

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS A-0 PART II
		Former Designation: <i>CEMS A-0 Part II</i>
TITLE: System of Steel Classification for Standard Steels		CURRENT REV No.: 1801
		DATE: Jan. 2018
WRITTEN/EDITED BY: J. Sponzilli	APPROVED BY: R. Goluch	SUPERSEDES: Rev. 1709 – Sep. 2017
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<i>This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.</i>		

1.0 APPLICATION

This specification describes a system of steel classification which allows for specifying steels on engineering drawings by codes which have or can produce the desired mechanical properties. The classification system will:

- Reduce the number of steels used within the company by permitting standardization of steels.
- Allow suppliers the freedom to select steels consistent with maintaining the desired mechanical properties
- Allow suppliers to use equivalent steels without having to obtain additional approval.

For flat rolled sheet, strip and plate, structural products, and tubing, it is recommended that MPAPS A-6, A-10, A-43, A-44, or other applicable specifications be used.

2.0 SCOPE

MPAPS A-0 consists of three major sections:

- Part I – Chemical Composition of Standard Steels
- Part II – System of Steel Classification for Standard Steels
- Part III – Classification System for Heat Treated Steels

This part of the specification defines a system of steel classification. Wherever practicable, this classification system is to be used on engineering drawings throughout the Company. In general, this specification is intended for non-heat-treated applications. Refer to **Section A.0 - General Information** at the end of this document for mechanical property tables listing expected minimum tensile properties for carbon steel grades and nominal tensile properties for alloy steel grades.

2.1 Restricted Chemical Substances

Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

3.0 REFERENCE DOCUMENTS

Unless otherwise specified, the latest issue of all referenced standards shall apply. The following Specifications, Standards, and Regulations are referenced in this specification.

Quality System Standard ISO 9001 or TS-16949	NAVISTAR Engineering Design Std A-16
CFR Title 29, Part 1910	NAVISTAR MPAPS B-50
NAVISTAR Supplier Packing and Shipping Std-D-13	ASTM A370

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4.0 REQUIREMENTS

4.1 Classification

The Navistar codes used for identification of classes will be composed of digits as described in the sections below.

4.2 Breakdown of Navistar Code Identification

	1st Position	Dash	2nd Position	3rd Position
	1 digit	--	1 digit	2 digits
	Refers to Steel Section of Navistar Material Specifications. Example: 0 for MPAPS A-0 2 for MPAPS A-2	Dash always follows 1st position .	Approximate carbon content. Example: 2 is in the 0.20% carbon range: 4 is in the 0.40% carbon range	00 thru 49 indicates carbon steel. These numbers are chosen arbitrarily and have no significance except as indicated, 15 indicates free machining steel
EXAMPLE CODE: 0-201	0	--	2	01
MEANING:	Steel Section MPAPS A-0		Approximately 0.20% Carbon	A Carbon Steel Class

Case Hardening (formerly designated as a 4th position in the Navistar code as a “C” or “N”). For applications which require case hardening, requirements will be specified on the engineering drawing per MPAPS A-40, along with the material requirement using the applicable steel code per this specification. Use of fully killed, fine grain steel is required.

Welding Applications (formerly designated as a 4th position in the Navistar code as a “W”). For applications requiring welding, steels having 0.25% carbon or less are recommended. As the level of carbon in the steel increases, the weldability of the steel decreases, and special precautions may be necessary to insure sound welds. When welding of cold worked steels (Table 2) is required, it should be noted that the minimum mechanical properties specified are obtained by cold work and will not be maintained in the welded area. If the weld area is in a critically stressed zone, refer to hot rolled minimum strength in Table 1 for property estimate.

4.3 The classification tables have 5 major headings as follows:

4.3.1 Column One: Navistar Code

Each Navistar code used on an engineering drawing must have the same meaning throughout the Corporation. Therefore, the exact degree of freedom permitted at the manufacturing level is defined precisely in the table.

4.3.2 Column Two: Description of Class

The explanation in this column covers the general engineering requirements of the Navistar code.

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4.3.3 Column Three: Minimum Expected Yield Strength

The minimum expected yield strength (for the non-heat treated condition) is that of the lowest strength steel included in the Navistar code. This data is a guide for the engineer in the selection of a class to meet specific mechanical requirements.

4.3.4 Column Four: Recommended Steels

The steels shown in this column cover the steels recommended by materials engineering and are grouped on the basis of yield strength. The Navistar code, not the actual steel, should be shown on the engineering drawing.

4.3.5 Column Five: Allowable Alternates

Allowable alternate materials for the carbon steel grades may be used **with permission of the Quality Control Manager of the purchasing plant.** These alternates must meet the minimum tensile properties and the restrictions of the code specified. When transverse properties or splitting strength are involved, sulfur and phosphorus will be restricted to the maximum of those of the recommended steels of the specified code.

4.3.6 Choice of Table

4.3.6.1 Table 1 should be used in all cases where the condition of the steel (e.g., hot rolled, cold finished or semi-finished) is optional and the minimum mechanical properties therein indicated are adequate.

4.3.6.2 Table 2 should be used only where higher mechanical properties, surface conditions, or other engineering considerations require the use of cold drawn steel only. Table 2 should not be used to obtain dimensional tolerances only. Where dimensional tolerance of cold drawn steel is desired and satisfactory mechanical properties can be met by a code in Table 1, this code should be used and dimensional tolerances placed on the drawing. This will allow the use of hot rolled, turned, or turned and polished steel, provided the dimensions are adhered to.

4.3.6.3 Table 3 should be used only where special high tensile steels are required.

4.4 Strand Cast Steel Restriction

Strand Cast (SC) (i.e., continuous cast) steel shall not be applied for critical parts except when produced by an approved SC steel source. Critical parts are those that 1) require heat treatment, 2) are fabricated from fine grained, fully killed micro-alloyed high-strength low-alloy (HSLA) steels, or 3) require refined manufacturing techniques indicative of high quality parts for critical applications.

Approval of the strand cast steel source and a definition of the scope of the approval must be obtained prior to the purchase of steel. Contact Materials Engineering for information on the strand cast approval process.

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5.0 QUALITY

6.0 QUALIFICATION

Engineering qualification of sources is required in advance of production shipments. Samples shall be accompanied by test data certifying that all requirements of the specification have been met.

6.1 Quality Control Plan

A Quality Control Plan for products supplied to the requirements of this specification will be established by mutual agreement between NAVISTAR and the supplier. Unless specific exception is noted, the following characteristics, where applicable*, shall be included in the plan as features for management by statistical process control.**



- * Other characteristics for inclusion in the control plan may be specified on the engineering drawing and/or purchase order.
- ** See NAVISTAR Engineering Design Standard A-16

7.0 SOURCE APPROVAL AND QUALITY CONTROL

7.1 Supplier Requirements

All suppliers to NAVISTAR are required to be registered to ISO 9001 Quality System Requirements. NAVISTAR will also accept TS-16949 registration as long as the supplier can also fulfill all AIAG PPAP (Production Part Approval Process) documentation and approval requirements. Suppliers must maintain their certification with an accredited registrar and must furnish copies of registration certificates to their Corporate Buyer upon request.

7.2 Approval

Parts supplied against contracts or purchase orders citing this specification shall be equivalent in all respects to those samples which were approved by the purchaser. No changes in formulation or processing practices are permitted without approval. In the event that changes in material, properties, processing practices, construction, color, or labeling of the product are required, the supplier shall notify NAVISTAR Materials Engineering and Purchasing and Supplier Development of the proposed change(s). Test data indicating conformance to all requirements of this specification, test samples, and new or amended or updated Material Safety Data Sheet(s) (MSDS), in accordance with CFR Title 29, Part 1910 shall be submitted with the request for change.

7.3 Process Control

The supplier shall either, perform and report results of tests on specific lots of parts produced using ISO 9001 or TS-16949 guidelines, or provide statistical evidence of the lot having been produced in a state of statistical control and with a process capable of providing all required properties. The part supplier and the quality control manager of the using NAVISTAR plant may determine testing and reporting requirements on specific products.

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