G17CrMo5-5 (EN 1.7357) Low-Alloy Steel Casting Material

Introduction

G17CrMo5-5 (EN 1.7357) is a low-alloy steel casting grade specified in EN 10213. The standard defines delivery conditions and engineering requirements for pressure-containing components. Casting process options include Investment Casting, Shell Molding Casting and Sand Casting, subject to the applicable specification and component requirements.

Manufacturing Process

Investment Casting
Shell Molding Casting
Sand Casting

Equivalent Grades

N/A

Reference Standards

Standard	Standard Title	Edition	Specification	Identifier
EN 10213	Steel castings for pressure purposes	2007+A1 :2016	G17CrMo5-5	EN 1.7357
EN 10293	Steel castings — Steel castings for general engineering uses	2015	G17CrMo5-5	EN 1.7357

Physical Properties

EN 10213–2007+A1:2016

Property	Value	Note
Density	7.85 kg/dm3	Test at 20 °C
Thermal Expansion	11.8 ×10?6/K	Temperature range: 20–100 °C
Thermal Expansion	12.9 ×10?6/K	Temperature range: 20–300 °C
Thermal Expansion	13.7 ×10?6/K	Temperature range: 20–500 °C
Thermal Conductivity	38.5 W/(m·K)	Test at 50 °C
Specific Heat	460 J/(kg·K)	Test at 20 °C
Magnetic Property	Magnetic	

Chemical Composition

Element	EN 10213 Edition 2007+A1:2016 · wt.% Cast analysis	EN 10293 Edition 2015 · wt.% Cast analysis
C	0.15–0.20	0.15–0.20
Si	<= 0.60	<= 0.60
Mn	0.50–1.00	0.50–1.00
P	<= 0.020	<= 0.025
S	<= 0.020[1]	<= 0.020[2]
Cr	1.00–1.50	1.00–1.50
Ni	<= 0.40	<= 0.40[3]
Mo	0.45–0.65	0.45–0.65
Cu	<= 0.30	<= 0.30[3]
V	<= 0.05	<= 0.05[3]

Notes

EN 10213 · Edition 2007+A1:2016

[1] S: For ruling thickness < 28 mm, sulfur up to 0.030 wt.% is permitted.

EN 10293 · Edition 2015

[2] S: For castings of ruling thickness <28 mm, sulfur up to 0.030 wt.% is permitted.

[3] Ni/Cu/V: Applies only where unspecified in unless otherwise agreed; no intentional addition except for finishing the heat.

Heat Treatment

EN 10213–2007+A1:2016 · +QT

Step	Operation	Temperature	Cooling
1	: quenching	920–960 °C[1]	air or liquid quench
2	: tempering	680–730 °C[1]	—

EN 10293–2015 · +QT

Step	Operation	Temperature	Cooling
1	: quenching	920–960 °C	air or liquid
2	: tempering	680–730 °C	—

Notes

EN 10213 · Edition 2007+A1:2016

[1] +QT: Treatment temperatures are given for information; required delivery condition is specified separately.

Mechanical Properties

Property	EN 10213 Edition 2007+A1:2016	EN 10293 Edition 2015[1]
Yield Strength (Rp0.2)	>= 315 MPa[2] >= 250 MPa[3] >= 230 MPa[4] >= 215 MPa[5] >= 200 MPa[6] >= 190 MPa[7] >= 175 MPa[8] >= 160 MPa[9]	>= 315 MPa
Tensile Strength	490–690 MPa[2]	490–690 MPa
Elongation	>= 20 %[2]	>= 20 %
Impact Energy	>= 27 J[2]	>= 27 J

Notes

EN 10293 · Edition 2015

[1] All properties in this column: wall thickness <= 100 mm; Test block of relevant thickness; maximum test-block wall thickness 150 mm; Room temperature; Properties apply to the casting up to the specified maximum wall thickness; above this, foreseeable lowering shall be agreed.

EN 10213 · Edition 2007+A1:2016

[2] Yield Strength (Rp0.2)/Tensile Strength/Elongation/Impact Energy: wall thickness <= 100 mm; Properties verified on test blocks of thickness up to 150 mm; applicability to casting wall thickness as stated. Larger governing thickness requires agreement.; Room temperature

[3] Yield Strength (Rp0.2): Test at 200 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[4] Yield Strength (Rp0.2): Test at 300 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[5] Yield Strength (Rp0.2): Test at 350 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[6] Yield Strength (Rp0.2): Test at 400 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[7] Yield Strength (Rp0.2): Test at 450 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[8] Yield Strength (Rp0.2): Test at 500 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[9] Yield Strength (Rp0.2): Test at 550 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

Welding Conditions

EN 10213–2007+A1:2016

Requirement	Value
Preheat	150–250 °C[1]
Interpass Temperature	<= 350 °C[2]
Post-weld Heat Treatment	>= 650 °C[3]

EN 10293–2015

Requirement	Value
Preheat	150–250 °C[4]
Interpass Temperature	<= 350 °C
Post-weld Heat Treatment	>= 650 °C[5]

Notes

EN 10213 · Edition 2007+A1:2016

[1] Preheat: Production welding by the foundry; ferritic/martensitic guidance is informative.; Preheat temperature depends on casting geometry, thickness and climatic conditions.

[2] Interpass Temperature: Production welding by the foundry; ferritic/martensitic guidance is informative.

[3] Post-weld Heat Treatment: Production welding by the foundry; ferritic/martensitic guidance is informative.; In general, production welds are major when prepared cavity depth exceeds 40% of the wall thickness; minor weld corrosion conditions may require special agreement.

EN 10293 · Edition 2015

[4] Preheat: Preheat depends on casting geometry, thickness and climatic conditions.

[5] Post-weld Heat Treatment: Post-weld temperature 20–50 °C below the base-material tempering temperature

Applications

At the casting-family level, typical applications include valve bodies, pump casings and other pressure-containing components. Material selection should account for service temperature, loading and the specified delivery condition.

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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

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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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