

INTRODUCTION

Companies that operate internationally may have contractual obligations worldwide through design manufacturing affiliates, local-content-contract customers, and countertrade purchasing programs, etc., that require purchasing of materials outside of the continental United States to specification systems and materials designations that may be unfamiliar to them. These businesses may need to respond to requests for proposals to manufacture products that are not designed in the United States. This cross-reference is a guide to engineers and procurement personnel for easy recognition of metallic materials designations that are equivalent to each other on the basis of chemical composition.

CHEMISTRY EQUALS EQUIVALENCY

The equivalency of materials in this cross-reference was determined by comparing the chemical compositions associated with each designation. Rarely were candidate chemical compositions so divergent that they needed to be questioned. However, in some alloy systems different elements in different amounts have similar effects on material properties; for example, nickel versus tungsten (wolfram) in stainless steels, cobalt versus nickel in copper alloys, and so forth. Economic considerations often dictate the substitution of alloying elements where a choice is possible. In such comparisons, equivalency was established in the best judgment of the editors.

CURRENT DESIGNATIONS ARE INCLUDED

Designations of the latest issue standards available are included. Many countries changed their materials designations in the latter part of the 1970s and in the 1980s to more rational systems of their own or to the systems of countries they perceive to be leaders in a particular material category or are economically tied to them. Users of this cross-reference who fail to find the designation they seek may be working with an obsolete designation for a material that is in fact in this cross-reference. Obsolete designations were included when available.

UNIFIED NUMBERING SYSTEM (UNS)

There are many organizations in the United States engaged in voluntary standards-making activities. They include branches of government, professional and technical societies, manufacturing and nonmanufacturing trade associations, public service and consumer groups, testing and inspection bodies, and organizations whose main purpose is the development of standards. This is a heterogeneous array of standards development organizations that operate with highly complicated and sometimes overlapping machineries.

The Unified Numbering System (UNS) provides a means of rationalizing these United States nationally used numbering systems for metallic materials, thereby avoiding confusion caused by having a choice of more than one identification number (designation) for the same material or by having the same number assigned to two or more entirely different materials. Hence, the UNS number is used throughout this cross-reference as the primary reference designation for United States metallic materials. Previously used and well-known United States national designations (AISI, CDA, AA, ASTM, SAE, etc.) and accepted ISO designations are located together immediately under the UNS number for easy identification.

The General Electric Company's corporate materials designation as defined in the Engineering Materials and Processes Information Service (EMPIS) is included because this cross-reference originated as a GE product before the copyright was sold to Genium Publishing Corporation.

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FERROUS MATERIALS

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Stainless Steels	-----
Tool Steels	-----
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NONFERROUS MATERIALS

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Aluminum and Aluminum Alloys	-----
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Magnesium Cast Alloys	-----
Copper and Copper Alloys	-----
Coppers	-----
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Cast Nickel Silvers and Leaded Coppers	-----

INDEXES OF CHEMICAL COMPOSITIONS OF SIMILAR MATERIALS

Material Category	-----
General	-----

System Requirements

Computer: IBM PC or compatible running Microsoft Windows™ version 3.1 or later; **Microprocessor:** 80386 or higher; RAM: 4MB minimum, 8MB recommended; **Hard Disk:** Required; installing the program and all material categories requires 25MB of disk; **Mouse:** A mouse is strongly recommended and is required for designing custom reports; **Video Monitor:** Enhanced Graphics Adapter (EGA) monitor or better; VGA is recommended.

Features of the Software

- Look up materials by their chemical composition or look up materials if you have a partial or complete designation for that material.
- Materials meeting search criteria are highlighted.
- When more than one material meets the search criteria, move quickly through the information with a "Goto" command.
- Extensive on-line help.
- Install only the metallic materials categories you need.
- Select a range of text and copy it to the Windows™ clipboard, then paste the text into another Windows™ application, such as a word processing or spreadsheet program.
- Save the results of a search as a text file.
- Print out one of the standard sets of reports available for each category.
- Create custom reports for each material category, which allows you to control exactly how a report appears.
- Change the display width and ordering of columns as well as display colors and fonts.

Locating a material by designation

There are two types of indexes in this software program. Each material category contains an index specific to that category, called the Category Index. There is also a General Index, which covers all the installed material categories.

Which index should you use? It depends on what you know about the material you want to locate. If you know the material category and already have a Category Window open for that category, you could use the Category Index. If you do not know the material category, you should use the General Index. The General Index takes care of determining the material category and opening a new Category Window.

You can also use either index if you are not sure of the material designation. When you perform an index search, IMMCR displays a list of all the designations it knows about. You can scan through the list just as you would scan an index in a book. If you know the material category, you should use the Category Index, since that index only contains the designations found in that category.

Type or choose a designation

Use this edit box to type the designation for the material you wish to locate. The list box below the edit box contains an alphabetical list of all designations recognized by IMMCR.

Check categories to search

Use this list box to select the material categories you are interested in. Only the material categories that have a check mark will be included in the search. Click on a material category to check it if it is not checked, or to remove the check mark if it is checked. You can check all the material categories by clicking the *Check All* button. You can remove the check marks from all the material categories by clicking the *Check None* button.

Type the designation for the material you want to locate

As you type into the edit box, the selected item in the list below the edit box will change to show you the closest designation IMMCR recognizes. The list may contain several items with the same value. This tells you that there is more than one material category that contains that designation.

Locating a material by chemical composition

One advantage of the electronic version of IMMCR over the book is the electronic version's ability to look up materials by chemical composition.

You tell IMMCR which elements to look up and the limits for the material content of those elements. You can select up to five elements. IMMCR will then scan through all the materials in the category, selecting those materials which satisfy your requirements. It will then display those materials and their equivalents in the Category Window.

Element

Use the drop-down list boxes on each row to select an element to be included in the search. The list box may contain elements that are not displayed in the Category Window. This is because IMMCR can scan the Other column in the Category Window for the elements that have ranges specified.

Minimum %

Use this edit box to enter a minimum percent composition for an element. IMMCR will only include those materials with a percent composition for the element greater than or equal to this value. If you leave this edit box blank, IMMCR will not place a lower limit on the percent composition for the element.

Maximum %

Use this edit box to enter a maximum percent composition for an element. IMMCR will only include those materials with a percent composition for the element less than or equal to this value. If you leave this edit box blank, IMMCR will not place an upper limit on the percent composition for the element.

How Composition Searches are Performed

IMMCR uses the following rules when determining if a material satisfies the composition search request:

- A material must satisfy all the specified element ranges to be included in the results. For example, suppose you specified a carbon content between 1.00% and 2.00%, and a silicon content less than or equal to 0.60% for the Tool Steels category.
 - The tool steel T30402, which has a carbon content between 1.40% and 1.60%, and a silicon content less than or equal to .60% satisfies the search.
 - The tool steel T30110, which has a carbon content between 1.25% and 1.50%, but a silicon content between 1.00% and 1.50%, does not satisfy the search.
- If a material does not have any values for the element, the material is not included in the results.

How Composition Searches are Performed (continued)

- If a material contains two values for the element, the material is included in the results if any portion of the range between those two values is within the *Minimum %* and *Maximum %* ranges. For example, suppose you specified a carbon content between 1.40% and 1.45% for the Tool Steels category.
 - The tool steel T30402, which has a carbon content between 1.40% and 1.60%, satisfies the search.
 - The tool steel T30110, which has a carbon content between 1.25% and 1.50%, also satisfies the search

Viewing Search Results

The Category Window is your view into a material category. A Category Window can display all the materials in the material category, or it can display only the results of a search. Each Category Window is separate from the other Category Windows. You can have more than one Category Window open for a material category, with each window displaying the results of a different search.

You can do several things with the Category Window:

- Copy selected portions of the window to the Windows clipboard.
- Locate individual materials within the results of a search using the "Goto" command.
- View any notes associated with the material category.
- Save the contents of the Category Window as a text file.