

# 2011

## Revit Foodservice Equipment Standards

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## Introduction

The purpose of this document is to define a set of guidelines and standards for model content creation in Revit® Architecture, Revit® MEP, and Revit® Structure for use in the Food Service Equipment Industry. Model content refers to the two-dimensional and three-dimensional standard component families that are used to create elements that represent manufactured food service equipment content items (for example, refrigerators, ranges, ice makers, and other commercial food service equipment).

By following the guidelines and standards in this guide, content creators in the Food Service Equipment Industry will ensure the portability, compatibility and performance of their content. Significant research has been conducted in the preparation of this standard. Great care has been taken to be in close compliance with industry standards and Autodesk published guidelines such as the *Revit Model Content Style Guide*. (Many topics in this standard have been quoted, paraphrased or interpreted from the Autodesk Content Style Guide). The Revit Model Content Style Guide (hereafter referred to as RMCSG) details Autodesk requirements for content created by manufacturers of all kinds (it is not specifically geared toward the Food Service Equipment Industry). It also sets the minimum requirements for such content to be published by the Autodesk® Seek web service. The Autodesk Seek web service requires:

- The uniform display of products offered by a single manufacturer
- Complete, consistent, and accurate presentation of product data across manufacturers
- The full use of Autodesk Seek search capabilities

Regardless of the ultimate use or distribution channel for Food Service Equipment content built in accordance to the recommendations of this document, the above Autodesk Seek requirements are seen as industry standard best practices. Therefore, similar goals are adopted by this standard and incorporated herein.

## Feedback on the Standard

Please send your comments on the Revit Food Service Equipment Standards and supporting documentation to the Forum at <http://rvttskfrce.ning.com>

## Audience

This guide is intended for anyone interested in the creation of food service equipment. This includes manufacturers, content service organizations, and other content creators who have advanced knowledge of both Revit software and Revit model content creation.

## Definitions:

Some definitions are in order before proceeding to specific recommendations and best practices.

### Revit Category

Revit groups elements in the software within a strict hierarchy. At the top of this hierarchy is a list of categories defined by the software. These categories define broad groupings of similar elements such as Walls, Doors, Furniture and Casework. The category list is built into Revit and **cannot** be changed by the user.

### Revit Family

In his blog the Building Coder<sup>i</sup>, Jeremy Tammik offers this definition: “A Revit family is a graphic representation of building objects and symbols. It can include geometry in 2D or 3D as well as data that supports the definition and creation of object instances.” Families are used to define the shape, form, physical and behavioral characteristics of individual elements used in a Revit project.

### Family Types

Each Family is capable of spawning variations. Some Families have no need for variations and as such can be thought of “Stand-alone” Families or a “Family of One.” When a piece of equipment however comes in more than one size or variation it would have more than one Family Type. Each Family Type is really just a named set of variations in the Family’s parameters.

### Classes of Families

There are three classes of Families in Revit:

**Component Family:** Depending on whom you ask or which document you read, you will find alternate names for the Component Family. They are sometimes referred to as: “Standard Families,” “Loadable Families” or simply “Families.” In this document, we will use the term “Component Families” since this matches the name of the generic tool used in Revit to insert them in a project. A Component Family is a user-definable building component or symbol. All Families, including Component Families, must belong to a Category and the chosen category will often endow the Family with certain behaviors, but otherwise, the exact composition and definition of the Component Family is largely up to the author of the Family to design and determine. Component Families are highly portable. They can be saved to external Revit files with an RFA extension and thereby loaded into other project files quickly and easily.

**System Family:** A System Family is pre-defined and built-in to the software and cannot be changed by the user. Many common Families in a Revit project are System Families such as Walls, Floors and Roofs. Such Families cannot be modified in any way. However all Families, including System Families can have Family Types. Family Types can always be modified by the user. System Families are part of all Revit project files. They cannot be saved to external RFA files. Sharing System Family Types from one project to another must be accomplished with the Transfer Project Standards functionality or via copy and paste.

**In-Place Family:** Used to model unique and special case geometry in a project. They cannot be shared between projects and as such are not considered further in this document.

**Type:** A named variation in a particular Family. A Family Type will have a saved value assigned to each parameter of the Family making it easy to swap out one variation of a Family with another. For example, the same range might come in two widths or the same work table in two different heights. Size variations are the most common use of Types, but they can be used to save the values of any parameter. For example each Type could have a different model number and cut sheet reference even where there might be little or no change geometrically.

**Instance:** This is the actual element selectable in the project file.

## Parameters

Parameters are properties assigned to the Revit project or to specific content items in a project model. Parameters expose interactive variables to the end user allowing them to manipulate the object, model or project in some meaningful way. Parameters can be used to drive the size and shape of geometry, allow variations in material or finish, control element visibility, establish loads, flow variables or nearly limitless other possibilities.

There are a few types of Parameters. At the top level of the hierarchy, there are System Parameters and user-defined Parameters. A System Parameter is built into Revit and always available. A user-defined parameter is one created by a Revit user and may be available only in a certain Family, a certain project, or multiple Families and projects depending on how it is defined.

User-defined Parameters can be created in a Family file or in a Project file as either “local” or “Shared” parameters. This really means that there are three total possibilities: Family Parameter (local), Project Parameter (local) and Shared Parameter. “Local” is not an official Revit term, but rather a description of their behavior. When described this way, both Family and Project Parameters can be considered local in the sense that they would only be available within that Family or Project file. By contrast, a Shared Parameter is defined externally in a separate “Shared Parameter file.” This means that the same parameter definition can be used (or “shared”) between multiple Families or Projects. Shared Parameter is an official Revit designation. Shared parameters can be used for both Family and Project parameters.

**Family Parameter:** exists only in the Family in which it is defined. A Family Parameter can drive geometry and control other physical or graphical characteristics of the Family. It cannot appear in Schedules or in Tags.

**Project Parameter:** exists only in the Project in which it is defined. A Project parameter is assigned to a specific Category and will be available to all elements of that category in the project even if the parameter is not explicitly defined in each Family. A Project Parameter can drive geometry and control other physical or graphical characteristics of the Family. It can appear in Schedules but cannot appear in Tags.

**Shared Parameter:** both Family and Project Parameters can be defined using a Shared Parameter. Shared Parameters are defined in an external text file and are thereby available for use in any Family or project. A Shared Parameter has a special ID designation (hidden from the user) that ensures each parameter is unique. To ensure the integrity of Shared Parameters, it is imperative that a single Shared Parameter file is maintained for the entire project team and ideally the entire organization. This is VERY important as

creating two parameters with exactly the same settings will NOT make them the same. Revit will see the hidden ID designation and treat each parameter as different even if they have the same name and settings. Careful coordination of resources is therefore imperative to ensure success when sharing content among the extended project team. A Shared Parameter can drive geometry and control other physical or graphical characteristics of the Family. They can appear in both Schedules and Tags.

**System Parameter:** these parameters are built into Revit. They require no user configuration, are always available and can appear in both Schedules and Tags.

## Type and Instance Parameters

When you define a parameter it can be applied at the Type or Instance level. Type parameters hold a single value that is applied across all instances of a Family. Instance-based parameters begin with a default value in the Family file that can be modified by the user to a unique value for each instance of a Family/Type in the project. Both applications of parameters have utility in Families and projects.

**Type-based Parameters:** Use Type-based for parameters that represent variations in an item from the manufacturer; those that would require the specification of a different model or item. For example if a product catalog lists multiple variations for an item that must be specified at the time of ordering, these items will typically be best represented in Revit as Type-based parameters. Dimensional parameters like width and depth are frequently designated as type-based.

**Instance-based Parameters:** Use Instance-based for parameters that represent variations in an item that are made onsite during installation. These adjustments make each instance slightly unique from other items of the same Family and Type. Examples include the length of a fabricated work counter that is cut to fit or fabricated to fit a unique installation condition.

It should be noted that the same Family can include some instance and some type-based parameters as appropriate. For example, a work table might use type-based parameters for the height and depth, but use instance-based for the counter length.

## Revit Content

Revit Content refers to any discrete item in the Revit software that can be re-used from project to project to represent a real item in the final built environment. This can include Families from any of the above classes. Therefore consideration must be given to the class of Family so that proper delivery mechanisms can be employed. For example, Component Families as noted above are portable and easily shared by saving the Family to an RFA file. To share System Family Types, one must create a “Library Project File” (saved as a Revit project file with an RVT extension) and copy the System Family Type therein. The recipient can then copy or transfer the Type from this file to their own project file. In-Place Families cannot be shared and should not be utilized to create content that you intend to share.

## Quality Revit Content

Perhaps the first challenge of creating content for Revit or any similar platform is defining exactly what said content should seek to achieve and establishing a benchmark for how quality will be defined. RMCSG defines quality Revit content as follows: “Quality Revit Content balances performance with design

accuracy and required levels of detail. Quality content is easy to use because it functions reliably in a range of projects and project phases, while delivering manufactured content in a format appropriate for architecture and engineering documentation deliverables.”

RMCSG further outlines the following quality considerations:

- Appropriate level of detail designed
- Adequate number of types created
- Flexible use of parameters
  - Accuracy – complete, consistent presentation of product data.
  - Standards – adheres to industry and Autodesk standards.
- Naming conventions
- Graphic guidelines
- Parameter usage
  - Performance – content designed to reduce the performance impact of the family on a project.
  - Testing – thorough testing of the family parameters and types independently and in a project environment.

## **Section 1: Planning Food Service Equipment Industry Revit Model Content**

In order to ensure Revit model content is developed efficiently and to the standards recommended herein, content authors should follow approved best practices and recommendations when creating Revit families.

Food Service Equipment Industry content can be created successfully in Revit Architecture or Revit MEP. In general, since some content might include System Family Types for architectural objects like Walls, it is

recommended that you use Revit Architecture unless the equipment you are creating has specific needs only available in Revit MEP.

## Recommended Family Template

All Component Families must be created from one of several Family Template files provided with the software. A Family Template determines a few key behaviors of the Family; namely its Category and its hosting requirements. As noted above in the “Definitions” topic, Revit includes many built-in Categories. Revit’s list of Categories is fairly broad in scope and is limited to overall building-wide categorizations. As such, it does not include a Category specifically for Food Service Equipment. Rather, Food Service Equipment in Revit is included under the much broader category of **Specialty Equipment**. This category will be used for most types of equipment. However, in selected cases, it may be appropriate to use the **Casework** category for certain items.

## Hosted vs Free-Standing Templates

Both Specialty Equipment and Casework categories include free-standing and host-based templates. If you choose either the *Specialty Equipment wall based.rft* or the *Casework wall based.rft* template, the Family created will require a Wall host when inserted. This means that user of the Family will *not* be able to insert the item without attaching it to a Wall in their project. If you choose the *Specialty Equipment.rft* or the *Casework.rft* Family Template, then the Family thus created will be “free standing” meaning that it will not require a host of any kind and can simply be inserted into a project. There are a few reasons that you will want to consider this situation very carefully before choosing a wall based Family template.

At first it may seem logical to use a Wall-hosted template for certain items particularly those that would normally hang on a Wall. For example, wall mounted cabinetry. However, the Kitchen Designer may begin his design before the Architect has completed his work. This means that the Wall elements may not all be in place, nor may their placements be permanent. This may pose challenges and unreasonable limitations on workflow and project schedule. Furthermore, many project teams separate geometry into different files and link them together as a way of managing workflow and the needs of the different disciplines working simultaneously on the project. Often such divisions are made across discipline lines meaning that the Architect and the Kitchen Designer could possibly be working in two separate Revit files and linking them together to coordinate their efforts. In such a case, use of Wall-hosted Families will prove problematic as items cannot be hosted by Walls across linked files. The element and its host **MUST** be in the same Revit project.

- For these reasons, the use of “Wall Based” Family Templates is *not* recommended.
- It is recommended that the *Specialty Equipment.rft* template file be used as the primary Family Template file for Food Service Equipment.
- In cases where it can be argued that Casework is a better choice of Category, please use the *Casework.rft* Family Template instead.

## Family Representations

Given the different kinds of drawings and deliverables in which a particular Family may be shown, it is often advisable to design the content to contain more than one representation. Revit offers three levels of detail display for views in a project. These include Coarse, Medium and Fine. Coarse is used for simple

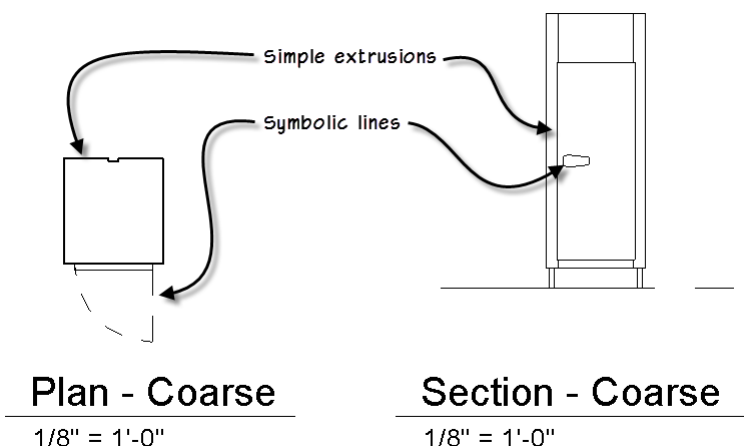
schematic and symbolic representations typically useful in overall scale drawings and in early design phases. Medium often shows a little more detail than Coarse and works best at larger scales and detailed construction document views. Fine level of detail should be reserved for visualization purposes and typically shows a high level of detail and much more realistic representations.

It is possible to include all three levels of detail in a single Component Family. An alternative approach is to include the Coarse and Medium detail levels in one Family for use in design development and construction document drawing sets and create a separate high detail Family for use in rendering and visualization.

## Coarse Level of Detail

When creating geometry for Coarse Level of Detail, focus on the overall form of the object. Represent elements using two-dimensional geometry or very simply three-dimensional extrusions or simplified forms. Avoid curves and fine details (such as hinges, latches, vents, louvers, knobs, etc) that would not plot well at  $\frac{1}{4}" = 1'-0"$  or smaller scales. The purpose of the Coarse Level of Detail is to accurately depict the overall shape and form of the element. It should be dimensionally accurate with respect to overall depth, width and height and assist in placement and determination of required clearances for the object in overall views. Surface details should be kept to a minimum. To draw any surface detailing that you do include in plan and elevation views, use Symbolic Lines wherever possible. Symbolic Lines are two-dimensional lines and shapes that appear only in project views parallel to the one in which the Symbolic Lines are drawn. For example, Symbolic Lines drawn in a plan view in the Family editor will display only in plan views in the project. Symbolic Lines drawn in an elevation will only display in elevations parallel to the one in which they are drawn.

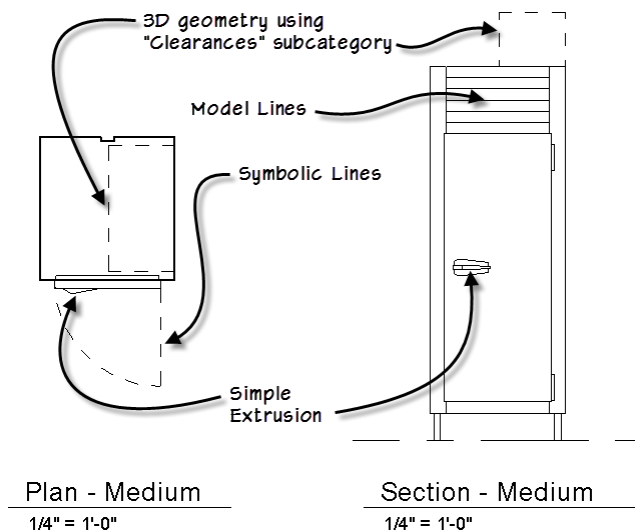
As a matter of best-practice, please generate a simplified 2D version of the Family in plan view using Symbolic lines. It is preferable to trace over all 3D forms with Symbolic Lines for the simplified 2D plan representation, however you can include only those 3D forms which are low in polygon count (such as simple rectilinear extrusions) in cases where the tracing of such forms would yield no benefit. Use the visibility controls in Revit to turn off all complex 3D forms and other unnecessary details from the simplified plan display.



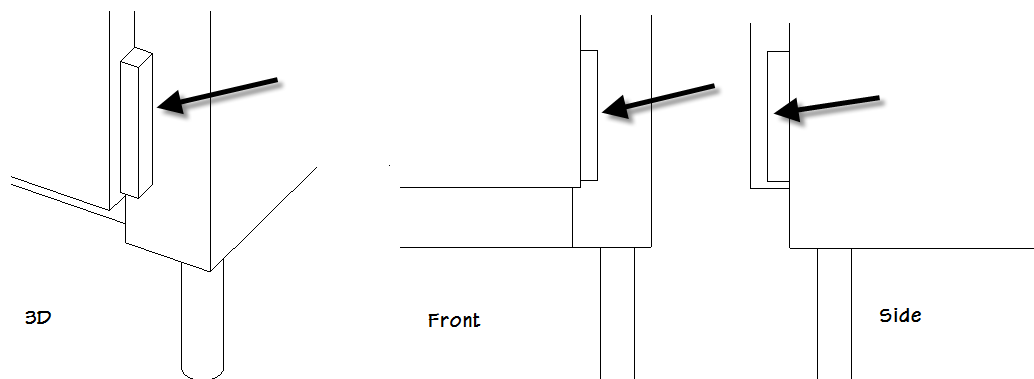


## Medium Level of Detail

Medium level of detail can be used in larger scale views and as the project progresses into the design development phase. In Medium detail, you can begin to include details such as hinges, louvers, clearances and latches. Many of these items can be added in plan and elevation views in the Family using Symbolic lines to keep model size and complexity in check. In cases where you wish to avoid complex 3D geometry, but still have details show in more than one view such as elevation and 3D views, consider using Model Lines instead of solids and voids.



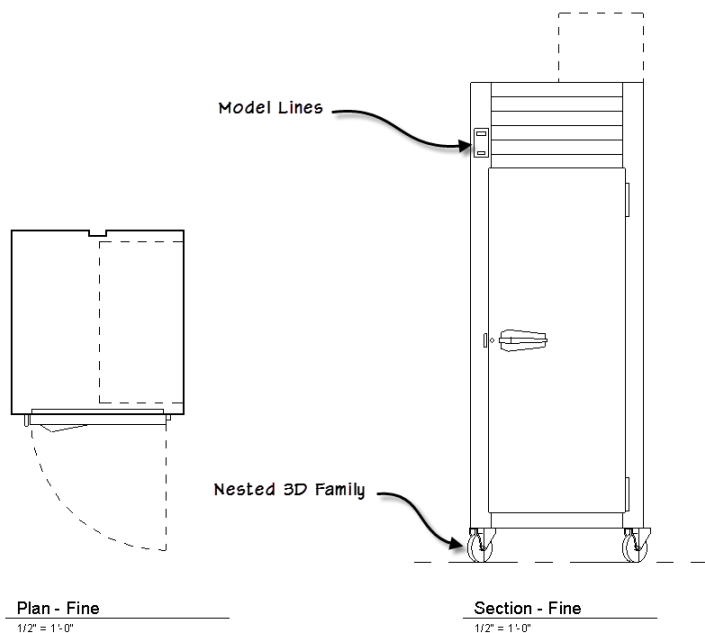
Limit the use of three-dimensional geometry to overall forms that appear in multiple views like plans, elevations and 3D. Symbolic lines used to represent the plan version of the Family for coarse scale should continue to display here in medium wherever possible and be supplemented by additional 2D Symbolic Lines as appropriate to represent further details required by medium detail. Use three-dimensional geometry for smaller details only when absolutely necessary or when it clearly adds an overall benefit to Family as a whole. For example, in medium detail it may be appropriate to depict the hinges on a refrigerator unit. The most efficient way to show such detail would be to create very simple rectangular extrusions so that they show in multiple views.



## Fine Level of Detail

Most deliverables required should be achievable using graphics built to either coarse or medium level of detail. However, fine details can be added and assigned to display only in fine level of detail for those views/drawings that require it. These may be large scale detail views and/or renderings. While the temptation to add every kerf, bolt screw and log plate may be strong, rarely are such details required to determine clearances, convey design intent or accurately specify specific equipment choices. Often data entry fields and parameters assigned to the Families can more efficiently convey manufacturer specifics without adding the extra overhead of modeling such details in 3D (or even 2D). The goal of this specification is to limit 2D and 3D modeling to those aspects of the equipment required to convey overall intent, aid in placement, accurately assist in quantity takeoffs and assist in placement of service connections. Should renderings also be required and fine details desired, model such items to show only in Fine level of detail and consider creating a separate Family for use in renderings instead.

Once again, for plan representations, rely heavily on Symbolic Lines reusing those drawn for the lower levels of detail and supplement them with fine details as required. Even in coarse level of detail, plan versions should be largely comprised of Symbolic Lines and 2D representations of the 3D form.



## Design and Performance Considerations

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. This is further exacerbated if you anticipate that the item will be copied many times throughout the project. The larger the file size, and the more times it is copied, the slower the performance, loading, and regeneration time

of the family (and therefore the host project) will be. When considering the design intent of a family, use the following guidelines:

- For larger commercial or institutional projects, in which hundreds of elements may be created with a single family, design the family to be as small as possible to minimize project size and performance impact.
- For smaller projects, where elements created with a single family are not used ubiquitously and where the overall project size is smaller, you can design the family to include more detail.

The key consideration to keep in mind when building food service equipment Families is to remember that the impact of food service equipment Families can easily be masked by workflow of the typical commercial kitchen designer. In other words, it would not be uncommon for a kitchen designer to work in a separate Revit project file and link in only the architectural backgrounds as needed. Further, the designer could easily isolate their efforts to a small and isolated area of the project or dedicated workset. Doing so would offer many benefits to the kitchen designer allowing them to focus on the area of the project within their realm of responsibility and increasing performance by avoiding the loading of the rest of the project. For example, in a large commercial facility such as a complex medical or educational facility, the areas requiring the services of a kitchen designer and needing to show food service equipment may be quite limited. However, remember that even though you can isolate a small work area and improve performance, ultimately all work areas must be brought back into a single model for coordination efforts. Therefore, when building food service equipment, it is better to assume that most projects requiring these items will be sizable enough to warrant the judicious modeling techniques advocated in this document.

## Family File Size Recommendations

The RMCSG includes a table recommending file sizes for many standard kinds of Families. Neither Specialty equipment in general nor food service equipment in specific is included in the table. However, based on the items that are included, the typical complexity required by food service items (as recommended above) and standard best-practice recommendations, a file size in the following ranges are good recommendations:

- Simple                250K – 500K
- Complex             600K – 750K

When working on a Family file, you can compact the file to reduce its size. Choose Save As from the Application menu and then click the Options button. Check the Compact checkbox and then click OK and Save. In a project environment, Compact can also be used as can Purge Unused to reduce the size of the project file.

As a further guideline, consider the following. A small food service project is likely to have 100 or fewer items of heavy equipment, a medium one perhaps 100-200, and a large project has over 200 items. At an average of ½ meg per content item times 100 is a 50 megabyte file for the equipment only. If this equipment is to be housed in the main architectural or MEP project file, this could have a significant impact on overall project performance. It is therefore always beneficial to be as prudent with file sizes as possible.

## Level of Detail Strategies

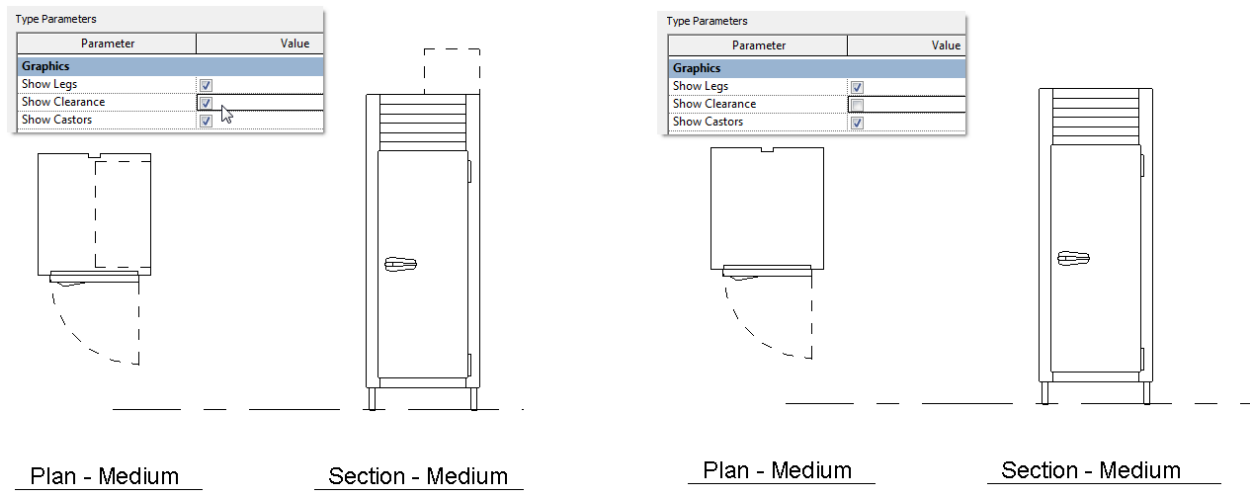
When you build your Families, try to reuse elements as much as possible. In other words, build items that will appear in fine level of detail and then use the visibility settings to hide them in lower levels of detail. If necessary, draw a second version of the geometry for lower levels of detail. For example, when drawing a piece of equipment with louver vents, consider the highest level of detail in which such louvers should be modeled. If you can effectively represent such details using Model Lines instead of 3D extrusions, this can be an effective way to manage file size and performance. If you instead must show a three-dimensional version of the louvers, show these only in fine level of detail and then show Model Lines in the same location for the louvers in Medium detail. Try not to show them at all in coarse.

- Don't model geometry that will not be visible when the family is added to a building model.
  - For example, for a refrigerator or range, model the outside of the unit only. Model the door, but not the inside of the range or refrigerator.
  - If shelves or other items on the inside of the unit must be shown, depict them with symbolic or model lines wherever possible in the views that would show them rather than modeling such items.
  - Do not include plates, kerfs, screws, or other highly specialized details.
- Do not duplicate geometry that can be used for different levels of detail. Use visibility settings instead to control what is shown under each level of detail setting.
- The following guideline from the RMCSG can be helpful when modeling geometry:

If the geometry is...	Set the detail level to...
Smaller than 1'	Fine
1' – 3'	Medium
Larger than 3'	Coarse

## Visibility Settings

Level of Detail is not the only way to control the way that elements in a Family display. Visibility parameters offer an additional level of display control to your Families. Visibility parameters can be assigned to any geometry in a Family. They can be controlled at the Type or Instance level. Thereby allowing the display of certain Family subcomponents to be turned on or off as Types are loaded and swapped in or element by element as appropriate. For example, in the illustrations above, the clearance required for the refrigerator is shown with dashed lines. This clearance item can be controlled by a visibility parameter which would enable users of this Family to decide in which views they wished to show the required clearances. Door Swings, Center lines, Pour Lines for kettles, and temporary or future equipment are other examples.



## Areas To Avoid For Optimum Performance (from the RMCSG)

This table (reproduced from the RMCSG) can be used as a guide to improve the performance of your Families. Many of these recommendations have already been elaborated upon above.

Common Mistake When Creating Families	Recommended Approach
Lack of planning prior to family creation	Before creating a family, use the guidelines in this document and plan your approach carefully.
Unnecessary parametric relationships	<p>Before adding geometry to a family:</p> <p>Plan the parametric relationships and create a family skeleton that features the main parametric relationships.</p> <p>Build only the parametric family behavior that you need to avoid over-constraining the model.</p> <p>Flex the skeleton to test the relationships before you add geometry.</p>
Use of geometry instead of symbolic lines in plan views	In plan view representations (and in some cases in elevations), geometry usually can be represented with symbolic lines (or Model Lines), rather than (solid) geometry. Using geometry instead of symbolic lines will create an unnecessarily larger Family.
High levels of geometric detail and underuse of visibility settings	Use the guidelines in the topics above to avoid unnecessarily large Family files.

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 strategically. Use nested content to share objects among multiple Families, for example, door hardware, burner configurations, and so on.
Large Families with many Types that do not include Type catalogs	The more Types (particularly unused) the heavier the Family. Create Type catalogs for Families that contain 6 or more Types.
Inadequate Family testing	See 3.1 General Family Testing Guidelines.

The purpose of creating Revit families for manufactured content is **not** for the manufacturing process, but for architecture and engineering documentation deliverables. It is important to create the family content at an appropriate level of detail for the intended use. In order to be considered in compliance with this standard, it is required that all geometry be modeled directly in Revit using native Revit tools. Elements can be created from imported geometry, but such imported geometry should be removed from the final content item before distribution. Furthermore every attempt should be made to build native geometry using the guidelines detailed herein.

### Nested Families, Groups and Voids

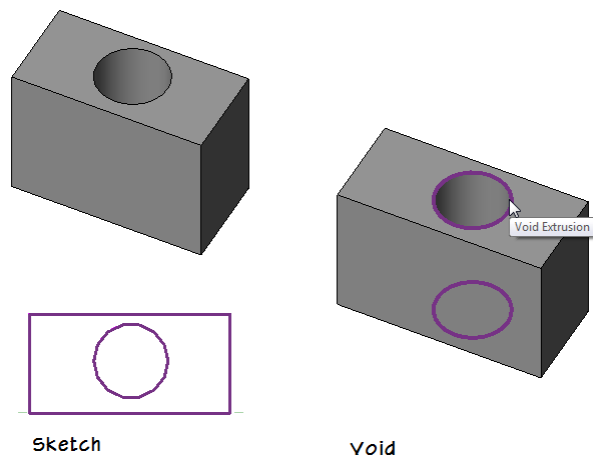
Nested Families are Families that are inserted as components within other Families. Nesting one Family within another can have many benefits. For example, if the same item must appear in more than one Family, like a common door handle, range burner configuration or refrigerator door. By creating the item as a separate Family and then nesting it into other Families, you can reuse items in a logical way. Another important advantage can arise when adding parameters to a nested Family instance. Consider a common element such as refrigerator door or range burner configuration. If you copy and paste the actual geometry from one Family to another, you must take greater care when establishing your reference planes and overall framework to be certain that the Family and the burners flexes the way you expect. If the burners are a nested Family, it can be easier to establish the desired relationship and achieve the correct flexing behavior with fewer constraints and parameters.

However, just as nesting Families in a logical way can have enormous benefits, nesting them too many levels deep can cause performance and other problems. Try to plan your strategy with respect to nesting carefully and limit nesting to no more than two levels deep. Remember, when you load a Family into a project, it also loads all of the nested Families. If one of the nested Families should be updated, it updates across the project in all locations that it is used including the nested instances.

Groups and Voids can also be quite useful in a Family when used sparingly but also impose performance penalties when overused or used improperly. For example, parametric arrays can be very compelling and useful. However, when used extensively in a Family, they can exact a huge price in performance.

Furthermore, even when used sparingly in a single Family, if that Family is copied many times in a project, performance can still take a hit. Therefore, limit array Groups in Families to those situations where the quantity of items must be parametric. If you can use other means to give the same degree of choice to the end user however, you may wish to entertain such alternatives in lieu of parametric arrays. For example, if a range has 4 burners or 6 burners, it might make more sense to use a simple set of visibility parameters to give the user a choice between the two rather than a parametric and grouped array.

Similarly, Voids sometimes offer the only way to model a particular element correctly or accurately. However, if possible, try to build the element from solids only instead of using voids. Sometimes this can be done just by varying the sketch. In other cases you will have to be a bit more creative and possibly break the form into a few pieces.



All of the preceding recommendations are overall considerations. Many Family creation strategies can offer benefits to the Family author in the form of expedience and convenience, but these must be weighed against potential detrimental effects to the overall project environment in which the end user is likely to be working. However, in some cases, a particular strategy (such as several nested Families or use of voids and arrays) is the only way to effectively achieve the desired end result. The goal is not demonize any particular tool or technique, but rather to ensure that all ramifications or each decision have been carefully weighed against both desired benefits and undesirable limitations or performance issues.

## Using Imported Geometry

Revit families support the import of content created in the following CAD file formats:

- DWG (Autodesk AutoCAD format)
- DXF (AutoCAD Drawing Interchange Format)
- SAT (Spatial Corporation Standard ACIS format)
- SKP (Google SketchUp Model format)
- ADSK (Autodesk AEC Exchange environment – Inventor to Revit)

The ADSK format is a new format introduced by Autodesk in recent releases of Inventor and Revit for the purposes of bridging between content items designed in Inventor (in high levels of manufacturing level detail) and Revit which requires a “specification” level of detail. You can learn more about the ADSK file format and strategies to utilize it in your Revit content in the RMCSG.

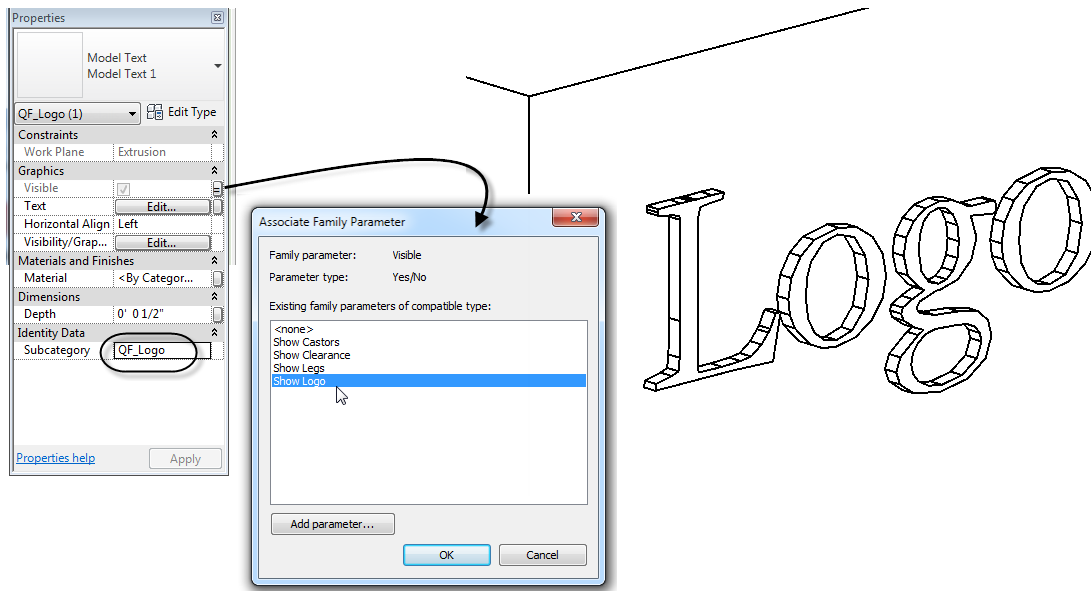
The other file formats can be imported directly into a Revit Family. If you import content into a family and use it to create the family without modification, the resulting family types will be added to building models as static elements that do not support the dynamic parametric relationships inherent in Revit building models. Families created directly from imported content do not support direct assignment of materials and other parameters, limiting their overall use in the project environment. Imported content may also have adverse effects on project performance. In some cases, these limitations may be acceptable, but to conform to standard building information modeling practice, it is recommended that most imported content should be recreated as a fully functional Revit family.

In most cases, it is considered best-practice to import the geometry into a new Revit Family template, position it in the desired location and then create new native Revit geometry in its place. When this process is complete, you can delete the imported CAD file to help reduce file size and undesired artifacts from the new Family file.

## Using Manufacturer Logos

Logos or other manufacturer specific identification is permitted in the geometry of your Family file provided that such identifiers are controlled by a Revit visibility parameter. The parameter should be named: **Show Logo** and configured as a Yes/No parameter. Any geometry in the Family that represents logo or manufacturer’s identification should have this Yes/No parameter assigned to control its visible parameter in the Family Editor.





Furthermore, to accommodate global on/off control of all logos applied in any Family, all logo geometry must be assigned to the subcategory: QF\_Logo. Review the “Food Service Equipment Subcategory List” topic below for more information on subcategories.

## Planning Summary

Before family creation begins, careful upfront planning of the family should be performed, even for the simplest of families. Planning families prior to creation can save time and prevent errors. Questions to consider include the following:

- Will the family need to accommodate multiple *sizes*?

For a piece of equipment that is available in several preset sizes, create a standard Component Family with an accompanying Type Catalog to allow a choice of sizes upon insertion. If the item includes many varieties beyond simple size differences, such a refrigerator that can be either a single unit, a refrigerator, freezer or both, or open front or both front and back, consider making separate Families for each variation and providing a Type Catalog for each a Family. In such a case, each of these related Families could share nested components as appropriate.

- How should the family *display* in different views?

The way the object should display in views determines the 3D and 2D geometry that you need to create, as well as how to define the visibility settings. Determine whether the object should display in a plan view, elevation view, and/or sectional views. Use level of detail display settings to control what is seen under different viewing circumstances. Use Coarse level of detail to simplify the Family for use in overall drawings and smaller scales. Use Medium level of detail for common views showing a moderate amount of detail. If required, use Fine level of detail for large scale views and renderings. Determine if there are optional items that do not always display such as clearances and the like. Consider using visibility parameters to control such items.

- Does this family require a *host*?

While several food service items could potentially benefit from using a Wall or Floor host, it is recommended that to ensure the greatest level of flexibility and compatibility with the files and workflows of the other players in the industry who may use your content that you refrain from using hosted Families. Build all food service equipment using either the *Specialty Equipment.rft* or the *Casework.rft* Family Template.

- How much *detail* should be modeled?

In some cases, you may not need 3D geometry. You may only need to sketch a 2D shape to represent your Family. Also, you may simplify the 3D geometry of your model to save time in creating the Family. For example, common elements like burners, louvers, handles and hinges do not require much detail to be recognizable. Model only what is necessary to convey intent and understanding of an element's function.

- What is the *insertion/origin* point of this family?

The insertion/origin point is the point at which you want to place the family in a project (indicated by the cursor position). Determining the appropriate insertion point will help users place the family in a project. Often Families will use the geometric center. This in no way limits the ultimate placement of the Family, but rather makes flexing the dimensions easier. You can include Reference Planes in the Family to assist in placement in projects. Such Reference Planes can even be used to indicate that a Family should have a certain clearance to a nearby wall or other item. Typically the insertion point for a Foodservice Equipment Symbol has been the left rear corner as the operator faces the item. If Clearance Lines are needed, they are offset the correct distance from this location.

## Section 2: Food Service Equipment Industry Model Content Creation Standards

The topics in this section detail standards for creation of Food Service Equipment Industry Revit Family content that is in compliance with industry accepted best practices and published Autodesk standards. 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.

### Family Creation Process

The basic steps for creating a Component Family include the following:

1. Create a new family file (RFA) using either the *Specialty Equipment.rft* or the *Casework.rft* Family Template.
2. Define subcategories for the family to help control the visibility of the family geometry.
3. Create the family skeleton, or framework:
  - a. Define the origin (the insertion point) of the family.

- b. Lay out reference planes to snap to when you sketch component geometry.
- c. Add dimensions to specify parametric relationships.
- d. Label dimensions to create type or instance parameters.
- 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 hosts) to verify correct component behavior.
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 in a project.
10. For Families requiring more than six Types, create a Type Catalog.

The above summary is included in the RMCSG. The steps are standard industry-wide best practice. Many resources are available to learn more about building Families. Search the Autodesk website, the online help and one of the many blogs and user forums for many articles and tutorials on the subject. Books and other resources are also available detailing every aspect of using Revit and Family content creation.

## Prototyping

If you need to create a number of similar families:

1. Plan and create a single “prototype” Family.
2. Test the prototype Family in the Family Editor and in a project environment to identify any errors or inconsistencies.
3. Correct any errors and inconsistencies and retest the Family to ensure it works properly before creating the additional Families based on the prototype.

## Units

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.

For information on changing the display of units, see “Project Units” in the Revit Help.

If unit-specific names are used in the Family or Type name, these will still appear when used in files of the other unit type. To avoid this, either refrain from using unit-specific names or rename Families or Types accordingly.

Recommendation: If you need to create content for both Imperial and Metric audiences, create unique Type Catalogs for each locale.

## Family Naming Guidelines

Resource naming is at the heart of any standard. It is important to name shared elements in a consistent and logical fashion so that they may be used by individuals in different organizations with little or no advance knowledge or translation required. Family and Type naming in Revit are certainly no exception. Family names are the primary means of identifying families in the Revit software.

After experimenting with other naming conventions, we recommend the following standards for naming Revit families of Foodservice Equipment:

- Create unique names for each Family.
- To identify foodservice equipment in the Specialty Equipment Category, all Families are to be identified by the prefix *QF\_*.
- The Family name should include the Manufacturer's name and the equipment item model number. For consistency in matching Revit projects to database utilities, we recommend using the name and model number as represented in AutoQuotes.
- Do **not** include the Family category in the Family name.
- 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. Family names must display in dialogs and in the Type Selector list in Revit.
- Do not use spaces between words in file names. To separate words within a syntax element (e.g., Manufacturer or Model Number) use the underscore character (*\_*).
- A Type Catalog and its associated Family should be identified by including *\_cat* before the file name extension. If a series of model numbers is covered by a Type Catalog, the model numbers may appear in the name.
- If a Type Catalog is to be used with a Family, name the Type Catalog (TXT file) with the same name as the Family. This is required for Revit to recognize the Type Catalog.

Examples:

QF\_Custom\_Worktable.rfa  
QF\_Custom\_Sink\_3\_Compartment.rfa  
QF\_Scotsman\_C0830\_C1030\_cat.rfa  
QF\_Scotsman\_C0830\_C1030\_cat.txt  
QF\_Hobart\_HL200.rfa  
QF\_Champion\_44DR\_cat.rfa  
QF\_Champion\_44DR\_cat.txt  
QF\_Perlick\_7055AD62.rfa  
QF\_Manitowc\_QD-0272A.rfa  
QF\_Garusr\_M47R.rfa  
QF\_Lakeside\_351.rfa

## Family Type Naming Guidelines

When naming a family Type, use the format and rules below:

- Do **not** include the Family name or category in the Type name.
- Type names should mirror actual usage. Type names may include model numbers.
- Type names should indicate the key differences between Types (configuration, utilities, size, etc.) 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.
- Keep Type names as short as possible. Type names must display in dialogs and in the Type Selector.

Examples:

**40°\_Booster\_Elec\_208/60/1**

**40°\_Booster\_Elec\_208/60/3**

**C0322MA\_1B**

**C0322MA\_32B**

**HL200\_2STD**

**HL200\_40STD**

**HL200\_41STD**

**CO3660R\_QS\_STD-LIGHTS**

**CO3660R\_QS\_LED\_LIGHTS**

## Format

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

For refrigerators, ranges, etc: **<width> x <depth> x <height>**

For tables and counters: **<width> x <depth> x <height>**

For sinks: **<width> x <depth> x <height> - <basin depth>**

## Categories and Subcategories

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 (for

example, Specialty Equipment 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 color, line pattern, and material assignment of the Family geometry can also be assigned to by category.

To display different line weights, line colors, line patterns, and material assignments for different geometric components of the Family (for example, Undercounter Details, Overcounter Details or Surface Details), 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.

### **Food Service Equipment Subcategory List**

The Specialty Equipment category will be used by most food service equipment. However, several other unrelated items will also use this category in Revit projects such as conveying systems and fire suppression equipment to name a few. Therefore, care should be taken not to overload the list with too many additional subcategories, particularly those that would have little meaning to other kinds of objects sharing the Specialty Equipment category. For this reason and since the primary function of subcategories is to provide global project-wide and view-wide control over like components with respect to line style, visibility and pattern, the following list of subcategories based on accepted Food Service Equipment Industry practices is proposed:

**QF\_Undercounter Details**

**QF\_Overcounter Details**

**QF\_Surface Details**

**QF\_Clearances**

**QF\_Logo**

## **Parameters**

Parameters should be added to the Families to house embedded data. All such parameters should use system parameters included in the Family Template first (usually under the Identity Data heading) and then add additional required parameters using Shared Parameters. System parameters are available to all elements belonging to a particular category automatically. Family parameters are only available to the Family in which they are added, unless they are defined using a Shared Parameter file. Shared Parameters ensure that parameter values are available in the project, in schedules and in tags. It is very important to set up a single Shared Parameter file to store all Shared Parameters and have all users share this single file. This is important because Revit assigns a unique identifier to each Shared Parameter (called a GUID – Global Unique Identifier). If the “same” parameter (same name and settings) is defined by two different individuals in separate Shared Parameter files, Revit will NOT see them as the same! Each version of the parameter would still have a different GUID making Revit see the two parameters as different.

This situation presents some unique challenges to the effort to standardize content and parameters across the many food service equipment manufacturers creating content for the industry. For this reason, a recommended Shared Parameter file containing a list of all food service parameters anticipated has been included with this document. There are utilities online that can be used to merge such a file with any existing Shared Parameter files that may already be in use in the end-user's firm. Given the importance of maintaining the integrity of the Shared Parameter file across your organization, you are highly encouraged to utilize such a tool to or other acceptable means to ensure that all required Shared Parameters are defined properly and in a single Shared Parameter file.

**REQUIREMENT:** To promote consistency in model content (particularly for manufacturer content that is shared on Autodesk Seek), use parameters as they are explicitly defined (including the GUID) in the approved shared parameters file. If a required parameter is not in the file, add it to your content as necessary. It is also recommended to include the shared parameter file containing the additional parameters with your content package. When creating custom parameters, follow the naming conventions included herein.

## List of Food Service Equipment Industry Shared Parameters

Consistent parameter naming enables easier and more comprehensive parametric searching in Autodesk Seek. Create parameters only when variation creates meaningfully differentiated types that represent real-world possibilities. Please note that the following Shared Parameter Table is for illustration purposes only. The actual Shared Parameter File (a TXT file) is available online at the FCSI, FEDA, and NAFEM websites. It will be updated as needed. Be sure to use the most recent file.

Category	Parameter Name	Parameter Group	Parameter Type	Discipline	Type Of Parameter
<b>Specialty Equipment</b>					
	Default Elevation	Constraints	System		
	Assembly Code	Identity Data	System		
	Cost	Identity Data	System		
	Description	Identity Data	System		
	Keynote	Identity Data	System		
	Manufacturer	Identity Data	System		
	Model	Identity Data	System		
	Type Comments	Identity Data	System		
	URL	Identity Data	System		
<b>Food Service Equipment</b>					
<b>Identification Data</b>					
	Type Mark	Identity Data	System	Common	Text
	Item Number	Identity Data	Shared	Common	Text
	Description	Identity Data	System	Common	Text
	Manufacturer	Identity Data	System	Common	Text

Category	Parameter Name	Parameter Group	Parameter Type	Discipline	Type Of Parameter
	Model Number	Identity Data	System	Common	Text
	Remarks	Identity Data	System	Common	Text
	Identify Quantity as Lot	Identity Data	Shared	Common	Yes/No
	URL Manufacturer	Identity Data	Shared	Common	Text
	URL Cutsheet	Identity Data	Shared	Common	Text
	Foodservice Equipment Identifier	Identity Data	Shared	Common	Yes/No
	NAFEM Spec ID No	Identity Data	Shared	Common	Text
	Furnished By	Identity Data	Shared	Common	Text
	Installed By	Identity Data	Shared	Common	Text
	Revision Code	Identity Data	Shared	Common	Text
	Specification by Manufacturer	Identity Data	Shared	Common	Text
	Specification by User	Identity Data	Shared	Common	Text
	MasterSpec.	Identity Data	Shared	Common	Text
	Omniclass Number and Title	Identity Data	System	Common	Text
	CSI MasterFormat	Identity Data	Shared	Common	Text
	SMACNA No	Identity Data	Shared	Common	Text
	Seismic Rating	Identity Data	Shared	Common	Text
	Weight	Identity Data	Shared	Common	Text
	Serial Number	Identity Data	Shared	Common	Text
	<b>Status</b>				
	Status	General	Shared	Common	Text
	<b>Utility Connections</b>				
	<b>Electrical</b>				
	Volts	Electrical	Shared	Electrical	Electrical Potential
	Cycle	Electrical	Shared	Electrical	Frequency
	Phase	Electrical	Shared	Common	Integer
	FL Amps	Electrical	Shared	Electrical	Current
	Watts	Electrical	Shared	Electrical	Wattage
	HP	Electrical	Shared	Common	Text
	Conn Conduit	Electrical	Shared	Common	Yes/No
	Conn Plug NEMA	Electrical	Shared	Common	Text
	Elec Conn RI Height	Electrical	Shared	Common	Length
	Elec Conn Connection Height	Electrical	Shared	Common	Length
	Min Ckt Ampacity	Electrical	Shared	Electrical	Current
	Max Overcurrent Protection	Electrical	Shared	Electrical	Current
	Number of Poles	Electrical	Shared	Electrical	Number of Poles
	Apparent Power	Electrical	Shared	Electrical	Apparent



Category	Parameter Name	Parameter Group	Parameter Type	Discipline	Type Of Parameter
					Power
<b>Cold Water</b>					
	Cold Water Size	Plumbing	Shared	Piping	Pipe Size
	Cold Water Flow	Plumbing	Shared	Piping	Flow
	Cold Water Temperature Recommended	Plumbing	Shared	Piping	Temperature
	Cold Water RI Height	Plumbing	Shared	Common	Length
	Cold Water Connection Height	Plumbing	Shared	Common	Length
<b>Chilled Water</b>					
	Chilled Water Supply Size	Plumbing	Shared	Piping	Pipe Size
	Chilled Water Flow	Plumbing	Shared	Piping	Flow
	Chilled Water Temperature	Plumbing	Shared	Piping	Temperature
	Chilled Water Supply RI Height	Plumbing	Shared	Common	Length
	Chilled Water Supply Connection Height	Plumbing	Shared	Common	Length
	Chilled Water Return Size	Plumbing	Shared	Piping	Pipe Size
	Chilled Water Return RI Height	Plumbing	Shared	Common	Length
	Chilled Water Return Connection Height	Plumbing	Shared	Common	Length
<b>Filtered Water</b>					
	Filtered Water Supply Size	Plumbing	Shared	Piping	Pipe Size
	Filtered Water Flow	Plumbing	Shared	Piping	Flow
	Filtered Water RI Height	Plumbing	Shared	Common	Length
	Filtered Water Connection Height	Plumbing	Shared	Common	Length
<b>Hot Water</b>					
	Hot Water Size	Plumbing	Shared	Piping	Pipe Size
	Hot Water Flow	Plumbing	Shared	Piping	Flow
	Hot Water Temperature	Plumbing	Shared	Piping	Temperature
	Hot Water RI Height	Plumbing	Shared	Common	Length
	Hot Water Connection Height	Plumbing	Shared	Common	Length
<b>Waste</b>					
	Direct Waste Size	Plumbing	Shared	Piping	Pipe Size
	Direct Waste RI Height	Plumbing	Shared	Common	Length
	Direct Waste Connection Height	Plumbing	Shared	Common	Length
	Indirect Waste Size	Plumbing	Shared	Piping	Pipe Size
	Indirect Waste Connection Height	Plumbing	Shared	Common	Length
	Indirect Waste Connection Type	Plumbing	Shared	Common	Yes/No
	Wastewater Discharge Temperature	Plumbing	Shared	Piping	Temperature
<b>Gas</b>					
	Gas Size	Mechanical	Shared	Piping	Pipe Size
	Gas Flow	Mechanical	Shared	Piping	Flow
	Gas RI Height	Mechanical	Shared	Common	Length

Category	Parameter Name	Parameter Group	Parameter Type	Discipline	Type Of Parameter
	Gas Connection Height	Mechanical	Shared	Common	Length
	Gas Input	Mechanical	Shared	HVAC	Heat Gain
	Gas KW	Mechanical	Shared	Common	Number
	<b>Steam</b>				
	Steam Supply Size	Mechanical	Shared	Piping	Pipe Size
	Steam Supply Minimum Pressure	Mechanical	Shared	Piping	Pressure
	Steam Supply Maximum Pressure	Mechanical	Shared	Piping	Pressure
	Steam Supply Volume	Mechanical	Shared	Piping	Flow
	Steam Supply RI Height	Mechanical	Shared	Common	Length
	Steam Supply Connection Height	Mechanical	Shared	Common	Length
	Steam Pounds per Hour	Mechanical	Shared	Common	Number
	Condensate Return Size	Mechanical	Shared	Piping	Pipe Size
	Condensate Return RI Height	Mechanical	Shared	Common	Length
	Condensate Return Connection Height	Mechanical	Shared	Common	Length
	<b>CO2</b>				
	CO2 Size	Mechanical	Shared	Piping	Pipe Size
	CO2 Pressure	Mechanical	Shared	Piping	Pressure
	CO2 Volume	Mechanical	Shared	Piping	Flow
	CO2 RI Height	Mechanical	Shared	Common	Length
	CO2 Connection Height	Mechanical	Shared	Common	Length
	<b>Compressed Air</b>				
	Compressed Air Size	Mechanical	Shared	Piping	Pipe Size
	Compressed Air Pressure	Mechanical	Shared	Piping	Pressure
	Compressed Air Volume	Mechanical	Shared	Piping	Flow
	Compressed Air RI Height	Mechanical	Shared	Common	Length
	Compressed Air Connection Height	Mechanical	Shared	Common	Length
	<b>Ventilation</b>				
	<b>Exhaust</b>				
	Exhaust Vent Width	Mechanical-Airflow	Shared	Common	Length
	Exhaust Vent Depth	Mechanical-Airflow	Shared	Common	Length
	Exhaust Vent Diameter	Mechanical-Airflow	Shared	Common	Length
	Exhaust RI Height	Mechanical-Airflow	Shared	Common	Length
	Exhaust Volume	Mechanical-Airflow	Shared	HVAC	Flow
	Exhaust Static Press	Mechanical-Airflow	Shared	HVAC	Pressure
	<b>Make Up Air</b>				
	MU Air Vent Width	Mechanical-Airflow	Shared	Common	Length
	MU Air Vent Depth	Mechanical-Airflow	Shared	Common	Length
	MU Air Vent Diameter	Mechanical-Airflow	Shared	Common	Length

Category	Parameter Name	Parameter Group	Parameter Type	Discipline	Type Of Parameter
	MU Air RI Height	Mechanical-Airflow	Shared	Common	Length
	MU Air Volume	Mechanical-Airflow	Shared	HVAC	Flow
	MU Air Static Press	Mechanical-Airflow	Shared	HVAC	Pressure
<b>Remarks</b>					
	Electrical Remarks	Electrical	Shared	Common	Text
	Plumbing Remarks	Plumbing	Shared	Common	Text
	Mechanical Remarks	Mechanical	Shared	Common	Text
	Ventilation Remarks	Mechanical-Airflow	Shared	Common	Text
<b>Connection Types</b>					
	Electric Connection Type	Electrical	Shared	Common	Text
	Plumbing Connection Type	Plumbing	Shared	Common	Text
	Mechanical Connection Type	Mechanical	Shared	Common	Text

## Creating Custom Parameters

Should it become necessary to add parameters not included on the list above, the guidelines published by Autodesk in the RMCSG have been adopted and are included here for reference. The Shared Parameters suggested above are for the purpose of this document only. The actual Shared Parameter File is obtainable from one of the foodservice organizations: FCSI; NAFEM; FEDA.

### Naming Guidelines from the RMCSG:

- Use standard approved parameter names when available. (See above)
- 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., Hot Water Temperature; Chilled Water Supply Size; Exhaust Static Pressure).

- Do not change label names provided by the Revit 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., Steam Volume; Steam Pressure). Parameters for subsequent items should include a number in the name before the final part of the description, but do not include a number in the name for the first item (e.g., Cold Water Supply Size; Cold Water Supply 2 Size).

- Avoid using symbols in parameter names, including: + - / \ \* ( ) " ' < > | ^ \$ { } [ ] .

Do **not** include units in the name of a parameter (e.g., Gas Flow; Supply Air Flow; Exhaust Air Flow), not CFM.

- Name Yes/No parameters so they imply that they return a Yes/No value, for example:
  - Has Handle
  - Is Energy Efficient

- Show Hoods

## Format

**<Function/Object> <Type of measurement/Descriptor>**

<b>&lt;Function/Object&gt;</b>	required if the parameter applies to a sub-component rather than the entire family.
<b>&lt;Type of measurement/Descriptor&gt;</b>	required for all parameters to describe the value being passed.

## Examples

PARAMETERS THAT APPLY TO THE ENTIRE FAMILY

**Format: <Type of measurement/Descriptor>**

**Height**  
**Width**  
**Total Gas Volume**  
**Full Load Current**  
**Waste Type**

PARAMETERS THAT DESCRIBE THE LINEAR DIMENSION OF A SUB-COMPONENT (CONNECTOR)

**Format: <Function/Object> Connection <Type of Measurement/Descriptor>**

**Gas Size Diameter**  
**Condenser Water Connection Diameter**  
**Cold Water Size Diameter**  
**Supply Air Connection Width**  
**Supply Air Connection Height**

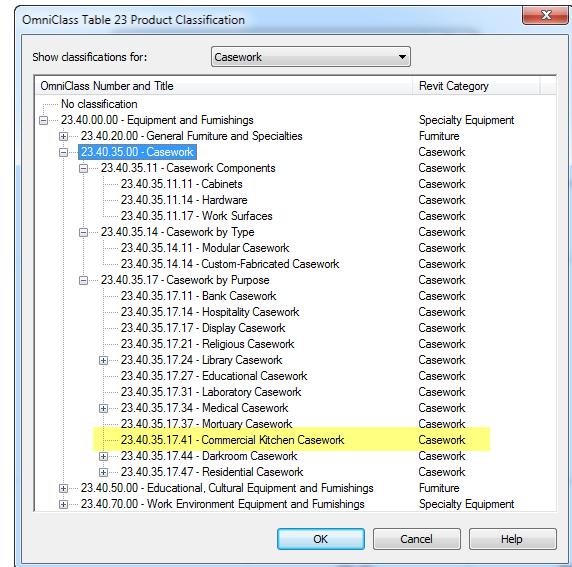
## CSI Classifications

The OmniClass classification system is published by the Construction Specification Institute (CSI). It incorporates some of their other standards including MasterSpec and UniFormat. All three of these systems are available to Revit and Revit files in one fashion or another. Each serves a different aspect of the design and construction process and workflow. Therefore, all three should be assigned to all Families.

## Omniclass

OmniClass can be assigned using the Family Category and Parameters dialog in the Family Editor. The following list is included in the Specialty Equipment Family template:

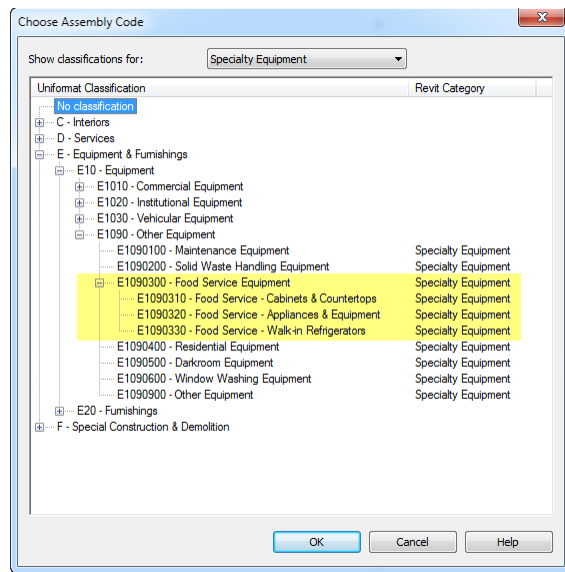
OmniClass Number and Title	Revit Category
No classification	
23.10.00.00 - Site Products	
23.25.00.00 - Structural and Space Division Products	
23.30.00.00 - Openings, Passages, Protection	Specialty Equipment
23.35.00.00 - Coverings, Cladding, and Finishes	
23.40.00.00 - Equipment and Furnishings	Specialty Equipment
23.40.05.00 - Plants and Planting Products	Planting
23.40.10.00 - Exterior Equipment and Furnishings	Specialty Equipment
23.40.20.00 - General Furniture and Specialties	Furniture
23.40.40.00 - Food Service Equipment and Furnishings	Specialty Equipment
23.40.40.11 - Specialized Food Storage and Display Furnishings	Specialty Equipment
23.40.40.11.11 - Refrigerators and Freezers	Specialty Equipment
23.40.40.11.11.11 - Refrigerators	Specialty Equipment
23.40.40.11.11.14 - Freezers	Specialty Equipment
23.40.40.11.11.17 - Refrigerator-Freezer	Specialty Equipment
23.40.40.11.14 - Food Storage Coolers	Specialty Equipment
23.40.40.11.14.11 - Walk-In Coolers	Specialty Equipment
23.40.40.11.14.14 - Display Coolers	Specialty Equipment
23.40.40.11.17 - Refrigerated Cases	Specialty Equipment
23.40.40.11.21 - Hot Cabinets	Specialty Equipment
23.40.40.11.24 - Cold Cabinets	Specialty Equipment
23.40.40.11.27 - Bottle Racks	Specialty Equipment
23.40.40.11.31 - Steam Tables	Specialty Equipment
23.40.40.11.34 - Snack Cabinets	Specialty Equipment
23.40.40.14 - Food Service Equipment	Specialty Equipment
23.40.40.14.11 - Food Delivery Carts and Conveyors	Specialty Equipment
23.40.40.14.11.11 - Food Delivery Carts	Specialty Equipment
23.40.40.14.11.14 - Food Delivery Conveyors	Specialty Equipment
23.40.40.14.14 - Food Preparation Equipment	Specialty Equipment
23.40.40.14.14.11 - Food Mixers	Specialty Equipment
23.40.40.14.14.14 - Drink Making Equipment	Specialty Equipment
23.40.40.14.17 - Food Cooking Equipment	Specialty Equipment
23.40.40.14.17.11 - Cookers, Ovens, Stoves	Specialty Equipment
23.40.40.14.17.14 - Hot Plates	Specialty Equipment
23.40.40.14.17.17 - Ranges	Specialty Equipment
23.40.40.14.17.21 - Grills	Specialty Equipment
23.40.40.14.17.24 - Fryers	Specialty Equipment
23.40.40.14.17.27 - Barbecues	Specialty Equipment
23.40.40.14.17.31 - Small Specialized Cooking Equipm...	Specialty Equipment
23.40.40.14.24 - Food Dispensing Equipment	Specialty Equipment
23.40.40.14.24.11 - Bar Equipment	Specialty Equipment
23.40.40.14.24.14 - Service Line Equipment	Specialty Equipment
23.40.40.14.24.17 - Soda Fountain Equipment	Specialty Equipment
23.40.40.14.27 - Ice Machines	Specialty Equipment
23.40.40.14.31 - Cleaning and Disposal Equipment	Specialty Equipment
23.40.50.00 - Educational, Cultural Equipment and Furnishings	Furniture
23.40.70.00 - Work Environment Equipment and Furnishings	Specialty Equipment
23.40.90.00 - Information and Communication Specialties	Specialty Equipment
23.40.95.00 - Furnishings, Ornaments, and Decoration	Specialty Equipment
23.45.00.00 - Sanitary, Laundry, and Cleaning Equipment	Specialty Equipment
23.50.00.00 - Conveying Systems & Material Handling	Specialty Equipment
23.55.00.00 - Manufactured Structures	Specialty Equipment
23.60.00.00 - General Purpose - Services	Specialty Equipment
23.65.00.00 - Supply and Distribution of Liquids and Gases	Specialty Equipment
23.70.00.00 - Waste Management	Specialty Equipment
23.75.00.00 - Climate Control (HVAC)	Mechanical Equipment
23.80.00.00 - Electric Power and Lighting	Electrical Equipment
23.85.00.00 - Information and Communication	Specialty Equipment



Assigning an appropriate designation to each Family offers a few key benefits:

- All components can be assigned a standard designation from a respected industry standard. This helps ensure consistency and compatibility from project to project and firm to firm.
- OmniClass classification parameters are searchable on content sites like Autodesk Seek.
- Within projects, you can include the OmniClass Number and Title in schedules.
- You can apply filters in views based on the value of the OmniClass Number and Title.
- You can tag objects based on the value of the OmniClass Number and Title.

In addition to OmniClass, all Revit Families also include built-in fields for assigning UniFormat Assembly Codes. You can choose an Assembly code from a predefined list of UniFormat codes included with Revit. This field is available in the Identity Data grouping of parameters. UniFormat codes tend to be more general than OmniFormat. They are typically used to assist in early cost estimation tasks. It is recommended that the Assembly code also be assigned to all Families. Like OmniClass, you can schedule, tag and filter based on these codes.



In addition to the above two classification systems, building components are often classified by their section in the CSI MasterFormat tables. In MasterFormat 2004, section 11 40 00 is for food service equipment. A complete list of specification sections from MasterFormat 2004 is included here\*:

#### 11 40 00 FOODSERVICE EQUIPMENT

##### **11 41 00 Food Storage Equipment**

- 11 41 13 Refrigerated Food Storage Cases
- 11 41 23 Walk-In Coolers
- 11 41 26 Walk-In Freezers

##### **11 42 00 Food Preparation Equipment**

##### **11 43 00 Food Delivery Carts and Conveyors**

- 11 43 13 Food Delivery Carts
- 11 43 16 Food Delivery Conveyors

##### **11 44 00 Food Cooking Equipment**

- 11 44 13 Commercial Ranges
- 11 44 16 Commercial Ovens

##### **11 46 00 Food Dispensing Equipment**

- 11 46 13 Bar Equipment
- 11 46 16 Service Line Equipment
- 11 46 19 Soda Fountain Equipment

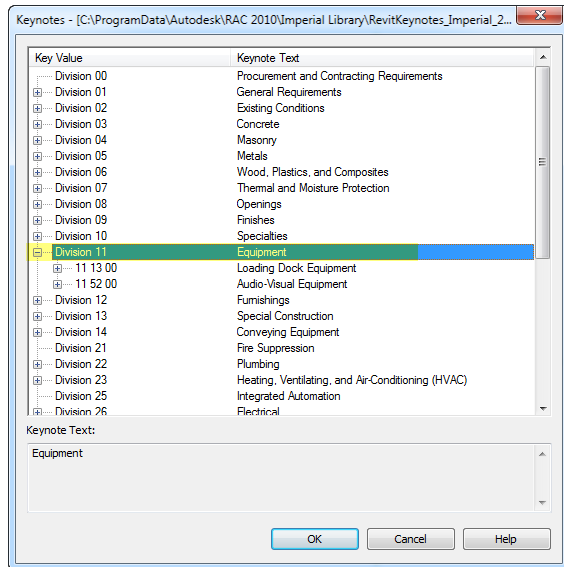
##### **11 47 00 Ice Machines**

##### **11 48 00 Cleaning and Disposal Equipment**

- 11 48 13 Commercial Dishwashers

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Interestingly, the MasterFormat designations, while more commonly used in industry, are not provided directly as a built-in list similar to the OmniFormat and UniFormat lists. Where we see these codes being used in Revit by default is in the Keynote feature. If Keynotes are utilized, they can be assigned to Families in much the same way as the other two classification systems by choosing the value from the loaded Keynote list. The difference is that a Keynote list can be customized per firm or even per project.



## Preview Images

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
- Autodesk Seek search results
- the Preview window in Revit Open and Load Family dialogs when a family is selected

By creating preview images that adhere to Autodesk standards, users can view consistent previews across families, ensuring a consistent user experience both in Autodesk Seek and in Revit software.

## Creating a Preview Image

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.

For most Food Service Equipment, create a 3D view in the Family file. Rename the view “Preview Image” and then set the view to SW Isometric view. (This can be done easily using the ViewCube). In some cases you may choose a plan or elevation view instead of a 3D view if it showcases the item better. The goal is to make the preview a useful tool to quickly aid in selecting the desired component.

In the Preview Image view, use Visibility/Graphic overrides and hide any objects that would distract from the preview such as dimensions, Reference Planes or other items that might clutter or otherwise make the preview less legible. If the Family is hosted, turn off the host in the Preview Image view.



Choose Save As from the Application menu and click the Options button. In the Preview area, set the Preview to use the Preview Image view that you set up.

## Type Catalogs

A type catalog is a comma-delimited TXT file that, when placed in the same directory as a Family, displays a list of available Family Types onscreen when the Family is loaded into a project. You can select and load just 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 Catalog also provides an external means of editing the Family, as you can add and remove Types in the catalog (TXT) file.

### Type Catalog Standards

The following standards are recommended by the RMCSG when creating type catalogs:

- Use any text editor to create Type Catalogs.
- Create Type Catalogs for Families that contain six or more Types.
- Name a Type Catalog file (TXT) with the same name as the Family file (RFA) that it supports and place it in the same directory.
- Ensure that parameters in Type Catalogs are used within the Family file. It is not necessary to have all of the Types in the Catalog in the Family file, but each parameter used in the file must be resident in the Family and applied to geometry as appropriate.

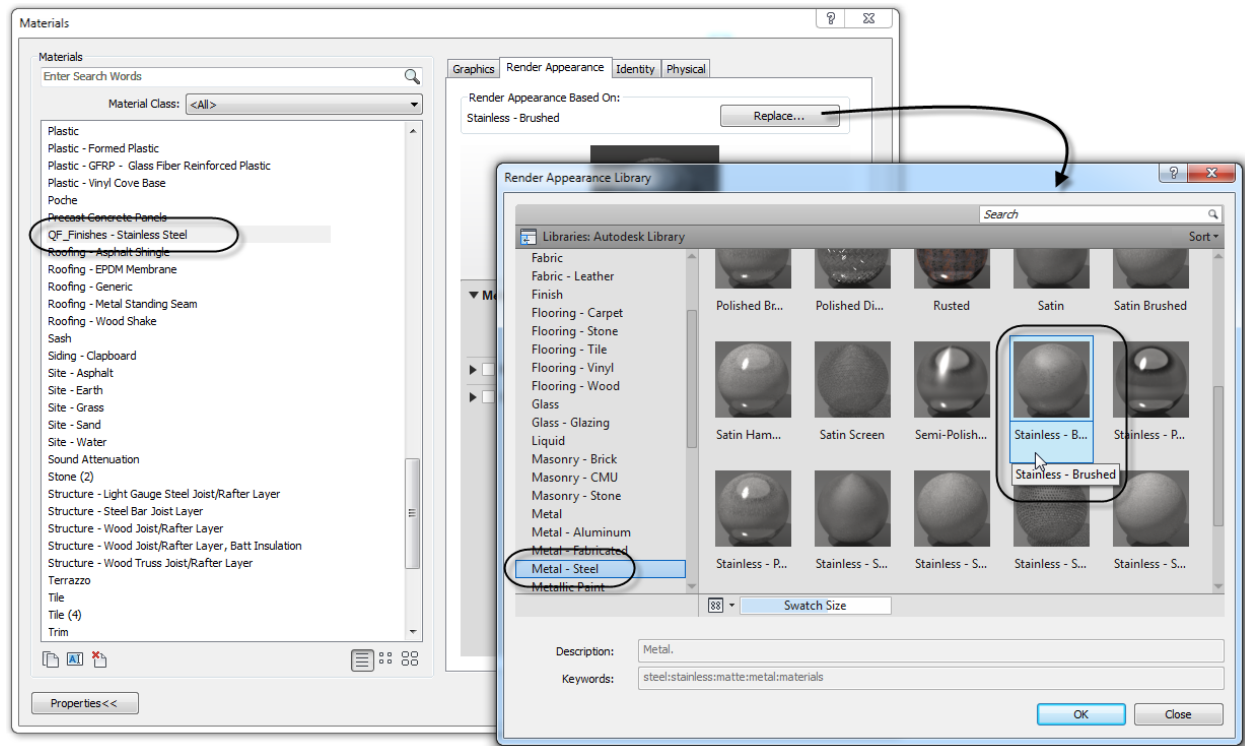
To use feet and inches in the names of Family Types in the Type Catalog, you must format the names with a quote mark after the foot or inch symbol as shown in the following table:

To display the type name...	In the type catalog, enter...
48" x 60"	48"" x 60""
3' – 6"	3"" –6""

For information on creating a type catalog, see “Creating Type Catalogs” in the Revit Help and Families Guide.

## Materials

If you will be assigning materials to your content and using them for photo-realistic renderings, it is recommended that you reserve highly detailed geometric representations for only the Fine level of detail. Revit ships with an extensive library of materials. To ensure consistency in projects, all equipment Families should use the same stainless steel material as their default material. To create the approved stainless steel material, open the “Materials” dialog. Create a new material (an easy way to do this is to select the existing Metal – Steel material and duplicate it). Rename the material to: **QF\_Finishes - Stainless Steel**. Click the Render Appearance tab and click the Replace button. In the “Render Appearance Library” dialog, choose Metal – Steel on the left and then select Stainless – Brushed on the right. Click OK twice to complete the material. Add this material to all of your Revit template files for easy access.



Additional material techniques and recommendation are available in the Autodesk Revit Model Content Style Guide. Please refer to that document for complete details.

## Connectors

In Revit MEP, the connector connects the single family component with other components to create MEP systems. Without a connector, an RME family would just be a static placeholder. In RAC, connectors can be added to Families, but are not utilized in RAC projects. RAC does not have systems functionality, so connectors are simply ignored by the software. However, if parameters are assigned to connectors, they can be scheduled in RAC projects.

In Revit MEP, there are 5 kinds of connectors:

- Electrical Connector
- Duct Connector
- Pipe Connector
- Cable Tray Connector
- Conduit Connector

Connectors can be added to Specialty Equipment Families; however in RME they will not enjoy full functionality. For example, piping connectors will fail to associate properly with the system designated in the Family file. If connector functionality is critical to your Family's functioning and behavior, consider using an MEP category instead such as Plumbing Fixture or Mechanical Equipment. Such categories should work well for hand sinks or exhaust hoods. However, they will be somewhat problematic for equipment with multiple types of connections like refrigerators, ranges, ice makers, etc. These items are

really more appropriate in the Specialty Equipment category, so careful consideration must be given to this issue and realistic expectations placed on the expected behavior of connectors in food service equipment.

Before making the final decision however, a few additional related points are worthy of mention. First, connectors do not work through linked files. This is true regardless of the category used for the Family. If you wish to connect a Family's connectors to a system and other equipment, all items must reside in the same Revit file. This is unlikely given the current workflow employed by most design and engineering firms today. The typical workflow employed is for each major discipline to perform their work in separate files and then link to each other's file in order to work with or print the entire project. Periodic updates of any party's file can be reloaded as needed via the Manage Links functionality. Since the food service designer is often in a different firm than the consulting engineers, working in the same Revit file is unlikely and problematic. Therefore, even if a different Family category is utilized in an effort to take advantage of connectors and systems, the connectors would still not work in the linked file scenario employed across the industry.

The second point of note is that Shared Parameters *can* be scheduled in all cases. Shared Parameters can be linked to connectors, or stored elsewhere in the Family parameters. So in anticipation of future Revit functionality, consider building Specialty Equipment Families complete with connectors. Then assign Shared Parameters to appropriate properties on the connector. These connectors and their Shared Parameters will be able to be included in all of your current schedules and delivered to your engineers following current industry practices. Should future functionality be introduced allowing connector functionality across Revit Links, your Families will be ready to take advantage.

### Adding a Connector

- Click the tool for the connector you wish to add (Electrical Connector, Conduit Connector or Pipe Connector).
- Click to place the connector in the drawing area.

RME 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 center of the face of the geometry and moves with the face. If the geometry is deleted, the connector is also deleted.

**RMCSG Best Practice Recommendation:** Place connectors on a face rather than on a work plane.

### System Types

The following table provides an overview of the application scenario for system types useful to commercial food service equipment. For a complete list of all System Types and scenarios, refer to the RMCSG.

<b>Pipe Connector</b>	<i>Other</i>	Families in gas, refrigerant systems, Place holder for pipe systems not included Equipment, device or fixture operates in power supply/distribution systems.	Gas connector of Water heater
<b>Electrical Connector</b>	<i>Power – Balanced</i> <i>Power – Unbalanced</i>		Generator Panel Board

## 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.

NOTE: The arrow does not represent the flow direction.

## Primary Connector

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

The primary connector of pipe and duct fittings should be located at coordinates (-1, 0, 0). For other Families, the location of the primary connector is not important.

## Linking Connector

When there is more than one pipe connector, 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.

## Connector Mapping

Edit Element Properties for the connector to define parameters for the connector. Click the browse button in the far right column to display a dialog where you can map connector parameters to family parameters (or shared parameters) with the same units. Connector mapping makes the connector parametric with the family.

## Connector Descriptions

In equipment with multiple connectors, it can be difficult to determine the function of each connector.

To make it easier to identify the function of connectors in the family, add connector descriptions. These descriptions display in the Select Connector dialog.

## SECTION 3: TESTING GUIDELINES

To ensure the quality of Revit Family content, thoroughly test Families before using them in production or sharing them with others. 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, test them both in a generic sandbox project created from a simple template and a project typical of the kind of project where it is likely to be used most frequently.

**TIP:** For large content creation projects, it is recommended that “spot checking” or random testing of 10% of the content be performed by a tester who is not the content creator.

### 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.
- ✓ If a Type Catalog is being used for the Family, save such Type testing until you load it into a project environment.
- ✓ 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 designated 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:
  - 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.
  - 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

- ✓ Using a test project, load the Family in a project environment, and check all views for anomalies. If the Family includes a Type Catalog, use it to load the Family and several of its Types.
- ✓ 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.
- ✓ 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.
- ✓ Test the following commands on geometry created in the Family:
  - Copy/Paste
  - Rotate
  - Mirror
- ✓ Test the Family in an actual project, verify its performance, and ensure that the project matches the design intent of the Family.

## Additional Files

Several documents have been researched to produce this document and are included herein by reference.

The following resources are available from Autodesk for working with both Revit model content and Autodesk Seek.

**AUTODESK REVIT MODEL CONTENT STYLE GUIDE:** The purpose of this guide is to define Autodesk 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 content (for example, windows, furnaces, heat pumps, and structural steel members).

**AUTODESK METADATA STYLE GUIDE AND PRODUCT WORKBOOK:** The Autodesk Metadata Style Guide defines styles and formatting rules that manufacturers, content service organizations, and content specialists must abide by so that the content that they produce can be loaded into the Autodesk Seek staging environment.

Download at: <http://seek.autodesk.com/revit.htm>

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<sup>i</sup> Visit the Building Coder blog at: <http://thebuildingcoder.typepad.com>