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SAE J1086 JUN89

**Numbering Metals
and Alloys**

SAE Recommended Practice
Revised June 1989

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NUMBERING METALS AND ALLOYS

UNS designations shall not be used for metals and alloys which are not registered under the system described herein, or for any metal or alloy whose composition differs from those registered.

1. SCOPE:

- 1.1 This recommended practice describes a unified numbering system (UNS) for metals and alloys which have a "commercial standing" (see Note 1), and covers the procedure by which such numbers are assigned.

Section 2 describes the system of alphanumeric designations or "numbers" established for each family of metals and alloys.

Section 3 outlines the organization established for administering the system.

Section 4 describes the procedure for requesting number assignment to metals and alloys for which UNS numbers have not previously been assigned.

- 1.2 The UNS provides a means of correlating many nationally used numbering systems currently administered by societies, trade associations, and individual users and producers of metals and alloys, thereby avoiding confusion caused by use of more than one identification number for the same material; and by the opposite situation of having the same number assigned to two or more entirely different materials. It provides, also, the uniformity necessary for efficient indexing, record keeping, data storage and retrieval, and cross referencing.

- 1.3 A UNS number is not in itself a specification, since it establishes no requirements for form, condition, quality, etc. It is a unified identification of metals and alloys for which controlling limits have been established in specifications published elsewhere. (See Note 2.)

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2. DESCRIPTION OF NUMBERS (OR CODES) ESTABLISHED FOR METALS AND ALLOYS:

2.1 The unified numbering system (UNS) establishes 18 series of numbers for metals and alloys, as shown in Table 1. Each UNS number consists of a single letter-prefix followed by five digits. In most cases the letter is suggestive of the family of metals identified, for example, A for aluminum, P for precious metals, S for stainless steels. Table 2 shows the secondary division of some primary series of numbers.

TABLE 1 - Primary Series of Numbers

UNS Series	Metal
Nonferrous metals and alloys	
A00001-A99999	Aluminum and aluminum alloys
C00001-C99999	Copper and copper alloys
E00001-E99999	Rare earth and rare earth-like metals and alloys (18 Items, see Table 2)
L00001-L99999	Low melting metals and alloys (14 Items, see Table 2)
M00001-M99999	Miscellaneous nonferrous metals and alloys (12 Items, see Table 2)
N00001-N99999	Nickel and nickel alloys
P00001-P99999	Precious metals and alloys (8 Items, see Table 2)
R00001-R99999	Reactive and refractory metals and alloys (14 Items, see Table 2)
Z00001-Z99999	Zinc and zinc alloys
Ferrous metals and alloys	
D00001-D99999	Specified mechanical properties steels
F00001-F99999	Cast irons
G00001-G99999	AISI and SAE carbon and alloy steels (except tool steels)
H00001-H99999	AISI H-steels
J00001-J99999	Cast steels (except tool steels)
K00001-K99999	Miscellaneous steels and ferrous alloys
S00001-S99999	Heat and corrosion resistant (stainless) steels
T00001-T99999	Tool steels
Welding filler metals	
W00001-W99999	Welding filler metals, covered and tubular electrodes, classified by weld deposit composition (see Table 2)

TABLE 2 - Secondary Division of Some Series of Numbers

UNS Series	Metal	UNS Series	Metal
E00001-E99999 Rare earth and rare earth-like metals and alloys	Actinium Cerium Mixed rare earths* Dysprosium Erbium Europium Gadolinium Holmium Lanthanum Lutetium Neodymium Praseodymium Promethium Samarium Scandium Terbium Thulium Ytterbium Yttrium	P00001-P99999 Precious metals and alloys	Gold Iridium Osmium Palladium Platinum Rhodium Ruthenium Silver
F00001-F99999 Cast irons	Gray, malleable, pearlitic malleable, and ductile (nodular) cast irons	R00001-R99999 Reactive and refractory metals and alloys	Boron Hafnium Molybdenum Niobium (Columbium) Tantalum Thorium Tungsten Vanadium Beryllium Chromium Cobalt Rhenium Titanium Zirconium
K00001-K99999 Miscellaneous steels and ferrous alloys		W00001-W99999 Welding filler metals, classified by weld deposit composition	Carbon steel with no significant alloying elements Manganese-molybdenum low alloy steels Nickel low alloy steels Austenitic stainless steels Ferritic stainless steels Chromium low alloy steels Copper base alloys Surfacing alloys Nickel base alloys
L00001-L99999 Low-melting metals and alloys	Bismuth Cadmium Cesium Gallium Indium Lithium Mercury Potassium Rubidium Selenium Sodium Thallium Tin Lead	W00001-W09999 W10000-W19999 W20000-W29999 W30000-W39999 W40000-W49999 W50000-W59999 W60000-W69999 W70000-W79999 W80000-W89999	
M00001-M99999 Miscellaneous nonferrous metals and alloys	Antimony Arsenic Barium Calcium Germanium Plutonium Strontium Tellurium Uranium Magnesium Manganese Silicon	Z00001-Z99999 Zinc and zinc alloys	Zinc

* Alloys in which the rare earths are used in the ratio of their natural occurrence (that is, unseparated rare earths). In this mixture, cerium is the most abundant of the rare earth elements.

- 2.2 Whereas some of the digits in certain of the UNS number groups have special assigned meaning, each series is independent of the others in such significance; this practice permits greater flexibility and avoids complicated and lengthy UNS numbers. (See Note 3.)
- 2.3 Wherever feasible, identification "numbers" from existing systems are incorporated into the UNS numbers. For example: The carbon steel which is presently identified by "AISI 1020" (American Iron & Steel Institute), is covered by "UNS G10200" and the nickel alloy presently identified by "M252" is covered by "UNS N07252."
- 2.4 Welding filler metals fall into two general categories: those whose compositions are determined by the filler metal analysis (e.g., solid bare wire or rods and cast rods) and those whose composition is determined by the weld deposit analysis (e.g., covered electrodes, flux-cored and other composite wire electrodes). The latter are assigned to a new primary series with the letter W as shown in Table 1. The solid bare wire and rods continue to be assigned in the established number series according to their composition.

(Readers are cautioned not to make their own "assignments" of numbers from such listings, as this can result in unintended and unexpected duplication and conflict.)

- 2.5 The ASTM and the SAE periodically publish up-to-date listings of all UNS numbers assigned to specific metals and alloys, with appropriate reference information on each. (See Note 6.) Many trade associations also publish similar listings related to materials of primary interest to their organizations.

3. ORGANIZATION FOR ADMINISTERING UNIFIED NUMBERING SYSTEM FOR METALS AND ALLOYS:

- 3.1 The organization for administering the UNS consists of: (1) an advisory board, (2) several number-assigning offices, (3) a corps of volunteer consultants, and (4) staffs at ASTM and SAE. In addition, SAE and ASTM committees dealing with various groups of materials may be consulted.
- 3.1.1 The Advisory Board has approximately 20 volunteer members who are affiliated with major producing and using industries, trade associations, government agencies, and standards societies, and who have extensive experience with identification, classification, and specification of materials. The Board is the administrative arm of SAE and ASTM on all matters pertaining to the UNS. It coordinates thinking on the format of each series of numbers and the administration of each by selected experts. It sets up ground rules for determining eligibility of any material for a UNS number, for requesting such numbers, and for appealing unfavorable rulings. It is the final referee on matters of disagreement between requesters and assigners.

3.1.2 UNS number assigners for certain materials are set up at trade associations which have successfully administered their own numbering systems; for other materials, assigners are located at the offices of SAE and ASTM. Each of these assigners has the responsibility for administering a specific series of numbers, as shown in Table 3. Each considers requests for assignment of new UNS numbers, and informs applicants of the action taken. Trade association UNS number assigners also report immediately to both SAE and ASTM details of each number assignment. ASTM and SAE assigners collaborate with designated consultants when considering requests for assignment of new numbers.

3.1.3 Consultants are selected by the Advisory Board to provide expert knowledge of a specific field of materials. Since they are utilized primarily by the Board and the SAE and ASTM number assigners, they are not listed in this recommended practice. At the request of the ASTM or SAE number assigner, a consultant considers a request for a new number in the light of the ground rules established for the material involved, decides whether a new number is justified, and informs the ASTM or SAE number assigner accordingly.

This utilization of experts (consultants and number assigners) is intended to insure prompt and fair consideration of all requests. It permits each decision to be based on current knowledge of the needs of a specific industry of producers and users.

3.1.4 Staff members at SAE and ASTM maintain duplicate master listings of all UNS numbers assigned.

3.1.5 Established SAE and ASTM committees which normally deal with standards and specifications for the materials covered by the UNS, and other knowledgeable persons, are called upon by the Advisory Board for advice when considering appeals from unfavorable rulings in the matter of UNS number assignments.

4. PROCEDURE FOR REQUESTING NUMBER ASSIGNMENT TO METALS AND ALLOYS NOT ALREADY COVERED BY UNS NUMBERS (OR CODES):

4.1 UNS numbers are assigned only to metals and alloys which have a commercial standing (as defined in Note 1).

4.2 The need for a new number should always be verified by determining from the latest complete listing of already assigned UNS numbers that a usable number is not available. (See Note 4.)

4.3 For a new UNS number to be assigned, the composition (or other properties, as applicable) must be significantly different from those of any metal or alloy which has already been assigned a UNS number.

4.3.1 In the case of metals or alloys that are normally identified or specified by chemical composition, the chemical composition limits must be reported.

TABLE 3 - Number Assigners and Areas of Responsibility

<p>The Aluminum Association 900 19th Street, NW Suite 30 Washington, DC 20006</p>	<p>Aluminum and aluminum alloys UNS Number Series: A00001 - A99999</p>
<p>Telephone: (202) 862-5100</p> <p>American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103</p> <p>Attention: Office for Unified Numbering System for Metals</p> <p>Telephone: (215) 299-5521</p>	<p>Rare earth and rare earth-like metals and alloys UNS Number Series: E00001 - E99999</p> <p>Cast irons UNS Number Series: F00001 - F99999</p> <p>Cast steels UNS Number Series: J00001 - J99999</p> <p>Miscellaneous steels and ferrous alloys UNS Number Series: K00001 - K99999</p> <p>Low melting metals and alloys UNS Number Series: L00001 - L99999</p> <p>Miscellaneous nonferrous metals and alloys UNS Number Series: M00001 - M99999</p> <p>Precious metals and alloys UNS Number Series: P00001 - P99999</p>
<p>American Welding Society 550 N.W. LeJeune Road P.O. Box 351040 Miami, FL 33135</p> <p>Attention: Office for Unified Numbering System</p> <p>Telephone: (305) 443-9353</p>	<p>Welding filler metals UNS Number Series: W00001 - W99999</p>
<p>Copper Development Association Greenwich Office Part 2 P.O. Box 1840 Greenwich, CT 06836-1840</p> <p>Attention: Office for Unified Numbering System for Metals</p> <p>Telephone: (203) 625-8232</p>	<p>Copper and copper alloys UNS Number Series: C00001 - C99999</p>
<p>SAE (Society of Automotive Engineers) 400 Commonwealth Drive Warrendale, PA 15096</p> <p>Attention: Office for Unified Numbering System for Metals</p> <p>Telephone: (412) 776-4841</p>	<p>Carbon and alloy steels UNS Number Series: G00001 - G99999</p> <p>H-Steels UNS Number Series: H00001 - H99999</p> <p>Nickel and nickel alloys UNS Number Series: N00001 - N99999</p> <p>Heat and corrosion resistant (stainless) steels UNS Number Series: S00001 - S99999</p> <p>Tool steels UNS Number Series: T00001 - T99999</p>
<p>Zinc Institute, Inc. 292 Madison Avenue New York, NY 10017</p> <p>Attention: Office for Unified Numbering System for Metals</p> <p>Telephone: (212) 578-4750</p>	<p>Zinc and zinc alloys UNS Number Series: Z00001 - Z99999</p>

- 4.3.2 In the case of metals or alloys which are normally identified or specified by mechanical (or other) properties, such properties and limits thereof must be reported. Only those chemical elements and limits, if any, which are significant in defining such materials need be reported.
- 4.4 Requests for new numbers shall be submitted on "Application for UNS Number Assignment" forms (Fig. 1). Copies of these are available from any UNS number assigning office (Table 3) or facsimiles may be made of the one herein.
- 4.5 All instructions on the printed application form should be read carefully and all information provided as indicated. (See Note 5.)
- 4.6 To further assist in assigning UNS numbers, the requester is encouraged to suggest a possible UNS number in each request, giving appropriate consideration to any existing number presently used by a trade association, standards society, producer, or user.
- 4.7 Each completed application form shall be sent to the UNS number assigning office having responsibility for the series of numbers which appears to most closely relate to the material described on the form (Table 3).

NOTES:

Note 1. The terms "commercial standing," "production usage," and others, are intended to portray a material in active industrial use, although the actual amount of such use will depend, among other things, upon the type of materials. (Obviously gold will not be used in the same "tonnages" as hot rolled steel.)

Different standardizing groups use different criteria to define the status that a material has to attain before a standard number will be assigned to it. For instance, the American Iron and Steel Institute requires for stainless steels "two or more producers with combined production of 200 tons per year for at least two years;" the Copper Development Association requires that the material be "in commercial use (without tonnage limits);" the Aluminum Association requires that the alloy must be "offered for sale (not necessarily in commercial use);" the SAE Aerospace Materials Division calls for "repetitive procurement by at least two users."

While it is apparent that no hard and fast usage definition can be set up for an all-encompassing system, the UNS numbers are intended to identify metals and alloys that are in more or less regular production and use.

A UNS number will not ordinarily be issued for a material which has just been conceived or which is still in only experimental trial.

GENERAL

Before attempting to complete this form, the applicant should be thoroughly familiar with the objectives of the UNS and the "ground rules" for assigning numbers, as stated in Section 4 of SAE J1086 and ASTM E 527.

MATERIAL DESCRIPTION

Identify the base element; the single alloying element that constitutes 50% or more of the total alloy content; other distinguishing predominant characteristics (such as "casting"); and common or generic names if any (such as "ounce metal" or "Waspalloy"). When no single element makes up 50% or more of the total alloy content, list in decreasing order of abundance, the two alloying elements which together constitute the largest portion of the total alloy contents; except that if no two elements make up at least 50% of the total alloy content, list the three most abundant, and so on. Instead of "iron", use "steel" to identify the base element of those iron-low-carbon alloys commonly known as steels.

When mechanical properties or physical characteristics are the primary defining criteria and chemical composition is secondary or nonsignificant, enter such properties and characteristics with the appropriate values or limits for each.

SUGGESTED UNS NO.

While applicant's suggestion may or may not be the one finally assigned, it will assist proper identification of the material by the UNS Number Assigner.

CHEMICAL COMPOSITION

◇ Enter limits such as 0.13–0.18 (not .13–.18 or 0.13 to 0.18), 1.5 max, 0.040 min, and balance. In space designated "other," enter information such as "Each 0.05 max, Total 0.15 max" and "Sn plus Pb 2.0 min". Additional specific elements not included in the list on this form may be entered in the spaces provided at the end of the list.

CROSS REFERENCES

Letter symbols listed indicate widely known trade associations and standards issuing organizations. Enter after appropriate symbols any known specification numbers or identification numbers issued by such groups to cover material equivalent to, similar to, or closely resembling the subject material.

Examples ; SAE J404 (50B44), AISI 415, ASTM A638 (660)

In space designated "other" enter any pertinent numbers issued by groups not listed above. In these instances, the full name and address of the issuing group shall be included.

**SUBMIT COMPLETED FORM TO
APPROPRIATE UNS NUMBER
ASSIGNER, AS LISTED IN
SAE J1086 AND ASTM E527**