LOW CARBON STEEL, COLD ROLLED SHEET

1. SCOPE

1.1 This specification provides the requirements for low carbon cold rolled (CR) sheet steel. There are two grades covered in the specification with Grade A1 identified as the preferred grade, see Table 1. It is intended to replace Former Company Material Specifications listed in Annex B and shall be used on all applicable new drawings.

1.2 REVISED GRADES – LEGACY MATERIALS

1.2.1 Revision C of this specification establishes new Grades with chemistry and mechanical property requirements. Former Grades A and B are withdrawn and are replaced with Grades A1 and B1 as shown in Table 1. These new grades shall be used where materials on existing drawings are updated by Design Engineering per this specification. Where these material updates are made to a drawing, the change shall be documented in the revision notes on the drawing. Annex B, Table B3 lists National standard materials previously referenced for the CNH Grades that shall not be used on new or updated drawings. For existing drawings, see Section 3.2 and Annex B.

TABLE: 1 Grade and Material Description

CNH Grade	Replaced Grade	Description
A1 (Preferred)	A	Cold rolled low carbon sheet steel, commercial quality
B1	B	Cold rolled low carbon steel of drawing quality, fully aluminum killed

2. RELATED SPECIFICATIONS

CNH DWGD100 (86979040) Specifying Steel Sheet Thickness
CNH ENPJ100 (86619032) Significant Characteristics
CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings
CNH MAT1010D Design & Material Information, Low Carbon Steel, CR Sheet

3. APPLICATION

3.1 Cold rolled carbon steel sheets and narrow widths cut or slit from wide sheets or coils are produced to commercial quality for use where bending, forming, welding and moderate drawing may be required. Cold rolled sheet is commonly produced in thicknesses up to 3 mm (0.118 in). It is recommended for applications, such as painted parts, that require improved surface finish compared to hot rolled sheet.

3.2 MAT1010 Grades A1 and B1 materials may be substituted respectively where former Grades A and B are specified on existing drawings. Former MAT1010 Grades A and B and previously referenced National Standard materials do not automatically substitute for the new Grades A1 and B1 respectively as new requirements are specified.

3.3 MAT1010 Grade B1, fully killed drawing steel sheet may be used when part fabrication requires severe drawing, forming, or essential freedom from aging. Drawing steel may be used where commercial quality is specified. Where drawing steel is specified, commercial quality shall not be used.

3.4 Strip steel has separate requirements for thickness, special finish, special edge and special temper. Strip material is covered in a separate specification. Narrow widths cut from sheet steel do not qualify as strip unless it meets strip requirements.

4. REQUIREMENTS

4.1 Low Carbon CR sheet steel supplied according to MAT1010 shall meet all requirements of this specification, applicable National Standards, and any special requirements specified on the engineering drawing.

4.2 Unless otherwise specified MAT1010 Grade A1 (preferred) shall be supplied to this specification.

4.3 NATIONAL STANDARD MATERIALS

4.3.1 Annex A provides a partial listing of National Standards materials identified as acceptable for supply to the MAT1010 grades. Other National Standard materials, not listed in Annex A, that comply with MAT1010 requirements may also be supplied. In general, it is permissible to produce a part from any of these comparable National Standard grades for a corresponding the MAT1010 Grades when no special strength or composition requirements are specified.

4.3.2 CNH Industrial Design Engineering must consider the differences in dimensional tolerances and properties of National Standard sheet materials supplied to this specification to assure functionality, reliability, and serviceability of a part when manufactured in different parts of the world. In applications where these differences can not be compensated for in the design, the material may be restricted to the originally specified National Standard material as described in CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings.

4.4 CHEMISTRY

Steels supplied to this specification must conform to the composition limits in Table 2. Grade B1 steel shall be deoxidized with aluminum to prevent gas evolution during solidification. The material composition shall not be changed by the supplier without the knowledge and consent of both controlling Design Engineering and the procuring CNH Industrial facility.

TABLE 2: Chemistry – CR Sheet and Strip Composition, % Heat Analysis (Element Maximum unless otherwise indicated)

Grade	C	Mn	P	S	Al	Si	Ni	Cr (1)	Mo	V	Cb/Nb	Ti (2)
A1 (Preferred)	0.02-0.15	0.60	0.030	0.035	--- (3)	---	0.20	0.15	0.06	0.008	0.008	0.025
B1	0.02-0.08	0.50	0.030	0.030	0.020 min	---	0.20	0.15	0.06	0.008	0.008	0.025

--- indicates element content is not specified; report if analyzed.
(1) Chromium is permitted, when the carbon content is less than or equal to 0.05%, at the steel producer's option of up to 0.25% maximum.
(2) Titanium is permitted at the steel producer's option, for steels that contain 0.02% carbon or more, to the lesser of 3.4N + 1.5S or 0.025%
(3) Where aluminum deoxidized steel is required, it is acceptable to specify a minimum of 0.01% aluminum.

4.5 MECHANICAL PROPERTIES

Materials supplied to Grades A1 and B1 shall meet mechanical property requirements in Table 3.

TABLE 3: MAT1010 CR Sheet - Mechanical Properties

Grade	Tensile Strength, MPa (psi)	Yield Strength, MPa (psi)	Elongation % Min.
A1 (Preferred)	270-410 (39,000 – 59,000)	140 – 280 (20,000 – 41,000)	26 [T<0.7 mm]
			28 [T>0.7 mm]
B1	270 – 350 (39,000 – 51,000)	140 – 210 (20,000 – 30,500)	36 [T<0.7 mm]
			38 [T>0.7 mm]

T = Thickness

4.6 BEND TEST

Sheet and strip materials supplied shall be capable of being bent at room temperature through 180 degrees flat on itself, either parallel with or transversely to the direction of rolling, without any cracks formed on the outside of the bent portion of the test specimen.

4.7 FINISH AND APPEARANCE

Unless otherwise specified, sheet material shall be supplied oiled with a matte finish.

4.8 DIMENSIONS AND TOLERANCES

4.8.1 Sheet products shall conform to the permissible variations in dimensions as specified in the applicable National Standards for the material supplied for an application.

4.8.2 It is recommended that the thickness range be specified on the engineering drawing per established guidelines in CNH DWGD100 Specifying Steel Sheet Thickness.

5. SPECIAL REQUIREMENTS

Optional conditions listed in National Standards may be applied as special requirements (SPCL). These requirements shall be indicated on the engineering drawing and apply to both the CNH grade and National Standard specified.

6. INSPECTION AND REJECTION

6.1 All sheet material supplied to this specification shall be equivalent in every respect to samples approved by the purchasing CNH Industrial location. While the purchasing location may test samples from incoming shipments for quality assurance, the supplier is responsible for ensuring that shipments meet the stated requirements without depending upon the purchaser's inspection.

6.2 All National Standards and related test methods for evaluation of materials supplied to this specification are to be latest issue unless otherwise specified.

7. DRAWING SPECIFICATIONS

7.1 Specifying a restricted (RSTR) or special (SPCL) material may require the use of a significant characteristic per CNH Industrial Engineering Procedure ENPJ100 (86619032). This determination will be made as part of the design review process.

7.2 The title block of engineering drawings shall contain material designations as described in CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings.

7.3 This specification contains specific steel composition and mechanical property requirements that are additional to those in the National Standards of the referenced materials. The MAT1010 specification must therefore be reviewed to assure compliance with these specific requirements. Where MAT1010 materials are specified in the drawing title block, the CNH Industrial Material block shall include the generic material name, the CNH Industrial Material Specification number, and grade. The Local Material block shall specify the following. It shall indicate "SEE CNH MAT1010" for standard material designations where applicable National Standard materials are permitted for the specified MAT1010 Grade, see Section 7.3.1. It shall indicate "SEE NOTES" for RSTR or SPCL specified materials; the "Material" drawing note shall include the applicable Local or National Standard material that was considered in the original part design, see Sections 7.3.2 and 7.3.3.

7.3.1 Preferred materials; also see Table 3.

LOCAL MATERIAL SEE CNH MAT1010
CNH MATERIAL CR SHEET, CNH MAT1010, GRADE A1

7.3.2 Restricted Material (RSTR):

LOCAL MATERIAL SEE NOTES
CNH MATERIAL CR SHEET, CNH MAT1010, GRADE B1, RSTR

Material Note (on drawing):
CR SHEET, EN 10130, DC04
NO ALTERNATE MATERIAL PERMITTED

7.3.3 Special Requirements (SPCL):

LOCAL MATERIAL SEE NOTES
CNH MATERIAL CR SHEET, CNH MAT1010, GRADE A1, SPCL

Material Note (on drawing):
CR SHEET, ASTM A1008, CS TYPE B
Special Requirements (SPCL) are:
PICKLED AND OILED

ANNEX A
National Standard Materials and Properties Information

1. Table A1 indicates National Standard materials identified by CNH Industrial Materials Engineering that are acceptable for supply to specified MAT1010 Grades. Other National Standard materials, not currently listed, that comply with MAT1010 requirements may also be supplied for part applications without Materials Engineering approval. Additional National Standard materials will be added to this listing by Materials Engineering as this information is available.

TABLE A1: National Standard Materials – MAT1010 CR Sheet
Mechanical Properties for Reference (1), (2)

Grade	Local Material or National Standard	Hardness, Rockwell B	Tensile Strength, MPa (psi)	Yield Strength, MPa (psi)	Elongation % Min.
A1 (Preferred Grade)	ASTM A1008, CS Type B	38 – 60 (3)	320 (46,000) (3)	140-275 (20,0000–40,000) (4)	30 (4)
	DIN 1623-T1, St 12	65 max	270–410 (39,000–59,000)	280 max (41,000 max.)	28
	EN 10130, DC01 (2)	---	270–410 (39,000-59,000)	140–280 (20,000-41,000)	28
	ISO 3574, CR1 (2)	---	270–410 (39,000-59,000)	140-280 (20,000-41,000)	28
	India; IS 513, CR1		270-410 (39,000–59,000)	140–280 (20,000–41,000)	28
B1	ASTM A1008, DS Type B	35 – 48 (3)	300 (43,000) (3)	150–240 (22,000 – 35,000) (4)	36 (4)
	DIN 1623-T1, St 14	50 max	270–350 (39,000-51,000)	210 (30,500) max	38
	EN 10130, DC04	---	270–350 (39,000-51,000)	140–210 (20,000-30,500)	38
	ISO 3574, CR4	---	270–350 (39,000-51,000)	140–210 (20,000-30,500)	37
	India; IS 513, CR4	50 max	270–350 (39,000–51,000)	140–210 (20,000–30,500)	37

(1) Steel suppliers recognize that European Standard specifications have superseded DIN Standards. For design purposes it is advisable to consider EN values.
(2) Grade A1 mechanical property values are valid for a limited time period. Forming within 6 weeks of supplier availability is recommended. Grade B1 steel exhibits improved aging resistance, mechanical property values are typically valid for at least 6 months.
(3) Properties referenced are typical values from SAE J877 (1997)
(4) Property values referenced are typical (non-mandatory) values from ASTM A1008/A1008M (2020). These materials may be supplied with the understanding that mechanical properties that vary from the indicated values should be expected. Supplier certified mechanical properties if required may result in a cost penalty to be addressed at the time of ordering.

ANNEX B
Former Company and National Standard Material Information

1. Table B1 shows Former CNH Company material specifications replaced by this specification.

TABLE B1: Former CNH Company Material Specifications

Grade	CASE	NH Pennsylvania FNHA Standard	NH Zedelgem Engineering Stds.	NH Tractor Engineering
A1	MS 435	2-A-051.00 (86050094)	WS 50.04 St 12-03	Fiat 52806, FEP01 IVECO 15-2806,FEP01
B1	MS 435 Option 19	N/A	N/A	Fiat 52806, FEP03 IVECO 15-2806,FEP03
	MS 435 Option 20	2-A-055.00 (86050093)	WS 50.04 St 14-03	Fiat 52806, FEP04 IVECO 15-2806,FEP04

2. Table B2 shows National Standard materials previously designated for withdrawn Grades.

TABLE B2: Local Material and National Standard References

Former Grade	ASTM(1)	DIN (2)	BS (2)	UNI EN (2, 3)	EN (2)	FIAT
A (Preferred)	A1008 CS Type B	DIN 1623-T1 St 12	BS 1449-1.3 CR4	UNI EN 10130 DC01	EN 10130 DC01	Fiat 52806 FEP01
B	A1008 DS Type B	DIN 1623 T1 St 14	BS 1449-1.3 CR1	UNI EN 10130 DC04	EN 10130 DC04	Fiat 52806 FEP04

(1) ASTM A1008 CS Type B and DS Type B superseded ASTM A366 and A620 respectively. ASTM A619 CR Drawing Quality steel specification was discontinued.
(2) Referenced DIN, BS, and UNI specifications have been superseded by European Standard EN 10130. DIN and UNI designations however continue to be recognized by many suppliers and steel producers.
(3) UNI EN 10130, DC01 and DC04 superseded UNI 5866 FEP01 and FEP04 respectively.

3. Restricted Former Listed National Standard Materials

Table B3 lists National Standard materials that were previously listed as comparable materials for the former Grades. These materials may be designated on existing CNH Industrial drawings and are provided here as a reference only to correlate these materials to former or current Grades. The materials listed in Table B3 shall not be used on new or updated drawings.

TABLE B3: Former Listed National Standard Materials (1) – (For Reference Only)

Grade		ASTM / SAE	DIN (2)	BS (2)	EN	FIAT
A	Sheet	---	---	BS 1449-1.3 CR4	UNI EN 10130 DC01	Fiat 52806 FEP01
B	Sheet	---	---	BS 1449-1.3 CR1	UNI EN 10130 DC04	Fiat 52806 FEP04

(1) The materials referenced may be found on some drawings and in previous revisions of MAT1010. When drawings are changed, the material specified should be updated to Grades listed in Table 1. See MAT1010D and/or the referenced National Standard for additional information.
(2) Many DIN and BS specifications have been superseded by European Standard EN 10130.