1.0 PURPOSE / SCOPE

1.1 To provide the testing standard and certification documentation requirements and to ensure specific flowdown clauses, in their entirety or equivalent, are flowed down to all lower tier subcontracts, and to prevent the inadvertent use of Counterfeit Parts, Material or Work.

2.0 TEST STANDARD & DOCUMENTATION

2.1 Material: Molybdenum and Tungsten materials and their alloys.

2.2 Each sample will be tested per ASTM E8/E8M “Standard Test Methods for Tension Testing of Metallic Materials”

2.3 Unless otherwise specified, testing documentation must specify the following:

a. Purchase Order number

b. Test Standard followed (e.g., ASTM E8/E8M-15)

c. Type of Test and Procedure

d. Material

e. Sample identification

f. 0.2% offset Yield Strength

g. Ultimate Tensile Strength

h. Elongation

i. Strain rate (see 2.4 below)

j. Judgement for each test (when requirements provided) PASS / FAIL

k. Tensile test curve and graph

l. Reason for rejection

m. Elongation Failures – inspect fracture location and evaluate validity based on middle 50% of gage length (ASTM E8-13a, 7.11.4). If fracture not within middle 50% of gage length, identify with some statement or note.

2.4 Special Strain Rate: Due to low ductility of Molybdenum and Tungsten materials and their alloys, tensile testing of these specimens requires special slower strain rates.

a. For Plate, sheet, foil per ASTM B386: Use strain rate of 0.002 to 0.005 in/in/min [mm/mm/min] through 0.6% offset and 0.02 to 0.05 in/in/min [mm/mm/min] through fracture.

b. For Bar, Rod and Wire per ASTM B387: Use strain rate of 0.002 to .005 in./in/-min to accurately determine 0.2% offset yield value, and 0.02 to 0.05 in/in-min to fracture.

2.5 Special Requirements for test specimens: Due to low ductility of Molybdenum and Tungsten materials and their alloys, tensile test specimens require the following special controls:

a. Surface finish of 16 micro-inch Ra or better in the gage length.

b. Machine 1% taper in reduced gage section per ASTME8

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c. Break corner edges of flat specimens.

d. No tool marks or undercut radii allowed.

e. No punch marking or heavy scribing for elongation measurements

f. Button head specimens NOT ALLOWED due to notch sensitive material

2.6 Reports to be submitted by email to: quality@elmettech.com

2.7 Retention of test specimens – The supplier shall retain test specimens for a period of one (1) year after test report date. The supplier has the option to return test specimens to Elmet for retention, provided the specimens are listed on the certification documents and shipping documentation. Regardless of retention location, all retained test specimens must be identified in a way to reliably trace back to the relevant test report(s).

3.0 REVISIONS AND APPROVALS

REV	DATE	ORIGINATOR	CHANGES
-	1/4/2017	S. Humphrey	Initial Issue
A	1/9/2017	S. Humphrey	Addition of 2.2.3.(11) Tensile test curve and graph reports and 2.2.3.(13) Pictures of any fracture surfaces
B	6/19/17	D. Drinan	Added 9., retention of specimens; revised title
C	02/7/2018	D. Drinan	Added special requirements for specimens and strain rate; elongation failure validity; reporting to changes; revised title.
D	06/11/2018	D. Drinan	Added 2.5e and lab reporting email
E	06/14/18	D. Drinan	Added 2.5b, 1% taper in gage section
F	06-25-18	D. Drinan	2.1 – material scope increased; 2.4 – clarified strain rate requirements
G	09-07-2022	D. Drinan	Updated 2.4 and 2.6
H	12-07-2022	S. Brousseau	Revised email address in 2.6.
I	12-23-2022	D. Drinan	Updated 2.4 and 2.6

APPROVED BY:

Digitally signed
by Dan Drinan

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