



TAM INTERNATIONAL

This confidential document and the copyright therein are the property of TAM International Incorporated and may not be used, copied, or disclosed to any third party without the prior written authorization of TAM International Incorporated.

# TAM International Incorporated

## AISI 4130, 4140 and 4145 80 KSI MYS Mechanical Tubing for Standard and **Sour** Service

### ESMA-2003

Approval of Document ESMA-2003

Signature

  
Tim Davis - Director Technology Group

1/31/22  
Date



TAM INTERNATIONAL

Document Title

AISI 4130, 4140 and 4145 - 80 KSI MYS Mechanical Tubing for Standard Service

Document No.

ESMA-2003

Rev

D

Page

1 OF 7

CAUTION: Check for latest revision of this document before use. Information contained in copied or printed material may be superseded.



### Table of Contents

1.0	SCOPE .....	3
2.0	CHEMISTRY .....	3
3.0	MECHANICAL PROPERTIES .....	3
4.0	CONDITION .....	4
5.0	QUALITY .....	4
6.0	COUNTRY OF ORIGIN .....	5
7.0	REPORTS .....	5
8.0	MATERIAL ACCEPTANCE .....	5
9.0	REFERENCE DOCUMENTS .....	6
10.0	DOCUMENT REVISION .....	6

Uncontrolled Document





### 1.0 Scope

- 1.1 This document provides specifications for AISI 4130, 4140, and 4145 mechanical tubing with 80,000 psi minimum yield strength used in standard service TAM products.
- 1.2 Material specified by this document is compliant with **NACE MR0175, Part 2 – Annex “A.”**

### 2.0 Chemistry

- 2.1 Materials specified by this document shall conform to the following compositional requirements (per ASTM A519):

ELEMENT	SYMBOL	GRADE		
		4130	4140	4145
CARBON	(C)	0.28-0.33	0.38-0.43	0.43-0.48
MANGANESE	(Mn)	0.40-0.60	0.75-1.00	
SILICON	(Si)	0.15-0.35		
PHOSPHOROUS	(P)	.040 MAX		
SULFUR	(S)	.040 MAX		
MOLYBDENUM	(Mo)	0.15-0.25		
CHROMIUM	(Cr)	0.80-1.10		
Nickel	(Ni)	<1%		

- 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.

	Document Title	AISI 4130, 4140 and 4145 - 80 KSI MYS Mechanical Tubing for Standard Service				
	Document No.	ESMA-2003	Rev	D	Page	3 OF 7
	CAUTION: Check for latest revision of this document before use. Information contained in copied or printed material may be superseded.					

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

Yield Strength	80,000 psi min
Tensile Strength	100,000 psi min
<b>Hardness</b>	<b>22 RC (MAX)</b>
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 a full thickness longitudinal strip.**

#### 4.0 Condition

4.1 **Material shall be in the Normalized, Austenitized, Quenched, and Tempered condition, but is acceptable if only Austenitized, Quenched, and Tempered.**

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 Engineering.

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:

- Statement of material condition
- Dimensions
- Chemical Analysis and Governing Specification
- Yield Strength and Governing Specification
- Tensile Strength and Governing Specification
- % Elongation and Governing Specification
- Reduction of Area and Governing Specification
- Hardness and Governing Specification
- Location of Testing and Test Samples
- "No Weld Repair" statement
- Volumetric NDE Type, Results, and Governing Specification
- Material Identification Number
- Heat Treatment times, temperatures, and quench media.
- Tempering Temperature
- Country of Origin

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 and approved on a Material Deviation Request (PF-09) before machining can begin.**





9.0 Reference Documents

- 9.1 ASTM A519, ASTM 370, API 5CT, ASTM E213, ASTM E570, ASTM E309, ASTM A751, **NACE MR0175, Part 2 – Annex "A."**

10.0 Document Revision

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

Uncontrolled Document



Document Title      AISI 4130, 4140 and 4145 - 80 KSI MYS Mechanical Tubing for Standard Service

Document No.      ESMA-2003      Rev      D      Page      6 OF 7

CAUTION: Check for latest revision of this document before use. Information contained in copied or printed material may be superseded.



TAM INTERNATIONAL

This confidential document and the copyright therein are the property of TAM International Incorporated and may not be used, copied, or disclosed to any third party without the prior written authorization of TAM International Incorporated.

Uncontrolled Document

Rev	Date	Description	Prepared By:	Reviewed By / Approved By	Date
A	07/30/2015	Initial Release / New Document	Mark Wyatt	M. Wyatt, T. Young, G. Fletcher	08/14/2015
B	03/01/2018	Updated to current standards.	J. Dinkel	T. Young, D. Gregory, G. Fletcher	03/01/2018
C	11/01/2018	All revisions designated in RED.	Luis Garcia	T. Young, D. Gregory / G. Fletcher	11/01/2018
D	09/14/2021	All revisions designated in RED.	T. Davis	T. Davis, C. Kelley, J. Dinkel, T. Young, M. Newman, L. Garcia, D. Gregory / G. Fletcher	01/31/2022



TAM INTERNATIONAL

Document Title AISI 4130, 4140 and 4145 - 80 KSI MYS Mechanical Tubing for Standard Service

Document No. ESMA-2003 Rev D Page 7 OF 7

CAUTION: Check for latest revision of this document before use. Information contained in copied or printed material may be superseded.