



National BIM Standard - United States® Version 3

2 Reference Standards

2.4 OmniClass™

2.4.4.12 OmniClass™ Table 41 – Materials, Pre Consensus Approved Draft 2012-10-30

2.4.4.12.1 Scope – Business Case Description

OmniClass™ is an existing industry standard that has been continuously developed, managed, and published since 2001 by CSI and Construction Specifications Canada. OmniClass™ has its own procedure for regular review and approval of all content by an independent body of subject matter experts composed of representatives from a wide variety of AECOO industry interest areas, the OmniClass Development Committee.

OmniClass™ is designed to provide a standardized means of classifying and organizing construction information, including BIM objects and related information. This classification and organization allows for grouping and more refined analysis, storage and retrieval, or presentation of that information, and can also aid in enhancing information exchanges and other forms of standardized data transfer. All individual OmniClass™ tables are capable of serving these purposes individually, but the tables are designed to work as a suite, enhancing each other's classifications by increasing the number of access points provided on any object so classified. As a result, increasing the number of OmniClass™ tables available within an NBIMS-US™ context will have a multiplicative effect on affected applications.

The intended uses of Table 41 – Materials described in this version of the Table are:

“Material names can be thought of as modifiers and can be combined with a product classification from Table 23 to enrich a product classification by the material from which it is made. For example, Aluminum-Framed Entrances is a product classification in Table 23, which can be associated with the material Aluminum from Table 41.”

2.4.4.12.1.1 Publishing organization

All OmniClass™ content is published by [CSI](#) and [Construction Specifications Canada](#).

2.4.4.12.1.2 Version

The version of OmniClass™ Table 41 – Materials approved is “2012-10-30,” designated as [OmniClass_41_2012-10-30.zip](#) on www.omniclass.org. The version of this table is listed as “Pre Consensus Approved Draft,” which is the final version of any OmniClass™ table as approved by the OmniClass Development Committee prior to full consensus approval, either through NBIMS-US™ or another consensus process.

2.4.4.12.1.3 Date of publication

This is for the current edition of OmniClass™ Table 41, approved by the OmniClass Development Committee and published by CSI on October 30, 2012.

2.4.4.12.1.4 Industry source and process

All work on and approval of OmniClass™ content is conducted by the OmniClass Development Committee (ODC), an independent group of industry subject matter experts administered and funded by CSI and Construction Specifications Canada.

Membership in the ODC is free of charge and open to all interested individuals. The membership currently consists of 110 individuals representing a wide variety of interest areas in the AECOO industry, including designers, product manufacturers and information providers, contractors, owners, software developers, government agencies, universities, and others. A full list of organizations represented on the ODC is included below in “Annex A.”

Development and review work takes place in a selection of Working Groups (WG) appointed and charged at the start of each biennial review cycle. Though all ODC members do not participate in every WG or take part in every development or review discussion, all ODC members are apprised of all WG activity quarterly and can request to participate in or monitor any WG at any time.

The following individuals were members of the WG that reviewed Table 41 – Materials content during the 2010-2012 review cycle:

Kelly Sawatzky – Keyword Specifications Inc. – WG Lead

Bill Brodt – U.S. National Aeronautics and Space Administration (NASA)

Elizabeth Chodosh – Cannon Design

Toby Considine – TC9, Inc.

Lew Finkel – Professional Construction Services

Grant Goodfellow – Autodesk

Lamar Henderson – Design Ecology

Daniel Kieckhefer – Open Data Standards

Deborah MacPherson – Cannon Design

Rodney Waller – FM Global

David Watson – Digicon

Robert Weygant – Sumex Design

At the close of each review cycle, WG present the outcomes of their review work to the full ODC membership for balloting and approval, which takes place following documented ODC procedure for approval of content.

2.4.4.12.1.5 Revision plans and notification

CSI has an MOA in effect with the buildingSMART alliance® relating to OmniClass™ content; in that agreement, CSI has agreed to notify the Alliance when OmniClass™ tables approved as NBIMS-US™ reference standards have been revised.

OmniClass™ has a regular review calendar for all tables. OmniClass™ Table 41 is next scheduled for review and possible update in the 2014-2016 OmniClass™ Review Cycle, scheduled to conclude in Q3 of 2016.

2.4.4.12.2 Normative references

None

2.4.4.12.3 Terms, definitions, symbols, units and abbreviated terms

For the purposes of this document, the following terms and definitions apply. These terms and definitions are drawn from the OmniClass™ informational documentation and the ISO standard upon which OmniClass™ is based, ISO 12006-2:2001.

2.4.4.12.3.1

construction entity

independent material construction result of significant scale serving at least one user activity or function

2.4.4.12.3.2

phase

a portion of work that arises from sequencing work in accordance with a predetermined portion of a stage

2.4.4.12.3.3

discipline

practice area or specialty of the actors (participants) that carry out the processes and procedures that occur during the life cycle of a construction entity

2.4.4.12.3.4

organizational role

the functional position occupied by a participant, either individual or group, which carries out the processes and procedures which occur during the life cycle of a construction entity

2.4.4.12.3.5

material

substance used in construction or to manufacture products and other items used in construction; these substances may be raw materials or refined compounds

2.4.4.12.3.6

property

characteristics of construction objects

2.4.4.12.3.7

work result

construction result achieved in the implementation phase or by subsequent alteration, maintenance, or demolition processes and identified by one or more of the following: the particular skill or trade involved; the construction resources used; the part of the construction entity which results; the temporary work or other preparatory or completion of work which is the result

2.4.4.12.3.8

Construction Specifications Canada

CSC

2.4.4.12.3.9

OmniClass Development Committee

ODC

2.4.4.12.3.10

**Working Groups
WG**

2.4.4.12.4 [OmniClass™ Table 41 – Materials](#)

2.4.4.12.4.1 License terms

OmniClass™ license terms can be obtained at <http://omniclass.org/license>.

2.4.4.12.4.2 Referenced by other NBIMS-US™ Content

All OmniClass™ tables reference and are intended to work with other OmniClass™ tables. Additionally, other NBIMS-US™ information exchanges may use one or more OmniClass™ tables as data elements, for example, Table 13 – Spaces by Function is used in COBie.

It is anticipated that as other information exchanges have need to classify additional data elements, the other OmniClass™ tables will be able to serve that role.

Annex A List of Organizations

A.1 List of organizations represented on the OmniClass™ Development Committee

4Clicks Solutions, LLC	Keyword Specifications, Inc.
Abbie Gregg, Inc.	Kiewit Corporation
AEC Infosystems	Kingspan, Inc.
Allen + Philip Architects	KJWW Engineering Consultants
American Institute of Architects (AIA)	LACECO Architects and Engineers
Appraisal Institute	LY Blair and Associates
Archi-Technology, LLC	M. C. Dean
ARCOM Master Systems	Manitoba Hydro
Army Corps of Engineers	Maryland Department of the Environment
Associated General Contractors of America (AGC)	McCarthy Building Companies, Inc.
Attainia	McGraw-Hill Construction
Autodesk	National Institute of Building Sciences (NIBS)
Beardsley Design Associates	NIBCO, Inc.
Bentley Systems	Onuma Inc.
BOMA International	Open Data Standards
Building Systems Design, Inc.	Open Standards Consortium for Real Estate (OSCRE)
buildingSMART alliance	Parsons Brinckerhoff
CAD Details	PlaneBIM
Cannon Design	Professional Construction Services, Inc.
CH2M Hill	Public Works and Government Services Canada, Real Property Services
Conspectus Inc.	Quarry Group, Inc.
Construction Specifications Canada (CSC)	Reed Construction Data
Construction Specifications Institute (CSI)	RS Means
Dassault Systèmes	RSP Architects
Davis Langdon	Sumex Design
Design Ecology	SynCadd
Digicon, Inc.	TC9, Inc.
Digital Alchemy	U.S. Army Corps of Engineers (USACE)
ESRI	U.S. Coast Guard
FM Global	U.S. Department of Defense (DoD)
FMBENCHMARKING	U.S. Department of State
GB Consultants	U.S. Department of Veterans Affairs (VA)
Georgia Institute of Technology	U.S. Federal Aviation Administration (FAA)
GOMO	U.S. General Services Administration (GSA)
Graphisoft	U.S. Geospatial Consortium
GRC Architects	U.S. Health Facility Planning Agency
Hall Building Information Group	U.S. National Aeronautics and Space Administration (NASA)
Harrison Publishing House, Inc.	U.S. National Inst. of Standards and Tech. Smart Grid Architecture Committee
HOK	Vela Systems, Inc.
International Code Council (ICC)	Woolpert
International Construction Information Society (ICIS)	Zurich Financial Services
International Institute for Sustainable Laboratories	
Jacobs Engineering	
JBHM Architects	
Johnson & Johnson Consultants, LLC	
JS Construction Consultants (JSCC)	
Kalin Associates	

**Annex B
Table 41 Approved by Consensus**

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-10 00 00	Chemical Elements	A pure chemical substance consisting of one type of atom distinguished by its atomic number.
41-10 10 00	Metals	An element, compound or alloy that is a good conductor of both electricity and heat.
41-10 10 10	Alkali Metals	Group 1 elements of the periodic table, most of which occur in nature, highly reactive.
41-10 10 10 10	Potassium	Atomic Number 19; primarily used as a fertilizer.
41-10 10 20	Alkaline Earth Metals	Group 2 elements, somewhat reactive. Not commonly used in construction.
41-10 10 30	Lanthanoids	A series of the fifteen metallic chemical elements with atomic numbers 57 through 71.
41-10 10 30 10	Neodymium	Atomic Number 60; primarily found in rare earth magnets.
41-10 10 40	Actinoids	Includes elements such as uranium and plutonium and are not commonly used in construction.
41-10 10 50	Transition Metals	Any element in the d-block of the periodic table.
41-10 10 50 11	Scandium	Atomic Number 21; aluminum alloy material.
41-10 10 50 13	Titanium	Atomic Number 22; primarily used as a pigment and a component of stainless steel; occasionally used as a cladding material.
41-10 10 50 15	Vanadium	Atomic Number 23; primarily used as an alloy in steel.
41-10 10 50 17	Chromium	Atomic Number 24; primarily used as a coating/finish and a component of stainless steel; still sometimes used as a pigment; used as a wood preservative in CCA.
41-10 10 50 19	Manganese	Atomic Number 25; primarily used as an alloy material in steel and aluminum.
41-10 10 50 21	Iron	Atomic Number 26; primarily used in steel, wrought and cast iron.
41-10 10 50 23	Nickel	Atomic Number 28; primarily used as an alloy material in steel.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-10 10 50 25	Copper	Atomic Number 29; primarily used in electric wires, roofing and plumbing; also used as a fungicide.
41-10 10 50 27	Zinc	Atomic Number 30; primarily used for galvanizing iron and steel, as an alloy in brass, and as a cladding material.
41-10 10 50 29	Niobium	Atomic Number 41; primarily used as an alloy material in steel.
41-10 10 50 31	Molybdenum	Atomic Number 42; primarily used as an alloy material in steel.
41-10 10 50 33	Silver	Atomic Number 47; primarily used in construction as a plating material.
41-10 10 50 35	Cadmium	Atomic Number 48; primarily used as a pigment and as a stabilizer in PVC. Also for plating steel.
41-10 10 50 37	Gold	Atomic Number 79; primarily used in construction as a plating material.
41-10 10 60	Post-Transition Metals	The category of metallic elements to the right of the transition elements on the periodic table.
41-10 10 60 11	Aluminum	Atomic Number 13; alloys are used primarily in windows, doors, cladding.
41-10 10 60 13	Tin	Atomic Number 50; used with lead as solder and in historic restorations.
41-10 10 60 15	Lead	Atomic Number 82; used in radiation shielding, stained glass, sound deadening, roofing materials, cladding, flashings.
41-10 10 60 17	Bismuth	Atomic number 83; used in solder as well as fire detection systems.
41-10 20 00	Metalloids	A chemical element with properties that are in-between or a mixture of metals and nonmetals.
41-10 20 11	Boron	Atomic Number 5; primarily used in glass, cleaning products, semiconductors, magnets, and fiberglass insulation.
41-10 20 13	Silicon	Atomic Number 14; used in elemental form for semiconductors and in manufacture of steel, aluminum casting.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-10 20 15	Germanium	Atomic Number 32; primarily used as germanium dioxide as a catalyst for PET; usually alloyed with silicon for use as a semiconductor; also alloyed with some metals.
41-10 20 17	Arsenic	Atomic Number 33; used as a wood preservative in CCA and in alloys for use in batteries and semiconductors.
41-10 20 19	Antimony	Atomic Number 51; used primarily as a flame retardant and in alloys.
41-10 20 21	Tellurium	Atomic Number 52; used in production of cadmium telluride (for solar panels) and in semiconductors.
41-10 20 23	Polonium	Atomic Number 84; used in devices to eliminate static charges (for example in textile mills).
41-10 30 00	Non-Metals	Chemical Group of elements that are generally defined by their contrast to metals.
41-10 30 10	Halogens	Non-metals family showing propensity for being highly reactive (due to being highly electronegative).
41-10 30 10 11	Fluorine	Atomic Number 9; primarily used in the production of steel and cast iron, as well as ceramics, glass, and cement.
41-10 30 10 13	Chlorine	Atomic Number 17; primarily used in the production of plastics, cleaning products, and water purification.
41-10 30 10 15	Bromine	Atomic Number 35; primarily used in the manufacture of flame retardants, and water and air purification.
41-10 30 10 17	Iodine	Atomic Number 53; primarily used as a disinfectant.
41-10 30 30	Noble Gases	Non-metal inert gases, odorless, colorless, with very low chemical reactivity.
41-10 30 30 11	Helium	Atomic Number 2; primarily used in welding with some use in leak detection, lasers (like those for bar-code readers) and as a refrigerant.
41-10 30 30 13	Neon	Atomic Number 10; primarily used in lighting, lightning arrestors, wave meter tubes, television tubes, and helium-neon lasers.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-10 30 30 15	Argon	Atomic Number 18; mostly used as an inert shielding gas in welding and other high-temperature industrial processes; also has uses in incandescent and fluorescent lighting, and other types of gas discharge tubes.
41-10 30 30 17	Krypton	Atomic Number 36; primarily used with argon in energy saving fluorescent lamps and "neon" lighting.
41-10 30 30 19	Xenon	Atomic Number 54; primarily used as a starter gas in high pressure sodium lamps.
41-10 30 50	Other Non-Metals	Non-Metallic elements which are not previously classified.
41-10 30 50 11	Hydrogen	Atomic Number 1; found naturally as an element; typically used in processes (primarily as a reactant) but also as a coolant and for use in specialty welding.
41-10 30 50 13	Carbon	Atomic Number 6; found naturally as an element with three naturally occurring isotopes (two stable and one radioactive); typically used in lubricants, pigments, and in alloys and other compounds in the built environment.
41-10 30 50 15	Nitrogen	Atomic Number 7; found naturally as an element; primarily occurring in the built environment in incandescent bulbs.
41-10 30 50 17	Oxygen	Atomic Number 8; found naturally as an element; primarily used in the production of steel but also used as a reactant for chemicals and in welding.
41-10 30 50 19	Phosphorus	Atomic Number 15; primarily used as a fertilizer but also used for water softening, as a plasticizer, and as a reactant in metal purification.
41-10 30 50 21	Sulfur	Atomic Number 16; found naturally as an element; primarily used as a fertilizer but also used for water softening, as a plasticizer, and as a reactant in metal purification.
41-10 30 50 23	Selenium	Atomic Number 15; primarily used in the production of fertilizer but also in the vulcanization of rubber.
41-30 00 00	Solid Compounds	Compounds defined as solids when observed at normal room temperature.
41-30 10 00	Mineral Compounds	Compounds which are laden with mineral deposits.
41-30 10 11	Igneous Rocks	Rocks formed from the cooling of magma or lava.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 10 11 11	Granite	A naturally occurring type of coarse-grained igneous rock.
41-30 10 11 21	Quartz	An abundant mineral made up of silicon and oxygen crystals.
41-30 10 11 21 11	Onyx	A rock made up of colored bands of silica, quartz and moganite.
41-30 10 13	Sedimentary Rocks	Rocks formed from the accumulated deposits of materials often in or around bodies of water.
41-30 10 13 11	Limestone	A naturally occurring rock produced through layering and sedimentary collection of calcite and aragonite typically produced from skeletal fragments of marine life.
41-30 10 13 11 11	Chalk	A compound rock formed from limestone and calcite
41-30 10 13 11 13	Lime	A general term used for calcium-containing inorganic materials extracted in the process of excessive heat application.
41-30 10 13 11 13 11	Hydrated Lime	The compound of traditional lime materials and water.
41-30 10 13 11 13 13	Quicklime	The heating of lime to remove Carbon dioxide leaving Calcium oxide.
41-30 10 13 11 13 15	Slaked Lime	The compound created when Quicklime and water are mixed.
41-30 10 13 11 15	Travertine	A form of limestone deposited by mineral (geothermally heated) springs through a rapid accumulation of calcium carbonate.
41-30 10 13 11 17	Tufa	A form of limestone deposited by mineral (ambient temperature) springs through a rapid accumulation of calcium carbonate.
41-30 10 13 11 19	Barite	A concentrated amount of barium sulfate often found in lead-zinc veins of limestone.
41-30 10 13 13	Sandstone	A traditionally porous rock composed of sand-sized quartz and feldspar minerals.
41-30 10 13 15	Shale	A rock composed of mud and clay materials typically in long, thin parallel layers.
41-30 10 13 15 11	Expanded Shale	Shale that has been heated to expand past its normal size.
41-30 10 15	Metamorphic Rocks	Rocks formed from the transformation of existing rock types through change in physical and chemical conditions.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 10 15 11	Graphite	The residual rock formed by the reduction of sedimentary carbon compounds.
41-30 10 15 13	Marble	A naturally occurring metamorphic rock composed of carbonate minerals (typically calcite or dolomite) in a recrystallized state.
41-30 10 15 13 11	Marble Stone	Marble which is used in products that benefit from a polished appearance.
41-30 10 15 13 15	Limestone Marble	Marble which is used in less demanding ways such as walls and columns.
41-30 10 15 13 17	Periclase (Magnesia)	Naturally occurring rock usually found in marble produced by metamorphism of limestones.
41-30 10 15 15	Quartzite	Sandstone that has been heated through pressure often as a result of tectonic compression.
41-30 10 15 17	Slate	A rock derived originally derived from shale or other clay like materials.
41-30 10 25	Binding Compounds	A mixture of substances that forms an adhesive.
41-30 10 25 11	Clay	A malleable substance resulting from the weathering of rocks and other substances over long periods of time.
41-30 10 25 11 11	Fire Clay	A type of clay used in creation of ceramics and fire brick.
41-30 10 25 11 13	Bentonite	A type of clay formed from volcanic ash, used in industrial purposes.
41-30 10 25 11 15	Expanded Clay	Clay that has been heated to make it more permeable, durable and better at thermal insulation.
41-30 10 25 11 17	Vermiculite	A type of clay that expands when heat is applied. Typically used in automotive brake linings, soil conditioning, and roofing.
41-30 10 25 11 17 11		Vermiculite to which heat has been applied and has expanded past its normal volume.
41-30 10 25 13	Ceramic	A substance made solid by heating and then cooling, typically used in the application of pottery and other decorative means, but has gained popularity as a binding agent for other materials in recent years. Also used in semiconductors.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 10 25 13 11	Brick	Typically bound with mortar, brick blocks are a common building product used to construct nearly every type of vertical structure.
41-30 10 25 13 13	Earthenware	A common ceramic material, which is used extensively for pottery tableware and decorative objects. May also be glazed in order to become watertight.
41-30 10 25 13 15	Terracotta	Historically used for sculpture and pottery, as well as shingles and brick, this substance is one of the earliest ceramics still in use. Typically not watertight and porous, but can be glazed to ensure watertightness.
41-30 10 25 13 17	Fired Shale	Shale that has been fired and hardened into a specific shape.
41-30 10 25 13 19	Porcelain	Primarily formed from Kaolin, this material originated in China and is recognized by its white color. Very resistant to thermal shock and considerably strong.
41-30 10 25 13 21	Vitreous China	A compound composed of clay and other compounds, the material is fired and then coated with ceramic to ensure watertightness.
41-30 10 25 15	Soil	A compound composed of organic and inorganic materials, this substance is typically used for planting and vegetation purposes.
41-30 10 25 17	Gypsum	A unique material that is moderately water-soluble but becomes less soluble at higher temperatures. Typically used in finishes such as gypsum board and plaster.
41-30 10 25 19	Silicate	A compound containing a silicon bearing anion. Typical silicates include sand and Portland Cement, as well as thousands of other minerals.
41-30 10 25 19 11	Asbestos	A compound composed of six naturally occurring silicate minerals. Historically used for its sound absorption, tensile strength and resistance to fire, heat and electrical damage, this substance has been found to be highly toxic and is no longer as extensively used.
41-30 10 25 19 13	Calcium Silicate	A compound used as a safer solution to asbestos. Typically used for insulation and fire protection.
41-30 10 25 19 15	Cement	A binding compound that, when set and hardened, binds two or more materials together. Typically used in mortar and concrete.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 10 25 19 15 11	Portland Cement	The most common type of cement in use worldwide. Typically used in concrete.
41-30 10 25 19 17	Mica	A compound classified as one or more of 37 phyllosilicate minerals that have a layered or platy texture.
41-30 10 25 19 17 11	Expanded Mica	Mica that has been heated to expand past its original volume.
41-30 10 25 19 19	Sand	A naturally occurring compound made of rock and mineral particles.
41-30 10 27	Manufactured Mineral Compounds	Compounds which are man made but whose primary sources are normally naturally occurring.
41-30 10 27 11	Carbon Fiber	A material consisting of thin crystalline carbon filaments. Typically used for its surprising strength to weight ratio.
41-30 10 27 13	Cermet	A compound with materials of both ceramic and metal. Typically used in manufacturing of capacitors, resistors and other electrical components.
41-30 10 27 15	Fly Ash	Ash that rises with other gases from combustion. Typically used in products such as Portland Cement, Roller-compacted Concrete and applications such as soil stabilization as well as waste treatment.
41-30 10 27 17	Glasses and Glass-Like Materials	Compounds contain glass or primarily formed from glass materials.
41-30 10 27 17 11	Glass	A typically brittle and transparent compound with a variety of uses.
41-30 10 27 17 13	Perlite	A compound made of volcanic glass with a high water content. Typically used for plasters, mortars, insulation and tiling. Also useful in filtration and to prevent soil compaction.
41-30 10 27 17 13 11	Expanded Perlite	Perlite that has been heated to expand past its original volume.
41-30 10 27 17 15	Porcelain Enamel	A compound created by fusing powdered glass to a substrate by firing.
41-30 10 27 19	Rock Fibers	Small parts of rock used to form various items for construction.
41-30 10 27 21	Silicon Carbide	A compound consisting of silicon and carbon. Naturally occurs in an extremely rare mineral called moissanite, however most is man made due to its rare nature.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 10 27 23	Unrefined Salt (Sodium Chloride)	Sodium Chloride which has not been altered or manufactured synthetically. Typically used as a food flavoring or preservative, but also in cosmetic applications.
41-30 20 00	Metallic Alloys	Compounds laden with metallic deposits or derived primarily from metal.
41-30 20 11	Ferrous Alloys	Compounds laden with iron deposits.
41-30 20 11 11	Carbon Steel	A compound used in steel applications, this is typically less ductile or malleable than stainless steel. Typical term used to denote any steel which is not stainless.
41-30 20 11 14	Stainless Steel	Corrosion, stain and rust resistant steel. Typically more ductile and malleable than traditional carbon steel.
41-30 20 11 17	Cast Iron	Iron which has been heated to liquefaction and then poured into a mold to solidify.
41-30 20 11 21	Wrought Iron	Iron alloy with a grain texture.
41-30 20 11 25	Ductile Iron	Iron which is more flexible and elastic than traditional iron. Typically used in piping.
41-30 20 11 29	Malleable Iron	Iron which is more malleable or able to bend than traditional iron. Often used for casting that require tensile strength and flexibility.
41-30 20 14	Aluminum Alloys	Compounds laden with aluminum deposits.
41-30 20 17	Copper Alloys	Compounds laden with copper deposits.
41-30 20 17 11	Brass	Composed of copper and zinc. Typically used in a variety of metallic purposes where low friction is required.
41-30 20 17 14	Bronze	Composed of copper and tin. Typically used in sculpture, weather-stripping and bronze wool for woodworking applications.
41-30 20 21	Zinc Alloys	Compounds laden with zinc deposits.
41-30 20 21 11	Zamak	A collection of alloys whose primary base metal is zinc but is alloyed with aluminum, magnesium and/or copper.
41-30 20 21 14	Mazac	Developed in answer to Zamak where pure zinc was not available. This employed a manufactured zinc.
41-30 20 24	Lead Alloys	Compounds laden with lead deposits.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 20 24 11	Solder	Compound which is heated and applied as a binding agent to two or more items that have a higher melting point than the solder.
41-30 20 24 14	Terne	Used to inhibit corrosion, typically on steel, this coating was historically comprised of lead and tin. In recent years, lead has been replaced by zinc.
41-30 30 00	Organic Compounds	Compounds laden with plant and/or animal deposits or derived primarily from plants or animals.
41-30 30 11	Plant Materials	Compounds which are laden with plant deposits or derived generally from plants.
41-30 30 11 11	Sap	Compound that appears as a fluid that circulates in the cellular structure of plants.
41-30 30 11 11 11	Combustion Residues	Compounds that are remnants of the firing or burning of another material.
41-30 30 11 11 13	Natural Rubber	A compound derived from latex and refined into useable rubber.
41-30 30 11 13	Fibers	Compounds that make up filaments typically woven into other stronger substances.
41-30 30 11 13 11	Cellulose	A compound found in the cell walls of green plants, this is the most common organic compound found on Earth.
41-30 30 11 13 13	Coir	A compound extracted from coconut husks.
41-30 30 11 13 15	Cotton	A compound which originates from the cotton plant. Typically used in yarn, thread, and other textiles.
41-30 30 11 13 17	Jute	A compound made of vegetable fiber usually spun into coarse long threads.
41-30 30 11 13 19	Linen	A compound identified as a textile which is made from the fibers of flax.
41-30 30 11 13 21	Reeds	A compound which is actually a tall plant similar to grass that typically grows in wet places.
41-30 30 11 13 23	Straw	A compound made from the dry stalks of cereal plants.
41-30 30 11 13 25	Textiles	A compound which is a flexible woven material consisting of natural or artificial fibers.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 30 11 15	Pulp	Plant material leftover after some type of extraction process. Typically formless and faceless but malleable.
41-30 30 11 15 11	Paper	A thin compound used for writing, printing, drawing or packaging.
41-30 30 11 17	Bark, Stem or Root	Plant materials that typically constitute the outside of a plant or the exterior edge.
41-30 30 11 17 11	Cork	An impermeable, buoyant material typically made of bark tissue from the Cork Oak.
41-30 30 11 17 13	Grass	A compound common to most domestic yards. Typically a green substance with narrow leaves that grow from the base.
41-30 30 11 17 13 11	Bamboo	A perennial evergreen thought to be the fastest growing plant in the world. Typically grows in long, hollow chutes.
41-30 30 11 19	Timber	Wood which has been designated for use and extracted from its original form in some manner.
41-30 30 11 19 11	Softwood Timber	A type of timber from the family of trees known as gymnosperms and also used to describe evergreens.
41-30 30 11 19 11 11	Southern Pine	A collection of pine trees that grow in the southern United States. Loblolly is one of the most prevalent in the US.
41-30 30 11 19 11 13	Douglas Fir-Larch	An evergreen coniferous tree of the Pseudotsuga genus.
41-30 30 11 19 11 15	Spruce-Pine-Fir	A type of Canadian wood with moderate strength that holds nails well and takes paint readily.
41-30 30 11 19 11 17	Redwood	A type of giant conifer tree characterized by a thick fibrous bark. Sequoias belong to this family. Typically found in California and Oregon.
41-30 30 11 19 11 19	Western Red Cedar	A species of evergreen coniferous tree in the Cupressaceae family. Typically found in western North America.
41-30 30 11 19 13	Hardwood Timber	A type of timber often from deciduous trees.
41-30 30 11 19 13 11	White Oak	One of the most pre-eminent hardwoods of eastern North America.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 30 11 19 13 13	Red Oak	A high quality, durable wood typically found in North, Central & South America. There are a wide variety of Red Oaks prevalent in the Americas.
41-30 30 11 19 13 15	Maple	Over 128 species of trees, most of which are native to Asia, characterized by their pointed leaves. Typically used for syrup, timber and pulpwood.
41-30 30 11 19 13 17	Cherry	Comprising the Prunus genus of tree, this is particularly useful for furniture and for it's fruit-bearing nature.
41-30 30 21	Animal Materials	Compounds which are laden with animal deposits or derived from animals.
41-30 30 21 11	Hair and Skin	Hair and flesh of animals used by humans to achieve a desired purpose.
41-30 30 21 11 11	Leather	A durable and flexible material created by tanning of animal hide.
41-30 30 21 11 13	Horsehair	Long coarse hair grown on the manes and tails of horses.
41-30 30 21 11 15	Wool	A fiber used in textiles, sourced from sheep and other animals such as goats (cashmere).
41-30 30 21 13	Food or Fuel	Compounds that constitute something that, when consumed in a system, provides energy to power that system.
41-30 30 21 13 11	Tallow	A compound rendered from the fat of beef or mutton. Typically used in high-end soaps, candles and as a lubricant.
41-30 30 21 13 13	Beeswax	A natural compound produced by bees. Typically used in food, cosmetics and pharmaceuticals.
41-30 30 21 15	Silk	Produced primarily by spiders, this is typically used in the creation and manufacturing of textiles.
41-30 50 00	Synthetic Compounds	Compounds which are laden with human-made deposits or created by humans.
41-30 50 11	Acids	Compounds with a low pH.
41-30 50 14	Bases (Alkalis)	Compounds with a high pH.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 50 17	Salts	Composed primarily of sodium chloride, this crystallized compound is typically used in food consumption and preservation.
41-30 50 21	Plastics	Man made moldable compounds used in a wide variety of purposes.
41-30 50 21 11	Acrylonitrile-Butadiene-Styrene (ABS)	A compound known as a copolymer made by polymerizing styrene and acrylonitrile.
41-30 50 21 14	Acrylic, Polymethyl Methacrylate	An acrylic with high-quality clarity which is often used as a glass substitute.
41-30 50 21 17	Epoxy	A thermosetting polymer formed from reaction of a resin with a hardener.
41-30 50 21 21	Polyamide	A polymer containing monomers of amides joined by peptide bonds.
41-30 50 21 24	Polybutylene (PB)	A polyolefin which, when applied as a pure or reinforced resin, can replace materials like metal, rubber and engineering polymers.
41-30 50 21 27	Phenolic	A class of chemical compounds consisting of a hydroxyl group bonded directly to an aromatic hydrocarbon group.
41-30 50 21 31	Polycarbonate	A group of thermoplastic polymers that are easily worked, molded and thermoformed.
41-30 50 21 34	Polyester	A category of polymers which contain the ester functional group in their main chain.
41-30 50 21 37	Polyethylene, Polythene (PE)	The most common type of plastic.
41-30 50 21 41	Polyisocyanurate	An improvement on polyurethane. Typically produced as a foam and used in rigid thermal insulation.
41-30 50 21 51	Polypropylene	A thermoplastic polymer used in packaging, labeling, textiles, stationery and a wide variety of other uses.
41-30 50 21 54	Polystyrene	An aromatic polymer made from the monomer styrene.
41-30 50 21 61	Polyurethane	A polymer composed of a chain of organic units joined by carbamate links.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 50 21 64	Polyvinyl Chloride, Plasticized (PVC)	A PVC with plasticizers; more flexible than standard PVC and can be used for wire insulation.
41-30 50 21 71	Polyvinyl Chloride, Unplasticised (PVC-U)	A cheap, strong compound typically used in manufacturing pipes.
41-30 50 21 74	Polyvinylidene Fluoride	A highly non-reactive and pure thermoplastic fluoropolymer produced by the polymerization of vinylidene difluoride.
41-30 50 21 81	Urea Formaldehyde	A non-transparent thermosetting resin or plastic made from urea and formaldehyde heated in the presence of a mild base such as ammonia or pyridine.
41-30 50 21 84	Vinyl	Any organic compound that contains a vinyl group, which are derivatives of ethene.
41-30 50 24	Rubbers	Any type of artificial elastomer, invariably a polymer.
41-30 50 24 11	Butyl Rubber	Impermeable to air and used in many applications requiring an airtight rubber.
41-30 50 24 14	Neoprene	Good chemical stability and maintains flexibility over a wide temperature range.
41-30 50 24 17	Silicone	Typically heat-resistant, used in sealants, adhesives, lubricants, medical applications and insulation.
41-30 50 24 21	Polysulfide	A class of chemical compound containing chains of sulfur atoms.
41-30 50 27	Petrochemical Compounds	Compounds originating from Petroleum-based substances mixed with other sources.
41-30 50 27 11	Asphalts	Compounds consisting of a sticky, black and highly viscous liquid or semi-solid present in most petroleum and natural deposits.
41-30 50 27 11 11	Asphalt	Primarily used in road construction.
41-30 50 27 11 13	Polymer Modified Asphalt	An asphalt with greater elastic and durability properties and greater temperature stability.
41-30 50 27 13	Coal Tars	Compound that occurs when coal is carbonized. Typically a brown or black liquid which is highly viscous.
41-30 50 27 13 11	Carbon Black	A compound produced by incomplete combustion of petroleum products. Typically used as a pigment and heat transfer agent for automobile tires.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-30 50 27 13 13	Coal Tar Pitch	A compound found as residue from coal firing. Typically used in waterproofing.
41-30 50 27 15	Paraffin	Compound typically used in fuels, waxes and paints, as well as some medical applications in liquid form.
41-30 50 27 17	Waxes	Compounds that are malleable in normal ambient temperatures. Typically used as a sealer and to make candles.
41-50 00 00	Liquids	Compounds defined as fluids when observed at normal room temperature.
41-50 10 00	Normal	Liquids with a neutral pH.
41-50 10 11	Distilled Water	Water which has had many of its impurities removed through distillation (boiling).
41-50 10 15	Deionized Water	Water which has had the ions removed.
41-50 30 00	Acid	Liquids with a low pH.
41-50 30 11	Rain Water	Water that falls from the sky, generally considered unfit for human consumption.
41-50 50 00	Alkali	Liquids with a high pH.
41-50 50 11	Ammonia	Typically used as a fertilizer, cleaning agent, and refrigerant.
41-50 50 15	Sea Water	Water which occurs in nature, typically in oceans, lakes, and most other bodies of water that connect to an ocean.
41-50 70 00	Other Liquids	Liquids with varying pH.
41-50 70 11	Ground Water	Water harvested or collected using subsurface means.
41-50 70 15	Petroleum Products	Fuels and other applications such as lubricants.
41-50 70 19	Alcohols	Cleaning agents, fuels, and recreational drugs. Various types of alcohol abound, with varying levels of toxicity.
41-50 70 23	Lubricants	Used to prevent wear on moving parts that touch or move closely together.
41-70 00 00	Gases	Compounds defined as gases when observed at normal room temperature.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-70 10 00	Non-Toxic Gases	Gases which are not inherently harmful to humans.
41-70 10 11	Air	A mixture of oxygen and other gases in the atmosphere.
41-70 10 19	Helium	Typically used in cryogenic applications for its cooling capabilities and as a shielding gas for arc welding.
41-70 10 23	Neon	Typically used in signage, this gas emits a bright reddish-orange light. Though still referred to as "neon" all other colors are produced by noble gases or fluorescent lighting.
41-70 10 27	Water Vapor	Occurs when water is heated to the point of evaporation, this is simply water heated to its gaseous state.
41-70 30 00	Toxic or Harmful Gases	Gases which are inherently harmful to humans.
41-70 30 10	Flammable Gases	Gases which can ignite.
41-70 30 10 11	Acetylene	Typically used in welding and while not especially toxic, it can contain toxic impurities when generated from calcium carbide.
41-70 30 10 15	Butane	A fuel typically used for pocket cigar/cigarette lighters and torches.
41-70 30 10 19	Ethylene	Used in polymerization, oxidation and other applications.
41-70 30 10 23	Propane	Used as a fuel for both furnaces and stoves, this gas is naturally odorless but manufactured (purchased) propane has a human-added odor for safety.
41-70 30 10 27	Hydrogen	Used in the petroleum and chemical industries and for the production of ammonia, as well as a coolant.
41-70 30 10 31	Isobutan	Flammable gas, typically used as a refrigerant and propellant for aerosol cans and foam products.
41-70 30 10 35	Methane	A relatively potent greenhouse gas used in industrial chemical processes.
41-70 30 30	Toxic Gases	Gases which can cause injury or death when encountered.
41-70 30 30 11	Arsine	Used in the semiconductor industry and for the synthesis of organoarsenic compounds.
41-70 30 30 15	Carbon Dioxide	Emitted naturally by humans, plants convert this gas into oxygen. May cause Carbon dioxide poisoning.

2012 DRAFT OmniClass™ Table 41 - Materials		
OmniClass™ Number	OmniClass™ Title	Definition
41-70 30 30 19	Carbon Monoxide	This gas is the result of a single carbon and single oxygen molecular bond.
41-70 30 30 23	Ethyl Chloride	Commonly used to produce tetraethyllead (TEL), an anti-knock additive for gasoline, it has also been used as a refrigerant, aerosol spray propellant, an anesthetic and a blowing agent for foam packaging.
41-70 30 30 27	Methyl Chloride	A widely used refrigerant in the past, it is no longer in use due to its toxicity and flammability.
41-70 30 30 31	Nitrogen Dioxide	Typically a byproduct of internal combustion engines and thermal power stations.
41-70 30 30 35	Oxygen	Toxic at high concentration, this gas comprises most of the mass of living organisms.
41-70 30 50	Other Harmful Gases	Gases which may or may not be inherently combustible or toxic but may still cause harm.
41-70 30 50 11	Refrigerant	Used for cooling purposes, these gases are non-toxic but may cause suffocation.
End of Table		