QT500-7 Ductile Cast Iron Casting Material

Introduction

QT500-7 is a spheroidal graphite iron casting grade covered by GB/T 1348. Typical applications include transmission housings, hubs, brackets and hydraulic components.

Manufacturing Process

Sand Casting
Shell Molding Casting
Lost Foam Casting

Equivalent Materials

Standard	Material Grade
ISO 1083	ISO1083/JS/500-7
SAE J434	D500
EN 1563	EN-GJS-500-7

Reference Standards

Standard	Standard Title	Edition	Specification	Identifier
GB/T 1348	Spheroidal graphite iron castings	2019	QT500-7	—

Physical Properties

Property	Value / Unit	Note	Source
Elastic Modulus	169 GPa	measured at room temperature unless otherwise stated, not an acceptance limit	GB/T 1348
Poisson Ratio	0.275	measured at room temperature unless otherwise stated, not an acceptance limit	GB/T 1348
Thermal Conductivity	35.2 W/(m·K)	Test at 300 °C; measured at room temperature unless otherwise stated, not an acceptance limit	GB/T 1348
Specific Heat	515 J/(kg·K)	measured at room temperature unless otherwise stated, not an acceptance limit; Temperature range: 20–500 °C	GB/T 1348

Property	Value / Unit	Note	Source
Thermal Expansion	12.5 ×10^-6/K	measured at room temperature unless otherwise stated, not an acceptance limit; Temperature range: 20–400 °C	GB/T 1348
Density	7.1 kg/dm3	measured at room temperature unless otherwise stated, not an acceptance limit	GB/T 1348
Maximum Magnetic Permeability	1596 uH/m	measured at room temperature unless otherwise stated, not an acceptance limit	GB/T 1348
Hysteresis Loss	1345 J/m3	measured at room temperature unless otherwise stated, not an acceptance limit; B = 1 T	GB/T 1348
Electrical Resistivity	0.51 uohm·m	measured at room temperature unless otherwise stated, not an acceptance limit	GB/T 1348

Chemical Composition

No specified chemical composition limits in GB/T 1348

Heat Treatment

GB/T 1348–2019

Heat treatment may be required under agreed delivery or retesting conditions. No grade-specific heat-treatment temperature or holding schedule is prescribed.

Mechanical Properties

Core Mechanical Properties

Conditions are not identical. Compare each stated condition and applicability separately.

GB/T 1348 — 2019 · Table 1 — Normative

Property	30 < t <= 60 mm	60 < t <= 200 mm	t <= 30 mm
Yield Strength (Rp0.2)	>= 300 MPa	>= 290 MPa	>= 320 MPa
Tensile Strength	>= 450 MPa	>= 420 MPa	>= 500 MPa
Elongation	>= 7 %	>= 5 %	>= 7 %

Common specimen condition: Separately cast, cast-on or side-by-side cast sample

Full original column conditions

30 < t <= 60 mm — Separately cast, cast-on or side-by-side cast sample · 30 < t <= 60 mm

60 < t <= 200 mm — Separately cast, cast-on or side-by-side cast sample · 60 < t <= 200 mm

t <= 30 mm — Separately cast, cast-on or side-by-side cast sample · t <= 30 mm

L0 = 5d; GB/T 228.1; Minimum prescribed value

Separately cast, cast-on or side-by-side cast sample · 30 < t <= 60 mm: wall thickness <= 60 mm

Separately cast, cast-on or side-by-side cast sample · 60 < t <= 200 mm: wall thickness <= 200 mm

Separately cast, cast-on or side-by-side cast sample · t <= 30 mm: wall thickness <= 30 mm

GB/T 1348 — 2019 · Table C.1 — Informative

Property	30 < t <= 60 mm	60 < t <= 200 mm	t <= 30 mm
Yield Strength (Rp0.2)	>= 280 MPa	>= 260 MPa	>= 300 MPa
Tensile Strength	>= 450 MPa	>= 400 MPa	>= 480 MPa
Elongation	>= 5 %	>= 3 %	>= 6 %

Full original column conditions

30 < t <= 60 mm — Specimen cut from the casting · 30 < t <= 60 mm

60 < t <= 200 mm — Specimen cut from the casting · 60 < t <= 200 mm

t <= 30 mm — Specimen cut from the casting · t <= 30 mm

source designation QT500-7/C; sampling position and acceptance properties subject to agreement; L0 = 5d; GB/T 228.1; Informative minimum guideline, not an unconditional acceptance requirement; Informative reference value; not an acceptance requirement

Specimen cut from the casting · 30 < t <= 60 mm: wall thickness <= 60 mm

Specimen cut from the casting · 60 < t <= 200 mm: wall thickness <= 200 mm

Specimen cut from the casting · t <= 30 mm: wall thickness <= 30 mm

GB/T 1348 — 2019 · Table G.1 — Informative

Property	Value
Shear Strength	450 MPa
Compressive Strength	800 MPa

Annex G informative reference data; measured at room temperature unless otherwise stated, not an acceptance limit; Informative reference value; not an acceptance requirement

GB/T 1348 — 2019 · Table G.2 — Informative

Property	t <= 30 mm
Tensile Strength	500 MPa

Full original column conditions

t <= 30 mm — Specimen cut from casting · diameter <=25 mm · t <= 30 mm

wall thickness <= 30 mm; Informative guideline; stress-controlled fatigue; N = 10^7 cycles, failure probability P = 50% for fatigue data; not an acceptance requirement; Informative reference value

Additional Mechanical Properties

Fatigue Properties

Conditions are not identical. Compare each stated condition and applicability separately.

GB/T 1348 — 2019 · Table G.2 — Informative

Property	Test window 1	Test window 2
Notched Rotating Bending Fatigue Strength	150 MPa[1]	— / Not specified
Notched Rotating Bending Fatigue Ratio	0.30[2]	— / Not specified
Reversed Tension Compression Fatigue Strength	— / Not specified	200 MPa[3]
Reversed Tension Compression Fatigue Ratio	— / Not specified	0.40[2]
Pulsating Tension Fatigue Strength	— / Not specified	280 MPa[4]
Reversed Torsional Fatigue Strength	— / Not specified	180 MPa[5]
Reversed Torsional Fatigue Ratio	— / Not specified	0.36[2]
Rotating Bending Fatigue Strength	— / Not specified	225 MPa[6]
Rotating Bending Fatigue Ratio	— / Not specified	0.45[2]

diameter <=25 mm; relevant wall thickness t <=30 mm; t <= 30 mm; wall thickness <= 30 mm; Informative guidance, not an acceptance requirement; The source cycle-count wording is inconsistent; N = 10^7 cycles (10 million), P = 50% reference: ISO 1083:2018 Table G.2 footnotes b/c; Supplemental reference; not an official GB corrigendum; Stress-controlled fatigue according to Wöhler; Informative reference value; not an acceptance requirement

Test window 1: Notched specimen, Kt <=3 machined from a sample cut from casting

Test window 2: Unnotched specimen machined from a sample cut from casting

Fracture Toughness

GB/T 1348 — 2019 · Table G.1 — Informative

Property	Value
Fracture Toughness (KIC)	25 MPa sqrt(m)

Annex G informative reference data; measured at room temperature unless otherwise stated, not an acceptance limit; Informative reference value; not an acceptance requirement

Other Mechanical Properties

GB/T 1348 — 2019 · Table G.1 — Informative

Property	Value
Torsional Strength	450 MPa

Annex G informative reference data; measured at room temperature unless otherwise stated, not an acceptance limit; Informative reference value; not an acceptance requirement

Notes

GB/T 1348 · Edition 2019

[1] Notched Rotating Bending Fatigue Strength: R = -1; approximately 21.8%; Kt <= 3; sigmabwk(R=-1)/Rm approx. 0.40 - 0.0002 × Rm; Mean source-strength, not a guaranteed limit

[2] Notched Rotating Bending Fatigue Ratio/Reversed Tension Compression Fatigue Ratio/Reversed Torsional Fatigue Ratio/Rotating Bending Fatigue Ratio: Source-not a calculated value

[3] Reversed Tension Compression Fatigue Strength: R = -1; approximately 22.3%; sigmaw/Rm approx. 0.50 - 0.0002 × Rm; Mean source-strength, not a guaranteed limit

[4] Pulsating Tension Fatigue Strength: R = 0; sigmamax = 2sigma; approximately 9%; sigma(R=0)/sigma(R=-1) approx. 0.7; Mean source-strength, not a guaranteed limit

[5] Reversed Torsional Fatigue Strength: R = -1; approximately 14%; tauw/Rm approx. 0.46 - 0.0002 × Rm; Mean source-strength, not a guaranteed limit

[6] Rotating Bending Fatigue Strength: R = -1; approximately 14.2%; sigmaw/Rm approx. 0.55 - 0.0002 × Rm; Mean source-strength, not a guaranteed limit

Welding Conditions

N/A

Applications

Ductile iron GB/T 1348 Grade QT500-7 is used for transmission housings, hubs, brackets and hydraulic components. They are used in vehicle assemblies, agricultural equipment and industrial machinery where a cast shape accommodates mounting points, bores or internal passages. The required balance of strength and ductility depends on the part and its loading.

These are family-level applications, and individual components still require selection against their design and inspection requirements.

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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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