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USACE / NAVFAC / AFCEA UFGS-01415 (December 2004)  
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Preparing Activity: USACE Superseding  
UFGS-01415 (August 2003)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMLR dated 22 December 2004

Latest change indicated by CHG tags

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### SECTION 01415

#### METRIC MEASUREMENTS 12/04

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NOTE: This guide specification covers the requirements for metric measurements in project specifications.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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#### 1.1 REFERENCES

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NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 621

(1994; R 1999e1) Use of Metric (SI) Units

in Building Design and Construction  
(Committee E-6 Supplement to E380)

ASTM SI 10

(2002) American National Standard for Use  
of the International System of Units (SI):  
The Modern Metric System

## 1.2 GENERAL

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NOTE: The Metric Conversion Act of 1975 (P.L. 94-168) designated the metric (SI) system as the preferred system of measurements in the United States. The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418) amended the 1975 Act (P.L. 94-168) to include a requirement for each Federal agency "to the extent economically feasible ..., use the metric system of measurement..., except to the extent that such use is impractical or is likely to cause significant inefficiencies...".

Executive Order 12770 of July 25, 1991, Metric Usage in Federal Government Programs, assigned certain responsibilities to the Department of Commerce and to the Executive Branch departments and agencies toward implementation of P.L. 94-168 and P.L. 100-418. The Executive Order requires use of the metric system of measurement in Federal Government procurements, grants, and other business related activities "to the extent economically feasible" and further states that "Metric usage shall not be required to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms".

Public Law 104-289 of October 11, 1996, Savings in Construction Act of 1996 (110 Stat. 3411) states that "a Federal agency may require that specifications for the acquisition of structures or systems of concrete masonry be expressed under the metric system of measurement, but may not incorporate specifications, that can only be satisfied by hard-metric versions of concrete masonry units, .. unless.. 1) hard-metric specifications are necessary in a contract for the repair or replacement of parts .. in existence or under construction upon the effective date of the Savings in Construction Act of 1996; or 2) the following 2 criteria are met: (A) the application requires hard-metric concrete masonry units to coordinate dimensionally into 100 millimeter building modules; and (B) the total installed price of hard-metric concrete masonry units is estimated to be equal to or less than the total installed price of using non-hard-metric concrete masonry units." The Savings in Construction Act of 1996 also contains similar requirements for recessed lighting fixtures.

This guide specification establishes the basis for Contractor compliance with the specified metric requirements and provides information necessary for the Contractor and Government administrative personnel to better understand the metric requirements. This guide specification is to be used in projects designated to use metric measurements.

ASTM SI 10 and ASTM E 621 have been used to the extent practicable in establishing the metric measurements in guide specifications.

The following is an illustration of designer choices for SI or I-P measurements:

SI MEASUREMENT	I-P MEASUREMENT
45 mm	1-3/4 inch
50.8 mm (2 inches)	2 inches

For the choices shown above, the metric measurement of 45 mm is a hard metric value, and 50.8 mm (2 inches) is a soft metric value.

During the SPECSINTACT printing process two automatic options are available:

- 1) For individual sections in the project either all SI or all I-P units can be selected.
- 2) For all sections in the project either all SI or all I-P units can be used.

A third option for a mix of SI and I-P units in a section is not automatic and requires the removal of the measurement tags and the unwanted requirements on a case by case basis during the editing process.

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This project includes metric units of measurements. The metric units used are the International System of Units (SI) developed and maintained by the General Conference on Weights and Measures (CGPM); the name International System of Units and the international abbreviation SI were adopted by the 11th CGPM in 1960. A number of circumstances require that both metric SI units and English inch-pound (I-P) units be included in a section of the specifications. When both metric and I-P measurements are included, the section may contain measurements for products that are manufactured to I-P dimensions and then expressed in mathematically converted metric value (soft metric) or, it may contain measurements for products that are manufactured to an industry recognized rounded metric (hard metric) dimensions but are allowed to be substituted by I-P products to comply with the law. Dual measurements are also included to indicate industry and/or Government standards, test values or other controlling factors, such as the code requirements where I-P values are needed for clarity or to trace back to the referenced standards, test values or codes.

### 1.3 USE OF MEASUREMENTS IN SPECIFICATIONS

Measurements in specifications shall be either in SI or I-P units as indicated, except for soft metric measurements or as otherwise authorized. When only SI or I-P measurements are specified for a product, the product shall be procured in the specified units (SI or I-P) unless otherwise authorized by the Contracting Officer. The Contractor shall be responsible for all associated labor and materials when authorized to substitute one system of units for another and for the final assembly and performance of the specified work and/or products.

#### 1.3.1 Hard Metric

A hard metric measurement is indicated by an SI value with no expressed correlation to an I-P value. Hard metric measurements are often used for field data such as distance from one point to another or distance above the floor. Products are considered to be hard metric when they are manufactured to metric dimensions or have an industry recognized metric designation.

#### 1.3.2 Soft Metric

- a. A soft metric measurement is indicated by an SI value which is a mathematical conversion of the I-P value shown in parentheses (e.g. 38.1 mm (1-1/2 inches)). Soft metric measurements are used for measurements pertaining to products, test values, and other situations where the I-P units are the standard for manufacture, verification, or other controlling factor. The I-P value shall govern while the metric measurement is provided for information.
- b. A soft metric measurement is also indicated for products that are manufactured in industry designated metric dimensions but are required by law to allow substitute I-P products. These measurements are indicated by a manufacturing hard metric product dimension followed by the substitute I-P equivalent value in parentheses (e.g., 190 x 190 x 390 mm (7-5/8 x 7-5/8 x 15-5/8 inches)).

#### 1.3.3 Neutral

A neutral measurement is indicated by an identifier which has no expressed relation to either an SI or an I-P value (e.g., American Wire Gage (AWG) which indicates thickness but in itself is neither SI nor I-P).

### 1.4 COORDINATION

Discrepancies, such as mismatches or product unavailability, arising from use of both metric and non-metric measurements and discrepancies between the measurements in the specifications and the measurements in the drawings shall be brought to the attention of the Contracting Officer for resolution.

### 1.5 RELATIONSHIP TO SUBMITTALS

Submittals for Government approval or for information only shall cover the SI or I-P products actually being furnished for the project. The Contractor shall submit the required drawings and calculations in the same units used in the contract documents describing the product or requirement unless otherwise instructed or approved. The Contractor shall use ASTM SI 10 and ASTM E 621 as the basis for establishing metric measurements

required to be used in submittals.

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