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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1086 and ASTM E 527

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NUMBERING METALS AND ALLOYS

Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

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 SAE Recommended Practice describes a unified numbering system (UNS) for metals and alloys which have a "commercial standing" (see 6.1), 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 6.2.)

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-8512 FAX: (412) 776-0243
TO PLACE A DOCUMENT ORDER; (412) 776-4970 FAX: (412) 776-0790
http:\\www.sae.org

2. References

2.1 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

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

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 Publication No. DS-56—Metals and Alloys and the Unified Numbering System

3. Description of Numbers (or Codes) Established for Metals and Alloys

3.1 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.

3.2 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 6.3.)

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 earthlike metals and alloys		P00001-P99999 Precious metals and alloys	
E00000-E00999	Actinium	P00001-P00999	Gold
E01000-E20999	Cerium	P01001-P01999	Iridium
E21000-E45999	Mixed rare earths(1)	P02001-P02999	Osmium
E46000-E47999	Dysprosium	P03001-P03999	Palladium
E48000-E49999	Erbium	P04001-P04999	Platinum
E50000-E51999	Europium	P05001-P05999	Rhodium
E52000-E55999	Gadolinium	P06001-P06999	Ruthenium
E56000-E57999	Holmium	P07001-P07999	Silver
E58000-E67999	Lanthanum		
E68000-E68999	Lutetium	R00001-R99999 Reactive and	
E69000-E73999	Neodymium	refractory metals and alloys	
E74000-E77999	Praseodymium		
E78000-E78999	Promethium	R01001-R01999	Boron
E79000-E82999	Samarium	R02001-R02999	Hafnium
E83000-E84999	Scandium	R03001-R03999	Molybdenum
E85000-E86999	Terbium	R04001-R04999	Niobium (Columbium)
E87000-E87999	Thulium	R05001-R05999	Tantalum
E88000-E89999	Ytterbium	R06001-R06999	Thorium
E90000-E99999	Yttrium	R07001-R07999	Tungsten
		R08001-R08999	Vanadium
F00001-F99999 Cast irons	Gray, malleable, pearlitic	R10001-R19999	Beryllium
	malleable, and ductile (nodular)	R20001-R29999	Chromium
	cast irons	R30001-R39999	Cobalt
		R40001-R49999	Rhenium
K00001-K99999 Miscellaneous		R50001-R59999	Titanium
steels and ferrous alloys		R60001-R69999	Zirconium
L00001-L99999 Low-melting		W00001-W99999 Welding filler	
metals and alloys		metals, classified by weld	
L00001-L00999	Bismuth	deposit composition	
L01001-L01999	Cadmium	W00001-W09999	Carbon steel with no significant
L02001-L02999	Cesium		alloying elements
L03001-L03999	Gallium	W10000-W19999	Manganese-molybdenum low
L04001-L04999	Indium		alloy steels
L06001-L06999	Lithium	W20000-W29999	Nickel low alloy steels
L07001-L07999	Mercury	W30000-W39999	Austenitic stainless steels
L08001-L08999	Potassium	W40000-W49999	Ferritic stainless steels
L09001-L09999	Rubidium	W50000-W59999	Chromium low alloy steels
L10001-L10999	Selenium	W60000-W69999	Copper base alloys
L11001-L11999	Sodium	W70000-W79999	Surfacing alloys
L13001-L13999	Tin	W80000-W89999	Nickel base alloys
L50001-L59999	Lead		
		Z00001-Z99999 Zinc and zinc alloys	Zinc
M00001-M99999 Miscellaneous nonferrous metals and alloys			
M00001-M00999	Antimony		
M01001-M01999	Arsenic		
M02001-M02999	Barium		
M03001-M03999	Calcium		
M04001-M04999	Germanium		
M05001-M05999	Plutonium		
M06001-M06999	Strontium		
M07001-M07999	Tellurium		
M08001-M08999	Uranium		
M10001-M19999	Magnesium		
M20001-M29999	Manganese		
M30001-M39999	Silicon		

1. 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.

3.3 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."

3.4 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.)

3.5 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 6.6.) Many trade associations also publish similar listings related to materials of primary interest to their organizations.

4. Organization for Administering Unified Numbering System for Metals and Alloys

4.1 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.

4.1.1 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.

4.1.2 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.

4.1.3 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 document. At the request of the ASTM or SAE number assigner, a consultant considers a request for a new number in 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.

TABLE 3—NUMBER ASSIGNERS AND AREAS OF RESPONSIBILITY

The Aluminum Association 900 19th Street, NW, Suite 30 Washington, DC 20006 Telephone: (202) 862-5100	Aluminum and aluminum alloys UNS Number Series: A00001-A99999
American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428-2959 Attention: Office for Unified Numbering System for Metals Telephone: (215) 299-5400	Rare earth and rare earth-like metals and alloys UNS Number Series: E00001-E99999 Cast irons UNS Number Series: F00001-F99999 Cast steels UNS Number Series: J00001-J99999 Miscellaneous steels and ferrous alloys UNS Number Series: K00001-K99999 Low melting metals and alloys UNS Number Series: L00001-L99999 Miscellaneous nonferrous metals and alloys UNS Number Series: M00001-M99999 Precious metals and alloys UNS Number Series: P00001-P99999
American Welding Society 550 N.W. LeJeune Road P.O. Box 351040 Miami, FL 33135 Attention: Office for Unified Numbering System Telephone: (800) 443-9353 Fax: 303-443-7559	Welding filler metals UNS Number Series: W00001-W99999
Copper Development Association 260 Madison Avenue New York, NY 10016-2401 Attention: Office for Unified Numbering System for Metals Telephone: (212) 251-7200	Copper and copper alloys UNS Number Series: C00001-C99999
SAE (Society of Automotive Engineers) 400 Commonwealth Drive Warrendale, PA 15096-0001 Attention: Office for Unified Numbering System for Metals Telephone: (412) 776-4841	Carbon and alloy steels UNS Number Series: G00001 - G99999 H-steels UNS Number Series: H00001-H99999 Nickel and nickel alloys UNS Number Series: N00001-N99999 Heat and corrosion resistant (stainless) steels UNS Number Series: S00001 - S99999 Tool steels UNS Number Series: T00001 - T99999
Zinc Institute, Inc. 292 Madison Avenue New York, NY 10017 Attention: Office for Unified Numbering System for Metals Telephone: (212) 578-4750	Zinc and zinc alloys UNS Number Series: Z00001 - Z99999

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

4.1.5 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.

5. Procedure for Requesting Number Assignment to Metals and Alloys Not Already Covered by UNS Numbers (or Codes)

5.1 UNS numbers are assigned only to metals and alloys which have a commercial standing (as defined in 6.1).

5.2 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 6.4.)

5.3 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.

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

5.3.2 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.

5.4 Requests for new numbers shall be submitted on "Application for UNS Number Assignment" forms (Figure 1). Copies of these are available from any UNS number assigning office (Table 3) or facsimiles may be made of the one herein.

5.5 All instructions on the printed application form should be read carefully and all information provided as indicated. (See 6.5.)

5.6 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.

5.7 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).

APPLICATION FOR UNS NUMBER ASSIGNMENT
and
Data Input Sheet for Entering a Specific Material in the
SAE-ASTM Unified Numbering System for Metals and Alloys
(See Reverse Side for Instructions for Completing This Form)

Material Description _____

_____

_____

_____ Suggested UNS No.

*UNS Assigned Description _____

_____

_____ *UNS Assigned No. _____

*Chemical Composition (percent by wt.)

Silver	Ag		Hafnium	Hf		Sulfur	S	
Aluminum	Al		Mercury	Hg		Antimony	Sb	
Arsenic	As		Indium	In		Selenium	Se	
Gold	Au		Iridium	Ir		Silicon	Si	
Boron	B		Lithium	Li		Tin	Sn	
Beryllium	Be		Magnesium	Mg		Tantalum	Ta	
Bismuth	Bi		Manganese	Mn		Tellurium	Te	
Carbon	C		Molybdenum	Mo		Thorium	Th	
Columbium	Cb		Nitrogen	N		Titanium	Ti	
Cadmium	Cd		Nickel	Ni		Uranium	U	
Cobalt	Co		Oxygen	O		Vanadium	V	
Chromium	Cr		Phosphorus	P		Tungsten	W	
Copper	Cu		Lead	Pb		Zinc	Zn	
Iron	Fe		Platinum	Pt		Zirconium	Zr	
Germanium	Ge		Rhenium	Re				
Hydrogen	H		Rhodium	Rh				

Other _____

_____

_____

*Cross References

AA _____
ACI _____
AISI _____
AMS _____
ANSI _____
ASME _____
ASTM _____
AWS _____
CDA _____
FED _____
MIL SPEC _____
SAE _____
OTHER _____

Requesting Person and Organization (full address) _____

_____ Date of Request _____

*Assigning Org. _____ *Date of UNS Assignment _____
Assigner's Name and Office _____

Applicant: DO NOT write in shaded areas.

* These items for Computer Operator

FIGURE 1A—APPLICATION FORM FOR UNS NUMBER ASIGNMENT (FRONT)

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 content; 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 "0.05 max each, 0.15 max total" and "Sn+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 A 638 (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 E 527

FIGURE 1B—APPLICATION FORM FOR UNS NUMBER ASSIGNMENT (BACK)