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Superseding J402 MAY1997

(R) New Steel Designation System for Wrought or Rolled Steel**1. Scope**

This SAE Standard describes a new alphanumeric designation system for wrought steel used to designate wrought ferrous materials, identify chemical composition, and any other requirements listed in SAE Standards and Recommended Practices.

The previous SAE steel designation coding system consisted of four or five numbers used to designate standard carbon and alloy steels specified to chemical composition ranges. Using SAE 1035 as an example, the 35 represents the nominal weight % carbon content for the grade. Using SAE 52100 as an example, the 100 represents the nominal weight % carbon content. The first two numbers of this four or five number series are used to designate the steel grade carbon or alloy system with variations in elements other than carbon. These are described in Table 1. In addition to the standard four or five number steel designation above, a letter was sometimes added to the grade code to denote a non-standard specific element being added to the standard grade. For example, with SAE 10B21, B designates a boron addition; with SAE 12L14, L designates a lead addition; and with SAE 10V45, V designates a vanadium addition.

For many years, the SAE four or five character steel designation system has provided a simple way to identify and label steel grades. However, it is not comprehensive enough to allow for the accurate coding of popular new or non-standard chemistry grades, different chemistries for the same grade that traditionally have been associated with a specific product form, eg. SAE 1006 and SAE 1008, steel grades with dual chemistry and mechanical property requirements, microalloyed grades, and grades with both chemistry and hardenability requirements. As a result, these grades could not be properly recorded within the constraints of the previous steel designation system and were not included in the SAE steel grade Tables in SAE J403/J404 and other SAE documents. The new steel designation system is meant to ensure that the original or old SAE steel grades are still usable and both old and new SAE grades can be referenced uniformly between Standards organizations. Since the UNS numbering system for metals provides the basis for the recording of steel grades between North American and International Standards organizations, UNS was used as the framework of the new coding system. However, in order for the traditional five number UNS code to be used, it had to be expanded and modified to allow for an increase in the number of grades that would need to be classified in the future and to provide proper coding of new or non-standard element modifications, corresponding element ranges and dual hardenability, mechanical property or special processing requirements.

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These new steel designations are the same in both the UNS and SAE systems, as described in this standard (J402) and the joint SAE J1086/ASTM E527 UNS Publication. An alphanumeric code has been developed to identify the composition of SAE steel grades.

1.1 Rationale

The name of J402 has been changed to reflect the “New SAE Steel Designation System for Wrought or Rolled Steel”. SAE J402 has been completely rewritten to describe a new SAE/UNS steel designation system which will be used to identify current and new steel grades. This system will replace the old UNS designations used to identify modified SAE steel grades.

2. References

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J403—Chemical Compositions of SAE Carbon Steels
SAE J404—Chemical Compositions of SAE Alloy Steels
SAE J1086—Numbering Metals and Alloys
SAE J1249—Former SAE Standard and Former SAE Ex-Steels
SAE J1268—Hardenability Bands for Carbon and Alloy H Steels
SAE J1868—Restricted Hardenability Bands for Selected Alloy Steels
SAE HS-1086—Metals and Alloys in the Unified Numbering System

2.1.2 ASTM PUBLICATIONS

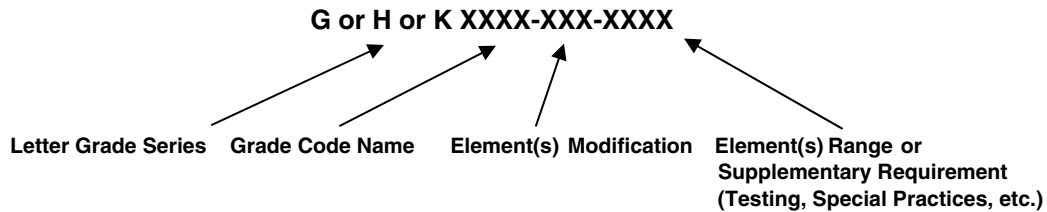
Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 527—Practice for Numbering Metals and Alloys (UNS)
ASTM DS 56H—Metals and Alloys in the Unified Numbering System (UNS)

3. New SAE Steel Designation

The new SAE steel designation is a five character alphanumeric code consisting of a letter prefix “G”, “H”, or “K”, and the conventional four number steel grade code. The first two numbers identify the characteristic carbon or alloy system and the last two numbers designate the nominal weight % carbon content. The four numeric descriptors will follow the current SAE steel specifications to enable continuity between this revised standard and prior standards. This five character code is followed by a three digit element modification code (reference Table 2) indicating the specific element(s) being modified, changed or added. The three digit code is then followed by a four digit code (reference Table 3) describing the modification in the chemical ranges and the Supplementary Requirements for Testing and Special Practices. The following illustrates the coding series for the new SAE grade designation.

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Examples using the new coding system are presented in the footnotes at the end of Tables 3 and 4.

4. *Grade Series*

4.1 **G Series Grades**

The standard SAE “G” series will have “chemistry only” requirements. Standard SAE steel grades are listed in SAE J403 and J404 with their specified chemistry ranges. Since there are no element modifications for these steels, their three digit element modification codes and the four digit element modification range codes are all zeros, indicating that there are no modifications.

The new SAE steel designation provides for the coding of new, non-standard or modified steel grades by the use of a three number digit modification code followed by a four digit modified element range code. Both the standard and the modified steels will share the same initial five character identification code to indicate which standard grade forms the basis for the modified grade.

4.2 **H Series Grades**

The SAE “H” series will have a dual chemistry and hardenability requirement. The chemistry ranges and the hardenability requirements for standard SAE H and RH grades are listed in SAE J1268 and SAE J1868, respectively. Non-standard or modified grades will be coded with a three digit element modification code and a four digit element modification range code.

The hardenability requirement may be a Jominy hardenability band requirement, specific J position(s) hardenability specification, a DI hardenability range or other condition. New grades will be listed in SAE J1268 and SAE J1868 and/or the appropriate ASTM standard along with their chemistry and hardenability requirement.

The specific hardenability requirement along with the chemistry is described in the UNS Publication – “Metals and Alloys in the Unified Numbering System” published jointly as SAE HS-1086 and ASTM DS-56H.

4.3 **K Series Grades**

The SAE “K” series steels have dual chemistry and supplementary mechanical property or special processing requirements. The chemistry and supplementary requirements for a specific grade/product is listed in the appropriate SAE/ASTM steel product standard. The grade along with the chemistry and the standard where details on the supplementary requirements can be found will be documented in the UNS Publication “Metals and Alloys in the Unified Numbering System” published jointly as SAE HS-1086 and ASTM DS-56H.