45006 [310M6] Malleable Cast Iron Casting Material

Introduction

ASTM A220/A220M Grade 45006 [310M6] is a pearlitic malleable iron casting grade. Its matrix contains ferrite, pearlite and tempered transformation products, with distributed temper carbon. Tensile acceptance uses separately cast test bars.

Manufacturing Process

Sand Casting
Shell Molding Casting
Lost Foam Casting

Equivalent Materials

Not Available

Reference Standards

Standard	Standard Title	Edition	Specification
ASTM A220/A220M	Pearlitic Malleable Iron	99	45006 [310M6]

Physical Properties

Property	Value	Applicable Conditions
Matrix Structure	Uniformly distributed temper carbon nodules in a matrix of ferrite, pearlite and tempered transformation products of austenite.	

Sources: ASTM A220/A220M:99

Chemical Composition

No specified chemical composition limits in ASTM A220/A220M

Heat Treatment

If reheat treatment is needed after initial tensile testing — If the initial test indicates that reheat treatment is needed, the entire casting lot and the representative test specimens must undergo reheat treatment together.

Surface condition after heat treatment (when agreed) — When agreed by the purchaser and producer, a maximum decarburization limit may be set in writing for any as-cast surface after heat treatment. Evaluate depletion of combined carbon after polishing and nital etching at 100×.

Typical manufacturing practice (informative) — Heat treatment is inherent in manufacturing pearlitic malleable iron. The standard gives no general temperature, holding time or cooling schedule.

When specified hardness is not met — Castings outside the required hardness range may be reheat treated and retested.

Where subsequent hardening is intended (L prefix) — Use sufficient combined carbon to respond to properly applied hardening and keep free ferrite as low as is consistent with other properties. The standard recommends an L prefix and a minimum hardness of 197 HB.

Typical manufacturing practice (informative): Informative values; not mandatory acceptance limits.

Sources: ASTM A220/A220M:99

Mechanical Properties

Primary Mechanical Properties

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Property	Requirement
Tensile Strength	>= 65000 psi [450 MPa]
Yield Strength	>= 45000 psi [310 MPa]
Elongation	>= 6 %

Separately cast test bar

Separately cast bars from the same lot are heat treated with the castings in the same production furnace and cycles.

Tensile Strength [Inch-pound]; Yield Strength [Inch-pound]; Elongation [Inch-pound]: Standard gauge length 2.00 ± 0.01 in. Mean diameter of cast bars at least 19/32 in.

Yield Strength: 0.2% offset in referee testing.

Elongation gauge length: 2 in. [50 mm]

Tensile Strength [SI]; Yield Strength [SI]; Elongation [SI]: Standard gauge length 50.0 ± 0.3 mm. Mean diameter of cast bars at least 15 mm.

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Condition: Typical Brinell hardness

Informative

Property	Value
Brinell Hardness	156–207 HB

Typical indentation diameter 4.2–4.8 mm. ASTM E10 with a 0.39 in. [10 mm] ball and 6600 lbf [3000 kgf] load.

Informative reference value

not an acceptance requirement

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Condition: Where subsequent hardening is intended (L prefix)

Informative

Property	Value
Brinell Hardness	>= 197 HB

The L prefix is recommended. Sufficient combined carbon is required. Free ferrite must be as low as consistent with other properties.

Informative reference value

not an acceptance requirement

Welding Conditions

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Property	Value
Post-weld Heat Treatment	For welded castings, Appendix X1.4 recommends appropriate post-weld heat treatment under strict metallurgical control.

Repair by plugging or welding requires prior written purchaser permission per §11.2.

Applications

Pearlitic malleable iron ASTM A220/A220M Grade 45006 [310M6] is part of a material family used for transmission gears and differential cases. The separately cast test-bar results need to be considered alongside the geometry of the actual casting.

CASTING QUALITY

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Casting Quality Industrial

As a professional manufacturer in China, We Casting Quality focus on Metal Parts OEM industry, and provide solutions and services in Metal Casting field as following:

Sand Casting

Investment Casting, Lost Wax process

Shell Casting

Lost Form Casting

Permanent Mold Casting

CNC Machining

CAD Design

Tools/Mold Design

Material Supplied

Cast Iron Castings (Grey Iron, Malleable Iron, Ductile Iron)

Carbon Steel and Alloy Steel Castings

Stainless Steel and Duplex Stainless Steel Castings

Aluminum Castings

Bronze and Brass Castings

Titanium and Cobalt Alloy Castings

What We Can Do

Design Ability

Our engineers will help you to improve the designs based on casting technology, then The simulation software will be processed to verify the casting pouring system. Pro/E, Solidworks, AutoCAD and ProCast are available in Casting Quality Industrial.

Saving Cost

Some manufacture processes may lead high cost. We will analyses the designs and advise the suitable methods to our customers. The best solution will be adopted.

Quality Control

From the raw material selecting to bulk production processing, all procedures will follow PPAP program if necessary. The certificates will be provided including chemistry, hardness, mechanical property or NDT testing.

Production Capacity

The max iron/steel castings can reach 30tons in weight, meanwhile the minus casting is around 1gram only.

We also have prototyping and 3D scanning ability for sample plan.

Logistic Service

The products will be delivered directly to customer’s workshop, which will save plenty of work for clients.

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