ASTM A998

Standard Specification for Synthetic Test Materials - Medium

This standard is issued under the fixed designation A998

1. Scope

1.1 This specification covers seamless and welded synthetic test materials for stress testing purposes.
1.2 The materials are furnished in various grades to simulate different complexity levels.
1.3 Supplementary requirements are provided for when additional testing is required.

2. Referenced Documents

2.1 ASTM Standards:
A999 Specification for Simple Test Materials
A997 Specification for Complex Test Materials
E112 Test Methods for Determining Average Grain Size

3. Terminology

3.1 Definitions:
  3.1.1 grade - a designation used to identify a specific combination of properties.
  3.1.2 synthetic - artificially created for testing purposes.
  3.1.3 stress test - evaluation under simulated load conditions.

4. Ordering Information

4.1 Orders shall include the following information:
  4.1.1 ASTM designation and year of issue
  4.1.2 Grade (see Table 1)
  4.1.3 Size, dimensions, and quantity

5. Materials and Manufacture

5.1 The material shall be manufactured by synthetic generation processes.
5.2 Heat treatment shall be performed as specified in Section 6.
5.3 Quality control measures shall ensure consistency across test samples.

6. Heat Treatment

6.1 Solution Annealing: Heat to 1100°C (2012°F), hold for 1 hour, rapid cool.
6.2 Stress Relief: Heat to 200°C (392°F), hold for 30 minutes, air cool.
6.3 Alternative treatments may be specified by purchaser.

7. Chemical Composition

7.1 The material shall conform to the chemical composition limits in Table 3.

Table 3: Chemical Composition Requirements (%)

Element	Grade X	Grade Y	Grade Z
Carbon (C)	0.03 max	0.05 max	0.08 max
Chromium (Cr)	22.0-24.0	24.0-26.0	20.0-22.0
Nickel (Ni)	4.5-6.5	5.5-7.5	8.0-10.5
Molybdenum (Mo)	3.0-3.5	2.5-3.5	2.0-3.0
Nitrogen (N)	0.14-0.20	0.18-0.25	0.08-0.14

8. Mechanical Properties

8.1 Tensile properties shall meet the requirements specified in Table 4.
8.2 Hardness values shall not exceed the maximum specified.
8.3 Impact testing shall be performed at -20°C (-4°F).

Table 4: Tensile Requirements

Grade	Yield (ksi)	Tensile (ksi)	Elongation (%)	Hardness (HB)
X	65	95	25	220 max
Y	75	105	22	240 max
Z	55	85	30	200 max

9. Additional Requirements

9.1 This section contains supplementary requirements for special applications.
9.2 Consult with manufacturer for specific testing procedures.
9.3 Additional certifications may be required based on end-use.

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