GX2CrNiMo19-11-2 (EN 1.4409) Austenitic Stainless Steel Casting Material

Introduction

GX2CrNiMo19-11-2 is a austenitic 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

CF3M — ASTM A351 / ASTM A743 / ASTM A744[1]

Notes

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

Reference Standards

Standard	Standard Title	Edition	Specification	Identifier
EN 10213	Steel castings for pressure purposes	2007+A1 :2016	GX2CrNiMo19-11-2	EN 1.4409
EN 10283	Corrosion resistant steel castings	2019	GX2CrNiMo19-11-2	EN 1.4409
EN 10340	Steel castings for structural uses	2007	GX2CrNiMo19-11-2	EN 1.4409
ISO 11972	Corrosion-resistant cast steels for general applications	2023	GX2CrNiMo19-11-2	EN 1.4409

Physical Properties

EN 10213–2007+A1:2016

Property	Value	Note
Density	7.9 kg/dm3	Test at 20 °C
Thermal Expansion	15.8 ×10?6/K	Temperature range: 20–100 °C
Thermal Expansion	17 ×10?6/K	Temperature range: 20–300 °C
Thermal Expansion	17.7 ×10?6/K	Temperature range: 20–500 °C
Thermal Conductivity	14.5 W/(m·K)	Test at 50 °C

Property	Value	Note
Thermal Conductivity	15.8 W/(m·K)	Test at 100 °C
Specific Heat	530 J/(kg·K)	Test at 20 °C
Magnetic Property	Not or slightly magnetic	

EN 10283–2019

Property	Value	Note
Density	7.9 kg/dm3	Test at 20 °C
Specific Heat	530 J/(kg·K)	Test at 20 °C
Thermal Conductivity	14.5 W/(m·K)	Test at 50 °C
Thermal Conductivity	15.8 W/(m·K)	Test at 100 °C
Thermal Expansion	15.8 ×10?6/K	Temperature range: 20–100 °C
Thermal Expansion	17 ×10?6/K	Temperature range: 20–300 °C
Thermal Expansion	17.7 ×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 10340 Edition 2007 · wt.% Cast analysis	ISO 11972 Edition 2023 · wt.%
C	<= 0.030	<= 0.030	<= 0.030	<= 0.03
Si	<= 1.50	<= 1.50	<= 1.50	<= 1.5
Mn	<= 2.00	<= 2.00	<= 2.00	<= 2.0
P	<= 0.035	<= 0.035	<= 0.035	<= 0.035
S	<= 0.025	<= 0.025	<= 0.025	<= 0.025
Cr	18.00–20.00	18.00–20.00	18.00–20.00	18.0–20.0
Ni	9.00–12.00	9.00–12.00	9.00–12.00	9.0–12.0
Mo	2.00–2.50	2.00–2.50	2.00–2.50	2.00–2.50
Cu	<= 0.50	<= 0.50[1]	<= 0.50	— / Not specified
N	<= 0.20	<= 0.20	<= 0.20	<= 0.20

Notes

EN 10283 · Edition 2019

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

Heat Treatment

EN 10213–2007+A1:2016 · +AT

Step	Operation	Temperature	Cooling
1	: solution annealing	1080–1150 °C[1]	water quench

EN 10283–2019 · +AT

Step	Operation	Temperature	Cooling
1	solution annealing	1080–1150 °C	water

EN 10340–2007 · +AT

Step	Operation	Temperature	Cooling
1	: solution annealing	1080–1150 °C	water

ISO 11972–2023 · Solution treated

Step	Operation	Temperature	Cooling
1	solution treatment	1080–1150 °C[2]	quench

Notes

EN 10213 · Edition 2007+A1:2016

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

ISO 11972 · Edition 2023

[2] Solution treated: Depending on thickness, accelerated air cooling.

Mechanical Properties

Property	EN 10213 Edition 2007+A1:2016	EN 10283 Edition 2019[1]	EN 10340 Edition 2007[2]	ISO 11972 Edition 2023[3]
Yield Strength (Rp1.0)	>= 220 MPa[4] >= 175 MPa[5] >= 145 MPa[6] >= 115 MPa[7] >= 105 MPa[8]	>= 220 MPa	— / Not specified	>= 220 MPa
Tensile Strength	440–640 MPa[4]	>= 440 MPa	440–640 MPa	>= 440 MPa
Elongation	>= 30 %[4]	>= 30 %	>= 30 %	>= 30 %
Impact Energy	>= 80 J[4] >= 70 J[9]	>= 80 J[10]	>= 80 J	>= 80 J[11]
Yield Strength (Rp0.2)	— / Not specified	>= 195 MPa	>= 195 MPa	>= 195 MPa

Notes

EN 10283 · Edition 2019

[1] All properties in this column: wall thickness <= 150 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.

[10] Impact Energy: KV2 as specified in

EN 10340 · Edition 2007

[2] All properties in this column: wall thickness <= 150 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

[3] All properties in this column: wall thickness <= 150 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.

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

EN 10213 · Edition 2007+A1:2016

[4] Yield Strength (Rp1.0)/Tensile Strength/Elongation/Impact Energy: 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

[5] Yield Strength (Rp1.0): Test at 100 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[6] Yield Strength (Rp1.0): Test at 200 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[7] Yield Strength (Rp1.0): Test at 300 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[8] Yield Strength (Rp1.0): Test at 400 °C; Verification of elevated-temperature yield values is subject to agreement at enquiry and order.

[9] Impact Energy: Test at -196 °C; Test block; maximum thickness 150 mm; Optional by agreement at enquiry and order

CASTING QUALITY

Welding Conditions

EN 10213–2007+A1:2016

Requirement	Value
Preheat	No preheat[1]
Interpass Temperature	At manufacturer discretion unless otherwise agreed[2]
Post-weld Heat Treatment	No heat treatment necessary. +AT is required for low-temperature use; minor welds require special agreement where corrosion conditions apply.[3]

EN 10283–2019

Requirement	Value
Preheat	No preheat[4]
Interpass Temperature	At manufacturer discretion unless otherwise agreed
Post-weld Heat Treatment	No post-weld heat treatment necessary[5]

Requirement	Value
Post-weld Heat Treatment	No post-weld heat treatment necessary[6]

EN 10340–2007

Requirement	Value
Preheat	No preheat[7]
Interpass Temperature	At manufacturer discretion unless otherwise agreed
Post-weld Heat Treatment	No post-weld heat treatment necessary[8]

Notes

EN 10213 · Edition 2007+A1:2016

[1] Preheat: Production welding by the foundry; requirements for austenitic/austenitic-ferritic grades are normative.; Preheat temperature depends on casting geometry, thickness and climatic conditions.

[2] Interpass Temperature: Production welding by the foundry; requirements for austenitic/austenitic-ferritic grades are normative.

[3] Post-weld Heat Treatment: Production welding by the foundry; requirements for austenitic/austenitic-ferritic grades are normative.; 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; Special arrangements may be agreed according to corrosion conditions. With low preheat and interpass temperatures (<=150 °C), post-weld heat treatment may be suppressed by agreement.

[6] Post-weld Heat Treatment: major welds; Special arrangements may be agreed according to corrosion conditions. With low preheat and interpass temperatures (<=150 °C), post-weld heat treatment may be suppressed by agreement.

EN 10340 · Edition 2007

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

[8] Post-weld Heat Treatment: For minor welds, special arrangements may be agreed according to corrosion conditions; production welds are generally major when cavity depth exceeds 40% of wall thickness. Special arrangements may be agreed according to corrosion conditions.

Applications

Typical casting applications include architectural cast components where corrosion resistance and surface finish are required.

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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.

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