

### Technical Specification

- 1) Material Specification : Magnesium alloy AZ 91E  
 2) Specification standard : ASTM B80-23  
 3) Supply condition : Solution annealed and aged (T6 Condition)  
 4) Form : Casting (Proof machined with protective coating)  
 5) Chemical Composition :  
 Chemical composition shall conform to the following:

Elements	% by weight	
	Min	Max
Aluminium	8.1	9.3
Zinc	0.40	1.0
Manganese	0.17	0.35
Silicon	-	0.20
Copper	-	0.015
Nickel	-	0.0010
Iron	-	0.005
Other Impurities each	-	0.01
Other Impurities total	-	0.30
Magnesium	Balance	

#### Sampling for Chemical Composition

One sample of each casting lot shall be taken in accordance with Practice E88 for chemical analysis or Practice E716 for spectrochemical analysis.

#### 6) Heat Treatment

Casting and Tensile Specimen shall be solution treated and precipitation heat treated as per ASTM B661. The recommended heat treatment cycle is given below

Treatment	Temperature	Times Hrs
Solution Treatment (Under argon atmosphere)	405±5	20
Precipitation treatment	215±5	5

However optimum heat treatment cycle to achieve the specified tensile Properties may be generated by the supplier. Castings and tensile specimens (min 3 nos) belonging to each melt shall be heat treated together.

7) **Tensile properties**

Minimum Tensile properties on test specimens (machined to ASTM B-557M) in heat treated condition shall be as follows.

- ▽ Yield strength (Y S) at 0.2% of offset : 110 MPa (Min.)
- ▽ Ultimate Tensile Strength (U T S) : 234 MPa (Min.)
- ▽ Percentage of Elongation (% E) : 3
- ▽ Hardness (Brinell) : 70
- ▽ Minimum three tensile specimens shall be cast from each melt.

Tensile test shall be conducted in a standard lab and the test reports shall be submitted.

8) **Radiographic Inspection**

100 % X –ray radiographic inspection shall be done on all casting as per the guidelines given in ASTM E 94. The radiograph shall be evaluated as per ASTM E 155. Reference radiograph and severity level of various defect shall be assessed. The acceptance criteria shall be as below.

9) **Ultrasonic Inspection**

Types of Defects

Max severity level of defect  
Acceptable as per ASTM E 155  
Ref. radiographs

Gas holes	2
Micro Shrinkage (feathery)	3
Micro Shrinkage (sponge)	3
Foreign material (less dense)	2
Foreign material (more dense)	2
Cracks, cold shuts	not permissible.

10) **Dimensional Inspection**

Dimensions of the proof machined castings shall conform to the tolerance limits specified in the drawing.

11) **Other Test:**

Visual examination and dimensional inspection to be completed.

## **General terms and conditions**

1. Material has to be procured from a reputed mill or through trading agency. If it is from trading agency, the details of the material manufacturer or the source mill should be known.
2. All material certificates have to be verified and endorsed by a reputed third party agency or by government approved, NABL accredited labs.
3. Following tests to be done (as per relevant standard) and reports has to be available with every raw material batch.
  - Dimensional inspection
  - Mechanical properties test
  - Chemical composition test
  - Non-destructive testing
4. All material properties have to be well within the acceptable limit given in the specification.
5. 100% non-destructive test to be conducted on all material and cleared as per AMS 2630 class A1.
6. Each of the above report shall contain the information like Material, Heat /Lot No., Size, Quantity, Supply Condition etc.

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