



G24Mn6 (EN 1.1118) Low-Alloy Steel Casting Material

Introduction

G24Mn6 (EN 1.1118) 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	G24Mn6	EN 1.1118
EN 10293	Steel castings — Steel castings for general engineering uses	2015	G24Mn6	EN 1.1118
EN 10340	Steel castings for structural uses	2007	G24Mn6	EN 1.1118

Physical Properties

N/A

Chemical Composition

Element	EN 10213 Edition 2007+A1:2016 · wt.% Cast analysis	EN 10293 Edition 2015 · wt.% Cast analysis	EN 10340 Edition 2007 · wt.% Cast analysis
C	0.20–0.25	0.20–0.25	0.20–0.25
Si	≤ 0.60	≤ 0.60	≤ 0.60
Mn	1.50–1.80	1.50–1.80	1.50–1.80
P	≤ 0.020 ^[1]	≤ 0.020 ^[2]	≤ 0.020
S	≤ 0.015	≤ 0.015	≤ 0.015
Cr	≤ 0.30	≤ 0.30 ^[3]	≤ 0.30 ^[4]
Ni	≤ 0.40	≤ 0.40 ^[3]	≤ 0.40 ^[4]



Element	EN 10213 Edition 2007+A1:2016 · wt.% Cast analysis	EN 10293 Edition 2015 · wt.% Cast analysis	EN 10340 Edition 2007 · wt.% Cast analysis
Mo	≤ 0.15	≤ 0.15 ^[3]	≤ 0.12 ^[4]
Cu	≤ 0.30	≤ 0.30 ^[3]	≤ 0.30 ^[4]
V	≤ 0.05	≤ 0.05 ^[3]	≤ 0.03 ^[4]

Notes

EN 10213 · Edition 2007+A1:2016

^[1] P: A phosphorus maximum of 0.025 wt.% may be agreed between purchaser and manufacturer.

EN 10293 · Edition 2015

^[2] P: A maximum phosphorus content of 0.025 wt.% is permitted by agreement between purchaser and manufacturer.

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

EN 10340 · Edition 2007

^[4] Cr/Ni/Mo/Cu/V: Cr + Mo + Ni + V + Cu ≤ 1.00 wt.%.

Heat Treatment

EN 10213–2007+A1:2016 · +QT2

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C ^[1]	liquid quench
2	: tempering	600–650 °C ^[1]	—

EN 10213–2007+A1:2016 · +QT3

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C ^[2]	liquid quench
2	: tempering	650–680 °C ^[2]	—

EN 10293–2015 · +QT1

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C	liquid
2	: tempering	520–570 °C	—

EN 10293–2015 · +QT2

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C	liquid



Step	Operation	Temperature	Cooling
2	: tempering	600–650 °C	—

EN 10293–2015 · +QT3

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C	liquid
2	: tempering	650–680 °C	—

EN 10340–2007 · +QT1

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C	liquid
2	: tempering	520–570 °C	—

EN 10340–2007 · +QT2

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C	liquid
2	: tempering	600–650 °C	—

EN 10340–2007 · +QT3

Step	Operation	Temperature	Cooling
1	: quenching	880–950 °C	liquid
2	: tempering	650–680 °C	—

Notes**EN 10213 · Edition 2007+A1:2016**

^[1] +QT2: Treatment temperatures are given for information; required delivery condition is specified separately.

^[2] +QT3: Treatment temperatures are given for information; required delivery condition is specified separately.

Mechanical Properties

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

Property	EN 10213 Edition 2007+A1:2 016 +QT2	EN 10213 Edition 2007+A1:2 016 +QT3	EN 10293 Edition 2015 +QT1 ^[1]	EN 10293 Edition 2015 +QT2 ^[2]	EN 10293 Edition 2015 +QT3 ^[3]	EN 10340 Edition 2007 +QT1 ^[4]	EN 10340 Edition 2007 +QT2 ^[5]	EN 10340 Edition 2007 +QT3 ^[6]
Yield Strength (Rp0.2)	>= 500 MPa ^[7]	>= 400 MPa ^[8]	>= 550 MPa ^[9]	>= 500 MPa ^[10]	>= 400 MPa ^[11]	>= 550 MPa ^[12]	>= 500 MPa ^[13]	>= 400 MPa ^[14]



Property	EN 10213 Edition 2007+A1:2 016 +QT2	EN 10213 Edition 2007+A1:2 016 +QT3	EN 10293 Edition 2015 +QT1 ^[1]	EN 10293 Edition 2015 +QT2 ^[2]	EN 10293 Edition 2015 +QT3 ^[3]	EN 10340 Edition 2007 +QT1 ^[4]	EN 10340 Edition 2007 +QT2 ^[5]	EN 10340 Edition 2007 +QT3 ^[6]
Tensile Strength	650–800 MPa ^[7]	600–800 MPa ^[8]	700–800 MPa ^[9]	650–800 MPa ^[10]	600–800 MPa ^[11]	700–800 MPa ^[12]	650–800 MPa ^[13]	600–800 MPa ^[14]
Elongation	$\geq 15\%$ ^[7]	$\geq 18\%$ ^[8]	$\geq 12\%$ ^[9]	$\geq 15\%$ ^[10]	$\geq 18\%$ ^[11]	$\geq 12\%$ ^[12]	$\geq 15\%$ ^[13]	$\geq 18\%$ ^[14]
Impact Energy	$\geq 50\text{ J}$ ^[7] $\geq 27\text{ J}$ ^[15]	$\geq 60\text{ J}$ ^[8] $\geq 27\text{ J}$ ^[16]	$\geq 27\text{ J}$ ^[17]	$\geq 27\text{ J}$ ^[18]	$\geq 27\text{ J}$ ^[19]	$\geq 27\text{ J}$ ^[20]	$\geq 27\text{ J}$ ^[21]	$\geq 27\text{ J}$ ^[22]

Notes

EN 10293 · Edition 2015

^[1] All properties in this column; +QT1: wall thickness $\leq 50\text{ mm}$; Test block of relevant thickness; maximum test-block wall thickness 150 mm; Properties apply to the casting up to the specified maximum wall thickness; above this, foreseeable lowering shall be agreed.

^[2] All properties in this column; +QT2: wall thickness $\leq 100\text{ mm}$; Test block of relevant thickness; maximum test-block wall thickness 150 mm; Properties apply to the casting up to the specified maximum wall thickness; above this, foreseeable lowering shall be agreed.

^[3] All properties in this column; +QT3: wall thickness $\leq 150\text{ mm}$; Test block of relevant thickness; maximum test-block wall thickness 150 mm; Properties apply to the casting up to the specified maximum wall thickness; above this, foreseeable lowering shall be agreed.

^[9] Yield Strength (Rp0.2)/Tensile Strength/Elongation; +QT1: Room temperature

^[10] Yield Strength (Rp0.2)/Tensile Strength/Elongation; +QT2: Room temperature

^[11] Yield Strength (Rp0.2)/Tensile Strength/Elongation; +QT3: Room temperature

^[17] Impact Energy; +QT1: Test at $-20\text{ }^{\circ}\text{C}$

^[18] Impact Energy; +QT2: Test at $-30\text{ }^{\circ}\text{C}$

^[19] Impact Energy; +QT3: Test at $-30\text{ }^{\circ}\text{C}$

EN 10340 · Edition 2007

^[4] All properties in this column; +QT1: wall thickness $\leq 50\text{ mm}$; Test block of relevant thickness; maximum thickness 150 mm; Yield and tensile strength also apply to the casting up to the maximum relevant wall thickness.

^[5] All properties in this column; +QT2: wall thickness $\leq 100\text{ mm}$; Test block of relevant thickness; maximum thickness 150 mm; Yield and tensile strength also apply to the casting up to the maximum relevant wall thickness.

^[6] All properties in this column; +QT3: wall thickness $\leq 150\text{ mm}$; Test block of relevant thickness; maximum thickness 150 mm; Yield and tensile strength also apply to the casting up to the maximum relevant wall thickness.

^[12] Yield Strength (Rp0.2)/Tensile Strength/Elongation; +QT1: Room temperature

^[13] Yield Strength (Rp0.2)/Tensile Strength/Elongation; +QT2: Room temperature

^[14] Yield Strength (Rp0.2)/Tensile Strength/Elongation; +QT3: Room temperature

^[20] Impact Energy; +QT1: Test at $-20\text{ }^{\circ}\text{C}$

^[21] Impact Energy; +QT2: Test at $-30\text{ }^{\circ}\text{C}$

^[22] Impact Energy; +QT3: Test at $-30\text{ }^{\circ}\text{C}$

**EN 10213 · Edition 2007+A1:2016**

^[7] Yield Strength (Rp0.2)/Tensile Strength/Elongation/Impact Energy; +QT2: 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

^[8] Yield Strength (Rp0.2)/Tensile Strength/Elongation/Impact Energy; +QT3: wall thickness ≤ 150 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

^[15] Impact Energy; +QT2: Test at -30 °C; Test block; maximum thickness 150 mm; Specified low-temperature impact requirement

^[16] Impact Energy; +QT3: Test at -30 °C; Test block; maximum thickness 150 mm; Specified low-temperature impact requirement

Welding Conditions**EN 10213–2007+A1:2016**

Requirement	Value
Preheat	20–150 °C ^[1]
Interpass Temperature	≤ 350 °C ^[2]
Post-weld Heat Treatment	Post-weld heat treatment temperature is 20–50 °C below the tempering temperature. ^[3]

EN 10293–2015

Requirement	Value
Preheat	20–150 °C ^[4]
Interpass Temperature	≤ 350 °C
Post-weld Heat Treatment	Post-weld temperature 20–50 °C below the base-material tempering temperature

EN 10340–2007

Requirement	Value
Preheat	20–150 °C ^[5]
Interpass Temperature	≤ 350 °C
Post-weld Heat Treatment	No post-weld heat treatment necessary

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.

EN 10340 · Edition 2007

^[5] Preheat: Preheat depends on casting geometry, thickness and climatic conditions.

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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CASTING QUALITY



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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