

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS	Standard: CR 001
		Edition: 12-2021

Contents

1. Scope	2
2. Normative references.....	2
3. Terms and definitions	3
3.1 Acronyms, abbreviations, designation, and symbols.....	3
4. Requirements	4
4.1 Chemical composition	4
4.2 Mechanical properties.....	6
4.3 Surface quality	7
4.3.1 Surface type	8
4.3.2 Surface finish	8
4.3.3 Surface treatment	8
4.4 Microstructure.....	9
4.5 Grain size	9
4.6 Inclusions	9
4.7 Tolerances on dimensions and shape.....	9
4.8 Quality document.....	9
4.9 Delivery.....	9
4.9.1 Information to be supplied by the purchaser.....	9
4.9.2 Identification of batches.....	10
5. Rules and regulations.....	10
6. Equivalences.....	10
7. Release and revisions.....	10
Annex A	11

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS	Standard: CR 001
		Edition: 12-2021

1. Scope

This standard specifies requirements for ordering, manufacturing, and supplying cold-rolled steel coil and sheets for cold forming with thicknesses less than or equal to 3.00 mm. The steels specified in this Maxion Standard are applicable to flat products that have special requirements of mechanical properties, formability and weldability.

2. Normative references

ASTM A1008/A1008M - Standard specification for steel, sheet, cold-rolled, carbon, structural, high-strength low-alloy, high-strength low-alloy with improved formability, required hardness, solution hardened, and bake hardenable.

ASTM A366/A366M - Standard specification for commercial Steel (CS) sheet, carbon, (0.15 maximum percent) cold-rolled.

ASTM A505 - Standard specification for steel, sheet and strip, alloy, hot-rolled and cold-rolled, general requirements for.

ASTM A507 - Standard specification for drawing alloy steel, sheet and strip, hot-rolled and cold-rolled.

ASTM A619/A619M - Standard specification for non-killed forming steel (NKFS) sheet, carbon, cold-rolled.

DIN 1623 - Cold rolled strip and sheet - Technical delivery conditions - General structural steels.

EN 10130 - Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions.

EN 10139 - Cold rolled uncoated low carbon steel narrow strip for cold forming - Technical delivery conditions.

EN 10204 - Metallic products - Types of inspection documents.

EN 10268 - Cold rolled steel flat products with high yield strength for cold forming - Technical delivery conditions.

EN 10338 - Hot rolled and cold rolled non-coated products of multiphase steels for cold forming - Technical delivery conditions.

FCA MS.50002 - Sheet steel for automotive application.

GMSA EMS.ME.1508 - Cold rolled carbon steel sheets, coated or uncoated, for drawing.

GMW2 - Low carbon sheet steel.

GMW3032 - High strength sheet steel, 180 MPa through 700 MPa yield strengths.

GMW3399 - Multi-phase and ultra-high strength sheet steel.

ISUZU ISC-A210 - Cold rolled special steel strip.

ISUZU ISC-C21-001 - Cold rolled steel sheets and strip for automobile uses.

JIS B 0601 - Geometrical Product Specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters.

JIS G 3135 - Cold-reduced high strength steel sheet and strip with improved formability for automobile uses.

JIS G 3141 - Cold-reduced carbon steel sheet and strip.

JIS G 3311 - Cold rolled special steel strip.

NBR 11888 - Sheet and coils of carbon and high strength alloy steel - General requirements.

NBR 5915-1 - Sheets and coils of cold rolled steel - Part 1: Requirements.

NBR 5915-2 - Sheets and coils of cold rolled steel - Part 2: Steels for stamping.

NBR 5915-3 - Sheets and coils of cold rolled steel - Part 3: Isotropic steels and structural steels.

NBR5915-4 - Plates and coils of cold rolled steel - Part 4: Steels hardened in a heater.

NBR5915-6 - Plates and coils of cold rolled steel - Part 6: micro-alloyed steels.

NBR 6649 - Thin coils and sheets of cold rolled carbon steel for structural use - Specification.

NBR 6658 - Carbon steel sheet and coils for general use - Specification.

NBR ISO 4288 - Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture.

SAE J1392 - Steel, high strength, hot rolled sheet and strip, cold rolled sheet, and coated sheet.

SAE J2340 - Categorization and properties of dent resistant, high strength, and ultra-high strength automotive sheet steel.

SAE J403 - Chemical compositions of SAE carbon steels.

VDA 239-100 - Sheet steel for cold forming.

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS	Standard: CR 001
		Edition: 12-2021

3. Terms and definitions

3.1 Acronyms, abbreviations, designation, and symbols

Interstitial free - IF

High-strength or soft IF steels have extremely low content of interstitial elements like nitrogen or carbon, to achieve high ductility and avoid the aging phenomenon by time. These steels normally have low yield strength, high elongations, high plastic strain ratio (r-value), and excellent formability.

Isotropic - IS

These steels have excellent stretch formability due to their isotropic behavior, characterized by the similarity of mechanical properties in different directions. Such behavior is directly related to the homogeneity of its microstructure.

Bake-hardening - BH

The higher strength of bake hardenable steels is achieved by solid solution hardening (aging effect). This effect improves the dent resistance for exposed outer panels after heat treatment in the painting process (e.g. 170°C for 20 minutes).

Dual-phase - DP

The microstructure of dual-phase steels consists mainly of ferrite matrix and a second dispersed microconstituent (martensite) responsible for the increase of the mechanical strength. These steels show a low YS/TS ratio, good formability, and strong work hardening capacity.

Complex-phase - CP

Complex-phase steels are characterized by a multiphase microstructure containing a ferritic-bainitic matrix with small amounts of martensite, tempered martensite, retained austenite, and pearlite. These steels combine high strength with relatively high ductility.

Transformation Induced Plasticity - TRIP or TR

Transformation induced plasticity or retained austenite steels have a fine-grained ferritic-bainitic microstructure with embedded retained austenite. Small portions of martensite can also be present. During plastic deformation, retained austenite transforms to martensite and leads to a strong work hardening (TRIP effect).

Martensitic - MS

Martensitic steels have a fully martensitic microstructure with small amounts of ferrite and/or bainite and thus a very high strength. These steel grades are more suited for bending processes like roll forming, considering their limited drawability.

Drawing grades

SD - Super deep drawing quality

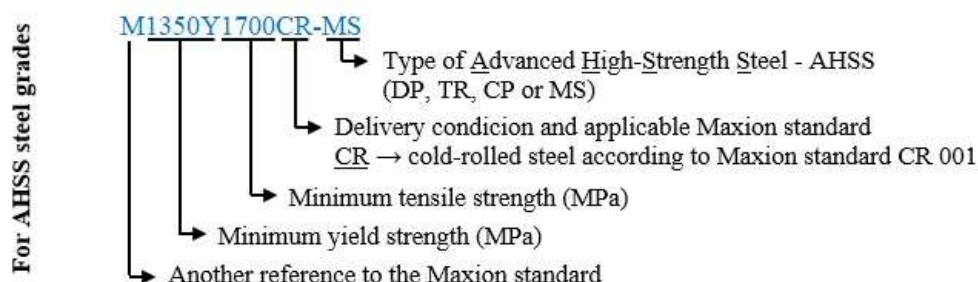
ED - Extra deep drawing quality

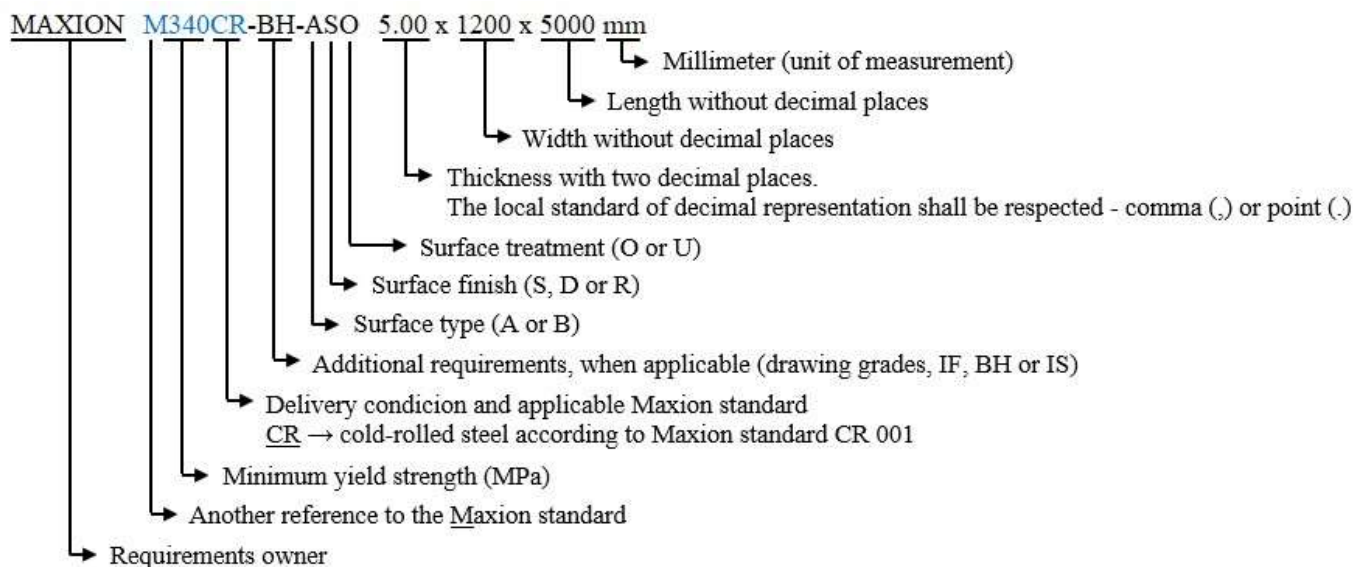
DD - Deep drawing quality

MD - Medium drawing quality

DQ - Drawing quality

This designation shall be referenced in other documents, drawing, etc., as follows example:





Minimum information must be described for each application or product:

Drawing	Steel grade + Thickness
Coil	Steel grade + Thickness + Width
Sheets	Steel grade + Thickness + Width + Length

E.g.: Coil M340CR-BH-ASO 5.00 x 1200 mm

4. Requirements

4.1 Chemical composition

Chemical composition requirements for products (coil and sheets) determined by ladle analysis or ASTM A571 are shown in Table 1.

Table 1 – Chemical composition

Grade	%C max	%Mn max	%Si max	%P max	%S max	%Al min	%Nb max	%V max	%Ti max	%B max	%Cr+ %Mo max	%Ti+ %Nb max	Notes
M100CR-SD	0.01	0.20	-	0.020	0.020	-	-	-	0.20	-	-	-	a)
M120CR-SD	0.02	0.25	-	0.020	0.020	-	-	-	0.30	-	-	-	a)
M140CR-SD	0.06	0.35	-	0.025	0.025	-	-	-	-	-	-	-	-
M140CR-ED	0.08	0.40	-	0.030	0.030	-	-	-	-	-	-	-	-
M140CR-DD	0.10	0.45	-	0.035	0.035	-	-	-	-	-	-	-	-
M140CR-MD	0.12	0.60	-	0.045	0.045	-	-	-	-	-	-	-	-
M180CR-IF	0.01	0.70	0.30	0.060	0.025	0.010	0.09	-	0.12	-	-	-	a), b)
M180CR-BH	0.06	0.70	0.50	0.060	0.030	0.015	-	-	-	-	-	-	-
M220CR-IF	0.01	0.90	0.30	0.080	0.025	0.010	0.09	-	0.12	-	-	-	a), b)
M220CR-IS	0.07	0.60	0.50	0.050	0.025	0.015	-	-	0.05	-	-	-	a), b)
M220CR-BH	0.08	0.70	0.50	0.085	0.030	0.015	-	-	-	-	-	-	-
M240CR-IF	0.01	1.60	0.30	0.100	0.025	0.010	0.09	-	0.12	-	-	-	a), b)
M240CR-BH	0.08	0.80	0.50	0.100	0.030	0.015	-	-	-	-	-	-	-
M240CR	0.07	0.80	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)

Grade	%C max	%Mn max	%Si max	%P max	%S max	%Al min	%Nb max	%V max	%Ti max	%B max	%Cr+ %Mo max	%Ti+ %Nb max	Notes
M260CR-IF	0.01	1.60	0.30	0.100	0.025	0.010	0.09	-	0.12	-	-	-	a), b)
M260CR-IS	0.07	0.70	0.50	0.050	0.025	0.015	-	-	0.05	-	-	-	a), b)
M260CR-BH	0.10	1.00	0.50	0.100	0.030	0.015	-	-	-	-	-	-	-
M260CR	0.10	1.00	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M280CR-IF	0.01	1.60	0.50	0.120	0.025	0.010	0.09	-	0.15	-	-	-	a), b)
M280CR-BH	0.10	1.00	0.50	0.110	0.030	0.015	-	-	-	-	-	-	-
M280CR	0.10	1.20	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M300CR-IS	0.08	0.70	0.50	0.080	0.025	0.015	-	-	0.05	-	-	-	a), b)
M300CR-BH	0.10	1.00	0.50	0.120	0.030	0.015	-	-	-	-	-	-	-
M300CR	0.10	1.20	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M320CR	0.10	1.20	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M340CR-BH	0.12	1.50	0.50	0.120	0.030	0.015	-	-	-	-	-	-	-
M340CR	0.12	1.50	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M380CR	0.12	1.60	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M420CR	0.14	1.60	0.50	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M460CR	0.14	1.80	0.60	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M500CR	0.14	1.80	0.60	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M550CR	0.15	1.80	0.60	0.030	0.025	0.015	0.09	-	0.15	-	-	-	b)
M260Y450CR-DP	0.14	2.00	0.75	0.080	0.015	0.015 - 1.000	-	0.20	-	0.005	1.00	0.15	c)
M290Y490CR-DP	0.14	2.00	0.75	0.080	0.015	0.015 - 1.000	-	0.20	-	0.005	1.00	0.15	c)
M330Y590CR-DP	0.15	2.50	0.75	0.040	0.015	0.015 - 1.500	-	0.20	-	0.005	1.40	0.15	c)
M440Y780CR-DP	0.18	2.50	0.80	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	1.40	0.15	c)
M590Y980CR-DP	0.20	2.90	1.00	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	1.40	0.15	c)
M700Y980CR-DP	0.23	2.90	1.00	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	1.40	0.15	c)
M400Y960CR-TR	0.24	2.20	2.00	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	0.60	0.20	c)
M450Y780CR-TR	0.25	2.50	2.20	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	0.60	0.20	c)
M350Y600CR-CP	0.18	2.20	0.80	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	1.00	0.15	c)
M570Y780CR-CP	0.18	2.50	1.00	0.080	0.015	0.015 - 2.000	-	0.20	-	0.005	1.00	0.15	c)
M780Y980CR-CP	0.23	2.70	1.00	0.080	0.015	0.015 - 2.000	-	0.22	-	0.005	1.00	0.15	c)
M900Y1180CR-CP	0.23	2.90	1.20	0.080	0.015	0.015 - 1.400	-	0.20	-	0.005	1.20	0.15	c)
M700Y900CR-MS	0.13	1.20	0.50	0.020	0.010	0.010	-	-	-	-	-	-	c)
M860Y1100CR-MS	0.13	1.20	0.50	0.020	0.010	0.010	-	-	-	-	-	-	c)
M1030Y1300CR-MS	0.28	2.00	1.00	0.020	0.010	0.010	-	-	-	-	-	-	c)
M1200Y1500CR-MS	0.28	2.00	1.00	0.020	0.010	0.010	-	-	-	-	-	-	c)
M1350Y1700CR-MS	0.35	3.00	1.00	0.020	0.010	0.010	-	-	-	-	-	-	c)

a) Ti can be replaced by Nb. C and N must be fully stabilized;

b) Nb, V, Ti, and B may be used individually or combined. However, the sum of the contents these elements shall not exceed 0.22%;

c) %Cu = 0.20 max.

max = maximum

min = minimum

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS	Standard: CR 001
		Edition: 12-2021

4.2 Mechanical properties

Mechanical properties in the delivery condition are given in Table 2. Tensile and bending tests shall be performed, according to ASTM A370 methodology, transversally to rolling direction, except for the cases indicated in the notes column. The sampling frequency shall be known and validated by the purchaser. Likewise, the mechanical properties obtained by mathematical methods can also be considered if previously approved.

Table 2 - Mechanical properties

Grade	Yield Strength - YS [MPa]	Tensile Strength - TS [MPa]	Elongation - EL [%] min		r min	n min	Notes
			L ₀ = 50 mm	L ₀ = 80 mm			
M100CR-SD	100 - 150	250 - 310	42	44	2.5	0.23	a), b), d)
M120CR-SD	120 - 170	270 - 330	41	41	2.1	0.22	a), b), c), d)
M140CR-SD	140 - 180	270 - 330	39	40	1.9	0.20	a), b), c), e)
M140CR-ED	140 - 210	270 - 350	38	38	1.6	0.18	a), b), c), e)
M140CR-DD	140 - 240	270 - 370	35	34	1.3	-	a), b), c), e)
M140CR-MD	140 - 280	270 - 410	30	28	-	-	a), b), c), f)
M180CR-IF	180 - 230	330 - 400	-	35	1.7	0.19	d)
M180CR-BH	180 - 230	290 - 360	-	34	1.6	0.17	g)
M220CR-IF	220 - 270	340 - 420	-	33	1.6	0.18	d)
M220CR-IS	220 - 270	300 - 380	-	34	-	0.18	h)
M220CR-BH	220 - 270	320 - 400	-	32	1.5	0.16	g)
M240CR-IF	240 - 300	360 - 430	34	32	1.4	0.17	d)
M240CR-BH	240 - 320	340 - 420	32	30	1.2	0.16	g)
M240CR	240 - 300 220 - 280 i)	340 - 420 330 - 410 i)	-	30 31 i)	1.2 j)	0.16 j)	-
M260CR-IF	260 - 320	380 - 440	-	31	1.4	0.17	d)
M260CR-IS	260 - 310	320 - 400	-	32	-	0.17	h)
M260CR-BH	260 - 320	360 - 440	-	29	-	-	g)
M260CR	260 - 330 240 - 310 i)	350 - 430 340 - 420 i)	-	26 27 i)	-	0.16 j)	-
M280CR-IF	280 - 340	400 - 460	32	30	1.4	0.17	d)
M280CR-BH	280 - 340	380 - 460	30	28	1.1	0.15	g)
M280CR	280 - 360 260 - 340 i)	360 - 460 350 - 450 i)	-	24 25 i)	-	0.16 j)	-
M300CR-IS	300 - 350	340 - 440	-	30	-	0.16	h)
M300CR-BH	300 - 360	390 - 480	-	26	-	-	g)
M300CR	300 - 380 280 - 360 i)	380 - 480 370 - 470 i)	-	23 24 i)	-	0.14 j)	-
M320CR	320 - 400 300 - 380 i)	400 - 500 390 - 490 i)	-	22 23 i)	-	0.14 j)	-
M340CR-BH	340 - 420	410 - 530	24	22	-	-	g)
M340CR	340 - 420 320 - 410 i)	410 - 510 400 - 500 i)	-	21 22 i)	-	0.13 j)	-

		Cópia Não Controlada MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS			Standard: CR 001		
					Edition: 12-2021		
Grade	Yield Strength - YS [MPa]	Tensile Strength - TS [MPa]	Elongation - EL [%] min		r min	n min	Notes
			L ₀ = 50 mm	L ₀ = 80 mm			
M380CR	380 - 480 350 - 450 i)	440 - 580 430 - 550 i)	-	19 20 i)	-	0.12 j)	-
M420CR	420 - 520 390 - 500 i)	470 - 600 460 - 580 i)	-	17 18 i)	-	0.11 j)	-
M460CR	460 - 580 420 - 560 i)	510 - 660 480 - 630 i)	-	13 14 i)	-	-	-
M500CR	500 - 620 460 - 600 i)	550 - 710 520 - 690 i)	-	12 13 i)	-	-	-
M550CR	550 - 650 530 - 630 i)	610 - 740 600 - 730 i)	-	12 13 i)	-	-	-
M260Y450CR-DP	260 - 340	450 min	-	27	-	0.16	g), i)
M290Y490CR-DP	290 -380	490 min	-	24	-	0.15	g), i)
M330Y590CR-DP	330 - 430	590 min	-	20	-	0.14	g), i)
M440Y780CR-DP	440 - 550	780 min	-	14	-	-	g), i)
M590Y980CR-DP	590 - 740	980 min	-	10	-	-	g), i)
M700Y980CR-DP	700 - 850	980 min	-	8	-	-	g), i)
M400Y690CR-TR	400 - 520	690 min	-	23	-	0.19	g), i)
M450Y780CR-TR	450 - 570	780 min	-	21	-	0.16	g), i)
M350Y600CR-CP	350 - 500	600 min	-	16	-	-	g), i)
M570Y780CR-CP	570 - 720	780 min	-	10	-	-	g), i)
M780Y980CR-CP	780 - 950	980 min	-	6	-	-	g), i)
M900Y1180CR-CP	900 - 1150	1180 min	-	4	-	-	g), i)
M700Y900CR-MS	700 - 1000	900 - 1100	-	3	-	-	i), k)
M860Y1100CR-MS	860 - 1100	1100 - 1300	-	3	-	-	i), k)
M1030Y1300CR-MS	1030 - 1300	1300 - 1500	-	3	-	-	i), k)
M1200Y1500CR-MS	1200 - 1500	1500 - 1700	-	3	-	-	i), k)
M1350Y1700CR-MS	1350 - 1700	1700 - 1900	-	3	-	-	i), k)
a) r and n values apply only to thickness ≥ 0.50 mm. Values are measured transversally to rolling direction; b) For thicknesses > 2.00 mm, the r value is reduced by 0.2; c) For thicknesses ≤ 0.50 mm, the YS max is increased by 40 MPa. For 0.50 < thicknesses ≤ 0.70 mm, the YS max is increased by 20 MPa; d) Non-aging effects are guaranteed for unlimited time; e) Non-aging effects are guaranteed for at least 6 months after the purchase; f) Non-aging effects are guaranteed for at least 3 months after the purchase; g) Increase in proof strength after heating - BH₂ = 35 MPa min. For thicknesses > 1.20 mm, special agreements shall be made; h) r = 1.40 max; i) Requirements for longitudinal test pieces; j) Indicative values; k) Bending 180° = 4.0t min. 1 [MPa] = 1 [N/mm²] YS or Y - Yield strength at 0.20% offset or lower yield point, if the yield strength is pronounced max = maximum min = minimum							

4.3 Surface quality

The surface of the material shall be free from coarse defects that affect its structural application. Defects that have impact on surface appearance, especially after painting, are also not acceptable. In this way, defects such as: coarse marks, siliceous scale, slip bands or stretcher-strain marks (caused by Lüders bands) shall be avoided.

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS		Standard: CR 001 Edition: 12-2021
--	---	--	--

4.3.1 Surface type

The classification of surface types depending on the application of the material is given in Table 3.

Table 3 - Surface types

Surface Type	Quality	Description
A	Exposed Surface	The surface for exposed parts shall be free of defects which might affect the uniform appearance of the paint or an electrolytic coating. The steel sheet shall meet the surface aspect for critical exposed applications.
B	Unexposed Surface	The surface for internal parts shall be free of any coarse defects or reworks that may compromise the processing and/or application of the steel. Special surface conditions can be negotiated and noted on the materials specification form.
When not informed in the order, consider surface type B.		

4.3.2 Surface finish

Surface finishes are shown in Table 4, according to JIS B 0601 and NBR ISO 4288.

Table 4 - Surface finishes

Surface Finish	Quality	Roughness - Ra [μm]
S	Bright/Smooth Finish	$Ra \leq 0.60$
D	Matte/Dull Finish	$0.56 < Ra \leq 1.50$
R	Rough Finish	$Ra > 1.50$
When not informed in the order, consider surface treatment R. Cut-off - λc: 0.80 mm Speed: 1 mm/s Test in the transverse direction the lamination		

4.3.3 Surface treatment

Applicable surface treatments are shown in Table 5. Details such as oil type and its quantity are given in the engineering specification or provided by the purchaser at the time of enquiry and order.

Table 5 - Surface treatments

Surface Treatment	Quality
O	Pickled and Oiled
U	Unpickled and Unoiled
When not informed in the order, consider surface treatment U.	

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS	Standard: CR 001
		Edition: 12-2021

4.4 Microstructure

The microstructure shall be suitable to the application of the material.

4.5 Grain size

Grain size shall be determined to ASTM E112 or by another previously validated method. Uniform and fine grain size (ASTM grain size number > 7) are desired for materials in this standard.

4.6 Inclusions

The material shall be free from coarse inclusions and thin inclusion shall not exceed a ranting of 2.0, according to ASTM E45. Furthermore, the inclusions present cannot compromise the application of the material. To characterize the inclusions another methodology can be used, however, prior validation is required.

4.7 Tolerances on dimensions and shape

The tolerance requirements are those given in the engineering specification or provided by the purchaser at the time of enquiry and order.

4.8 Quality document

An inspection document, inspection certificate or quality certificate shall be supplied to prove the conformity of the supplied product. This document must include the methodology of tests and analysis, as well as the results obtained for the fundamental specifications, according to EN 10204.

4.9 Delivery

4.9.1 Information to be supplied by the purchaser

In order to allow the manufacture to supply conform products, the following information shall be provided by the purchaser at the time of enquiry and order:

- Part number;
- Full designation of the material as given in item 3.1;
- Nominal dimensions and its tolerances, or normative reference related to dimensions;
- Application of the products;
- Surface type, finish, and treatment;
- Type of edge;
- Oil type and quantity (when applicable);
- Package;
- Limits on the mass and the sizes of the coils and sheets;
- Additional requirements;
- Additional inspection documents.

Note: The producer must develop and supply the material in order to meet the performance and application desired by the purchaser.

	MAXION STRUCTURAL COMPONENTS COLD-ROLLED STEELS FOR COLD FORMING GENERAL REQUIREMENTS	Standard: CR 001
		Edition: 12-2021

4.9.2 Identification of batches

The batches supplied shall be identified from the labels containing at least the following information:

- Client name;
- Full designation of the material as given in item 3.1;
- Invoice number;
- Batch identification;
- Mass;

Additional information must be negotiated by the purchaser at the time of enquiry and order.

5. Rules and regulations

The products shall be produced and supplied in accordance with applicable international and local legislations. The supplier shall create the Material Data Sheets (MDS) and/or Conflict Minerals Declarations (CMD) and send them to their customer at no cost. If requested by the customer, this registration must be done through platforms that collect, maintain, analyze, and archive information about the materials across all levels of your supply chain (e.g. IMDS and/or CDX). The producer must supply products according to initial approval or equivalent. Any changes in material or manufacturing process is not permitted without prior notification and approval. Lack of notification by the supplier constitutes grounds for rejection of any shipment.

6. Equivalences

See Table 6 of annex A.

7. Release and revisions

Issue	Edition	Date	Description	Responsible
0	12-2021	12/15/2021	Initial publication	Dr. Paulo H. O. M. Alves Quality Dept.

Annex A
Table 6 - Equivalence relationship between different designations of steels

MAXION	STEEL NUMBER	BRAZIL ABNT NBR	EUROPE 'EN'	GERMANY DIN, SEW, VDA	USA ASTM, SAE	JAPAN JIS	ITALY UNI	FRANCE AFNOR	ENGLAND BS	SPAIN UNE	SWEDEN SS	INTER 'ISO'	GM	FIAT FCA
M100CF-SD	1.0898	NBR 5915 EEP GR 4	EN 10130 DC07	-	-	-	FEP07	-	-	-	-	-	-	-
M120CF-SD	1.0873	NBR 5915 EEP GR 3	EN 10130 DC06	IF18 CR5	ED05	SPCG	FEP06	IF	-	-	-	-	GMW2M-ST-5-CR5 GM6409M-CR5 EMS.ME.1508.GRADE CSC	CR06
M140CF-SD	1.0312	NBR 5915 EEP GR 2	EN 10130 DC05	CR4	1006 DDS	SPCF	FEP05	SES	-	-	-	-	GMW2M-ST-5-CR4 QS 101020 (QS 10102K) GM6409M-CR4 EMS.ME.1508.GRADE EEP-PC	CR05
M140CF-ED	1.0338	NBR 5915 EEP GR 1	EN 10130 DC04	RRS114 St14 CR3	1008 A619 DDS DS TYPE A DS TYPE B	SPCE	FEP04	ES	1CR 1CS 1HR 1HS CR1 CR2	AP04	1147	Cr04 CR24	GMW2M-ST-5-CR3 QS 101020 (QS 10102K) GM6409M-CR3 EMS.ME.1508.GRADE EEP	CR04
M140CF-DD	1.0347	NBR 5915 EP	EN 10130 DC03	St13 US14 CR2	1008 1010	SPCD	FEP03	E	CR2 CR3	AP02	1146	-	GMW2M-ST-5-CR2 QS 101020 (QS 10102K) GM6409M-CR2 EMS.ME.1508.GRADE EP	CR02
M140CR-MD	1.0330	NBR 5915 EM NBR 6658 GF40-GF55	EN 10130 DC01	FEP01 St12 CR1	1010 CS TYPE A CS TYPE B CS TYPE C	SPCC SPCCT	FEP01	C F12 FEP01	CR4 FEP01	AP00	1142	Cr01 CR22	GMW2M-ST-5-CR1 QS 101020 (QS 10102K) GM6409M-CR1 EMS.ME.1508.GRADE EM	CR01
M180CR-IF	1.0922	NBR 5915 IFAR-180	EN 10268 HC180Y	CR160IF CR180IF	-	-	-	-	-	-	-	-	-	IFC180Y330T
M180CR-BH	1.0395	NBR 5915 BH-180	EN 10268 HC180B	CR180BH	180B BHS 180	SPFC340H	-	-	-	-	-	-	GMW3032-ST-5 CR180B2	BHC180Y290T
M220CR-IF	1.0925	NBR 5915 IFAR-210	EN 10268 HC220Y	CR180IF CR210IF	-	-	-	-	-	-	-	-	-	IFC210Y340T
M220CR-IS	1.0346	NBR 5915 IS-220	EN 10268 HC220I	-	-	-	-	-	-	-	-	-	-	-
M220CF-BH	1.0396	NBR 5915 BH-210	EN 10268 HC220B	CR180BH CR210BH	210B BHS 210	-	-	-	-	-	-	-	GMW3032-ST-5 CR210B2	BHC210Y310T
M240CR-IF	-	NBR 5915 IFAR-240	EN 10268 HC260Y	CR210IF CR240IF	-	-	-	-	-	-	-	-	-	IFC240Y360T
M240CF-BH	-	NBR 5915 BH-240	EN 10268 HC260B	CR210BH CR240BH	-	-	-	-	-	-	-	-	GMW3032-ST-5 CR240B2	BHC240Y340T
M240CR	-	NBR 5915 ARBL-240 NBR GF-21	EN 10268 HC260LA	CR210LA	SS GRADE 170 SS GRADE 205 SHS 180 SHS 210 SS GRADE 230 T1 SS GRADE 230 T2	SPFC340	-	-	-	-	-	-	GMW3032-ST-5 CR240LA	LAC210Y310T

Annex A
Table 6 - Equivalence relationship between different designations of steels (cont.)

MAXION	STEEL NUMBER	BRAZIL ABNT NBR	EUROPE "EN"	GERMANY DIN, SEW, VDA	USA ASTM, SAE	JAPAN JIS	ITALY UNI	FRANCE AFNOR	ENGLAND BS	SPAIN UNE	SWEDEN SS	INTER "ISO"	GM	FIAT FCA
M260CR-IF	1.0928	NBR 5915 IFAR-270	EN 10268 HC260Y	CR240IF	-	-	-	-	-	-	-	-	-	-
M260CR-IS	1.0349	NBR 5915 IS-260	EN 10268 HC260I	-	-	-	-	-	-	-	-	-	-	-
M260CR-BH	1.0400	NBR 5915 BH-270	EN 10268 HC260B	CR240BH	-	-	-	-	-	-	-	-	GMW 3032-ST-S CR270B2	-
M260CR	1.0480	NBR 5915 ARBL-270	EN 10268 HC260LA	CR240LA	SHS 240 SS GRADE 230 T1 SS GRADE 230 T2	SPFC340	-	-	-	-	-	-	GMW 3032-ST-S CR270LA	LAC240Y320T
M280CR-IF	-	NBR 5915 IFAR-270	EN 10268 HC260Y	-	-	-	-	-	-	-	-	-	-	IFC280Y380T
M280CR-BH	-	NBR 5915 BH-270	EN 10268 HC260B	CR270BH	-	-	-	-	-	-	-	-	-	BHC280Y380T
M280CR	-	NBR 5915 ARBL-270 NBR CF-24	EN 10268 HC260LA	CR270LA	SHS 240 SS GRADE 275 T1 SS GRADE 275 T2	SPFC370	-	-	-	-	-	-	-	LAC270Y340T
M300CR-IS	1.0447	NBR 5915 IS-300	EN 10268 HC300I	-	-	-	-	-	-	-	-	-	-	-
M300CR-BH	1.0444	NBR 5915 BH-300	EN 10268 HC300B	CR270BH	-	-	-	-	-	-	-	-	GMW 3032-ST-S CR300B2	-
M300CR	1.0489	NBR 5915 ARBL-300	EN 10268 HC300LA	CR270LA	300S SHS 280 300Y	SPFC370	-	-	-	-	-	-	GMW 3032-ST-S CR300LA	LAC270Y340T
M320CR	-	NBR 5915 ARBL-300 NBR CF-26	EN 10268 HC300LA	CR300LA	HSLAS GR 310 SHS 300 SS GRADE 310	SPFC390	-	-	-	-	-	-	-	LAC300Y360T
M340CR-BH	-	NBR 5915 BH-340	EN 10268 HC300B	-	-	-	-	-	-	-	-	-	-	-
M340CR	1.0548	NBR 5915 ARBL-340	EN 10268 HC340LA	CR300LA	300Y HSLAS GR 310 340S	SPFC390	-	-	-	-	-	-	GMW 3032-ST-S CR340LA	LAC300Y360T
M380CR	1.0550	NBR 5915 ARBL-380 NBR CF-28	EN 10268 HC380LA	CR340LA	340Y HSLAS GR 340 HSLAS-F GR 340 SS GRADE 340	SPFC440	-	-	-	-	-	-	GMW 3032-ST-S CR330LA	LAC340Y410T
M420CR	1.0556	NBR 5915 ARBL-420	EN 10268 HC420LA	CR380LA	380Y HSLAS GR 380	SPFC440	-	-	-	-	-	-	GMW 3032-ST-S CR420LA	LAC380Y450T
M460CR	1.0574	-	EN 10268 HC460LA	CR420LA	420Y HSLAS GR 410 HSLAS-F GR 410 SS GRADE 410	SPFC490	-	-	-	-	-	-	-	LAC420Y480T

Annex A
Table 6 - Equivalence relationship between different designations of steels (cont.)

MAXION	STEEL NUMBER	BRAZIL ABNT NBR	EUROPE 'EN'	GERMANY DIN, SEW, VDA	USA ASTM, SAE	JAPAN JIS	ITALY UNI	FRANCE AFNOR	ENGLAND BS	SPAIN UNE	SWEDEN SS	INTER 'ISO'	GM	FIAT FCA
M500CR	1.0573	NBR 5915 ARBL-500	EN 10268 HC500LA	CR460LA	-	SPFC490 SPFC540	-	-	-	-	-	-	GMW3032-ST-S CR500LA	LAC500Y560T
M550CR	-	NBR 5915 ARBL-550	-	-	-	SPFC540	-	-	-	-	-	-	GMW3032-ST-S CR550LA	LAC500Y560T LAC550Y620T
M260Y450CR-DP	1.0937	-	HCT450X	-	-	-	-	-	-	-	-	-	-	-
M290Y490CR-DP	1.0995	-	HCT490X	CR290Y490T-DP	-	-	-	-	-	-	-	-	GMW3395-ST-S CR490T/290Y-DP	DPC290Y490T
M330Y590CR-DP	1.0996	-	HCT590X	CR290Y490T-DP CR330Y590T-DP	-	-	-	-	-	-	-	-	GMW3395-ST-S CR590T/340Y-DP	DPC330Y590T
M440Y780CR-DP	1.0943	-	HCT780X	CR440Y780T-DP CR440Y780T-DH	-	-	-	-	-	-	-	-	GMW3395-ST-S CR780T/420Y-DP	DPC420Y780T
M590Y980CR-DP	1.0944	-	HCT980X	CR590Y980T-DP	-	-	-	-	-	-	-	-	GMW3395-ST-S CR980T/550Y-DP	DPC590Y980T
M700Y980CR-DP	1.0997	-	HCT980XG	CR700Y980T-DP CR700Y980T-DH	-	-	-	-	-	-	-	-	-	DPC700Y980T
M400Y690CR-TR	1.0947	-	HCT690T	CR400Y690T-TR	-	-	-	-	-	-	-	-	-	TRC400Y690T
M450Y780CR-TR	1.0948	-	HCT780T	CR450Y780T-TR	-	-	-	-	-	-	-	-	-	TRC440Y780T
M350Y600CR-CP	1.0953	-	HCT600C	-	-	-	-	-	-	-	-	-	-	-
M570Y780CR-CP	1.0954	-	HCT780C	CR570Y780T-CP	-	-	-	-	-	-	-	-	GMW3395-ST-S CR780T/600Y-CP	MPC570Y780T
M780Y980CR-CP	1.0955	-	HCT980C	CR780Y980T-CP	-	-	-	-	-	-	-	-	GMW3395-ST-S CR980T/800Y-CP	MPC780Y980T
M900Y1180CR-CP	1.0969	-	HCT1180G2	CR900Y1180T-CP	-	-	-	-	-	-	-	-	GMW3395-ST-S CR1180T/875Y-MP	MPC900Y1180T
M700Y900CR-MS	-	-	-	-	-	-	-	-	-	-	-	-	GMW3395-ST-S CR900T/700Y-MS	MTC700Y900T
M860Y1100CR-MS	-	-	-	CR860Y1100T-MS	-	-	-	-	-	-	-	-	GMW3395-ST-S CR1100T/860Y-MS	-
M1030Y1300CR-MS	-	-	-	CR1030Y1300T-MS	-	-	-	-	-	-	-	-	GMW3395-ST-S CR1300T/1030Y-MS	MTC1030Y1300T
M1200Y1500CR-MS	-	-	-	CR1220Y1500T-MS	-	-	-	-	-	-	-	-	GMW3395-ST-S CR1500T/1200Y-MS	MTC1200Y1500T
M1350Y1700CR-MS	-	-	-	CR1350Y1700T-MS	-	-	-	-	-	-	-	-	GMW3395-ST-S CR1700T/1350Y-MS	-