

# *OmniClass*<sup>TM</sup>

A Strategy for Classifying the Built Environment

## **Table 49 - Properties**

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## Definition

*Properties* are characteristics of construction entities. Property definitions do not have any real meaning out of context, without reference to one or more construction entities.

*Requirements* define characteristics needed in a potential or proposed construction entity. Requirements are framed using the relevant property names.

*Factors* influence the properties of constructed objects, either before selection or design or after construction.

*Information resources* relating to construction entities may use property names and factor names as their subject matter descriptors.

## Discussion

The members of other OmniClass tables are construction entities (objects), expressed as nouns (for things) or verbs (for activities). Properties serve as modifiers of these objects; adjectives and other modifiers. This table is limited to properties that are common to, or shared by, two or more construction entities. The names of properties that are unique or specific to a certain construction object do not currently appear in this table except as examples.

*Factors* are things or characteristics of things that influence the nature of a property and are expressed as nouns. Many factors have a direct relationship to a single property that they influence, which is indicated by the terminology used. Other factors influence many different properties, which together represent the effect the factor has on the object. A factor may influence a property during its design or selection or after construction, as stresses or degrading influences. Because there is not necessarily a one-to-one relationship between factors and properties, this table also includes a classification scheme for factors that influence properties of construction entities.

This table differs from other OmniClass tables in that it includes preferred names for properties, not just a classification system for them. The names of properties appear in ***bold italics***. Where there are several common names for a property, sub-property names are indented below the main property heading.

Two types of commentary are used in the table - units of measure and general comments. Both are used where considered necessary to fully define the property and its usage. SI units of measure are used in definitions, but other units may be employed at the discretion of the user.

The format used is as follows:

Classification Category

**Property name**

(comments)

[units of measure]

**Subproperty name**

**Subproperty name**

## Examples

Common properties include color, width, length, thickness, depth, diameter, area, fire resistance, weight, strength, moisture resistance. Every property has a name, a value, and a unit of measure. Non-numeric properties have text values, such as "red," "flat," "opaque," and "aluminum".

Common factors include atmospheric and meteorological characteristics, fire hazards, noise, occupants' concern for comfort, structural loadings, need for durability, and impact on the environment.

## Table Uses

This table can be used in the following ways:

- To describe the characteristics of actual constructed objects, by using a name defined in one of the other tables with modifiers selected from this table.
- To define requirements for proposed or potential construction objects. (e.g. "design brief", "whole building performance specifications", "construction specifications", "keynotes")
- To describe the characteristics of products not yet incorporated into constructed objects, by adding modifiers from this table to a product name selected from Table 23. (e.g. "manufacturer's product data")
- To compare the characteristics of any two similar objects.
- To classify information resources on subjects relating to factors and properties.
- To facilitate the arrangement of information in technical documents.

## Table Users

All persons involved in the application of any of the OmniClass tables who also need to define properties or requirements.

Technical information library managers, information providers, product manufacturers, designers, specifiers, facility managers, cost estimators, purchasing agents, construction managers, commissioning agents.

## Legacy Sources

- BS 6100 Glossary of Building and Engineering Terms

- CI/SfB Construction Indexing Manual
- EPIC
- IAI-NA Project Management Domain Specification project
- IEEE/ASTM SI 10-1997, Standard for Use of the International System of Units (SI): The Modern Metric System
- ISO 12006-2 Table 4.17 – Properties and Characteristics (by type)
- ISO 31-0 – Quantities and Units
- UniClass Table N – Properties and Characteristics

| Number | Title |
|--------|-------|
|--------|-------|

## Numbers & Titles

### Fundamental Properties

#### Time Definitions

**time**

[second, s; minute, min; hour, h]

**current time**

**start time**

**end time**

**day**

[day, day]

**business day**

**week day**

**calendar day**

**month**

**year**

[year, yr]

**date**

[day, month, year; ddmmyy; year, month, day; yymmdd]

**duration**

[time, day, year]

**age**

**age range**

**time span**

**elapsed time**

**expected life span**

**actual life span**

**aesthetic life span**

(not worn out but "too ugly to bear looking at")

**frequency**

[hertz, Hz; 1 Hz=1/s; other one-per measures can be used, such as once-per-day]

**periodic frequency**

**electrical power frequency**

**frequency of sound**

**rotational frequency**

[rotations per second, r/s; SI unit is rad/s but is not very practical]

**velocity**

[meters per second, m/s]

**speed (non-preferred term)**

**acceleration**

[meters per second squared, m/s<sup>2</sup>]

**angular velocity**

[radians per second, rad/s]

**angular acceleration**

[radians per second squared, rad/s<sup>2</sup>]

#### Identifications

##### Unique Identifications

**object id**

**lfc**

##### Generic Identifications

**object name**

| Number | Title |
|--------|-------|
|--------|-------|

|                             |  |
|-----------------------------|--|
|                             | <b>Masterformat number</b>   |
|                             | <b>Uniformat number</b>  |
| Proprietary Identifications | <b>name</b>  |
|                             | <b>owner name</b>  |
|                             | <b>maker name</b><br><i>(e.g. manufacturer, fabricator, constructor)</i> |
|                             | <b>brand name</b>  |
|                             | <b>SKU number</b>  |
|                             | <b>EAN number</b><br><i>(i.e. international bar code)</i>                |
|                             | <b>UPC code</b><br><i>(i.e. bar code)</i>                                |
| Facility Identifications    | <b>facility name</b>   |
|                             | <b>building name</b>   |
|                             | <b>building number</b>   |
|                             | <b>story number</b>  |
|                             | <b>room number</b>   |

| Location Definitions |
|----------------------|
|----------------------|

|                           |   |
|---------------------------|---|
| Geographical Locations    | <b>latitude</b><br><i>[degrees, minutes, seconds]</i>                             |
|                           | <b>longitude</b><br><i>[degrees, minutes, seconds]</i>                            |
|                           | <b>GPS position</b>   |
|                           | <b>altitude</b><br><i>[meters above mean sea level, m]</i>                        |
|                           | <b>compass orientation</b><br><i>(i.e. which way it faces, e.g. north, south)</i> |
| Political/Legal Locations | <b>country (also nation)</b>  |
|                           | <b>state (also province)</b>  |
|                           | <b>county (also parish, township)</b>   |
|                           | <b>municipality</b>   |
|                           | <b>city</b>   |
|                           | <b>town</b>   |
|                           | <b>village</b>  |
|                           | <b>district</b>   |
|                           | <b>planning district</b>  |
|                           | <b>zoning district</b>  |
|                           | <b>legal description</b>  |
|                           | <b>street address</b>   |
| Communications Locations  | <b>www address</b>  |
|                           | <b>internet country code</b>  |
|                           | <b>telephone number</b>   |
|                           | <b>fax number</b>   |
|                           | <b>email address</b>  |

| Quantity Definitions |
|----------------------|
|----------------------|

|  |  |
|--|--|
|  | <b>a single item</b><br><i>[each, Ea]</i>  |
|  | <b>a set of items</b><br><i>(property definition must define what the set is)</i><br><i>[set, Set]</i> |

| Number  | Title   |
|---|---|
|   | <p><b>a pair of items</b><br/> <i>(property definition must define what the pair is)</i><br/>           [pair, Pr]</p> <p><b>number of items</b><br/>           [numeric]</p> <p><b>amount of substance</b><br/>           [mole, mol]</p> <p><b>concentration</b><br/>           [mole per cubic meter, mol/m<sup>3</sup>]</p>   |
| <b>Properties of Properties</b>                   |   |
|   | <p><b>property name</b></p> <p><b>property value</b></p> <p><b>unit of measure</b></p> <p><b>value type</b></p> <p><b>method</b><br/> <i>(such as test method, inspection, assertion)</i></p> <p><b>authority</b><br/> <i>(who determines value)</i></p> <p><b>value role</b><br/> <i>(i.e. exact measure, nominal, minimum, maximum)</i></p>   |
| <b>Inherent Properties Of Constructed Objects</b> |   |
| <b>Composition Properties</b>                     |   |
|   | <p><b>Appearance, Apparent Properties</b></p> <p><b>color</b></p> <p><b>opacity</b></p> <p><b>texture</b></p> <p><b>sheen</b></p> <p><b>gloss</b></p> <p><b>odor</b></p> <p><b>taste</b></p> <p><b>Characteristics Relating to Specific Types of Objects</b><br/> <i>(these properties vary in meaning based on the relevant object)</i></p> <p><b>type</b></p> <p><b>quality</b></p> <p><b>grade</b></p> <p><b>components</b></p> <p><b>Properties of Solid Matter, Materials</b></p> <p><b>material</b><br/> <i>(i.e. what it's made out of)</i><br/>           [text values, see Table 42]</p> <p><b>raw material</b></p> <p><b>constituent materials</b></p> <p><b>chemical composition</b></p> <p><b>alloy, temper</b><br/> <i>(metals, some plastics)</i></p> <p><b>recycled content</b><br/>           [percent by mass]</p> <p><b>post-industrial recycled content</b></p> <p><b>pre-consumer recycled content</b></p> <p><b>post-consumer recycled content</b></p> <p><b>emittable content</b></p> <p><b>volatile organic compounds emitted</b></p> <p><b>odor</b></p> |

| Number                                       | Title  |
|--|--|
|  | <i>off gas content</i>   |
|  | <i>particulate discharge</i>   |
|  | <i>toxic content</i>   |
|  | <i>Lead content</i>  |
|  | <i>Asbestos content</i>  |
|  | <i>Formaldehyde content</i>  |
|  | <i>OSHA hazardous chemical content</i>   |
|  | <i>NIOSH Registry chemical content</i>   |
|  | <i>TSCA regulated substance content</i>  |
|  | <i>finish</i>  |
|  | <i>integral finish</i>   |
|  | <i>(values would be specific to object being finished)</i>   |
|  | <i>applied finish</i>  |
|  | <i>(values would be specific to finish, not object being finished)</i>   |
|  | <i>shrinkage, expansion</i>  |
|  | <i>(due to some factor other than heat, cold, moisture)</i>  |
| Properties of Air and Other Gases            |  |
|  | <i>visibility</i>  |
|  | <i>vapor pressure</i>  |
|  | <i>[pascal, Pa]</i>  |
|  | <i>air pressure</i>  |
|  | <i>static pressure</i>   |
|  | <i>humidity</i>  |
|  | <i>relative humidity</i>   |
|  | <i>velocity</i>  |
|  | <i>odor</i>  |
|  | <i>contaminant content</i>   |
|  | <i>ozone content</i>   |
| Properties of Liquids                        |  |
|  | <i>concentration</i>   |
|  | <i>pH</i>  |
|  | <i>evaporation rate</i>  |
|  | <i>evaporate content</i>   |
|  | <i>volatile organic compounds emitted</i>  |
| Properties of Solids Relating to Gases       |  |
|  | <i>(see Pressure for air and water leakage)</i>  |
|  | <i>vapor permeance</i>   |
|  | <i>[kilogram per pascal second meter squared, kg/(Pa s m<sup>2</sup>); values are usually so small nanogram must be used.]</i> |
|  | <i>vapor permeability</i>  |
|  | <i>[kilogram per pascal second meter, kg/(Pa s m)]</i>   |
|  | <i>permeability to gas</i>   |
|  | <i>(a specific gas)</i>  |
|  | <i>permeability to pollutants</i>  |
|  | <i>vapor resistance</i>  |
|  | <i>[pascal second meter squared per kilogram, (Pa s m<sup>2</sup>)/kg; values are usually so large that MPa is used.]</i>      |
|  | <i>vapor resistivity</i>   |
|  | <i>[pascal second meter per kilogram, (Pa s m)/kg; resistivities are additive.]</i>  |
|  | <i>resistance to degradation</i>   |
|  | <i>ozone resistance</i>  |
| Properties of Solids Relating to Water Vapor |  |
|  | <i>water vapor/moisture permeance</i>  |
|  | <i>[kilogram per pascal second meter squared, kg/(Pa s m<sup>2</sup>); values are usually so small nanogram must be used.]</i> |
|  | <i>water vapor/moisture permeability</i>   |
|  | <i>[kilogram per pascal second meter, kg/(Pa s m)]</i>   |
|  | <i>moisture resistance</i>   |

| Number   | Title  |
|--|--|
|  | [pascal second meter squared per kilogram, (Pa s m <sup>2</sup> )/kg; values are usually so large that MPa is used.] |
|  | <i>moisture absorption resistance</i>  |
|  | <i>moisture resistivity</i>  |
|  | [pascal second meter per kilogram, (Pa s m)/kg; resistivities are additive.]   |
|  | <i>hygroscopicity</i>  |
|  | <i>hygrometric expansion</i>   |
|  | <i>condensation resistance</i>   |
|  | <i>resistance to degradation due to water vapor</i>  |
|  | <i>suitability for exterior exposure</i>   |
| Properties of Solids                           | Relating to Liquid Water   |
|  | <i>water absorption</i>  |
|  | <i>water permeability</i>  |
|  | <i>water imperviousness</i>  |
|  | <i>water resistance</i>  |
|  | <i>water absorption resistance</i>   |
|  | <i>moisture resistance</i>   |
|  | <i>freeze-thaw resistance</i>  |
|  | <i>frost resistance</i>  |
|  | <i>resistance to rising damp</i>   |
|  | <i>corrosion resistance</i>  |
|  | <i>galvanic constant</i>   |
|  | <i>suitability for continuous immersion</i>  |
| Properties of Solids                           | Relating to Other Liquids  |
|  | <i>corrosion resistance</i>  |
|  | <i>chemical resistance</i>   |
|  | ( <i>must specify chemical and concentration</i> )   |
|  | <i>acid resistance</i>   |
|  | <i>alkali resistance</i>   |
|  | <i>stain resistance</i>  |
| Properties of Solids                           | Relating to Biological Factors   |
|  | <i>microorganism resistance</i>  |
|  | <i>fungus resistance</i>   |
|  | <i>mildew resistance</i>   |
|  | <i>bacteria/virus growth resistance</i>  |
|  | <i>decay resistance</i>  |
|  | <i>suitability for ground contact use</i>  |
|  | <i>insect resistance</i>   |
|  | <i>termite resistance</i>  |
|  | <i>animal resistance</i>   |
|  | <i>rodent resistance</i>   |
|  | <i>suitability for marine use</i>  |
|  | <i>plant growth resistance</i>   |
| <b>Properties Relating to Function and Use</b> |  |
| Properties Relating to Use                     |  |
|  | <i>function (of object)</i>  |
|  | <i>intended function</i>   |
|  | <i>actual function</i>   |
|  | <i>method of operation</i>   |
|  | <i>ease of use</i>   |
|  | <i>efficiency</i>  |
|  | <i>limitations on use</i>  |
|  | <i>by-products produced</i>  |
|  | <i>waste produced</i>  |
| Properties Relating to Misuse                  |  |
|  | <i>theft resistance</i>  |

## Properties Relating to Function and Use

Properties Relating to Use

*function (of object)*

*intended function*

*actual function*

*method of operation*

*ease of use*

*efficiency*

*limitations on use*

*by-products produced*

*waste produced*

Properties Relating to Misuse

*theft resistance*

| Number                     | Title   |
|----------------------------|---|
|                            | <p><b>abuse resistance</b></p> <p>Properties Relating to Maintenance of Objects</p> <p><b>durability</b><br/>(must be defined)</p> <p><b>ease of cleaning</b></p> <p><b>scrubbability</b></p> <p><b>stain resistance</b></p> <p><b>ease of service</b></p> <p><b>service interval</b></p> <p><b>ease of repair</b></p> <p><b>mode of failure</b></p> <p><b>ease of replacement</b></p> <p>Properties Relating Modification and Adaptation of Objects</p> <p><b>ease of removal</b></p> <p><b>ease of relocation</b></p> <p><b>ease of adding on</b></p> <p><b>adaptability</b></p> <p><b>flexibility</b></p>  |
| <b>Shapes and Sizes</b>    |   |
|                            | <p>Shapes</p> <p><b>form</b><br/>[text values, such as panel, board, plate, sheet, film, tile, block, mesh, fabric, blanket, pipe, tube, wire, bar, liquid, mastic, emulsion, aggregate, foam]</p> <p><b>shape</b><br/>(mostly complex shapes)<br/>[text values, such as flat, curved, cylindrical, wide flange, angle, channel, extrusion]</p> <p><b>geometry</b></p> <p><b>hand</b><br/>(e.g. left hand, right hand)</p> <p><b>texture</b><br/>(3-dimensional texture)</p> <p>Sizes</p> <p><b>size</b><br/>(Sizes are arbitrary dimensional designations, as opposed to measurements using standard dimensional names; such as "size 12 shoe"; sizes almost always are specific to a particular object, with the meaning of the size name established by convention or voluntary or regulatory standard.)<br/>(must be defined; do not use size as a property name unless the other dimensional names are not appropriate.)</p> |
| <b>Measured Dimensions</b> |   |
|                            | <p>Linear Dimensions</p> <p><b>length</b><br/>(i.e. longest dimension, normally horizontal)<br/>[meter, m; use mm if decimal m are necessary; use km for more than 10000 m]</p> <p><b>distance</b></p> <p><b>span</b><br/>(i.e. distance between supports)</p> <p><b>width</b><br/>(i.e. second longest dimension, horizontal)<br/>[meter, m; use mm if decimal m are necessary; use km for more than 10000 m]</p> <p><b>height</b><br/>(i.e. vertical dimension unless very short/thin or below grade; (for height above sea level, use altitude)<br/>[meter, m; use mm if decimal m are necessary; use km for more than 10000 m]</p> <p><b>rise</b><br/>(i.e. difference in height from bottom to top)</p>  |

| Number | Title   |
|--------|---|
|        | <p><b>fall</b><br/>(i.e. difference in height from top to bottom)</p> <p><b>thickness</b><br/>(i.e. third dimension of item that is relatively thin; may be horizontal or vertical)<br/>[millimeter, mm; for very thin objects micrometer may be used, do not use mils or micron]</p> <p><b>wall thickness</b><br/>(e.g. hollow members)</p> <p><b>dry film thickness</b><br/>(e.g. coatings)</p> <p><b>thickness of cover</b><br/>(e.g. earth fill)</p> <p><b>depth</b><br/>(i.e. third dimension of item that is measured/viewed from outside in; e.g. from top of ground into ground<br/>(vertically), from front to backside<br/>(horizontally)<br/>[millimeter, mm]</p> <p><b>diameter</b><br/>[millimeter, mm; unless very large]</p> <p><b>inside diameter</b></p> <p><b>outside diameter</b></p> <p><b>radius</b><br/>[millimeter, mm; unless very large]</p> <p><b>spacing</b><br/>[millimeter, mm]</p> <p><b>gauge</b><br/>(i.e. when referring to spacing; obsolete or object-specific term, requires definition)</p> <p><b>tolerance, dimensional</b><br/>(i.e. manufacturing or fabrication variation from stated size)</p> <p><b>length tolerance</b></p> <p><b>width tolerance</b></p> <p><b>thickness tolerance</b></p> <p><b>squareness</b></p> <p><b>flatness</b></p> <p><b>bow</b></p> <p><b>warp</b></p> <p><b>tolerance, installation</b><br/>(i.e. variation from designed position once installed; specific to assembly and overall size)<br/>[millimeter per meter, mm/m]</p> <p><b>Two-Dimensional Properties</b></p> <p><b>area</b><br/>[millimeter squared, mm<sup>2</sup>; use m<sup>2</sup> for areas over 9999 mm<sup>2</sup>]</p> <p><b>net rentable area</b></p> <p><b>floor area per occupant</b></p> <p><b>perimeter</b><br/>[mm, millimeter; m, meter]</p> <p><b>circumference</b><br/>[mm, millimeter; m, meter]</p> <p><b>Angular Dimensions, Properties Related to Slope</b></p> <p><b>slope</b><br/>(also gradient)<br/>[ratio, 1:01]</p> <p><b>angle, plane</b><br/>(alternate: if angle can be understandably expressed as a ratio, do so)<br/>[degree, deg]</p> <p><b>angle, solid</b><br/>[steradian, sr]</p> <p><b>Volume</b></p> |

| Number | Title |
|--------|-------|
|--------|-------|

**volume**[cubic meter, m<sup>3</sup>]**fluid volume**

[liter, L; cubic meter may also be used if appropriate]

**dry volume**[cubic meter, m<sup>3</sup>; do not use L for dry volume]**volume per unit time***(flow)*[cubic meter per second, m<sup>3</sup>/s; flow can also be expressed as mass per unit time]**air infiltration***(at a certain static pressure difference)*

[usually measured as volume per unit area or length of crack, per unit time]

**water penetration***(at a certain static pressure difference)***water absorption**

[percent by volume]

**section modulus**[cubic meter, m<sup>3</sup>]**modulus of section**[millimeter cubed, mm<sup>3</sup>]**second moment of area**[millimeter to fourth power, mm<sup>4</sup>]

| Properties Relating to Mass and Force |  |
|---------------------------------------|--|
|---------------------------------------|--|

## Mass-Related Properties

**mass***(do not use the term "weight" for mass)*

[kilogram, kg; mg may be used for small masses; do not use metric ton]

**mass per unit length**

[kilogram per meter, kg/m]

**mass per unit area**[kilogram per meter squared, kg/m<sup>2</sup>]**mass per unit time**

[kilogram per second, kg/s]

**flow****abrasion resistance***(mass removed per unit time using a specific abrader)***specific volume**[meter cubed per kg, m<sup>3</sup>/kg]**density***(mass per unit volume)*[kilogram per meter cubed, kg/m<sup>3</sup>]**smoke density****smoke developed index****specific gravity**

[unitless coefficient]

**moment of inertia**[kilogram meter squared, kg m<sup>2</sup>]**momentum**

[kilogram meter per second, kg m/s]

**angular momentum**[kilogram meter squared per second, (kg m<sup>2</sup>)/s]

## Force-Related Properties

**force**[newton, N; N=(kg m)/s<sup>2</sup>]**force per unit length**

[newton per meter, N/m]

**surface tension**

[newton per meter, N/m]

| Number                                       | Title   |
|--|---|
|  | <b>thrust to mass ratio</b><br>[newton per kilogram, N/kg]  |
| Viscosity                                    | <b>viscosity, dynamic</b><br>[pascal second, Pa s]  |
|  | <b>viscosity, kinematic</b><br>[meter squared per second, m <sup>2</sup> /s]                                    |
|  |   |
| <b>Properties Relating to Applied Forces</b> |   |
| <b>Pressure and Stress</b>                   |   |
|  | [newton per meter squared, N/m <sup>2</sup> ]   |
|  | <b>pressure</b><br>[pascal, Pa; use kPa, Mpa for more convenient numbers]                                       |
|  | <b>absolute pressure</b>  |
|  | <b>atmospheric pressure</b>   |
|  | <b>ambient pressure</b><br>[Pa (ambient)]   |
|  | <b>gage pressure</b><br>(absolute pressure minus ambient pressure, usually atmospheric pressure)<br>[Pa (gage)] |
|  | <b>static pressure differential</b>   |
|  | <b>vacuum</b><br>(use negative pressure)  |
|  | <b>wind pressure</b><br>(not wind speed)  |
|  | <b>vapor pressure</b>   |
|  | <b>stress</b><br>(reaction to applied force)<br>[pascal, Pa]  |
|  | <b>abrasion resistance</b>  |
|  | <b>adhesion strength</b><br>(determined by test method)   |
|  | <b>bending strength</b>   |
|  | <b>compressive resistance</b>   |
|  | <b>compressive strength</b>   |
|  | <b>crack resistance</b>   |
|  | <b>creep resistance</b>   |
|  | <b>explosion resistance</b>   |
|  | <b>fatigue resistance</b>   |
|  | <b>fiber stress in bending [wood]</b>   |
|  | <b>hardness</b>   |
|  | <b>impact strength</b><br>(use impact energy absorption (energy and work))                                      |
|  | <b>indentation resistance</b>   |
|  | <b>peel strength</b><br>(determined by test method)   |
|  | <b>puncture resistance</b>  |
|  | <b>screw pullout resistance</b>   |
|  | <b>shear strength</b>   |
|  | <b>tear strength</b>  |
|  | <b>tensile strength</b>   |
|  | <b>uniform wind load resistance</b>   |
|  | <b>wind uplift resistance</b>   |
|  | <b>modulus of elasticity</b><br>[megapascal, Mpa]   |
|  | <b>elasticity</b>   |
|  | <b>stiffness</b>  |

| Number | Title |
|--------|-------|
|--------|-------|

**compressibility**  
[reciprocal of pascal, 1/Pa]

**elongation**  
**elongation at yield**

**friction**  
**leakage under pressure**  
**air infiltration**  
**water leakage**

**Bending Moment and Torque**

**bending moment**  
[newton meter, N m]

**torque**  
[newton meter, N m]

**moment of force**  
[newton meter, N m]

**Properties Relating to Heat, Temperature, and Fire****Temperatures**

**temperature**  
[degree Celsius, degree C]

**absolute temperature**  
**ambient temperature**  
**boiling point**  
**brittleness temperature**  
**deflection temperature**  
**dew point**  
**flash point**  
**freezing point**  
**melting point**  
**service temperature range**  
**surface temperature**

**temperature differential**  
[degree Celsius, degree C]

**temperature interval**  
[degree Celsius, degree C]

**Properties of Fire**

**fire type**  
**fire source**  
**temperature**  
[degree Celsius, degree C]

**temperature rise**  
**smoke density**  
(determined by method; see also mass, density)

**Properties of Thermal Energy**

**thermal energy**  
[joule, J]

**quantity of heat**  
[joule, J]

**entropy**  
[joule per kelvin, J/K]

**heat capacity**  
[joule per kelvin, J/K]

**density of heat**  
[joule per meter squared, J/m<sup>2</sup>]

**internal energy**  
[joule per meter cubed, J/m<sup>3</sup>]

**specific entropy**  
[joule per kilogram kelvin, J/(kg K)]

| Number | Title |
|--------|-------|
|--------|-------|

**specific heat capacity**

[joule per kilogram kelvin, J/(kg K)]

**molar entropy/heat capacity**

[joule per mole kelvin, J/(mol K)]

**heat flow rate**

[watt, W]

**density of heat flow rate**[watt per meter squared, W/m<sup>2</sup>; traditional units would be Btu per hour per square foot, calorie per square centimeter minute.]**heat flux density**[watt per meter squared, W/m<sup>2</sup>]**irradiance**[watt per meter squared, W/m<sup>2</sup>]**Properties of Objects in Reaction to Heat, Heat Transfer, and Fire****coefficient of linear thermal expansion**

[reciprocal of degree Celsius, 1/degree C. Traditional I-P units involve linear dimensions; convert linear dimension to a ratio, then use that ratio in degF to degC conversion.]

**condensation resistance factor**

[unitless coefficient determined by measuring temperature under specific conditions]

**thermal conductivity**

(traditional "k" value)

[watt per meter kelvin, W/(m K)]

**thermal conductance**

(see coefficient of heat transfer)

**thermal resistivity**

(traditional "r" value)

[kelvin meter per watt, (K m)/W]

**thermal insulance**

("R" value; U.S. traditional name is thermal resistance; thermal insulance is the ISO 31/IV name)

[kelvin meter squared per watt, (K m<sup>2</sup>)/W]**coefficient of heat transfer**

("U" value; also called thermal conductance)

[watt per meter squared kelvin, W/(m<sup>2</sup> K)]**thermal diffusivity**[meter squared per second, m<sup>2</sup>/s]**thermal resistance**

(ISO 31/IV name; not U.S. traditional "R" value)

[kelvin per watt, K/W]

**ignitibility**

(determined by method)

**ignition resistance****flammability****flash point****deflection temperature****combustibility**

(determined by method)

**flame propagation****flame spread index**

(determined by method)

[unitless coefficient]

**fire energy output per unit area time**[watt per meter squared, W/m<sup>2</sup>]**critical radiant flux**

(applies to floor coverings)

**rate of heat release****fire resistance****fire endurance****hourly rating**

| Number | Title |
|--------|-------|
|--------|-------|

*(determined by method)*  
[hour, hr]

**smoke produced**  
**smoke developed index**

### Properties Relating to Energy and Work

Many traditional I-P units for energy and work, such as Btu, kilowatthour, therm, calorie, horsepower, foot-pound, foot-pound-force, etc, are much more understandable when the SI units joule for energy and work and watt for power are used.

**energy**

[joule, J;  $J=N\ m$ ;  $=(kg\ m^2)/s^2$ ]

**kinetic energy**

*(moment of inertia times angular velocity squared divided by 2)*

**potential energy**

**thermal output**

**energy consumed**

**energy demand**

**work**

[joule, J;  $J=N\ m$ ]

**impact energy absorption**

*(usually defined by test for specific material and thickness)*

**impact resistance**

**energy density**

[joule per meter cubed,  $J/m^3$ ]

**specific energy**

[joule per kg,  $J/kg$ ]

**molar energy**

[joule per mole,  $J/mol$ ]

**power**

[watt, W;  $W=J/s$ ; kilowatthour (kWh) is acceptable for electrical energy applications only]

**power consumption**

**radiant flux**

**energy per unit area time**

[watt per meter squared,  $W/m^2$ ]

**power density**

**radiance**

[watt per meter squared steradian,  $W/m^2\ sr$ ]

**radiant intensity**

[watt per steradian,  $W/sr$ ]

**energy efficiency**

[EER]

**fuel consumption**

[cubic meter per joule,  $m^3/J$ ]

[kilogram per joule,  $kg/J$ ]

[meter per meter cubed,  $m/m^3$ ; also commonly expressed as L/100 km]

[kilometer per liter,  $km/L$ ; also commonly expressed as L/100 km]

**fuel efficiency**

**water consumption**

### Properties Relating to Sound

Properties of Sound, Noise

**sound pressure**

*(this is the "sound level" that we hear; 0 decibels = 20 micropascals, the standard reference value; the decibel is a logarithmic unit signifying the ratio of actual pressure to reference pressure; decibels make the numbers more convenient but measurement in Pa is still appropriate.)*

[micropascal; pascal]

## Number Title

|   |   |
|---|---|
|   | <i>noise level</i>  |
|   | <i>sound power</i><br>[watt, W; picowatt, pW]   |
|   | <i>sound energy flux</i><br>[watt, W]   |
|   | <i>sound intensity</i><br>[watt per meter squared, W/m <sup>2</sup> ]                                 |
|   | <i>sound energy density</i><br>[joule per meter cubed, J/m <sup>3</sup> ]                             |
|   | <i>sound frequency</i><br>[hertz, hZ]   |
| Properties Relating to Reaction to Sound, Noise |   |
|   | <i>specific acoustic impedance</i><br>[pascal second per meter, (Pa s)/m]                             |
|   | <i>acoustic impedance</i><br>[pascal second per meter cubed, (Pa s)/m <sup>3</sup> ]                  |
|   | <i>sound isolation</i>  |
|   | <i>sound transmission resistance</i>  |
|   | <i>sound insulation</i>   |
|   | <i>STC rating</i><br>(determined by specific method)<br>[unitless coefficient]                        |
|   | <i>sound reflectance</i>  |
|   | <i>sound absorption</i>   |
|   | <i>Noise Reduction Coefficient (NRC)</i><br>(determined by specific method)<br>[unitless coefficient] |
|   | <i>speech intelligibility</i>   |

## Properties Relating to Light and Other Electromagnetic Radiation

## Properties of Light

|  |  |
|--|--|
|  | <i>light source</i>  |
|  | <i>luminous intensity</i><br>[candela, cd]                           |
|  | <i>luminance</i><br>[candela per meter squared, cd/m <sup>2</sup> ]  |
|  | <i>brightness</i>  |
|  | <i>luminous flux</i><br>[lumen, lm; lm = cd sr (candela steradian)]  |
|  | <i>quantity of light</i><br>[lumen second, lm s]                     |
|  | <i>illuminance</i><br>[lux, lx; lx = lm/m <sup>2</sup> ]             |
|  | <i>light emission</i>  |
|  | <i>light exposure</i><br>[lux second, lx s]                          |
|  | <i>wave number</i><br>[1 per meter, 1/m]                             |
|  | <i>polarization</i>  |
| Properties of Objects in Regard to Light |  |
|  | <i>opacity</i>   |
|  | <i>transparency</i>  |
|  | <i>translucence</i>  |
|  | <i>light transmission</i>  |
|  | <i>visible light transmission</i><br>[percent of total sunlight]     |
|  | <i>ultraviolet light transmission</i><br>[percent of total sunlight] |

| Number | Title |
|--------|-------|
|--------|-------|

**total solar energy transmission**

[percent of total sunlight]

**light absorption****light reflectance****visible light reflectance**

[percent of total sunlight]

**total solar energy reflectance**

[percent of total sunlight]

**reflectivity****refractive index****glare****glare index****shading coefficient****heat gain coefficient****resistance to degradation in light****UV resistance****fade resistance****luminous efficacy**

[lumen per watt, lm/W]

**light output**

Properties Relating to Harmful Radiation

**activity of a radionuclide**

[becquerel, Bq]

**dose equivalent**

[sievert, Sv]

**absorbed dose**

[gray, Gy]

**radiation exposure**

[coulomb per kilogram, C/kg; I-P name is roentgen]

**radiation transmission resistance**

## Properties Relating to Electricity and Magnetism

Properties of Electricity

**source**

(i.e. AC, DC)

**frequency**

[hertz, Hz]

**electric current**

[ampere, A]

**current density**[ampere per meter squared, A/m<sup>2</sup>]**electric potential difference**

[volt, V; use V (ac) rather than VAC to indicate alternating current]

**electromotive force**

[volt, V]

**electric field strength**

[volt per meter, V/m]

**electric charge**

[coulomb, C; C = A s]

**quantity of electricity**

[coulomb, C]

**electric flux density**[coulomb per meter squared, C/m<sup>2</sup>]**electric charge density**[coulomb per meter cubed, C/m<sup>3</sup>]

Properties of Objects in Relation to Electricity

**resistance**

## Number Title

|                                  |  |
|----------------------------------|--|
|                                  | [ohm; ohm = V/A; no symbol should be used since the symbol is not standard on keyboards]             |
|                                  | <b>electrical insulation</b>   |
|                                  | <b>power</b>   |
|                                  | [watt, W; for electrical utilities kilowatthour, kWh, may be used but should be phased out, use MJ.] |
|                                  | <b>power consumption</b>   |
|                                  | <b>power output</b>  |
|                                  | <b>electric conductance</b>  |
|                                  | [siemens, S; $S = A/V$ ]   |
|                                  | <b>admittance</b>  |
|                                  | [siemens, S]   |
|                                  | <b>susceptance</b>   |
|                                  | [siemens, S]   |
|                                  | <b>electrical conductivity</b>   |
|                                  | [siemens per meter, S/m]   |
|                                  | <b>electrical capacitance</b>  |
|                                  | [farad, F; $F = C/V$ ]   |
|                                  | <b>dielectric constant</b>   |
|                                  | (ratio of capacitance to capacitance of air)   |
|                                  | <b>permittivity (electrical)</b>   |
|                                  | [farad per meter, F/m]   |
|                                  | <b>electric inductance</b>   |
|                                  | [henry, H; $H = Wb/A$ ]  |
|                                  | <b>self-inductance</b>   |
|                                  | [henry, H]   |
|                                  | <b>reluctance</b>  |
|                                  | [reciprocal of henry, 1/H]   |
| Properties Relating to Magnetism |  |
|                                  | <b>magnetic flux</b>   |
|                                  | [weber, Wb; $Wb = V s$ ]   |
|                                  | <b>magnetic vector potential</b>   |
|                                  | [kiloweber per meter squared, kWb/m <sup>2</sup> ]   |
|                                  | <b>permeance</b>   |
|                                  | [henry, H]   |
|                                  | <b>mutual inductance</b>   |
|                                  | [henry, H]   |
|                                  | <b>magnetic potential difference</b>   |
|                                  | [ampere, A]  |
|                                  | <b>magnetomotive force</b>   |
|                                  | [ampere, A]  |
|                                  | <b>magnetic field strength</b>   |
|                                  | [ampere per meter, A/m]  |
|                                  | <b>magnetic permeability</b>   |
|                                  | [henry per meter, H/m]   |
|                                  | <b>magnetic flux density</b>   |
|                                  | [tesla, T; $T = Wb/m^2$ ]  |
|                                  | <b>magnetic induction</b>  |
|                                  | [tesla, T]   |

## Properties Relating to Construction Process

### Properties of Actors

|                   |                           |
|-------------------|---------------------------|
| <b>discipline</b> | (see Table 33 for values) |
| <b>role</b>       | (see Table 34 for values) |

| Number  | Title   |
|---|---|
|   | <p><i>age</i></p> <p><i>gender</i></p>  |
| <b>Properties of Activities</b>                         |   |
|   | <p><i>phase at which performed</i><br/>(see Table 31 for values)</p> <p><i>service performed</i><br/>(see Table 32 for values)</p> <p><i>implementation aids used</i><br/>(see Table 35 for values)</p>   |
| <b>Properties of Communications</b>                     |   |
|   | <p><i>communication type</i></p> <p><i>information type</i><br/>(see Table 35 for values)</p>   |
| <b>Properties Relating to Manufacture of Products</b>   |   |
| Properties Relating to Manufactured/Fabricated products |   |
|   | <p><i>designer name</i></p> <p><i>maker name (see Identification)</i></p> <p><i>maker experience</i></p> <p><i>method of manufacture</i></p> <p><i>manufacture date</i></p> <p><i>production rate</i></p> <p><i>location of manufacture</i></p> <p><i>location of assembly</i></p> <p><i>pre-assembled or not</i></p> <p><i>in stock vs. custom product</i></p> |
| Properties Relating to Harvested Products               |   |
|   | <p><i>location of harvest</i></p> <p><i>harvest date</i></p>  |
| Properties Relating to Extracted Products               |   |
|   | <p><i>location of extraction</i></p> <p><i>extraction date</i></p>  |
| <b>Properties Relating to Procurement, Acquisition</b>  |   |
| Properties Relating to Product Availability             |   |
|   | <p><i>availability</i></p> <p><i>warehouse location</i></p> <p><i>purchase terms</i></p> <p><i>purchase date</i></p>  |
| Warranty Properties                                     |   |
|   | <p><i>warranty type</i></p> <p><i>warranty length</i></p> <p><i>warranty start date</i></p> <p><i>warranty end date</i></p> <p><i>warranty terms</i></p> <p><i>warranty service location</i></p>  |
| Cost Properties   |   |
|   | <p><i>unit cost</i></p> <p><i>wholesale cost</i></p> <p><i>retail cost</i></p> <p><i>manufacturer's suggested retail price</i></p> <p><i>installation cost</i></p> <p><i>shipping cost</i></p> <p><i>discount</i></p>   |

| Number | Title |
|--------|-------|
|--------|-------|

## Delivery, Handling, and Storage

*ease of moving*  
*ship date*  
*shipping time*  
*delivery time*  
*delivery date*  
*delivery terms*  
*shipping mode*  
*shipper type*  
*packaging*  
*marking*  
     *bar code marking*  
*date put in storage*  
*maximum storage time*  
*maximum storage temperature*  
*minimum storage temperature*  
*ease of storing*

| Properties Relating to Installation |  |
|-------------------------------------|--|
|-------------------------------------|--|

## Properties Relating to Installer

*installer experience*  
*installer type*

## Properties Relating to Execution Methods

*surface preparation method*  
*installation start date*  
*installation end date*  
*installation method*  
*application rate*  
     [unit of volume per sq m]  
*coverage*  
     [sq m per unit of volume]  
*ease of installation*  
     *ease of application*  
     *ease of placing*  
     *ease of assembly*  
     *workability*  
*fastening method*  
*fastener type*  
*adhesive type*  
*jointing method*  
*field finishing method*  
*field finishing material*  
*ambient temperature during installation*  
*pot life*  
     [time]  
*tack free time*  
     [time]  
*recoat time*  
     [time]  
*cure time*  
     [time]  
*tools required*  
*cleaning method*

## Properties Relating to Execution Quality

(For dimensional tolerances see dimensions)

*field inspection method*  
*inspection date*

| Number | Title |
|--------|-------|
|--------|-------|

*field test method*  
*test date*

### Properties Relating to Cessation of Use

#### Properties Relating to Potential for Re-Use

*relocatability*  
*reusability*  
*recyclability*

#### Properties Relating to Removal

*removal date*  
*demolition date*  
*recycled date*

#### Properties Relating to Disposal

*disposal shipment date*  
*disposal date*  
*biodegradability*

#### Properties Relating to Decommissioning

*decommissioning date*

## Factors That Influence the Properties of Constructed Objects

### Impact of Environment on Objects

#### Time

Passage of Time

#### Atmospheric and Meteorological Characteristics

##### Sunlight

Visible Light  
Ultraviolet Light  
Infrared

##### Temperature

Outside Air Temperature  
Inside Air Temperature  
Heat Radiated  
Ground Temperature  
Water Temperature

##### Humidity

Relative Humidity  
Condensation, Dew Point

##### Precipitation

Rain  
Snow  
Hail  
Drought  
Wildfire Danger (due to drought)

##### Wind

Velocity  
Hurricanes  
Tornados

##### Lightning

##### Air Pollution

Acid Rain  
Ozone Concentration

#### Topographic, Physiographic, and Structural Characteristics

##### Land

Elevation  
Slope  
Avalanche Probability

##### Water Bodies

Flooding Probability

| Number | Title |
|--------|-------|
|--------|-------|

|  |                         |
|--|-------------------------|
|  | Tidal Action            |
|  | Storm Surge Probability |
|  | Shelter                 |
|  | From Wind               |
|  | From Sun                |

**Geological Characteristics**

|  |                   |
|--|-------------------|
|  | Seismic Activity  |
|  | Volcanic Activity |

**Human-Generated Environmental Characteristics**

|  |                           |
|--|---------------------------|
|  | Population Density        |
|  | Vehicular Traffic Density |
|  | Noise Sources             |
|  | External Noise            |
|  | Occupants' Activities     |
|  | Impact Noise              |
|  | Equipment                 |
|  | Fire Hazards              |
|  | Fire Sources              |
|  | Fire Danger, Probability  |
|  | Fire Severity             |
|  | Artificial Heat Sources   |
|  | Explosion Danger          |

**Biological Factors Other Than Human**

|  |                        |
|--|------------------------|
|  | Microorganism Effects  |
|  | Mold, Mildew Growth    |
|  | Other Fungus Growth    |
|  | Bacteria, Viruses      |
|  | Plant Growth           |
|  | Insect Nesting, Attack |
|  | Termites               |
|  | Bird Nesting, Attack   |
|  | Animal Nesting, Attack |
|  | Rodents                |

| Impact of Objects on Environment |
|----------------------------------|
|----------------------------------|

**Resource Reduction Factors**

|  |                             |
|--|-----------------------------|
|  | Water Consumption           |
|  | Electricity Consumption     |
|  | Fuel Consumption            |
|  | Non-Renewable Materials Use |

**Degrading Factors**

|  |                          |
|--|--------------------------|
|  | Natural Land Disturbance |
|  | Surface Run-off Increase |
|  | Light Pollution          |
|  | Heat Island Effect       |
|  | Ozone Depletion          |
|  | CFC Emissions            |
|  | HCFC Emissions           |
|  | Indoor Air Quality       |

**By-Products Produced**

|  |                    |
|--|--------------------|
|  | Construction Waste |
|  | Occupant Waste     |
|  | Recycled Waste     |
|  | Liquid Wastes      |
|  | Air Pollution      |
|  | Toxic Emissions    |
|  | Particulates       |
|  | VOC Emissions      |

| Structural Loadings |
|---------------------|
|---------------------|

**Dead Loads**

| Number | Title |
|--------|-------|
|--------|-------|

**Live Loads**

- Uniform Design Loads
- Wind Loads
- Snow Loads
- Horizontal Loads
- Impact Loads
- Seismic Loads
- Moving Loads

**Mechanical Loads****Loading Effects**

- Deformation
- Penetration
- Settlement, Subsidence
- Collapse

**Occupancy Factors****Occupants, Users**

- Human Occupants, Users
  - Age
  - Gender
  - Body Properties
  - User Groups
  - Organizational Groups
  - Demographics
  - Change in Occupancy Type
  - Change in Actual Occupants
- Non-Human Users
  - Animals
  - Plants

**Occupant Concerns**

- Amenity Concerns
  - Noise Reduction
- Comfort, Convenience Concerns
  - Air Leakage, Air Infiltration, Air Tightness, Drafts
  - Water Leakage
  - Thermal Comfort
  - Humidity
  - Condensation
  - Radiant Heat
- Health Concerns
  - Hygiene
  - Ergonomics
  - Special Needs
  - Toxicity of Objects (e.g. lead, asbestos, etc)
- Fire Safety Concerns
  - Means of Egress
  - Fire Prevention
  - Fire Fighting
  - Fire Mitigation
- Other Safety Concerns
  - Accident Prevention
  - Explosion Prevention, Mitigation
- Security Concerns
  - External Security
  - Internal Security Zones
- Sociological Concerns
  - Customs
  - Cultural Concerns
- Economic Concerns
- Work Concerns

**Use of Objects**

| Number | Title |
|--------|-------|
|--------|-------|

- Function, Use
  - Intended or Expected Function or Use
  - Actual Function, Use
  - Change in Function, Use
  - Ease of Use
- Need for Durability
  - Weakening
  - Degradation, Wear, Decay, Dilapidation, Dereliction, Disintegration
  - Effects of Light Exposure
  - Effects of Unstable Materials
  - Failure
- Misuse of Objects
  - Accidental Damage, Breakage
  - Intentional Damage, Abuse
  - Vandalism
  - Theft
- Maintenance of Objects**
  - Ease of Cleaning
  - Ease of Repair
  - Ease of Service
    - Parts Replacement
- Modification of Objects**
  - Strengthening, Reinforcement, Stiffening, Toughening
  - Renewal, Modernization, Purification
  - Renovation, Restoration, Reconstruction
  - Adaptation, Alteration, Conversion, Modification
  - Removal
  - Relocation
  - Replacement

**End of Table 49**