

Business To Manufacturing   
Markup Language

Material

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B2MML-Material

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# Change history

|  |  |  |  |
| --- | --- | --- | --- |
| **Change** | **Date** | **Person** | **Description** |
| V01 | 7 April 2002 | Dennis Brandl  Dave Emerson | Initial release |
| V02 | 23 Sept 2003 | Dennis Brandl  Dave Emerson | * Added Location information to lot type * Changed ##any to "Any" element of type "AnyType" * Move StorageLocation and Quantity to MaterialLotType |
| V03 | 26 Aug 2005 | Dennis Brandl  Dave Emerson | * Added substitution groups. One group added just before each Any element. * Added MaterialLotID to MaterialSubLot so a stand alone MaterialSubLot element can be identified with a Lot ID. |
| V0301 | 29 Dec 2005 | Dennis Brandl | * Added properties to sublots |
| V04 | 04 June 2007 | Dennis Brandl | * Added transaction elements |
| V0401 | Oct 2008 | Dennis Brandl | * Changed version number |
| V0500 | Mar 2011 | Dennis Brandl | * Updated for ISA 95.02-2010 * Added assembly definitions * Changed QATest to MaterialTest |
| V0600 | Aug 2012 | D. Brandl | Updated MESA Copyright |

# Schema Scope

This document defines the information about material definitions, material classes, material lots, material sublots, and QA (Quality Assurance) tests that may be exchanged between business systems and manufacturing operations systems. This information is based on the data models and attributes defined in the ANSI/ISA 95.00.02 Enterprise/Control System Integration standard. Contact ISA (The Instrumentation, System, and Automation Society) for copies of the standard. Additional information on the standard is available at [www.isa.org](http://www.isa.org).

## Key Information Assumptions

The data represented in these schemas is derived from the UML model below. This model is defined in the ANSI/ISA 95.00.02 standard. The information model in the model below is not hierarchical, so the key assumption is that the information may be accessed from any of four starting points: material class, material definition, material lot, material sublot or material test specifications, as identified by the dotted collections in the figure.



Model of Exchanged Material Information

This schema uses a common schema for definition of elements that are used in multiple schemas, such as ID, Description, and Value. See the document defining the Common schema for definition of the common elements.

## MaterialInformation

The main structuring element of the schema definition is MaterialInformation.

## MaterialLot

A material lot object uniquely identifies a specific amount of material, countable or weighable. This describes the actual total quantity or amount of material available, its current state, and its specific property values.

MaterialLot elements may be used to contain information about specific material and subsets of the material stored as sublots. It may also include the definition of QA test results. It may include the list of material definitions the material belongs to and the list of QA test specifications associated with properties.

## MaterialSubLot

A material lot may be stored as separately identifiable quantities. Each separate identifiable quantity of the material is identified in a material sublot. All material sublots must contain the same material lot, so they use the material lot element’s property values. A material sublot may be just a single item. Material sublots may have sublot specific properties, such as RFID tag IDs or other identification properties, maintained in a MaterialSublotProperty element.

Each material sublot also contains the location of the sublot, the quantity or amount of material available in the sublot, and a reference to the material lot. Material sublots may contain other sublots. For example, a sublot may be a pallet, each box on the pallet may also be a sublot, and each material blister pack in the box may also be a sublot.

## MaterialDefinition

A material definition is a means to describe goods with similar characteristics for purposes of scheduling and planning. Examples of these may be “City Water”, “HCl”, and “Grade B Aluminum”. The materials may be identified as raw, intermediate, or final and may have other state information, such as availability of safety information.

MaterialDefinition information may be used to contain information about material definitions. It may contain the list of material lots belonging to the definition and the list of QA test specifications associated with material definition properties.

## MaterialClass

A material class is means of defining groupings material definitions for use in production scheduling or processing. An example of a material class is "Sweetener", with members of "Fructose", "Corn Syrup", and "Sugar Cane Syrup". Another example of a material class is "Water", with members of "City Water", "Recycled Water", and "Spring Water". A material definition may belong to zero or more material classes.

MaterialClass information may be used to contain information about material classes. It may contain the list of material definitions belonging to the class and the list of QA test specifications associated with material class properties.

## MaterialTestSpecification

A material test specification may be associated with a material class property. This is typically used where a test is required to ensure that the material has the required property value. A material test specification may identify a test for one or more material class properties. Not all properties need to have a defined material test specification.

MaterialTestSpecification information may be used to contain information about material tests. It may contain identifications of the tested material properties and the tested material class properties.

# Element Definitions

| **Element/Type** | **Description** |
| --- | --- |
| MaterialClass  ***MaterialClassType*** | Contains a definition of a material class, the properties associated with the class, and the list of material definitions associated with the class. |
| MaterialClassProperty  ***MaterialClassPropertyType*** | Contains a definition of a property for a material class, the nominal value of the property, any nested properties, and the ID of a QA test specification for the property. |
| MaterialDefinition  ***MaterialDefinitionType*** | Contains a definition of a material definition, the properties associated with the definition, the list of material class the definition belongs to, and the list of material lots belonging to the definition. |
| MaterialDefinitionProperty  ***MaterialDefinitionPropertyType*** | Contains a definition of a property for a material definition, the nominal value of the property, any nested properties, and the ID of a QA test specification for the property. |
| MaterialInformation  ***MaterialInformationType*** | Contains material information, may include a list of material classes, material definitions, material lots, material sublots, and QA test specifications. |
| MaterialLot  ***MaterialLotType*** | Contains a definition of a material lot, the properties associated with the lot, the material definition of the lot, a status of the lot, the list of material sub lots associated with the lot, an optional storage location and quantity. |
| MaterialLotProperty  ***MaterialLotPropertyType*** | Contains a definition of a property for a material lot, the value of the property, any nested properties, and the ID of a QA test specification for the property. It may contain a storage location and quantity, and test results from QA material tests. |
| MaterialSubLot  ***MaterialSubLotType*** | Contains a definition of a material sublot, a status of the sublot, the storage location of the sublot, the quantity of the sublot, any sublots that make up the sublot, and the ID of the associated material lot.  NOTE: The **MaterialSublotProperty** is of type **MasterialLotPropertyType**. |
| MaterialTestSpecification  ***MaterialTestSpecificationType*** | Contains a definition of a material test specification, including the ID and version of the test, the list of tested material class properties, the list of tested material definition properties, the list of tested material lot properties, and application defined elements. |
| TestedMaterialClassProperty  ***TestedMaterialClassPropertyType*** | Contains an identification of a tested material class and a property ID. |
| TestedMaterialDefinitionProperty  ***TestedMaterialDefinitionPropertyType*** | Contains an identification of a tested material definition and a property ID. |
| TestedMaterialLotProperty  ***TestedMaterialLotPropertyType*** | Contains an identification of a tested material lot and a property ID. |

# Transaction Elements

The following elements are defined to support the ISA 95 Part 5 transactions, using the transaction data types defined in the B2MML-Common.xsd schema.

| **Material Information Elements** | **Description** |
| --- | --- |
| GetMaterialInformation | Get *MaterialClass*, *MaterialDefinition*, *MaterialLot*, *MaterialSubLot*, and *MaterialTestSpecification* definitions. |
| ShowMaterialInformation | Returned information from the *GetMaterialInformation* message. |
| ProcessMaterialInformation | Process *MaterialClass*, *MaterialDefinition*, *MaterialLot*, *MaterialSubLot*, and *MaterialTestSpecification* definitions. |
| AcknowledgeMaterialInformation | Returned status from the *ProcessMaterialInformation* message. |
| ChangeMaterialInformation | Change *MaterialClass*, *MaterialDefinition*, *MaterialLot*, *MaterialSubLot*, and *MaterialTestSpecification* definitions. |
| RespondMaterialInformation | Returned status from the *ChangeMaterialInformation* message. |
| CancelMaterialInformation | Cancel *MaterialClass*, *MaterialDefinition*, *MaterialLot*, *MaterialSubLot*, and *MaterialTestSpecification* definitions. |
| SyncMaterialInformation | Published *MaterialClass*, *MaterialDefinition*, *MaterialLot*, *MaterialSubLot*, and *MaterialTestSpecification* definitions. |

| **Material Class Elements** | **Description** |
| --- | --- |
| GetMaterialClass | Get *MaterialClass* definitions. |
| ShowMaterialClass | Returned information from the *GetMaterialClass* message. |
| ProcessMaterialClass | Process *MaterialClass* definitions. |
| AcknowledgeMaterialClass | Returned status from the *ProcessMaterialClass* message. |
| ChangeMaterialClass | Change *MaterialClass* definitions. |
| RespondMaterialClass | Returned status from the *ChangeMaterialClass* message. |
| CancelMaterialClass | Cancel *MaterialClass* definitions. |
| SyncMaterialClass | Published *MaterialClass* definitions. |

| **Material Definition Elements** | **Description** |
| --- | --- |
| GetMaterialDefinition | Get *MaterialDefinition* definitions. |
| ShowMaterialDefinition | Returned information from the *GetMaterialDefinition* message. |
| ProcessMaterialDefinition | Process *MaterialDefinition* definitions. |
| AcknowledgeMaterialDefinition | Returned status from the *ProcessMaterialDefinition* message. |
| ChangeMaterialDefinition | Change *MaterialDefinition* definitions. |
| RespondMaterialDefinition | Returned status from the *ChangeMaterialDefinition* message. |
| CancelMaterialClass | Cancel *MaterialDefinition* definitions. |
| SyncMaterialDefinition | Published *MaterialClass* definitions. |

| **Material Lot Elements** | **Description** |
| --- | --- |
| GetMaterialLot | Get *MaterialLot* definitions. |
| ShowMaterialLot | Returned information from the *GetMaterialLot* message. |
| ProcessMaterialLot | Process *MaterialLot* definitions. |
| AcknowledgeMaterialLot | Returned status from the *ProcessMaterialLot* message. |
| ChangeMaterialLot | Change *MaterialLot* definitions. |
| RespondMaterialLot | Returned status from the *ChangeMaterialLot* message. |
| CancelMaterialLot | Cancel *MaterialLot* definitions. |
| SyncMaterialLot | Published *MaterialLot* definitions. |

| **Material Sublot Elements** | **Description** |
| --- | --- |
| GetMaterialSubLot | Get *MaterialSubLot* definitions. |
| ShowMaterialSubLot | Returned information from the *GetMaterialSubLot* message. |
| ProcessMaterialSubLot | Process *MaterialSubLot* definitions. |
| AcknowledgeMaterialSubLot | Returned status from the *ProcessMaterialSubLot* message. |
| ChangeMaterialSubLot | Change *MaterialSubLot* definitions. |
| RespondMaterialSubLot | Returned status from the *ChangeMaterialSubLot* message. |
| CancelMaterialSubLot | Cancel *MaterialSubLot* definitions. |
| SyncMaterialSubLot | Published *MaterialSubLot* definitions. |

| **QA Material Test Specification Elements** | **Description** |
| --- | --- |
| GetMaterialTestSpec | Get *MaterialTestSpecification* definitions. |
| ShowMaterialTestSpec | Returned information from the *GetMaterialTestSpec* message. |
| ProcessMaterialTestSpec | Process *MaterialTestSpecification* definitions. |
| AcknowledgeMaterialTestSpec | Returned status from the *ProcessMaterialTestSpec* message. |
| ChangeMaterialTestSpec | Change *MaterialTestSpecification* definitions. |
| RespondMaterialTestSpec | Returned status from the *ChangeMaterialTestSpec* message. |
| CancelMaterialTestSpec | Cancel *MaterialTestSpecification* definitions. |
| SyncMaterialTestSpec | Published *MaterialTestSpecification* definitions. |

# Diagram Convention

The schema diagrams using the following convention to illustrate the structure of the schema elements, the type of the elements and attributes, and the rules for optional elements and repetition.



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About the XML Committee: The XML Committe was formed within MESA to provide a forum for the development of the B2MML and BatchML specifications.