



**Designation: E 527 – 83 (Reapproved 1997)<sup>ε1</sup>**

## **Standard Practice for Numbering Metals and Alloys (UNS)<sup>1</sup>**

This standard is issued under the fixed designation E 527; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

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<sup>ε1</sup> NOTE—Keywords were added editorially in October 1997.

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### **1. Scope**

1.1 This practice (Note 1) covers a unified numbering system (UNS) for metals and alloys that have a “commercial standing” (see Note 2), 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.

NOTE 1—UNS designations shall not be used for metals and alloys that are not registered under the system described herein, or for any metal or alloy whose composition differs from those registered.

NOTE 2—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 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 that has just been conceived or that is still in only experimental trial.

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 also provides 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.

NOTE 3—Organizations that issue specifications should report to appropriate UNS number-assigning offices (3.1.2) any specification changes that affect descriptions shown in published UNS listings.

### **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, and S for stainless steels.

2.2 Whereas some of the digits in certain 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.


NOTE 4—This arrangement of alphanumeric six-character numbers is a compromise between the thinking that identification numbers should indicate many characteristics of the material, and the belief that numbers should be short and uncomplicated to be widely accepted and used.

2.3 Wherever feasible, identification “numbers” from existing systems are incorporated into the UNS numbers. For example: carbon steel, presently identified by AISI 1020 (American Iron and Steel Institute), is covered by “UNS G 10200”; and free cutting brass, presently identified by CDA (Copper Development Association C 36000), is covered by “UNS C 36000.” Table 2 shows the secondary division of some primary series of numbers.

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<sup>1</sup> This practice is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.91 on Editorial.

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**TABLE 1 Primary Series of Numbers**

<i>Nonferrous Metals and Alloys</i>	
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 (15 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
<i>Ferrous Metals and Alloys</i>	
D00001–D99999	specified mechanical properties steels
F00001–F99999	cast irons and cast steels
G00001–G99999	AISI and SAE carbon and alloy 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
<i>Specialized Metals and Alloys</i>	
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**

<i>E00001–E99999 Rare Earth and Rare Earth-Like Metals and Alloys</i>	
E00000–E00999	actinium
E01000–E20999	cerium
E21000–E45999	mixed rare earths <sup>A</sup>
E46000–E47999	dysprosium
E48000–E49999	erbium
E50000–E51999	europium
E52000–E55999	gadolinium
E56000–E57999	holmium
E58000–E67999	lanthanum
E68000–E68999	lutetium
E69000–E73999	neodymium
E74000–E77999	praseodymium
E78000–E78999	promethium
E79000–E82999	samarium
E83000–E84999	scandium
E85000–E86999	terbium
E87000–E87999	thulium
E88000–E89999	ytterbium
E90000–E99999	yttrium
<i>F00001–F9999 Cast Irons</i>	
<i>K00001–K99999 Miscellaneous Steels and Ferrous Alloys</i>	
<i>L00001–L99999 Low-Melting Metals and Alloys</i>	
L00001–L00999	bismuth
L01001–L01999	cadmium
L02001–L02999	cesium
L03001–L03999	gallium
L04001–L04999	indium
L05001–L05999	lead
L06001–L06999	lithium
L07001–L07999	mercury
L08001–L08999	potassium
L09001–L09999	rubidium
L10001–L10999	selenium
L11001–L11999	sodium
L12001–L12999	thallium
L13001–L13999	tin
<i>M00001–M99999 Miscellaneous Nonferrous Metals and Alloys</i>	
M00001–M00999	antimony
M01001–M01999	arsenic
M02001–M02999	barium
M03001–M03999	calcium

**TABLE 2** *Continued*

M04001–M04999	germanium
M05001–M05999	plutonium
M06001–M06999	strontium
M07001–M07999	tellurium
M08001–M08999	uranium
M10001–M19999	magnesium
M20001–M29999	manganese
M30001–M39999	silicon
<i>P00001–P99999 Precious Metals and Alloys</i>	
P00001–P00999	gold
P01001–P01999	iridium
P02001–P02999	osmium
P03001–P03999	palladium
P04001–P04999	platinum
P05001–P05999	rhodium
P06001–P06999	ruthenium
P07001–P07999	silver
<i>R00001–R99999 Reactive and Refractory Metals and Alloys</i>	
R01001–R01999	boron
R02001–R02999	hafnium
R03001–R03999	molybdenum
R04001–R04999	niobium (columbium)
R05001–R05999	tantalum
R06001–R06999	thorium
R07001–R07999	tungsten
R08001–R08999	vanadium
R10001–R19999	beryllium
R20001–R29999	chromium
R30001–R39999	cobalt
R40001–R49999	rhenium
R50001–R59999	titanium
R60001–R69999	zirconium
<i>W00001–W99999 Welding Filler Metals Classified by Weld Deposit Composition</i>	
W00001–W09999	carbon steel with no significant alloying elements
W10000–W19999	manganese-molybdenum low alloy steels
W20000–W29999	nickel low alloy steels
W30000–W39999	austenitic stainless steels
W40000–W49999	ferritic stainless steels
W50000–W59999	chromium low alloy steels
W60000–W69999	copper base alloys
W70000–W79999	surfacing alloys
W80000–W89999	nickel base alloys
<i>Z00001–Z99999 Zinc and Zinc Alloys</i>	

<sup>ε</sup> 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.

2.4 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.

NOTE 5—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 ASTM and SAE periodically publish up-to-date listings of all UNS numbers assigned to specific metals and alloys, with appropriate reference information on each.<sup>2</sup> Many trade


associations also publish similar listings related to materials of primary interest to their organizations.

### 3. Organization for Administering the UNS for Metals and Alloys

3.1 The organization for administering the UNS consists of the following:

3.1.1 *Advisory Board*—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.

<sup>2</sup> Request ASTM DS 56A and SAE Handbook Supplement HS 1086a, *Unified Numbering System for Metals and Alloys*, (a joint ASTM–SAE publication), PCN 05-056001-01.

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3.1.2 *Several Number-Assigning Offices*— 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 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 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 *Corps of Volunteer Consultants*— 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 the SAE number assigner accordingly. This utilization of experts (consultants and number assigners) is intended to ensure 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 *Staffs at ASTM and SAE*—Staff members at SAE and ASTM maintain duplicate master listings of all UNS numbers assigned.

3.1.5 In addition, 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.

**TABLE 3 Number Assigners and Areas of Responsibility**

<p>The Aluminum Association 818 Connecticut Ave. N.W. Washington, D.C. 20006 Attention: Office for Unified Numbering System for Metals Telephone: (202)862-5100</p>	<p>Aluminum and Aluminum Alloys UNS Number Series: A 00001–A 99999</p>
<p>American Iron and Steel Institute 1000 16th St., N.W. Washington, D.C. 20036 Attention: Office for Unified Numbering System for Metals Telephone: (202)452-7236</p>	<p>Carbon and Alloy Steels UNS Number Series: G 00001–G 99999 H-Steels UNS Number Series: H 00001–H 99999 Tool Steels UNS Number Series: T 00001–T 99999</p>
<p>American Welding Society 550 N. W. LeJeune Road P.O. Box 351040 Miami, FL 33135 Attention: Office for Unified Numbering System for Metals Telephone: (305)642-7090</p>	<p>Welding Filler Metals UNS Number Series: W 00001–W 99999</p>
<p>Copper Development Association 405 Lexington Ave. New York, N. Y. 10017 Attention: Office for Unified Numbering System for Metals Telephone: (212)953-7321</p>	<p>Copper and Copper Alloys UNS Number Series: C 00001–C 99999</p>
<p>ASTM 100 Barr Harbor Drive West Conshohocken, Pa. 19428 Attention: Office for Unified Numbering System for Metals Telephone: (610)832-9652</p>	<p>Rare Earth and Rare Earth-Like Metals and Alloys UNS Number Series: E 00001–E 99999 Low Melting Metals and Alloys UNS Number Series: L 00001–L 99999 Miscellaneous Steels and Ferrous Alloys UNS Number Series: K 00001–K 99999 Miscellaneous Nonferrous Metals and Alloys UNS Number Series: M 00001–M 99999 Cast Steels UNS Number Series: J 00001–J 99999 Heat and Corrosion Resistant (Stainless) Steels UNS Number Series: S 00001–S 99999 Zinc and Zinc Alloys UNS Number Series: Z 00001–Z 99999 Precious Metals and Alloys UNS Number Series: P 00001–P 99999 Cast Irons and Cast Steels UNS Number Series: F 00001–F 99999</p>
<p>Society of Automotive Engineers 400 Commonwealth Drive Warrendale, Pa. 15096 Attention: Office for Unified Numbering System for Metals Telephone: (412)776-4841</p>	<p>Nickel and Nickel Alloys UNS Number Series: N 00001–N 99999 Steels Specified by Mechanical Properties UNS Number Series: D 00001–D 99999 Reactive and Refractory Metals and Alloys UNS Number Series: R 00001–R 99999</p>

#### **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 that have a commercial standing (as defined in Note 2).

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 or is not available.

NOTE 6—In assigning UNS numbers, and consequently in searching complete listings of numbers, the predominant element of the metal or alloy usually determines the prefix letter of the series to which it is assigned. In certain instances where no one element predominates, arbitrary decisions are made as to what prefix letter to use, depending on the producing industry and other factors.

4.3 For a new UNS number to be assigned, the composition (or other properties, as applicable) must be significantly different from that 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.

4.3.2 In the case of metals or alloys that 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 (see Fig. 1 and Fig. 2). Copies of these are available from any UNS number-assigning office (see 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.

NOTE 7—The application form is designed to serve also as a data input sheet to facilitate processing each request through to final print-out of the data on electronic data-processing equipment and to minimize transcription errors at number-assigning offices and data-processing centers.

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 that appears to most closely relate to the material described on the form (see Table 3).

#### **5. Keywords**

5.1 aluminum alloy numbering system; aluminum alloy UNS numbering; cast iron numbering system; cast iron UNS numbering; copper alloy numbering system; copper alloy UNS numbering; ferrous alloys numbering system; ferrous alloys UNS numbering; nickel alloy numbering system; nickel alloy UNS numbering; reactive metals and alloys numbering system; reactive metals and alloys UNS numbering; refractory metals and alloys numbering system; refractory metals and alloys UNS numbering; steel alloy numbering system; steel alloy UNS numbering; stainless steel alloy numbering system; stainless steel alloy UNS numbering; unified numbering system; UNS metal and alloy numbering system; weld filler metal numbering system; weld filler metal numbering; welding electrode numbering system; welding electrode UNS numbering

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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**

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

**\*Cross References**

AA \_\_\_\_\_  
 ACI \_\_\_\_\_  
 AISI \_\_\_\_\_  
 ANSI \_\_\_\_\_  
 AMS \_\_\_\_\_  
 ASME \_\_\_\_\_  
 ASTM \_\_\_\_\_  
 AWS \_\_\_\_\_  
 CDA \_\_\_\_\_  
 FED \_\_\_\_\_  
 MIL SPEC \_\_\_\_\_  
 SAE \_\_\_\_\_  
 OTHERS \_\_\_\_\_

Requesting Person and Organization (full address) \_\_\_\_\_

Date of Request \_\_\_\_\_

**\*Assigning Org** \_\_\_\_\_

**\*Date of UNS Assignment** \_\_\_\_\_

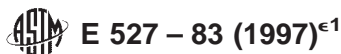
**Assigner's Name and Office** \_\_\_\_\_

Applicant do not write in shaded areas.

\*These items for Computer Operator.

NOTE—Reverse side of Fig. 1 is located on the next page.

**FIG. 1 Sample Application Form.**



**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 SAE J 1086 and ASTM E 527, Section 4.

**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 that 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.”

**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 J 404 (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 J 1086 AND ASTM E 527.

**FIG. 2 Sample Application Form (Reverse Side).**

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