.:		
FEED	KTS Doc. No.: 10001-000-KTSL-SPEC-0001	REV. 0	Page <b>2</b> of <b>3</b>

## 5. Flange Specifications

<ul style="list-style-type: none"> <li>Material</li> </ul>	Forged carbon steel per ASTM A105N, with heat treatment and hardness control to meet NACE MR0175.
<ul style="list-style-type: none"> <li>Standards</li> </ul>	ASME B16.5 for sizes up to NPS 24 (ASME B16.47 for larger diameters)
<ul style="list-style-type: none"> <li>Facing</li> </ul>	Raised Face (RF).

## 6. Valve Specifications

<ul style="list-style-type: none"> <li>Valve types</li> </ul>	Gate, globe and check
<ul style="list-style-type: none"> <li>Material</li> </ul>	Body and bonnet materials shall be carbon steel, ASTM A216 Grade WCB or equivalent. See below, for trim materials.
<ul style="list-style-type: none"> <li>Standards</li> </ul>	<ul style="list-style-type: none"> <li>Flanged valves (2.5" and above): ASME B16.34</li> <li>Socket-weld valves (2" and below): API 602 (Class 800)</li> </ul>
<ul style="list-style-type: none"> <li>Trim</li> </ul>	NACE-compliant trim is mandatory. All trim materials must be corrosion resistant alloys (CRAs) suitable for sour service per NACE MR0175, such as 13% Cr or better.

## 7. Gaskets

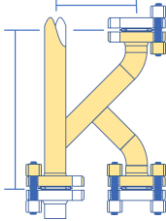
Spiral wound gaskets in accordance with ASME B16.30, with 316L stainless steel inner ring and windings, and graphite filler.

## 8. Bolting

<ul style="list-style-type: none"> <li>Material</li> </ul>	Stud bolts: ASTM A193 Grade B7M (for sour service) Nuts: heavy hexagonal nuts per ASTM A194 Gr. 2HM
<ul style="list-style-type: none"> <li>Coating</li> </ul>	Appropriate coating should be used for corrosion protection.

## 9. Welding Procedures

<ul style="list-style-type: none"> <li>WPS / PQR</li> </ul>	Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR) to meet NACE MR0175 requirements, ensuring final weldment and heat-affected zone hardness is below specified limits.
<ul style="list-style-type: none"> <li>NDE</li> </ul>	Non-Destructive Examination (NDE) procedures for welds must be in accordance with ASME B31.3 and any project-specific requirements.

<b>Kearns Technical Solutions Ltd</b>	PROJECT SPECIFICATION PIPING MATERIAL SPECIFICATION		
	OWNER Doc. No.:		
FEED	KTS Doc. No.: 10001-000-KTSL-SPEC-0001	REV. 0	Page <b>3</b> of <b>3</b>

## 10. Testing and Inspection

<ul style="list-style-type: none"> <li>• HIC testing</li> </ul>	For materials in wet sour service, Hydrogen-Induced Cracking (HIC) testing in accordance with NACE TM0284 may be required.
<ul style="list-style-type: none"> <li>• Hardness testing</li> </ul>	Post-weld hardness testing is required on production welds to ensure compliance with NACE MR0175.
<ul style="list-style-type: none"> <li>• Documentation</li> </ul>	All material test reports (MTRs) and certifications must include evidence of NACE compliance, including chemical composition and hardness test results
<ul style="list-style-type: none"> <li>• Material certification</li> </ul>	EN 10204 Type 3.1