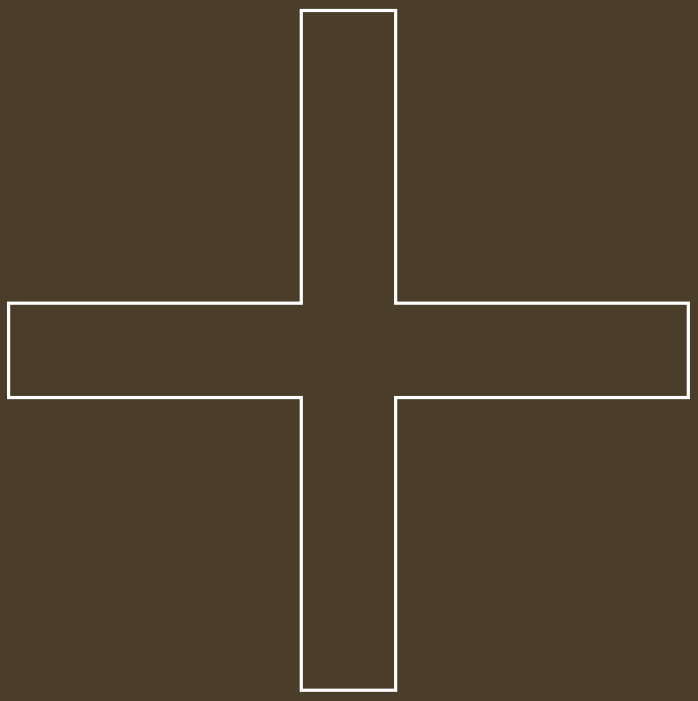
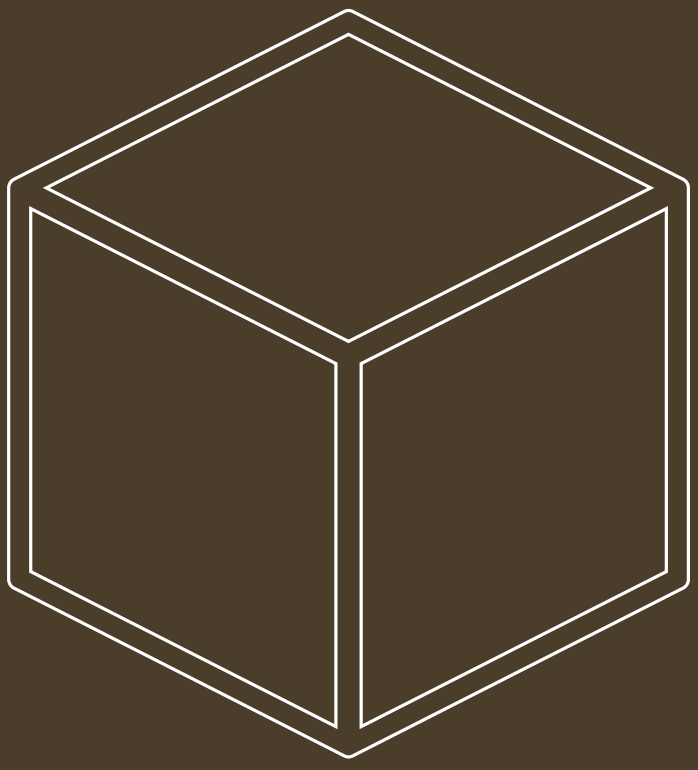
The Bimstore Bible

Autodesk Revit





bimstore

These standards are structured from content within the following documents:

BS8541 -Library objects for architecture, engineering and construction.

ISO 16739 - Asset Management & Operation

ISO 15686-4:2014 - COBie

Autodesk Revit Architecture 2010 Families Guide

Autodesk Revit Model Content Style Guide

AEC (UK) BIM Standard for Autodesk Revit

Contents

1.0 Introduction

The purpose of this guide is to define Bimstore guidelines and standards for model content creation in Revit Architecture, Revit MEP, and Revit Structure.

Model content refers to the two-dimensional and three dimensional standard component families that are used to create elements that represent manufactured or generic content (for example, windows, doors, furniture and plumbing fixtures).

By following the guidelines and standards in this document, content creators will ensure the portability and performance of their content in a BIM process.

This will meet the baseline standard to be hosted on Bimstore, because we ensure that our components shall:

- Display uniformly regardless of context.
- Be a standard, complete, consistent, accurate and uniform representation.
- Be compatible with recognised industry standards.
- Be usable throughout the BIM process, from early conceptual design to
- Facilities Management and operation of the building.

2.0 Planning a model family

When creating a Revit family, the intended use of the family in a project environment determines the extent to which it is designed. You can design all families to include a number of representations for use in different project views and project phases.

The type and size of the project that a family is intended for use in is a critical point to consider when deciding what representations should be included in the family and what level of detail each representation should have. The more detailed a family is, the larger its file size will be. The larger the file size, the slower the performance, loading and regeneration time of the family will be.

When considering the design intent of a family, use the following guidelines.

2.1 Determining the template to use

For objects typically hosted by other components, such as a window or light fixture, start with a host-based template.

For example, for a window or door, use a wall-based template, such as Window.rft or Door.rft. How the family is hosted (or what it does or does not attach to) determines which template should be used to create the family. In general, the choice of a template is driven by the host of the object. **With the following exceptions:**

- Floor-based objects typically use a level-based template unless they are required to cut the floor. For example, furniture objects are created with a level-based template.

- For objects that are designed to be used in more than one discipline, such as plumbing or lighting fixtures, use a host-based template that allows the greatest flexibility for all disciplines. For example, a lighting fixture used exclusively in an architectural discipline could be created with a ceiling or wall-based template, but for an engineering environment, a face-based template is required for the model linking workflow. Therefore, for a lighting fixture that will be used in both disciplines, use a face-based template.

2.2 Determine the family's use

Before you even open Revit, grab a piece of paper and plan your family. Although it may be tempting to jump straight in and start building your family, this can cause you problems later.

Some of the questions you will need to establish are:

- Is the family a generic family or a family based upon specific manufacturers' content? – This is a fundamental question to establish early on. Generally, a manufacturer's content is created with fewer parameters than generic content. For example, if a manufacturer only makes one table size, then why add a parameter to change its length?

- What parameters does the family need? – Think about what parameters are required. Adding additional unnecessary parameters will increase model size and decrease its performance. Think about what parameters may require scheduling.

- What template should you use? – See section 2.1. This is a critical decision that will affect how the family behaves, displays and schedules within your model.

- Family Intent & Purpose – Establish what the family is going to be used for and model appropriately for its intended use. Is the family an all-purpose family that can be used from concept to construction or is it targeted at a specific phase, i.e. construction.

- Level of Detail – This is an important concept covered in section 2.3. Decide early what the family representations will be at the different levels of detail (coarse, medium & fine).

- Does a PDT/S exist – A Product Data Sheet (PDT) is defined set of data that the industry has collectively agreed for a product type. If an 'approved PDT/S' exists you should collect this data and build it into your object (see section 7.4.3 for more

Important

Use the family planning checklist in Appendix 01 to assist you in this process.

2.3 Level of detail

Detail levels determine which pieces of family geometry display in different types of project view. When a Revit element is created with a family and added to a project view, the current detail level of the view (fine, medium, or coarse) displays the appropriate family geometry.

Families that include intricate levels of detail can impede performance when used in projects. For optimal family performance, only necessary family geometry should be modelled and the use of highly detailed representations should be assigned to an appropriate detail level.

When deciding what level of detail should be shown, use the following recommendations:

- Do not model geometry that will not be visible when the family is added to a building model. For example, for a table family that includes a drawer, model the face only, not the entire drawer and its contents.

- Do not duplicate geometry that can be used for different detail levels.

If the geometry is...	Set detail level to...
Smaller than 25mm	Fine
25mm – 75mm	Medium
Larger than 50mm	Coarse

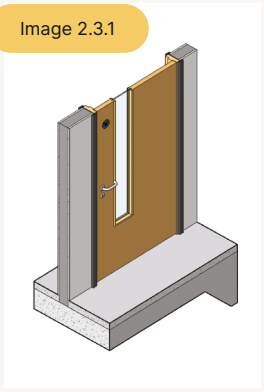
- Depending on the type of family, use the following guidelines when modelling geometry:

- Level of detail must be utilised on all families, regardless of type, using common sense to determine what is shown at each detail level.

- Although Revit has three 'Levels of detail' built into the software as coarse, medium and fine, these are referred to in BS8541-3:2012:

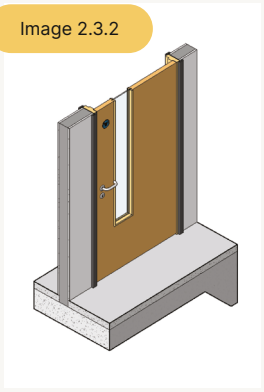
Revit Level of Detail	BS8541:3
Coarse	Schematic Level
Medium	Coordination Level
Fine	Visualisation Level

Image 2.3.1



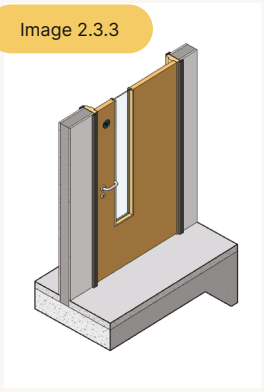
Coarse

Image 2.3.2



Medium

Image 2.3.3



Fine

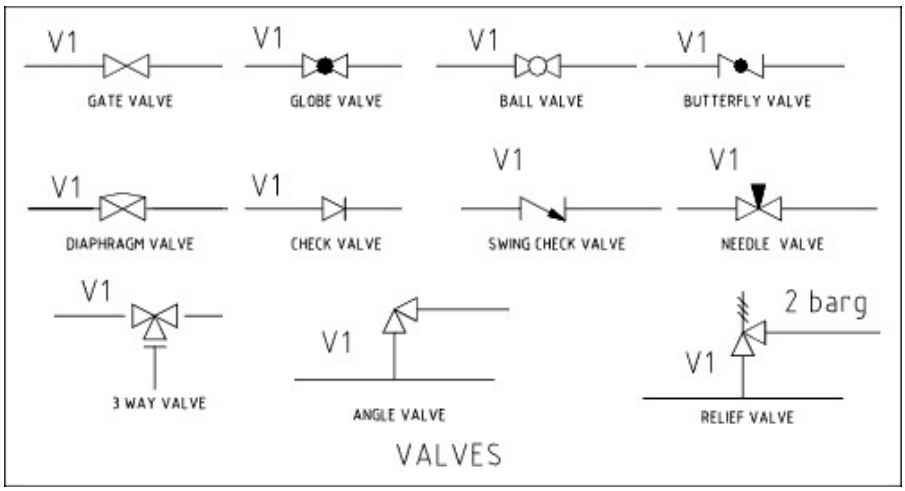
2.4 Element visibility

Typically, the geometry of an element created by a family will change depending on the current project view. The visibility settings of the family determine in which project views elements created with the family will display.

In a plan view, you may want to see a 2D representation of the element. In a 3D or elevation view, you may want to display a fully detailed 3D representation of the element. In other views, you may want to hide the element. Limiting the visibility of highly detailed family geometry to only certain views can improve project performance.

For some object types, you will need a means of displaying a graphical BS8541-2 convention at Coarse Level of Detail (Schematic Level). The Level of Detail and convention shall be appropriate to the construction product and scale. The BS8541-2 conventions should be followed and shall be a representation, a simplified representation or a symbol.

Image 2.4.1



Valves

Important

Please contact the Bimstore content team if you are unsure if your object type has a symbolic object requirement, as depending on object type the symbolic representation may be required across detail levels, as **section 2.3**.

2.5 Nesting families

A nested family is one that has been loaded into another family. In some cases, it can be convenient to represent parts of the nested family separately from the main family model. For example, you could create a door handle ironmongery family and load this into the door family. This allows you to build upon previous work while creating families suited to your needs.

Nesting family recommendations:

- Instead of nesting, consider creating all of the necessary geometry in the family. Use reference lines and labels to lock geometry in place.

- Limit nesting to two levels – The deeper that families are nested, the longer they take to update in the project file.

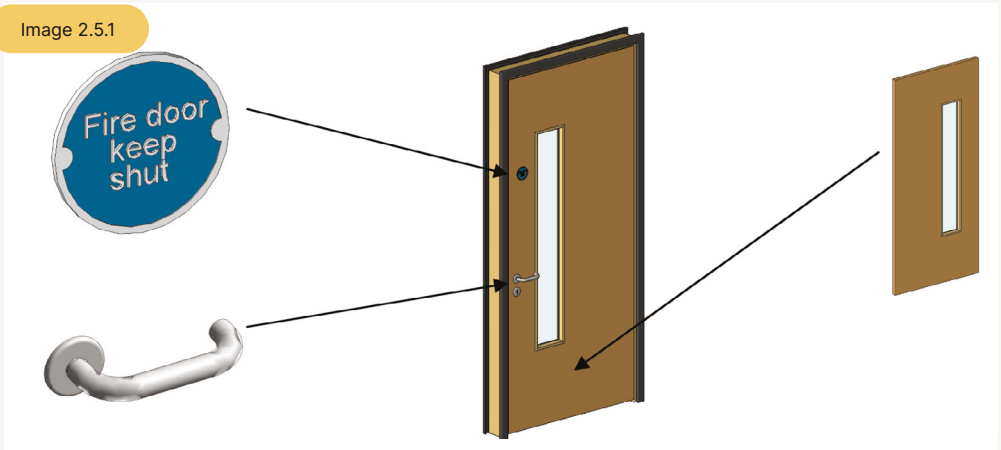
- Only nest high-value content that may be used in several different families, such as a door handle.

- Be careful when changing a nested component that is shared by more than one family.

- When you reload the component into the project file it will update all of the families in the file sharing the same nested family. You can stop this behaviour by unticking the “shared” button in the “category and parameters” dialogues.

- No more than six nested families should be nested into a single family.

Image 2.5.1



Example of nesting families

2.6 Family size

Although not as important as it was prior to Revit 2010, many large components can affect a Building Information Model's performance.

It is recommended to keep the components' file size as small as possible; however this must be considered carefully as one very large parametric family (that can be configured to almost any configuration) will be loaded into a project only once. The alternative would be many smaller individual families, but these individual families when combined can be larger (and just as cumbersome) as a single large flexible component.

It is recommended that a typical family be no larger than around 700kb, however every family and its functionality is unique so this can vary.

We recommend the following to keep your family as small as possible:

- Purge and audit your family prior to upload (be careful not to remove any material types you may have added!)

- Keep nesting to a minimum and ensure the nested objects are also purged and audited, including removing any unused types!

- Limit the use of custom materials and bitmaps whenever possible.

- Only model what is required to an appropriate level of detail. You will excite no one with your threads on screws!

- Remove any CAD or images used while building your component and purge to make double sure they've been removed!

- Never explode CAD into your family.

- Useful Tip: After building, try doing a 'save as' and save the family with a different name to test during creation. This removes any temporary history data and can reduce file size by as much as 50%!

Important

Nesting families increases the file size and affects performance, specifically the regeneration process of the family views. Remember to purge your nested families as well as your main host family before packaging for issue.

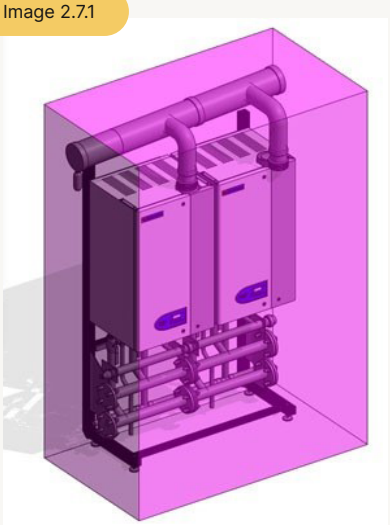
2.7 Space data and clearance zones

The BIM object may include 2D and 3D space zones to assist the specifier in placing or specifying the object:

- Minimum operation space
- Access space
- Placement and transportation space
- Installation space
- Detection zone space

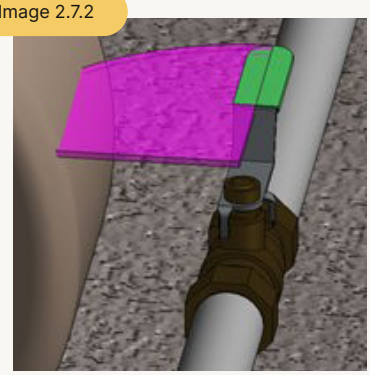
When space zones are used in an object their visibility must be controlled by a yes/no parameter and set not to display by default. See examples below.

Image 2.7.1



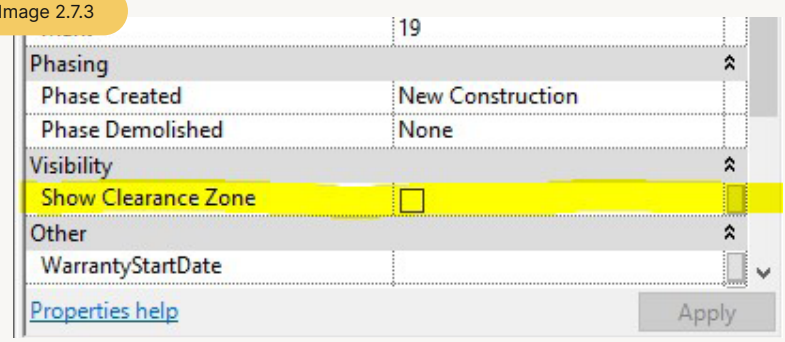
Clearance zone around a boiler

Image 2.7.2



Swing zone on a valve lever

Image 2.7.3



Example of a yes/no instance parameter for a clearance zone

2.8 Areas to avoid for optimal performance

Below are some of the common mistakes that are made when creating content for Autodesk Revit. After planning your family, review this table to prevent making the same mistakes.

Common mistakes when creating families...	Recommended approach...
Lack of planning prior to family creation	Before creating a family, use the guidelines outlined in 2.0 Planning a Revit Model Family
Unnecessary parametric relationships	Before adding geometry to a family: 1) Plan the parametric relationships and create a reference plane skeleton that features the main parametric relationships. 2) Build only the parametric family behaviour that you need to avoid over constraining the model.
High levels of geometric detail and under-use of visibility settings	Use the guidelines in the 2.3 Level of Detail and 2.4 Element Visibility sections of this guide to avoid unnecessarily large family files
Use of geometry instead of symbolic lines in plan views	In plan view representations, geometry usually can be represented with symbolic lines, rather than (solid) geometry. Using geometry instead of symbolic lines will create an unnecessarily larger family
Overuse of voids, formulas and arrays	Extensive use of voids, formulas and arrays will add to the overall family size and affect its performance in projects
Use of too many nested families (families imported into other families)	Nest families to create geometry in other families only when necessary. Only use nested content to share objects among multiple families, for example, door hardware, muntin patterns, and so on
Large families with many types that do not include type catalogues	The more types (particularly unused) the heavier the family. Create type catalogues for families that contain six or more types
Inadequate family testing	See section 13.0 General Family Testing Guidelines
Using of non-native CAD geometry	Importing geometry from other design packages can severely limit functionality and parametric capability, increase possibility of corruption and cause file size bloat. Where possible, always use native Revit geometry over importing from other packages (see section 3.2).

3.0 Content creation workflow

Before you create a model family, review the standards in this section and then use the best practice workflow below to create your content. This workflow helps to ensure that your content is created in the most efficient and least error prone manner.

1. Create a new family file (.rfa) with the appropriate family template.

2. Define subcategories for the family to help control the visibility of the family geometry.

3. Create the family skeleton, or framework, usually using reference planes or lines;

    a. Define the origin (the insertion point) of the family. In most families, the template will already have this defined.
    b. Lay out reference planes to snap to when you sketch the component geometry.
    c. Add dimensions to specify parametric relationships.
    d. Label dimensions to create type or instance parameters or 2D representation.
    e. Test, or flex, the skeleton.

4. Define family type variations by specifying different parameters.

5. Add a single level of geometry in solids and voids and constrain the geometry to reference planes.

6. Flex the new model (types and its hosts) to verify correct component behaviour.

7. Repeat previous steps until the family geometry is complete.

8. Specify 2D and 3D geometry display characteristics with subcategory and entity visibility settings.

9. Save the family, and then test it.

10. For large families that include many types (8+), create a type catalogue.

3.1 Areas to avoid for optimal performance

If you need to create a number of similar families, plan and create a “prototype family”. Test the prototype family (section 13) in the family editor and in a project environment to identify any problem areas and inconsistencies. Correct any errors and inconsistencies and retest the family to ensure it works properly before creating any additional families. This prototype family can now be stripped and used as a template and a benchmark for the additional families.

3.2 Conversion from fabrication/digital prototyping software

We understand that many product manufacturers and content creators may already have digital models of their products in platforms such as Autodesk Inventor, Solidworks, Catia and Siemens NX etc.

Models produced in these platforms are generally created for manufacturing and fabrication purposes and as such are not suitable for consumption by a parametric BIM platform such as Autodesk Revit without some modification. Generally any fabrication content should be simplified or 'shrink wrapped' and exported as a .SAT (solid) format before importing into the most appropriate Autodesk Revit template. The .SAT can then be exploded which will turn the .SAT solid into native Revit geometry (Autodesk Revit version 2015 and above only).

3.2.1 Areas to avoid for optimal performance

Starting in the 2010 release of Autodesk products, the Autodesk Exchange format (.adsk) provided a method for manufacturers to leverage Digital Prototypes to produce Revit Families in the Autodesk exchange format (.adsk).

In Revit 2015 onwards the tool was further improved to convert Autodesk Inventor geometry to native Revit geometry, however this rarely works on anything but the most basic content. Bimstore only accept native Revit geometry and currently does not accept the .adsk exchange format for content due to known limitations around LOD, .SAT import issues and limited functionality as highlighted below:

- As a result of the model simplification process in Inventor and differences between the Inventor and AEC product's parametric geometry handling, the geometry that is currently produced for AEC applications through the AEC Exchange Environment is static and cannot be edited directly by the Revit user. It will appear as imported geometry (.SAT).

- ADSK files do not currently contain visual appearance information, and there is no way within Revit products to manually modify their text.

- ADSK files do not currently support Revit Hosting behaviour and therefore the content cannot be placed on Faces of Building Elements, or have holes cut in them. Integrating the content into a Revit family (.rfa) file can help remove this limitation.

- Light Source Definitions cannot currently be defined in ADSK files, and thus must be manually added in the Revit environment, if needed. Integrating them into a Revit family (.rfa) file can help remove this limitation.

4.0 Family units

All content created by Bimstore must be created in Metric. This is established at template selection and as long as you are using the Bimstore family template, the units will be set to Metric.

Although families can be created as unit-specific (imperial or metric), Revit software stores all coordinates in universal units and displays specific units according to user preference. This means that:

- Units can be set to display as necessary for a target audience (i.e., display as decimal units for a civil engineering drawing or fractional units for an architectural drawing).

- Families created in imperial units may be loaded into and used in metric projects and vice versa.

- Although reverse engineering someone else's family can cause unforeseen problems, sometimes it is necessary. When reverse engineering a family, it may be necessary to change the units of the family to aid the reverse engineering process. For more information on how to do this refer to the Revit Help Documentation.

5.0 Family naming

Family names are the primary means of identifying families in the Revit software.

Bimstore family naming conventions are created in accordance with BS8541-1:2012, which ensures that families can be identified in 70 industry standards, Bimstore and the Revit software itself. The naming conventions include descriptions that allow the user to search for families by element, by manufacturer and/or base units.

5.1 Family (component) naming

Guidelines

- Create unique names for each family. For example, a fixed window family and a fixed door family cannot share the same name.

- Use natural language to name a family. The family name should describe how the family is identified in the real world (i.e in catalogues, by manufacturer, etc).

- If possible, do not include the family category in the family name, unless the functional type is the same as the category (e.g. window).

- Use 'Title Casing' (as with the title of a book) for family names, as they are case sensitive.

- Keep file names as short as possible.

- When adding optional descriptions to family file names, consider the order in which the descriptions are listed to ensure that the family files display in the Project Browser in the most logical and intuitive order.

- Do not use spaces between words in file names. To separate words within a syntax element (e.g. Manufacturer or Descriptor) use the underscore character (_).

- If a hyphen (-) is used to include a performance range, enclose the range in parentheses, for example, (230-250_Ton).

- If a type catalogue is to be used with a family, name the type catalogue (txt.file) with the same name as the family. See section 10.0 for additional information.

- If a system family (wall, roof, railing, floor, stair) the [function_type] field can be omitted as it is clear what the component is by the system selection.

- If the content is from an external source and not named in accordance with this guide, the family must be renamed in accordance with this guide.

Format

All families created for Bimstore must be named in the following format:
< Source > _ < Type > _ < Product> _ < Differentiator/Descriptor> _ <2D if necessary>

An example family for an internal flush face door made by a company called Laidlaw would be for example:
"Laidlaw_Doorset_FlushFace_Internal"

An example family for a domestic condensing boiler made by a company called Baxi would be for example:
"Baxi_Boiler_DuoTech_DomesticCombi"

A thermally broken HTlight aluminium casement window made by a company called Acme would be:
"Acme_Window_HTlight_ThermallyBrokenAluminiumCasement"

Field/Component	Required or Optional	Description
<Source>	Required	Used to identify the library object manufacturer. The manufacturer name shall not be abbreviated.
<Type>	Required	Used to identify the object type.
<Product>	Required	Used to convey additional information to further define the construction product, such as the product range. This field can also be used to identify the predefined (Sub)type.
<Differentiator/ Descriptor>	Optional	Brief plain-English description of the component or to convey additional specialist information not captured in property data
<2D>	As needed	Use only 2D families

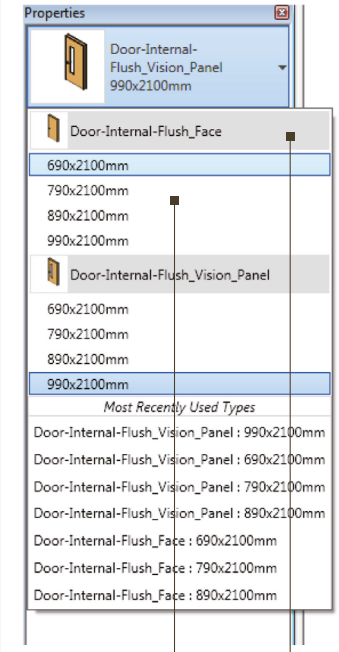
5.2. Type naming conventions

All families must include one predefined type. For families that create real-world objects that are available in standard sizes, predefined types should be generated. Unless they represent nominal sizes, type names should include units or capacity and include a unit indicator. When naming a family type, use the format and rules below:

Guidelines

- Do not include the family name or category in the type name.
- Type names should mirror actual usage.
- Type names should indicate the key differences between types (size, count, material) and, when applicable, reflect standard sizes. In some cases, you may base names on size difference, but use common terms rather than numbers.
- When types are named by size, use dimensions only. Avoid the use of characters or words (h, w, d, or height, width, depth).
- Type names should include units or capacity and a unit indicator, unless they represent nominal sizes.
- Metric types should reflect the local unit standard, unless the types are intended to be generic.
- Keep type names as short as possible. Type names must display in dialogues and in the Type Selector.

Image 5.2.1



Format

Unless there is a market-specific reason to do otherwise, use the following general order in type names:

- For doors and windows: <width> x <height>
- For casework and furniture: <width> x <depth> x <height>
- For other element types: <width> x <depth>

Further examples for an imperial window:

- 200mm x 600mm
- 1500mm x 600mm
- 1800mm x 600mm

6.0 Category and subcategory standards/usage

All families, including generic families, must be assigned to appropriate categories and subcategories.

When a family is created, it is assigned a category. The category defines its top level of identification (e.g, Door, Window, or Casework) within the project environment. When the family is used in a project, the family can be located in the Project Browser under its category and elements created by the family types will schedule by its category. The line weight, line colour, line pattern and material assignment of the family geometry can also be assigned by category.

To display different line weights, line colours, line patterns and material assignments for different geometric components of the family (e.g. the frame, sash, mullions and glass that comprise a window), the components can be assigned to subcategories within the family category.

Categories are predefined in Revit software and cannot be created or changed by the user. Subcategories are predefined in some families, but other subcategories can be created in families as needed.

Important

For the most part, the subcategories required will be automatically defined in the family template.

7.0 Bimstore parameter usage

Families contain parameters that not only create the family geometry, but identify or classify the elements that are created by the family. All families have predefined parameters that you assign values or data to, but you can add parameters that are not predefined in Revit software.

The Bimstore template that you use to create your family (see section 2.1) will contain the minimum parameters required to meet these family creation guidelines and industry standards such as BS8541-4:2012.

Should you wish to add additional parameters, then ensure that these are created as 'shared parameters'. These should be defined in an shared parameter .txt file that is independent of family and project files.

If you add a shared parameter which you think would be useful for future families, you can request that the parameter is added to the Bimstore standard templates via our contact form. If you are adding shared parameters to system files, you must ensure that the file is included with the upload to Bimstore as a .txt file.

Important

Family Parameters; should only be used in place of shared parameters in a situation where the data is not required to appear in schedules or tags, or where used formula prevents shared parameter use.

7.1 Parameter naming convention

Consistent parameter naming enables easier and more comprehensive parametric searching. Create parameters only when variation creates meaningfully differentiated types that represent real-world possibilities.

Guidelines

- Use standard approved parameter names when available.
- Keep parameter names as short as possible.
- Avoid abbreviation and truncation when possible.
- Use 'Title Casing' (as with the title of a book) for parameter names, as they are case sensitive (e.g. Coefficient of Performance; Point of Shipment; High and Low Pressure
- Gas Connection Diameter).
- Do not change label names provided by the Bimstore family templates.
- Parameter names that you reuse to create equalities should be carefully checked for name coherence.
- Use the most common descriptor for a group of parameters as the first part of the name so that the parameters sort logically (e.g. Filter Face Area; Filter Efficiency).
- Avoid using symbols in parameter names, including: + - / \ * ( ) " ' < > | ^ $ { } [ ].
- Do not include units in the name of a parameter (e.g. Supply Air Flow CFM).
- Using the terms Actual or Design:

a. Actual – describes the actual value the system definition requires. "Actual" parameters are linked to connectors and are often used for parameters that define flow rates, for example, Actual Supply Air Flow; Actual Chilled Water Flow.
b. Design – describes what the product is designed to do, for example, Design Ventilation Air Flow; Design Return Air Flow.

- Name Yes/No parameters so they imply that they return a Yes/No value, for example:

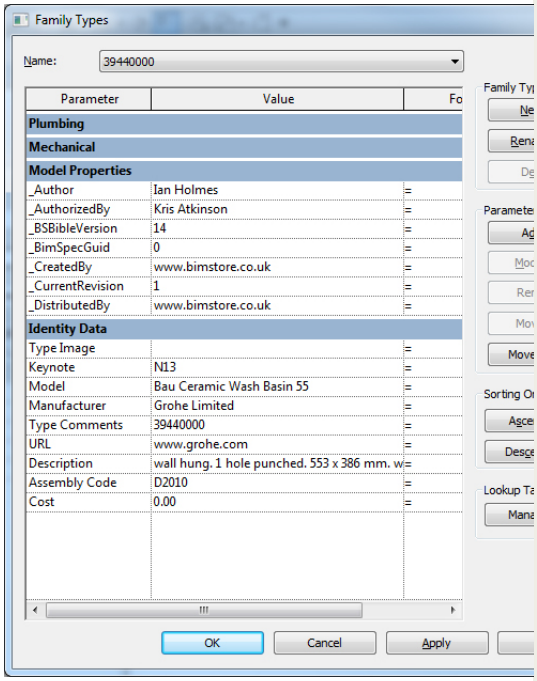
  a. Has Handle
  b. Is Energy Efficient
  c. Show Hoods

7.2 Correct use of the Bimstore parameters

By default you will notice six parameters under the "Model Properties" category of the template. These parameters MUST be completed before the family is uploaded to Bimstore or used in a 'live' project environment.

Parameter name	Description	Type of Parameter
_CurrentRevision	Current Bimstore revision of the current family. This is numerical and should begin at 1.	System (Integer)
_CreatedBy	This should read "www. Bimstore.co " or your own URL if created in-house.	System (URL)
_DistributedBy	This should read "www. Bimstore.co "	System (URL)
_Author	The authors name, i.e. your name	System (Text)
_BimSpecGuid	Leave this field blank, this will be completed by Bimstore	System (Integer)
_BSBibleVersion	Version of Bimstore Bible with which content is compliant	System (Integer)

Image 7.2.1



Family types properties

"_CurrentRevision"
This parameter should be maintained when editing and updating families. This should start at 1 and progress per family revision.

"_CreatedBy"
This parameter should always reference the Bimstore website.

"_Author"
This should be the name of the person who made the original family and should not be changed when the family is revised. You may use a URL in this field to link to a company website, if appropriate.

"_BimSpecGuid"
This is used by Bimstore to identify this component and link it with property dimensions in Bimstore and other future software packages.

7.3 COBie parameters to BS1192:4

All Bimstore content must have the correct COBie parameters. These parameters are used to create COBie Information Exchanges (a standard format Excel file) that can be utilised by third party software and organisations.

COBie (BS1192:4) is quickly becoming the standard information schem a in the UK and many organisations - including the UK Government - are now asking for a completed COBie file as a deliverable upon occupancy of a building. It is important that all Bimstore content is compatible with COBie (defined in BS1192:4), and that when a COBie file is created from the building information model the data is transferred in the correct schema.

Not all COBie fields require a value, for example "WarrantyStartDate" will be entered by the contractor or client upon handover of COBie. However, it is important that this parameter exists when it is exported. The component shall have completed COBie values where known and shall not include unset or undefined values. Where the information is unknown, not applicable or not available a default value 'n/a' shall be used. If the datatype restricts the use of an alphanumeric value, the appropriate value to that property shall be used, e.g. '0'.

All COBie parameters must be saved in the 'Other' category in Autodesk Revit and where there is duplication between hard coded Revit parameters and COBie parameters, the data should be mapped between fields, e.g. 'Fire Rating' (hard coded) should be mapped to the IFC property 'FireRating'.

The minimum MANDATORY COBie parameters for all Bimstore content are:

Type or instance	Parameter name	Description	Value Type	Value Required
System	Name	“Acme_Window_HTlight_ ThermallyBrokenAluminiumCasement”.	Text	Default
System	Description	Mediascape is a unique solution answering the triple challenge companies’ face in making their workplaces work better - making teams more productive and creative, optimising m² of collaborative space and providing seamless and instant access to technology and information.	Text	Default
Type	TypeName	2000mmx2000mmx900mm Square Top	Text	Required
Type	AssetType	Fixed	Text	Required
Type	As needed	Use only 2D families	Text	Required
Type	CreatedBy	technical@acme.com	Text	Required
Type	CreatedOn	2017-02-26 T09:00:00	Text	Required
Type	Manufacturer	Acme Inc	Text	Default
Type	Model	MediaScape MV	Text	Default
Type	ModelNumber	ModelNumber	Text	Required
Type	ModelReference	MediaSpace MV	Text	Required
Type	ManufactureName	Steelcase Inc	Text	Required
Instance	AssetIdentifier	AT002-323-232T	Text	Blank
Instance	BarCode	392324411002	Text	Blank
Type	AccessibilityPerformance	n/a	Text	Optional
Type	CodePerformance	n/a	Text	Optional
Type	Consitituents	MediaScape Media Screen, MediaScape Adjustable Desk Unit	Text	Optional
Type	DocumentationTechnical	http://acme.com/literature/ Technicalguide.pdf	URL	Optional
Type	DocumentationCertificates	http://acme.com/certificates/ Certificates.pdf	URL	Optional
Type	DocumentationLiterature	http://acme.com/literature Salesbrochure.pdf	URL	Required
Type	DocumentationInstallationGuide	http://acme.com/literature/ Installationguide.pdf	URL	Optional

Type or instance	Parameter name	Description	Value Type	Value Required
Type	DocumentationMaintenance	http://acme.com/literature/Maintenanceguide.pdf	URL	Optional
Type	WarrantyGuarantorParts	aftercare@acme.com	Text	Required
Type	WarrantyGuarantorLabour	aftercare@acme.com	Text	Optional
Type	WarrantyDurationLabour	20	Integer	Optional
Type	WarrantyDurationParts	20	Integer	Required
Type	WarrantyDurationUnit	Years	Text	Required
Type	WarrantyDescription	20 year labour and part warranty. Warranty excludes hinges	Text	Required
Type	Cost	545	Number	Optional
Type	ReplacementCost	545	Number	Optional
Type	ExpectedLife	30	Integer	Required
Type	DurationUnit	Years	Text	Required
Type	Shape	Rectangle	Text	Optional
Type	Size	2000×2000	Text	Optional
Type	Colour	White	Text	Optional
Type	Finish	Matt	Text	Optional
Type	Grade	n/a	Text	Optional
Type	Material	MDF	Text	Required
Type	Features	Extendable table top, power assisted height adjustment	Text	Optional
Type	SpareParts	Hinge Cover(23232), USB Port (22844), Spring Kit(34311)	Text	Optional
Type	ProductionYear	2017	Text	Optional
Type	ReferencedStandard	EU9231	Text	Optional
Instance	WarrantyStartDate	2013-12-12T13:29:45	Date	Blank
Instance	InstallationDate	2013-12-12T13:29:45	Date	Blank
Instance	SerialNumber	2013-12-12T13:29:45	Integer	Blank

Important

For the most part, the subcategories required will be automatically defined in the family template.

7.4 Classification parameters

BS8541-1:2012 is defined as the classification system used in BIM objects. For UK content, Uniclass2015 should be used and all content must have the following parameter with the correct Uniclass reference from "Table L-Products" or Table G-Systems".

Please note that as well as adding a shared parameter to the object as above, it is important to define the classification within the classification settings of the object itself as shown in section 7.5.

Parameter Name	Example Value	Description
ClassifcationName	Uniclass2015	Name of the classification system e.g. Uniclass2015
ClassifcationValue	Pr_40_20_76_90	Classifications value of the object

7.4.1 NBS Create parameters

The following parameters should be added to content to allow the minimum compatibility with NBS specification products, e.g. NBS Create. Depending upon the object type there may be additional parameters that can be added. Please seek advice from Bimstore about the parameters that may be required for your product type.

Name	Example Value	Description
NBSObjectName	ACME HardwoodTimberDoor	The name of the object as it will appear in NBS Create
NBSReference	45-35-72/374	Alphanumeric value of the appropriate NBS clause reference from https://toolkit.thenbs.com. The clause reference shall be in the format xx-yy-zz/nnn where xx-yy-zz is the NBS section code and nnn is the 3 digit NBS clause number. This code can also be taken from the NBS BIM Tool Kit.
NBSNote		Leave Blank
NBSDescription	Towel rings	Alphanumeric value of the appropriate NBS clause title from https://toolkit.thenbs.com. If the value is not known or not available, the property shall be completed with 'n/a'.
NBSOfficeMasterTag	n/a	Always put n/a
BIMObjectName	AcmeInc_ClassroomSeating_UltimateStool	Object name as per section 5.1. Do not include file extension (e.g. .RVT).

7.4.2 IFS parameters

By adding IFC parameters you will increase the overall effectiveness of the 'Revit to IFC' export process. Revit handles the minimum IFC parameter requirements upon export to IFC, however by adding the parameters below it will improve accuracy and interoperability with other platforms where the exported IFC may be utilised.

Although below are the minimum requirements required to allow your objects to be exported to IFC, it is worth referring to the Building Smart website for a more detailed breakdown of the IFC 2×3 TC1 fields by product type and adding any additional information that you feel may be beneficial to your product. http://buildingsmart-tech.org

Parameter Name	Example Value	Required	Description
IfcExportAs	Chair	Mandatory	The Export type
IfcExportType	IfcFurnishingElementType	Mandatory	The IFC export Type
NominalLength	600	Optional	Nominal Length
NominalHeight	900	Optional	Nominal Height
NominalDepth	550	Optional	Nominal Depth

Important

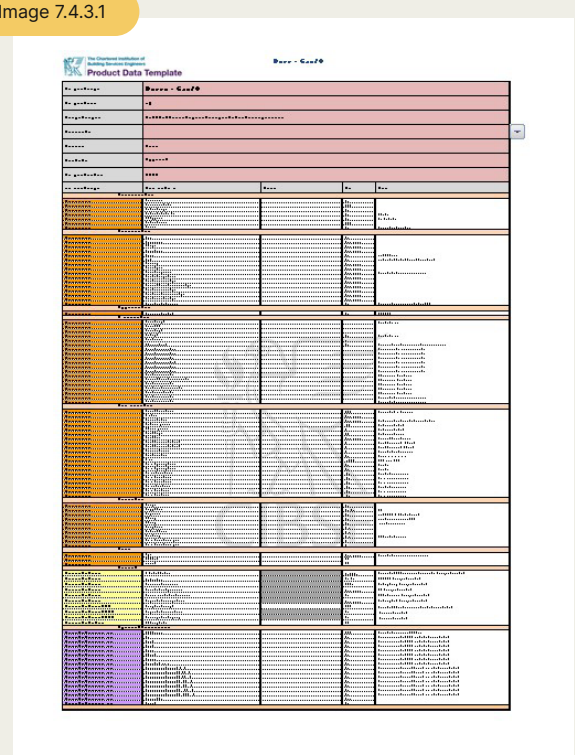
Ensure that all the above IfcExportAs and IfcExportType parameters are saved under the 'IFC Parameters' category in Revit.

7.4.3 Product Data Sheet/Templates

Product Data Templates are set property sets (parameters) that various UK construction industry bodies have agreed is required data that should be made available for each construction product. Once you complete the Product Data Template (PDT) with your product data it becomes a Product Data Sheet (PDS).

The concept of PDTs has now expanded, with various working groups working on defining these templates for standardisation of product data. Most of these groups are working to the European CEN 442 standard, for product data. Because of the limited number of approved PDTs currently available to the industry, Bimstore only enforce that PDT data is required for products where an approved PDT is publicly available. You should check if there is an APPROVED product data template available for your object category before creating your content. Your local association should be able to assist you to establish is a PDT is available.

Image 7.4.3.1



Typical product data template

Important

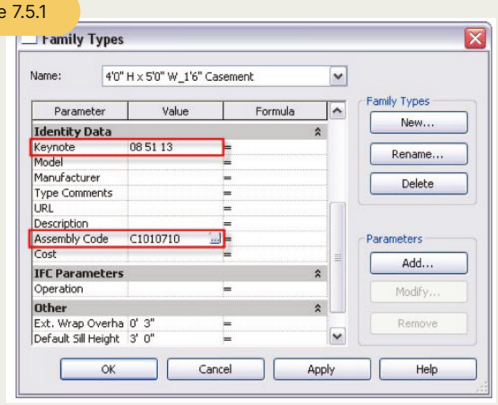
Product data templates are NOT a requirement of the Government's 2016 Level 2 BIM mandate. The minimum data required for the Government's Level 2 BIM mandate is defined by BS1192:4 which is COBie (see section 7.3).

7.5 Assigning the Assembly Dode and Keynote Data

Even though your objects should include a classification code - see section 7.4, Revit requires that the Keynote and Assembly Code should be assigned to each family type so that it understands the object type and how it should display and behave in a project.

1. Open the Family Types dialogues for the family.
2. Under Identity Data, for Keynote, enter the NBS reference appropriate for the family content. Refer to the NBS website for a list of classification codes (based on CI/SfB classifications).
3. Under Identity Data, for Assembly Code, click in the Value field, and click the browse button to select the appropriate Assembly Code from the dialogues.
4. Repeat the procedure for each type in the family.

Image 7.5.1



Family types properties

7.6 Assigning Masterformat and Uniformat classification

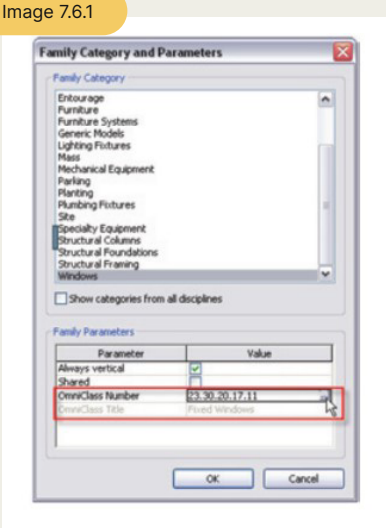
The OmniClass 1.0 code is assigned to the family. You do not need to assign it to each family type.

1. In Revit, open the Family Category and Parameters dialogues.
2. Under Family Parameters, for OmniClass Number, click in the field, and click the browse button to select the appropriate OmniClass code from the dialogues.

Important

Notice that the OmniClass Title value is added automatically.

Image 7.6.1



Family categories and parameters

7.7 Protecting your content with DigitalDNA

All Bimstore created content can be watermarked with a proprietary technology called DigitalDNA.

This allows content to be digitally marked with owner and creator information at binary level. This means that your content is protected from theft and any suspect content can be checked at a later date to establish if it originated from your content.

- Does not increase file size
- Does not affect operation of the object
- The DNA is invisible and the object behaves just like a normal object
- 256 bit encrypted
- Cannot be removed (apart from by Bimstore)
- All content is signed and sent to our cloud server for future validation purposes
- Digital DNA cannot be added into content prior to Revit 2016.

Important

Although Digital DNA is an internal tool used by the Bimstore content creation team on all Bimstore created content, Bimstore offer injecting DNA into your own authored content on request (info@Bimstore.co). We also licence the technology to third party companies if you require this capability yourself.

8.0 Material naming conventions

All Bimstore created families must contain accurate, realistic finishes. This means that finish materials must be assigned to the family geometry.

Finish material naming conventions organise the material by manufacturer and from general description to more specific description. Depending on the type of material, a finish material name may include a colour, code, finish type, or identification number.

It is important when creating materials within a family to give them a manufacturer prefix- for example “Acme_Chrome”. This prevents the material from being overwritten by other materials contained in the project when inserted.

8.1 Material naming

Guidelines

When creating materials for use in Bimstore families, it is important that the following guidelines are observed.

- Finish names should indicate the key differences between materials (Manufacturer, Type, Colour, Finish) and, when applicable, reflect standard sizes. In some cases, you may base names on size difference, but use common terms rather than numbers.

- Finish names should reflect the local unit standard, unless the materials are intended to be generic.

- Keep finish names as short as possible.

- Where possible, the standard Revit materials should be used when applying materials in families. A standard material should be duplicated and renamed in accordance with the guidelines set out in this section.

- Use camelCase instead of spaces.

Important

To optimise the file size for families with a large number of available materials, provide only the most common materials in the family and provide the remaining materials in a separate finish library. See the Finishes part type guide for more information.

8.1.1 Name format for individual finish materials

<Finish Type> - <Manufacturer> - <Code> - <Descriptor>

Examples:

- Paint - Acme Paint - AC 440 - Vintage Brown Matte
- Glass - Acme Glazing - Series 1205 – Clear
- Aluminium - Acme Metal - AC120 -Anodized (Clear)
- Fabric - Acme Fabrics - AC F820 - Hounds tooth - Black/White
- Stain - Acme Windows - Natural Wood Finish

8.2 Material ‘image’ naming

If a standard material cannot be modified to suit, then a custom material may be made. These materials can consist of a number of images, bump, cut-out maps etc.

These guidelines must be followed for the creation and naming of these images:

- Create unique names for each unique material image.
- Capitalise the leading letters in each portion of the material name.
- Do not use spaces between words in file names. To separate words within a syntax element (e.g., Manufacturer or Descriptor), use the underscore character (_).
- Acceptable file formats for material images include: bmp, jpg, jpeg and png.
- Provide a readme file to describe where the image files must be located and how to map Revit to the “Revit Manufacturer Library“ folder in the Rendering Options dialogues. This file must be included in the .zip file when it is uploaded to Bimstore.

Examples

Image File:

- Paint-Acme_Paint-AC_440-Vintage_Brown_Matte.jpg
- Stain-Acme_Windows-Natural_Wood_Finish.jpg

Bump Image File:

- Paint-Acme-Paint-AC-440-Vintage_Brown_Matte-bump.jpg

Cutouts/Perforations:

- cutout.jpg Aluminum-Acme_Fencing-AC120-Anodized-cutout.jpg

8.3 Custom Materials

Wherever possible, it is recommended that any custom materials that you create within your family use the standard Revit bitmaps with adjustment to the material settings.

If your material requires a custom image file/bitmap ensure that the image and any associated bump-map or cut-out image files are copied to and loaded from the following local directory (replace XXUNIQUE-ID with your company name).

C:\LocalRVT\Bimstore\Materials\XX-UNIQUE-ID-XX

All custom material image maps used in your family must be included in the zip file upload in a folder called “Materials” as shown.

9.0 Preview image standards

A family preview image is a reduced thumbnail image of a 2D or 3D family view that graphically identifies a family before it is downloaded or opened.

Preview images display in:

- Thumbnails view in Microsoft® Windows Explorer
- Bimstore search results
- The Preview window in Revit Open and Load Family dialogues when a family is selected.

By creating preview images that adhere to Bimstore standards, users can view consistent previews across families, ensuring a consistent user experience both in the Revit software and third party libraries such as Bimstore, Autodesk Seek, etc.

To create a preview image, begin by creating a family view to use exclusively for the preview image. Although you can save any family view as the preview image view, the best practice is to create a view that can be set to consistently display as is required for the preview image.

After you create the view, set Autodesk standard graphic controls in the preview image view to ensure visual consistency with the preview images of other Revit families.

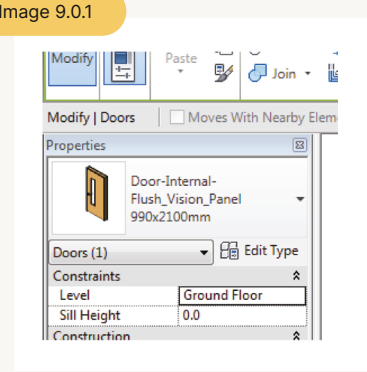
Different graphic standards exist for the following types of family preview images:

- Detail component and annotation families
- Hosted model component families.

Important

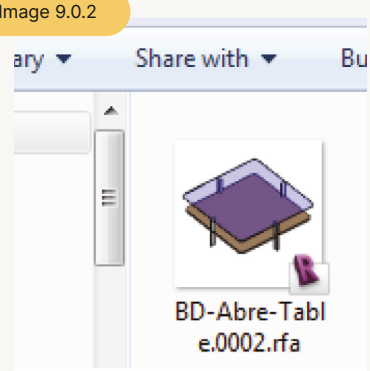
When modifications to the preview image view are complete, save the view and set the family to use the current view as the preview image. Each time you save and close the family, you must ensure that the preview image view is the active (open) view so it will display as the preview image.

Image 9.0.1



Preview in Revit

Image 9.0.2



Preview in Windows Explorer

Image 9.0.2

Preview in Bimstore

9.1 How to create a detail component preview image

For an easily identifiable detail component preview, set the preview image to display the 2D view that features only the component line work and filled regions.

To do this you must:

1. Open the detail component family for which you want to create a preview image.

2. Turn off dimensions, ref planes and parameter labels etc.

   a. Click View menu
   b. In the Visibility/Graphic Overrides dialogues, click the Annotation Categories tab.
   c. Under Visibility, clear Dimensions, Levels, Reference Lines and Reference Planes.
   d. Click OK.

3. On the View Control Bar:

   a. Click the current view scale and depending on the family units, click 1:10, 1:5.
   b. Click Detail Level and click Fine.
   c. Click Model Graphics Style and click Wireframe.

4. Click Save.

5. If you are creating a preview for a host-based family, set the host visibility:

   a. For family previews in which the host should not display, select all host categories.
   b. Click OK

6. Set standard view controls in the Preview view, on the View Control Bar:

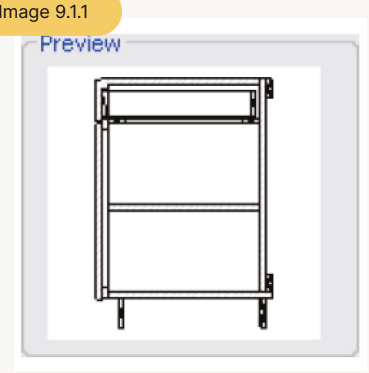
   a. Click the current view scale, and depending on the family units, click 1:10 or 1:5.
   b. Click Detail Level and click Fine.
   c. Click Model Graphics Style and click Shading with Edges.

7. Set the preview image to display the current view, on the View Control Bar:

   a. Click File menu - Save As.
   b. In the Save As dialogues, in the lower-right corner, click Options.
   c. In the File Save Options dialogues, under Preview, for Source, select “3D View: Preview”, then select “Regenerate if view/sheet is not up-to-date”.
   d. Click OK.

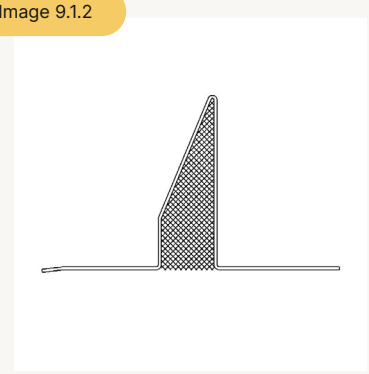
8. Click Save.

Image 9.1.1



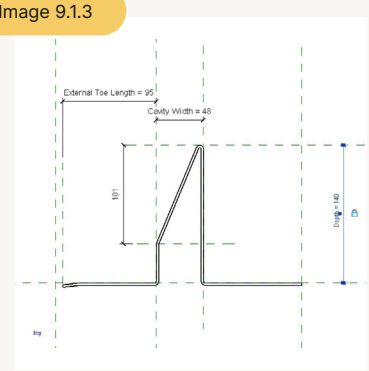
Preview

Image 9.1.2



Correct

Image 9.1.3



Incorrect

9.2 How to create a model component image

Use the following steps to set up your own preview image for model families, such as doors, windows, furniture, etc.

To create a view to use as the preview image

1. If necessary, open the family for which you want to create a preview image.

2. In the Project Browser, select a view of the family that you want to use:

   a. For a door or window family, select an elevation view (preferably front).
   b. For other model component families, select a 3D view.

3. Right-click the view name, and click Duplicate View-Duplicate.

4. Rename the duplicate view:

   a. In the Project Browser, right-click the view name, and click Rename.
   b. Type Preview and click OK.
   c. Click No to rename the names of corresponding views and levels.

5. If necessary, open the view.

6. Depending on the type of component that you are creating, set the view orientation:

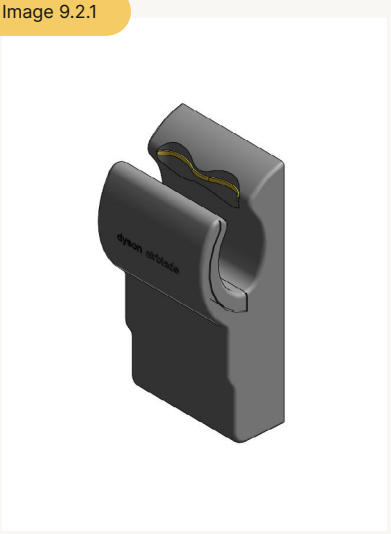
   a. For a door or window family in an elevation view, on the View Cube, click
   b. For other families that display in a 3D view, on the View Cube, click to set a south east orientation, right-click, and click Set Current View as Home. Turn off visibility of dimensions and reference planes/lines and if necessary set host visibility

7. Click View menu - Visibility/Graphics.

8. In the Visibility/Graphic Overrides dialogues, click the Annotation Categories tab.

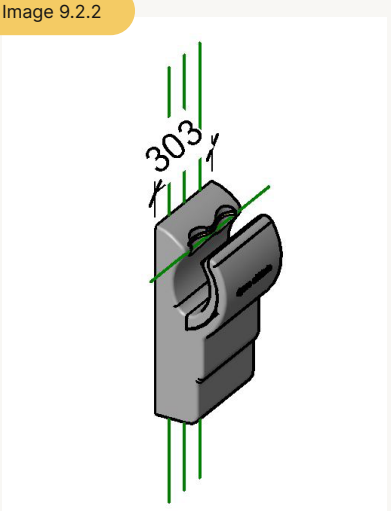
9. Under Visibility, clear Dimensions, Levels, Reference Lines and Reference Planes.

Image 9.2.1



Preview in Revit

Image 9.2.2



Preview in Revit

10.0 Type catalogue standards and usage

A type catalogue is a comma-delimited .txt file which, when placed in the same directory as a family, displays a list of family types before the family is loaded into a project.

You can select and load only the family types that the current project requires, avoiding an unnecessary increase in project size from unused types and a long list of types in the Type Selector. The type catalogue also provides an external means of editing the family, as you can remove and add parameters and types in the catalogue file (.txt).

Important

Only use 'Type Catalogues' when your family contains more than eight preconfigured family types.

10.1 How to create a type catalogue

Use the following steps to set up your own preview image for model families, such as doors, windows, furniture, etc.

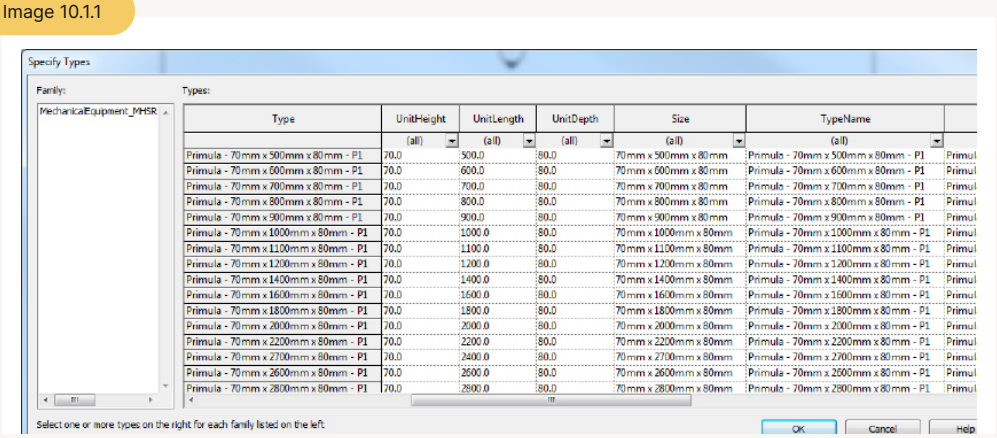
Use the following standards when creating type catalogues:

- Use any text editor to create type catalogues.
- Create type catalogues for families that contain eight or more types.
- Name a type catalogue file (.txt) with the same name as the family file (.rfa) that it supports.
- Ensure that parameters in type catalogues are test loaded by the family for which you create the type catalogue. If the parameters are not used, the family will not load.
- When uploading a family to Bimstore, ensure that the type catalogue is included in the .zip upload.

Important

For information on creating a type catalogue, see "Creating Type Catalogues" in the Revit Help and Families Guide.

Image 10.1.1



Type catalouge

11.0 Material application in model families

Materials can be applied to families to depict the realworld display of elements created with the family in shaded and rendered views.

Depending on how you apply materials to a family's geometry, you can control the user's ability to modify the materials of elements that they create with the family.

Use these guidelines to apply materials to family geometry:

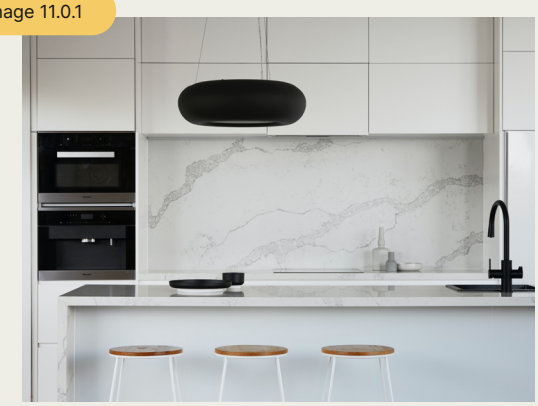
If possible, use the materials that are available in the Revit software when assigning materials to family geometry. If you need to create a material, make sure that the material name conforms to the naming conventions described in the Material Naming Conventions topic (Section 8.1).

If you want to...	Then...
Use materials that will not need to be changed	Option 1 - Apply the material directly to the family geometry by assigning it to the Material parameter
Use materials that will not need to be changed	Option 2 - Apply a material to the family category create subcategories, assign materials to each subcategory and assign subcategories to geometry
Change the material for a geometric component in a family by instance or type	Option 3 - Create an instance or type material parameter and assign it to the appropriate family geometry. NOTE: This is the most flexible and preferred method of material assignment

Important

When applying materials to a family, remember that materials increase the family size, which in turn decreases its performance when it is loaded and used in projects.

Image 11.0.1



Example render with materials applied.

11.1 Option 1

Applying materials with the material parameter

You can apply materials directly to some or all of the family geometry in the Family Editor. Each piece of family geometry has a default Material parameter to which you can assign materials.

Use this method when the material of the family geometry is unlikely to change, such as for a manufactured component that is supplied with a single standard material.

Result: When you create elements in a project with the family, you cannot:

- Change the element materials without editing the family
- Change the material for instances or types of the family
- Change the materials by assigning a material to the element category

11.2 Option 2

Apply materials to a family geometry by category and subcategory

You can apply materials to all or select pieces of family geometry by subcategory Subcategories are categories that exist within the family category. You can assign different pieces of family geometry to each subcategory and then apply a different material to each subcategory. To apply material to geometry that is not assigned to a subcategory, you can apply materials by the family category.

Use this method when you want to be able to apply different materials to different family components by category or subcategory.

Result: When you create an element in a project with the family:

- You can change the materials assigned to each subcategory or category.

11.3 Option 3

Apply materials to a family geometry and change using instance/type

You can create and assign a custom instance/type material parameter to family geometry. This is the most flexible option to use when applying materials to your family geometry.

Use this method to allow the user to change family materials by instance or by type. By setting the material parameter to <by category> this option can also allow the elements to be updated by subcategory or category.

Result: When you create an element with the family in a project:

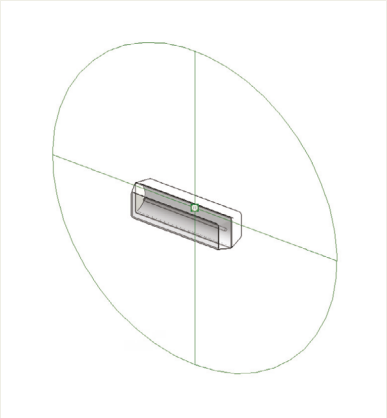
- The parameter gives you the option to change a material for an instance of the element or for each type of element that you create.

12.0 Adding MEP connectors in families

In Revit MEP, the connector connects the single family component with other components to create MEP systems. Without a connector, a family would just be a static placeholder.

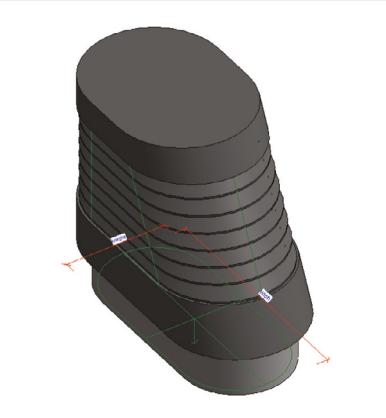
If you are creating any electrical, plumbing or mechanical content then you must include the relevant MEP connectors. Even if you are unsure of the exact parameter fields, the connector must still be added, to comply with the Bimstore standards. If you are creating a Revit MEP component, it may be possible to skip this section.

Image 12.0.1



MEP Electrical connector

Image 12.0.2



Ductwork connector (oval)

12.1 Adding a connector

1. Click the tool for the connector you wish to add (Electrical Connector, Duct Connector or Pipe Connector).

2. Click to place the connector in the drawing area.

MEP provides two ways to place the connector, placing it on a face or on a work plane. If you select the Place on Face option, the connector is automatically added to the centre of the face of the geometry and moves with the face. If the geometry is deleted, the connector is also deleted.

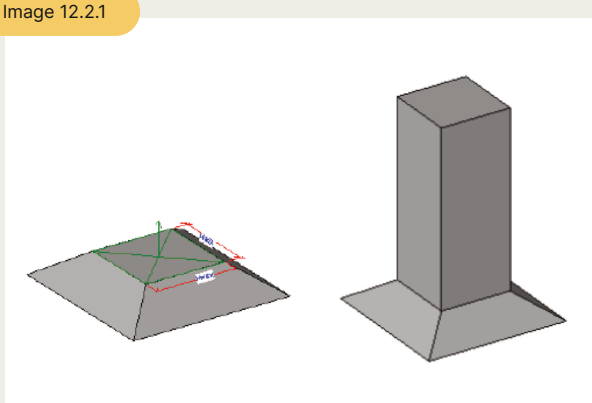
Best Practice

Place connectors on a face rather than on a work plane.

12.2 Connector direction

For duct/pipe connectors, an arrow, perpendicular to the surface, displays. The direction that the arrow is pointing is also the direction in which the connecting duct/pipe will be drawn. As the picture shows, a vertical duct can be drawn from an up connector in an air terminal.

Image 12.2.1



Pipework 3D view

Note

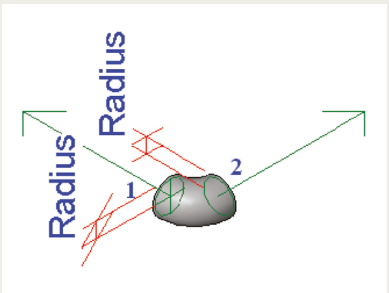
The arrow does not represent the flow direction.

12.3 Primary Connector

By default, the first connector in each domain is assigned as the primary connector. In the following image, you can easily identify the primary connector (connector 1) by the cross symbol. The Re-assign Primary tool allows you to re-assign the primary connector, as required.

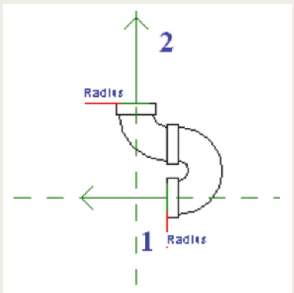
The primary connector of pipe and duct fittings should be located at coordinates (-1, 0, 0). In the following image of the plan view of a P-Trap, connector 1 is the primary connector. For other family types, the location of the primary connector is not important.

Image 12.3.1



Pipework 3D view

Image 12.3.2



Pipework 3D view

12.4 Linking the connector

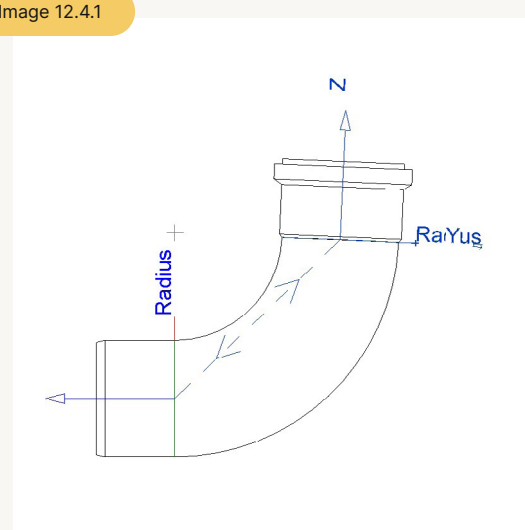
When there are more than one pipe/duct connectors, there is a choice for linking connectors.

- Linked connectors only have an effect when the system type is set to global for equipment or fitting.

- Linking connectors on equipment makes it possible to propagate engineering data, allowing you to use equipment as an inline component in a system.

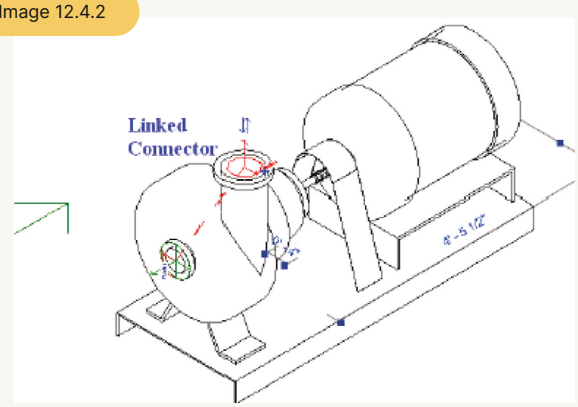
- Linking connectors on fittings should include the primary connector.

Image 12.4.1



Linked Connector

Image 12.4.2



Linked Connector

13.0 General family testing guidelines

Perform general testing on a family when it is:

- Open in the Family Editor

- Loaded into a project.

Use the criteria in the checklists below to test families in each of the above environments When testing families in projects, it is strongly recommended that you:

- Test families in projects that match the design intent of the family. For example, test a window family that is designed to be placed in a large commercial building in a large commercial project.

- Content that is designed to work in more than one Revit discipline must be tested in all applicable disciplines. For example, for a lighting fixture, test the connectors in Revit MEP, and verify that the fixture casts light as expected when rendering in Revit Architecture.

13.1 Family editor testing criteria

- Test all family parameters to ensure that the geometry flexes/adjusts correctly when the family parameters are modified.

- Test all family types – change the type, apply it and inspect the geometry to verify that the dimensions and relationships are maintained.

- In a host-based family, verify that the host flexes as expected. Change the host thickness and ensure that the family geometry adjusts appropriately.

- Verify that the family preview image is using the Preview view.

- Check all views to ensure that the family displays appropriately in different detail levels and when different Model Graphics styles are applied.

- Test constraints:

  a. Test the handles on the edge of the geometry and make sure that all geometry is constrained to either a reference plane or a reference line.
  b. Test the dimension parameter to make sure that the reference plane or line is being adjusted by the parameter and not the actual geometry.

13.2 Project testing criteria for Revit Architecture

These are items to be checked in families created for primary use in Revit Architecture.

For all families:

- Inspect the family appearance in all views (plan, reflected ceiling plan, elevation, Section, 3D) at all detail levels (Coarse, Medium, Fine).

- Inspect the family appearance in different Model Graphics Styles: Wireframe, Hidden Line, Shading and Shading with Edges.

- Test all family types – change the type, apply it and inspect the geometry to verify that the dimensions and relationships are maintained.

- Create new types and modify all parameters, checking all views for anomalies.

- Modify all material assignments to verify that materials are associated to the geometry correctly. TIP: To better inspect family geometry, modify all material type parameters to glass. Also, if any of the family geometry does not display as glass, then a material parameter is assigned incorrectly.

- Modify category and subcategory materials to verify the family is not using material type parameters.

For hosted families:

- Place hosted families into the provided host thicknesses and confirm families work in all hosts appropriate to the families use, including in-place walls and mass elements.

- Modify the host thickness by 25% - 400% and check for unconnected geometry and/or plan representations that may be disconnected from the geometry.

- Re-inspect the family appearance in all views to ensure that the geometry displays as expected.
- Dimension to all references and snap all references to walls.
- Create a test rendering.

Test the following commands on geometry created in the family:

- Copy/Paste
- Rotate
- Mirror

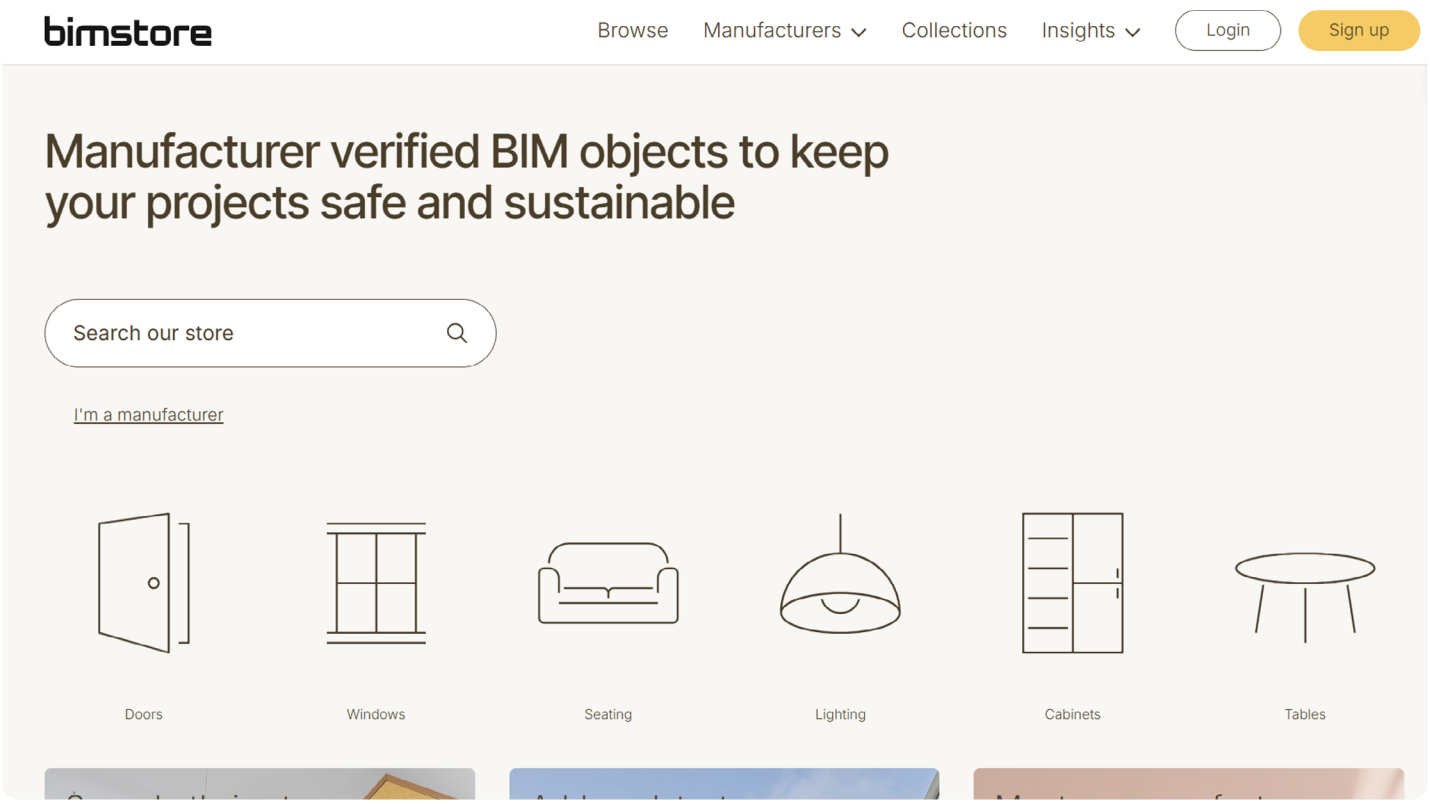
13.3 Family specific testing guidelines

Depending on the type of family being tested, there may be specific criteria to test in addition to the general testing that should be performed on all families.

Use this table to determine if a family requires any specific testing:

Family Type	Example	Test
Freely-Placed	Furniture, entourage	Test in a relevant project context. For example, place furniture or casework elements on a floor with a texture to ensure that the elements mask the floor.
Hosted	Window, door	Ensure that the family interacts properly with a host and adjusts to different host thicknesses.
Face-Based	Light fixture	Ensure that the family attaches properly to faces and doesn't improperly embed in, or project away from, the face of the object to which it is attached.
Detail Component	Detail component	Ensure that the family snaps to other geometry correctly and that it masks any geometry on which it is placed.

14.0 Distributing content



In order to distribute your content using the Bimstore.co portal, it must meet the standards outlined in this document.

When you are satisfied that it does, you can make your submission to Bimstore for verification, following which it will be uploaded to the site and will appear in the listings and search results.

Once you are ready to submit your content, please contact **info@Bimstore.co** who will walk you through the submission process.

Our main goal at Bimstore is to distribute high-quality, manufacturer-specific content to the construction industry. We trust that you understand that these processes reinforce that commitment and safeguard the integrity of this site as an industry leader in the distribution of BIM components.

15.0 Appendix – Content creation checklist

☐ Generic ☐ Manufacture specific

Parameters required

Template file

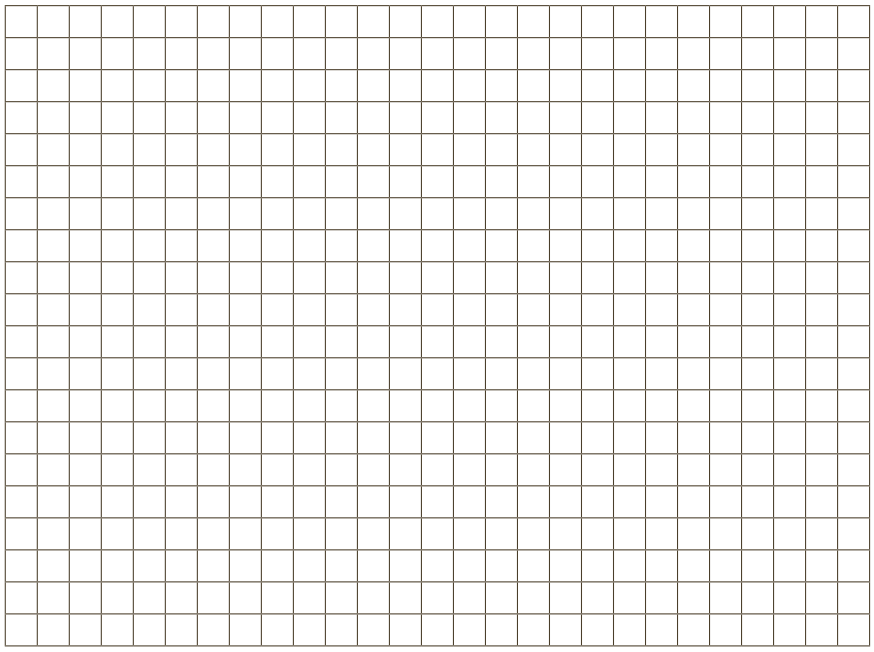
Intent/purpose

☐ Design & Validate ☐ Operate & Maintain ☐ Prototype & design ☐ Manufacture & design

Level of detail

Coarse	Medium	Fine

Level of detail



Category

Subcategories

Sketch framework/skeleton

Family editor	Revit project	
☐	☐	Test all family parameters to ensure that the geometry flexes/adjusts correctly when the family parameters are modified.
☐	☐	Test all family types – change the type, apply it, and inspect the geometry to verify that the dimensions and relationships are maintained.
☐	☐	In a host-based family, verify that the host flexes as expected. Change the host thickness and ensure that the family geometry adjusts appropriately.
☐	☐	Verify that the family preview image is using the Preview view.
☐	☐	Check all views to ensure that the family displays appropriately in different detail levels and when different Model Graphics styles are applied.
☐	☐	Test constraints: a. Test the handles on the edge of the geometry and make sure that all geometry is constrained to either a reference plane or a reference line. b. Test the dimension parameter to make sure that the reference plane or line is being adjusted by the parameter and not the actual geometry.

Project testing criteria for Revit Architecture

These are items to be checked in families created for primary use in Revit Architecture.

Family editor	Revit project	
		For all families:
☐	☐	Inspect the family appearance in all views (plan, reflected ceiling plan, elevation, Section, 3D) at all detail levels (Coarse, Medium, Fine).
☐	☐	Inspect the family appearance in different Model Graphics Styles: Wireframe, Hidden Line, Shading, and Shadingwith Edges.
☐	☐	Test all family types – change the type, apply it, and inspect the geometry to verify that the dimensions and relationshipsare main tained.
☐	☐	Create new types and modify all parameters, checking all views for anomalies.
☐	☐	Modify all material assignments to verify that materials are associated to the geometry correctly. TIP: To better inspect family geometry, modify all material type parameters to glass. Also, if any of the family geometry does not display as glass, then a material parameter is assigned incorrectly.
☐	☐	Modify category and subcategory materials to verify the family is not using material type parameters.
		For hosted families:
☐	☐	Place hosted families into the provided host thicknesses and confirm families work in all hosts appropriate to the families use, including in-place walls and mass elements.
☐	☐	Modify the host thickness by 25% - 400%, and check for unconnected geometry and/or plan representations that may be disconnected from the geometry.
☐	☐	Re-inspect the family appearance in all views to ensure that the geometry displays as expected.
☐	☐	Dimension to all references and snap all references to walls.
☐	☐	Create a test rendering.
		Test the following commands on geometry created in the family:
☐	☐	Copy/Paste
☐	☐	Rotate
☐	☐	Mirror