

NACE International Publications Style Manual

This edition of the *NACE International Publications Style Manual* is based on revisions prepared by the NACE Publications Division and Technical Activities Division staff members in conjunction with the NACE Publications Activities Committee and NACE Reference Publications Committee, an administrative committee of the Technical Coordination Committee.



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Section 1: Scope

This manual contains style guidelines for NACE International publications, whether printed or electronic. For the purposes of this manual, the term style is intended to mean the manner in which the printed or electronic material is presented; this includes word usage, punctuation, spelling, typography, arrangement, layout, format, and organization.

The guidelines presented herein include requirements, recommendations, and options. In this manual, the term must is used to designate a requirement (i.e., mandatory); the term should is used to indicate a recommendation (i.e., a strong preference but not mandatory); and the term may is used to indicate an optional element of style.

1.1 NACE Publications

The following publications are covered by this style manual.

1.1.1 Books and Compilations

1.1.2 Periodicals

1. Articles published in *Materials Performance (MP)*
2. Articles Published in *CORROSION*

Note: Being a nontechnical magazine, NACE International's *CoatingsPro* follows the *Chicago Manual of Style*.

1.1.3 Newsletters

1. *InspectThis!*
2. *Stay Current*

1.1.4 Conference and Symposium Papers⁽¹⁾

1.1.5 Technical Committee Publications

1. Standards
 - a. Standard practice
 - b. Standard test method
 - c. Standard material requirements
2. Technical committee reports
 - a. State-of-the-art report
 - b. Informational report
3. Special Publications
 - a. Manual
 - b. Reference book
 - c. Compilation

1.1.6 Operating Manuals, Legal Documents, and Policy Documents

This manual does not define style for operating manuals, legal documents, and policy documents, for which other rules may apply.

Section 2: General Style Guidelines for NACE Publications

2.1 Introduction

This section contains general style guidelines for NACE publications. Additional guidelines that specifically pertain to technical committee publications are given in Section 3.

2.1.1 Language and Spelling Reference

Publications by NACE International are usually in the English language. Publications designed for a specific market, country, or region may be in the primary language of that market, country, or region.

With some exceptions NACE uses *The American Heritage Dictionary of the English Language*, latest edition, to resolve questions regarding spelling, definition, and usage. For exceptions, see *Appendix A: Exceptions to Common Use and/or The American Heritage Dictionary of the English Language*.

⁽¹⁾Refer to the NACE Technical Program Manual for Authors

2.2 Abbreviations, Acronyms, Signs, and Symbols

For standard abbreviations, acronyms, signs, and symbols used in NACE publications, refer to:

- *Appendix B: Abbreviations, Symbols, and Acronyms*
- *Appendix C: Signs and Symbols—Mathematical, Engineering, and Chemical Reactions*
- *Appendix D: Chemical Elements and their Symbols*
- *Appendix E: Addresses and Acronyms of Frequently Cited Organizations*
- *Appendix F: Abbreviations of Periodicals Frequently Cited in NACE publications*

2.2.1 Consistency of Use

Abbreviations, acronyms, signs, and symbols must be used consistently throughout the publication.

2.2.2 Identification

Abbreviations and acronyms must be identified on first use by spelling out the term completely and following it with the abbreviation or acronym in parentheses. If the term is used only once, the abbreviation or acronym should not be included.

2.2.2.1 Chemical Elements

Those symbols listed in Appendix D (e.g., Fe for iron) may be used without identification.

2.2.2.2 Units of Measure

Abbreviations and symbols for units of measure listed in *Appendix B* may be used without identification.

2.2.3 In Titles and Headings

Abbreviations must not be used in titles, headings, and subheadings. Acronyms must not be used in titles but may be used in subheadings for subparagraphs.

2.2.4 Organizational Names

Organizational names must be spelled out completely on first use within text, references, and bibliographies, except for those acronyms adopted officially by the organization (*Appendix E*).

2.2.5 Periodical Titles

Periodical titles must be spelled out and italicized when first mentioned within the text. *MP* is acceptable on second reference for *Materials Performance*. *CORROSION* must be in all caps and italicized. The abbreviation “CJ” must not be used for *CORROSION*; “journal” is not part of the publication’s title (*Appendix F*).

2.3 Appendixes

2.3.1 When to Use

Appendixes should be used in a publication when inclusion of supplementary information within the main body text would disturb the continuity of the publication. Alternatively, brief supplementary information may be included in a footnote.

2.3.2 Title and Identification

Every appendix must have a title and be lettered sequentially (*Appendix A*, *Appendix B*, etc.) in the order mentioned in the text.

2.3.3 Position

Appendixes must immediately follow the reference list (or bibliography, if used).

2.4 Bibliographies

Bibliographies may be used at the end of a publication to credit sources consulted in its preparation or to cite sources that contain information related to the subject of the publication.

2.4.1 Position

Bibliographies, when used, must appear after the list of references.

2.4.2 Differ from References

Bibliographies differ from references in the following ways:

- Bibliographic entries are not numbered.
- The name of the first author in each entry is reversed, with surname followed by initials.
- Bibliographic entries are listed in alphabetical order by the last name of the first author or by the title if there is no author or editor.
- The first line is flush with the left margin with subsequent lines in each entry indented.
- Each main segment of an entry is separated by a period.
- The facts of publication (address and name of publisher, date of publication) are not enclosed in parentheses.

2.4.3 Sample Entries

The presentation of information in bibliographic entries must be consistent in order, content, and punctuation with the sample entries given in *Appendix G: Sample Entries for Bibliographies*.

2.5 Capitalization

All capitalization must be consistent with rules of convention outlined in the *American Heritage Dictionary of the English Language*, latest edition. For exceptions, see *Appendix A*.

2.5.1 Textual Matter

2.5.1.1 Titles

The first and last words in a title, as well as all nouns, pronouns, adjectives, verbs, adverbs, subordinate conjunctions, and prepositions consisting of five or more letters must be capitalized. Articles (a, an, the), coordinate conjunctions (and, or, for, nor), and prepositions having fewer than five letters must not be capitalized, unless they are the first or last words of the title or subtitle. All elements of a hyphenated compound word in a title must be capitalized.

2.5.1.2 NACE Standards

Standard, Standard Practice, Test Method, and Material Requirement must be capitalized when they refer to specific NACE standards by designation, but not when they refer to a class of standards.

2.5.1.3 Specific Units within a Publication

Specific units, excluding pages, must be capitalized when they are cited within the text, such as Section 2, Foreword, Paragraph 2.6.8, Figure 2, Table 2, Equation (4).

2.5.1.4 Material Specifications

Material specifications such as alloys, types, classes, grades, and other terms must be capitalized (e.g., Type 310 stainless steel).

2.5.1.5 Abbreviations

The following abbreviations must not be capitalized in reference or bibliographic citations unless the abbreviation begins a segment of the citation:

- comp.—compilation, compiled by, compiler (pl. comps)
- ed.—edited by, edition, editor (pl. eds.)
- no.—number
- trans.—translated by, translation, translator(s)
- vol.—volume

2.5.2 Trade and Company Names

2.5.2.1 Trade Names

Trade names must be capitalized unless the name is accepted as generic.

2.5.2.2 Company Names

Full names of institutions and companies must be capitalized according to the institution or company practice.

2.5.3 Professional Titles

A professional title such as director, professor, or chair must be capitalized if it appears directly before the person's name, but not otherwise.

2.6 Corrosion-Related Terms

Corrosion-related terms must be used consistent with definitions given in the latest revision of NACE/ASTM G193, “Standard Terminology and Acronyms Relating to Corrosion” (Item no. 21137). Special usage and uncommon terms not included in the glossary should be defined in the text as appropriate. For abbreviations, symbols, and acronyms associated with corrosion-related terms, see *Appendix B*.

2.7 Equations

2.7.1 Numbering

All equations must be numbered consecutively throughout a publication, with the equation’s number in parentheses placed adjacent to the right-hand margin. Equations must be centered with an extra line of space above and below.

2.7.2 Citing

Equation must be spelled out and capitalized in text: Equation (5). Equations should be cited as shown in *Appendix H: Citing Equations, Figures, and Tables*.

2.7.3 Multiplication

A lowercase x, rather than a mid-height dot (\cdot), must be used to indicate multiplication in all equations except where units of measure are related to corrosion (see p. 12) and in *Appendix B*. The multiplication symbol (\times) should be used in *CORROSION*.

2.8 Footnotes

2.8.1 Use

Footnotes should be used to give brief supplementary information that would otherwise interrupt the logical flow of the text.

2.8.2 Alternatives

A reference section or appendix should be used instead of footnotes when the number of footnotes on a page or the length of footnotes becomes disruptive.

2.8.3 Indicating

Footnotes must be indicated by superscript Arabic numerals enclosed in parentheses (to differentiate them from reference numbers).

2.8.4 Numbering

Footnotes must be numbered consecutively throughout the publication, or consecutively and separately within each unit (e.g., chapter) of a publication.

2.8.5 Position

The footnote must appear at the bottom of the page on which it is indicated.

2.8.6 Within Figures and Tables

Footnotes within figures and tables must be indicated by superscript uppercase letters enclosed in parentheses, lettered consecutively and separately for each figure and table, and located immediately below each figure and table.

2.9 Graphics

2.9.1 Credit

A statement of the source (a credit line) must be included with all graphics that are not of the author’s own creation. There is no fixed style for credit lines, unless stipulated by the owner or copyright holder.

2.9.2 Designations

All illustrative elements (photographs, diagrams, graphs) must be designated as Figure in the text. All graphic elements in tabular form must be designated as Table.

2.9.3 Figures

2.9.3.1 Numbering

Figures must be numbered consecutively throughout the publication (or chapter), using Arabic numbers, in the order they are mentioned in the text.

2.9.3.2 Captions

Each figure must have a caption that clearly and succinctly identifies its contents. Figure captions must appear directly below the figure or the last element in a series of images constituting one numbered figure.

2.9.3.3 Citing

Figure must be spelled out and capitalized when referring to a specific figure in the text: Figure 2. Figures should be cited as shown in *Appendix H: Citing Equations, Figures, and Tables*.

2.9.3.4 Photographs

2.9.3.4.1 Scale Dimensions

Scale dimensions must be provided, where appropriate, in the lower right corner on photomicrographs. The dimensional marker must be given as a factor of 10 in metric units 5 to 10 mm long following reduction of the photograph for printing.

2.9.3.5 Graphs

2.9.3.5.1 Subject

The subject of the graph must be clearly stated in the figure caption.

2.9.3.5.2 Labels

Abscissa and ordinate lines must be clearly labeled using descriptive words and applicable units of measure.

2.9.3.5.3 Grids

Background grids should be minimized (for example, two to four intermediate gridlines) between the abscissa and ordinate lines.

2.9.4 Tables

2.9.4.1 Title

Each table must have a title that clearly and succinctly identifies its content.

2.9.4.2 Numbering

Tables must be numbered consecutively throughout the publication, using Arabic numerals, in the order they are mentioned in the text.

2.9.4.3 Citing

Table must be spelled out and capitalized when referring to a specific table in the text: Table 6. Tables should be cited as shown in *Appendix H*.

2.9.4.4 Units of Measure

When all numbers in a column of a table are the same unit of measure, the unit of measure must be given in the column heading, rather than repeating it in each row.

2.10 Numbers

In the text, the numbers zero through nine must be expressed as words and all others must be expressed as numerals, with the following exceptions:

1. All numbers used with any unit of measure must be expressed in numerical form (e.g., 6 kPa, not six kPa).
2. In a series of numbers containing one or more numerals, all numbers must be expressed as numerals (e.g., The measurements were taken at 1 day, 7 days, and 30 days).

3. Any number that begins a sentence must be spelled out (e.g., Twelve specimens were used for each test.). If unavoidable, numerals may be used to identify a calendar year beginning a sentence.
4. Dates, hours (used with a.m. or p.m.), ages, addresses and highway numbers, exact sums of money, exact measurements, and page and other reference numbers must be expressed in numerals.

2.10.1 Ordinals

First through ninth must be spelled out when they indicate sequence in time or location. Figures must be used when the sentence was assigned in forming names (e.g., 7th Fleet, 4th International Conference).

2.10.2 Decimal Fractions

Decimal fractions must be indicated by a period, never by a comma. For decimal fractions less than zero, a zero must precede the period (e.g., 0.47, not .47).

2.11 Punctuation

All punctuation must be consistent with the rules of convention outlined in *The American Heritage Dictionary of the English Language*, latest edition, except as noted below.

2.11.1 Commas

2.11.1.1 In a Series

Commas must be used to separate elements in a series, and before the concluding conjunction.

2.11.1.2 With Adjectives

Commas must be used to separate a series of adjectives equal in rank. If replacing the commas with the word *and* does not change the meaning, the adjectives are equal.

2.11.1.3 In Numbers

Commas must be used for most numbers higher than 999. The primary exceptions are street addresses, broadcast frequencies, room numbers, serial numbers, telephone numbers, and years.

2.11.2 Hyphens

2.11.2.1 In Compound Modifiers

Hyphens must be used in compound modifiers when:

1. the phrase might be misunderstood if no hyphen were used (e.g., unionized vs. un-ionized);
2. the term is in common usage and appears with hyphens in other literature (e.g., high-temperature);
or
3. the compound modifier appears before a noun consisting of two or more words or is part of a group of compound modifiers.

Hyphens must not be used when the first word of the compound modifier is *very* or an adverb ending in *ly*. In other cases, the use of hyphens will be left to the discretion of the editor.

2.11.2.2 With Alloys

Hyphens must be used between the elemental components of an alloy (e.g., Ni-Cr-Mo alloys) to differentiate alloys from chemical compounds (e.g., NaCl).

2.11.2.3 With Prefixes

Compound words formed with prefixes are normally not hyphenated, whether they are nouns, verbs, adjectives, or adverbs. However, there are cases in which it is appropriate to insert a hyphen between a prefix and the root word. Hyphens must be used:

1. before a capitalized word or a numeral (e.g., sub-Saharan, pre-1950);
2. before a compound term (e.g., non-self-sustaining, pre-World War II);
3. to separate two vowels, and other combinations of letters or syllables that might cause misreading (e.g., anti-intellectual, extra-alkaline);
4. to separate the repeated terms in a double prefix (e.g., sub-subfloor); and
5. when a prefix or combining form stands alone (e.g., over- and underused, macro- and microeconomics).

See *Appendix I: Prefix Examples*.

2.11.3 Italics
Italics must be used for titles of publications named in the main body of text; foreign words not yet assimilated into English; names of ships, trains, aircraft, and spacecraft; and titles of works of art. Italics may be used sparingly for emphasis.

2.11.4 Parentheses
Parentheses must be used to enclose numerals or letters marking divisions and to denote specific equation numbers.

2.11.4.1 Brackets
Brackets must be used as parentheses within parentheses (e.g., carbon dioxide [CO₂]).

2.11.4.2 In Mathematical Formulas
In mathematical formulas, the order for an enclosure should be: {{{{({})}}}}. As angle brackets, bars, and double bars may carry mathematical significance, they must not be used to supplement the usual series above.

2.11.5 Quotation Marks
Titles of papers, articles, reports, standards, book chapters, and other short works must be enclosed in quotation marks.

2.11.5.1 With Other Punctuation Marks
A period and comma must be placed within the quotation marks. Punctuation such as semicolons, colons, exclamation points, question marks, and dashes must be placed outside the quotation marks, unless they are part of the quotation itself.

2.12 References

2.12.1 Information
Authors must supply complete information for references so that the sources can be identified and located.

2.12.2 Indicating
References must be indicated in the text by a superscript Arabic numeral, and numbered consecutively throughout the publication. References may be numbered consecutively and separately within each unit (e.g., chapter) of a large publication (such as a book) with a separate reference list at the end of each unit.

2.12.3 Placement
To avoid interrupting the flow of thought of a sentence, reference numbers must be placed after any punctuation, except a dash, and normally should be placed at the end of a sentence.

2.12.3.1 Standards and Similar Documents
When a document such as a standard is mentioned within a sentence, the reference number should immediately follow the reference.

2.12.3.2 Multiple References
If several documents are mentioned within the same sentence, the appropriate reference number must be placed at the end of each reference.

2.12.4 List of References
The list of references must appear after the main body of text or publication unit, and before a bibliography and appendix.

2.12.5 Draft Documents
Draft documents (including draft standards) must not be cited in the text of publications or in references. Instead, a reference may be made to Work in Progress by a task group, committee, or other organization.

2.12.6 Private Correspondence
Private correspondence must be designated as such within the text. When a letter or other personal communication is listed as a reference, the entry must begin with the name of the letter writer or caller.

2.12.7 Punctuation

Each main segment of an entry must be separated by a comma, with a period ending each entry.

2.12.8 Sample Entries

The information in reference entries must be consistent in order, content, and punctuation with the sample entries given in *Appendix J: Sample Entries for References*.

2.13 Spelling

All spelling must be consistent with *The American Heritage Dictionary of the English Language*, latest edition. For exceptions, see *Appendix A*.

2.14 Trade Names and Author Affiliations

For the purposes of this manual, trade name is defined as “the name given by a manufacturer or merchant to a product, process, or service to distinguish it as made or sold by the concern and that may be used and protected as a trademark. Trade name also refers to any name under which the concern does business (e.g., company name, association, organization, etc.). This definition includes company name URL (web) addresses, and does not exclude names that are not necessarily copyrighted or have a trademark.”

2.14.1 Use

A trade name may be used only once in any set of materials, and must be replaced with an alternative designation on subsequent mentions. Trade names must not be used in *CORROSION* articles unless technically necessary.

2.14.1.1 Prohibitions

Trade names must not be used in any form in titles, figures, tables, captions, or abstracts of publications.

2.14.1.2 Exceptions

A trade name may be used once in an abstract in *CORROSION* when technically necessary (e.g., an article evaluating a specific alloy). This should be used in rare cases.

2.14.1.3 Alternative Designations

Generic substitutes, UNS numbers, ASTM or API specification numbers, or chemical compositions must be used as alternative designations in place of trade names, where possible. The assigned UNS number (where available) must appear the first time a material is mentioned. The UNS number must be given in parentheses immediately following the material’s name when the name first appears (e.g., Type 304 stainless steel [UNS S30400]). For subsequent mentions of the material, the generic name may be used alone. Each UNS number only needs to be used once per article.

For some examples of generic substitutes for trade names, see *Appendix K: Examples of Trade Names and Generic Substitutes*.

2.14.2 Indicating

Trade names must be indicated with a superscript trademark dagger (†) and identified in corresponding footnotes that state “†Trade name.”

2.14.3 Trade and Technical Associations

The names of trade and technical associations must be spelled out (with the exception of NACE International and other acronyms officially adopted by the organization) in full in a footnote the first time they appear in a publication. Contact information, such as a mailing address or Internet address, must be included. See *Appendix E*.

Note: *MP* does not use footnotes for this purpose. Trade and technical associations must be identified in the text, followed by city and state or city and country in parentheses.

2.14.4 Company Names

A company name, if technically significant, must be used only once in any article or paper, and must be replaced with a generic description thereafter.

2.14.4.1 Author’s Affiliation

The name of the author’s company affiliation must not appear more than once in the text of a publication.

2.14.5 Internet Addresses

An Internet address (URL) is a privately owned domain name, and is considered a trademark. Citations in the text in technical articles may include the author of the work, but must not include the actual URL. The URL may be mentioned only in a reference list or footnote.

2.15 Units of Measure

2.15.1 Use

Metric units must be used in accordance with the latest revision of ASTM SI 10, "American National Standard for Use of the International System of Units (SI): The Modern Metric System." The actual units of measure must be stated first in the text. If the actual unit of measure is a U.S. customary unit, it must be followed in parentheses by the metric conversion. If the actual unit of measure is a metric unit, it may be followed by the U.S. customary unit conversion in parentheses. See *Appendix L: U.S. Customary/Metric Conversion for Units of Measure Commonly Used in Corrosion-Related Publications*.

2.15.2 Conversions

In making conversions from U.S. customary to metric units, the exact conversion factor must be used in multiplication and the product must be rounded to the same number of significant digits as the original unit of measure, or to the number of significant digits that represents the degree of accuracy of the original measurement.

Significant digits are defined as the digits of a number that have a significance; the digits of a number beginning with the first nonzero digit on the left of the decimal point, or with the first nonzero digit after the decimal point if there is no nonzero digit to the left of the decimal point, and ending with the last digit to the right. Note that the use of the final zero in the number 0.230 implies that the number is known to third-place accuracy.

2.15.2.1 Temperatures

Temperature conversions normally should be rounded to the nearest whole number. Fractions of degrees should not be used unless necessary for technical accuracy. Further rounding (e.g., to the nearest 5 or 10 degrees) may be used, especially for conversions at high temperatures. For example, a heat treatment temperature of 1,150 °F converts to 621 °C, but use of 620 °C may be more practical when it provides an acceptable degree of accuracy. See *Appendix M: Celsius and Fahrenheit Temperature Conversions*.

2.15.3 Related to Corrosion

In accordance with ISO guidelines, the units of measure shown in Table 1 below must be used for measurements related to corrosion:

Table 1: Units of Measure Related to Corrosion

For	Use
Corrosion rate	µm/y or mm/y
Cathodic protection <ul style="list-style-type: none">• Anode current density• Anode consumption• Anode output	<ul style="list-style-type: none">• mA/m² or A/m²• kg/A·y• A·y/kg
Protective coatings <ul style="list-style-type: none">• Coverage• Coating resistance• Thickness	<ul style="list-style-type: none">• m²/L• Ω·m²• µm, mm, mils
Electroplating <ul style="list-style-type: none">• Coating thickness	<ul style="list-style-type: none">• µm or g/m²

Section 3: Style Guidelines for Technical Committee Publications

3.1 Introduction

This section contains style guidelines in addition to, or instead of, those contained in Section 2 that specifically pertain to technical committee publications developed under the auspices of the Technical Coordination Committee (TCC).

3.2 Technical Committee Publications

Technical committee publications are developed to document, update, and standardize new and existing corrosion technology in the following forms defined in the *NACE International Technical Committee Publications Manual*.

3.2.1 Standards

NACE issues three classes of written standards: standard practice (SP), standard test method (TM), and standard material requirements (MR).

3.2.1.1 Standard Practices

SPs (formerly called recommended practices, or RPs) are methods of selection, design, installation, or operation of a material or system when corrosion is a factor. This class of standard may provide details of construction of a corrosion control system; methods of treating the surface of materials to reduce requirements for using corrosion-control devices; criteria for proper operation and maintenance of a corrosion-control system; methods for proper use of corrosion-control techniques; procedures for increasing the effectiveness, safety, and economic benefits of an installation or system; procedures for proper use of an installed corrosion-control system to prevent its deterioration; or other practices requiring a description of techniques or control parameters for a system.

3.2.1.2 Standard Test Methods

TMs are tests related to corrosion prevention and control. This class of standard may give the method of conducting tests of any type to ascertain the characteristics of a material, design, or operation. Acceptance or performance criteria are not permitted in TMs. These criteria may be covered in SPs or MRs.

3.2.1.3 Standard Material Requirements

MRs are standards that define the necessary characteristics of a material when corrosion is a factor in the selection, application, and maintenance of the material. This class of standard may include chemical composition of the material, its mechanical properties, and its physical properties. These standards state the requirements of a material to provide a basis for contractual specifications by interested parties.

3.2.2 Technical Committee Reports

NACE issues two categories of technical committee reports (TCRs):

3.2.2.1 State-of-the-Art

State-of-the-art reports deal with the current science and technology of a method, technique, material, device, system, or other aspect of corrosion-control work.

3.2.2.2 Informational

Informational reports encompass statements on a specific problem (summarizing its ramifications, controversial points, and possible solutions), surveys of common practices, bibliographies on special subjects, etc.

3.2.3 Special Publications

3.2.3.1 Manuals

3.2.3.2 Reference Books

3.2.3.3 Compilations

Compilations usually consist of standards, reports, and/or articles on a given subject.

3.3 General

3.3.1 Guidelines and Procedures

All technical committee publications must be written, edited, and published in accordance with guidelines and procedures established by the TCC and defined in the *NACE Technical Committee Publications Manual*, and with this manual.

3.3.2 Graphics

Graphics must be provided in accordance with Paragraph 2.9 for final publication. Reproducible photocopies of photographs may be used with drafts. Color graphics are not used in printed standards, TCRs, and most special publications. Therefore, all graphics used in these publications must be suitable in black and white. Color graphics may be used for final publication available in electronic form (e.g., on the NACE web site and CD-ROMs).

3.4 Standards

3.4.1 Not Approved Notice

The following not approved notice must appear on the cover page and at the top of each page of draft standards:
NOT APPROVED: This draft of a proposed NACE International standard is for committee use only and must not be duplicated in any form for publication or for any use other than NACE committee use.

3.4.2 Disclaimer

The following disclaimer must appear on the cover page of published standards (in draft standards, the disclaimer precedes the foreword):

This NACE International standard represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone, whether he or she has adopted the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in conformance with this standard. Nothing contained in this NACE standard is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by letters patent, or as indemnifying or protecting anyone against liability for infringement of letters patent. This standard represents minimum requirements and should in no way be interpreted as a restriction on the use of better procedures or materials. Neither is this standard intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this standard in specific instances. NACE assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official NACE interpretations issued by NACE in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

Users of this NACE standard are responsible for reviewing appropriate health, safety, environmental, and regulatory documents and for determining their applicability in relation to this standard prior to its use. This NACE standard may not necessarily address all potential health and safety problems or environmental hazards associated with the use of materials, equipment, and/or operations detailed or referred to within this standard. Users of this NACE standard are also responsible for establishing appropriate health, safety, and environmental protection practices, in consultation with appropriate regulatory authorities if necessary, to achieve compliance with any existing applicable regulatory requirements prior to the use of this standard.

CAUTIONARY NOTICE: NACE standards are subject to periodic review, and may be revised or withdrawn at any time in accordance with NACE technical committee procedures. NACE requires that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of initial publication and subsequently from the date of each reaffirmation or revision. The user is cautioned to obtain the latest edition. Purchasers of NACE standards may receive current information on all standards and other NACE publications by contacting the NACE FirstService Department, 15835 Park Ten Place, Houston, TX 77084-5145 (tel: +1 281-228-6200, email: firstservice@nace.org).

3.4.3 Components

Standards must contain the following components in the order listed:

1. Cover sheet
2. Disclaimer
3. Table of contents
4. Foreword
5. Body

6. References
7. Bibliography
8. Appendixes (if required)

3.4.3.1 Cover Sheet

The following information must appear on the cover sheet:

1. NACE logo
2. Committee designation (drafts only)
3. Not approved notice (drafts only)
4. NACE standard designation (published standards only)
5. Title of the standard
6. Draft number(s) followed by history and date of draft (drafts only)
7. Disclaimer (second page of drafts)
8. Year, month, and day of approval (published standards only)
9. NACE address
10. ISBN (published standards only)
11. Copyright (date and ownership)

3.4.3.2 Foreword

The foreword must explain concisely the purpose and intended audience of the standard. Any pertinent explanatory information on the nature of the standard must also be included, such as its service to the industry, other advantages of its availability, and other related standards. If the standard replaces a previously issued standard or TCR, the history of the standard's development must be documented in the foreword. The sponsoring committee(s) must be identified in the last paragraph of the foreword.

3.4.3.2.1 Special Emphasis Note

At the end of the foreword, a text box must be inserted that contains the following special emphasis note:

In NACE standards, the terms *shall*, *must*, *should*, and *may* are used in accordance with the definitions of these terms in the *NACE International Publications Style Manual*. The terms *shall* and *must* are used to state requirements that are considered mandatory. The term *should* is used to state something that is good and is recommended, but is not considered mandatory. The term *may* is used to state something that is considered optional.

3.4.3.3 Body

The body of the standard must be divided into consecutively numbered (using Arabic numerals) and titled sections. Section headings must be centered. Each section must be divided into consecutively numbered paragraphs (designated by the section number followed by sequential digits, separated by periods), with optional numbered subparagraphs, using the decimal numbering system demonstrated in this manual. Each paragraph should constitute a consideration or statement under that section. Subparagraphs (related thoughts) must be designated by adding more periods and consecutive digits. Paragraphs must be left justified, and subparagraphs must be indented consistent with their hierarchy, as demonstrated in this manual. Headings and subheadings may be used for paragraphs and subparagraphs, respectively.

3.4.3.3.1 General Section

The first section, with the heading *General*, must define the scope, must explicitly state limitations regarding the technical use of the standard, may describe the standard's development (chronological sequence, inductive or deductive approach), and/or may give information about the applicability of the standard.

3.4.3.3.2 Tables and Figures

Tables and figures must be inserted in order at appropriate places as close as possible to the point of first mention in the main body text. The main body text must discuss, make a conclusion about, or summarize the significance of all data in each table and figure.

3.4.3.4 References and Bibliographies

3.4.3.4.1 Standards and Reports

Citations of standards and reports must not include the year of publication. Instead, latest revision in parentheses must follow the standard or report designation (see Appendixes G and J for examples).

3.4.3.5 Appendixes

Appendixes of the standard must be cited within the text of the standard and must be designated sequentially (A, B, etc.) in the order in which they are mentioned in the text. Each appendix must have a title. The appendix designation (e.g., *Appendix A*) must be centered at the top of the first page of the appendix, and its title must be centered on the second line. Paragraphs in the appendix may be numbered. For numbered paragraphs, the appendix designation must precede the paragraph numbers (e.g., A1.1 for the first paragraph in the first section of the first or only appendix, C2.4 for the fourth paragraph in the second section of Appendix C). Appendixes in NACE standards may either be mandatory (required) or nonmandatory (informative). Each appendix must be clearly labeled as mandatory or nonmandatory, and also must be indicated as such in the text of the standard at the first mention of the appendix.

3.4.3.5.1 Mandatory Appendixes

Mandatory appendixes constitute provisions of the standard and must be followed by users of the standard.

3.4.3.5.2 Nonmandatory Appendixes

Nonmandatory appendixes are provided for information only and users are not required to follow the provisions therein. However, a nonmandatory appendix may contain requirements or procedures to be used if the user of the standard chooses to follow the appendix.

At the beginning of each nonmandatory appendix, below the appendix title and before the body of the appendix, a text box must be inserted that contains the following note:

This appendix is considered nonmandatory, although it may contain mandatory language. It is intended only to provide supplementary information or guidance. The user of this standard is not required to follow, but may choose to follow, any or all of the provisions herein.

3.4.3.6 Shall, Must, Should, May

In NACE standards, it is of utmost importance to differentiate mandatory statements that establish requirements from nonmandatory statements that provide recommendations or options. The terms *shall* and *must* must be used to state requirements (i.e., mandatory). The term *should* must be used to indicate something that is good (or desirable) and is recommended, but is not considered mandatory. The term *may* must be used to state something that is considered optional.

Phrases such as “it is essential” must be avoided, because it is unclear whether this is intended as a mandatory or nonmandatory statement. Use of the term *can* should be carefully considered. The term *can* may be used in a context consistent with its formal meaning, which is “having the ability.” Use of the term *can* should be avoided in a context wherein it could be informally construed as granting permission or making a recommendation.

3.4.3.7 Trade Names

Trade names must not be used in NACE standards except in reference or bibliographic citations or footnotes acknowledging the copyright holder of published material approved for use by the source, if necessary.

3.4.3.8 Alternative Designations

Generic substitutes, UNS numbers, ASTM or API specification numbers, or chemical compositions must be used as alternative designations in place of trade names.

3.4.3.8.1 Generic Substitutes

For some examples of generic substitutes for trade names, see *Appendix K*.

3.4.3.8.2 UNS Numbers

The assigned UNS number (where available) must appear the first time a material is mentioned. The UNS number must be given in parentheses immediately following the material’s generic

name when the name first appears (e.g., Type 304 stainless steel [UNS S30400] or Alloy 600 [UNS N06600]). For subsequent mentions of the material, the generic name may be used alone.

3.4.3.9 Authors' Names and Affiliations

Authors' names and affiliations must not be mentioned in standards.

3.4.4 Units of Measure

Metric units must be stated first in the text. The U.S. customary unit may be mentioned following the metric unit and enclosed in parentheses. See *Appendix L*. Both metric and U.S. customary units must be included in tables and figures. When a table or figure is reprinted from another source, appropriate conversion factors must be given in a footnote.

3.5 Technical Committee Reports

3.5.1 Not Approved Notice

The following not approved notice must appear on the first page and at the top of each subsequent page of draft TCRs:

NOT APPROVED: This draft of a proposed NACE International technical committee report is for committee use only and must not be duplicated in any form for publication or for any use other than NACE Committee work.

3.5.2 The following disclaimer must appear on the first page of draft and published TCRs:

This NACE International technical committee report represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not included in this report. Nothing contained in this NACE report is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by Letters Patent, or as indemnifying or protecting anyone against liability for infringement of Letters Patent. This report should in no way be interpreted as a restriction on the use of better procedures or materials not discussed herein. Neither is this report intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this report in specific instances. NACE assumes no responsibility for the interpretation or use of this report by other parties.

Users of this NACE report are responsible for reviewing appropriate health, safety, environmental, and regulatory documents and for determining their applicability in relation to this report prior to its use. This NACE report may not necessarily address all potential health and safety problems or environmental hazards associated with the use of materials, equipment, and/or operations detailed or referred to within this report. Users of this NACE report are also responsible for establishing appropriate health, safety, and environmental protection practices, in consultation with appropriate regulatory authorities if necessary, to achieve compliance with any existing applicable regulatory requirements prior to the use of this report.

CAUTIONARY NOTICE: The user is cautioned to obtain the latest edition of this report. NACE reports are subject to periodic review, and may be revised or withdrawn at any time without prior notice. NACE reports are automatically withdrawn if more than 10 years old. Purchasers of NACE reports may receive current information on all NACE publications by contacting the NACE FirstService Department, 15835 Park Ten Place, Houston, TX 77084-5145 (tel: +1 281-228-6200, email: firstservice@nace.org).

3.5.3 Components

TCRs must contain the following components in the order listed:

1. Designation and title
2. Disclaimer
3. Foreword
4. Body
5. References (if required)
6. Bibliography (if required)
7. Appendixes (if required)

3.5.3.1 First Page

The following information must appear on the first page:

1. NACE logo
2. Committee designation (drafts only)
3. Not approved notice (drafts only)
4. NACE TCR designation (published reports only)
5. Title of the TCR
6. Draft number(s) followed by history and date of draft (drafts only)
7. Copyright (drafts: year and ownership; published TCRs: month, year, and ownership)
8. NACE address (drafts only)
9. Disclaimer notice (second page of drafts)

3.5.3.2 Foreword

The foreword must explain concisely the purpose, scope, limitations, and intended audience of the TCR and give other pertinent explanatory information on the nature of the TCR. If the TCR replaces a previously issued standard or TCR, the history of the TCR's development must be documented in the foreword. The sponsoring committee(s) must be identified in the last paragraph of the foreword.

3.5.3.2.1 Special Emphasis Note

At the end of the foreword, a text box must be inserted that contains the following special emphasis note:

NACE technical committee reports are intended to convey technical information or state-of-the-art knowledge regarding corrosion. In many cases, they discuss specific applications of corrosion mitigation technology, whether considered successful or not. Statements used to convey this information are factual and are provided to the reader as input and guidance for consideration when applying this technology in the future. However, these statements are not intended to be requirements or recommendations for general application of this technology, and must not be construed as such.

3.5.3.3 Body

The body of the TCR should include sections such as introduction, description, experimental procedure, results, discussion, summary, or conclusions, in narrative paragraphs with appropriate headings. Paragraphs in TRCs should not usually be numbered, but may be if necessary to improve readability or to aid in locating information in a long TCR.

3.5.3.3.1 Tables and Figures

Tables and figures must be inserted in order at appropriate places as close to the point of first mention in the main body text. The main body text must discuss, make a conclusion about, or summarize the significance of all data in each table and figure.

3.5.3.4 References and Bibliographies

3.5.3.4.1 Standards and Reports

Citations of standards and reports must not include the year of publication when the overall standard or report is being cited. Instead, latest revision in parentheses must follow the standard or report designation (see Appendixes G and J for examples). However, in some cases in which a specific verbatim statement in the standard or report is being cited, the year of publication may be included.

3.5.3.4.2 Other Organizations' Publications

When citing another organization's publication, a footnote number must be placed after the name or acronym of the organization (at first mention only), and a separate reference number must be placed after the publication's designation (or title, if there is no alphanumeric designation). The footnote must provide the full name and mailing address of the issuing organization. The reference must be in accordance with Paragraphs 2.12 and 3.5.3.4.1.

- 3.5.3.5** **Appendixes**
Appendixes of the TCR must be cited within the text of the TCR and must be designated sequentially (A, B, etc.) in the order in which they are mentioned in the text. Each appendix must have a title. The appendix designation (e.g., *Appendix A*) must be centered at the top of the first page of the appendix, and its title must be centered on the second line. Paragraphs in the appendix may be numbered. For numbered paragraphs, the appendix designation must precede the paragraph numbers, (e.g., A1.1 for the first paragraph under the first section of the first or only appendix, C2.4 for the fourth paragraph under the second section of *Appendix C*).
- Appendixes in TCRs are intended to provide supplementary information only, and users are not required to follow the provisions therein. An appendix in a TCR may contain mandatory or recommending language in specifications or procedures that are included as examples of those that have been used successfully (see Paragraph 3.5.3.8).
- At the beginning of each TCR appendix, below the appendix title and before the body of the appendix, a text box must be inserted that contains the following note:
- This appendix is intended to provide supplementary information only, although it may contain mandatory or recommending language in specifications or procedures that are included as examples of those that have been used successfully. Nothing in this appendix shall be construed as a requirement or recommendation with regard to any future application of this technology.
- 3.5.3.6** **Shall, Must, Should, May**
TCRs inform the user about methods or techniques that have been or are being used in industry or research, without explicitly establishing requirements or recommending the use of one particular practice of technology over another in the future. A TCR must not establish requirements or make recommendations in any form (either literal or implied). Requirements may be established and recommendations may be made only in association standards.
- Because the terms *shall*, *must*, *should*, and *may* are defined in Paragraph 3.4.3.6 of this manual as terms that convey requirements and recommendations, these terms and other recommending language must not be used.
- 3.5.3.7** **Trade Names**
Trade names must not be used in TCRs except in reference or bibliographic citations or footnotes acknowledging the copyright holder of published material approved for use by the sources, if necessary.
- 3.5.3.7.1** **Authors' names and affiliations**
Authors' names and company affiliations must not be mentioned in technical committee reports.
- 3.5.3.8** **Alternative Designations**
Generic substitutes, UNS numbers, ASTM or API specification numbers or chemical compositions must be used as alternative designations in place of trade names.
- 3.5.3.8.1** **Generic Substitutes**
For some examples of generic substitutes for trade names, see *Appendix K*.
- 3.5.3.8.2** **UNS Numbers**
The assigned UNS number (where available) must appear the first time a material is mentioned. The UNS number must be given in parentheses immediately following the material's generic name when the name first appears (e.g., Type 304 stainless steel [UNS S30400] or Alloy 600 [UNS N06600]). For subsequent mentions of the material, the generic name may be used alone.
- 3.5.3.9** **Specifications and Procedures**
If specifications or procedures are given in a TCR as examples of those that have been used successfully, they must be included only in an appendix. The main body text of the TCR must clearly indicate their inclusion as examples at the first mention of the appendix.

3.6 TCC Special Publications

TCC special publications such as manuals (including software manuals), reference books, and compilations must be prepared in accordance with the general guidelines in Section 2 of this manual. Any other specific style guidelines deemed necessary must be developed jointly by the Technical Activities Division in cooperation with the sponsoring committee or developer.

3.6.1 Not Approved Notice

The following notice must appear on the cover page of draft manuals, reference books, and compilations:

NOT APPROVED: This draft of a proposed NACE International publication is for committee use only and must not be duplicated in any form for publication or for any use other than NACE committee work.

3.6.2 Disclaimer

The following disclaimer must appear on the first page of draft and published manuals, reference books, and compilations, before their forewords:

Reproduction of contents in whole or part or transfer into electronic or photographic storage without permission of copyright holder is expressly forbidden. Neither NACE International, its officers, directors, nor members thereof accept responsibility for the use of methods and materials discussed herein. No authorization is implied concerning the use of patented or copyrighted material. The information is advisory only and the use of the materials and methods is solely at the risk of the user.

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Appendix A

Exceptions to Common Use and/or *The American Heritage Dictionary of the English Language*

a, an Use *a* before consonant sounds and *an* before vowel sounds. Always use *a* before NACE.

aboveground One word.

academic degrees Abbreviate doctorate, bachelor's degree, or master's degree as Ph.D., B.A. or B.S., or M.A. or M.S., respectively.

accreditation, certification Accreditation is granted to institutions, like schools; people receive certification (e.g., *June Smith received certification from Hard Knox University, an accredited institution*).

acidproof One word.

acknowledgment Not *acknowledgement*.

acronyms Never separate the letters of an acronym with periods.

active-passive transition Hyphenate.

addresses Use the abbreviations Ave., Blvd., St., Dr., Rd., and Ln. only with numbered addresses (e.g., *1600 Pennsylvania Ave.*).

admiralty metal Do not capitalize.

adviser Not *advisor*.

a.m., p.m. Use lower case, with periods, no space after the periods. See also times.

ampersand (&) Use *and* whenever possible. Use the ampersand when used in proper company names.

annual Use lower case in all uses. Never write *first annual*.

annual banquet Capitalize only as an integral part of the proper noun: *NACE Annual Banquet*. Use lower case elsewhere.

annual conference Capitalize only as an integral part of the proper noun: *NACE Annual Conference*. Use lower case elsewhere.

anticorrosion (one word)

appendix, appendixes, appendices Use *appendixes*, not *appendices*.

as-cast Hyphenate when used as an adjective.

as per Do not use this construction in published material. Instead, use *as requested*, *as specified*, or *in accordance with*.

as-received Hyphenate when used as an adjective.

as-welded Hyphenate when used as an adjective.

association Capitalize only if it is part of an organization's name.

assure, ensure, insure All these terms are used to mean making something secure or certain, but within different contexts. *Ensure* is usually best within the context of NACE documents. For example: *The goal of many standard practices is to ensure the technical integrity of some facility by taking defined actions to mitigate corrosion*. The term *assure* has the unique context of putting someone's mind to rest by informing them confidently, and with a view of removing doubt, that something has been made secure. For example: *Many corrosion engineers have a defined role within their organization to assure management of the technical integrity for safe and reliable operation of their facilities with respect to corrosion control, which is commonly referred to as a technical assurance role*. The term *insure* should be

avoided in NACE documents because it most often carries the implication of guaranteeing life or property against risk, such as by an insurance policy that provides monetary compensation for harm or loss.

author A gender-neutral noun. Can also be a verb (e.g., *He authored the paper*).

base, -based Base is a supporting foundation or bottom part. The suffix *-based* implies an essential ingredient: *a nickel-based alloy*. Never: *a nickel-base alloy*.

board and board of directors Capitalize only as an integral part of a proper noun.

building Never abbreviate. Capitalize the names of buildings, including the word building if it is an integral part of the proper noun.

build-up Hyphenate when used as a noun.

butt weld Two words when used as a noun.

bylaws Do not capitalize.

by-product Hyphenate.

chair Capitalize chair as a formal title before a name: *TCC Chair John Doe*. Do not capitalize as a casual temporary position: *former chair Jane Doe*. Do not capitalize after a name: *John Doe, chair of the NACE Books Committee*. Do not use *chairman, chairwoman, or chairperson*.

cobalt-based Hyphenate.

cold-rolled Hyphenate when used as an adjective or a verb.

comma Use commas to separate elements in entries. Use a comma before the concluding conjunction (*and, or, etc.*).

committee, subcommittee Capitalize only as a proper noun. Capitalize complete (proper) names of NACE committees: *Publications Activities Committee*. Use lower case for committee names in informal use: *government committee, education subcommittee*.

company, companies Use Co. or Cos. when a business uses either word at the end of its proper name.

company names Use the full name as it appears on the company's letterhead or as used by the company in practice. Use a comma before *Inc.* or *Ltd.* unless the company does not in its own use.

compose, comprise Compose means to create or put together. It commonly is used in the active and passive voices: *NACE is composed of several areas. She composed the article. Comprise* means to contain, to include, or embrace. It is used in the active voice followed by a direct object: *NACE comprises several areas*. Remember: the whole comprises the parts.

continual, continuous They are not interchangeable. *Continual* means repeated or intermittent, *continuous* means unbroken.

copper-based Hyphenate.

corporation Abbreviate as *Corp.* when a company or government agency uses the word at the end of its name. Spell out elsewhere.

corrosive A noun.

CORROSION Spell out the name of the NACE journal as *CORROSION* in all uses. Never: *Corrosion Journal* or *CJ*. Where possible, use small caps as indicated to distinguish the journal name from the word corrosion.

corrosiveness, corrosivity OK to use either.

counter electrode Two words, not hyphenated.

courses Capitalize only proper course and NACE International seminar names and set off in quotation marks: "CP1—Cathodic Protection Tester."

courtesy titles Do not use the courtesy titles *Miss, Mr., Mrs., Ms.,* or *Dr.* in printed material other than correspondence, unless you are quoting another person. Always use the designation *FNACE* to indicate a NACE Fellow on first reference: *John Doe, FNACE.*

Currency: When specifying dollar currency, use AUS\$, CAN\$, U.S.\$, etc.

dash (—) The short dash or en dash (–) is used as a negative sign (e.g., –6) and as a minus sign. The long dash or em dash (—) is used to set off items for emphasis: *Catholic Protection—An Introduction.*

data A plural noun that requires plural verbs and pronouns (e.g., *the data are...*).

data point Two words.

database One word.

dates Use Arabic numerals. *See also months.*

decades Use Arabic numerals to indicate decades of history. Show plural by adding the letter *s*: *the 1990s, the mid-1970s.* Do not use apostrophes in plurals.

dew point Two words.

District of Columbia Abbreviate as *DC* and set off with a comma when used after Washington.

division Capitalize when referring to formal NACE Headquarters divisions: *Publications Division, Education Division,* etc. Use lower case elsewhere.

dollars Always use lower case. Use figures and the \$ sign: *The book costs \$2 for members.* Do not use zeros and a decimal point when referring to whole dollars.

email One word lower case. Capitalize only when at the start of a sentence: *I received an e-mail* or *E-mail me at msd@pubs.net.*

embed Not imbed.

employed, used *Employed* means hired, not used.

ensure, insure, assure All these terms are used to mean making something secure or certain, but within a different context. *Ensure* is usually best within the context of NACE documents. For example: *The goal of many standard practices is to ensure the technical integrity of some facility by taking defined actions to mitigate corrosion.* The term *assure* has the unique context of putting someone's mind to rest by informing them confidently, and with a view of removing doubt, that something has been made secure. For example: *Many corrosion engineers have a defined role within their organization to assure management of the technical integrity for safe and reliable operation of their facilities with respect to corrosion control, which is commonly referred to as a technical assurance role.* The term *insure* should be avoided in NACE documents because it most often carries the implication of guaranteeing life or property against risk, such as by an insurance policy that provides monetary compensation for harm or loss.

environmentally assisted cracking Do not hyphenate. The preferred term is *environmental cracking.*

entitled Use it to mean having the right to do or possess something. Use *titled* to mean given the name of: *The book is titled Galvanic Corrosion.*

equiaxial One word.

erosion-corrosion Hyphenate as a noun or adjective.

European Union Formerly referred to as the European Community, the union comprises 25 European nations and was formed for trade purposes. Names of its currency are the *euro* and the *euro-cents.* EU is acceptable on second reference.

ex officio Do not italicize.

executive director Capitalize before a name only if it is a formal title.

federal Use lower case when used as an adjective to distinguish something from state or local entities.

feedwater One word.

fiberglass Do not capitalize the generic term.

Fiberglas (with one s) is the trade name.

fiber optic Two words.

flatbed One word as a noun or adjective.

flowmeter One word.

-fold Follow the guidelines: *a tenfold increase, twofold, multifold*, but *25-fold*. Adjectival compounds with *-fold* are not hyphenated unless they are formed with numerals.

foreign postal codes They follow the province in addresses, much like ZIP codes for the United States: *Calgary, Alberta T2G 2B3, Canada*.

foreign spellings Do not use them in documents distributed in the United States except in proper names, formal addresses, references, or quoted material.

forgeability Not forgability.

fractions Spell out amounts less than one in text, using hyphens between the words: *two-thirds, one-half*. Use figures for precise amounts, converting to decimals whenever practical. Use the online style ($\frac{1}{2}$) for fractions wherever possible. Otherwise, use a hyphen between whole numbers and fractions: *1-1/2, 2-1/8*.

gauge Never *gage*.

government Always use lower case; never abbreviate.

government agencies Always include an indicator of the specific government you are referring to, because NACE readers are international (e.g., the *U.S. Environmental Protection Agency*).

gray Not grey.

gross domestic product Do not capitalize. *GDP* is acceptable on second reference.

groundbed One word.

groundwater One word.

half-cell Hyphenate.

half-life Hyphenate.

handheld (one word).

headquarters Lower case.

heat-affected zone Hyphenate.

heat-treated Hyphenate when used as an adjective or a verb.

held, hold The verb means to keep in one's grasp. We do not hold meetings; we may conduct them or schedule them. Similarly, we do not hold academic degrees, we earn them.

high Follow the guidelines: *high-performance system, high-temperature alloy, high-pressure rig*, but *a solution of high strength*. With few exceptions, *high-* adjectival compounds are hyphenated in any position.

hot-rolled Hyphenate when used as an adjective or a verb.

hyphens Hyphens are joiners. Use them whenever ambiguity would result if they were omitted. Use a hyphen when a compound modifier (two or more words that express a single concept) precedes a noun: *corrosion-related terms, high-performance alloy, heat-affected zone*. Do not use hyphens after *very* or adverbs ending in *ly*, or as minus signs. Hyphens are seldom used with prefixes.

inch Abbreviate *in*; never use quotation marks.

index, indexes, indices Use *indexes*, not *indices*.

initials Use periods and no space. This format will ensure that the initials always appear on the same line. In *MP*, members should be recognized with their first names and middle initials, unless they prefer both initials. It is the author's responsibility to determine which style.

in-service Hyphenate when used as an adjective.

in situ Do not italicize. Do not hyphenate.

instant-on, instant-off Hyphenate.

insure, assure, ensure All these terms are used to mean making something secure or certain, but within a different context. *Ensure* is usually best within the context of NACE documents. For example: *The goal of many standard practices is to ensure the technical integrity of some facility by taking defined actions to mitigate corrosion*. The term *assure* has the unique context of putting someone's mind to rest by informing them confidently, and with a view of removing doubt, that something has been made secure. For example: *Many corrosion engineers have a defined role within their organization to assure management of the technical integrity for safe and reliable operation of their facilities with respect to corrosion control, which is commonly referred to as a technical assurance role*. The term *insure* should be avoided in NACE documents because it most often carries the implication of guaranteeing life or property against risk, such as by an insurance policy that provides monetary compensation for harm or loss.

international Abbreviate as *Int.* on second use. Never *NACE Int.*—organization may be designated as *NACE* on second use.

Internet Capitalize in all uses.

iron-based Hyphenate when used as an adjective.

italics Use sparingly. Italicize magazine, journal, or book titles. Generally, use italics instead of boldface.

judgment Never judgement.

junior Abbreviate as *Jr.* when used after a name. Precede by a comma.

line pipe Two words. Hyphenate when used as an adjective.

List-serv, list server *List-serv* is a trade name. Use *list server*.

low Follow the guidelines: *low-level security, low-temperature alloy, low-pressure rig*, but *a solution of low strength*. With few exceptions, *low-* adjectival compounds are hyphenated in any position.

-ly words Do not use a hyphen between adverbs ending in *-ly* and adjectives they modify.

machinability Not machineability.

mackinawite Do not capitalize.

macro- It is *macrosphere*, *macrocell*, etc. Words with this prefix are seldom hyphenated.

magnetic particle test Not *Magnaflux*.

micro- It is *microimage*, *microorganism*, etc. Words with this prefix are seldom hyphenated.

microbiologically influenced corrosion Do not hyphenate.

months Spell out and capitalize the names of months in all uses. When a phrase lists only a month and a year, do not separate the year with a comma. When a phrase refers to a month, a day, and a year, set off the year with a comma: *The meeting is in January 1999*, or *the meeting is on January 14*, but *the meeting is January 14, 1999*.

MP Spell out the name of the NACE journal *Materials Performance* on first use. *MP* is acceptable in subsequent references.

NACE This is not considered an acronym, and, as such, is pronounced NACE (like mace with an “n”), rather than spelled out N-A-C-E. It always takes the article *a*. *NACE International* is always used on first reference. *NACE* may be used alone in subsequent references.

nickel-based Hyphenate when used as an adjective.

nital Do not capitalize.

non- A prefix, not a noun or an adjective. Words with this prefix are seldom hyphenated. Hyphenate when used with capitalized words (non-European, etc.).

noon Do not put 12 in front of it. *See also times*.

numbers Use Arabic forms (1, 2, 3, etc.) unless Roman numerals are specifically required. Generally, express the numbers zero through nine as words and all others as numerals. Several exceptions apply. Express numbers followed by units of time or measurement as numerals: *The vessel was pressurized to 6 kPa*. Spell out numbers that begin sentences, except when the number identifies a calendar year: *1980 was a good year for the oil industry*. These rules also apply to ordinal numbers (1st, 2nd, etc.) and the corresponding words. Precede decimals less than 1 with a zero: *The specimen was 0.3 m long*.

oil field, oilfield Use two words as a noun, one as an adjective. *Oilfield equipment is used in the oil field*.

online One word.

on-site Hyphenate when used as an adjective.

O-ring Capitalize, hyphenate.

over, more than, greater than *Over* generally refers to spatial relationships: *The plane flew over the city*. Use *more than* or *greater than* with numerals: *The book sold more than 30 copies*. *The corrosion rate was greater than 20 mpy*.

overpotential One word.

people, persons The preferred plural of person is *people*. Use *persons* only in quoted material.

post office box It is *PO Box 1234*, not *P.O. Box 1234*.

postweld One word. Do not hyphenate.

pre-, post- It is *preempt*, *preconference*, *precracked*, *postdoctoral*, etc. Words with these prefixes are seldom hyphenated.

president Capitalize as a formal title before a name. Use lower case elsewhere.

principal, principle *Principal* is a noun or adjective meaning someone or something first in rank or authority: *school principal* or *principal reason for success*. *Principle* is a noun meaning a truth, doctrine, or rule of conduct: *uncompromising principle of honesty*.

prove, proved, proven, proving Use *proven* only as an adjective: *a proven solution. He has proved his worth to the organization.*

quasi- Follow the guidelines: *quasi-judicial, quasi-legislative*. Hyphenate *quasi-* compounds when they precede the noun.

quotation marks Use publishing marks (“ and ”) rather than typical keyboard quote marks. All punctuation, other than semicolons, colons, and dashes, goes inside the quotation marks.

quotes Using accurate direct quotes is highly encouraged. Please be careful. “Doctored” or “manufactured” quotes, especially quotes that prove to be inaccurate or misleading, can be construed as libel.

re- It is *reedit, reunify, retest, reexamine*, etc. Words with this prefix are seldom hyphenated.

reference Do not use this noun as a verb. The verb is *refer*.

Reference electrodes Spell out on first use; for example, vs. silver/silver chloride (Ag/AgCl).

region Do not capitalize unless it is an integral part of a proper noun: *The South Central Region comprises many sections.*

salt spray test Do not hyphenate.

salt water Two words.

saran Do not capitalize unless referring to the trademark.

seawater Always one word.

section Do not capitalize unless it is an integral part of a proper noun: *The Houston Section is the largest NACE section.*

self- Always hyphenate as a prefix.

semi- It is *semiopaque, semiconductor*, but *semi-independent, semi-indirect*, etc. Words with this prefix are not hyphenated unless the second word begins with *i*.

senior Abbreviate as *Sr.* when used after a name. Precede by a comma.

solution-annealed Hyphenate when used as an adjective or a verb.

states Spell out state names in all copy except mailing addresses, where postal abbreviations are used. States should be set off by commas when they follow cities. *The committee is meeting in Houston, Texas, but PO Box 1234, Houston, TX 77084.*

status quo Do not italicize.

stepwise One word.

Stoke's law Capitalize.

stress corrosion cracking Do not hyphenate.

stress-relieved Hyphenate when used as an adjective.

sub- Words with this prefix are seldom hyphenated.

sulfur, sulfate, sulfide, sulfite Never sulphur, sulphate, sulphide, or sulphite.

super- It is superalloy, superaustenitic, superduplex, superferritic, etc. Words with this prefix are seldom hyphenated.

Teflon A trademark for a type of nonstick coating. Use the generic term *polytetrafluoroethylene*. *PTFE* is acceptable on second reference.

telex, telephone Acceptable in any reference. Use *tel* or *fax* as the shortened versions. Use a colon to separate these words from the actual number: *fax: +1 713-492- 8254*.

telex, telephone numbers Use the form *+1 713-492-0535, ext. 200* (if applicable) but no plus for toll-free numbers; *1 800-555-1212*. For foreign phone and fax numbers, always include the country and city code.

that, which These pronouns are not interchangeable. *That* is used to introduce an essential clause, or one that cannot be eliminated from the sentence without changing the meaning. *Which* introduces a nonessential clause, or one that can be eliminated without changing the author's meaning. *Which* must be preceded by a comma and almost invariably is followed by what would otherwise be a complete sentence. Generally, *that* is the correct pronoun.

thermal spray test Do not hyphenate.

times Use figures except for noon and midnight. Use a colon to separate hours from minutes. Do not use zeros after the colon. Use a.m. and p.m. (periods, no space) to denote time of day.

titles Capitalize formal titles when used before one or more names. Use lower case for occupational descriptions.

to Do not use hyphens to indicate to: *The test will take 12 to 14 days*. However, *Jan. 12–14, 2007*, is permissible in listings and calendars.

topcoat One word.

top-of-the-line corrosion Hyphenate.

toward There is no such word as *towards*.

trans- Words with this prefix are seldom hyphenated.

U-bend Capitalize, hyphenate.

ultra- Words with this prefix are seldom hyphenated.

underdeposit corrosion

underfilm corrosion Underfilm is one word in this context.

underground One word.

under- Words with this prefix are seldom hyphenated.

United Arab Emirates Spell out as a noun, *U.A.E.* (periods, no space) may be used as an adjective.

United Kingdom Spell out as a noun. *U.K.* (periods, no space) may be used as an adjective or in addresses.

United States Spell out as a noun. *U.S.* (periods, no space) may be used as an adjective.

use, utilize *Use* is the shorter and preferred form. *Utilize* is appropriate in the narrower sense of making useful or productive what has been otherwise or of expanding productivity by finding new uses for the thing or person involved. However, *use* is always acceptable.

V-notch Hyphenate when used as a noun or an adjective.

waste water, wastewater Two words as a noun, one word as an adjective.

water-quenched Hyphenate when used as an adjective or a verb.

wave number Two words.

wavemeter One word.

web Acceptable for most uses for the *World Wide Web*: *web page*, *web site*. Always lower case in this context. Eliminate *www* and *https* in web site addresses.

wellbore One word.

well known Follow the guidelines: *well-known man*, *ill-favored girl*, *well-intentioned person*, but *he is well known*, etc. Compounds with *well-*, *ill-*, *better-*, *best-*, *little-*, *lesser-* are hyphenated before the noun unless the expression carries a modifier.

which, that These pronouns are not interchangeable. *Which* introduces a nonessential clause, or one that can be eliminated without changing the author's meaning. *Which* must be preceded by a comma and almost invariably is followed by what would otherwise be a complete sentence. *That* is used to introduce an essential clause, or one that cannot be eliminated from the sentence without changing the meaning. Generally, *that* is the correct pronoun.

wire-line Hyphenate when used as an adjective.

x-ray Hyphenate.

Appendix B

Abbreviations, Symbols, and Acronyms for Use in Corrosion-Related Publications

Abbreviations—General

Terms marked with an asterisk (*) must be spelled out at first mention.
The other abbreviations listed in this section may be used at first mention.

absolute*	abs.
academic degrees	use periods and run together (B.A., B.S., M.A., M.S., Ph.D.)
ante meridian	a.m.
antilogarithm	antilog
compilation	comp.
Corporation	Corp.
corrosion allowance*	C.A.
department	Dept. (spell out unless used in a proper name)
division	Div. (spell out unless used in a proper name)
edition, editor	ed.
elongation	elong.
exempli gratia (for example)	e.g.
exponential	exp (the symbol exp. can be e or 10 ; for example, 1e , depending on use)
figure	spell out when the lower-case word is used in text. The abbreviation Fig. may be used when referring to a specific figure. Capitalize when referring to a specific figure.
institute	Inst. (spell out unless used in a proper name)
number	no.
oxidation-reduction (potential)*	redox
page	p.
pages	pp.
post meridian	p.m.
reference	ref.
that is (id est)	i.e.
translation, translator	trans.
versus	vs.
volume (publication)	vol.

These abbreviations may be used in tables and figures only.

approximate	approx.
average	avg.
diameter	dia.
maximum	max.
minimum	min.
not applicable	N/A
not detected	ND
not determined	– (en dash)
not reported	NR

Abbreviations and Symbols—Units of Measure

ampere	A	kilocoulomb	kC
ampere-hour	A·h ₂	kilogram	kg
ampere per square meter	A/m	kilogram per ampere-year	kg/A·y
ampere-year per kilogram	A·y/kg	kilogram per cubic meter	kg/m ³
angstrom	Å	kilohertz	kHz
atmosphere	atm	kilojoule	kJ
barrel [oil]	bbl	kilometer	km
barrel per day	bpd	kilometer per hour	km/h
becquerel	Bq	kiloohm	kΩ
British thermal unit	Btu	kilopascal	kPa
candela	cd	kilovolt	kV
centimeter	cm	kilovolt-ampere	kVA
coulomb	C	kilowatt	kW
cubic centimeter	cm ³	kilowatt hour	kWh
cubic foot	ft ³	liter	L
cubic foot per day	ft ³ /d, cfd	lumen	lm
cubic foot per minute	ft ³ /m, cfm	lux	lx
cubic foot per second	ft ³ /s, cfs	megahertz	MHz
cubic inch	in ³	megaohm	MΩ
cubic meter	m ³	megapascal	MPa
cubic meter per second	m ³ /s	megavolt	MV
cubic millimeter	mm ³	megawatt	MW
cubic yard	yd ³	meter	m
curie	Ci	meter per hour	m/h
cycle per minute	cpm	meter per second	m/s
cycle per second (hertz)	Hz	metric ton	t
day	d	microgram	μg
decade	(spell out)	micrometer	μm
decibel	dB	mile	mi
decimeter	dm	milliampere	mA
degree Celsius	°C	milligram	mg
degree Fahrenheit	°F	milligram per liter	mg/L
degree (plane angle)	spell out	milliliter	mL
dollar	\$	millimeter	mm
electron volt	eV	millimeter per year	mm/y
farad	F	milliohm	mΩ
foot	ft	millisecond	ms
foot per minute	ft/min	millivolt	mV
foot per second	ft/s	milliwatt	mW
foot-pound-force	ft·lbf	mil per year	mpy
gallon	gal	minute	min
gallon per minute	gpm	minute [plane angle]	'
gigapascal	GPa	molar [concentration]	M
gram	g	mole	mol
gram per liter	g/L	mole per hour	mol/h
gray	Gy	mole per year	mol/y
hectare	ha	mole percent	mol%
henry	H	month	(spell out)
hertz	Hz	nanometer	nm
horsepower	hp	newton	N
hour	h	newton-meter	N·m
inch	in	newton per meter	N/m
inch per second	in/s	normal [concentration]	N
joule	J	ohm	Ω
kelvin	K	ohm-centimeter	Ω·cm
kiloampere	kA	ohm-meter	Ω·m

ounce	oz	sievert	Sv
part per billion	ppb	square centimeter	cm ²
part per million	ppm	square foot	ft ²
part per million by volume	ppmv	square inch	in ²
part per million by weight	ppmw	square kilometer	km ²
pascal	Pa	square meter	m ²
pascal-second	Pa·s	square millimeter	mm ²
pound	lb	tesla	T
pound-force	lbf	thousand pound-force per square inch	ksi
pound-force-foot	lbf-ft	ton	(spell out)
pound-force per square foot	lbf/ft ²	trace	tr
pound-force per square inch	psi	unified atomic mass unit	u
pound-force per square inch absolute	psia	volt	V
pound-force per square inch gauge	psig	volume percent	vol%
pound per cubic foot	lb/ft ³	watt	W
quart	qt	weber	Wb
radian	rad	week	(spell out)
revolution per minute	rpm	weight	wt
revolution per second	rps	weight percent	wt%
second	s	yard	yd
second [plane angle]	"	year	y
seimens	S		
siemens per meter	S/m		

Acronyms

aboveground storage tank	AST	deionized [water]	DI
acoustic emission	AE	differential thermal analysis	DTA
acrylonitrile butadiene styrene [polymer]	ABS	direct current	DC
all volatile treatment [boiler treatment]	AVT	direct current voltage gradient	DCVG
alternating current	AC	direct imaging mass analyzer	DIMA
alternating current voltage gradient	ACVG	discounted cash flow	DCF
American Wire Gauge	AWG	dissolved oxygen	DO
atomic absorption [spectroscopy]	AA	double-cantilever-beam	DCB
Auger electron spectroscopy	AES	dry film thickness	DFT
biological oxygen demand	BOD	ductile iron	DI
Birmingham Wire Gauge	BWG	eddy current test (testing)	ECT
body-centered cubic	bcc	electric resistance weld (welded)	ERW
boiler feedwater	BFW	electrical resistance	ER
boiling point	bp	electrochemical current noise	ECN
boiling water reactor	BWR	electrochemical impedance spectroscopy	EIS
Brinell hardness	HB	electrochemical noise [technique]	EN
carbon steel	CS	electrochemical potential noise	EPN
cathodic protection	CP	electrochemical potentiokinetic reactivation	EPR
chemical oxygen demand	COD	electromagnetic test (testing)	ET
chlorinated polyvinyl chloride	CPVC	electromotive force	EMF, emf
close interval potential survey	CIPS	electron energy loss spectroscopy	EELS
close interval survey	CIS	electron probe microanalysis	EPMA
cold-rolled	CR	electron spectroscopy for chemical analysis	ESCA
constant extension rate test	CERT	energy dispersive spectroscopy	EDS
conversion electron Mossbauer spectroscopy	CEMS	energy dispersive x-ray analysis	EDXA
cooling water	CW	ethylenediaminetetraacetic acid	EDTA
cooling water tower	CWT	ethylene propylene diene elastomer	EPDM
copper/copper sulfate (Cu/CuSO ₄) electrode	CSE	face-centered cubic	fcc
corrosion-resistant alloy	CRA	fast Fourier transform	FFT
critical crevice-corrosion temperature	CCT	fiberglass-reinforced plastic	FRP
critical pitting temperature	CPT	fiber-reinforced plastic	FRP
current density	CD	flow-accelerated corrosion	FAC

flue gas desulfurization	FGD	nominal pipe size	NPS
fluid catalytic cracking unit	FCCU	nondestructive examination	NDE
fluidized bed combustion	FBC	nondestructive test (testing)	NDT
fluorocarbon elastomer	FKM	normal hydrogen electrode	NHE
fluorinated ethylene propylene [copolymer]	FEP	normalized and tempered	N&T
flux-cored arc weld (welding)	FCAW	nuclear magnetic resonance	NMR
Fourier transform infrared	FTIR	ocean thermal-energy conversion	OTEC
freezing point	fp	oil-country tubular goods	OCTG
frequency response analyzer	FRA	oil-quenched	OQ
furnace-cooled	FC	organic zinc-rich (coating)	OZ
fusion-bonded epoxy [coating]	FBE	outside diameter (when used in text)	OD
gas metal arc weld (welding)	GMAW	perfluoroalkoxy [polymer]	PFA
gas tungsten arc weld (welding)	GTAW	perfluorocarbon elastomer	FFKM
glass (fiberglass)-reinforced epoxy	GRE	pipeline current mapping	PCM
glass (fiberglass)-reinforced plastic	GRP	polybutylene	PB
heat-affected zone	HAZ	polycarbonate	PC
heat exchanger	HX	polyetheretherketone	PEEK
heat treatment (heat-treated)	HT	polyethylene	PE
high frequency	HF	polypropylene	PP
high-level liquid waste [nuclear]	HLLW	polytetrafluorethylene	PTFE
high-pressure water cleaning	HPWC	polythionic acid	PTA
high-pressure waterjetting	HPWJ	polyurethane	PUR
high-strength low-alloy [steel]	HSLA	polyvinyl acetate	PVAC
high-temperature hydrogen attack	HTHA	polyvinyl chloride	PVC
high-voltage alternating current	HVAC	polyvinylidene chloride	PVDC
high-voltage direct current	HVDC	polyvinylidene fluoride	PVDF
hot-dipped galvanized	HDG	postweld heat treatment (heat-treated)	PWHT
hot-rolled	HR	potential of zero charge	PZC
hydrogen embrittlement	HE	power factor	PF
hydrogen-induced cracking	HIC	precipitation hardening (hardenable)	PH
hydrogen ion activity [negative logarithm of]	pH	pressurized water reactor	PWR
hydrogen stress cracking	HSC	pulsed eddy current	PEC
impressed current	IC	quality assurance	QA
impressed current cathodic protection	ICCP	quality control	QC
infrared	IR	quenched and tempered	Q&T
inline inspection	ILI	radio frequency	RF
inorganic zinc-rich [coating]	IOZ	radiographic test (testing)	RT
inside diameter (when used in text)	ID	reinforced thermoset plastic	RTP
intergranular attack	IGA	relative humidity	RH
intergranular corrosion	IGC	Rockwell B hardness	HRB
intergranular stress corrosion cracking	IGSCC	Rockwell C hardness	HRC
ion microprobe mass analyzer	IMMA	room temperature	RT
ion scattering spectroscopy	ISS	root mean square	RMS
Knoop hardness	HK	Ryzner Stability Index	RSI
Langelier Saturation Index	LSI	saturated calomel electrode	SCE
light water reactor	LWR	scanning Auger microscopy	SAM
linear polarization resistance	LPR	scanning electron microscopy	SEM
linear variable differential transformer	LVDT	scanning reference electrode technique	SRET
liquid metal cracking	LMC	scanning transmission electron microscopy	STEM
liquid penetrant test (testing)	PT	secondary ion mass spectroscopy	SIMS
low-pressure water cleaning	LPWC	shielded metal arc weld (welding)	SMAW
magnetic particle test (testing)	MT	slow strain rate	SSR
maximum allowable working pressure	MAWP	slow strain rate test (technique)	SSRT
melting point	mp	solution anneal (solution-annealed)	SA
microbiologically influenced corrosion	MIC	spark-sources mass spectroscopy	SSMS
mixed metal oxide	MMO	specific gravity	SG
multiple crevice assembly	MCA	specified minimum yield strength	SMYS
net present value	NPV	stainless steel	SS

standard hydrogen electrode	SHE	ultrahigh frequency	UHF
standard temperature and pressure	STP	ultrahigh pressure	UHP
Standard Wire Gauge [British]	SWG	ultrahigh-pressure waterjetting	UHPWJ
stress corrosion cracking	SCC	ultrasonic test (testing)	UT
stress-oriented hydrogen-induced cracking	SOHIC	ultraviolet	UV
stress relief (stress-relieved)	SR	ultraviolet spectroscopy	UVS
styrene-butadiene rubber	SBR	underdeposit corrosion	UDC
submerged arc weld (welding)	SAW	underground residential distribution	URD
sulfate-reducing bacteria	SRB	underground storage tank	UST
sulfide stress cracking	SSC	vapor phase corrosion inhibitor	VCI
Système Internationale d'Unites [metric]	SI	Vickers hardness	HV
tensile strength (stress)	TS	volatile corrosion inhibitor	VCI
thermal-sprayed aluminum	TSA	volatile organic compound	VOC
thermogravimetric analysis	TGA	water cleaning	WC
time-temperature sensitization [diagram]	TTS	water-cooled reactor	WCR
time-temperature-transformation [diagram]	TTT	water-quenched	WQ
time to failure	TTF	waterjetting	WJ
total acid number	TAN	wavelength dispersive spectrometry	WDS
total dissolved solids	TDS	wedge opening load	WOL
total hardness	TH	wet fluorescent magnetic particle test (testing)	WFMT
transgranular stress corrosion cracking	TGSCC	x-ray diffraction	XRD
transmission electron microscopy	TEM	x-ray fluorescence	XRF
trisodiumphosphate	TSP	x-ray photoelectron spectroscopy	XPS
tungsten inert gas [weld,welding]	TIG	yield strength (stress)	YS
ultimate tensile strength (stress)	UTS	zero-resistance ammeter	ZRA

Appendix C

Signs and Symbols—Mathematical, Engineering, and Chemical Reactions

Mathematical: These signs and symbols are used without spelling them out at first mention.

+	plus, addition, positive	≈	approximately equals	d	derivative
−	minus, subtraction, negative	≅	approximately equals, congruent	∂	partial derivative, or variance
±	plus or minus	≤	less than or equal to	Δx	increment of x
x	multiplication	≥	greater than or equal to	∫	integral of
÷	division	→	approaches	x	absolute value of x
/	divided by	α	varies as	AxB	vector product of A and B
<	less than	∞	infinity	A·B	scalar product of A and B
«	much less than	√	square root of	n	variable number
>	greater than	:	ratio	N	unspecified number
»	much greater than	∴	therefore	∑	summation
=	equals	AB	length of line from A to B	σ	standard deviation
≠	not equal to	π	pi (3.14159+)	ln	natural logarithm
≡	identical with	°	degrees	log	common logarithm
~	similar to, about, approximately	Δ	difference	exp	exponential function

Engineering: These symbols must be spelled out at first mention, with the symbol given in parentheses, except in equations, where the definition must be given immediately following the equation.

A	area	h	height	γ	surface tension
α	coefficient of linear thermal expansion	Z	impedance	T	temperature, torque
c	circumference	Z'	real part of the impedance	κ	thermal conductivity
E _{corr}	corrosion potential	Z''	imaginary part of the impedance	t	time, thickness
E _p	critical pitting potential	l	length	v	velocity (linear)
K _{IC}	critical stress intensity factor	L	load	η	viscosity, overpotential
I	current	P	pressure	E	voltage, potential, elastic modulus
d	depth, diameter, distance	ω	radian frequency, angular velocity	V	volume
d	inside diameter	r	radius	λ	wavelength
D	outside diameter	R	resistance	W	weight
ρ	density, electrical resistivity	ε	strain	w	width
f	frequency	σ	stress		
ν	friction coefficient	K	stress intensity factor		

Chemical Reactions: These signs and symbols are used without spelling them out at first mention.

→	forms by the chemical reaction	↑	passes off as gas	·	chemically combined (as in Fe ₂ O ₃ ·H ₂ O)
—	forms by the reversible chemical reaction	↓	precipitates from solution		

Appendix D

Chemical Elements and their Symbols

Element	Symbol	Element	Symbol	Element	Symbol
Actinium	Ac	Gallium	Ga	Potassium	K
Aluminum	Al	Germanium	Ge	Praseodymium	Pr
Americium	Am	Gold	Au	Promethium	Pm
Antimony	Sb	Hafnium	Hf	Protactinium	Pa
Argon	Ar	Hahnium	Ha	Radium	Ra
Arsenic	As	Helium	He	Radon	Rn
Astatine	At	Hohlmium	Ho	Rhenium	Re
Barium	Ba	Hydrogen	H	Rhodium	Rh
Berkelium	Bk	Indium	In	Rubidium	Rb
Beryllium	Be	Iodine	I	Ruthenium	Ru
Bismuth	Bi	Iridium	Ir	Rutherfordium	Rf
Boron	B	Iron	Fe	Samarium	Sm
Bromine	Br	Krypton	Kr	Scandium	Sc
Cadmium	Cd	Lanthanum	La	Seaborgium	Sg
Calcium	Ca	Lawrencium	Lr	Selenium	Se
Californium	Cf	Lead	Pb	Silicon	Si
Carbon	C	Lithium	Li	Silver	Ag
Cerium	Ce	Lutetium	Lu	Sodium	Na
Cesium	Cs	Magnesium	Mg	Strontium	Sr
Chlorine	Cl	Manganese	Mn	Sulfur	S
Chromium	Cr	Meitnerium	Mt	Tantalum	Ta
Cobalt	Co	Mendelevium	Md	Technetium	Tc
Copper	Cu	Mercury	Hg	Tellurium	Te
Curium	Cm	Molybdenum	Mo	Terbium	Tb
Dubnium	Db	Neodymium	Nd	Thallium	Tl
Dysprosium	Dy	Neon	Ne	Thorium	Th
Einsteinium	Es	Neptunium	Np	Thulium	Tm
Erbium	Eb	Nickel	Ni	Tin	Sn
Europium	Eu	Niobium (Columbium)	Nb	Titanium	Ti
Fermium	Fm	Nitrogen	N	Tungsten	W
Fluorine	F	Nobelium	No	Uranium	U
Francium	Fr	Osmium	Os	Vanadium	V
Gadolinium	Gd	Oxygen	O	Xenon	Xe
		Palladium	Pd	Ytterbium	Yb
		Phosphorus	P	Yttrium	Y
		Platinum	Pt	Zinc	Zn
		Plutonium	Pu	Zirconium	Zr
		Polonium	Po		

Appendix E

Addresses and Acronyms of Frequently Cited Organizations

Allerton Press, Inc.

18 W. 27th St.
New York, NY 10001
Tel: +1 646-424-9686
Fax: +1 646-424-9695
Web site: allertonpress.com

The Aluminum Association

1525 Wilson Blvd., Ste. 600
Arlington, VA 22209
Tel: +1 703-358-2960
Fax: +1 703-358-2961
Web site: aluminum.org

American Association of State Highway and Transportation Officials (AASHTO)

444 N. Capitol St. N.W., Ste. 249 Washington, DC 20001
Tel: +1 202-624-5800
Fax: +1 202-624-5806
Web site: transportation.org

American Chemical Society (ACS)

1155 Sixteenth St., N.W. Washington, DC 20036
Tel: 1 800-227-5558 (U.S. only) or +1 202-872-4600
Fax: +1 202-872-4615
Web site: acs.org

ACGIH (formerly the American Conference of Governmental Industrial Hygienists)

1330 Kemper Meadow Dr. Cincinnati, OH 45240
Tel: +1 513-742-2020
Fax: +1 513-742-3355
Web site: acgih.org

American Concrete Institute (ACI)

PO Box 9094
Farmington Hills, MI 48333-9094
Tel: +1 248-848-3700
Fax: +1 248-848-3701
Web site: concrete.org

American Galvanizers Association (AGA)

6881 S. Holly Circle, Ste. 108
Centennial, CO 80112
Tel: +1 720-554-0900
Fax: +1 720-554-0909
Web site: galvanizeit.org

American Gas Association (AGA) 400 N. Capitol St. N.W., Ste. 450 Washington, DC 20001

Tel: +1 202-824-7000
Web site: aga.org

American Institute of Aeronautics & Astronautics (AIAA)

1801 Alexander Bell Dr., Ste. 500
Reston, VA 20191-4344
Tel: 1 800-639-2422 or +1 703-264-7500
Fax: +1 703-264-7551
Web site: aiaa.org

American Institute of Chemical Engineers (AIChE)

120 Wall St., Fl. 23
New York, NY 10005-4020
Tel: 1 800-242-4363 or +1 212-591-8100
Fax: +1 212-591-8888
Web site: aiche.org

American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME), The

PO Box 270728
Littleton, CO 80127-0013
Tel: +1 303-948-4255
Fax: +1 303-948-4260
Web site: aimehq.org

American Iron and Steel Institute (AISI)

1140 Connecticut Ave. N.W., Ste. 705
Washington, DC 20036
Tel: +1 202-452-7100
Web site: steel.org

American National Standards Institute (ANSI)

25 W. 43rd St., 4th Fl.
New York, NY 10036
Tel: +1 212-642-4900
Fax: +1 212-398-0023
Web site: ansi.org

American Nuclear Society (ANS)

555 N. Kensington Ave. LaGrange Park, IL 60526
Tel: 1 800-323-3044 or +1 708-352-6611
Fax: +1 708-352-0499
Web site: ans.org

American Petroleum Institute (API)

1220 L St. N.W.
Washington, DC 20005-4070
Tel: +1 202-682-8000
Web site: api.org

American Public Health Association (APHA)

800 I St. N.W.
Washington, DC 20001
Tel: +1 202-777-2742
Fax: +1 202-777-2534
Web site: apha.org

American Society for Nondestructive Testing (ASNT)

PO Box 28518
Columbus, OH 43228-0518
Tel: 1 800-222-2768 or +1 614-274-6003
Fax: +1 614-274-6899
Web site: asnt.org

American Society of Civil Engineers (ASCE)

1801 Alexander Bell Dr. Reston, VA 20191-4400
Tel: 1 800-548-2723 or +1 703-295-6300
Fax: +1 703-295-6222
Web site: asce.org

American Water Works Association (AWWA)

6666 W. Quincy Ave. Denver, CO 80235
Tel: 1 800-926-7337 or +1 303-794-7711
Fax: +1 303-347-0804
Web site: awwa.org

American Welding Society (AWS)

550 N.W. LeJeune Rd. Miami, FL 33126
Tel: 1 800-443-9353 or +1 305-443-9353
Fax: +1 305-443-7559
Web site: aws.org

Argonne National Laboratory (ANL)

9700 S. Cass Ave. Argonne, IL 60439
Tel: +1 630-252-2000
Web site: anl.gov

ASM International (ASM)

9639 Kinsman Rd.
Materials Park, OH 44073-0002
Phone: 1 800-336-5152 (US & Canada), 001 800-368-9800
(Europe), or +1 440-338-5151
Fax: +1 440-338-4634
Web site: asminternational.org

ASME

Two Park Ave.
New York, NY 10016-5990
Tel: 1 800-843-2763 (US & Canada), 001-800-843-2763
(Mexico), or +1 973-882-1167 (outside North America) Web site:
asme.org

Associação Brasileira de Corrosão (ABRACO)

(Brazilian Corrosion Association) Av. Venezuela, 27 - Sl. 412/418
Centro Rio de Janeiro, Brazil CEP 20081-310
Tel: +55 (0) 21 25161962
Fax: +55 (0) 21 22332892
Web site: abraco.org.br

Association of American Railroads (AAR)

50 F St. N.W.
Washington, DC 20001-1564
Tel: +1 202-639-2100
Web site: aar.org

Association Francaise de Normalisation (AFNOR)

11 rue Francis de Pressense
93571 La Plaine Saint-Denis, Cedex, France
Tel: +33 (0) 1 41 62 80 00
Fax: +33 (0) 1 49 17 90 00
Web site: afnor.org

Associazione Italiana di Metallurgia (AIM)

Piazzale Rodolfo Morandi 2-20121 Milan, Italy
Tel: +39 02 76021132
Fax: +39 02 76020551
Web site: aimnet.it

ASTM International (ASTM)

100 Barr Harbor Dr. PO Box C700
West Conshohocken, PA 19428-2959 Tel: +1 610-832-9500
Fax: +1 610-832-9555
Web site: astm.org

Australasian Corrosion Association (ACA)

PO Box 112
Kerrimuir, Victoria 3129 Australia
Tel: +61 (0) 3 9890 4833
Fax: +61 (0) 3 9890 7866
Web site: corrosion.com.au

Battelle Memorial Institute

505 King Ave.
Columbus, OH 43201
Tel: 1 800-201-2011 or +1 614-424-6424
Web site: battelle.org

The Brookings Institution

1775 Massachusetts Ave. N.W.
Washington, DC 20036-2188
Tel: +1 202-797-6000
Fax: +1 202-797-6004
Web site: brookings.edu

British Standards Institution (BSI)

389 Chiswick High Rd.
London W4 4AL, U.K.
Tel: +44 (0) 20 8996 9001
Fax: +44 (0) 20 8996 7001
Web site: bsigroup.com

Cambridge University Press

32 Avenue of the Americas New York, NY 10013-2473
Tel: +1 212-924-3900
Fax: +1 212-691-3239
Web site: cambridge.org

CSA International (CSA)

178 Rexdale Blvd.
Toronto, Ontario M9W 1R3, Canada
Tel: 1 866-797-4272 or +1 416-747-4000
Fax: +1 416-747-4149
Web site: csa-international.org

**Centro Nacional de Investigaciones Metalurgicas (CENIM)
(National Center for Metallurgical Research)**

Avenida Gregorio del Amo
8 Madrid E-28040, Spain Tel: +34 915 538 900
Fax: +34 915 347 425
Web site: cenim.csic.es

**Cesky Svaz Vedeckotechnických Společností (CSVTS)
(Czech Association of Scientific and Technical Societies)**

Novotneho Lavka 5
116 68 Prague 1, Czech Republic
Tel: +420 2 21082111
Web site: csvts.cz

Chinese Mechanical Engineering Society (CMES)

46 Road Sanlihe
Beijing 100823, People's Republic of China
Tel: +86 (0) 10 68595316
Fax: +86 (0) 10 68533613
Web site: cmes.org

Chinese Society for Corrosion and Protection (CSCP)

Corrosion Building
Beijing University of Science and Technology 30 Xue Yuan Road
Beijing 100083, People's Republic of China
Tel: +86 (0) 10 62332201
Fax: +86 (0) 10 82372305
Web site: cscp.org.cn

Compressed Gas Association (CGA)

4221 Walney Rd.
Chantilly, VA 20151
Tel: +1 703-788-2700
Fax: +1 703-961-1831
Web site: cganet.com

Corrosion and Metals Research Institute (KIMAB)

Drottning Kristinas väg 48 114 28 Stockholm, Sweden
Tel: +46 (0) 8 440 48 00
Fax: +46 (0) 8 440 45 35
Web site: kimab.com

Corrosion Institute of Southern Africa

PO Box 966
Kelvin 2054 South Africa
Tel: +27 (0) 11 802 5145 or +27 (0) 860 267772
Fax: +27 (0) 11 804 9474
Web site: corrosioninstitute.org.za

DECHEMA

(Society for Chemical Engineering and Biotechnology)

Theodor-Heuss-Allee 25
60486 Frankfurt am Main
Germany
Tel: +49 (0) 69 7564-0
Fax: +49 (0) 69 7564-201
Web site: dechema.de

Department of Defense Single Stock Point (DODSSP)

(MIL specifications and standards)
Document Automation and Production Service 700 Robbins Ave.,
Bldg. 4/D
Philadelphia, PA 19111-5094
Tel: +1 215-697-6396
Web site: dodssp.daps.dla.mil

**Deutsches Institut für Normung e.V. (DIN) (German Institute
for Standardization) Burggrafenstraße 6**

10787 Berlin
Germany
Tel: +49 (0) 30 2601-0
Fax: +49 (0) 30 2601-1231
Web site: din.de

DNV GL

Veritasveien 1
PO Box 300, 1322 Hovik
Norway
Web site: dnvgl.com

Electric Power Research Institute (EPRI)

3420 Hillview Ave. Palo Alto, CA 94304
Tel: +1 650-855-2000
Web site: epri.com

The Electrochemical Society (ECS)

65 S. Main St., Bldg. D Pennington, NJ 08534-2839
Tel: +1 609-737-1902
Fax: +1 609-737-2743
Web site: electrochem.org

Elsevier B.V.

Radarweg 29
Amsterdam 1043 NX, The Netherlands Tel: +31 (0) 20 485 3911
Fax: +31 (0) 20 485 2457
Web site: elsevier.com

European Committee for Standardization (CEN)

Avenue Marnix 17
B-1000 Brussels
Belgium
Web site: cen.eu

European Federation of Corrosion (EFC)

1 Carlton House Terrace London SW1Y 5DB, U.K.
Tel: +44 (0) 20 7839 4071
Fax: +44 (0) 20 7839 2289
Web site: efcweb.org

EWI

(formerly Edison Welding Institute)
1250 Arthur E. Adams Dr.
Columbus, OH 43221-3585
Tel: +1 614-688-5000
Fax: +1 614-688-5001
Web site: ewi.org

Federal Institute for Materials Research and Testing (BAM)

Unter den Eichen 87 12205 Berlin, Germany

Tel: +49 (0) 30 8104-0

Fax: +49 (0) 30 8112029

Web site: bam.de

Federal Highway Administration (FHWA)

U.S. Department of Transportation (DOT)

1200 New Jersey Ave. S.E.

Washington, DC 20590

Tel: +1 202-366-4000

Web site: fhwa.dot.gov

Federal Railroad Administration (FRA)

U.S. Department of Transportation (DOT)

1120 Vermont Ave. N.W.

Washington, DC 20590

Tel: +1 202-493-6000

Web site: fra.dot.gov

FMJ International Publications, Ltd.

Queensway House 2 Queensway

Redhill, Surrey RH1 1QS, U.K.

Tel: +44 (0) 1737 768 611

Fax: +44 (0) 1737 761 685

Gas Technology Institute (GTI)

1700 S. Mount Prospect Rd.

Des Plaines, IL 60018-1804

Tel: +1 847-768-0500

Fax: +1 847-768-0501

Web site: gastechology.org

Gulf Publishing Company

PO Box 2608

Houston, TX 77252

Tel: +1 713-529-4301

Fax: +1 713-520-4433

Web site: gulfpub.com

Hydrogen Fluoride Industry Practices Institute (HFPI)

3050 K St. N.W., Ste. 400

Washington, DC 20007

Tel: +1 202-342-8538

Web site: hfipi.org

Institut für Korrosionsschutz Dresden GmbH (IKS)

(formerly Zentralstelle für Korrosionsschutz)

(Institute for Corrosion Protection Dresden)

Gostritzer Str. 61-63

01217 Dresden, Germany

Tel: +49 (0) 351 871 7100

Fax: +49 (0) 351 871 7150

Web site: .iks-dresden.de

L'Institut National de la Recherche Agronomique (INRA)

(National Institute for Agricultural Research)

147 rue de l'Université

75338 Paris, Cedex 07, France

Tel: +33 (0) 1 42 75 90 00

Fax: +33 (0) 1 47 05 99 66

Web site: inra.fr

Institute of Corrosion (ICorr)

Corrosion House, Vimy Ct.

Leighton Buzzard, Bedfordshire LU7 1FG, U.K. Tel: +44 (0) 1525 851 771

Fax: +44 (0) 1525 376 690

Web site: icorr.org

IEEE (formerly Institute of Electrical and Electronics Engineers)

3 Park Ave., 17th Fl.

New York, NY 10016-5997 Tel: +1 212-419-7900

Fax: +1 212-752-4929

Web site: ieee.org

Institute of Materials, Minerals, and Mining (IOM3)

1 Carlton House Terrace London SW1Y 5DB, U.K. Tel: +44 (0) 20 7451 7300

Fax: +44 (0) 20 7839 1702

Web site: iom3.org

Institute of Nuclear Power Operations (INPO)

700 Galleria Pkwy., Ste. 100

Atlanta, GA 30339-5943

npo.info

Instituto Español de Corrosión y Protección (IECP)

C/ Espalter, 15

28014 Madrid, Spain

Tel: +34 91 360 1820

Web site: aicop.net

International Institute of Welding (IIW)

Paris Nord 2 – 90 rue des Vanesses – BP 51362 Villepinte 95942

Roissy ch. de Gaulle. Cedex, France

Tel: +33 (0) 1 49 90 36 08

Fax: +33 (0) 1 49 90 36 80

Web site: iiw-iis.org

International Organization for Standardization (ISO)

Chemin de Blandonnet 8

CP 401

1214 Vernier

Geneva, Switzerland

Tel: +41 (0) 22 749 01 11

Fax: +41 (0) 22 733 34 30

Web site: iso.org

International Titanium Association (ITA)

2655 West Midway Blvd., Ste. 300
Broomfield, CO 80020-7186
Tel: +1 303-404-2221
Fax: +1 303-404-9111
Web site: titanium.org

The Iron and Steel Institute of Japan (ISIJ)

Tekko Kalkan (SF)
3-2-10, Nihonbashi-Kayabacho
Chuo-ku, Tokyo 103-0025
Japan
Tel: +81 (0) 3 3669-5931
Fax: +81 (0) 3 3669-5934
Web site: isij.or.jp

Japanese Standards Association (JSA)

4-1-24 Akasaka, Minato-ku
Tokyo 107-8440, Japan
Tel: +81 (0) 3 3583-8005
Fax: +81 (0) 3 3586-2014
Web site: jsa.or.jp

Japan Society of Corrosion Engineering (JSCE)

Tokyo Products Building (2nd Floor) 1-33-3 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan
Tel: +81 (0) 3 3815-1161
Fax: +81 (0) 3 3815-1291
Web site: jcorr.or.jp

John Wiley & Sons, Inc.

111 River St.
Hoboken, NJ 07030-5774
Tel: +1 201-748-6000
Fax: +1 201-748-6088
Web site: wiley.com

Library of Congress

Cataloging Division
101 Independence Ave. S.E. Washington, DC 20540
Tel: +1 202-707-5000
Web site: loc.gov

Materials Properties Council (MPC)

PO Box 201547
Shaker Heights, OH 44120 Tel: +1 216-658-3847
Fax: +1 216-658-3854
Web site: forengineers.org

Materials Research Society (MRS)

506 Keystone Dr.
Warrendale, PA 15086-7573
Tel: +1 724-779-3003
Fax: +1 724-779-8313
Web site: mrs.org

Materials Technology Institute (MTI)

1215 Fern Ridge Pkwy., Ste. 206 Louis, MO 63141-4405
Tel: +1 313-576-7712
Fax: +1 314-576-6078
Web site: mti-global.org

The McGraw-Hill Companies

1221 Avenue of the Americas New York, NY 10020-1095
Tel: +1 212-904-2000 or +1 212-512-2000
Web site: mcgraw-hill.com

The Minerals, Metals, and Materials Society (TMS)

184 Thorn Hill Rd. Warrendale, PA 15086-7514
Tel: +1 724-776-9000
Fax: +1 724-776-3770
Web site: tms.org

National Board of Boiler and Pressure Vessel Inspectors

1055 Crupper Ave.
Columbus, OH 43229
Tel: +1 614-888-8320
Fax: +1 614-888-0750
Web site: nationalboard.org

National Electrical Manufacturers Association (NEMA)

1300 N. 17th St., Ste. 1752
Rosslyn, VA 22209
Tel: +1 703-841-3200
Fax: +1 703-841-5900
Web site: nema.org

National Fire Protection Association (NFPA)

1 Batterymarch Park
Quincy, MA 02169-7471
Tel: +1 617-770-3000
Fax: +1 617-770-0700
Web site: nfpa.org

National Institute for Materials Science (NIMS)

1-2-1 Sengen Tsukuba
Ibaraki 305-0047, Japan
Tel: +81 (0) 29 859-2000
Fax: +81 (0) 29 859-2029
Web site: nims.go.jp

National Institute for Occupational Safety and Health (NIOSH)

U.S. Department of Health and Human Services (HHS)
Centers for Disease Control and Prevention (CDC)
Patriots Plaza Bldg., Ste. 9200
395 E St. S.W.
Washington, DC 20201
Tel: 1 800-232-4636 or +1 513-533-8328
Fax: +1 513-533-8347
Web site: cdc.gov/niosh

National Institute of Standards and Technology (NIST)

100 Bureau Drive, Stop 8500
Gaithersburg MD 20899-8500
Tel: +1 301-975-5658
Web site: nist.gov

Nickel Institute

Brookfield Pl.
161 Bay St., Ste. 2700
Toronto, Ontario M5J 2S1
Canada
Tel: +1 416-591-7999
Fax: +1 416-591-7987
Web site: nickelinstitute.gov

Norsk Korrosjonsteknisk Forening (NKF)

c/o Polyteknisk Forening Rosenkrantz gt. 7
0159 Oslo, Norway
Tel: +47 22 42 68 70
Fax: +47 22 42 58 87
Web site: polyteknisk.no
NSF International (NSF)
PO Box 130140
Ann Arbor, MI 48113-0140 Tel: +1 734-769-8010
Fax: +1 734-769-0109
Web site: nsf.org

Nuclear Energy Institute (NEI)

1201 F St. N.W., Ste. 1100
Washington, DC 20004-1218
Web site: nei.org

Oak Ridge National Laboratory (ORNL)

PO Box 2008
Oak Ridge, TN 37831
Tel: +1 865-574-4160
Web site: ornl.gov

Occupational Safety & Health Administration (OSHA)

U.S. Department of Labor 200 Constitution Ave. N.W.
Washington, DC 20210 Tel: 1 800-321-6742
Web site: osha.gov

Office of Naval Research (ONR)

875 North Randolph St., Ste. 1425
Arlington, VA 22203-1995
Tel: +1 703-696-5358
Fax: +1 703-696-5940
Web site: onr.navy.mil

Ordem dos Engenheiros (Portuguese Society of Engineers)

Av. Sidónio Pais, n. 4 E
1050 - 212 Lisbon, Portugal
Tel: +351 21 3132600
Fax: +351 21 3524632
ordemengenheiros.pt

Pacific Northwest National Laboratory (PNNL)

PO Box 999
Richland, WA 99352
Tel: +1 509-375-2121 or 1 888-375-7665
Web site: pnl.gov

PennWell Corporation

1421 S. Sheridan Rd.
Tulsa, OK 74112
Tel: 1 800-331-4463 or +1 918-835-3161
Web site: pennwell.com

Pipeline Research Council International (PRCI)

1401 Wilson Blvd., Ste. 1101
Arlington, VA 22209
Tel: +1 703-387-0190
Fax: +1 703-387-0192
Web site: prci.org

Portland Cement Association (PCA)

5420 Old Orchard Rd. Skokie, IL 60077
Tel: +1 847-966-6200
Fax: +1 847-966-8389
Web site: cement.org

Royal Society of Chemistry (RSC)

Thomas Graham House Science Park, Milton Rd. Cambridge CB4
0WF, U.K.
Tel: +44 (0) 1223 420066
Fax: +44 (0) 1223 423623
Web site: rsc.org

SAE International (SAE)

400 Commonwealth Dr.
Warrendale, PA 15096-0001
Tel: 1 877-606-7323 or +1 724-776-4841
Fax: +1 724-776-0790
Web site: sae.org

Sandia National Laboratories (SNL)

PO Box 5800
Albuquerque, NM 87185
Tel: +1 505-844-8066
Web site: sandia.gov

Scientific Society of Mechanical Engineering

H-1027 Budapest Fo u. 68, Hungary
Tel: +36 (06) 1 202-0656
Fax: +36 (06) 1 202-0252
Web site: gte.mtesz.hu

Societe de Chimie Industrielle (SCI)

28 Rue Saint Dominique F-75007 Paris, France
Tel: +33 (0) 1 53 59 02 10
Fax: +33 (0) 1 45 55 40 33
Web site: scifrance.org

The Society for Protective Coatings (SSPC)

800 Trumbull Dr.
Pittsburgh, PA 15205
Tel: 1 877-281-7772 or +1 412-281-2331
Fax: +1 412-281-9992
Web site: sspc.org

Society of Chemical Industry (SCI)

14/15 Belgrave Square London SW1X 8PS, U.K. Tel: +44 (0) 20 7598 1500
Fax: +44 (0) 20 7598 1545
Web site: soci.org

Society of Petroleum Engineers (SPE)

PO Box 833836
Richardson, TX 75083-3836
Tel: +1 972-952-9393 or 1 800-456-6863
Fax: +1 972-952-9435
Web site: spe.org

SPI: The Society of the Plastics Industry

1667 K St. N.W., Ste. 1000
Washington, DC 20006
Tel: +1 202-974-5200
Fax: +1 202-296-7005
Web site: plasticsindustry.org

Southwest Research Institute (SwRI)

PO Drawer 28510
San Antonio, Texas 78228-0510
Tel: +1 210-684-5111
Fax: +1 210-522-3547
Web site: swri.org

Specialty Steel Industry of North America (SSINA)

3050 K St. N.W.
Washington, DC 20007
Tel: 1 800-982-0355 or +1 202-342-8630
Fax: +1 202-342-8631
Web site: ssina.com

Surface Coatings Association Australia (SCAA)

PO Box 563
Toorak, Victoria 3142, Australia Tel: +61 (0) 3 9827 8921
Fax: +61 (0) 3 9824 0258
Web site: scaa.asn.au

Swedish Standards Institute (SIS)

Sankt Paulsgatan 6
SE-118 80 Stockholm, Sweden Tel: +46 (0) 8 555 520 00
Fax: +46 (0) 8 555 520 01
Web site: sis.se

TAPPI

(formerly Technical Association of the Pulp and Paper Industry)
15 Technology Pkwy. S.
Peachtree Corners, GA 30092
Tel: +1 707-446-1400
Fax: +1 707-446-6947
Web site: tappi.org

Taylor & Francis Group

2 Park Square, Milton Park
Abingdon, Oxfordshire OX14 4RN, U.K. Tel: +44 (0) 20 7017 6000
Fax: +44 (0) 20 7017 6699
Web site: tandf.co.uk

Transport Canada (TC)

330 Sparks St.
Ottawa, Ontario K1A 0N5 Canada
Tel: +1 613-990-2309
Fax: +1 613-954-4731
Web site: tc.gc.ca

TWI

(formerly The Welding Institute) Granta Park, Great Abington
Cambridge CB21 6AL, U.K.
Tel: +44 (0) 1223 899000
Fax +44 (0) 1223 892588
Web site: twi.co.uk

U.S. Department of Transportation (DOT)

1200 New Jersey Ave. S.E. Washington, DC 20590
Tel: +1 202-366-4000
Web site: dot.gov

U.S. Environmental Protection Agency (EPA)

Ariel Rios Bldg.
1200 Pennsylvania Ave. NW Washington, DC 20460
Tel: +1 202-272-0167
Web site: epa.gov

U.S. Food and Drug Administration (FDA)

5600 Fishers Ln.
Rockville, MD 20857-0001
Tel: 1 888-463-6332
Web site: fda.gov

U.S. Geological Survey (USGS)

12201 Sunrise Valley Dr. Reston, VA 20192
Tel: +1 703-648-4000
Web site: usgs.gov

U.S. Government Printing Office (GPO)

732 N. Capitol St. N.W.
Washington, DC 20401
Tel: +1 202-512-0000
Web site: gpo.gov

U.S. Nuclear Regulatory Commission (NRC)

Washington, DC 20555-0001

Tel: 1 800-368-5642

Web site: nrc.gov

WaterJet Technology Association (WJTA)

906 Olive St., Suite 1200 St. Louis, MO 63101-1434

Phone: +1 314-241-1445

Fax: +1 314-241-1449

Web site: wjta.org

Welding Research Council (WRC)

PO Box 201547

Shaker Heights, OH 44120

Phone: +1 216-658-3847

Fax: +1 216-658-3854

Web site: forengineers.org

Appendix F

Abbreviations for Periodicals Frequently Cited in NACE Publications

Periodical	Abbreviation
Acta Chemica, Mineralogica, et Physica	Acta Chem. Mineral. Phys.
Acta Metallurgica	Acta Metall.
Acta Physica et Chemica	Acta Phys. Chem.
Advanced Corrosion Science and Technology	Adv. Corros. Sci. Technol.
Advances in Materials Research	Adv. Mater. Res.
American Institute of Chemical Engineers Journal	AICHE J.
American Journal of Physics	Amer. J. Phys.
American Journal of Science	Amer. J. Sci.
Analytical Chemistry	Anal. Chem.
Annual Review of Microbiology	Ann. Rev. Microbiol.
Applied Materials Research	Appl. Mater. Res.
Applied Physics Letters	Appl. Phys. Lett.
Applied Scientific Research	Appl. Sci. Res.
Applied Spectroscopy	Appl. Spectrosc.
Australian Journal of Marine and Freshwater Research	Aust. J. Mar. Freshwater Res.
British Corrosion Journal	Br. Corros. J.
British Journal of Applied Physics	Br. J. Appl. Phys.
Canadian Journal of Chemistry	Can. J. Chem.
Chemical and Process Engineering	Chem. Process Eng.
Chemical Engineering	Chem. Eng.
Chemical Engineering Progress	Chem. Eng. Prog.
Chemical Oceanography	Chem. Ocean.
Chemical Processing	Chem. Processing
CORROSION	Corrosion
Corrosion Bulletin	Corros. Bull.
Corrosion and Material Protection	Corros. Mater. Prot.
Corrosion Prevention and Control	Corros. Prev. Control
Corrosion Science	Corros. Sci.
Developments in Industrial Microbiology	Dev. Ind. Microbiol.
Electrochimica Acta	Electrochim. Acta
Engineering Fracture Mechanics	Eng. Fract. Mech.
Federation of European Microbiological Societies - Microbiology Letters	FEMS Microbiol. Lett.
Geochimica et Cosmochimica Acta	Geochim. Cosmochim. Acta
Hydrocarbon Processing	Hydroc. Proc.
Industrial and Engineering Chemistry	Ind. Eng. Chem.
Inorganic Chemistry	Inorg. Chem.
International Biodeterioration Bulletin	Int. Biodeterior. Bull.
International Journal of Fracture	Int. J. Fract.
International Journal of Heat and Mass Transfer	Int. J. Heat Mass Transfer
International Journal of Powder Metallurgy	Int. J. Powder Metall.
Journal of the American Chemical Society	J. Chem. Soc.
Journal of the American Concrete Institute	J. Concr. Inst.
Journal of the American Society of Naval Engineers	J. Soc. Nav. Eng.
Journal of the American Water Works Association	J. Water Works Assoc.
Journal of Applied Chemistry	J. Appl. Chem.
Journal of Applied Physics	J. Appl. Phys.
Journal of Applied Polymer Science	J. Appl. Polym. Sci.
Journal of Applied Sciences	J. Appl. Sci.
Journal of Bacteriology	J. Bacteriol.
Journal of Catalysis	J. Catalysis
Journal of Chemical and Engineering Data	J. Chem. Eng. Data
Journal of Chemical Physics	J. Chem. Phys.
Journal of Chemical Thermodynamics	J. Chem. Thermodyn.
Journal fuer Chemie und Physik	J. Chem. Phys.

Periodical	Abbreviation
Journal of Chromatographic Science	J. Chromatogr. Sci.
Journal of Coated Fibrous Materials	J. Coated Fibrous Mater.
Journal of Coatings Technology	J. Coatings Technol.
Journal of Composite Materials	J. Compos. Mater.
Journal of Electroanalytical Chemistry	J. Electroanal. Chem.
Journal of the Electrochemical Society	J. Electrochem. Soc.
Journal of General Microbiology	J. Gen. Micro.
Journal of Geophysical Research	J. Geophys. Res.
Journal of Inorganic and Nuclear Chemistry	J. Inorg. Nucl. Chem.
Journal of the Institute of Metals	J. Inst. Met.
Journal of the Iron and Steel Institute	J. Iron St. Inst.
Journal of Materials Science	J. Mater. Sci.
Journal of Metals	J. Met.
Journal of Nuclear Materials	J. Nucl. Mater.
Journal of the Oil and Colour Chemists' Association	J. Oil Colour Chem. Assoc.
Journal of Paint Technology	J. Paint Technol.
Journal of Petroleum Technology	J. Pet. Technol.
Journal of Physical Chemistry	J. Phys. Chem.
Journal of Polymer Science	J. Polym. Sci.
Journal of Protective Coatings & Linings	J. Prot. Coatings Linings
Journal of Research, National Bureau of Standards	JRNBS
Journal of Scientific Instruments	J. Sci. Instrum.
Journal of the Society of the Chemical Industry	J. Soc. Chem. Ind.
Journal of Testing and Evaluation	J. Test. Eval.
Journal of Vacuum Science and Technology	J. Vac. Sci. Technol.
Marine Chemistry	Mar. Chem.
Materials and Corrosion	Mater. Corros.
Materials Evaluation	Mater. Eval.
Materials Performance	MP
Materials Protection and Performance	MP&P
Materials and Process Technology	Mater. Process Technol.
Materials Science and Engineering	Mater. Sci. Eng.
Metal Progress	Met. Prog.
Metallurgical Transactions	Metall. Trans.
Metallurgical Transactions A. Physical Metallurgy and Materials Science	Metall. T-A
Modern Metals	Mod. Met.
Naval Engineers' Journal	Naval Eng. J.
Nickel	Nickel
Nuclear and Chemical Waste Management	Nucl. Chem. Waste Manag.
Nuclear Science and Engineering	Nucl. Sci. Eng.
Nuclear Technology	Nucl. Technol.
Ocean Industry	Ocean Ind.
Oil and Gas Journal	Oil Gas J.
Physics of Metals and Metallography	Phys. Met. Metallogr.
Polymer Engineering and Science	Polym. Eng. Sci.
Precision Metal	Precis. Met.
Proceedings of the Institution of Mechanical Engineers	Proc. Inst. Mech. Eng.
Proceedings, Royal Society of London	Proc. Roy. Soc. London
Scripta Metallurgica	Scrip. Metal.
Surface and Interface Analysis	Surf. Interface Anal.
Surface Science	Surf. Sci.
Surface Technology	Surf. Technol.
Technical Association of the Pulp and Paper Industry Journal	TAPPI J.
Thermal Engineering	Therm. Eng.
Transactions of the American Institute of Mining, Metallurgical, and Petroleum Engineers	Trans. AIME
Transactions of the American Society for Metals	Trans. ASM
Transactions of the American Society for Steel Treating	Trans. Amer. Soc. Steel Treat.

<u>Periodical</u>	<u>Abbreviation</u>
Transactions of the Institute of Marine Engineers	Trans. Inst. Marine Eng.
Transactions of the Iron and Steel Institute of Japan	Trans. ISIJ
Tribology International	Tribol. Int.
Water Research	Water Res.
Werkstoffe und Korrosion (Materials and Corrosion)	Werkst. Korros.
Zashchita ot Korrozii v Khimicheskoi Promishlennosti	Zashch. Korroz. Khim. Promsti.
Zashchita Metallov.	Zashch. Met.
Zeitschrift für Elektrochemie	Z. Elektrochem.
Zeitschrift für Physikalische Chemie	Z. Phys. Chem

Appendix G

Sample Entries for Bibliographies

Books

- Name of the author(s), editor(s), or institution responsible for publication
- Full title of the book, including subtitle, if any
- Editor, compiler, or translator, if any
- Title of series, if any, and volume or number in the series
- Edition, if not the original
- Volume number or total number of volumes of a multivolume work
- Facts of publication (city and state where published, publisher, date of publication)

Examples

Books with one or two authors:

Atkinson, J.T.N., and H. Van Drosselaar. *Corrosion and Its Control: An Introduction to the Subject*. 2nd ed. Houston, TX: NACE, 1985.

Books with three or more authors:

Butts, J.A., J.T.N. Atkinson, and H. Van Drosselaar. *Copper, The Science and Technology of the Metal, Its Alloys, and Compounds*. American Chemical Society Monograph Series no. 122. New York, NY: Reinhold Publishing Corp., 1954.

Books with multiple authors and compiled by one or more editors:

Moniz, B.J., and W. Pollock, eds. *Process Industries Corrosion—The Theory and Practice*. Houston, TX: NACE, 1986.

CD-ROM of a Periodical with Print Version

- Name of the author or editor
- Title of the work
- Title of the publication, if any
- Title of the CD-ROM
- Name of the distributor or publisher
- City/state of the distributor or publisher
- Date of publication or pressing

Example

Ramirez, A. "Computer Groups Plan Standards." *New York Times*, Dec. 14, 1993. late ed. New York Times Ondisc. CD-ROM. Alameda, CA: UMI-ProQuest, June 1994.

CD-ROM Other Than a Periodical

- Name of the author or editor
- Title of the work
- Title of the CD-ROM
- City/state of publisher or distributor
- Name of the distributor or publisher
- Date of publication or pressing

Example

Shelley, M.W. "Frankenstein." *Classic Library*. CD-ROM. Alameda, CA: Andromeda, 1993.

Company, Government, and Private Reports

- Name of author(s)
- Title of the report
- Name of publishing agency
- Identifying report number, if any
- Date of publication

Examples

"Army National Guard Controlled Humidity Preservation Program Economic Analysis." U.S. Army Cost and Economic Analysis Center Report. May 1997.

Jones, J.J. "Stress Corrosion Cracking of Iron." Ohio Research Council Report, ORC-272. June 30, 1972.

Morrison, J.D. "Report on Relative Corrosivity of Atmospheres at Various Distances from the Seacoast." NASA, John F. Kennedy Space Center, MTB 099-74. January 1980.

"Stress Corrosion Cracking on Canadian Oil and Gas Pipelines." Canada National Energy Board Report, MH-2-95. November 1996.

Conference Papers

- Name of author(s)
- Title of the paper
- Name of conference
- Paper number
- City and state of publisher or sponsor
- Name of publisher or sponsor
- Date of conference and/or publication

Examples

Note: For NACE annual conference papers, the title of the conference has changed over the years, as indicated below.

1943 to 1969

Hedrick, H.G. "Microbiological Corrosion of Aluminum." NACE 25th Annual Conference, paper no. 38. Houston, TX: NACE, 1969.

1970

Kadlecek, P.E. "A Wrought Corrosion Resistant Two-Phase Stainless Steel." NACE 1970 Annual Conference, paper no. 66. Houston, TX: NACE, 1970.

1971 to Present

Wei, R., E. Trillo, J. Dante, K. Coulter, "Corrosion Properties of Plasma Deposited Corrosion Resistant Alloy Coatings on UNS G41400 Carbon Steel." CORROSION 2014, paper no. 4147. Houston, TX: NACE International, 2014.

Gummow, B. "Corrosion Control of Iron and Steel Water Piping—A Historical Perspective." NACE Northern Area Eastern Conference, Quebec City, Canada. Houston, TX: NACE, 2002.

Ogawa, H., and T. Hara. "A Mechanistic Analysis of Hydrogen-Induced Cracking in the High-pH Environments." 13th Int. Corros. Congress, paper no. 218. Clayton, Australia: Australasian Corrosion Association, 1996.

Reid, T.A., and A. Turnbull. "Hydrogen Embrittlement of Duplex Stainless Steel Evaluated by the Interrupted Slow Strain Rate Technique." EUROCORR 1999. Frankfurt- am-Main, Germany: DECHEMA e.V., 1999.

Smith, A.J. "Evaluation of Inhibitors for Condensate Wells." CORROSION/73, paper no. 134. Houston, TX: NACE, 1973.

E-mail

Treat as a private communication.

Federal Regulations

- Number of regulation or law, if any
- Title of regulation
- City and state of publishing agency
- Name of publishing agency
- Date of publication

Example

U.S. Code of Federal Regulations (CFR) Title 49. "Transportation." Washington, DC: Office of the Federal Register, 1995.

Internet Web Site

- Name of the author
- Title of the posting or periodical involved
- Description of the posting
- Date of the posting, if any
- Web address
- Date author consulted this source (Web sites change frequently)

Example

Still, L. "On the Battlefields of Business, Millions of Casualties." New York Times. March 3, 1996. www.nytimes.com/specials/downsize/03down1.html. Aug. 17, 1996.

Note: Only Web citations of archival journals are permitted in *CORROSION*. Treat other Web citations as private communications.

List Server or Newsgroup

Treat as a private communication.

Papers from a Collection

- Name of author(s)
- Title of the paper
- Name of collection
- City and state of publisher
- Name of publisher
- Date of publication

Example

Hamby, T.W., and R.N. Tuttle. "Deep, High-Pressure Sour Gas Is a Challenge." In *H₂S Corrosion in Oil and Gas Production: A Compilation of Classic Papers*. Eds. R.N. Tuttle and R.D. Kane. Houston, TX: NACE, 1981.

Patents

- Name of the author(s)
- Title of the patent
- Country in which patent was issued, follow by the patent number
- Year in which the patent was filed

Example

Schriever, M.P. Non-Chromated Oxide Coating for Aluminum Substrates. U.S. Patent 5378298. 1980.

Periodical Articles

- Name of the author(s)
- Title of the article (in English)
- Name of the periodical (include translated titles of non-English publications whenever possible)
- Volume number
- Issue number (not necessary if journal page numbers are continuous throughout the volume)
- Date of the volume (or issue volume)
- Page(s) of the particular citation

Examples

LaCasse, G.A., and T. Ingvordsen. "Deep, High-Pressure Sour Gas Is a Challenge." *MP* 27, 9 (1988): p. 49.

Sedriks, A.J., J.W. Schultz, and M.A. Cordovi. "Deep, High-Pressure Sour Gas Is a Challenge." *Boshoku Gijutsu (Corrosion Engineering)* 28, 2 (1979): p. 82.

Private Communication

- Name of writer(s) of the correspondence
- Employer or company involved, if any
- Type of correspondence
- Recipient of correspondence
- Date of correspondence

Examples

Smith, J.P., XYZ Corp. Correspondence to author. August 10, 1991.

Smith, J.P., XYZ Corp. Correspondence to A.B. Jones, WW Corp. August 10, 1991.

Proceedings

- Name of author(s), if specific paper is cited
- Title of the paper, if specific paper is cited
- Name of conference
- Paper number, if specific paper is cited
- City and state of publisher or sponsor
- Name of publisher or sponsor
- Date of conference and/or publication
- Page(s) of the particular citation

Examples

Hausler, R.H., ed. *Corrosion Inhibition*, Proc. Int. Conf. Corrosion Inhibitors, held May 16-20, 1983. Houston, TX: NACE, 1988, p. 68.
"Pollution Prevention/Case Studies." Tri-Service Corrosion Conference, held January 14-16, 2002. San Antonio, TX: NACE/DoD, 2002, p. 18.

Proceedings of the Fifth International Congress on Metallic Corrosion, held May 1972. Houston, TX: NACE, 1974, p. 73.

Starkey, R.L. "Deep, High-Pressure Sour Gas Is a Challenge." In *Biologically Induced Corrosion*, Proc. Int. Conf. Corrosion Inhibitors, held June 10-12, 1985. S.C. Dexter, ed. Houston, TX: NACE, 1986, p. 3.

Note: The date on which the meeting took place is optional.

Standards and Technical Committee Reports

- Number of standard or report
- Title of standard or report
- City and state of publisher
- Name of publisher
- Date of publication (see note below for exception)

Examples

- ASTM G 79-83. "Standard Practice for Evaluation of Metals Exposed to Carburization Environments." Annual Book of ASTM Standards. West Conshohocken, PA: ASTM, 1987.
- NACE SP0390-2009. "Maintenance and Rehabilitation Considerations for Corrosion Control of Atmospherically Exposed Existing Steel-Reinforced Concrete Structures." Houston, TX: NACE, 2006.
- NACE Publication 6G191. "Surface Preparation of Contaminated Concrete for Corrosion Control." Houston, TX: NACE, 1991.
- FHWA-RD-91-011. "Effect of Surface Contaminants on Coating Life." McLean, VA: U.S. Department of Transportation, Federal Highway Administration, November 1991. Also available as SSPC Publication 91-07, Pittsburgh, PA: SSPC, 1991.

Note: When citing standards, the year of revision should be included whenever possible, except when citing standards in NACE technical committee publications. When citing standards in technical committee publications, use "(latest revision)" after the standard designation number rather than the actual revision date of the standard (so that readers will obtain the most current version), and do not cite a page number, as shown below.

- ASTM G79 (latest revision). "Standard Practice for Evaluation of Metals Exposed to Carburization Environments." West Conshohocken, PA: ASTM.
- NACE SP0390 (latest revision). "Maintenance and Rehabilitation Considerations for Corrosion Control of Atmospherically Exposed Existing Steel-Reinforced Concrete Structures." Houston, TX: NACE.
- NACE Publication 6G191 (latest revision). "Surface Preparation of Contaminated Concrete for Corrosion Control." Houston, TX: NACE.
- NACE Publication 6G197/SSPC-TU 2 (latest revision). "Design, Installation, and Repair of Coating Systems for Concrete Used in Secondary Containment." Houston, TX: NACE, and Pittsburgh, PA: SSPC.

Standards and Technical Committee Reports – Jointly Published

- Number of standard or report for each publisher
- Title of standard or report
- City and state of each publisher
- Names of publishers
- Date of publication

Examples

- NACE No. 1/SSPC-SP 5. "White Metal Blast Cleaning." Houston, TX: NACE, 2000.
- ANSI/NACE MR0175/ISO 15156. "Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production." Houston, TX: NACE, 2003.

Note: When citing a joint standard in a document to be issued by the standard's co-publisher, list that co-publisher's standard designation first in the bibliographic entry (e.g., in a NACE document that cites a joint NACE/SSPC standard, the NACE standard designation should be listed first).

Note: When citing joint standards, the year of revision should be included whenever possible, except when citing joint standards in NACE technical committee publications. When citing joint standards in technical committee publications, use "(latest revision)" after the standard designation number rather than the actual revision date of the standard (so that readers will obtain the most current version), and do not cite a page number, as shown below.

- NACE No. 1/SSPC-SP 5 (latest revision). "White Metal Blast Cleaning." Houston, TX: NACE.
- ANSI/NACE MR0175/ISO 15156 (latest revision). "Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production." Houston, TX: NACE.

Theses and Dissertations

- Name of author(s)
- Title of the work
- University or college
- Date of dissertation or thesis

Examples

- Parish, G.W. "Nonlinear Control and Output Decoupling of Robot Arm Dynamics." Master's thesis, Arizona State University, 1986.
- Budd, K.D. "Structure Evolution in Sol-Gel Derived, Lead Titanate-Based Materials and Application to the Processing of Thin Dielectric Layers." Ph.D. diss., University of Illinois, 1986.

Unpublished Works

- Name of author(s)
- Title of the work, if any
- Name of collection, if any
- City and state of meeting, workshop, or speech
- Date of meeting, workshop, or speech

Example

- Jones, J.J. "Stress Corrosion Cracking of Iron." Presented at NACE Northeast Region Meeting. Pittsburgh, PA, 1982.

Withdrawn and Out-of-Print Publications

- Number of standard, regulation, or law, if any
- Title of standard, regulation, or law
- City and state of publishing agency
- Name of publishing agency
- Date of publication, if known

Example

NACE Standard RP0172 (withdrawn). "Surface Preparation of Steel and Other Hard Materials by Water Blasting Prior to Coating or Recoating." Houston, TX: NACE, 1972. (Available from NACE as an historical document only.)

Volume/Issue Reference List for *Materials Performance* and *CORROSION*

MP Name History

Materials Protection..... 1962 to 1970

Materials Protection and Performance 1971 to 1973

Materials Performance 1974 to present

Materials Performance

Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year
1.....	1962	12.....	1973	23.....	1984	34.....	1995	45.....	2006	56.....	2017
2.....	1963	13.....	1974	24.....	1985	35.....	1996	46.....	2007	57.....	2018
3.....	1964	14.....	1975	25.....	1986	36.....	1997	47.....	2008	58.....	2019
4.....	1965	15.....	1976	26.....	1987	37.....	1998	48.....	2009	59.....	2020
5.....	1966	16.....	1977	27.....	1988	38.....	1999	49.....	2010	60.....	2021
6.....	1967	17.....	1978	28.....	1989	39.....	2000	50.....	2011	61.....	2022
7.....	1968	18.....	1979	29.....	1990	40.....	2001	51.....	2012	62.....	2023
8.....	1969	19.....	1980	30.....	1991	41.....	2002	52.....	2013	63.....	2024
9.....	1970	20.....	1981	31.....	1992	42.....	2003	53.....	2014	64.....	2025
10.....	1971	21.....	1982	32.....	1993	43.....	2004	54.....	2015		
11.....	1972	22.....	1983	33.....	1994	44.....	2005	55.....	2016		

CORROSION

Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year
1.....	3/45-12/46	15.....	1959	29.....	1973	43.....	1987	57.....	2001	71.....	2015
2.....	1/47-6/47	16.....	1960	30.....	1974	44.....	1988	58.....	2002	72.....	2016
3.....	7/47-12/47	17.....	1961	31.....	1975	45.....	1989	59.....	2003	73.....	2017
4.....	1948	18.....	1962	32.....	1976	46.....	1990	60.....	2004	74.....	2018
5.....	1949	19.....	1963	33.....	1977	47.....	1991	61.....	2005	75.....	2019
6.....	1950	20.....	1964	34.....	1978	48.....	1992	62.....	2006	76.....	2020
7.....	1951	21.....	1965	35.....	1979	49.....	1993	63.....	2007	77.....	2021
8.....	1952	22.....	1966	36.....	1980	50.....	1994	64.....	2008	78.....	2022
9.....	1953	23.....	1967	37.....	1981	51.....	1995	65.....	2009	79.....	2023
10.....	1954	24.....	1968	38.....	1982	52.....	1996	66.....	2010	80.....	2024
11.....	1955	25.....	1969	39.....	1983	53.....	1997	67.....	2011	81.....	2025
12.....	1956	26.....	1970	40.....	1984	54.....	1998	68.....	2012		
13.....	1957	27.....	1971	41.....	1985	55.....	1999	69.....	2013		
14.....	1958	28.....	1972	42.....	1986	56.....	2000	70.....	2014		

Appendix H

Citing Equations, Figures, and Tables

Equation	Figures	Tables
Equation (1)	Figure 1 Figure 1(a)	Table 1
(Equation [1])	(Figure 1[a])	(Table 1)
Equations (1) and (2)	Figures 1 and 2	Tables 1 and 2
Equations (1), (2), and (4)	Figures 1(a), (b), and (d) Figures 2(a) and 3(a)	Tables 1, 2, and 4
Equations (1) through (3)	Figures 1 through 3 Figures 8(a) through (h)	Tables 1 through 3
(Equations [1] through [3])	(Figures 8[a] through [h])	(Tables 1 through 3)

Appendix I

Prefix Examples

Prefix **Examples**

ante	antediluvian, anteroom
anti	antihero, anticlerical (but anti-inflammatory)
bi	bivalent, biconvex, binomial
bio	bioecology, biophysical
co	coordinate, coauthor (but co-opt, co-worker) counter counterclockwise, countermeasure
extra	extraterrestrial, extrafine (but extra-administrative) infra infrasonic, infrastructure
inter	intertidal, interrelated
intra	intrazonal, intracranial (but intra-arterial)
macro	macroeconomics, macromolecular
meta	metagalaxy, metastable (but meta-analysis)
micro	microminitaurized, microimage, micromethod
mid	midocean, midtown, mid-century (but mid-nineteenth century, mid-1990s, mid-nineteenth-century history)
mini	minivan, miniskirt
multi	multiauthor, multifaceted (but multi-institutional)
neo	neoclassical, neoorthodox, neotropical
non	nonnegotiable (but non-corrosion-inhibiting, non-Asian)
over	overanalyzed, overmagnified
post	postdoctoral, postwar (but post-Vietnam, post-tensioned)
pre	precede, preempt, premix (but pre-Columbian)
pro	proindustrial, promarket (but pro-American)
proto	prototrophic, prototype
pseudo	pseudomorph, pseudoscience
re	reexamine, redigitize (but re-cover, re-creation)
semi	semiopaque, semiconductor (but semi-independent)
socio	socioeconomic, sociopolitical
sub	subadjacent, subbasement, substandard
super	supertanker, superhigh (frequency)
supra	supramolecular, supranational, (but supra-European)
trans	transoceanic, transmembrane, transcontinental, transatlantic (but trans-Brazilian) ultra ultramontane, ultraorganized
un	unfunded, unneutered (but un-English, un-ionized)
under	underused, undersea, underrate

Appendix J

Sample Entries for References

Books

- Name of the author(s), editor(s), or institution responsible for publication.
- Full title of the book, including subtitle, if any.
- Editor, compiler, or translator, if any.
- Title of series, if any, and volume or number in the series.
- Edition, if not the original.
- Volume number or total number of volumes of a multivolume work.
- Facts of publication (city and state where published, publisher, date of publication).
- Page number(s) of the particular citation.

Examples

Books with one or two authors:

1. J.T.N. Atkinson, H. Van Droffelaar, *Corrosion and Its Control: An Introduction to the Subject*, 2nd ed. (Houston, TX: NACE, 1985), p. 25.

Books with three or more authors:

1. J.A. Butts, J.T.N. Atkinson, H. Van Droffelaar, *Copper, The Science and Technology of the Metal, Its Alloys, and Compounds*, American Chemical Society Monograph Series no. 122 (New York, NY: Reinhold Publishing Corp., 1954), p. 320.

Books with multiple authors and compiled by one or more editors:

1. B.J. Moniz, W.I. Pollock, eds., *Process Industries Corrosion—The Theory and Practice* (Houston, TX: NACE, 1986), p. 123.

For MP, books with three or more authors or editors:

1. J.A. Butts, et al., *Copper, The Science and Technology of the Metal, Its Alloys, and Compounds*, American Chemical Society Monograph Series no. 122 (New York, NY: Reinhold Publishing Corp., 1954), p. 320.

CD-ROM of a Periodical with Print Version

- Name of the author or editor.
- Title of the work.
- Title of the publication, if any.
- Title of the CD-ROM.
- Name of the distributor or publisher.
- City/state of the distributor or publisher.
- Date of publication or pressing.

Example

1. A. Ramirez, "Computer Groups Plan Standards," *New York Times*, Dec. 14, 1993, late ed., New York Times Ondisc, CD-ROM (Alameda, CA: UMI-ProQuest, June 1994).

CD-ROM Other Than a Periodical

- Name of the author or editor.
- Title of the work.
- Title of the CD-ROM.
- City/state of publisher or distributor.
- Name of the distributor or publisher.
- Date of publication or pressing.

Example

1. M.W. Shelley, "Frankenstein," Classic Library, CD-ROM (Alameda, CA: Andromeda, 1993).

Company, Government, and Private Reports

- Name of author(s), if applicable.
- Title of the report.
- Name of publishing agency.
- Identifying report number, if any.
- Date of publication.
- Page(s) of the particular citation.

Examples

1. J.J. Jones, "Stress Corrosion Cracking of Iron," Ohio Research Council Report, ORC-272, June 30, 1972.
2. J.D. Morrison, "Report on Relative Corrosivity of Atmospheres at Various Distances from the Seacoast," NASA, John F. Kennedy Space Center, MTB 099-74, January 1980.
3. "Operations in Controlled Humidity Space, Section 3-52," DoD Joint Service Manual for Storage and Materials Handling, DoD 4145.19R, April 1994.
4. "Army National Guard Controlled Humidity Preservation Program Economic Analysis," U.S. Army Cost and Economic Analysis Center Report, May 1997.
5. "Stress Corrosion Cracking on Canadian Oil and Gas Pipelines," Canada National Energy Board Report, MH-2-95, November 1996.

Conference Papers

- Name of author(s).
- Title of the paper.
- Name of conference.
- Paper number, if applicable.
- City/state of publisher or sponsor.
- Name of publisher or sponsor.
- Date of conference and/or publication.
- Page(s) of the particular citation.

Examples

Note: For NACE annual conference papers, the title of the conference has changed over the years, as indicated below.

1943 to 1969

1. H.G. Hedrick, "Microbiological Corrosion of Aluminum," NACE 25th Annual Conference, paper no. 38 (Houston, TX: NACE, 1969), p. 14.

1970

1. P.E. Kadlecck, "A Wrought Corrosion Resistant Two- Phase Stainless Steel," NACE 1970 Annual Conference, paper no. 66 (Houston, TX: NACE, 1970), p. 14.

1971 to Present

1. R. Wei, E. Trillo, "Corrosion Properties of Plasma Deposited Corrosion Resistant Alloy Coatings on UNS G41400 Carbon Steel," CORROSION 2014, paper no. 4147, Houston, TX: NACE International, 2014.
2. T.A. Reid, A. Turnbull, "Hydrogen Embrittlement of Duplex Stainless Steel Evaluated by the Interrupted Slow Strain Rate Technique," EUROCORR 1999 (Frankfurt-am- Main, Germany: DECHEMA e.V., 1999), p. 6.
3. H. Ogawa, T. Hara, "A Mechanistic Analysis of Hydrogen- Induced Cracking in the High-pH Environments," 13th Int. Corros. Congress, paper no. 218 (Clayton, Australia: Australasian Corrosion Association, 1996), p. 10.
4. B. Gummow, "Corrosion Control of Iron and Steel Water Piping—A Historical Perspective," NACE Northern Area Eastern Conference, Quebec City, Canada (Houston, TX: NACE, 2002), p. 1.

E-mail

Treat as a private communication.

Federal Regulations

- Number of regulation or law, if any.
- Title of regulation.
- City and state of publishing agency.
- Name of publishing agency.
- Date of publication.
- Page(s) of the particular citation.

Example

1. U.S. Code of Federal Regulations (CFR) Title 49, "Transportation," (Washington, DC: Office of the Federal Register, 1995), p. 4.

Internet Web Site

- Name of the author.
- Title of the posting or periodical involved.
- Description of the posting.
- Web address.
- Date author consulted this source (Web sites change frequently).

Example

1. L. Still, "On the Battlefields of Business, Millions of Casualties," New York Times, March 3, 1996, <http://www.nytimes.com/specials/downsize/03down1.html> (Aug. 17, 1996).

Note: Only Web citations of archival journals are permitted in *CORROSION*. Treat other Web citations as private communications.

List Server or Newsgroup

Treat as a private communication.

Papers from a Collection

- Name of author(s).
- Title of the paper.
- Name of collection.
- City and state of publisher.
- Name of publisher.
- Date of publication.
- Page(s) of the particular citation.

Example

1. T.W. Hamby, R.N. Tuttle, "Deep, High-Pressure Sour Gas Is a Challenge," in H2S Corrosion in Oil and Gas Production: A Compilation of Classic Papers, eds. R.N. Tuttle, R.D. Kane (Houston, TX: NACE, 1981), p. 680..

Patents

- Name of the author(s).
- Title of the patent.
- Country in which patent was granted, followed by the patent number.
- Year in which the patent was filed.

Example

1. M.P. Schriever, "Non-Chromated Oxide Coating for Aluminum Substrates," U.S. Patent 5378298, 1995.

Periodical Articles

- Name of the author(s).
- Title of the article (in English; omit in CORROSION).
- Name of the periodical (include translated titles of non-English publications whenever possible).
- Volume number.
- Issue number (not necessary if journal page numbers are continuous throughout the volume).
- Date of the volume (or issue volume).
- Page(s) of the particular citation.

Examples

1. G.A. LaCasse, T. Ingvordsen, "Dessicant Drying of Gas Pipelines," *MP* 27, 9 (1988): p. 49.
2. V. Jovancicevic, S. Ramachandran, P. Prince, "Inhibition of Carbon Dioxide Corrosion of Mild Steel by Imidazolines and Their Precursors," *Corrosion* 55, 5 (1999): p. 449.

Private Communication

- Name of writer(s) of the correspondence.
- Employer or company involved, if any.
- Type of correspondence.
- Recipient of correspondence.
- Date of correspondence.

Examples

1. J.P. Smith, XYZ Corp., correspondence to author, August 10, 1991.
2. J.P. Smith, XYZ Corp., correspondence to A.B. Jones, WW Corp., August 10, 1991.

Proceedings

- Name of author(s), if specific paper is cited.
- Title of the paper, if specific paper is cited.
- Name of conference.
- Paper number, if specific paper is cited.
- City and state of publisher or sponsor.
- Name of publisher or sponsor.
- Date of conference and/or publication.
- Page(s) of the particular citation.

Examples

1. R.H. Hausler, ed., Corrosion Inhibition, Proc. Int. Conf. Corrosion Inhibitors, held May 16-20, 1983 (Houston, TX: NACE, 1988), p. 68.
2. Proceedings of the Fifth International Congress on Metallic Corrosion, held May 1972 (Houston, TX: NACE, 1974), p. 73.
3. "Pollution Prevention/Case Studies," Tri-Service Corrosion Conference, held January 14-16, 2002 (San Antonio, TX: NACE/DoD, 2002), p. 18.
4. P. L. Jones, F.H. Cocks, T.H. Flourney, "Performance Evaluation of Corrosion Control Products," 3rd Conf. on Aging Aircraft, Albuquerque, NM, held September 20-23 (Washington, DC: Joint NASA/DoD/FAA, 1999), p. 12.
5. R.L. Starkey, "Deep, High-Pressure Sour Gas Is a Challenge," in Biologically Induced Corrosion, Proc. Int. Conf. Corrosion Inhibitors, ed. S.C. Dexter, held June 10-12, 1985 (Houston, TX: NACE, 1986), p. 3..

Note: The date on which the meeting took place is optional.

Standards and Technical Committee Reports

- Number of standard or report.
- Title of standard or report.
- City and state of publisher.
- Name of publisher.
- Date of publication (see note below for exception).
- Page(s) of the particular citation (see note below for exception).

Examples

1. ASTM G79-83, "Standard Practice for Evaluation of Metals Exposed to Carburization Environments" (West Conshohocken, PA: ASTM, 1987), p. 1.
2. NACE SP0390-2009, "Maintenance and Rehabilitation Considerations for Corrosion Control of Atmospherically Exposed Existing Steel-Reinforced Concrete Structures" (Houston, TX: NACE, 2009), p. 3.

- ISO 8407, "Corrosion of Metals and Alloys—Removal of Corrosion Products from Corrosion Test Specimens" (Geneva, Switzerland: ISO, 1991), p. 5.
- NACE Publication 6G191, "Surface Preparation of Contaminated Concrete for Corrosion Control" (Houston, TX: NACE, 1991), p. 5.

Note: When citing standards, the year of revision should be included whenever possible, except when citing standards in NACE technical committee publications. When citing standards in technical committee publications, use "(latest revision)" after the standard designation number rather than the actual revision date of the standard (so that readers will obtain the most current version) and do not cite a page number, as shown below.

- ASTM G 79 (latest revision), "Standard Practice for Evaluation of Metals Exposed to Carburization Environments" (West Conshohocken, PA: ASTM).
- NACE SP0390 (latest revision), "Maintenance and Rehabilitation Considerations for Corrosion Control of Atmospherically Exposed Existing Steel-Reinforced Concrete Structures" (Houston, TX: NACE).
- NACE Publication 6G191 (latest revision), "Surface Preparation of Contaminated Concrete for Corrosion Control" (Houston, TX: NACE).
- SSPC-SP 1 (latest revision), "Solvent Cleaning" (Pittsburgh, PA: SSPC).

Standards and Technical Committee Reports—Jointly Published

- Number of standard or report that includes designation for both co-publishers.
- Title of standard or report.
- City and state of co-publisher.
- Name of co-publisher.
- Date of publication (see note below for exception).
- Page(s) of the particular citation (see note below for exception).

Examples

- NACE No. 1/SSPC-SP 5, "White Metal Blast Cleaning" (Houston, TX: NACE, 2000), p. 3.
- ANSI/NACE MR0175/ISO 15156, "Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production" (Houston, TX: NACE, 2003), p. 5.

Note: When citing a joint standard in a document to be issued by the standard's co-publisher, be sure to list that co-publisher's standard designation first in the reference entry (e.g., in a NACE document that cites a joint NACE/SSPC standard, the NACE standard designation should be listed first).

Note: When citing joint standards, the year of the review should be included whenever possible, except when citing joint standards in NACE technical committee publications. When citing joint standards in technical committee publications, use (latest revision) after the standard designation, rather than the actual revision date of the standard, (so that readers will obtain the most current version) and do not cite a page number, as shown below.

- NACE No. 1/SSPC-SP 5 (latest revision), "White Metal Blast Cleaning" (Houston, TX: NACE).
- ANSI/NACE MR0175/ISO 15156 (latest revision), "Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production" (Houston, TX: NACE).

Theses and Dissertations

- Name of author(s).
- Title of the work.
- University or college.
- Date of dissertation or thesis.

Examples

- D.W. Parish, "Nonlinear Control and Output Decoupling of Robot Arm Dynamics" (Master's thesis, Arizona State University, 1986), p. 49.
- K.D. Budd, "Structure Evolution in Sol-Gel Derived, Lead Titanate-Based Materials and Application to the Processing of Thin Dielectric Layers" (Ph.D. diss., University of Illinois, 1986), p. 52.

Unpublished Works

- Name of author(s).
- Title of the work, if any.
- Name of collection, if any.
- City and state of meeting, workshop, or speech.
- Date of meeting, workshop, or speech.

Example

- J.J. Jones, "Stress Corrosion Cracking of Iron," presented at NACE Northeast Region Meeting, Pittsburgh, PA, 1982..

Withdrawn and Out-of-Print Publications

- Number of standard, regulation, or law, if any.
- Title of standard, regulation, or law.
- City and state of publishing agency.
- Name of publishing agency.
- Date of publication (if available).

Example

1. NACE Standard RP0172 (withdrawn). "Surface Preparation of Steel and Other Hard Materials by Water Blasting Prior to Coating or Recoating." (Houston, TX: NACE, 1972). (Available from NACE as a historical document only.)

Volume/Issue Reference List for *Materials Performance* and *CORROSION*

MP Name History

<i>Materials Protection</i>	1962 to 1970
<i>Materials Protection and Performance</i>	1971 to 1973
<i>Materials Performance</i>	1974 to present

Materials Performance

Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year
1.....	1962	12.....	1973	23.....	1984	34.....	1995	45.....	2006	56.....	2017
2.....	1963	13.....	1974	24.....	1985	35.....	1996	46.....	2007	57.....	2018
3.....	1964	14.....	1975	25.....	1986	36.....	1997	47.....	2008	58.....	2019
4.....	1965	15.....	1976	26.....	1987	37.....	1998	48.....	2009	59.....	2020
5.....	1966	16.....	1977	27.....	1988	38.....	1999	49.....	2010	60.....	2021
6.....	1967	17.....	1978	28.....	1989	39.....	2000	50.....	2011	61.....	2022
7.....	1968	18.....	1979	29.....	1990	40.....	2001	51.....	2012	62.....	2023
8.....	1969	19.....	1980	30.....	1991	41.....	2002	52.....	2013	63.....	2024
9.....	1970	20.....	1981	31.....	1992	42.....	2003	53.....	2014	64.....	2025
10.....	1971	21.....	1982	32.....	1993	43.....	2004	54.....	2015		
11.....	1972	22.....	1983	33.....	1994	44.....	2005	55.....	2016		

Corrosion

Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year	Volume	Year
1.....	3/45-12/46	15.....	1959	29.....	1973	43.....	1987	57.....	2001	71.....	2015
2.....	1/47-6/47	16.....	1960	30.....	1974	44.....	1988	58.....	2002	72.....	2016
3.....	7/47-12/47	17.....	1961	31.....	1975	45.....	1989	59.....	2003	73.....	2017
4.....	1948	18.....	1962	32.....	1976	46.....	1990	60.....	2004	74.....	2018
5.....	1949	19.....	1963	33.....	1977	47.....	1991	61.....	2005	75.....	2019
6.....	1950	20.....	1964	34.....	1978	48.....	1992	62.....	2006	76.....	2020
7.....	1951	21.....	1965	35.....	1979	49.....	1993	63.....	2007	77.....	2021
8.....	1952	22.....	1966	36.....	1980	50.....	1994	64.....	2008	78.....	2022
9.....	1953	23.....	1967	37.....	1981	51.....	1995	65.....	2009	79.....	2023
10.....	1954	24.....	1968	38.....	1982	52.....	1996	66.....	2010	80.....	2024
11.....	1955	25.....	1969	39.....	1983	53.....	1997	67.....	2011	81.....	2025
12.....	1956	26.....	1970	40.....	1984	54.....	1998	68.....	2012		
13.....	1957	27.....	1971	41.....	1985	55.....	1999	69.....	2013		
14.....	1958	28.....	1972	42.....	1986	56.....	2000	70.....	2014		

Appendix K

Examples of Trade Names and Generic Substitutes

<u>Trade Name</u>	<u>Use</u>
Aloxite	aluminum oxide
Alundum	
Aradite	epoxy resin
Armco	high-purity iron
Bakelite	
Butterworthing	
Carborundum	
Celite	
Chromel-Alumel	
Ferralium	
Freon	fluorohydrocarbon
Galvalum Geiger-Muller tube	
Gunitite	shotcrete
Hastelloy	
Haydite	
Incoloy	
Inconel	
Invar	
Kel-F	polychlorotrifluoroethylene
Kynar	polyvinylfluoroethylene
Lucite	polymethyl methacrylate (PMMA)
Magnaflux	magnetic particle inspection Magne-Gage
Monel	
Mylar	polyester film
Nichrome	
Nujol	light mineral oil
Plexiglas	polymethyl methacrylate (PMMA)
Pyrex	borosilicate glass
Saran	saran
Scotch Tape	pressure-sensitive tape
Teflon	polytetrafluoroethylene (PTFE)
Tensometer	tensile machine
Thiokol	polysulfide rubber
Tygon	vinyl
Vaseline	petroleum jelly
Vycor	high-silica

Appendix L

U.S. Customary/Metric Conversion for Units of Measure Commonly Used in Corrosion-Related Publications

1 A/ft ²	= 10.76 A/m ²	1 inH ₂ O	= 249.1 Pa
1 acre	= 4,047 m ² = 0.4047 ha	1 knot	= 0.5144 m/s
1 A·h/lb	= 2.205 A·h/kg	1 ksi	= 6.895 MPa
1 bbl (oil, U.S.)	= 159 L = 0.159 m ³	1 lb	= 453.6 g = 0.4536 kg
1 bpd (oil)	= 159 L/d = 0.159 m ³ /d	1 lbf/ft ²	= 47.88 Pa
1 Btu	= 1,055 J	1 lb/ft ³	= 16.02 kg/m ³
1 Btu/ft ²	= 11,360 J/m ²	1 lb/100 gal (U.S.)	= 1.198 g/L
1 Btu/h	= 0.2931 W	1 lb/1,000 bbl	= 2.853 mg/L
1 Btu/h·ft ²	= 3.155 W/m ² (K-factor)	1 mA/in ²	= 0.155 mA/cm ²
1 Btu/h·ft ² ·°F	= 5.678 W/m ² ·K	1 mA/ft ²	= 10.76 mA/m ²
1 Btu·in/h·ft ² ·°F	= 0.1442 W/m·K	1 Mbpd (oil)	= 159 kL/d = 159 m ³ /d
1 cfm	= 28.32 L/min = 0.02832 m ³ /min = 40.78 m ³ /d	1 mile	= 1.609 km
1 cup	= 236.6 mL = 0.2366 L	1 square mile	= 2.590 km ²
1 cycle/s	= 1 Hz	1 mile (nautical)	= 1.852 km
1 ft	= 0.3048 m	1 mil	= 0.0254 mm = 25.4 μm
1 ft ²	= 0.0929 m ² = 929 cm ²	1 MMcfd	= 2.832 x 10 ⁴ m ³ /d
1 ft ³	= 0.02832 m ³ = 28.32 L	1 mph	= 1.609 km/h
1 ft·lbf (energy)	= 1.356 J	1 mpy	= 0.0254 mm/y = 25.4 μm/y
1 ft·lbf (torque)	= 1.356 N·m	1 oz	= 28.35 g
1 ft/s	= 0.3048 m/s	1 oz fluid (Imp.)	= 28.41 mL
1 gal (Imp.)	= 4.546 L = 0.004546 m ³	1 oz fluid (U.S.)	= 29.57 mL
1 gal (U.S.)	= 3.785 L = 0.003785 m ³	1 oz/ft ²	= 2.993 Pa = 0.1198 g/m ²
1 gal (U.S.)/min (gpm)	= 3.785 L/min = 0.2271 m ³ /h	1 oz/gal (U.S.)	= 7.49 g/L
1 gal/bag (U.S.)	= 89 mL/kg (water/cement ratio)	1 psi	= 0.006895 MPa = 6.895 kPa
1 grain	= 0.06480 g = 64.80 mg	1 qt (Imp.)	= 1.1365 L
1 grain/ft ³	= 2.288 g/m ³	1 qt (U.S.)	= 0.9464 L
1 grain/100 ft ³	= 22.88 mg/m ³	1 tablespoon (tbs)	= 14.79 mL
1 hp	= 0.7457 kW	1 teaspoon (tsp)	= 4.929 mL
1 microinch (μin)	= 0.0254 μm = 25.4 nm	1 ton (short)	= 907.2 kg
1 in	= 0.0254 m = 2.54 cm = 25.4 mm	1 U.S. bag cement	= 42.63 kg (94 lb)
1 in ²	= 6.452 cm ² = 645.2 mm ²	1 yd	= 0.9144 m
1 in ³	= 16.387 cm ³ = 0.01639 L	1 yd ²	= 0.8361 m ²
1 in·lbf (torque)	= 0.113 N·m	1 yd ³	= 0.7646 m ³
1 inHg	= 3.386 kPa		

Units Not To Be Used—Convert to SI Units

<u>Do Not Use</u>	<u>Value in SI Units</u>
angstrom (Å)	1 Å = 0.1 nm = 10 ⁻¹⁰ m
are (a)	1 a = 1 dam ² = 100 m ²
atmosphere, standard (atm)	1 atm = 101.325 kPa
atmosphere, technical (at)	1 at = 98.0665 kPa
bar	1 bar = 100 kPa
calorie (cal)	1 cal = 4.184 J
candle	1 candle = 1 cd
candlepower (cp)	1 cp = 1 cd
centipoise (cP)	1 cP = 0.001 Pa·s
centistokes (cSt)	1 cSt = 10 ⁻⁶ m ² /s
dyne (dyn)	1 dyn = 10 ⁻⁵ N
erg (erg)	1 erg = 10 ⁻⁷ J
fermi (fermi)	1 fermi = 1 fm = 10 ⁻¹⁵ m
gamma (γ)	1 γ = 1 nT = 10 ⁻⁹ T
gauss (G)	1 G = 10 ⁻⁴ T
gon, grad, grade (gon)	1 gon = (π/200) rad
kilocalorie (kcal)	1 kcal = 4.184 kJ
kilogram-force (kgf)	1 kgf = 9.807 N
kilogram-force per square millimeter (kgf/mm ²)	1 kgf/mm ² = 9.807 MPa
langley (cal/cm ²)	1 cal/cm ² = 41.84 kJ/m ² = 4.184 x 10 ⁴ J/ m ²
maxwell (Mx)	1 Mx = 10 ⁻⁸ Wb
metric carat	1 carat = 200 mg = 2 x 10 ⁻⁴ kg
metric horsepower	1 metric horsepower = 735.5 W
micron	1 micron = 1 μm = 10 ⁻⁶ m
millibar (mbar)	1 mbar = 100 Pa
millimeter of mercury (mmHg)	1 mmHg = 133.3 Pa = 0.1333 kPa millimeter, centimeter, or meter of water (mmH ₂ O, etc.)
1 mmH ₂ O = 9.807 Pa, etc. millimicron	1 millimicron = 1 nm = 10 ⁻⁹ m
mho	1 mho = 1 S
poise (P)	1 P = 0.1 Pa·s
stokes (St)	1 St = 1 cm ² /s = 10 ⁻⁴ m ² /s
torr (Torr)	1 Torr = 133.3 Pa
γ (mass)	1 γ = 1 μg = 10 ⁻⁹ kg
λ (volume)	1 λ = 1 mm ³ = 1 μL = 10 ⁻⁹ m ³

Appendix M

Celcius and Fahrenheit Temperature Conversions

°C		°F	°C		°F	°C		°F	°C		°F
-273	-459	-	-11.7	11	52	18.9	66	151	99	210	410
-262	-440	-	-11.1	12	54	19.4	67	153	104	220	428
-251	-420	-	-10.6	13	55	20	68	154	110	230	446
-240	-400	-	-10	14	57	20.6	69	156	115	240	464
-229	-380	-	-9.4	15	59	21.1	70	158	121	250	482
-218	-360	-	-8.9	16	61	21.7	71	160	127	260	500
-207	-340	-	-8.3	17	63	22.2	72	162	132	270	518
-196	-320	-	-7.8	18	64	22.8	73	163	138	280	536
-184	-300	-	-7.2	19	66	23.3	74	165	143	290	554
-173	-280	-	-6.7	20	68	23.9	75	167	149	300	572
-162	-260	-436	-6.1	21	70	24.4	76	169	154	310	590
-151	-240	-400	-5.6	22	72	25	77	171	160	320	608
-140	-220	-364	-5	23	73	25.6	78	172	165	330	626
-129	-200	-328	-4.4	24	75	26.1	79	174	171	340	644
-123	-190	-310	-3.9	25	77	26.7	80	176	177	350	662
-118	-180	-292	-3.3	26	79	27.2	81	178	182	360	680
-112	-170	-274	-2.8	27	81	27.8	82	180	188	370	698
-107	-160	-256	-2.2	28	82	28.3	83	181	193	380	716
-101	-150	-238	-1.7	29	84	28.9	84	183	199	390	734
-96	-140	-220	-1.1	30	86	29.4	85	185	204	400	752
-90	-130	-202	-0.6	31	88	30	86	187	210	410	770
-84	-120	-184	0	32	90	30.6	87	189	215	420	788
-79	-110	-166	0.6	33	91	31.1	88	190	221	430	806
-76	-105	-157	1.1	34	93	31.7	89	192	226	440	824
-73.3	-100	-148	1.7	35	95	32.2	90	194	232	450	842
-71.0	-95	-139	2.2	36	97	32.8	91	196	238	460	860
-67.8	-90	-130	2.8	37	99	33.3	92	198	243	470	878
-65.0	-85	-121	3.3	38	100	33.9	93	199	249	480	896
-62.2	-80	-112	3.9	39	102	34.4	94	201	254	490	914
-59.3	-75	-103	4.4	40	104	35	95	203	260	500	932
-56.7	-70	-94	5	41	106	35.6	96	205	265	510	950
-53.9	-65	-85	5.6	42	108	36.1	97	207	271	520	968
-51.1	-60	-76	6.1	43	109	36.7	98	208	276	530	986
-48.3	-55	-67	6.7	44	111	37.2	99	210	282	540	1,004
-45.5	-50	-58	7.2	45	113	37.8	100	212	288	550	1,022
-42.8	-45	-49	7.8	46	115	41	105	221	293	560	1,040
-40.0	-40	-40	8.3	47	117	43	110	230	299	570	1,058
-37.2	-35	-31	8.9	48	118	46	115	239	304	580	1,076
-34.4	-30	-22	9.4	49	120	49	120	248	310	590	1,094
-31.7	-25	-13	10	50	122	52	125	257	315	600	1,112
-28.9	-20	-4	10.6	51	124	54	130	266	321	610	1,130
-26.1	-15	5	11.1	52	126	57	135	275	326	620	1,148
-23.3	-10	14	11.7	53	127	60	140	284	332	630	1,166
-20.6	-5	23	12.2	54	129	63	145	293	338	640	1,184
-17.8	0	32	12.8	55	131	66	150	302	343	650	1,202

°C		°F	°C		°F	°C		°F	°C		°F
-17.2	1	34	13.3	56	133	68	155	311	349	660	1,220
-16.7	2	36	13.9	57	135	71	160	320	354	670	1,238
-16.1	3	37	14.4	58	136	74	165	329	360	680	1,256
-15.6	4	39	15	59	138	77	170	338	365	690	1,274
-15	5	41	15.6	60	140	79	175	347	371	700	1,292
-14.4	6	43	16.1	61	142	82	180	356	376	710	1,310
-13.9	7	45	16.7	62	144	85	185	365	382	720	1,328
-13.3	8	46	17.2	63	145	88	190	374	387	730	1,346
-12.9	9	48	17.8	64	147	91	195	383	393	740	1,364
-12.2	10	50	18.3	65	149	93	200	392	399	750	1,382
404	760	1,400	760	1,400	2,552	1,116	2,040	3,704	1,471	2,680	4,856
410	770	1,418	766	1,410	2,570	1,121	2,050	3,722	1,477	2,690	4,874
415	780	1,436	771	1,420	2,588	1,127	2,060	3,740	1,482	2,700	4,892
421	790	1,454	777	1,430	2,606	1,132	2,070	3,758	1,488	2,710	4,910
426	800	1,471	782	1,440	2,624	1,138	2,080	3,776	1,493	2,720	4,928
432	810	1,490	788	1,450	2,642	1,143	2,090	3,794	1,499	2,730	4,946
438	820	1,508	793	1,460	2,660	1,149	2,100	3,812	1,504	2,740	4,964
443	830	1,526	799	1,470	2,678	1,154	2,110	3,830	1,510	2,750	4,982
449	840	1,544	804	1,480	2,696	1,160	2,120	3,848	1,516	2,760	5,000
454	850	1,562	810	1,490	2,714	1,166	2,130	3,866	1,521	2,770	5,018
460	860	1,580	816	1,500	2,732	1,171	2,140	3,884	1,527	2,780	5,036
465	870	1,598	821	1,510	2,750	1,177	2,150	3,902	1,532	2,790	5,054
471	880	1,616	827	1,520	2,768	1,182	2,160	3,920	1,538	2,800	5,072
476	890	1,634	832	1,530	2,786	1,188	2,170	3,938	1,543	2,810	5,090
482	900	1,652	838	1,540	2,804	1,193	2,180	3,956	1,549	2,820	5,108
487	910	1,670	843	1,550	2,822	1,199	2,190	3,974	1,554	2,830	5,126
493	920	1,688	849	1,560	2,840	1,204	2,200	3,992	1,560	2,840	5,144
498	930	1,706	854	1,570	2,858	1,210	2,210	4,010	1,566	2,850	5,162
504	940	1,724	860	1,580	2,876	1,216	2,220	4,028	1,571	2,860	5,180
510	950	1,743	866	1,590	2,894	1,221	2,230	4,046	1,577	2,870	5,198
515	960	1,760	871	1,600	2,912	1,227	2,240	4,064	1,582	2,880	5,216
520	970	1,778	877	1,610	2,930	1,232	2,250	4,082	1,588	2,890	5,234
526	980	1,796	882	1,620	2,948	1,238	2,260	4,100	1,593	2,900	5,252
532	990	1,814	888	1,630	2,966	1,243	2,270	4,118	1,599	2,910	5,270
538	1,000	1,832	893	1,640	2,984	1,249	2,280	4,136	1,604	2,920	5,288
543	1,010	1,850	899	1,650	3,002	1,254	2,290	4,154	1,610	2,930	5,306
549	1,020	1,868	904	1,660	3,020	1,260	2,300	4,172	1,616	2,940	5,324
554	1,030	1,886	910	1,670	3,038	1,266	2,310	4,190	1,621	2,950	5,342
560	1,040	1,904	916	1,680	3,056	1,271	2,320	4,208	1,627	2,960	5,360
565	1,050	1,922	921	1,690	3,074	1,277	2,330	4,226	1,632	2,970	5,378
571	1,060	1,940	927	1,700	3,092	1,282	2,340	4,244	1,638	2,980	5,396
576	1,070	1,958	932	1,710	3,110	1,288	2,350	4,262	1,643	2,990	5,414
582	1,080	1,976	938	1,720	3,128	1,293	2,360	4,280	1,649	3,000	5,432
587	1,090	1,994	943	1,730	3,146	1,299	2,370	4,298			
593	1,100	2,012	949	1,740	3,164	1,304	2,380	4,316			

°C		°F	°C		°F	°C		°F
598	1,110	2,030	954	1,750	3,182	1,310	2,390	4,334
604	1,120	2,048	960	1,760	3,200	1,316	2,400	4,352
610	1,130	2,066	966	1,770	3,218	1,321	2,410	4,370
615	1,140	2,084	971	1,780	3,236	1,327	2,420	4,388
620	1,150	2,102	977	1,790	3,254	1,332	2,430	4,406
626	1,160	2,120	982	1,800	3,272	1,338	2,440	4,424
631	1,170	2,138	988	1,810	3,290	1,343	2,450	4,442
637	1,180	2,156	993	1,820	3,308	1,349	2,460	4,460
642	1,190	2,174	999	1,830	3,326	1,354	2,470	4,478
648	1,200	2,192	1,004	1,840	3,344	1,360	2,480	4,496
653	1,210	2,210	1,010	1,850	3,362	1,366	2,490	4,514
660	1,220	2,228	1,016	1,860	3,380	1,371	2,500	4,532
666	1,230	2,246	1,021	1,870	3,398	1,377	2,510	4,550
671	1,240	2,264	1,027	1,880	3,416	1,382	2,520	4,568
677	1,250	2,282	1,032	1,890	3,434	1,388	2,530	4,586
682	1,260	2,300	1,038	1,900	3,452	1,393	2,540	4,604
688	1,270	2,318	1,043	1,910	3,470	1,399	2,550	4,622
693	1,280	2,336	1,049	1,920	3,488	1,404	2,560	4,640
699	1,290	2,354	1,054	1,930	3,506	1,410	2,570	4,658
704	1,300	2,372	1,060	1,940	3,524	1,416	2,580	4,676
710	1,310	2,390	1,066	1,950	3,542	1,421	2,590	4,694
716	1,320	2,408	1,071	1,960	3,560	1,427	2,600	4,712
721	1,330	2,426	1,077	1,970	3,578	1,432	2,610	4,730
727	1,340	2,444	1,082	1,980	3,596	1,438	2,620	4,748
732	1,350	2,462	1088	1,990	3,614	1,443	2,630	4,766
738	1,360	2,480	1,093	2,000	3,632	1,449	2,640	4,784
743	1,370	2,498	1,099	2,010	3,650	1,454	2,650	4,802
749	1,380	2,516	1,104	2,020	3,668	1,460	2,660	4,820
754	1,390	2,534	1,110	2,030	3,686	1,466	2,670	4,838