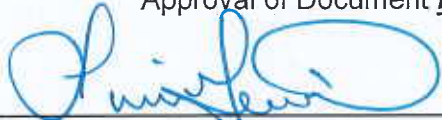



# TAM International Incorporated

## AISI 4130 110 KSI MYS Mechanical Tubing for Sour Service

**ESMA-2009**


Approval of Document <u>ESMA-2009</u>	
Signature	 <u>Luis Garcia – Sustaining Engineering Manager</u>
	<u>June 5, 2020</u> Date

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## 1.0 Scope

- 1.1 This document provides specifications for AISI 4130 mechanical tubing with 110,000 psi minimum yield strength used in sour service TAM products, including those requiring welding processes and controlled hardness.
- 1.2 Material specified by this document is required to comply with NACE MR-01-75 and resistant to Sulfide Stress Cracking (SSC) in H<sub>2</sub>S environments. **Testing shall be per NACE Standard TM-0177-Method A. The minimum threshold stress required is 85 percent of specified minimum yield strength.**
- 1.3 C-110 material made in accordance with API 5 CT requirements is an acceptable material to use. NOTE: If C-110 material is used, then the requirements set for by API for this material supersede all the requirements of this specification.

## 2.0 Chemistry


- 2.1 Materials specified by this document shall conform to the following compositional requirements (per API 5CT):

		GRADE
		4130
ELEMENT	SYMBOL	WEIGHT %
CARBON	(C)	.35 max
MANGANESE	(Mn)	1.20 max
NICKEL	(Ni)	0.99 max
PHOSPHOROUS	(P)	.020 max
SULFUR	(S)	.005 max
MOLYBDENUM	(Mo)	0.25-1.00
CHROMIUM	(Cr)	0.40-1.50

- 2.2 Compositional testing shall be performed in accordance with the latest revision of ASTM A751, or by any commonly accepted technique routinely employed for chemical analysis of steels which provides equivalent results to the practices contained in ASTM A751. Reports shall include quantitative results for specified elements of each heat of material.

## 3.0 Mechanical Properties

- 3.1 Mechanical testing shall be performed in accordance with the latest revision of ASTM A370 on a prolongation which has undergone the same heat treatment and mechanical processing as the finished product. Test specimens shall be machined from a prolongation removed from the product only after completion of all thermal processing. Testing shall be performed for each heat and lot of raw material.

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3.2 The mechanical properties of this material shall conform to the following requirements:

Yield Strength	110,000 psi min 120,000 psi max
Tensile Strength	115,000 psi min
Hardness	30 HRC Max
Elongation	15% min
Reduction of Area	40% min

3.3 Tensile testing shall be performed on a 4D round specimen. Yield strength shall be determined using the 0.2% offset method.

3.4 Test specimens shall be taken from mid-wall (1/2 T) or at a point between the mid-wall (1/2 T) and volume of final machined part.

#### 4.0 Condition

4.1 Material shall be in the Normalized, Austenitized, Quenched, and Tempered condition.

4.2 The minimum tempering temperature shall be **no less** than 1100°F (593°C).

4.3 All material shall be uniform in composition, clean, and free from foreign materials.

4.4 Material shall be free of micro-segregation.

#### 5.0 Quality

5.1 NDE

5.1.1 Volumetric NDE shall be performed with either ultrasonic or radiographic inspection as follows:

5.1.1.1 As far as practical, the entire volume of each part shall be volumetrically inspected after heat treatment or any other thermal treatment for mechanical properties and prior to machining operations that limit effective interpretation of the results of the examination.

5.1.1.2 For quench-and-tempered products, the volumetric inspection shall be performed after heat treatment or any other thermal treatment for mechanical properties

5.1.1.3 Radiographic NDE – Shall comply with procedures specified in ASTM E94.

5.1.1.4 Ultrasonic NDE – Specification/Acceptance Criteria is per API 5CT SR-2 latest edition. Allows for one or more of the following: ASTM E213, ASTM E570, or ASTM E309.

5.2 No weld repair is permitted.

5.3 Material identification number (heat, melt code, alloy designation, etc.) shall be permanently marked on each piece of material, preferably low stress stamps.


## 6.0 Country of Origin

6.1 Acceptable countries of origin are United States, Canada, Mexico, United Kingdom, Italy, Spain, France, Germany, Japan, and South Korea. Other countries can be accepted with approval from TAM.

## 7.0 Reports

7.1 Material ordered to this specification shall be accompanied by a Material Test Report. Reports shall reference the final condition of the material and shall contain the following minimum information which will be subject to inspection upon receipt:

1. Statement of material condition
2. Dimensions
3. Chemical Analysis and Governing Specification
4. Yield Strength and Governing Specification
5. Tensile Strength and Governing Specification
6. % Elongation and Governing Specification
7. Reduction of Area and Governing Specification
8. Hardness and Governing Specification
9. Location of Testing and Test Samples
10. "No Weld Repair" statement
11. Volumetric NDE Type, Results, and Governing Specification
12. Material Identification Number
13. Heat Treatment times, temperatures and quench media.
14. Tempering Temperature
15. Country of Origin

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## 8.0 Material Acceptance

- 8.1 All requirements of this specification are subject to verification at the discretion of TAM International.
- 8.2 TAM Engineering Manager or designee is ultimately responsible for accepting or rejecting material that does not conform to any portion of this specification.
- 8.3 Any material deviations must be submitted in writing and approved before machining can begin.

## 9.0 Reference Documents

- 9.1 ASTM A519, ASTM 370, API 5CT, ASTM E213, ASTM E570, ASTM E309, ASTM A751

## 10.0 Document Revision

- 10.1 Document revisions will be handled in accordance with SOP-009 Document Control.

Rev	Date	Description	Prepared By:	Reviewed By / Approved By	Date
A		New release.			