GF Piping Systems

GF Revit

Pipes, Fittings and Accessories

GFDO_MA_00086 / EN / 0a (04/2021)

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1. General Information

1.1. Integrity of pipes, fittings and accessories

Currently GF Piping Systems Revit packages offer various ranges of pipes for each system/product line using the nominal diameter (DN) as the connecting diameter. The main reasons for this are:

1. It supports design and engineering methodology for planners;
2. It is the only way for material interchange.

1.2. Irregular sizes

GF Piping Systems offers some products for which the nominal diameter is assigned to 2 different sizes and vice versa depending on different jointing technologies. Relevant information of the outer and nominal diameters for every system is provided in every Revit file and can be found under "Legend View" as "User Instruction".

To control those irregular sizes for pipes in Revit, users need to pay attention to the pipe segments parameter (Image 1).

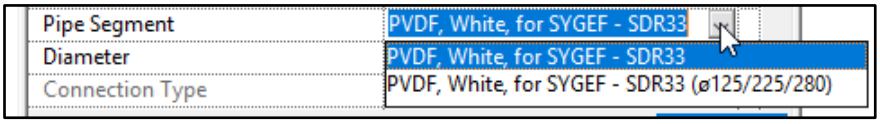

Image 1: Irregular sizes for pipes controlled via pipe segment

In case of irregular sizes for pipe fittings users are given an option to control those irregular sizes in relevant Revit families. Usually this feature is called "use_larger_diameter" and is a shared parameter meaning that users can select all relevant pipe fittings and by one click activate irregular sizes (Image 2).

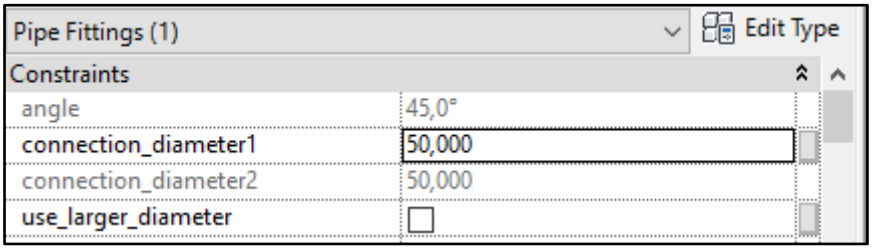

Image 2: Irregular sizes for pipes fittings controlled via the "use_larger diameter"parameter

1.3. Naming Convention

GF Piping Systems uses a hybrid version for naming Revit families. The most common are pipe fittings and pipe accessories and they are named starting with PIF and PIA respectively. Some Revit family names are too long, therefore GF Piping Systems introduced abbreviations for these cases. The full list of abbreviations used in the names of GF Revit families can be found in Appendix A.

2. Pipes

2.1. Single or multi-layer pipes

Single or multi-layer pipes are the most used pipes at GF Piping Systems and they are the most dominant across all applications. Revit includes inner and outer diameters as well as the nominal diameter (DN) based on defined real pipes sizes.

2.2. Pipes with soft insulation

Pipes with soft insulation are created in a similar way as plain pipes (single or multi-layer pipes) with defined inner, outer and nominal diameters. However, users need to activate the soft insulation manually to activate article numbers in GF custom schedules. Without applying the necessary insulation, article numbers will not appear in the schedules.

2.3. Pre-Insulated Pipes (pipes with hard shell)

Pre-insulated piping systems have specific characteristics; which is why GF Piping Systems uses the most optimal interpretation for creating them. In general, pre-insulated pipes consist of an inner pipe, an outer shell/jacket and insulation filled between the inner pipe and outer shell/jacket; which means that they could be treated as single pipes. Consequently, for the inner and nominal pipe diameters GF Piping systems uses the inner and nominal diameters of the inner pipe and the shell/jacket diameter of the outer pipe for the outer diameter.

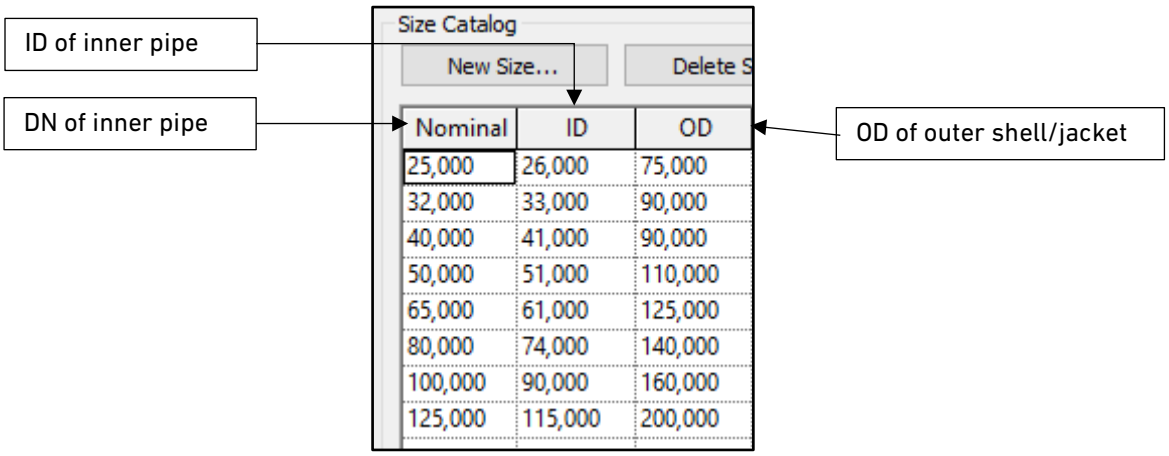

Image 3: The example of data used to define pre-insulated pipes in Revit

2.4. Double-containment pipes

Double-containment pipes are created using a similar method as pre-insulated pipes with Revit using inner and nominal diameters of the inner pipe and the outer diameter of the outer pipe.

GF Piping Systems created 2 specific schedules for inner and outer pipes.

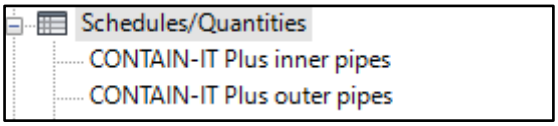

Image 4: Schedules for inner and outer pipes

3. Pipe Fittings

3.1. Couplers, sockets, unions, and other variations

In the most cases couplers, sockets, and unions connect pipes with the same diameter and material and therefore these products are simple to use. Splitting any pipe into 2 pieces allows the selection of a pre-defined coupler from the routing preferences in Revit, which could be replaced with any other available alternative.

Some systems such as pre-insulated and some double-containment pipes require couplers to connect pipes and pipe fittings. In those cases, couplers were created as nested shared Revit families and activating them they will allow them to appear in GF Revit schedules.

From time to time, some of these products might not have a symmetrical geometry and the function "reverse_direction" was introduced for them.

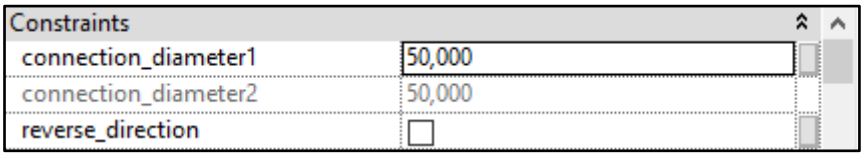

Image 5: A feature of "reverse_direction"

In some exceptional cases certain variations of couplers, sockets or unions are used that can connect even different diameters or materials. However, those cases are very rare.

3.2. Endcaps

Endcaps or caps are among the most simple products developed by GF Piping Systems and there are no complex variations of those parts; which is why their use is straightforward. There is always a single connection for caps/endcaps and they can be integrated into piping systems using common methods.

3.3. Bends and elbows

The main difference between a bend and an elbow is a radius of curvature, other than that both of them work in the same way in Revit.

In most scenarios, bends and elbows are simple products with the same connecting diameters, connection types, insertion depths, and symmetries. However, there are occasional exceptions with different nominal diameters, connection types as well as symmetries. In the case of different nominal diameters on both ends, sizes as well as other necessary data should align automatically in a correct way. However, working with a bend or elbow, which has the same diameter, but a different connection type, insertion depth or symmetry on both ends would cause an issue. For that purpose, GF Piping Systems added the feature "reverse_direction" which allows flexibly and efficiently changing directions where necessary.

3.4. Tees

Usually for systems with limited products, tees are identical and/or have the same connection types for all ends. However, GF Piping Systems offers a huge diversity of products which gives tees a broader variety of options. Despite the fact that GF Piping Systems created pre-defined routing preferences for every pipe type, users should pay particular attention to connection types to make sure the connecting details match their expectations. Some pre-insulated and double-containment systems have tees with the additional option of adding or removing couplers. If activated, they will appear in Revit schedules.

3.5. Crosses

Crosses are not very common in the product portfolio of GF Piping Systems, but they are modelled using a standard Revit modeling methodology and can be inserted by standard approaches.

3.6. Saddles

Saddles can be found mostly in industrial and utility systems. To enable various saddles, GF Piping Systems created separate pipe types with "Saddle" in the naming, so users could identify them easily. By selecting a pipe type which includes the word "Saddle" users can insert saddles instead of tees.

Users should be aware that some saddles will not read all pipes diameters and they should change this manually.

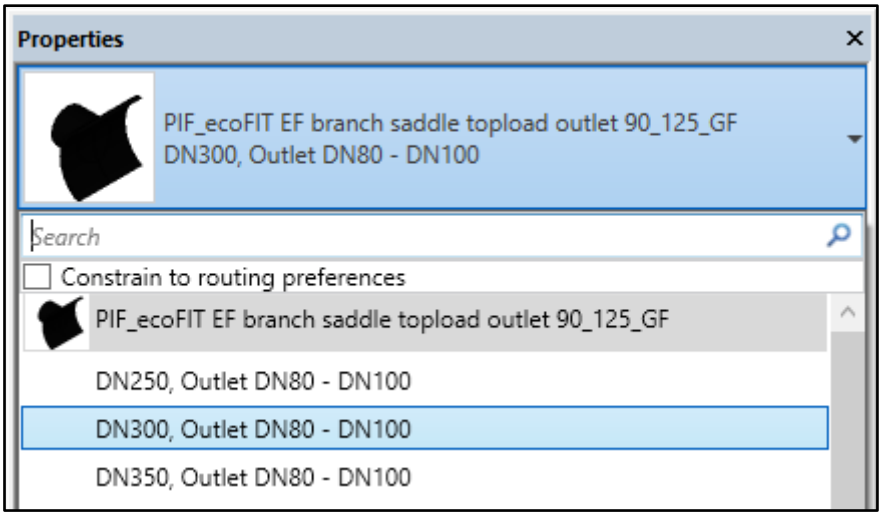

Image 6: The example of the saddle with required manual size selection

In addition, options for "use_larger_diameter" should be always borne in mind.

3.7. Transitions and adapters

The basic premise of transitions, adapters and their variations is to connect different sizes with different systems, however, from time to time some these products have the same connecting diameter on both ends. To avoid malfunctions in Revit while using the same sizes on both ends for transitions defined in Revit, GF Piping Systems differentiates among items with different diameters and the same diameter on both ends. Revit families where transitions and adapters have the same diameter on both ends are named slightly differently possessing "(eq)" or "(un)" at the end of their names. These Revit families are assigned to part type – union and function in the same way as couplers, sockets or unions. If those parts are not symmetrical, the "reverse_direction" feature helps to control the directions.

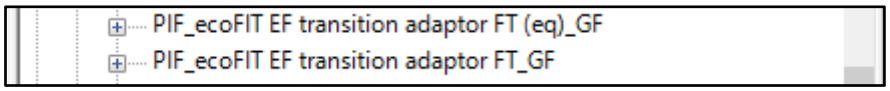

Image 7: The example of part with equal (eq) and different sizes on both ends

3.8. Reducers and reducing bushes

Reducers or reducing bushes are modelled using a similar methodology to transitions or adapters. However, the application of reducers or reducing bushes is not the same. In some cases reducers might have the same nominal diameter on both ends; however, their outer diameter will be different. Revit families where reducers have the same diameter on both ends are named slightly differently possessing "(eq)" or "(un)" at the end of the naming of Revit families. These Revit families are assigned to part type – union and function in the same way as couplers, sockets or unions. If those parts are not symmetrical, they have the "reverse_direction" feature to control directions.

Most reducers for pressure piping systems are centric and easily combined with other parts. However, waste water systems have eccentric reducers, which require a slightly different approach in handling. GF Piping Systems modelled eccentric reducers in such a way that inserting them results in an exclamation mark. Clicking the feature "eccentric" will fix the issue without any additional manual adjustments.

3.9. Multi-reducers

To make our Revit users' life easier, GF Piping Systems created multi-reducers consisting of relevant nested Revit families, which allow automatically inserted required items to form a multi-reducer. As nested shared families are used forming multi-reducers, each necessary item would appear in GF Revit schedules.

3.10. Flanges

GF Piping Systems offers a variety of flanges and therefore their modelling approach is divided into flanges for flange adaptors and flanges for pipe connections. Flanges that are used together with flange adaptors do not have assigned connectors and they can be easily placed in the required location. Meanwhile flanges that are used directly on pipes have assigned connectors and can be connected directly to pipes. Some flanges have an asymmetric geometry and users can control the orientation of the part by using the "reverse_direction" feature.

3.11. Flange adaptors

Flange adaptors are modelled by assigning "flange" as a part type; therefore, they function as flanges. There are a few standard options for inserting this type of part. Furthermore, as flange adaptor have the same nominal diameter on both sides and an asymmetric geometry, users can control the orientation of the part by using the "reverse_direction" feature.

4. Valves

4.1. Standard valves

GF piping systems offers many different types of valves, yet they are modelled using similar methodologies. As a result, there are only a few remarks for the users:

1. The different sizes for each valve are distinguished by type name. This means that if there are any changes in terms of pipe size, users should be aware of this restriction and change valve sizes according to their needs
2. All valves with dynamic parts, such as handles, have clearance zones and they can be activated by enabling the "RSen_C_clashvolume" feature

4.2. Kits

Certain valves consist of standard and non-standard parts, however, the additional parts for those valves are not nested Revit families and they have only one article number for the full kit.

5. Measurement and Controlling Systems

5.1. Overview

Measurement and controlling devices consist of 2 types: installation fittings and measurement and controlling devices.

Installation fittings are special items that function as an interface between the standard integrity of piping systems using nominal diameters and a unique methodology connecting measurement and control devices. Installation fittings are not available for all systems; therefore, GF Revit users should check or consult with specialists regarding their availability.

5.2. Unique methodology

The majority of installation fittings work in the same way as standard connectors connecting piping systems using the nominal diameter, however, for measurement and controlling devices a unique connection methodology is used. For this purpose, a conduit connection was introduced, which is the most safe and suitable type of connection. It prevents a Revit user from connecting a pipe to the connection of the fitting-host.

There are three things Revit users should be aware of:

a. Connection type
b. Connection size
c. The host is leading

To define the connection type and size GF Piping Systems used only one parameter, but that parameter possesses two numerical values separated by a comma and defines two parameters as below:

[Connection Type], [Size]

Connection types are defined in Table 1.

Code	GF Piping Systems Revit content
1	Bayonet
2	Female thread gas cylindrical (BSPP)
3	Female thread metric
4	Female thread conical (NPT)
5	Female thread gas conical (BSPT)
6	Female thread flare (UNF)
7	Male thread conical (NPT)
8	Male thread metric
9	Male thread gas conical (BSPT)
10	Male thread gas cylindrical (BSPP)
11	Male thread flare (UNF)

Table 1: Numbered index of connection types

Sizes are defined in Table 2.

Size, Inches (fractional expression)	Sizes, Inches (decimals expression)	Calculated size for proposed format
½"	0.5	05
¾"	0.75	075
1"	1	1
1 ¼"	1.25	125
1 ½"	1.5	15

Table 2: Inch sizes expressions for the proposed unique format of Revit connectors

A few examples combining connection types and sizes are indicated in Table 3.

Please note: There are a few exceptions for metric sizes. It can be seen in Table 3 that connection type 3 and 8 might have metric systems and they sizes are expressed in millimeters.

Connection Type	Size	Outcome diameter
Male NPT	½"	7.05
Male Metric	16	8.16
Male NPT	¾"	7.075
Male BSPP	¾"	10.075
Female Metric	10	3.10
Female NPT	¾"	4.075
Female BSPP	1"	2.1
Male BSPT	1 ¼"	9.125
Female UNF	1 ½"	6.15
Male NPSM	1¼	10.125

Table 3: A few examples of conduit connections

6. Pipe Supports

6.1. Methodology

All GF Piping Systems parts to clamp or guide pipes in Revit were created using the part type "Mechanical Equipment".

6.2. Usage

To use available pipe supports from GF Piping Systems users should remember a few things.

1. Pipe supports do not read pipe sizes and therefore users should enter that data manually
2. Pipe supports are not automatically aligned to the pipe orientation; therefore users should adjust the positioning manually

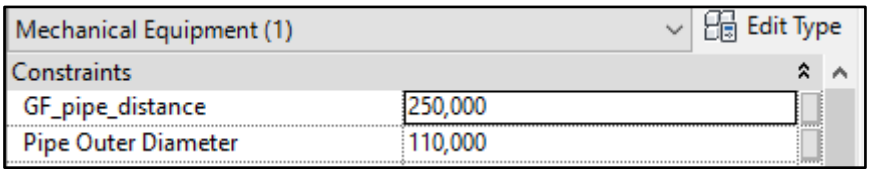

Image 8: Required manual input

7. Appendix

Typical abbreviation for some words in Revit family names

Full Word	Abbreviation in Revit
Butt Fusion	BT
Socket Fusion	SF
Electrofusion	EF
Silicon free	sf
Male thread	mt
Female thread	ft
union	(un)
electric	elec
manual	man
pneumatic	pneu
manual emergency override	man em ov
without manual override	no man ov
manual override	man ov
spigots	spi
horizontal	hor
with mounting inserts	mount ins
back	bck
flange	flng
adaptor	adpt
serrated	serr
equal	(eq)