



MEDIUM CARBON AND ALLOY STEEL, HOT ROLLED PLATE (Cross Reference Specification)

1. SCOPE

1.1 This specification provides cross reference information for medium carbon and alloy, hot rolled (HR) plate steel. Three Grades are described, see Table 1. It is intended to replace the Former CNH Company Material Specifications listed in Table 2 and should be used on all applicable new drawings. Table 5 lists National standard materials previously referenced for the MAT1017 Grades that shall not be specified on new or updated drawings.

1.2 All National Standards and related test methods designated are to be latest issue unless otherwise specified.

Table 1 CNH Grade and Material Description	
CNH Grade	Description
A	Hot rolled medium carbon steel plate. Most commonly available grade. Carbon content range of referenced grades is 0.36 to 0.50% by weight. Can be oil quenched and tempered to a surface hardness of 210-250 HB. ⁽¹⁾
B	Hot rolled medium carbon steel plate. Carbon content range of referenced grades is 0.50 to 0.70% by weight. Can be oil quenched and tempered to a surface hardness of 220-264 HB. ⁽¹⁾
C	Hot rolled medium carbon alloy steel plate. Responds readily to heat treatment for improved wear resistance and strength. Carbon content range of referenced grades is 0.36 to 0.45% by weight. Can be oil quenched and tempered to a surface hardness up to 388-415 HB. ⁽¹⁾

(1) Higher hardness ranges can be achieved with a more severe quench, however too severe a quench can result in cracking.

2. RELATED SPECIFICATIONS

Case MS-324 Steel - Abrasion Resistant

CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings

CNH MAT1017D Design and Materials Information, Medium Carbon Steel, HR Plate

CNH MAT1025 (87021627) HSLA HR Plate

CNH DWGD100 (86979040) Specifying Steel Sheet Thickness

CNH DWGD105 (87034339) Specifying Steel Plate Thickness

CNH ENPJ100 (86619032) Significant Characteristics

FNHA 2-A-256 (9842905) Hot Rolled Abrasion Resistant Steel Plate

Table 2 Former CNH Company Material Specifications				
CNH Grade	CASE	NH Pennsylvania FNHA Standard	NH – Zedelgem Engineering Stds	NH Tractor Engineering
A	MS-321, 1045	2-A-252 (9842900)	WS 50.04, Ck45	Fiat 52505, C40
B	MS-323, 1065	---	DIN 17200, Ck55	---
C	MS-450, 4140H	2-A-253 (9842901)	---	---

ISSUED BY GER 18MAR17	ECN NO. 35263474	NAME SPEC MED CARBON HR PLATE		
APPROVED BY ENR 18MAR17	REV. B	PAGE 1 OF 5	CNH NUMBER 87034364	



3. APPLICATION

3.1 Hot rolled medium carbon steel plates are produced to chemical composition requirements for use in bolted general structural applications for improved strength and wear resistance. This plate is typically available in thicknesses of 3 mm (0.118 in.) and above in Europe and 0.188 inch (4.76 mm) and above in North America. For thicknesses below 0.188 inch (4.76 mm) Grade A materials may be available as sheet in North America while Grades B and C are typically not available. For these thicknesses selection of comparable Grade B and C materials will require consultation with materials personnel. Tolerances for sheet materials differ from those for plate materials, see Engineering Standards DWGD100 and DWGD105 for guidelines on thickness selection.

3.2 CNH Grade A (see Table 2) is the most commonly available medium carbon hot rolled plate steel and may be used in certain welded applications depending on the welding process, heat input, size, and other factors. Due to the higher carbon content of Grade B and the alloy content of Grade C, weldability of these grades is poor and is not recommended. If welding of Grades B or C material is necessary, consult a welding engineer for required special welding procedures and weld quality verification. Grade C is typically through, flame, or induction hardened for high strength and/or wear resistance. Grade C has the highest hardenability, whereas Grade A has the least hardenability.

3.2.1 Use of CNH MAT1025 (87021627) High Strength Low Alloy (HSLA) HR plate should be considered for applications where yield strength is the primary design consideration. HSLA steels typically have better availability and have comparable yield strength to MAT1017 Grade A and B steels. However, Grade A and B medium carbon steel plate has, respectively, about 20% and 40% higher ultimate tensile strength and correspondingly improved high cycle fatigue strength. Medium carbon plate will also have better wear resistance than HSLA plate.

3.2.2 Use of abrasion resisting steel plate, such as per Case MS-324 or FNHA 2-A-256 (9842905) should be considered for wear resistance applications.

3.3 Pickling, descaling or other surface preparation may be required for applications, such as painted parts, where improved surface finish is needed. Where surface finish is critical to the application, this requirement should be negotiated with the supplier and noted on the purchase order.

3.4 Plate steel that is to be laser cut may require improved flatness and reduced residual stress compared to conventional plate steel. Cold reduced or temper rolled plate may be required to meet these requirements. Manufacturing and/or purchasing are responsible to negotiate the correct material conditions with suppliers to meet these requirements in addition to requirements in designated National Standards.

3.4.1 Laser cutting of Grade C materials is not recommended due to the potential for high hardness and cracking at the edge cut. Laser cutting of Grade C materials is only permitted after written approval from product Engineering.

NAME	REV.	PAGE	CNH NUMBER
SPEC MED CARBON HR PLATE	B	2 OF 5	87034364



4. GRADES

4.1 LOCAL / NATIONAL STANDARDS

Applicable National Standards for medium carbon, hot rolled steel plate are listed in Table 3, additional material references are provided in CNH MAT1017D. In general, it is permissible to produce a part from any of the Table 3 comparable National Standard grades for a corresponding CNH Grade when no special strength or composition requirements are specified.

Table 3 Local Material and National Standard References			
CNH Grade	ASTM	DIN^(1, 2)	EN⁽¹⁾
A	ASTM A830, 1045	DIN 17200, Ck45	EN 10083-1, C45E EN 10083-1, C40E
B	ASTM A830, 1055 ASTM A830, 1065	DIN 17200, Ck55	EN 10083-1, C55E EN 10083-1, C60E
C	ASTM A829, 4140	DIN 17200, 42CrMo4	EN 10083-1, 42CrMo4

(1) Referenced DIN specifications have been superseded by European Standard EN 10083. Former DIN designations continue to be recognized by some suppliers and steel producers.

(2) DIN tolerance standards are DIN 1016 and DIN 1543 (Superseded by EN 10051 and EN 10029 respectively)

5. REQUIREMENTS

5.1 CNH plate steel shall meet all requirements of the applicable National Standard and any special requirements specified on the engineering drawing.

5.2 DIMENSIONS AND TOLERANCES

5.2.1 Plate products shall conform to the permissible variations in dimensions as specified in the designated National Standard.

5.2.2 It is recommended that the plate thickness be specified on engineering drawing per the guidelines of CNH DWGD105 (87034339).

6. SPECIAL REQUIREMENTS

Optional conditions or grades 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.

7. INSPECTION AND REJECTION

All plate material supplied to this specification shall be equivalent in every respect to samples approved by the purchasing CNH 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.

NAME	REV.	PAGE	CNH NUMBER
SPEC MED CARBON HR PLATE	B	3 OF 5	87034364



8. DRAWING SPECIFICATIONS

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

8.2 The title block of engineering drawings shall contain material designations as described in CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings. The following are examples of material designations for hot rolled plate on drawings:

8.2.1 Preferred materials; also see Table 3.

CNH Material HR Plate, CNH MAT1017, Grade A
Local Material HR Plate, ASTM A830 Grade 1045

8.2.2 Restricted Material (RSTR):

CNH Material HR Plate, CNH MAT1017, Grade A, RSTR
Local Material See Notes

Material Note (on drawing):

HR Plate Fiat 52505, C40

No Alternate Material Permitted

8.2.3 Special Requirements (SPCL)

CNH Material HR Plate CNH MAT1017, Grade C, SPCL
Local Material See Notes

Material Note (on drawing):

HR Plate EN 10083-1, 42CrMo4+QT

Special Requirements (SPCL) are:

Pre-quenched and tempered plate, 33-40 HRC

9. DESIGN PROPERTIES

9.1 Mechanical properties for comparable National Standard material grades are grouped together in Table 4 for engineering guidance.

9.2 CNH Engineering must consider the differences in dimensional tolerances and mechanical properties of referenced National Standard plate materials 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 local material as described in CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings.

NAME	REV.	PAGE	CNH NUMBER
SPEC MED CARBON HR PLATE	B	4 OF 5	87034364



Material Specifications

MAT1017

Table 4 Mechanical Properties ⁽¹⁾⁽²⁾					
CNH Grade	Local Material / National Standard	Tensile Strength, Mpa (psi), Min	Yield Strength, MPa (psi), Min	Elongation % Min.	Hardness, HB
A	ASTM A830, 1045	570 (82,500)	310 (45,000)	16	≥163
	DIN 17200, Ck45	580-770 (84,000-111,500)	340 (49,500)	17	—
	EN 10083-1, C40E or C45E	580 (84,000)	320 (46,500)	14	—
B	ASTM A830, 1055-1065	650 (94,500)	360 (52,000)	12	≥192
	DIN 17200, Ck55	630-870 (91,500-126,000)	370 (53,500)	15	—
	EN 10083-1, C55E or C60E	680 (98,500)	370 (53,500)	10	—
C	ASTM A829, 4140	655 (95,000) Typical	372 (54,000) Typical	25 Typical	197 Typical
	DIN 17200, 42CrMo4	Properties are expected to be similar to ASTM A829, 4140			≤241 ⁽³⁾
	EN 10083-1, 42CrMo4				≤241 ⁽³⁾

(1) Steel Suppliers may recognize that European Standard specifications have superseded DIN Standards. For design purposes it is recommended that EN property values should be used.

(2) Values listed are for plate with thickness less than 16 mm. Mechanical property requirements vary with plate thickness. DIN and EN Grade A and B property values are for the normalized condition, which are comparable to as-hot rolled mechanical properties.

(3) Maximum hardness given for the annealed condition

10. Restricted Former Listed National Standard Materials

Table 5 lists National Standard materials that were previously listed as comparable materials for the former MAT1017 Grades. These materials may be designated on existing drawings and are provided here as a reference only to correlate these materials to former or current Grades. The materials listed in Table 5 shall not be specified on new or updated drawings.

Table 5 Former National Standard Materials ⁽¹⁾ (For Reference Only)					
CNH Grade	ASTM	DIN ⁽²⁾	BS ⁽²⁾	EN	FIAT
A			BS 970-1, 080M40 BS 970-1, 080A42 BS 970-1, 080M46		Fiat 52505, C40 Fiat 52404, C43
B			BS 970-1, 070M55 BS 970-1, 070M60		Fiat 52501 C53
C			BS 970-1, 708M40		Fiat 52517, 40CrMo4

(1) These material references may be found on some drawings and in previous revisions of MAT1020. When drawings are changed the material specified should be updated to those listed in Table 3. See MAT1017D and/or the referenced national standard for additional information.

(2) Many DIN and BS specifications have been superseded by European Standards. DIN and BS designations may continue to be recognized by some steel suppliers and producers.

NAME	REV.	PAGE	CNH NUMBER
SPEC MED CARBON HR PLATE	B	5 OF 5	87034364