



GX4CrNi13-4 (EN 1.4317) Martensitic Stainless Steel Casting Material

Introduction

GX4CrNi13-4 is a martensitic stainless steel grade specified in EN 10283 for corrosion-resistant cast 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

CA6NM — ASTM A743^[1]

Notes

^[1] Source: ISO 11972:2023, Table A.1 (similar grade reference).

Reference Standards

Standard	Standard Title	Edition	Specification	Identifier
EN 10213	Steel castings for pressure purposes	2007+A1:2016	GX4CrNi13-4	EN 1.4317
EN 10283	Corrosion resistant steel castings	2019	GX4CrNi13-4	EN 1.4317
EN 10293	Steel castings — Steel castings for general engineering uses	2015	GX4CrNi13-4	EN 1.4317
EN 10340	Steel castings for structural uses	2007	GX4CrNi13-4	EN 1.4317
ISO 11972	Corrosion-resistant cast steels for general applications	2023	GX4CrNi13-4	EN 1.4317

Physical Properties

EN 10213–2007+A1:2016

Property	Value	Note
Density	7.7 kg/dm ³	Test at 20 °C
Thermal Expansion	10.5 ×10 ⁻⁶ /K	Temperature range: 20–100 °C
Thermal Expansion	11 ×10 ⁻⁶ /K	Temperature range: 20–300 °C
Thermal Expansion	12 ×10 ⁻⁶ /K	Temperature range: 20–500 °C
Thermal Conductivity	26 W/(m·K)	Test at 50 °C



Property	Value	Note
Thermal Conductivity	27 W/(m·K)	Test at 100 °C
Specific Heat	460 J/(kg·K)	Test at 20 °C
Magnetic Property	Magnetic	

EN 10283–2019

Property	Value	Note
Density	7.7 kg/dm ³	Test at 20 °C
Specific Heat	460 J/(kg·K)	Test at 20 °C
Thermal Conductivity	26 W/(m·K)	Test at 50 °C
Thermal Conductivity	27 W/(m·K)	Test at 100 °C
Thermal Expansion	10.5 ×10 ⁻⁶ /K	Temperature range: 20–100 °C
Thermal Expansion	11 ×10 ⁻⁶ /K	Temperature range: 20–300 °C
Thermal Expansion	12 ×10 ⁻⁶ /K	Temperature range: 20–500 °C

Chemical Composition

Element	EN 10213 Edition 2007+A1:2016 · wt.% Cast analysis	EN 10283 Edition 2019 · wt.% Cast analysis	EN 10293 Edition 2015 · wt.% Cast analysis	EN 10340 Edition 2007 · wt.% Cast analysis
C	≤ 0.06	≤ 0.06	≤ 0.06	≤ 0.06
Si	≤ 1.00	≤ 1.00	≤ 1.00	≤ 1.00
Mn	≤ 1.00	≤ 1.00	≤ 1.00	≤ 1.00
P	≤ 0.035	≤ 0.035	≤ 0.035	≤ 0.035
S	≤ 0.025	≤ 0.025	≤ 0.025	≤ 0.015
Cr	12.00–13.50	12.00–13.50	12.00–13.50	12.00–13.50
Ni	3.50–5.00	3.50–5.50	3.50–5.00	3.50–5.00
Mo	≤ 0.70	≤ 0.70	≤ 0.70	≤ 0.70
Cu	≤ 0.30	≤ 0.30 ^[1]	≤ 0.30 ^[2]	≤ 0.30
N	— / Not specified	— / Not specified	— / Not specified	≤ 0.08
V	≤ 0.08	≤ 0.08 ^[1]	≤ 0.08 ^[2]	— / Not specified



Element	EN 10213 Edition 2007+A1:2016 · wt.% Cast analysis	EN 10283 Edition 2019 · wt.% Cast analysis	EN 10293 Edition 2015 · wt.% Cast analysis	EN 10340 Edition 2007 · wt.% Cast analysis	ISO 11972 Edition 2023 · wt.%
C	<= 0.06	<= 0.06	<= 0.06	<= 0.06	<= 0.06
Si	<= 1.00	<= 1.00	<= 1.00	<= 1.00	<= 1.0
Mn	<= 1.00	<= 1.00	<= 1.00	<= 1.00	<= 1.0
P	<= 0.035	<= 0.035	<= 0.035	<= 0.035	<= 0.035
S	<= 0.025	<= 0.025	<= 0.025	<= 0.015	<= 0.025
Cr	12.00–13.50	12.00–13.50	12.00–13.50	12.00–13.50	12.0–13.5
Ni	3.50–5.00	3.50–5.50	3.50–5.00	3.50–5.00	3.5–5.0
Mo	<= 0.70	<= 0.70	<= 0.70	<= 0.70	<= 0.70
Cu	<= 0.30	<= 0.30 ^[1]	<= 0.30 ^[2]	<= 0.30	— / Not specified
N	— / Not specified	— / Not specified	— / Not specified	<= 0.08	— / Not specified
V	<= 0.08	<= 0.08 ^[1]	<= 0.08 ^[2]	— / Not specified	— / Not specified

Notes

EN 10283 · Edition 2019

^[1] Cu/V: Applies unless otherwise agreed; unspecified elements shall not be intentionally added without purchaser agreement except for finishing the heat.

EN 10293 · Edition 2015

^[2] 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	1000–1050 °C ^[1]	air or liquid quench
2	: tempering	590–620 °C ^[1]	—

EN 10283–2019 · +QT1

Step	Operation	Temperature	Cooling
1	quenching	1000–1050 °C	air or liquid
2	tempering	590–620 °C	—



EN 10283–2019 · +QT2

Step	Operation	Temperature	Cooling
1	quenching	1000–1050 °C	air or liquid
2	tempering	500–530 °C	—

EN 10283–2019 · +QT3

Step	Operation	Temperature	Cooling
1	quenching	1000–1050 °C	air or liquid
2	tempering	660–680 °C	—
3	tempering	560–620 °C	—

EN 10293–2015 · +QT

Step	Operation	Temperature	Cooling
1	: quenching	1000–1050 °C	air
2	: tempering	590–620 °C	—

EN 10340–2007 · +QT

Step	Operation	Temperature
1	: quenching	1000–1050 °C
2	: tempering	590–620 °C

ISO 11972–2023 · QT1

Step	Operation	Temperature	Cooling
1	austenitizing	1000–1050 °C	air cool
2	tempering	570–620 °C	air or furnace cool

ISO 11972–2023 · QT2

Step	Operation	Temperature	Cooling
1	austenitizing	1000–1050 °C	air cool
2	tempering	500–530 °C	air or furnace cool

Notes

EN 10213 · Edition 2007+A1:2016

^[1] +QT: 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	EN 10283 Edition 2019 +QT1 ^[1]	EN 10283 Edition 2019 +QT2 ^[2]	EN 10283 Edition 2019 +QT3 ^[3]	EN 10293 Edition 2015 ^[4]	EN 10340 Edition 2007 ^[5]	ISO 11972 Edition 2023 QT1 ^[6]	ISO 11972 Edition 2023 QT2 ^[7]
Yield Strength (Rp0.2)	>= 550 MPa ^[8] >= 515 MPa ^[9] >= 485 MPa ^[10] >= 455 MPa ^[11] >= 440 MPa ^[12]	>= 550 MPa	>= 830 MPa	>= 500 MPa	>= 550 MPa	>= 570 MPa	>= 550 MPa	>= 830 MPa
Tensile Strength	760–960 MPa ^[8]	>= 760 MPa	>= 900 MPa	>= 700 MPa	760–980 MPa	760–960 MPa	>= 750 MPa	>= 900 MPa
Elongation	>= 15 % ^[8]	>= 15 %	>= 12 %	>= 16 %	>= 15 %	>= 15 %	>= 15 %	>= 12 %
Impact Energy	>= 27 J ^[8]	>= 50 J ^[13]	>= 35 J ^[14]	>= 50 J ^[15]	>= 50 J	>= 50 J	>= 50 J ^[16]	>= 35 J ^[17]

Notes

EN 10283 · Edition 2019

^[1] All properties in this column; +QT1: wall thickness ≤ 300 mm; Test block; maximum thickness 150 mm; Room temperature; Yield and tensile strength also apply to the casting up to the maximum specified wall thickness.

^[2] All properties in this column; +QT2: wall thickness ≤ 300 mm; Test block; maximum thickness 150 mm; Room temperature; Yield and tensile strength also apply to the casting up to the maximum specified wall thickness.

^[3] All properties in this column; +QT3: wall thickness ≤ 300 mm; Test block; maximum thickness 150 mm; Room temperature; Yield and tensile strength also apply to the casting up to the maximum specified wall thickness.

^[13] Impact Energy; +QT1: KV2 as specified in

^[14] Impact Energy; +QT2: KV2 as specified in

^[15] Impact Energy; +QT3: KV2 as specified in

EN 10293 · Edition 2015

^[4] All properties in this column: wall thickness ≤ 300 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 10340 · Edition 2007

^[5] All properties in this column: wall thickness ≤ 300 mm; Test block of relevant thickness; maximum thickness 150 mm; Room temperature; Yield and tensile strength also apply to the casting up to the maximum relevant wall thickness.

ISO 11972 · Edition 2023

^[6] All properties in this column; QT1: wall thickness ≤ 300 mm; Room temperature; Test blocks used to verify mechanical properties shall not exceed 150 mm thickness. Properties for samples removed from castings shall be agreed between manufacturer and purchaser.



[7] All properties in this column; QT2: wall thickness ≤ 300 mm; Room temperature; Test blocks used to verify mechanical properties shall not exceed 150 mm thickness. Properties for samples removed from castings shall be agreed between manufacturer and purchaser.

[16] Impact Energy; QT1: Verification of impact tests is required only when indicated by the customer.

[17] Impact Energy; QT2: Verification of impact tests is required only when indicated by the customer.

EN 10213 · Edition 2007+A1:2016

[8] Yield Strength (Rp0.2)/Tensile Strength/Elongation/Impact Energy: wall thickness ≤ 300 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

[9] Yield Strength (Rp0.2): Test at 100 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

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

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

[12] Yield Strength (Rp0.2): Test at 350 °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	100–200 °C ^[1]
Interpass Temperature	≤ 300 °C ^[2]
Post-weld Heat Treatment	Post-weld heat treatment: normal tempering temperature. ^[3]

EN 10283–2019

Requirement	Value
Preheat	20–200 °C ^[4]
Interpass Temperature	At manufacturer discretion unless otherwise agreed
Post-weld Heat Treatment	Tempering at the same temperature as the base material ^[5]
Post-weld Heat Treatment	Tempering at the same temperature as the base material ^[6]

EN 10293–2015

Requirement	Value
Preheat	100–200 °C ^[7]
Interpass Temperature	≤ 300 °C
Post-weld Heat Treatment	Same as base-material tempering temperature

**EN 10340–2007**

Requirement	Value
Preheat	100–200 °C ^[8]
Interpass Temperature	<= 300 °C
Post-weld Heat Treatment	Same as the base-material tempering temperature

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 10283 · Edition 2019

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

^[5] Post-weld Heat Treatment: minor welds

^[6] Post-weld Heat Treatment: major welds

EN 10293 · Edition 2015

^[7] Preheat: Preheat depends on casting geometry, thickness and climatic conditions.

EN 10340 · Edition 2007

^[8] Preheat: Preheat depends on casting geometry, thickness and climatic conditions.

Applications

Typical casting applications include valves, continuous-casting rolls and Pelton or Francis turbine components.

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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.

Contact with Us Immediately:

Mark Wang

Email: mark@castingquality.com

WhatsApp: +861396488078

Website: www.castingquality.com