



# Material Specifications

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| Number:      | MS 382  |
| Date Issued: | B-MAR13 |

## COLD DRAWN CARBON STEEL – STANDARD QUALITY, KILLED, FINE GRAIN (SUPERSEDED)

This specification has been superseded by CNH Material Specifications as indicated in the table below. The CNH Material Specification identified shall be specified on all applicable new and updated drawings.

| Superseded Specification and Material Grade | CNH Material Specification / Grade  |
|---------------------------------------------|-------------------------------------|
| MS-382, 1035                                | CNH MAT1040, Grade A and “AR, RSTR” |
| MS-382, 1045                                | CNH MAT1040, Grade B and “BR, RSTR” |
| MS-382, 1050                                | CNH MAT1040, Grade C and “CR, RSTR” |
| MS-382, 1141                                | CNH MAT1065, Grade B and “BR, RSTR” |

The controlled versions of CNH specifications and standards are published on the CNH Intranet site.

The documents are also available on the CNH electronic viewing system (e.g. eViewer). Suppliers are able to access these documents on CSCN (CNH Supplier Communications Network).

For existing drawings the superseded specification is available for viewing following this page and remains applicable until a drawing is updated to the new specification. See CNH MAT1003 (86979049) Metallic Material Designations on Engineering Drawings for additional information regarding updating specified materials.

For information about superseded specifications refer to ENS0050 (87523699).

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### 1. SCOPE

- 1.1 This specification covers Case Corporation requirements for cold drawn carbon steel commodities manufactured to standard quality.
- 1.2 Steels are called out in this specification by AISI/SAE designations. Each designation describes a different combination of physical and mechanical properties requirements. Steels with identical physical and mechanical properties may be named differently in other parts of the world, such as by AFNOR designation in France, DIN designation in Germany or BS designation in Great Britain. Any steel meeting all requirements of the AISI/SAE designation specified on a Case drawing, regardless of its local name in that particular area of the world, is acceptable for use on that part. No additional material notes on the drawing, or requests to use that local steel are necessary.
- 1.3 Commodities covered by this specification are produced as rounds, hexagons, and flats.
- 1.4 Where applicable, requirements are stated in both metric (SI) and US customary (pound, inch, etc.) units. Values in one system are not exact equivalents of values in the other. Therefore, each system must be used independently and each set of values regarded as a separate set of requirements. In determining conformance to this specification, no mixing of specification values is permissible.
- 1.5 This specification may involve hazardous materials, apparatus, and procedures. This specification does not claim to address all of the safety issues associated with its use and application. Specification users bear the responsibility for consulting appropriate safety or health practices and determining the applicability of regulatory limitations prior to use.

### 2. REQUIREMENTS

#### 2.1 Chemical Analysis

Requirements shown are for cast or heat analysis; permissible variations from these limits, for check or product analysis, are given in ASTM A29 or SAE J409. Although limits are not specified for titanium and columbium, the amounts of these elements shall be reported; if the analysis of any of these elements is less than 0.008%, it may be reported as <0.008%. Small quantities of other elements, which are not specified or required, may be found in these steels; these are acceptable in the following maximum amounts (cast or heat analysis): 0.35% copper, 0.25% nickel, 0.20% chromium, 0.06% molybdenum, and 0.0005% boron.

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### 2.1 Chemical Analysis (continued)

| Grade | Cast or Heat Analysis, mass % |             |            |             |             |                |
|-------|-------------------------------|-------------|------------|-------------|-------------|----------------|
|       | Carbon                        | Manganese   | Phosphorus | Sulfur      | Silicon     | Aluminum       |
| 1035  | 0.32 - 0.38                   | 0.60 - 0.90 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1038  | 0.35 - 0.42                   | 0.60 - 0.90 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1043  | 0.40 - 0.47                   | 0.70 –1.00  | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1045  | 0.43 - 0.50                   | 0.60 - 0.90 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1045H | 0.42 - 0.51                   | 0.50 - 1.00 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1050  | 0.48 - 0.55                   | 0.60 - 0.90 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1060  | 0.55 - 0.65                   | 0.60 - 0.90 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1141  | 0.37 - 0.45                   | 1.35 - 1.65 | 0.030 max  | 0.08 - 0.13 | 0.15 - 0.35 | 0.015 - 0.060* |
| 1522H | 0.17 - 0.25                   | 1.00 - 1.50 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060  |
| 1524  | 0.19 - 0.25                   | 1.35 - 1.65 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060  |
| 1524H | 0.18 - 0.26                   | 1.25 - 1.75 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060  |
| 1541  | 0.36 - 0.44                   | 1.35 -1.65  | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |
| 1541H | 0.35 - 0.45                   | 1.25 - 1.75 | 0.030 max  | 0.050 max   | 0.15 - 0.35 | 0.015 - 0.060* |

\* This requirement is waived if grain refinement is accomplished using 0.050% minimum vanadium.

### 2.2 Metallurgy

2.2.1 Steel for commodities supplied to this specification shall be cold drawn from hot rolled product made by open hearth, electric furnace, or oxygen steel making practice.

2.2.2 The steel shall be fully deoxidized with silicon, aluminum, or both and treated with aluminum or vanadium, as specified, to produce an average austenitic grain size of ASTM 5 or finer. Steel exhibiting duplex grain structure is unacceptable.

2.2.3 Steel for Grades 1045H, 1522H, 1524H, and 1541H shall conform to the appropriate hardenability bands in ASTM A304 or SAE J1268.

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### 2.2 Metallurgy (continued)

- 2.2.4 Strand cast product may be supplied provided it receives a 7 to 1 minimum reduction, from cast size to final size, and meets all other requirements of this specification.

During the introduction of strand cast steel (1970's), there were problems associated with the surface finish, internal cleanliness, and center soundness. With current modern steelmaking practices, however, many strand cast mills can supply a high quality product. If there are any questions or concerns regarding a strand caster's capabilities contact Materials Engineering.

- 2.2.5 For all grades except 1141, steel cleanliness shall meet the following requirements. No sulfide or silicate inclusion shall exceed 30 microns (0.0012 inches) in width and no alumina or globular oxide inclusion shall exceed 30 microns (0.0012 inches) in any dimension. Oxygen content shall not exceed 60 parts per million (0.006%) by weight.

| JK Microscopic Method per ASTM E-45 |       |                   |       |                     |       |                           |       |
|-------------------------------------|-------|-------------------|-------|---------------------|-------|---------------------------|-------|
| Type A<br>Sulfides                  |       | Type B<br>Alumina |       | Type C<br>Silicates |       | Type D<br>Globular Oxides |       |
| Thin                                | Heavy | Thin              | Heavy | Thin                | Heavy | Thin                      | Heavy |
| 3½                                  | 3     | 3                 | 2½    | 3                   | 2½    | 2½                        | 2     |

- 2.2.6 Standard quality cold drawn commodities shall be produced from special quality hot rolled steel. Special quality hot rolled steel is homogeneous, free of visible pipe, and conditioned as needed to remove any injurious surface imperfections.

### 2.3 Dimensional Tolerances

Steel commodities furnished to this specification shall conform to the applicable standard AISI tolerances for cold drawn product (see the appropriate sections of Case MS 301).

### 2.4 Material Condition Options

It is sometimes cost effective to use material with special conditions, which are available from steel producers at an extra price. Material condition options are listed in Case MS 302. Case Manufacturing or part suppliers may, at their discretion, order and use material with any of these options, except where a particular option or options are specified on the drawing.

### 2.5 Identification

The supplier shall furnish the purchaser with a report identifying the supplier's name, steel grade, product size, lot number, cast or heat analysis, Case raw material code number if applicable, and this Case MS specification number. Shipments shall be appropriately identified with the same information.

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### 3. METHODS OF TEST

- 3.1 All test designations are latest issue unless otherwise specified. Suppliers are not required to perform the specific test procedures cited but must ascertain that their products will conform to the specification limits when tested by the specified methods. However, the specified methods will be used to reconcile disputed results.
- 3.2 Test methods are available from the following sources.
- 3.2.1 Case MT test methods are available through Case Purchasing in accordance with the provisions of Case Corporate Policy 4-318.
- 3.2.2 ASTM test methods are available from ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428
- 3.2.3 SAE documents are available from SAE, 400 Commonwealth Drive, Warrendale, PA 19096-0001.
- 3.3 Measure austenitic grain size per Case MT 301, Austenitic Grain Size by Thermal Etch. Measure cleanliness per ASTM E45 Method A.

### 4. DESIGNATION ON DRAWINGS AND PURCHASE ORDERS

#### 4.1 Drawings

Material designation on drawings shall include the generic name, this Case materials specification number, steel grade or grades, and any options required for Engineering reasons.

Example: Turned and polished carbon steel, Case MS 382, 1045 or 1050

For all commodities, material dimensions shall be specified in the body of the drawing and not as part of the material note.

#### 4.2 Purchase Orders

The purchase order shall indicate size, generic name, this specification number, the particular steel grade, and any additional requirements specified by Case Engineering and Case Manufacturing.

Example: 25 mm diameter cold drawn carbon steel bar, Case MS 382, 1045, option 17

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