# QT600-3 Ductile Cast Iron Casting Material

## Introduction

QT600-3 is a spheroidal graphite iron casting grade covered by GB/T 1348. Typical applications include gear blanks, transmission components, crankshafts and machinery parts.

## Manufacturing Process

Sand Casting
Shell Molding Casting
Lost Foam Casting

## Equivalent Materials

| Standard | Material Grade |
|---|---|
| EN 1563 | EN-GJS-600-3 |
| ISO 1083 | ISO1083/JS/600-3 |

## Reference Standards

| Standard | Standard Title | Edition | Specification | Identifier |
|---|---|---|---|---|
| GB/T 1348 | Spheroidal graphite iron castings | 2019 | QT600-3 | — |

## Physical Properties

| Property | Value / Unit | Note | Source |
|---|---|---|---|
| Elastic Modulus | 174 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 | 32.5 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 | 7.2 kg/dm3 | measured at room temperature unless otherwise stated, not an acceptance limit | GB/T 1348 |
| Maximum Magnetic Permeability | 866 uH/m | measured at room temperature unless otherwise stated, not an acceptance limit | GB/T 1348 |
| Hysteresis Loss | 2248 J/m3 | measured at room temperature unless otherwise stated, not an acceptance limit; B = 1 T | GB/T 1348 |
| Electrical Resistivity | 0.53 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)** | >= 360 MPa | >= 340 MPa | >= 370 MPa |
| **Tensile Strength** | >= 600 MPa | >= 550 MPa | >= 600 MPa |
| **Elongation** | >= 2 % | >= 1 % | >= 3 % |

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)** | >= 340 MPa | >= 320 MPa | >= 360 MPa |
| **Tensile Strength** | >= 550 MPa | >= 500 MPa | >= 580 MPa |
| **Elongation** | >= 2 % | >= 1 % | >= 3 % |

### 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 QT600-3/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** | 540 MPa |
| **Compressive Strength** | 870 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** | 600 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** | 168 MPa[1] | — / Not specified |
| **Notched Rotating Bending Fatigue Ratio** | 0.28[2] | — / Not specified |
| **Reversed Tension Compression Fatigue Strength** | — / Not specified | 228 MPa[3] |
| **Reversed Tension Compression Fatigue Ratio** | — / Not specified | 0.38[2] |
| **Pulsating Tension Fatigue Strength** | — / Not specified | 319 MPa[4] |
| **Reversed Torsional Fatigue Strength** | — / Not specified | 204 MPa[5] |
| **Reversed Torsional Fatigue Ratio** | — / Not specified | 0.34[2] |
| **Rotating Bending Fatigue Strength** | — / Not specified | 258 MPa[6] |
| **Rotating Bending Fatigue Ratio** | — / Not specified | 0.43[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)** | 20 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** | 540 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 QT600-3 is used for gear blanks, transmission components, crankshafts and machinery parts. Such castings are used in industrial drives, agricultural machinery, engines and off-highway equipment. Component selection depends on section size, loading and the required finished surface. Wear performance or fatigue life cannot be inferred from the grade name alone; any surface treatment and associated acceptance requirements must be specified for the actual part.

CASTING QUALITY

Last Updated: 2026-11-06

# 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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