AutoPLANT to OpenPlant: WorkSet Configuration

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AutoPLANT-to-OpenPlant Migration

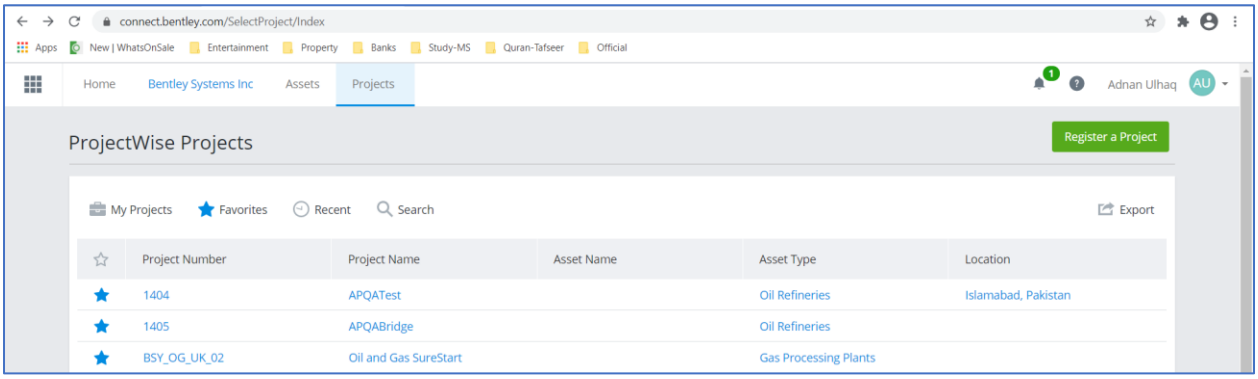
This section describes migrating AutoPLANT Modeler content into OpenPlant Modeler.

This requires iModel Connector for AutoPLANT to publish data to iModelHub/PlantSight. Note that IModel Connector for AutoPLANT is available as a separate installer through Bentley Software Downloads. This utility is also available through AutoPLANT Modeler installer (and can be installed alongwith AutoPLANT Modeler).

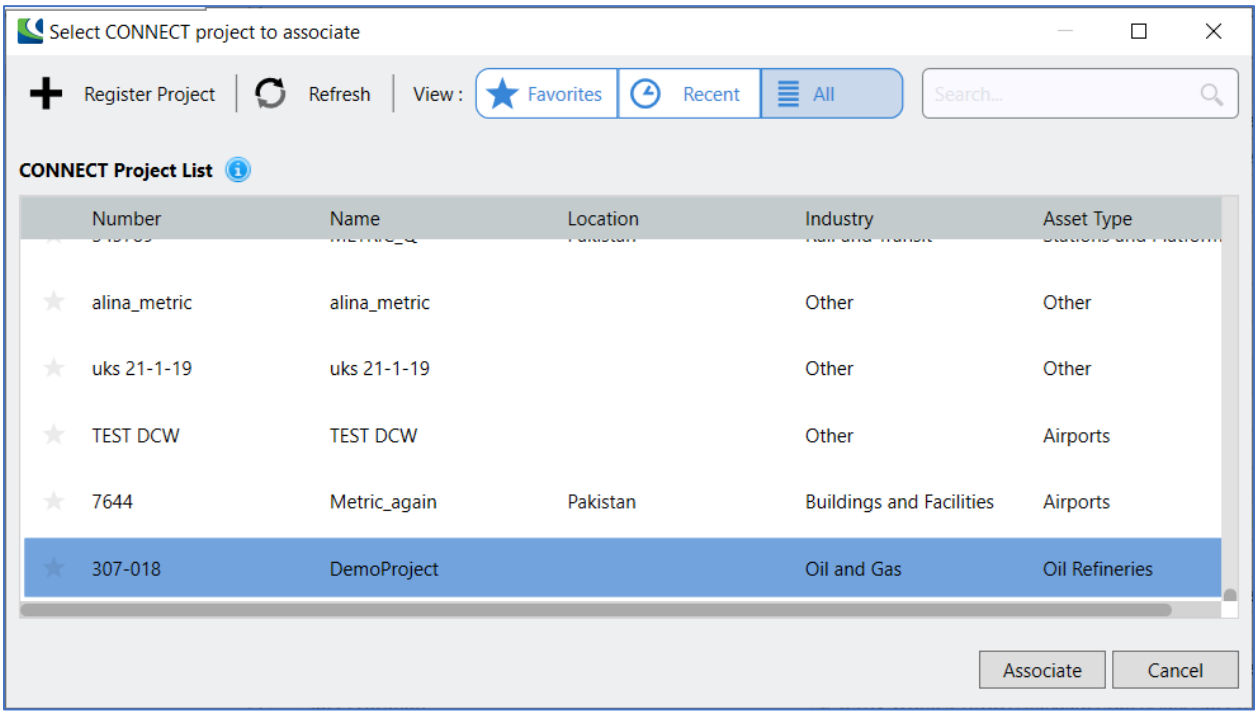
1. Migration Workflow

The workflow to migrate AutoPLANT models and data to OpenPlant Modeler may consist of following steps:

1. Register a CONNECT Project.



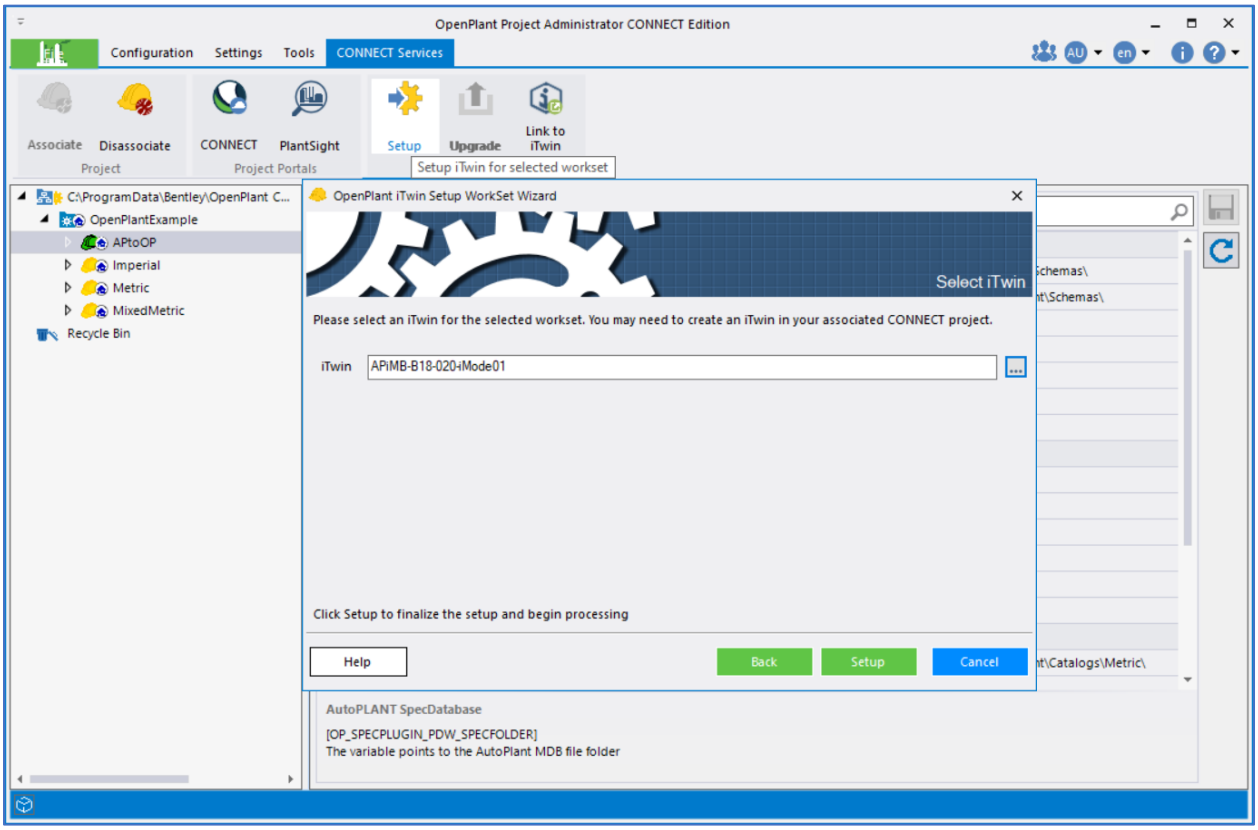
2. Through OpenPlant Project Administrator, **Associate** to the CONNECT Project registered in step 1 above with an appropriate WorkSet.



Note: For the AutoPLANT-to-OpenPlant migration workflow, please use the specific OpenPlant WorkSet designed for this very purpose.

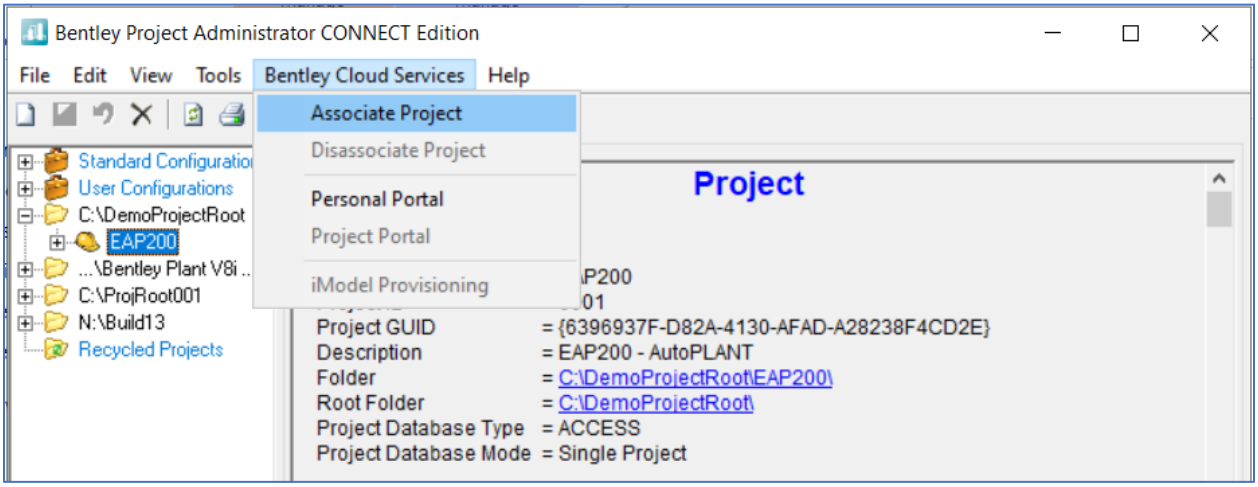
Refer to **Configuration** section for more details.

3. Also, **Setup** the WorkSet with OpenPlant Schema from within OpenPlant Project Administrator.



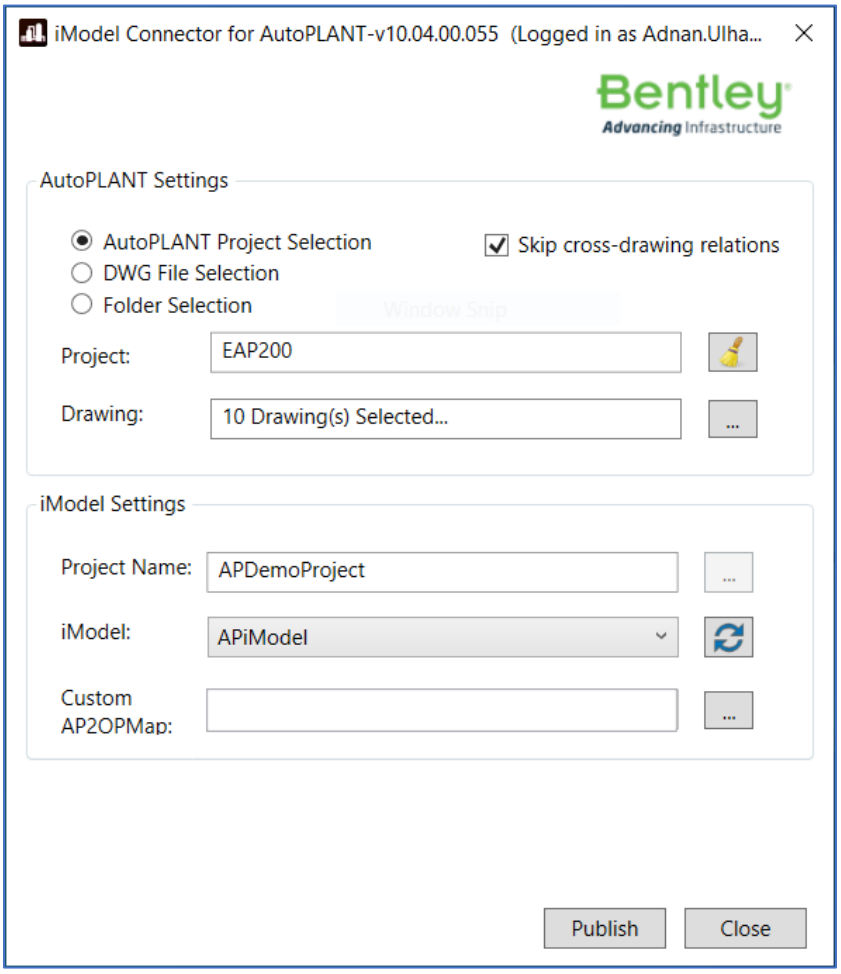
Refer to OpenPlant Project Administrator documentation for more details.

4. Load AutoPLANT's Bentley Project Administrator and login to the AutoPLANT project containing models that need to be migrated to OpenPlant Modeler.
5. Now, through Bentley Project Administrator, **Associate Project** to the same CONNECT project as created in step 1 above:



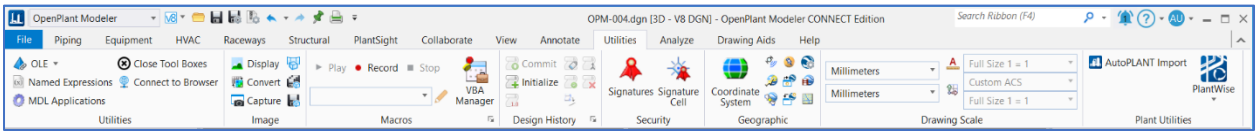
Note: In order to use In-Session workflow to publish from within the AutoPLANT Modeler session, select the **iModel Provisioning** dialog and pick the iTwin that has already been Setup.

6. Once done, load **iModel Connector for AutoPLANT** to publish data to the CONNECT project on iModelHub/PlantSight.



Refer to **iModel Connector for AutoPLANT** section for more details.

7. After publishing, load OpenPlant Modeler in the same WorkSet as used in step 3 and open a file.
8. From OpenPlant Modeler, select **Utilities > AutoPLANT Import** ribbon option:



9. First Load the AutoPLANT Model list in the dialog, import and upgrade the models to complete the migration through **AutoPLANT Import** dialog.
   Refer to **Importing AutoPLANT models in OpenPlant Modeler** section for more details:

2. iModel Connector for AutoPLANT

iModel Connector for AutoPLANT allows users to publish their models alongwith data to iModelHub / PlantSight based on OpenPlant schemas.

These published models can then be used directly through iModelHub or PlantSight for drawing review, walk throughs and Clash detection etc., or can be imported into OpenPlant Modeler for further usage.

There are two ways user can publish data into iModelHub / PlantSight:

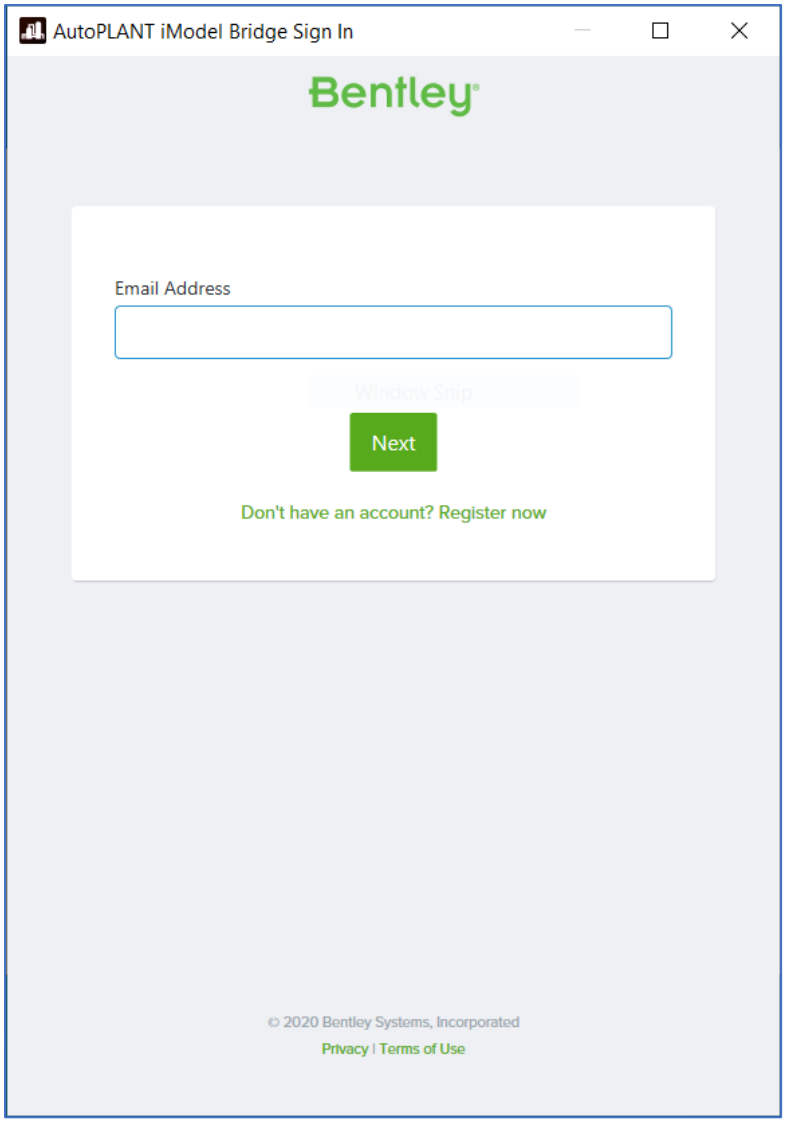
1. Through iModel Connector for AutoPLANT interface
2. From within AutoPLANT Modeler (will be referred as In-Session workflow)

2.1. Publishing AutoPLANT models through iModel Connector for AutoPLANT interface

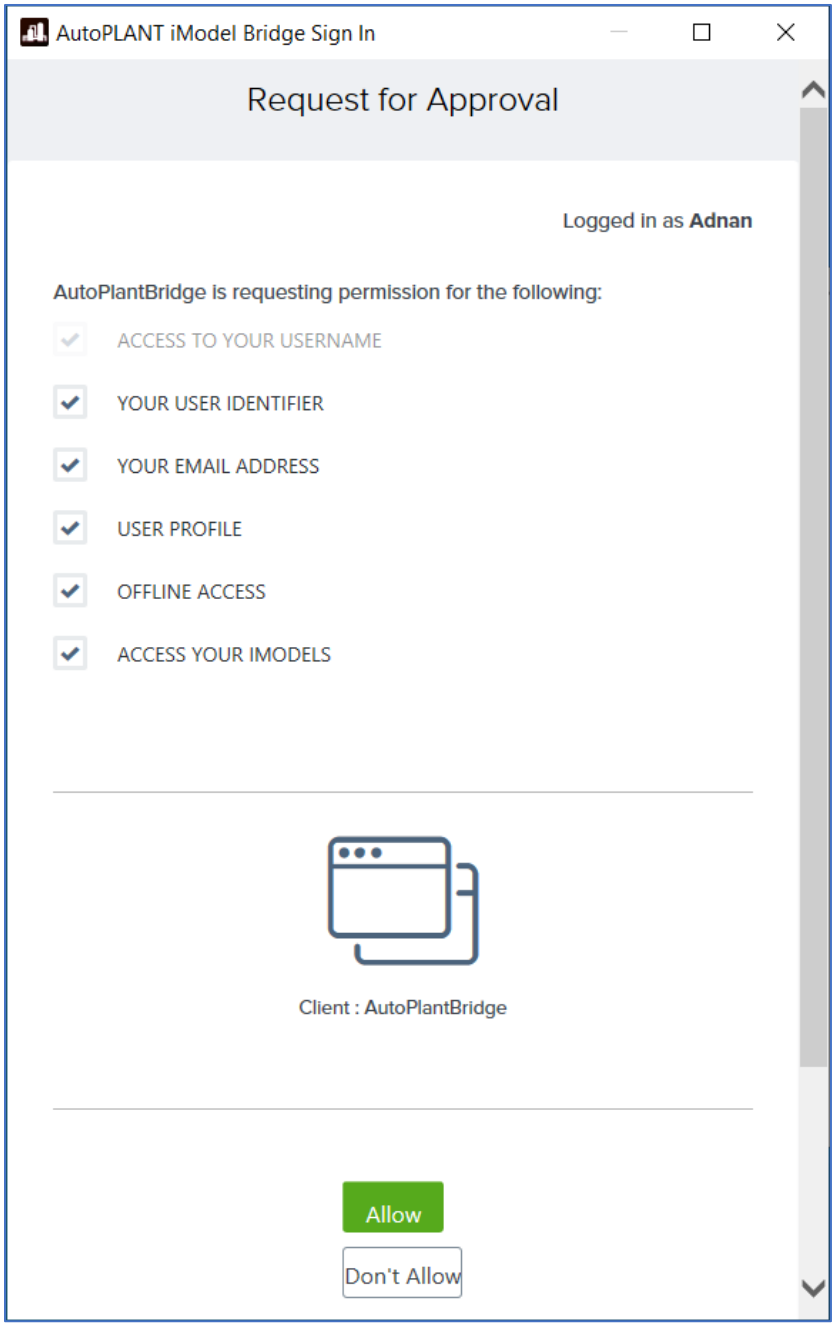
Users can directly publish all their models in a single go or a set of models to iModelHub / PlantSight based on OpenPlant schemas using iModel Connector for AutoPLANT by itself.

Remember that prerequisite steps to configure WorkSets and AutoPLANT project with CONNECT project should already be completed before starting the publish process.

Once user loads iModel Bridge for AutoPLANT, it will prompt to Sign In with email:

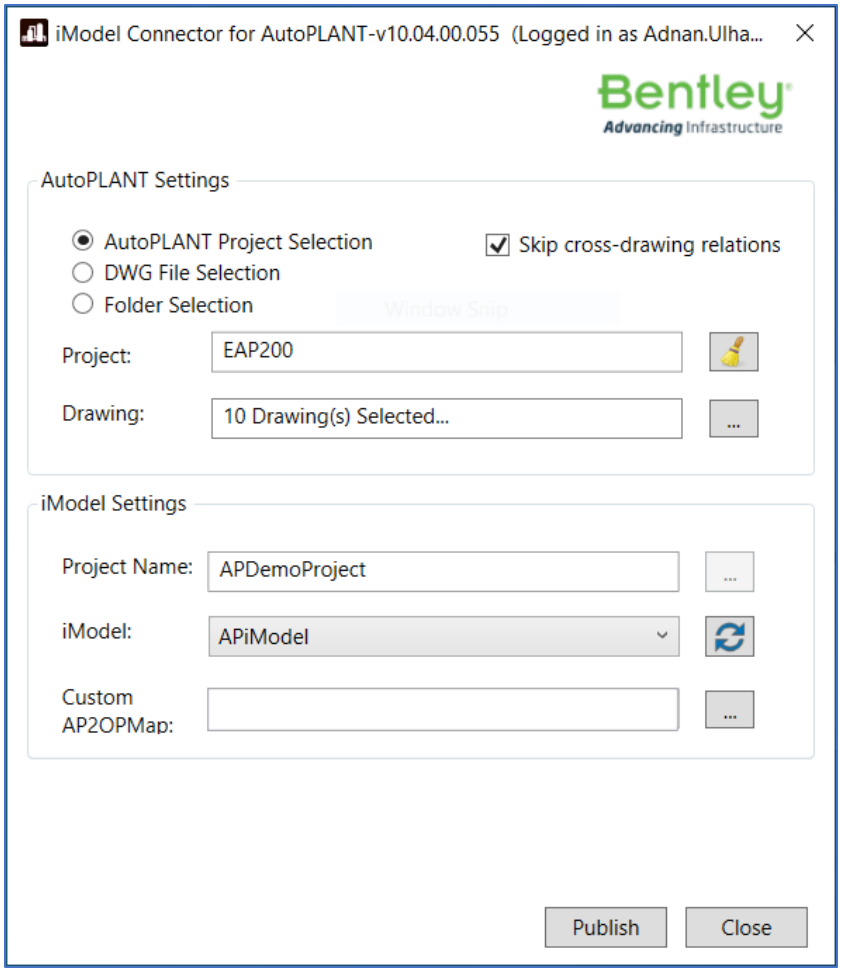


After Signing in with a valid account, the product requests permission. Press **Allow** to continue using Bridge.

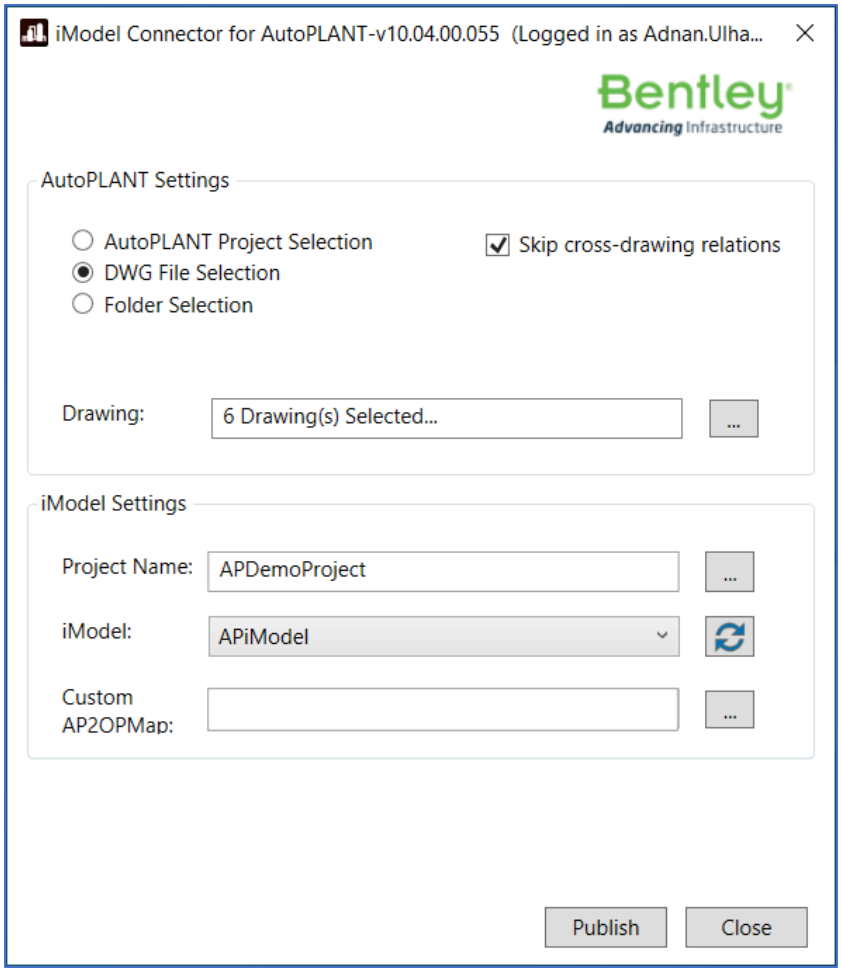


AutoPLANT iModel Bridge will load with three options for model selection from AutoPLANT Settings section.

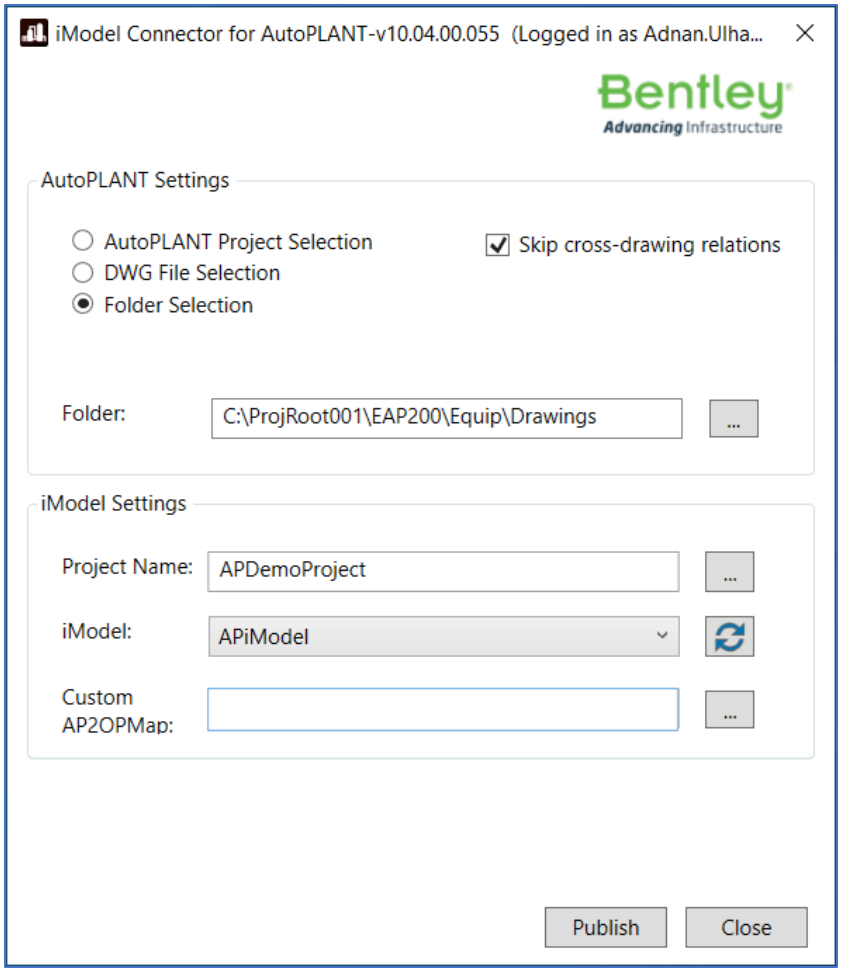
So with **AutoPLANT Project Selection** option, user can select the AutoPLANT project and then through Browse button, can pick multiple or All models from the list of models from the selected AutoPLANT project:



With **DWG File Selection** option, the interface will change slightly and user can pick models (DWG files) from Explorer window to be published through Bridge:



With **Folder Selection** option, the interface will update accordingly and user will be able to select a folder through Browse button to publish all models present in that folder:

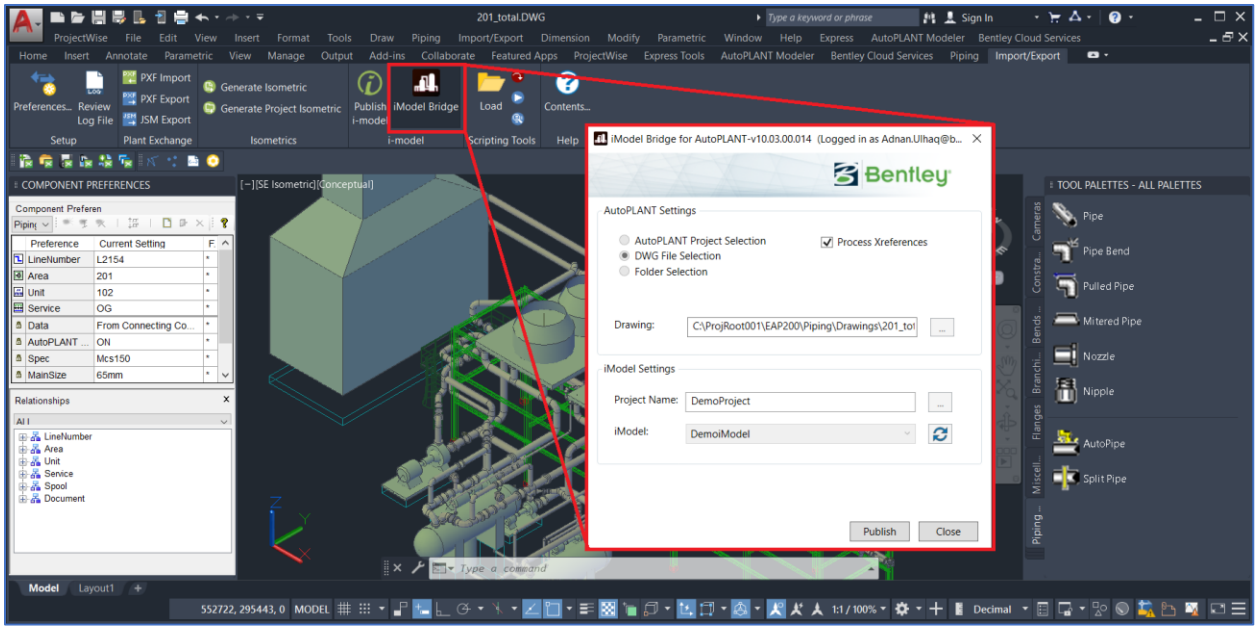


The **iModel Settings** section contains **Project Name** and **iModel** fields. Both these fields will get populated when **AutoPLANT Project Selection** option is selected based on which CONNECT Project and iModel the selected AutoPLANT project is linked to.

Project Name and **iModel** fields are to be populated for other two options i.e., **DWG File Selection** and **Folder Selection** in order to point to where the models are to be published to.

2.2. Publishing AutoPLANT models through In-Session Workflow

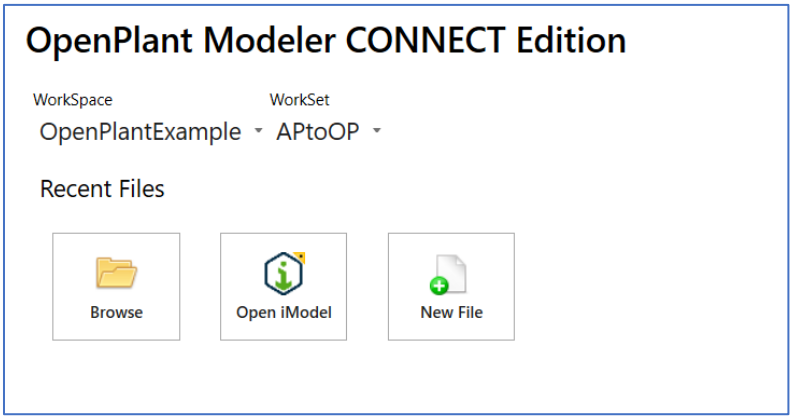
User can publish to iModelHub / PlantSight right from inside of the drawing while working on it. Select **Import/Export > iModel Bridge** ribbon button would load iModel Connector for AutoPLANT with all setting automatically getting populated.



3. Importing AutoPLANT models in OpenPlant Modeler

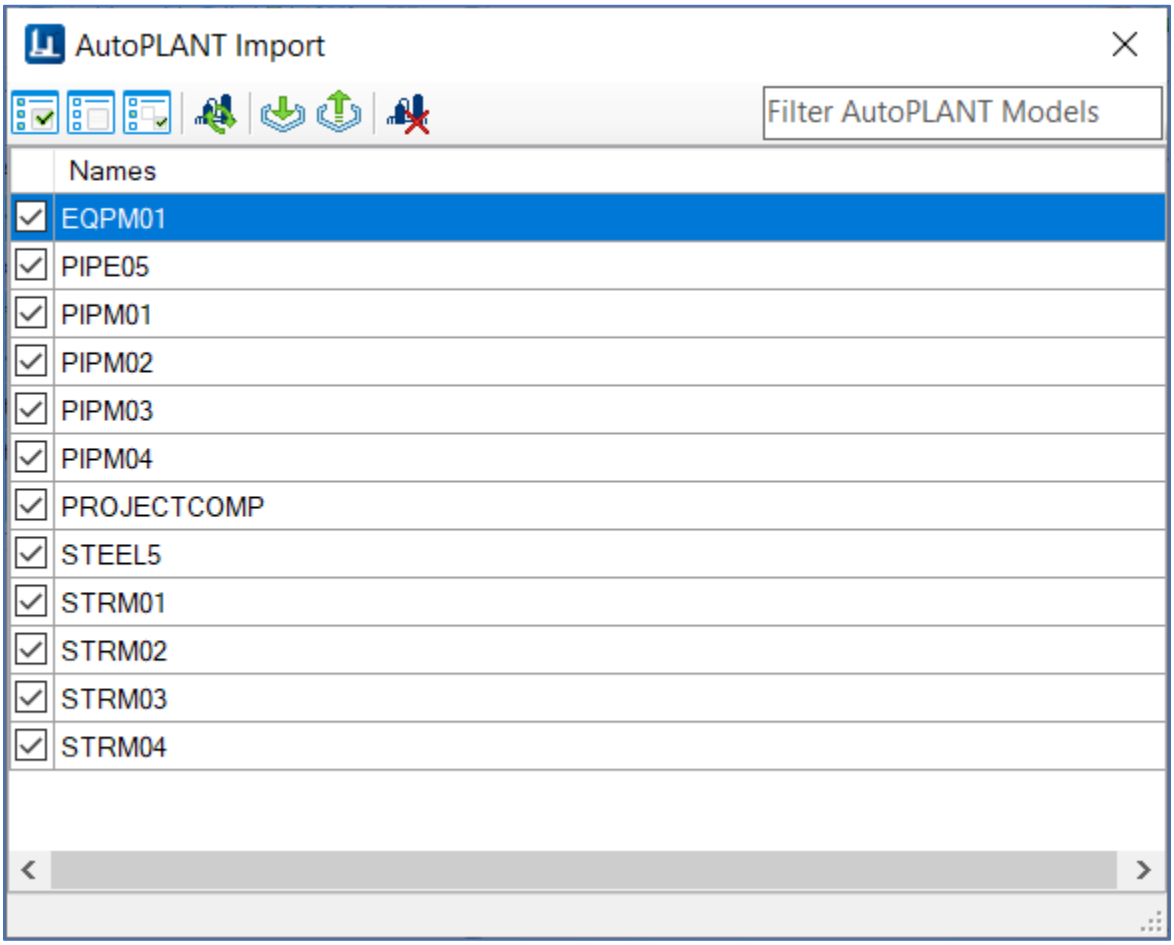
Once AutoPLANT models have been published into iModelHub / PlantSight, it can be imported into OpenPlant Modeler.

1. To achieve this, first load OpenPlant Modeler in the WorkSet that was Setup with OpenPlant schema. *See step 3 from Migration Workflow*.
2. Once loaded, create a **New** file in this WorkSet.



3. After the new OpenPlant Modeler file is loaded, launch **Utilities > AutoPLANT Import** through the ribbon button.

This will load **AutoPLANT Import** dialog.

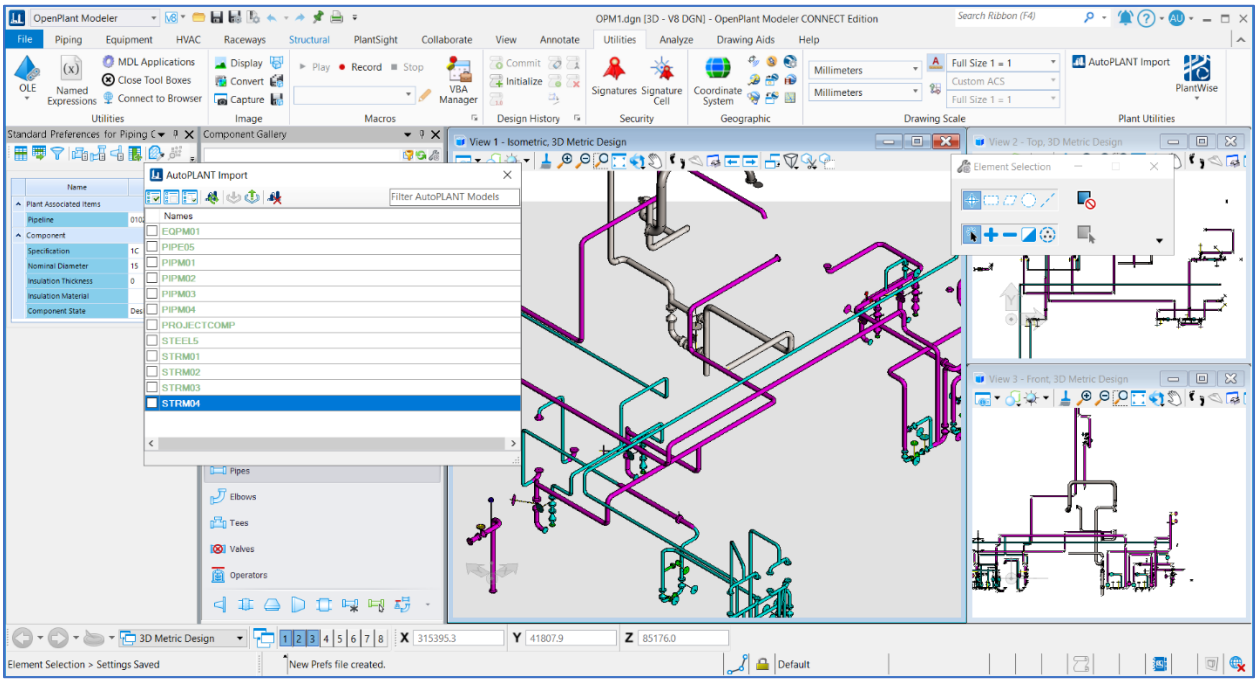


The contents of this dialog are explained below:

Icon	Feature	Description
	Select All	Allows to select all models from the list
	Clear Selection	Deselects all selected models from the list
	Invert Selection	Reverses or swaps the model selection from the list
	Load available AutoPLANT Model Names from iModel	Allows to list down all AutoPLANT models that have been published into iModelHub / PlantSight.

 OR 	Import AutoPLANT Model from iModel	Starts the import process against the selected / All models from the list in the OpenPlant file. Note that if no model is selected from the list, this button remains as grayed out.
	Upgrade imported AutoPLANT data to OPM Components	Converts the imported AutoPLANT components into OpenPlant components
	Delete AutoPLANT data that has not be upgraded	Deletes all AutoPLANT instances in the DGN file
	Filter list	Filters list of loaded AutoPLANT Models in the dialog

4. The model list will already be loaded in the AutoPLANT Import dialog. If not, press **Load available AutoPLANT Model Names** button to load all models from the iTwin.
5. Next, **Select All** to select the models to be imported into OpenPlant Modeler file just created.
   Or
   Make selection from the list manually through the checkboxes to import the selected set of models.
6. Next, press the **Import** button.
   This will turn all selected set of models to green color showing that these models have been imported into the OpenPlant Modeler file.
   Press **Fit View** buton to see the imported components in the file.



7. Now since components have been imported into the OpenPlant Modeler file, pressing **Upgrade imported components** button will convert these to OpenPlant Modeler components.

4. Configurations

A WorkSet has been specifically created for AutoPLANT-to-OpenPlant migration process for Out-of-the-box settings. Contact support for this WorkSet.

AutoPLANT iModel Bridge uses XML mapping file to map AutoPLANT components to OpenPlant ones. It's located at the bridge installation: **Assets/AP2OPMapping.xml**.

4.1. Mapping file structure

The mapping is an XML file with root element **<Mapping>**.
There are following kinds of sub-elements:

1. **<APClass>** element is the main entry for AutoPLANT to OpenPlant class mapping.
   It maps multiple AutoPLANT classes to one OpenPlant class.
   It contains attributes: **name**, **OPname**, **APBase**, **PortCount**, **readMethod**. Only **name** is main attribute.
   - **name** is a list of AutoPLANT classes separated by comma in following format: **Module:Class**.
   - **OPname** is OpenPlant class name. This attribute can be absent for base APM classes.
   - **APBase** is base APM class. Properties and attributes of this class are added to derived class.
   - **PortCount** is count of ports in component of APM class.
   - **readMethod** is name of method to used to move values from xdata of components to Physical component of
     represention of data.

   Example below:
   <APClass
   name="Base:AT_VALVE_CNTL,Base:AT_VALVE_CNTL_BFLY,Base:AT_VALVE_CNTL_CHECK,Base:AT_VALVE_CNTL_GLOBE,AT_PVIC:AT_VALVE_BLNC789" OPname="CONTROL_VALVE">

   Sub-elements of **<APClass>** are **<APProperty>**.

2. **<APProperty>** represents single property mapping.
   It contains two main attributes **name**, **OPname** and three optional attributes : **ValueMap**, **ignore**, "typeName".
   - **name** is a property name in AutoPLANT.
   - **OPname** is a property name in OpenPlant.
   - **ValueMap** is a name of **<ValueMap>** element located in the end of **AP2OPMapping.xml**. If **ValueMap** attribute is specified then property is transformed using corresponding map in **
     < ValueMap>** element.

- **typeName** is a type of data. This attribute is nessessary to set if property is defined in base APClass,
  where "OPClass" is empty. By default it is "string". Example <APProperty name="GTYPE" typeName="double" OPname="ANGLE" />
- **ignore** - is used to exclude moving AP property to OpenPlant. This can be used if base class has such
  property but it need not use this value in OpenPlant. Example : ignore="1"

Otherwise the property is not transformed and set to OpenPlant as is (only units transformations are applied).

3. **<ValueMap>** element represents one-to-one mapping for properties with attribute **ValueMap**. It contains **<ValueMapItem>** sub-elements.
4. **<ValueMapItem>** element is a property mapping entry. It represents how to transform the particular property value from AutoPLANT to OpenPlant.

   In example below AutoPLANT property value "100LB" transforms into OpenPlant "CL100":
   <ValueMapItem OPname="CL100" APname="100LB" />

5. **<JointTypeMap>** element is a list of joint types with information about available end preparations and fasteners.
6. **<JointType>** element is a sub-element of **<JointTypeMap>**.
   It defines the properties of the particular joint type.
   It contains 4 sub-elements:
   - **<JOINT_NAME>** is a name of joint in OpenPlant.
   - **<END_PREPARATION_1>** is a list of available end preparations for one end.
   - **<END_PREPARATION_2>** is a list of available end preparations for another end.
   - **<FASTENER>** is a list of fasteners for the joint.

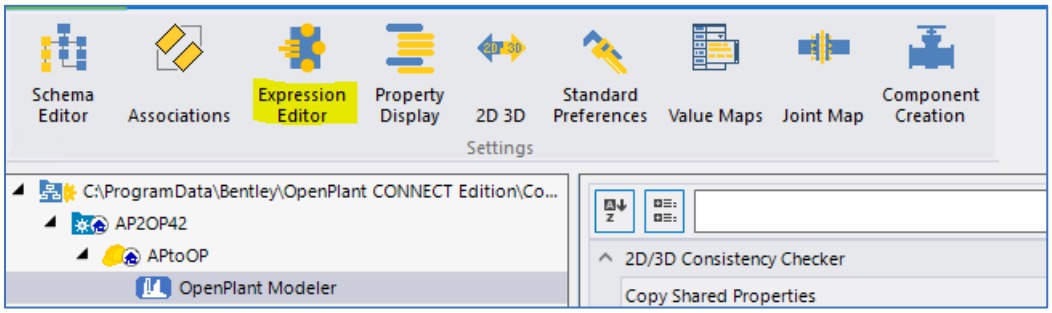
4.2. Configuration Changes:

This section explains the sample configuration changes need for migration. Since users may have done customization in AutoPLANT for their project needs, this section will help in understanding the changes done in out of the box setup and accordingly further changes can be done as per actual project requirements. The basic objective is to have an OpenPlant WorkSet configured the exact same way as the project content looks like in AutoPLANT. So, if you were to create a new model in OpenPlant in this WorkSet the project nomenclature and definitions for tags and other project objects would look the same way as you would model in AutoPLANT.
The configuration updates done for AutoPLANT-to-OpenPlant migration for out of the box WorkSets are explained below, which will help user not only update their WorkSets accordingly but will also help them understand how to update their WorkSets for customized components.

This section explains these configuration changes done so far:

4.2.1. Generic Updates

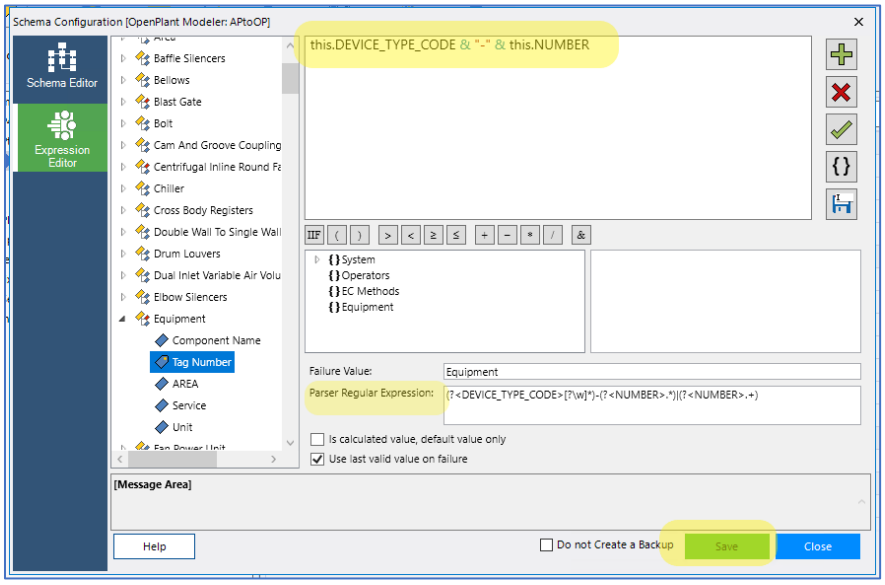
1. Invoke Expression Editor within OPPA for the WorkSet where changes need to be incorporated.



2. Make the following changes to Equipment Tag Number:

   Tag Number = this.DEVICE_TYPE_CODE & "-" & this.NUMBER

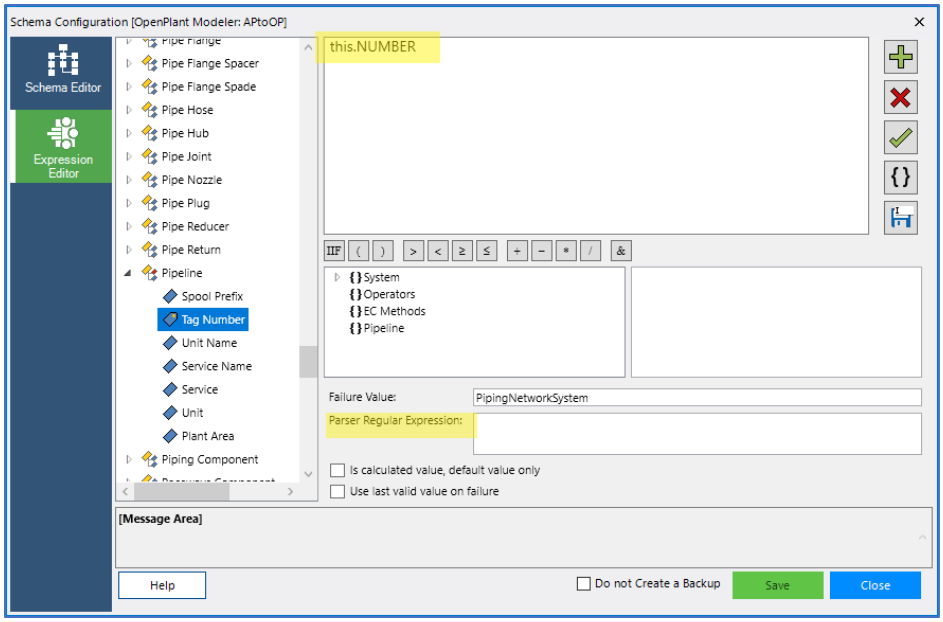
   Parser Regular Expression = (?<DEVICE_TYPE_CODE>[?\w]*)-(?<NUMBER>.*)|(?<NUMBER>.+)



3. Save changes

4. Make the following changes to Pipeline Tag Number:

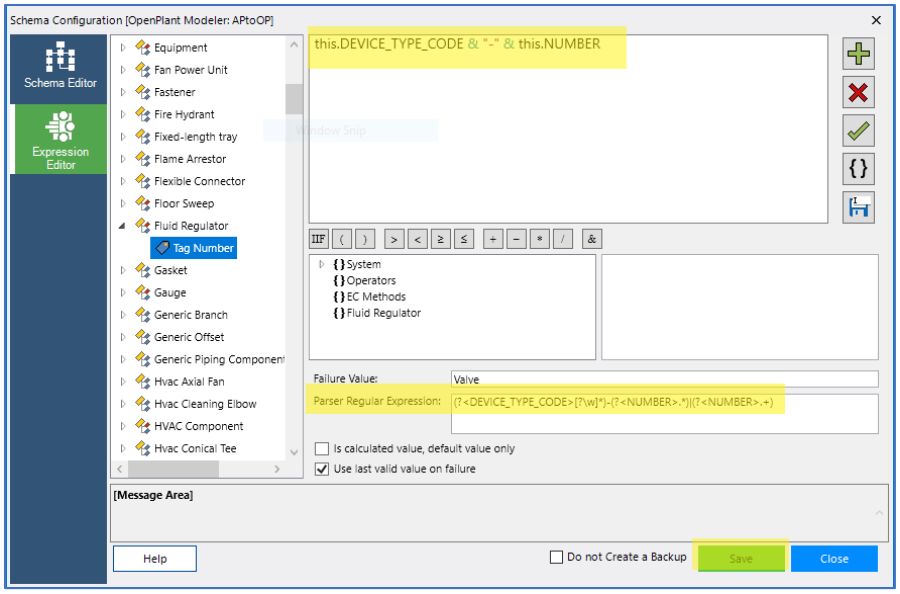
   Tag Number = this.NUMBER
   Parser Regular Expression = Nil(*Leave it blank)*



5. Save changes

6. Make the following changes to Fluid Regulator Tag Number:

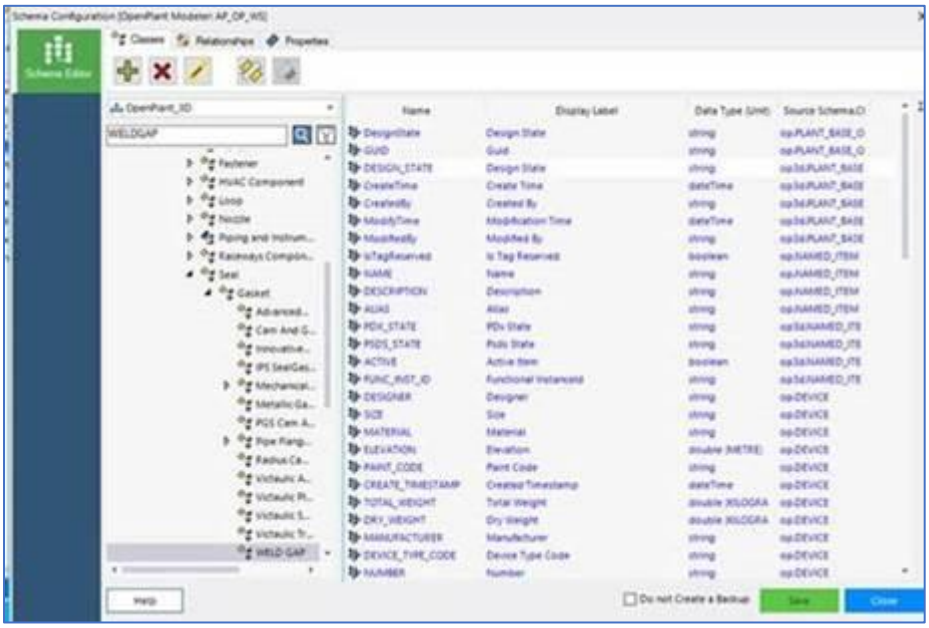
   Tag Number = this.DEVICE_TYPE_CODE & "-" & this.NUMBER
   Parser Regular Expression = (?<DEVICE_TYPE_CODE>[?\w]*)-(?<NUMBER>.*)|(?<NUMBER>.+)



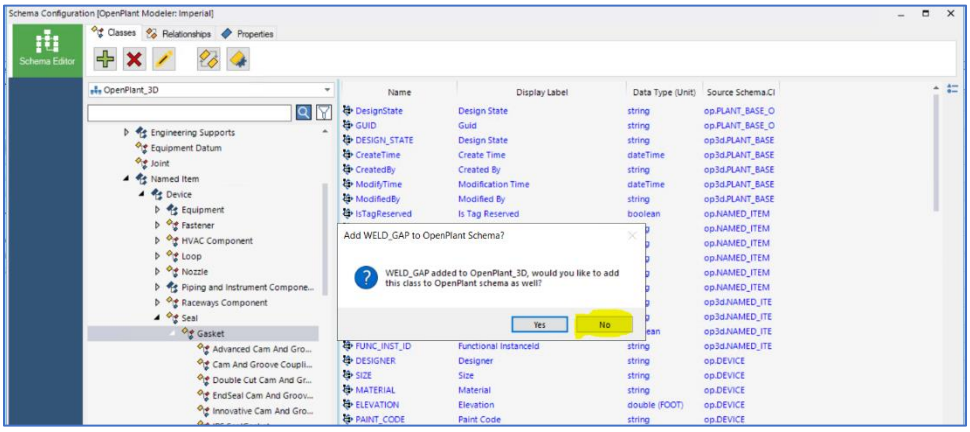
7. Save changes

4.2.2. Introducing WELD_GAP Custom Classe and Joint:

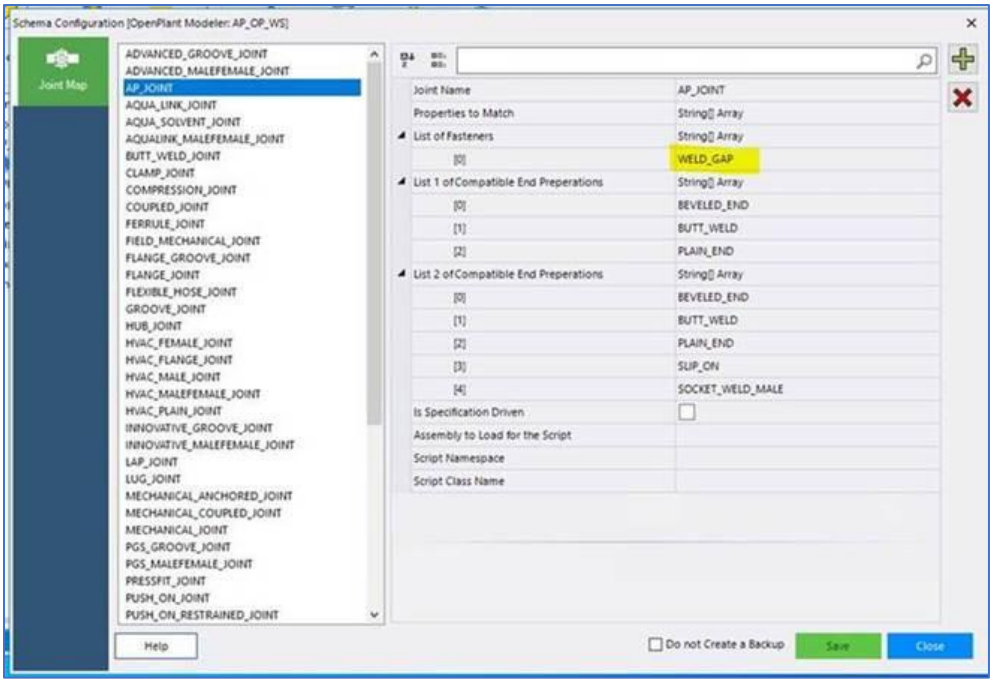
1. Invoke Schema Editor via OPPA and add WELD_GAP as Domain class under Gasket in OP_3D schema and save.



2. Select ‘No’ on the following dialog which would pop-up after the creation of new class ’WELD_GAP’.



3. **Now invoke Joint Map from OPPA and add AP_JOINT which should be a copy of** BUTT_WELD but must use WELD_GAP as fastener



4.2.3. GETTING THREE_PORTS_GENERIC_PIPING_COMPONENTS into OPM

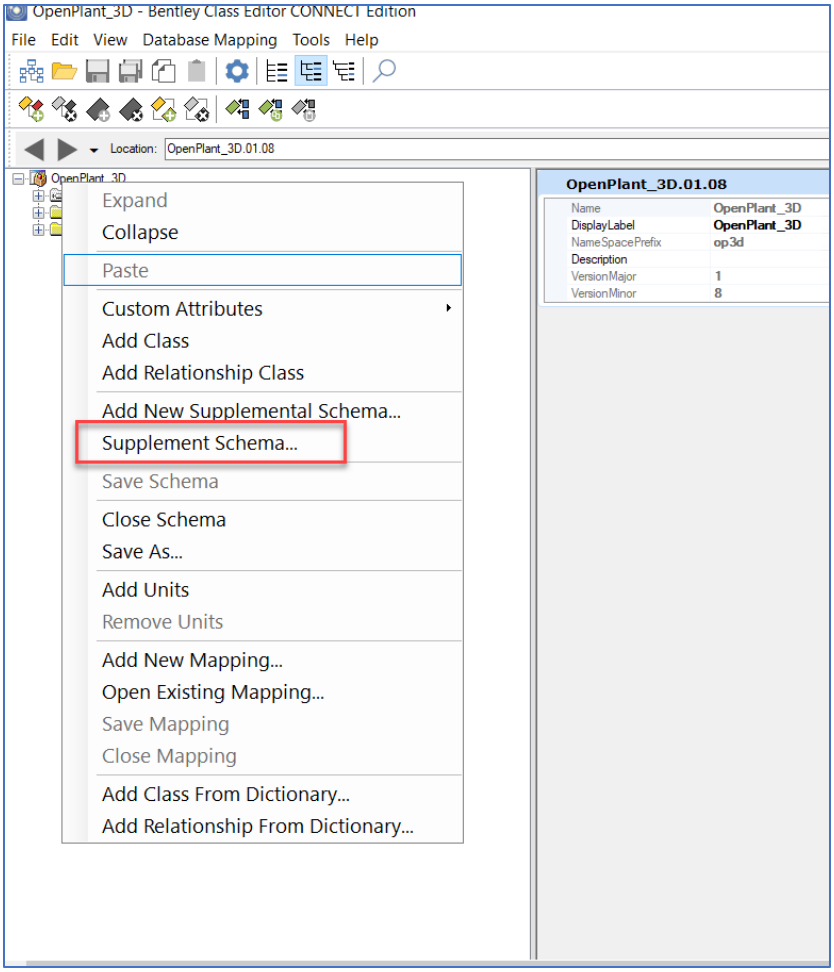
To do so, please follow these steps:

4.2.3.1. Configurations Required at AP2OP Workset Level:

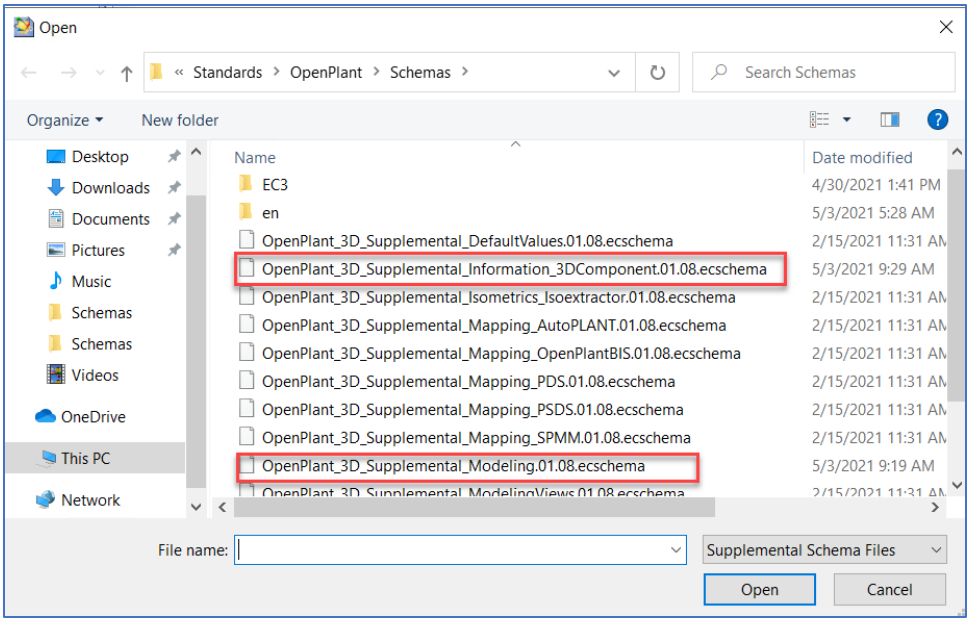
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'



4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



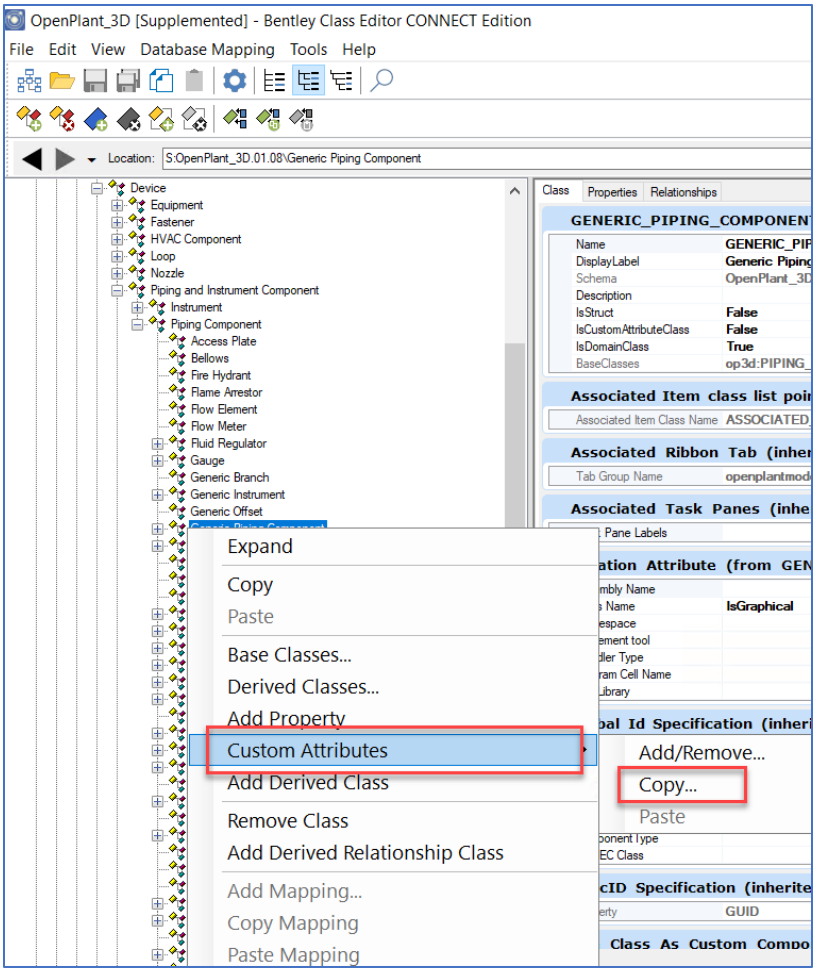
Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Expand the ‘Classes’ and follow the hierarchy as shown below, to find ‘**Generic Piping Component’.**

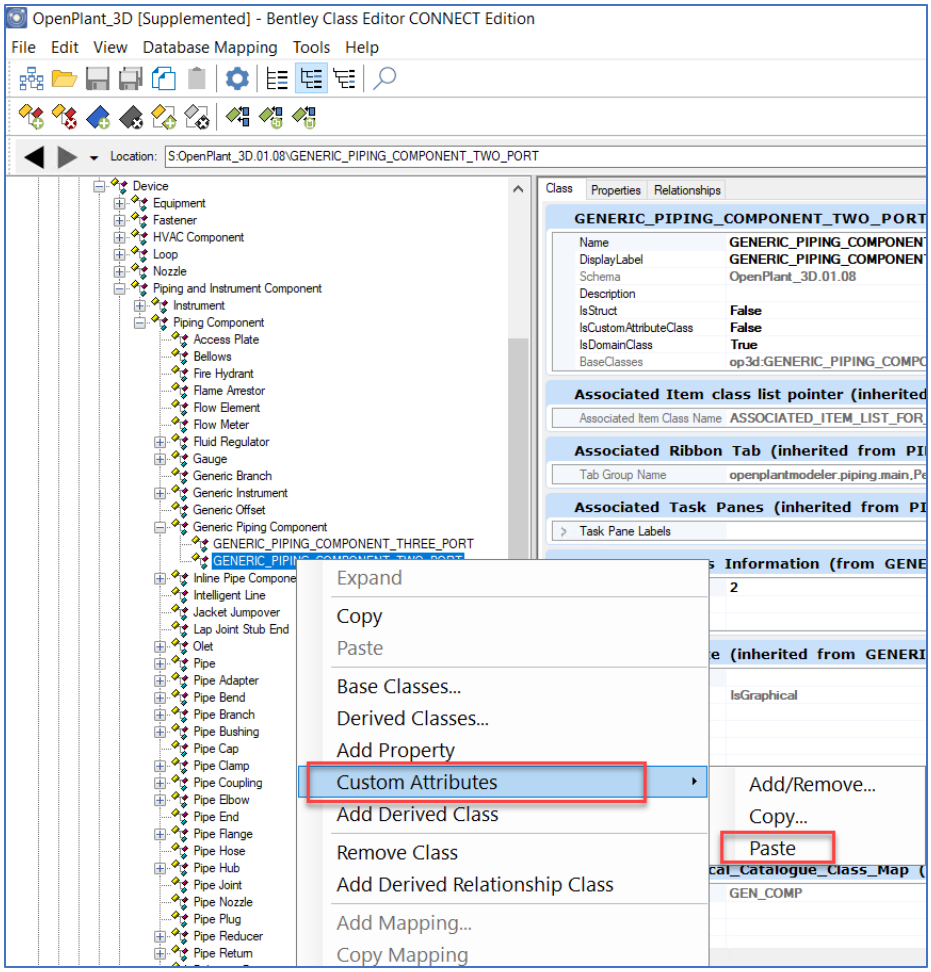
6. Right Click on ‘Generic Piping Components’ and select **‘Add Derived Classes.’**

7. Specify its ‘Name’ and ‘Display Label’ as ‘**GENERIC_PIPING_COMPONENT_TWO_PORT’**

8. Go to the Parent Class **‘Generic Piping Component’** and Right click to copy **‘Component Port Information’** as a **‘Custom Attributes’.**



9. Paste this custom attribute into the newly created derived class ‘Generic Piping Component Two_Ports’

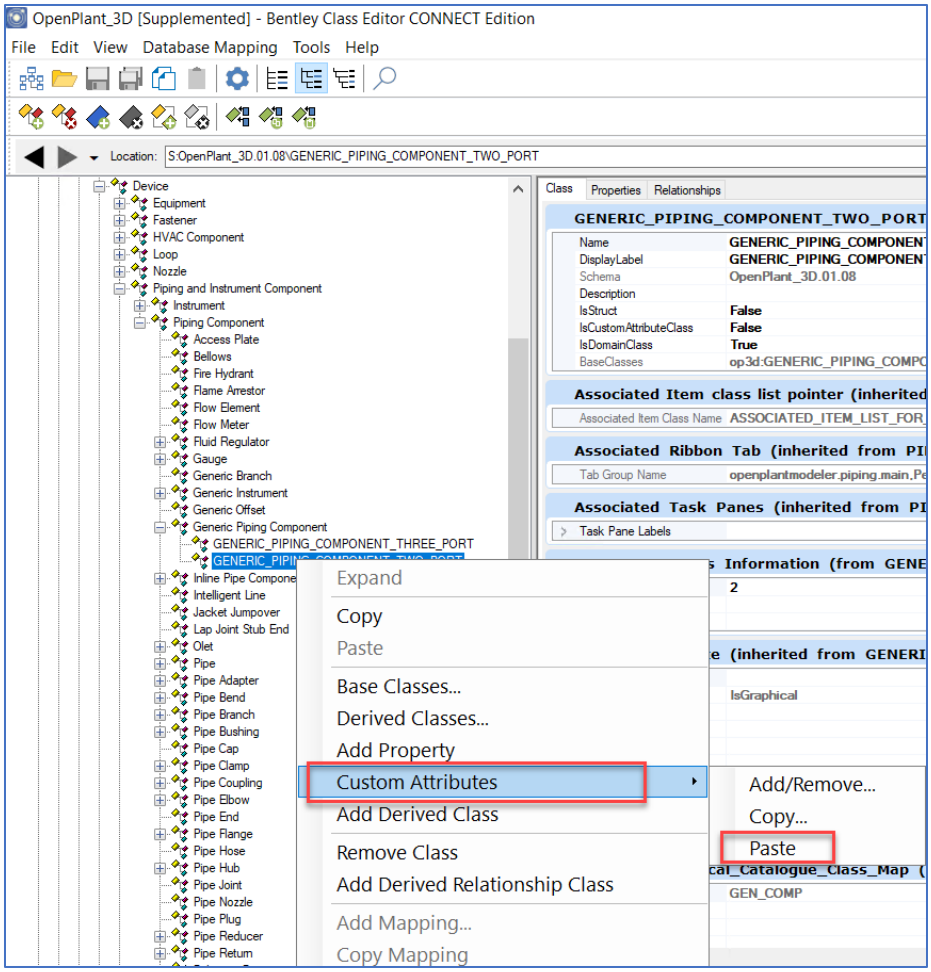


10. Now ‘Remove’ this custom attribute ‘**Component Port Information** from the Right click menu of the parent class.

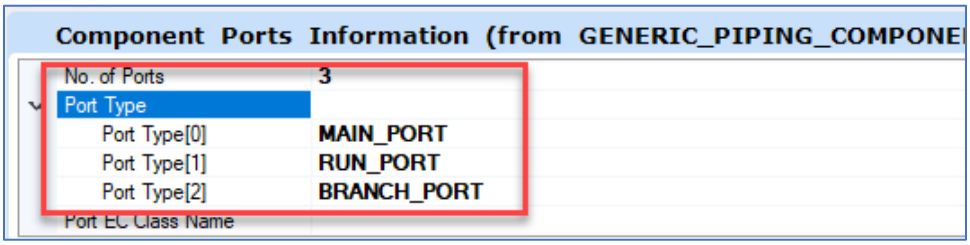
11. Again, Right Click on ‘Generic Piping Components’ and select **‘Add Derived Classes’** to add another child class.

12. Specify its ‘Name’ and ‘Display Label’ as ‘**GENERIC_PIPING_COMPONENT_THREE_PORT’.**

13. Paste the previously copied ‘**Component Port Information’** custom attribute into this newly created derived class ‘**GENERIC_PIPING_COMPONENT_THREE_PORT’**



14. Add the Port No. as **3** and add its name as **'BRANCH_PORT'** as shown below.
    Note: It will not be visible in real time once you add it, to see port 3 switch to some other class and revert.



15. Save these changes to schemas and close the 'Bentley Class Editor'.

16. Now create a new **i-model** on i-model hub and provision it using this updated workset.

4.2.3.2. Configurations Required as AP2OPMapping.xml:

1. Go to the machine where APIMB is installed (if not the same) and navigate to this path: C:\Program Files\Bentley\APiModelBridge\Assets
And open 'AP2OPMapping.xml' file in Notepad
2. Search for the following keyword: **generic_piping**, until you can find the mapping for **'Generic_Piping_Component'.**
3. Copy this '**APClass'** including all its '**APProperties'** and paste it right below.
4. Rename the older **'Generic_Piping_Component'** to **GENERIC_PIPING_COMPONENT_TWO_PORT'.**
5. Rename the pasted **'Generic_Piping_Component'** to **GENERIC_PIPING_COMPONENT_THREE_PORT'**
6. Remove all AP Classes from **GENERIC_PIPING_COMPONENT_THREE_PORT'** and add following**:**
<APClass
name**="Base:AT_INLINETRAP,Base:AT_WYESWTRAP,Base:AT_RETTRAP,Base:AT_WYETRAP,Base:AT_VALVE_RELCHANGEOVER"**
OPname="GENERIC_PIPING_COMPONENT_THREE_PORT"
7. Save this file at some other location and replace it with the original one.
8. Now publish the docs containing 'Three ports Generic Piping components.
9. Verify on I-model hub preview that the mappings have been updated.
10. Go through the Import and upgrade process inside OPM and notice that now 'Three ports generic piping components are not being missed out.

4.2.4. Getting 'Pipe Nozzle' as Custom Component inside the OPM

4.2.4.1. Configurations Required as AP2OP Workset Level:

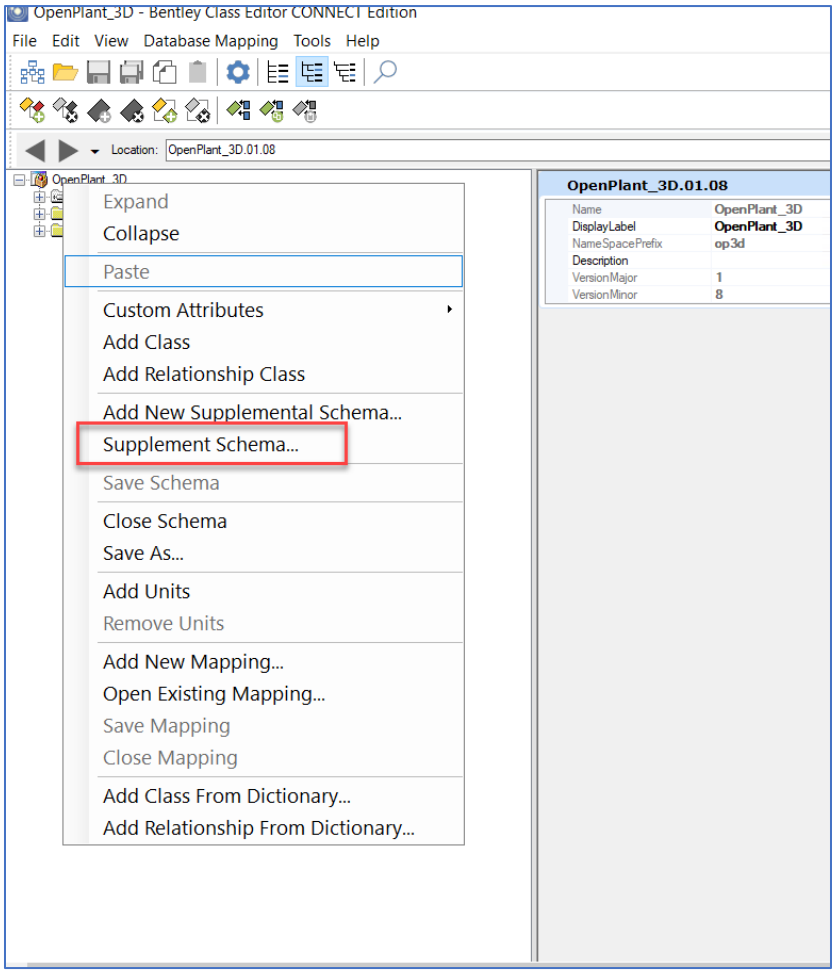
Please follow following steps to get 'Pipe Nozzle' as a custom component after running the Upgrade process.

1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.

Can be found at this link
C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\AP to OP OPPA33 Metric\Standards\OpenPlant\Schemas

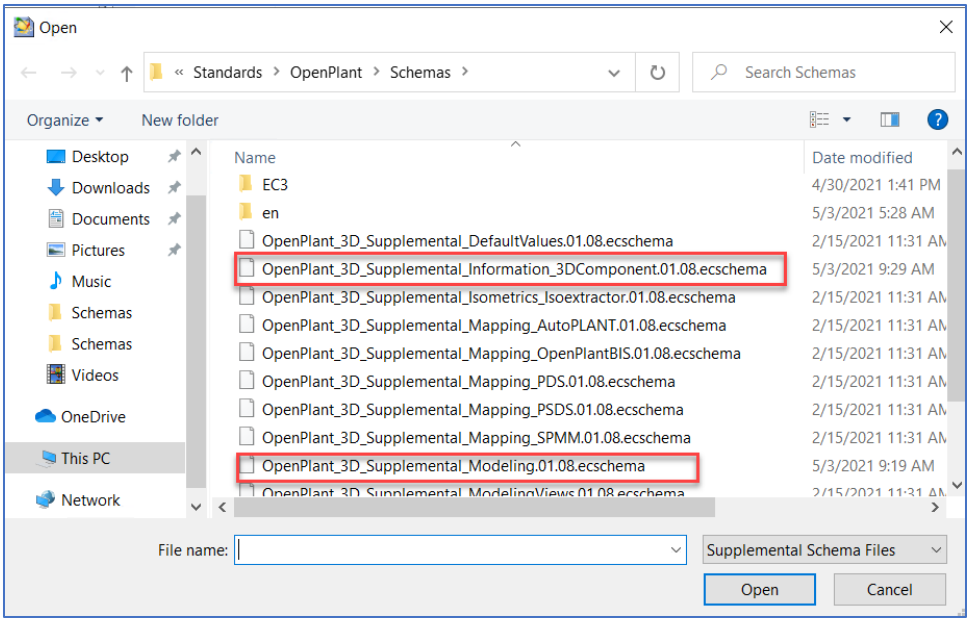
2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

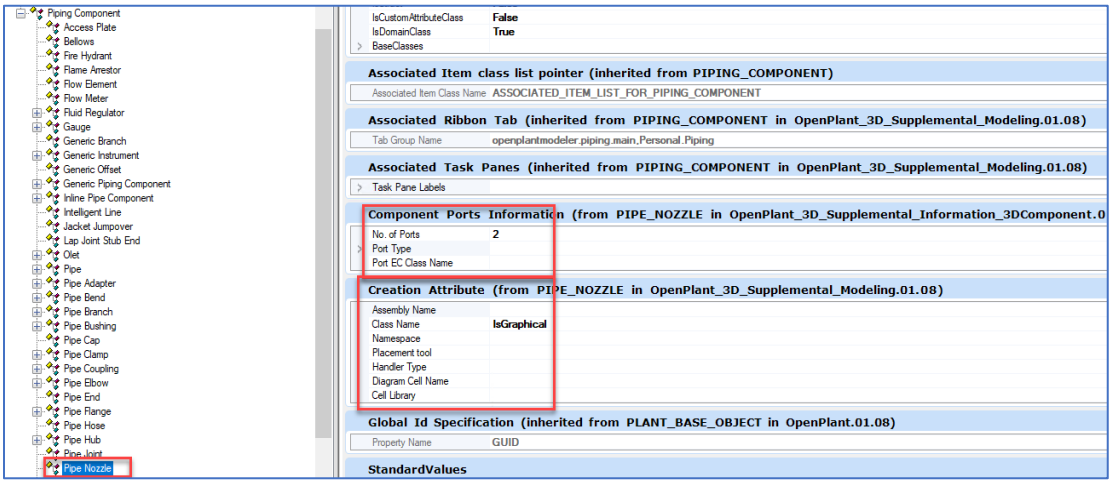


4. Add following two Supplemental schemas:

- Supplemental_Information_3DComponent
- Supplemental Modeling



5. Use the same Reference schemas as used in **Step:2** and press **OK.**
6. Expand the ‘Openplant3D-Supplemented’ schema and navigate to find the ‘Pipe Nozzle’ Class
7. Copy following ‘Creation Attributes’ from ‘GENERIC_PIPING_COMPONENT’ and ‘Component Port Information’ from ‘GENERIC_PIPING_COMPONENT _TWO_PORT’ and paste them inside the ‘Pipe Nozzle’ class.
    - Creation Attribute
    - Component Port Information



8. Now save these changes and close the ‘Bentley Class Editor’.
9. Try to publish doc containing ‘Pipe Nozzle’ and verify that if is appears as a custom component inside OPM or not?

4.2.5. Fixing 'TEE Strainer', 'Basket Strainer' and 'Duplex Strainer' by AP2OP Schema customization

4.2.5.1. TEE Strainer

1. Go to AP2OP workset location (in my case" C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\AP_OP_59_Workspace\WorkSets\Metric\Standards\OpenPlant\Modeler"
2. Open 'Modeler.cfg' file in Notepad.
3. Search for 'OPM_AP2OP_ALWAYS_TREAT_AS_CUSTOM_COMPONENT'
4. Add class 'T_STRAINER' in the list, by separating with a semi-colon (;).

4.2.5.2. BASKET Strainer

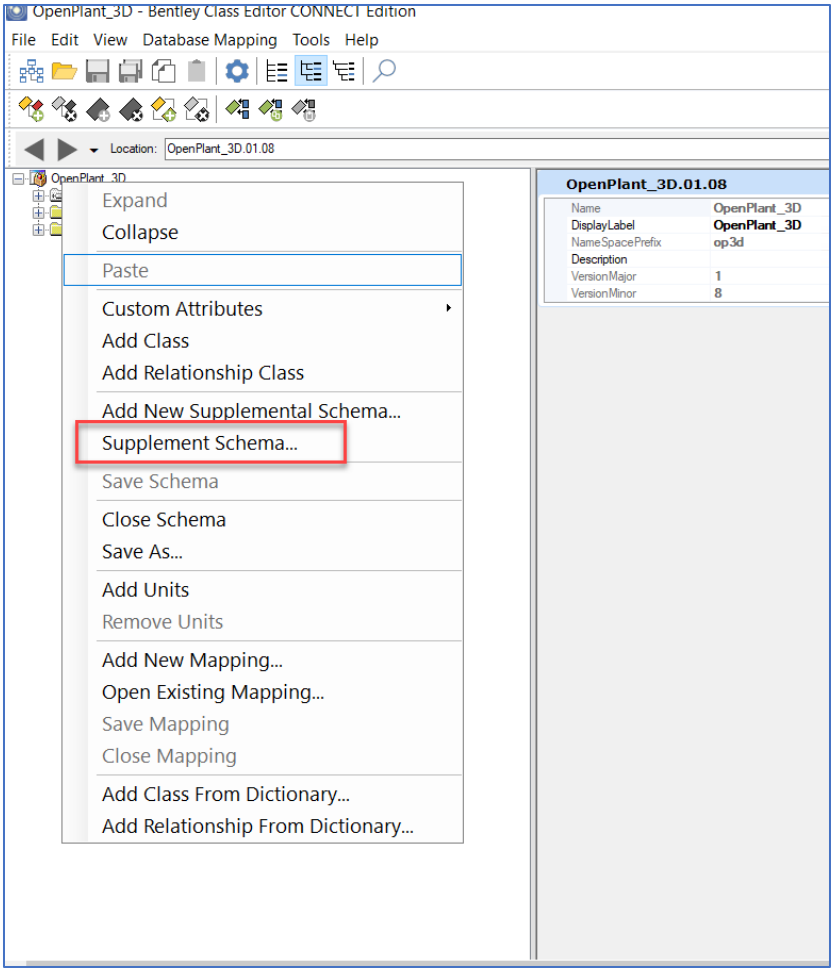
1. Go to AP2OP workset location (in my case" C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\AP_OP_59_Workspace\WorkSets\Metric\Standards\OpenPlant\Modeler"
2. Open 'Modeler.cfg' file in Notepad.
3. Search for 'OPM_AP2OP_ROTATE_COMPS_DATA'
4. Add this 'BASKET_STRAINER|0|-90' in the list in the following way:

OPM_AP2OP_ROTATE_COMPS_DATA=PIPE_WYE|0|-180;**BASKET_STRAINER|0|-90**;STRAINER|0|-180

4.2.5.3. Duplex Strainer

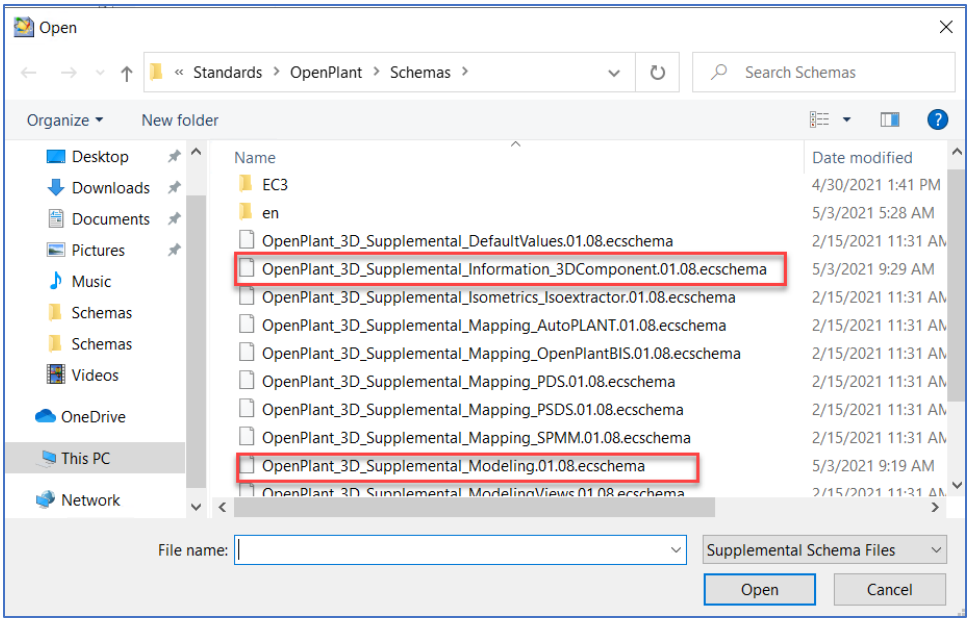
Please follow following steps to get 'Duplex Strainer' after running the Upgrade process.

1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08. ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\AP_OP_59_Workspace\WorkSets Metric\Standards\OpenPlant\Schemas
2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas
3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'



4. Add following two Supplemental schema:

    - Supplemental_Information_3DComponent
    - Supplemental Modeling



5. Use the same Reference schemas as used in **Step:2** and press **OPEN.**

6. Navigate to the 'Strainer' parent class and expand it.
7. Click on 'Duplex Strainer' and change its ports from 3 to 2.
8. Remove the 'Branch port' from the element drop-down

So, in this way schema configuration of 'Duplex Strainer's is done, which makes it import inside OPM successful.

4.2.6. Getting all types of Supports from APM to OPM by AP2OP schema configuration

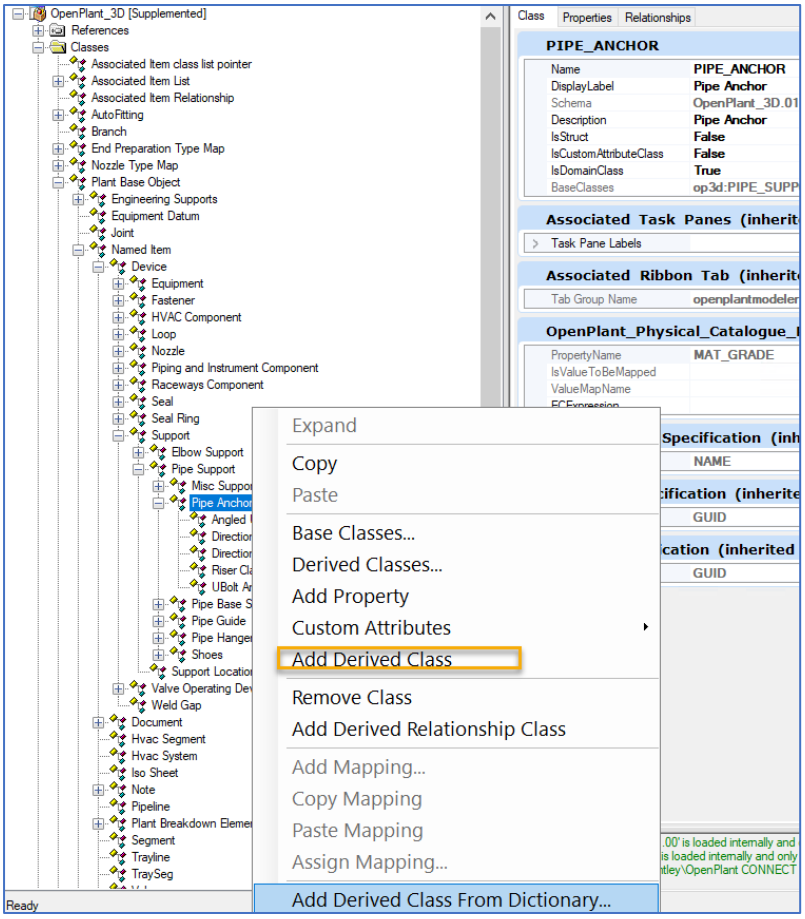
Presently all supports from APM are wrongly mapped generally to the 'Parent Class' of supports due to which it cannot be imported.

So, for the present situation a solution of creating new Child 'Generic' class within their main 'parent class' is suggested. Please follow the following steps to add the 'Generic' classes:

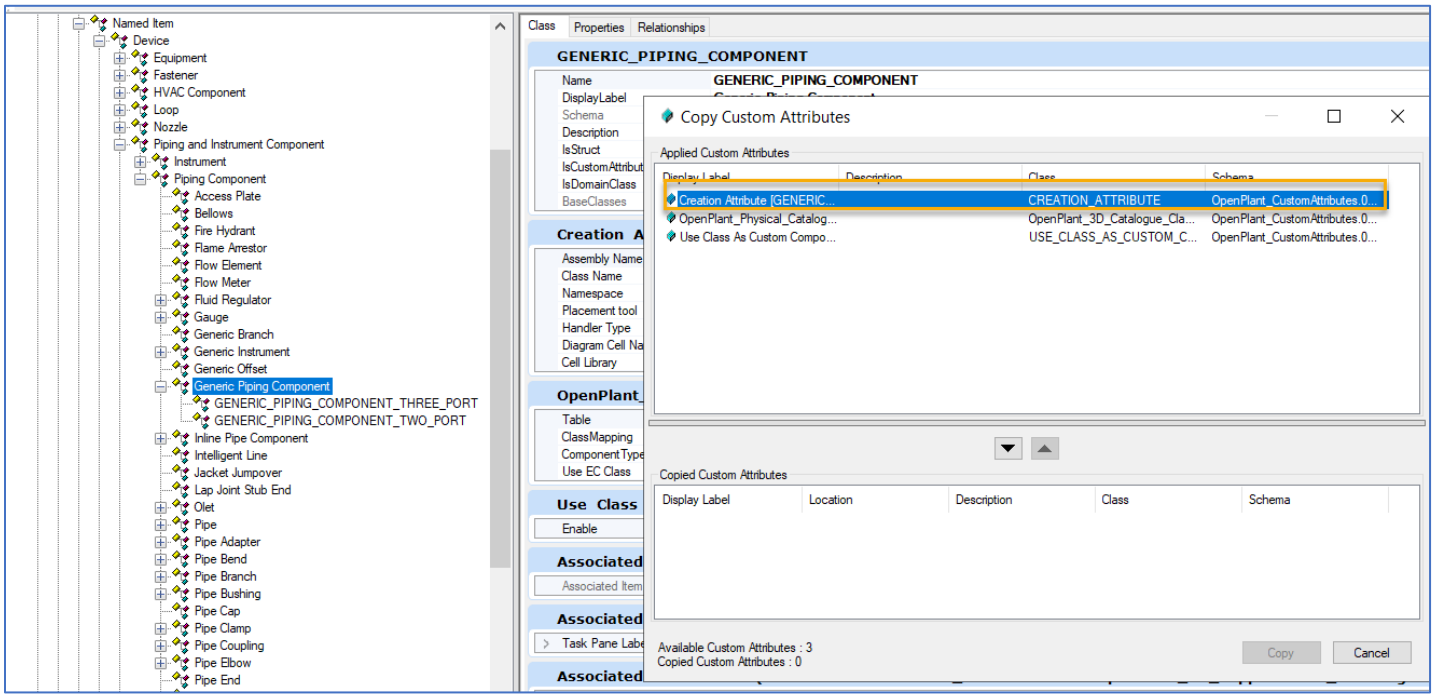
4.2.6.1. Configuration Required at 'AP2OP Workset Level:

4.2.6.1.1. GENERIC_PIPE_ANCHOR

1. Add a new derived class under the parent 'PIPE_ANCHOR' named 'GENERIC_PIPE_ANCHOR'



2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPING_COMPONENT’ and paste it into this class.



3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.1.2. GENERIC_MISC_SUPPORT

1. Add a new derived class under the parent ‘MISC_SUPPORT’ named ‘GENERIC_MISC_SUPPORT’
2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPE_ANCHOR’ and paste it into this class.
3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.1.3. GENERIC_SHOES

1. Add a new derived class under the parent ‘SHOES’ named ‘GENERIC_SHOES’
2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPE_ANCHOR’ and paste it into this class.
3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.1.4. GENERIC_PIPE_HANGER

1. Add a new derived class under the parent ‘PIPE_HANGER’ named ‘GENERIC_PIPE_HANGER’
2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPE_ANCHOR’ and paste it into this class.
3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.1.5. GENERIC_PIPE_BASE_SUPPORT

1. Add a new derived class under the parent ‘PIPE_BASE_SUPPORT’ named ‘GENERIC_PIPE_BASE_SUPPORT’
2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPE_ANCHOR’ and paste it into this class.
3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.1.6. GENERIC_PIPE_GUIDE

1. Add a new derived class under the parent ‘PIPE_GUIDE’ named ‘GENERIC_PIPE_GUIDE’
2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPE_ANCHOR’ and paste it into this class.
3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.1.7. GENERIC_ELBOW_SUPPORT

1. Add a new derived class under the parent ‘ELBOW SUPPORT’ named ‘GENERIC_ELBOW_SUPPORT’
2. Copy the ‘Creation Attribute’ from ‘GENERIC_PIPE_ANCHOR’ and paste it into this class.
3. Notice that a new child class has been created with ‘Creation Attribute’ as ‘IsGraphical’

4.2.6.2. Configurations Required in AP2OPMapping.xml file:

[This is by-default part of the iModel Connector for AutoPLANT build and user is not required to manually do this. However, mentioning here for record]

As most of the supports which are getting failed to import are actually mapped to the parent classes. So, it is required to rename their OPname mapping to ‘generic’ ones.

Please follow these steps:

4.2.6.2.1. Renaming Following OPname:

4.2.6.2.1.1. PIPE_HANGER' to 'GENERIC_PIPE_HANGER':

1. Search for 'PIPE_HANGER' inside AP2OPMapping.xml.
2. Rename the mapping with OPname from 'PIPE_HANGER' to 'GENERIC_PIPE_HANGER'

4.2.6.2.1.2. PIPE_ANCHOR' to 'GENERIC_PIPE_ANCHOR':

1. Search for 'PIPE_ANCHOR' inside AP2OPMapping.xml.
2. Rename the mapping with OPname from 'PIPE_ANCHOR' to 'GENERIC_PIPE_ANCHOR'

4.2.6.2.1.3. 'PIPE_BASE_SUPPORT' to 'GENERIC_PIPE_BASE_SUPPORT':

1. Search for 'PIPE_BASE_SUPPORT' inside AP2OPMapping.xml.
2. Rename the mapping with OPname from PIPE_BASE_SUPPORT' to 'GENERIC_PIPE_BASE_SUPPORT'

4.2.6.2.1.4. 'SHOES' to 'GENERIC_SHOES':

1. Search for 'SHOES inside AP2OPMapping.xml.
2. Rename the mapping with OPname from 'SHOES to 'GENERIC_SHOES'

4.2.6.2.1.5. 'PIPE_GUIDE' to 'GENERIC_PIPE_GUIDE':

1. Search for 'PIPE_GUIDE' inside AP2OPMapping.xml.
2. Rename the mapping with OPname from 'PIPE_GUIDE' to 'GENERIC_PIPE_GUIDE'

4.2.6.2.1.6. 'MISC_SUPPORT to 'GENERIC_MISC SUPPORT':

1. Search for 'MISC_SUPPORT inside AP2OPMapping.xml.
2. Rename the mapping with OPname from 'MISC_SUPPORT to 'GENERIC_MISC SUPPORT'

4.2.6.2.2. Reconfiguration required for specific APClass

Although from the previous step of renaming class to 'Generic' ones has solved most of the supports but some of them are still need reconfiguration.

Please follow these steps to correct mapping for these specific supports:

4.2.6.2.2.1. AT_SUPPORT_GBOLT --- U Bolt Guide

1. Find AT_SUPPORT_GBOLT inside the AP2OPMapping.xml and notice that this support is listed under 'Ubolt Anchor' – NOT OK
2. Erase its entry from 'Ubolt Anchor'
3. Copy and paste the whole 'Ubolt Anchor' mapping including its APProperties.
4. Delete all entries of APClass names from the copied class.
5. Rename the OPname to 'UBOLT_GUIDE'.

6. And paste just one APClass name as ‘Base:AT_SUPPORT_GBOLT’.

4.2.6.2.2.2. AT_SUPPORT_STEEL ---GENERIC_MISC_SUPPORT

1. Find AT_SUPPORT_STEEL inside the AP2OPMapping.xml and notice that this support is listed under ‘SUPPORT’ – NOT OK.
2. Erase its entry from ‘SUPPORT’.
3. Search for ‘GENERIC_MISC_SUPPORT’.
4. And paste ‘Base:AT_SUPPORT_STEEL’ inside its APClass name.

4.2.6.2.2.3. AT_SUPPORT_UABOXES --- GENERIC_PIPE_ANCHOR’

1. Find AT_SUPPORT_UABOXES inside the AP2OPMapping.xml and notice that this support is listed under ‘DIRECTIONAL PIPE ANCHOR’ – NOT OK.
2. Erase its entry from ‘DIRECTIONAL PIPE ANCHOR’.
3. Search for ‘GENERIC_PIPE_ANCHOR’.
4. And paste ‘Base:AT_SUPPORT_UABOXES’ inside its APClass name.

4.2.6.2.2.4. AT_SUPPORT_UGBOXES --- GENERIC_PIPE_GUIDE

1. Find AT_SUPPORT_UGBOXES inside the AP2OPMapping.xml and notice that this support is listed under ‘DIRECTIONAL PIPE GUIDE’ – NOT OK.
2. Erase its entry from ‘DIRECTIONAL PIPE GUIDE’.
3. Search for ‘GENERIC_PIPE_GUIDE’.
4. And paste ‘Base:AT_SUPPORT_UABOXES’ inside its APClass name.

4.2.6.2.2.5. AT_SUPPORT_GENHANGER ----GENERIC_PIPE_HANGER’:

1. Find ‘AT_SUPPORT_GENHANGER’ inside the AP2OPMapping.xml and notice that this support is listed under ‘ROD HANGER’ – NOT OK.
2. Erase its entry from ‘ROD HANGER’.
3. Search for ‘GENERIC_ HANGER’.
4. And paste ‘Base: AT_SUPPORT_GENHANGER inside its APClass name.

4.2.6.2.2.6. AT_SUPPORT_SHOEPADSLOP --- 'GENERIC_SHOES':

1. Find 'AT_SUPPORT_SHOEPADSLOP inside the AP2OPMapping.xml and notice that this support is listed under 'TEE SHOE' – NOT OK.
2. Erase its entry from 'TEE SHOE'.
3. Search for 'GENERIC_SHOES'.
4. And paste 'Base: AT_SUPPORT_SHOEPADSLOP inside its APClass name

4.2.6.2.2.7. AT_SUPPORT_ELBOWLUG --GENERIC_ELBOW_SUPPORT

1. Find 'AT_SUPPORT_ELBOWLUG-- 'inside the AP2OPMapping.xml and notice that this support is listed under 'GENERIC PIPE_HANGER'– NOT OK.
2. Erase its entry from 'GENERIC PIPE_HANGER'.
3. Copy and paste the whole 'GENERIC PIPE_HANGER' mapping including its APProperties.
4. Delete all entries of APClass names from the copied class.
5. Rename the OPname to 'GENERIC_ELBOW_SUPPORT'.
6. And paste just one APClass name as 'Base:AT_SUPPORT_ELBOWLUG'**.**

So, in this way schema configuration for supports is done, which makes them import inside OPM successful.

4.2.7. Fixing 'Inline Steam Trap', 'Generic Offset', 'Steam Trap and 'Drip Pan Elbow' by AP2OP Schema customization

4.2.7.1. Configurations Required in AP2OP Workset:

Please follow following steps to incorporate **GENERIC_OFFSET, STEAM_TRAP, TEE_TRAP and DRIP_PAN_ELBOW** after running the Upgrade process.

1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Work set.

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

4. Add following two Supplemental schema:

    - Supplemental_Information_3DComponent
    - Supplemental Modeling

5. Use the same Reference schemas as used in **Step:2** and press **OK.**
6. Expand the 'Openplant3D-Supplemented' schema and navigate to find
    1. **GENERIC_OFFSET**
    2. **STEAM_TRAP**

7. Copy the 'Creation Attribute' from OPM Class 'GENERIC_PIPING_COMPONENT' and 'Component Port information' from 'GENERIC_PIPING_COMPONENT_TWO_PORT' and paste them inside the '**GENERIC_OFFSET**' and '**STEAM_TRAP'** classes.
8. Copy the 'Component Port information' from 'GENERIC_PIPING_COMPONENT_TWO_PORT' and paste it into '**TEE_TRAP'** class.
9. Change the 'Component Port Information' for '**TEE_TRAP'** to '3' and add 'BRANCH_PORT' (as it contains 3 Ports inside AP environment)
10. Navigate to '**DRIP_PAN_ELBOW'** inside 'PIPE_ELBOW' parent class and change its 'Creation attribute' to 'IsGraphical' by coping it from OPM Class 'GENERIC_PIPING_COMPONENT'.

10. Now Save these changes and close the 'Bentley Class Editor'.
11. Try to publish doc containing **'GENERIC_OFFSET, STEAM_TRAP, TEE_TRAP and DRIP_PAN_ELBOW'** and verify that if these components appear as a custom component inside OPM

4.2.7.2. Configurations Required in AP2OPMapping.xml file:

4.2.7.2.1. AT_INLINETRAP --- GENERIC_PIPING_COMPONENT_THREE_PORT

1. Find 'AT_INLINETRAP' inside the AP2OPMapping.xml.
2. Erase its present entry from any other OP class (if exist).
3. Search for 'GENERIC_PIPING_COMPONENT_THREE_PORT'.
4. And paste 'Base:AT_INLINETRAP' inside its APClass name.

4.2.8. Fixing 'Valve-TopWorks' by AP2OP Schema customization

4.2.8.1. Conclusions

While some topworks classes are similar, most are not.

We map compatible classes (with special steps in the AP Connector to convert properties, because some calculations are required), or keep APM graphics if no OPM draw script is available. Extra EC classes are created if needed.

Also some valve operators in APM allow another topwork on them: like a chain on a gear operator. EC relationship class VALVE_OPERATING_DEVICE_HAS_VALVE_OPERATING_DEVICE was created for that (with support in AP Connector). Some modifications from OPM are required to support it.

We list existing APM and OPM topworks classes with notes. Found or possible issues are highlighted in red.

APM topworks are from the Base module. APM vs OPM classes comparison was mostly name then graphics based.

Important difference is about specs: OPM has TOPWORKS table in the specs, but APM just uses parameters from the dialog in the script.

4.2.8.2. OPM placeable topworks

Name (as in placement tool)	APM equivalent	Notes	EC class name	Ok?
HAND WHEEL	Handwheel		HAND_WHEEL	+
VALVE WRENCH	Wrench Operator		VALVE_WRENCH	+
BAR HANDLE	Bar Handle Operator		BAR_HANDLE	-
CUBE OPERATOR	Cube Operator		CUBE_OPERATOR	f
CONE OPERATOR	Cone Operator		CONE_OPERATOR	+
SEAL CAP OPERATOR	Seal Cap		SEAL_CAP_OPERATOR	+
DIAPHRAGM OPERATOR	Diaphragm Operator	**Has picture of Cylinder Operator in the placement tool! (OPM 10.9.0.59)**	DIAPHRAGM_OPERATOR	-
GEAR BOX OPERATOR	Gear Operator		GEARBOX_OPERATOR	^
PHEUMATIC VALVE ACTUATOR	Pneumatic Actuator	**Misspelled in the placement tool.**	PNEUMATIC_VALVE_ACTUATOR	+
ELECTRIC VALVE ACTUATOR	Electric Actuator		ELECTRIC_VALVE_ACTUATOR	-
DIAPHRAGM GEAR OPERATOR	Diaphragm-Gear Operator	**Wrong graphics! (OPM 10.9.0.59)**	DIAPHRAGM_GEAR_OPERATOR	-
Bar Handle	—	**Missing picture in the placement tool! (OPM 10.9.0.59)**	T_HY_BAR_HANDLE	0

Cylinder Operator	Cylinder Operator	**Has picture of DIAPHRAGM OPERATOR in the placement tool! (OPM 10.9.0.59)**	CYLINDER_OPERATOR	-
CHAIN OPERATOR	Chain Operator (I)		CHAIN_OPERATOR	-
Motor Operated Valve Actuator	—		MOTOR_OPERATED_VALVE_ACTUATOR	0

For some reason Relief Operator is not in the placement menu. OPM draw script is present. Its EC class is RELIEF_OPERATOR.

4.2.8.3. APM placeable topworks

Name (as in placement tool)	OPM equivalent	Notes	AP class name	Ok?
Cone Operator	CONE OPERATOR		AT_TOPWORKS_CONE	+
Cube Operator	CUBE OPERATOR		AT_TOPWORKS_CUBE	f
Cylinder Operator	Cylinder Operator		AT_TOPWORKS_CYLINDER	-
Seal Cap	SEAL CAP OPERATOR		AT_TOPWORKS_SEALCAP	+
Handwheel	HAND WHEEL	**One extra parameter in APM.**	AT_TOPWORKS_HANDWHEEL	+
Handwheel (Rising Stem)	—		AT_TOPWORKS_HWHEELRISING	-
Wrench Operator	VALVE WRENCH	**Somewhat different graphics!**	AT_TOPWORKS_BALLLEVER	+
Bar Handle Operator	BAR HANDLE		AT_TOPWORKS_BHANDLE	-
Gear Operator	GEAR BOX OPERATOR	OPM class has more parameters.	AT_TOPWORKS_GEAROPERATOR, ROTOCHAINCHECK=0	^
Diaphragm Operator	DIAPHRAGM OPERATOR	**One extra parameter in APM.**	AT_TOPWORKS_DIAPHRAGMSPRING	-
Diaphragm-Gear Operator	DIAPHRAGM GEAR OPERATOR	**OPM graphics/placement tool do not look right.**	AT_TOPWORKS_DIAGEAR	-
Relief Operator	Relief Operator	**Not in the placement tool. OPM draw script is present.**	AT_TOPWORKS_RELIEF	+

Chain Operator (I)	CHAIN OPERATOR	Name is the same as Chain Operator (II).	AT_TOPWORKS_CHAIN	-
Rotork Actuator	—		AT_TOPWORKS_ROTORKACTUATOR	-
Diaphragm Actuator	—		AT_TOPWORKS_DIAPHRAGM	-
Roto Chain Links On Gear Operator	—	Topwork on topwork! (On Gear Operator.) Or part of Gear Operator.	AT_TOPWORKS_ROTOCHAIN_GEAROP, or part of AT_TOPWORKS_GEAROPERATOR with ROTOCHAINCHECK=1	-
Chain Operator (II)	—	Name is the same as Chain Operator (I).	AT_TOPWORKS_CHAINROTO	-
Chain Operator Links	—	Topwork on topwork! (On Chain Operator (II).)	AT_TOPWORKS_CHAIN_LINK	-
Electric Actuator	ELECTRIC VALVE ACTUATOR		AT_TOPWORKS_ELECT	-
Pneumatic Actuator	PHEUMATIC VALVE ACTUATOR		AT_TOPWORKS_PNEUM	+
Pneumatic Spring Return Actuator	—		AT_TOPWORKS_G	+
G20xx-SR Actuator	—		AT_TOPWORKS_G20xx	-
Spring Return Actuator c/w Manual Overdrive	—		AT_TOPWORKS_G_M11	-
G20xx-SR-M11 Actuator c/w Manual Overdrive	—		AT_TOPWORKS_G_SR_M1	-
Diaphragm and Handwheel Actuator	—	APM graphics may be a bit wrong.	AT_TOPWORKS_DIAPHANDWHEEL	-
Bayonet Actuator	—		AT_TOPWORKS_BAYONET	-

“Ok?”: “+” means ok, “f” means flipped graphics, “^” means almost correct, “0” means not applicable, “-“means missing or wrong.

4.2.8.4. Required work

1. Configure in OPM project: flip Cube operator.
2. Create EC classes with IsGraphical creation attribute OR map to some suitable classes with : Handwheel (Rising stem), Rotork actuator, Diaphragm actuator, Roto chain links on gear operator, Chain operator (II), Chain operator links, G20xx-SR actuator, Spring return actuator c/w manual overdrive, G20xx-SR-M11 actuator c/w manual overdrive, Diaphragm and handwheel actuator, Bayonet actuator.
   Note 1: both “Pneumatic Spring Return Actuator” and “Pneumatic Actuator” are mapped to “Pheumatic valve actuator”, and while that class has OPM draw script, APM graphics are kept.
   Note 2: RELIEF_OPERATOR, PNEUMATIC_VALVE_ACTUATOR and VALVE_WRENCH are configured to keep APM graphics (in Modeler.cfg).
3. Fix mapping: Cylinder operator, Bar handle operator, Diaphragm operator, Diaphragm-Gear operator, Chain operator (I), Electric actuator.

4.2.8.5. Work done

1. Appending “CUBE_OPERATOR|2|-180” to OPM_AP2OP_ROTATE_COMPS_DATA setting seems to work.
2. Class by class:
   a. Added ELECTRIC_VALVE_ACTUATOR to OPM_AP2OP_ALWAYS_TREAT_AS_CUSTOM_COMPONENT list of exceptions.
   b. Changed mapping of “G20xx-SR Actuator”, “Spring Return Actuator c/w Manual Overdrive” and “G20xx-SR-M11 Actuator c/w Manual Overdrive” from “Gear operator” to PNEUMATIC_VALVE_ACTUATOR (they seem to be pneumatic).
   c. Created new classes for “Bayonet actuator” and “Diaphragm and handwheel operator”. Just BAYONET_ACTUATOR and DIAPHRAGM_AND_HANDWHEEL_ACTUATOR, VALVE_ACTUATOR descendants.

3. Class by class:
   a. Cylinder operator in OPM lacks C and D parameters from APM. Fixed mapping, ignoring extra parameters. Note that APM graphics are closer to diaphragm operator, so graphics are configured to be kept.
   b. Bar handle operator in OPM has more parameters than in APM. Fixed mapping, ignoring extra parameters. Graphics are kept too.

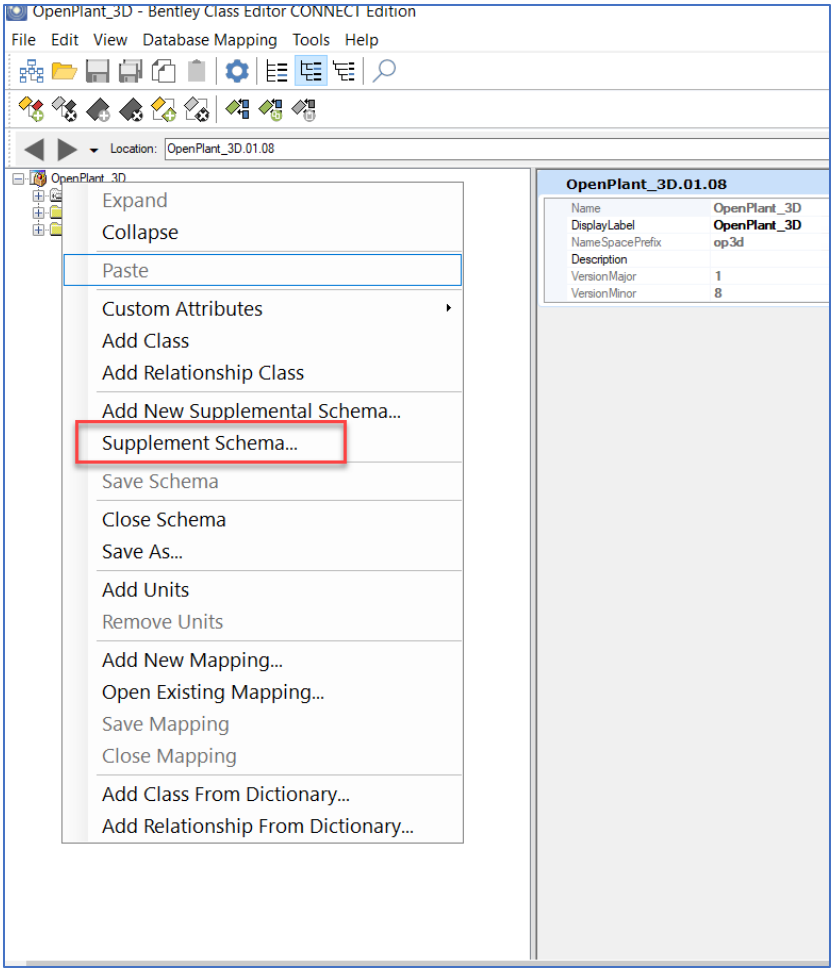
4.2.9. Fixes for Piping ‘Base’ module components getting 'missed' or give 'wrong graphics' due to incorrect mappings.

4.2.9.1. Fixing ‘Fire Hydrant’:

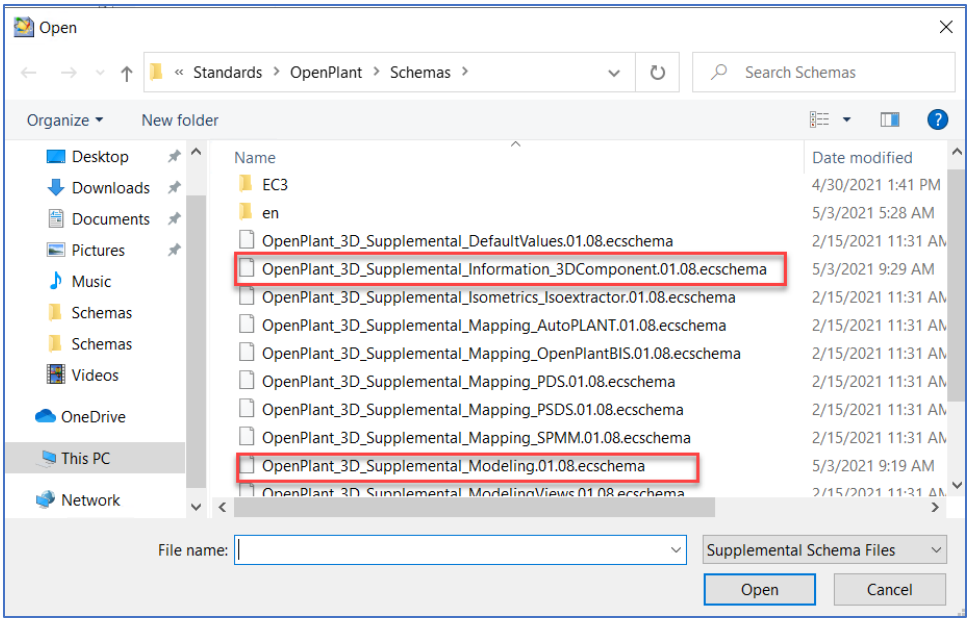
1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

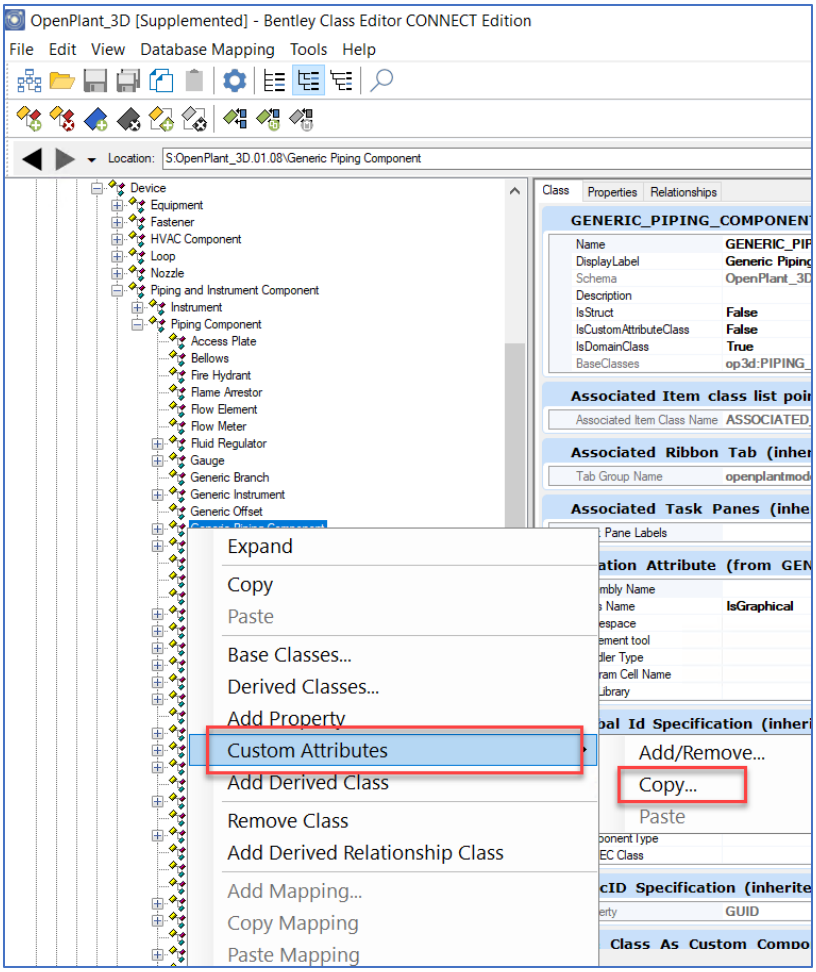


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Expand the ‘Classes’ and follow the hierarchy, to find ‘**Fire Hydrant**’**.**
6. Go to the class **‘Generic Piping Component’** and Right click to copy **‘Creation Attribute’** as a **‘Custom Attributes’.**



7. Paste this custom attribute into the 'Fire Hydrant' class.
8. Now copy the '**Component Port Information'** from **GENERIC_PIPING_COMPONENT_TWO_PORT.**
9. Paste it into the 'Fire_hydrant' class.
10. Edit the No.of Ports from **2** to **1**.
11. Delete the 'Run_Port' from 'Port Type'.
12. As a result, we can now incorporate Fire Hydrants into the OP world.

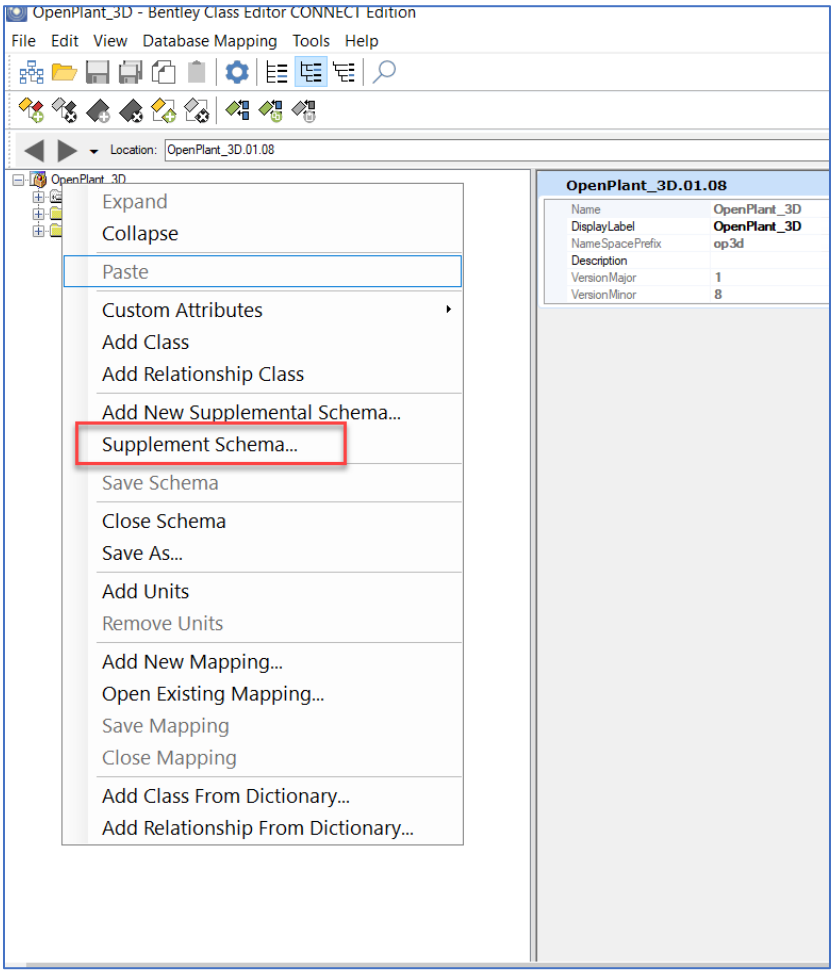
4.2.9.2. Fixing 'Pressure_Relief_Valve':

1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

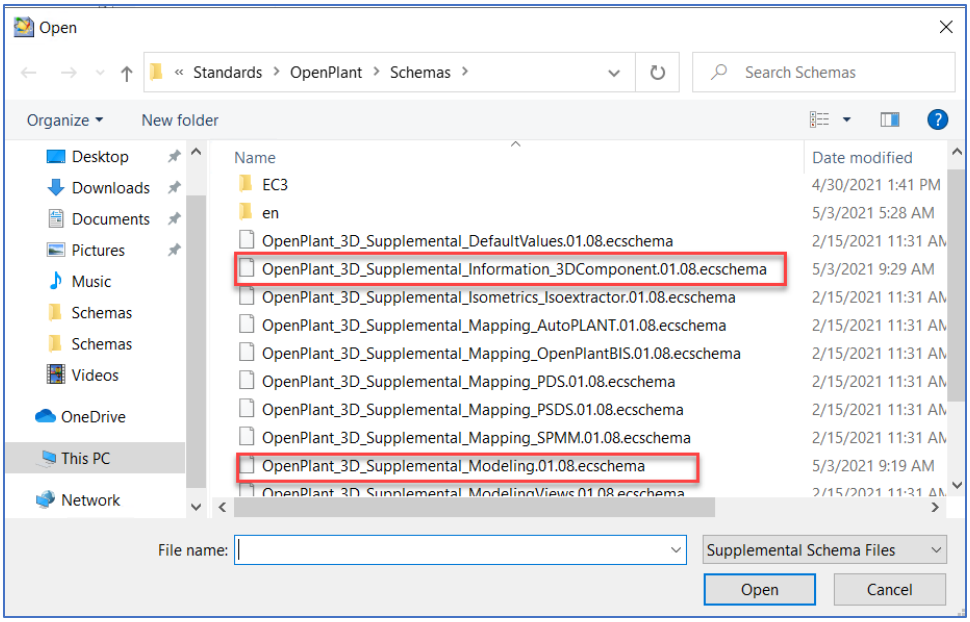
2. Load all Reference schemas from this location:

C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

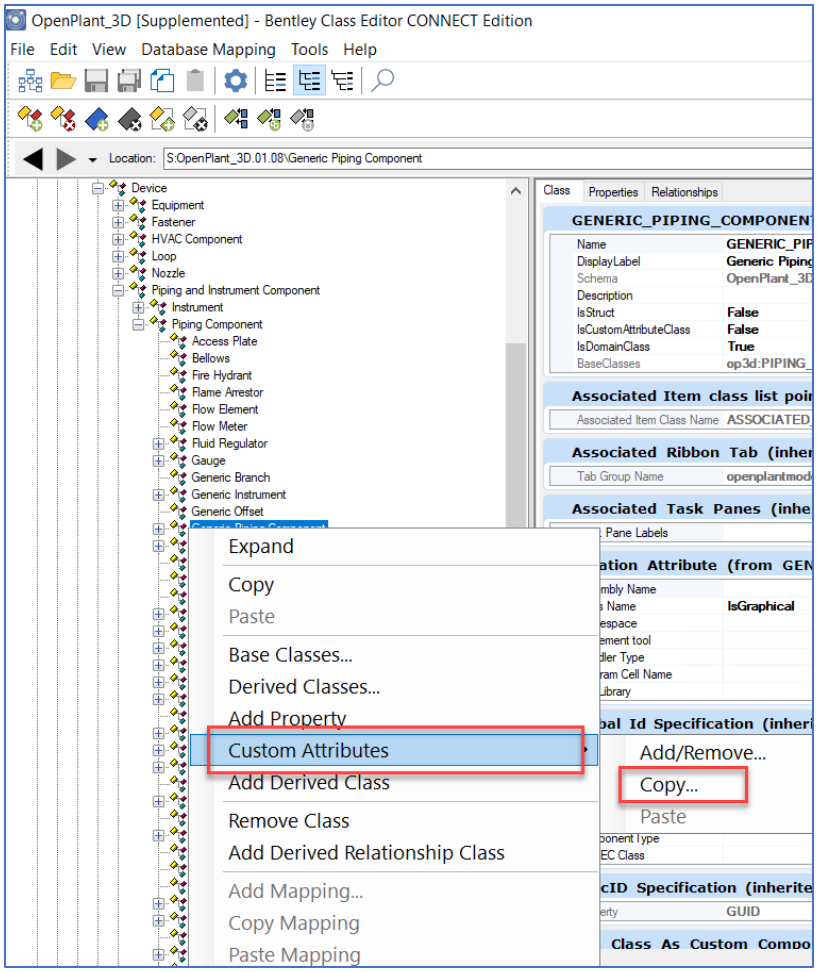


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Search for the class '**Presssure_Relief_Valve**'.
6. Navigate to it.
7. Edit the No.of Ports from **2** to **1**.
8. Delete the 'Run_Port' from 'Port Type'.
9. Go to the class **'Generic Piping Component'** and Right click to copy **'Creation Attribute'** as a **'Custom Attributes'.**



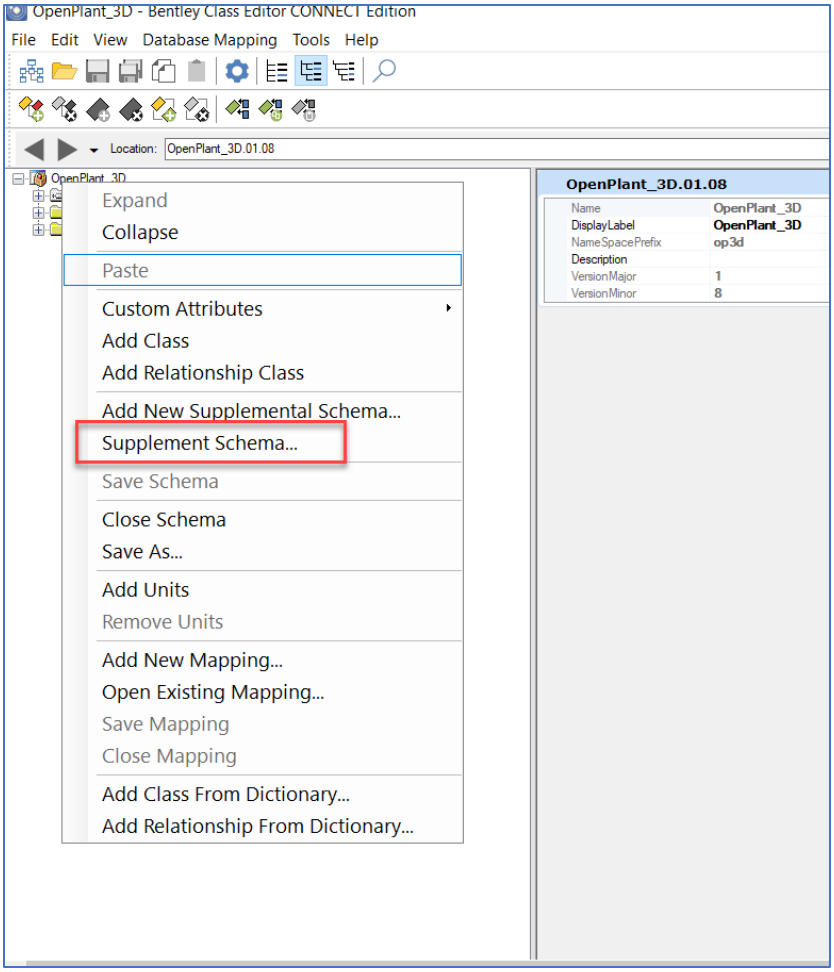
10. Paste this custom attribute into the '**Presssure_Relief_Valve**' class.
11. As a result, we can now incorporate **Presssure_Relief_Valve** into the OP world.

4.2.9.3. Fixing 'WELDOFLANGE' and 'Welding_Boss':

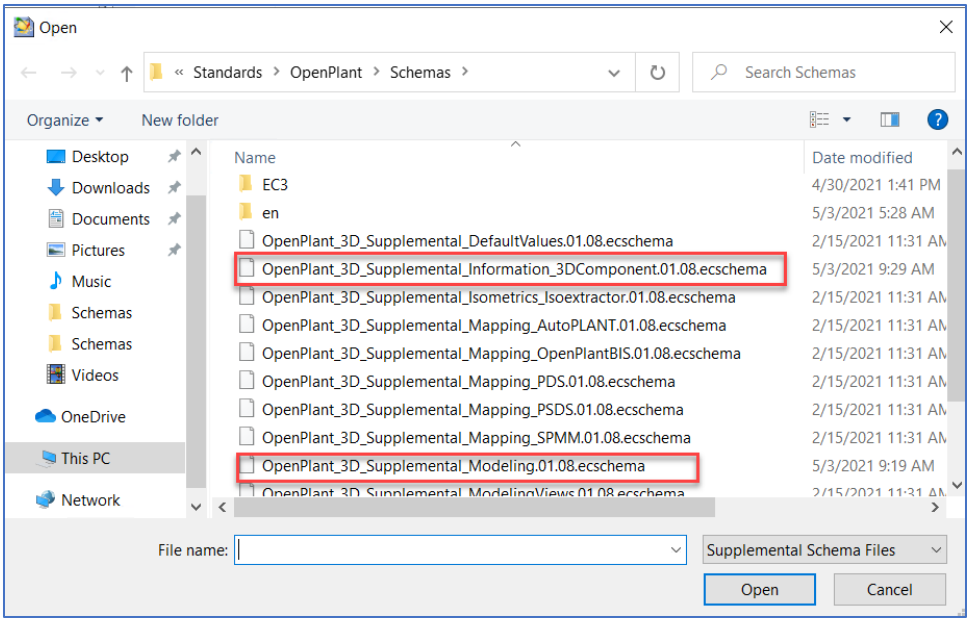
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

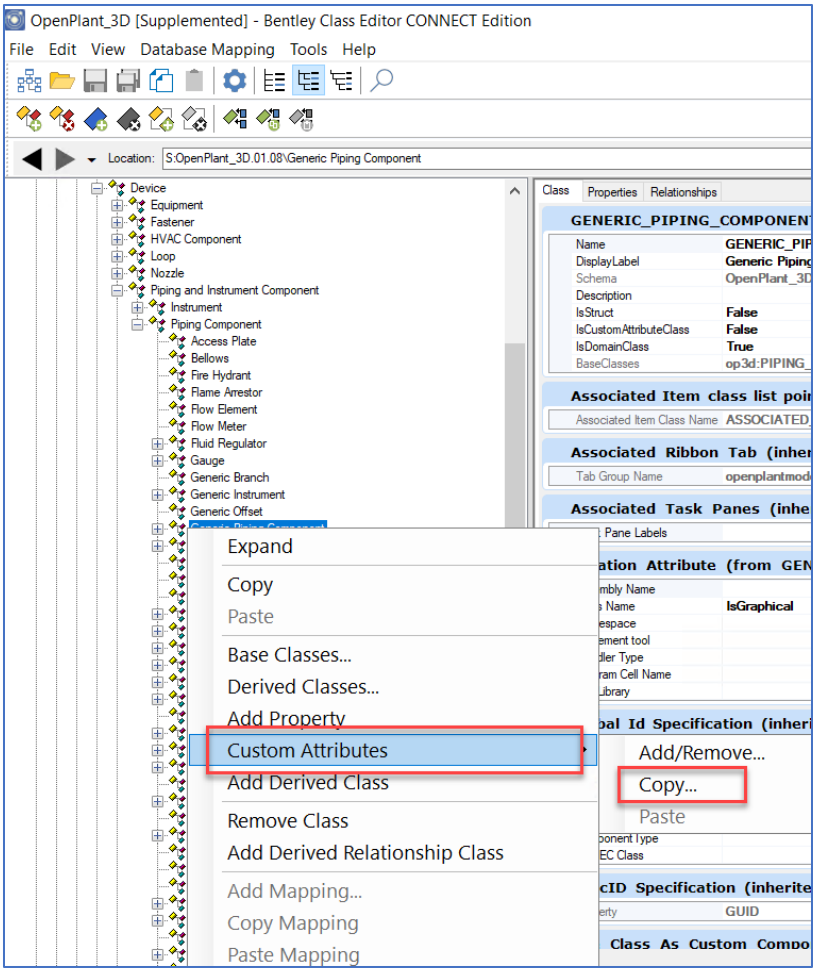


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Expand the ‘Classes’ and follow the hierarchy, to find ‘**Welding Boss**’ and ‘**Weldoflange**’**.**
6. Go to the class **‘Generic Piping Component’** and Right click to copy **‘Creation Attribute’** as a **‘Custom Attributes’.**



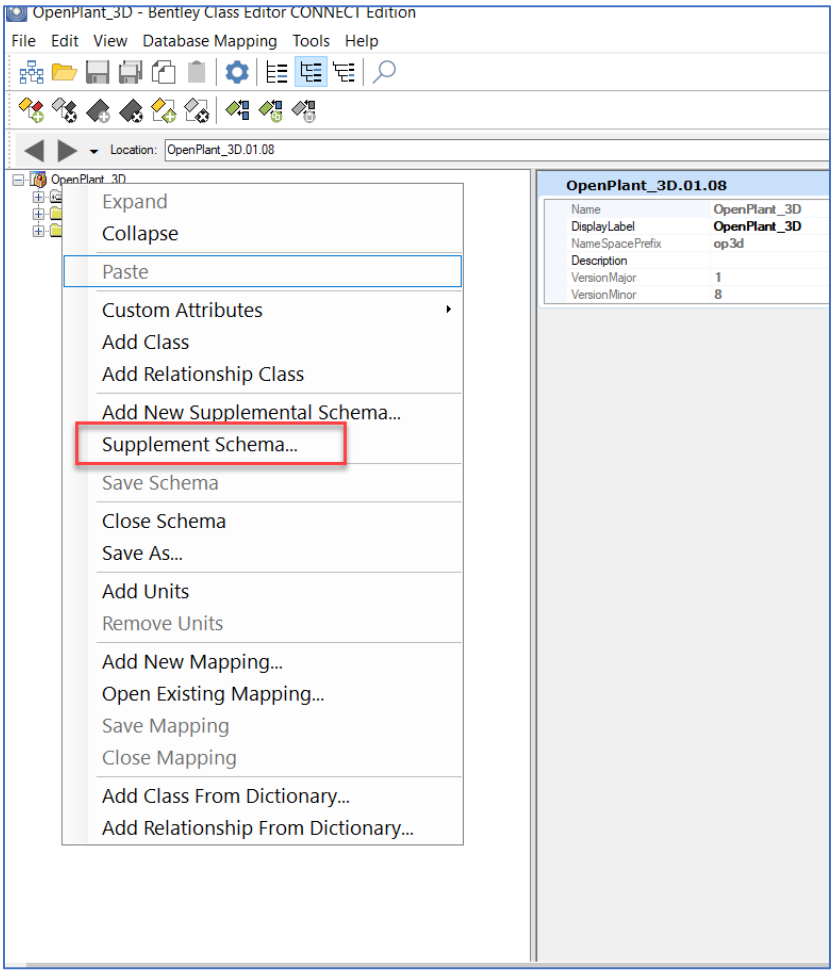
7. Paste this custom attribute into both '**Welding Boss**' and '**Weldoflange**' classes.
8. As a result, we can now incorporate '**Welding Boss**' and '**Weldoflange**' into the OP world.

4.2.9.4. Fixing 'Pipe_Elbow_Street':

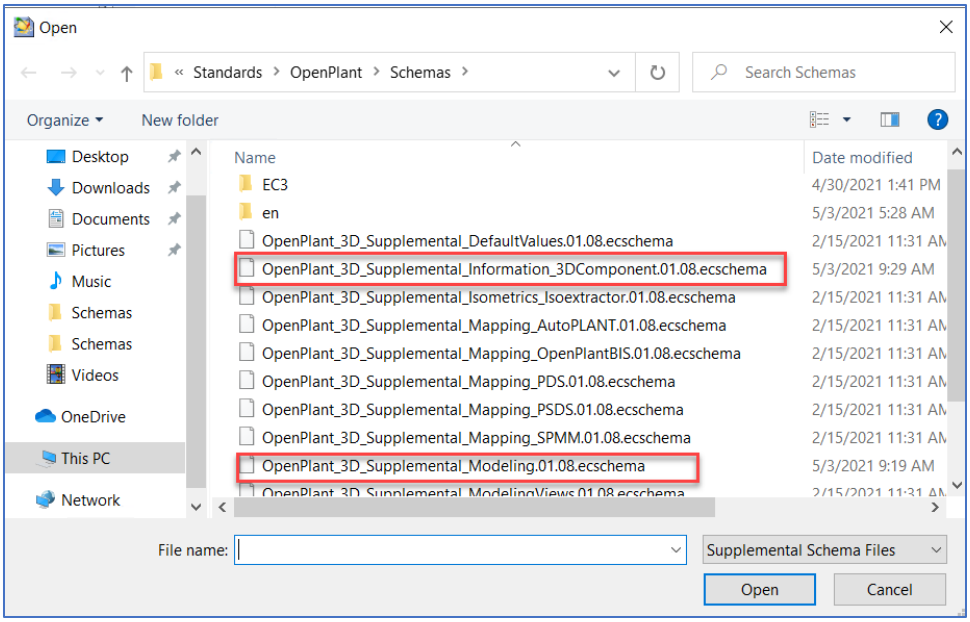
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

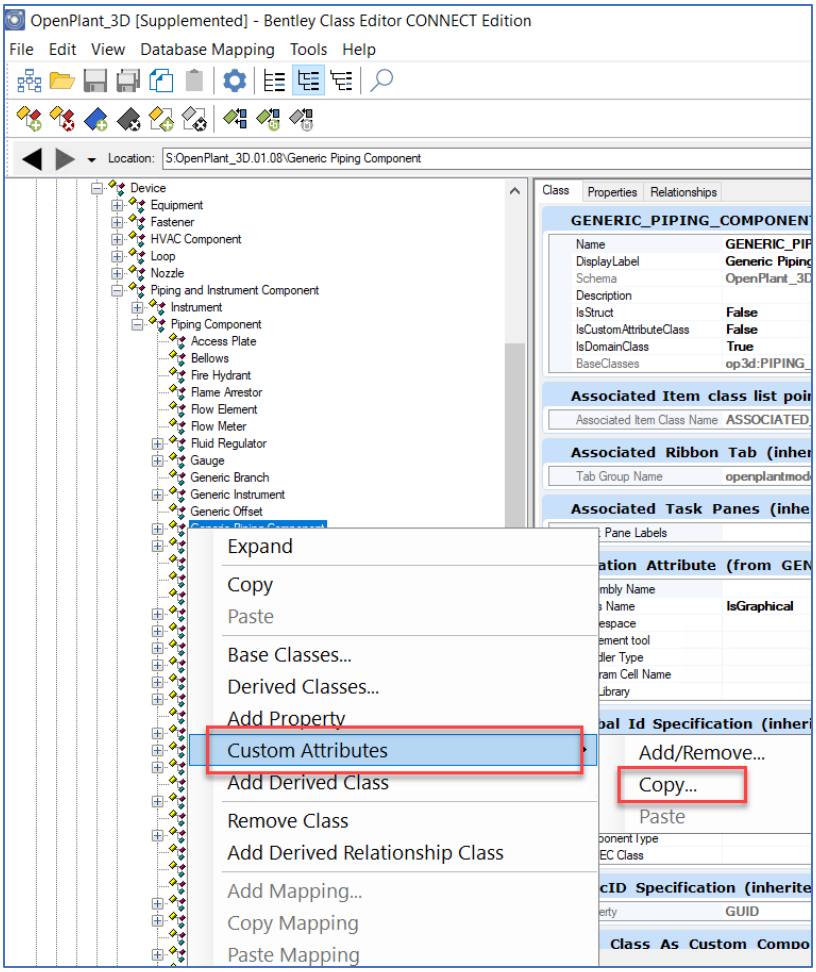


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Expand the ‘Classes’ and follow the hierarchy, to find ‘**Pipe_Elbow_Street’.**
6. Go to the class **‘PIPE_ELBOW_45_DEGREE_STREET’** and Right click to copy **‘Component Port Information’** as a **‘Custom Attributes’.**



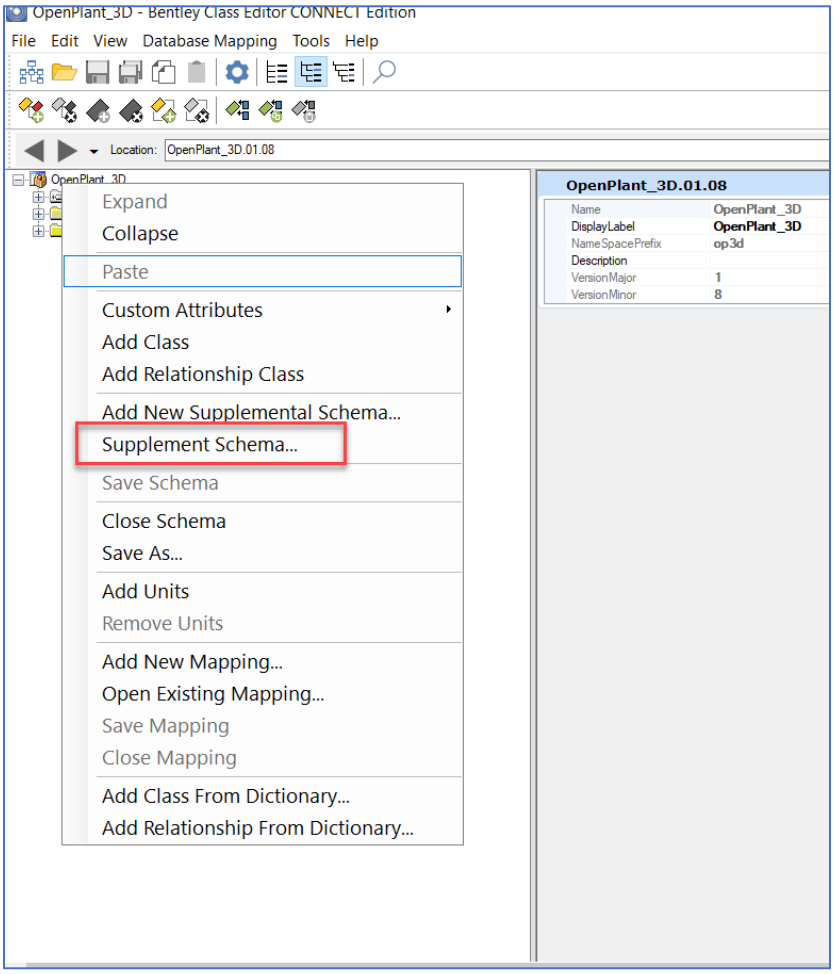
9. Paste this custom attribute into parent class ‘Pipe Elbow Street’.
10. As a result, we can now incorporate ‘**Pipe Elbow Street**’ into the OP world.

4.2.9.5. Fixing ‘Pipe End’:

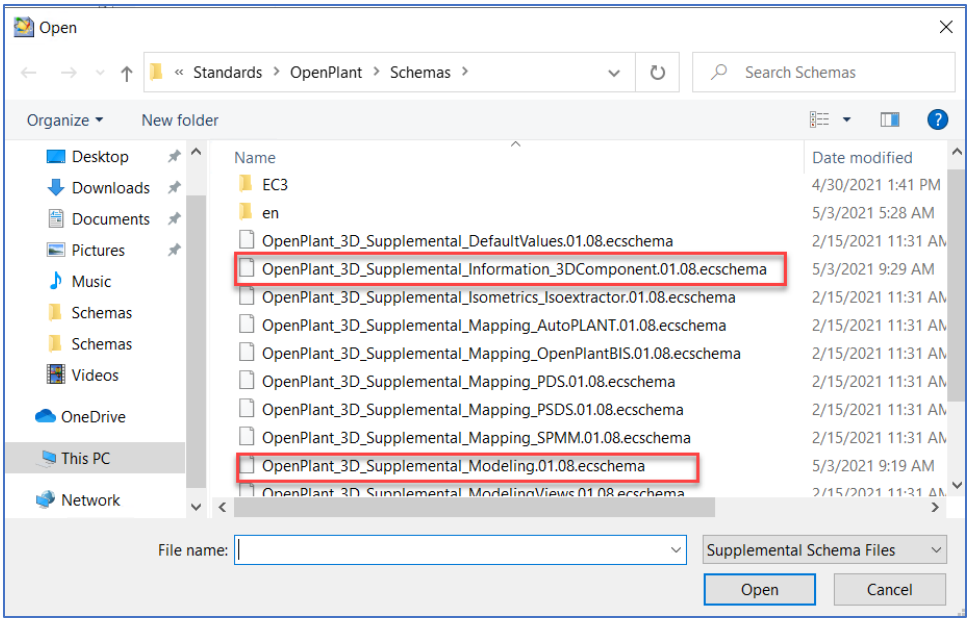
1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

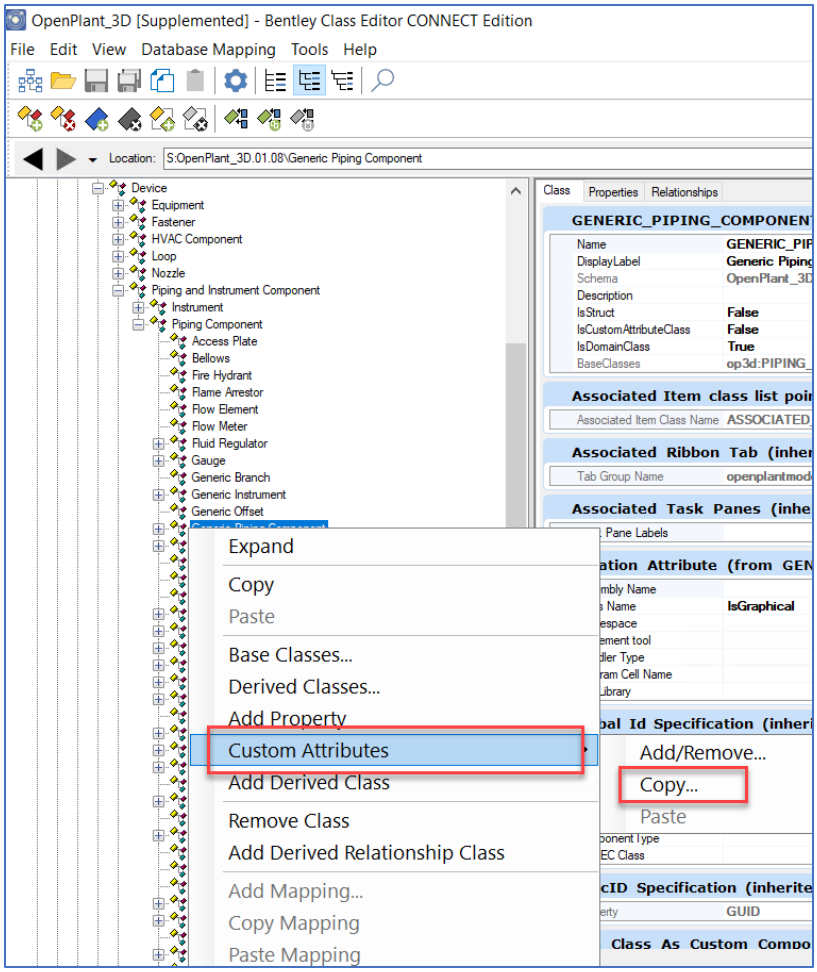


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Expand the ‘Classes’ and follow the hierarchy, to find ‘**Pipe_End’.**
6. Now copy the ‘**Component Port Information’** from **GENERIC_PIPING_COMPONENT_TWO_PORT.**
7. Paste it into the ‘Pipe_End’ class.
8. Edit the No.of Ports from **2** to **1**.
9. Delete the ‘Run_Port’ from ‘Port Type’.
10. Go to the class **‘Generic Piping Component’** and Right click to copy **‘Creation Attribute’** as a **‘Custom Attributes’.**



11. Paste this custom attribute into parent class '**Pipe_End'.**

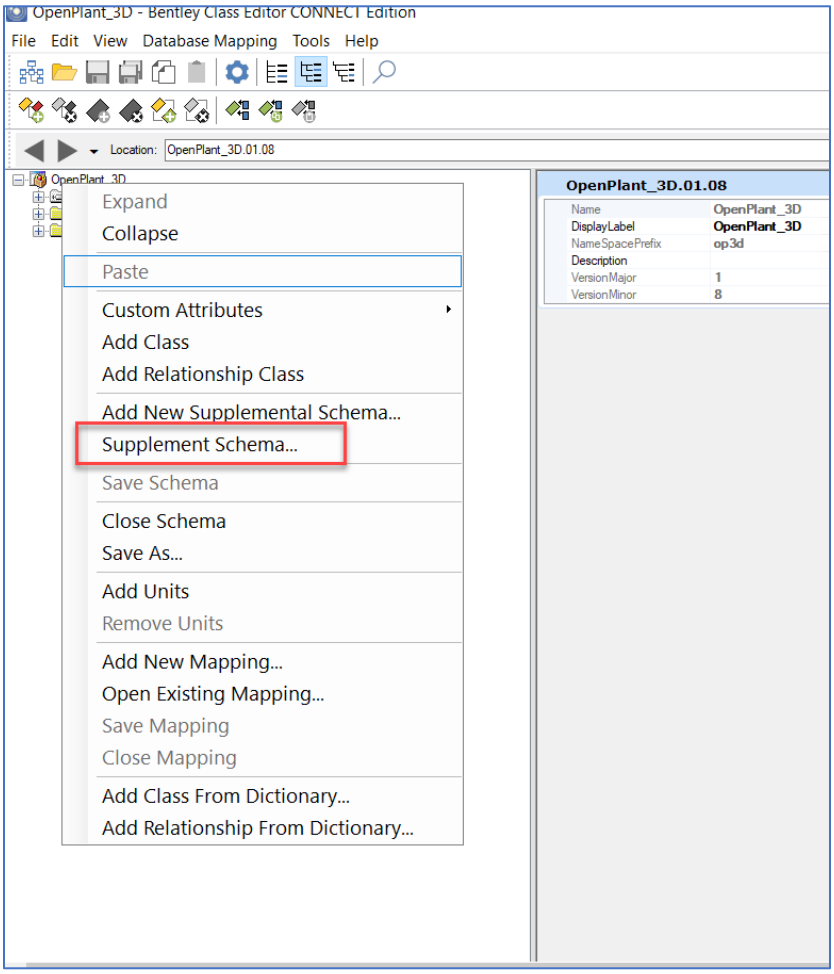
12. As a result, we can now incorporate '**Pipe_End'** into the OP world.

4.2.10. Incorporating 'Concentric_Swage' as a Custom Component.

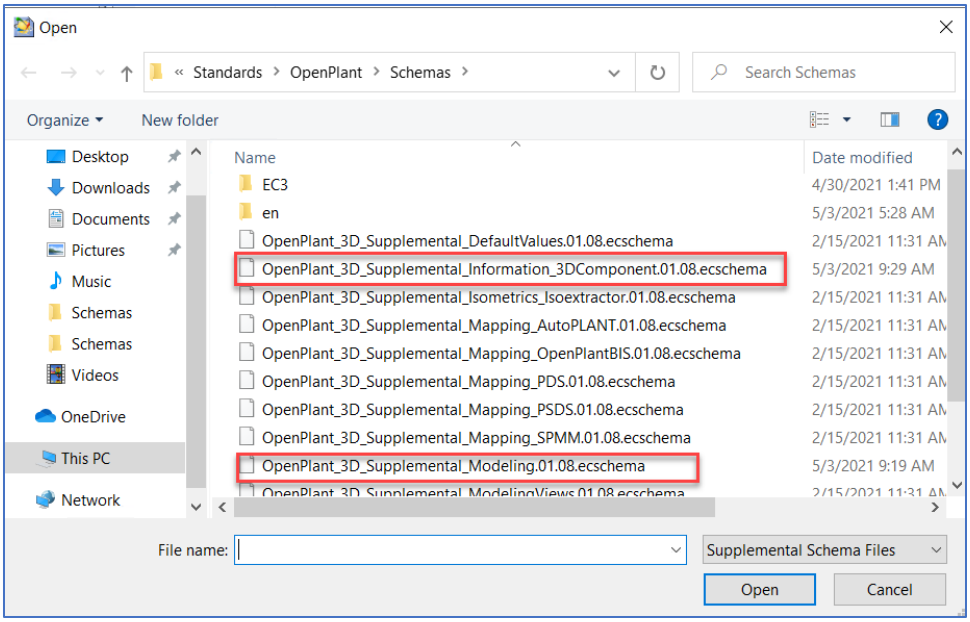
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

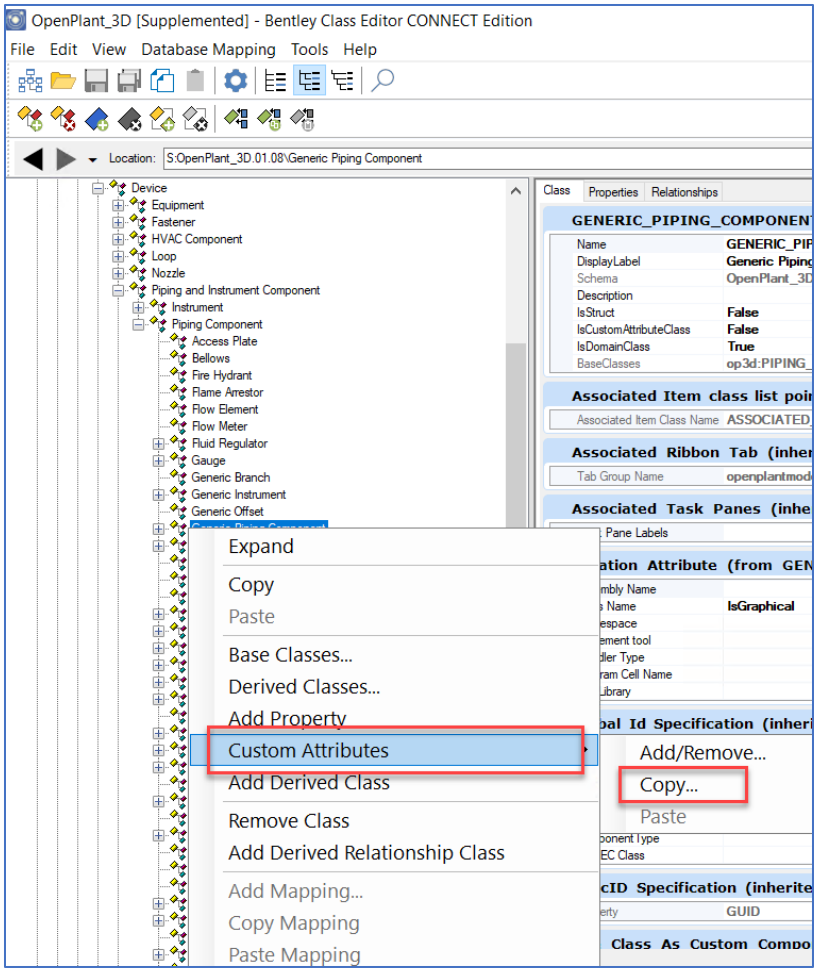


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Search for ‘CONCENTRIC_SWAGE’ class and select it.
6. Go to the class **‘Generic Piping Component’** and Right click to copy **‘Creation Attribute’** as a **‘Custom Attributes’.**



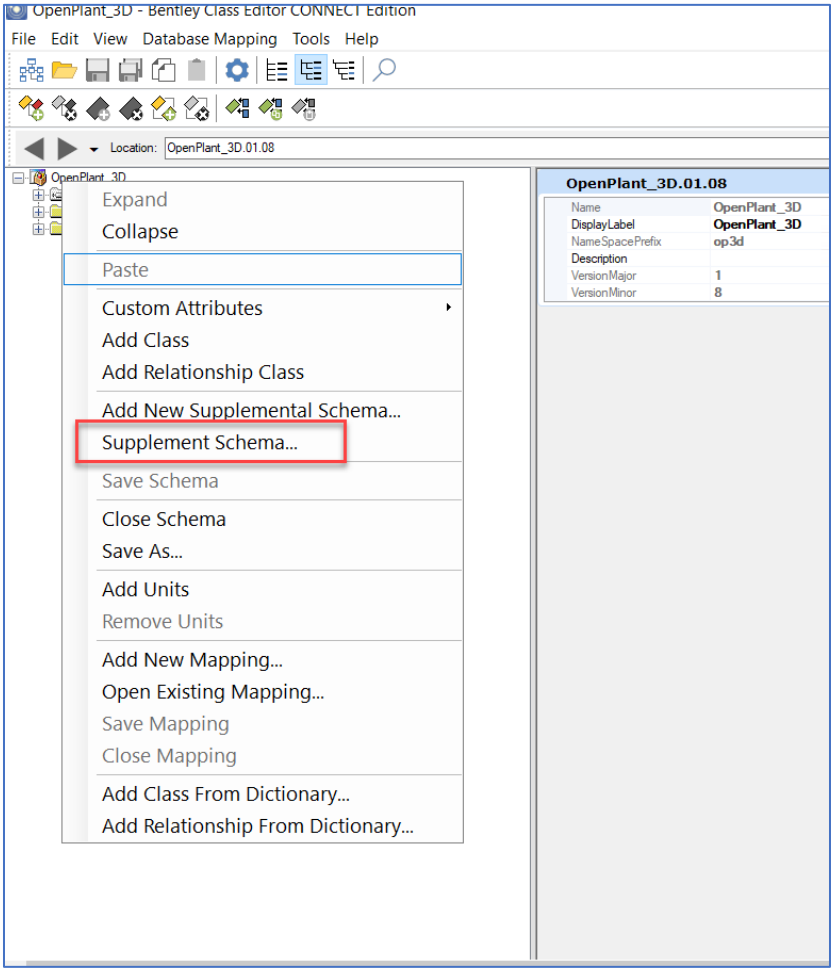
7. Paste this ‘Creation Attribute’ into the ‘CONCENTRIC_SWAGE’.
8. Now copy the ‘**Component Port Information’** from **GENERIC_PIPING_COMPONENT_TWO_PORT.**
9. Paste this attribute to ‘CONCENTRIC_SWAGE’ class also.
10. As a result, we can now incorporate ‘CONCENTRIC_SWAGE’ into the OP world.

4.2.11. Incorporating ‘LATROLET_90_DEGREES’ as a Custom Component

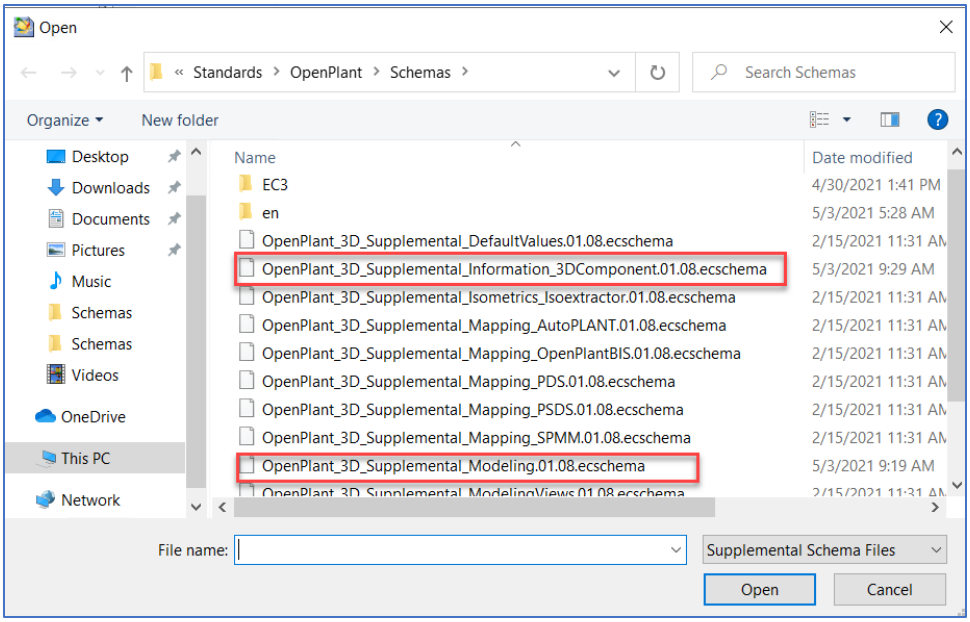
1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

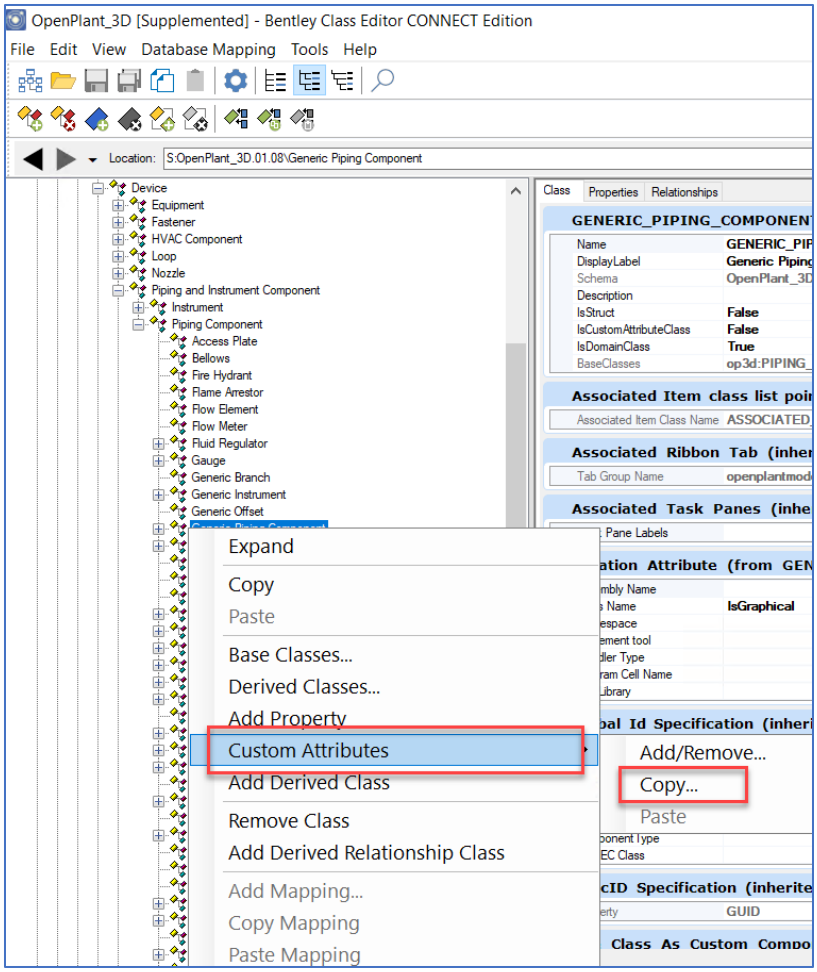


4. Add following two Supplemental schemas:
   - Supplemental_Information_3DComponent
   - Supplemental Modeling

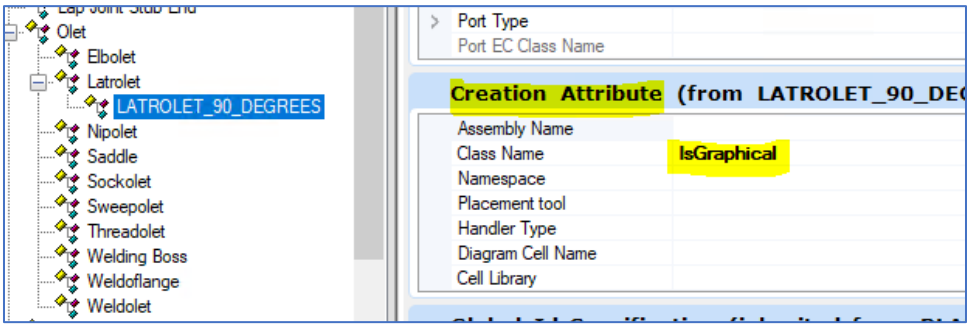


Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Search for ‘LATROLET’ class and select it.
6. Right Click on ‘LATROLET’ and select **‘Add Derived Classes.’**
7. Specify its ‘Name’ and ‘Display Label’ as ‘LATROLET_90_DEGREES’
8. Go to the class **‘Generic Piping Component’** and Right click to copy **‘Creation Attribute’** as a **‘Custom Attributes’.**



9. Paste this ‘Creation Attribute’ into the newly created ‘LATROLET_90_DEGREES’ class.



10. As a result, we can now incorporate ‘LATROLET_90_DEGREES’ into the OP world.

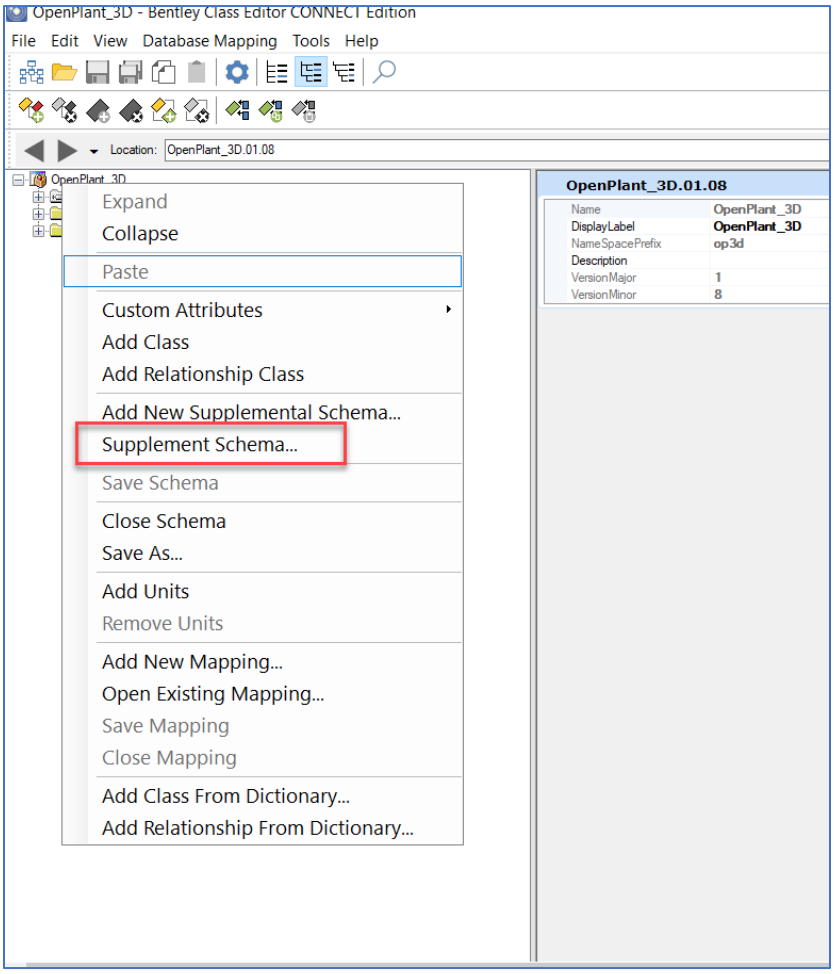
4.2.12. Incorporating ‘TAP-TAP' End-Conditions for ‘TAP_JOINT’

1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.

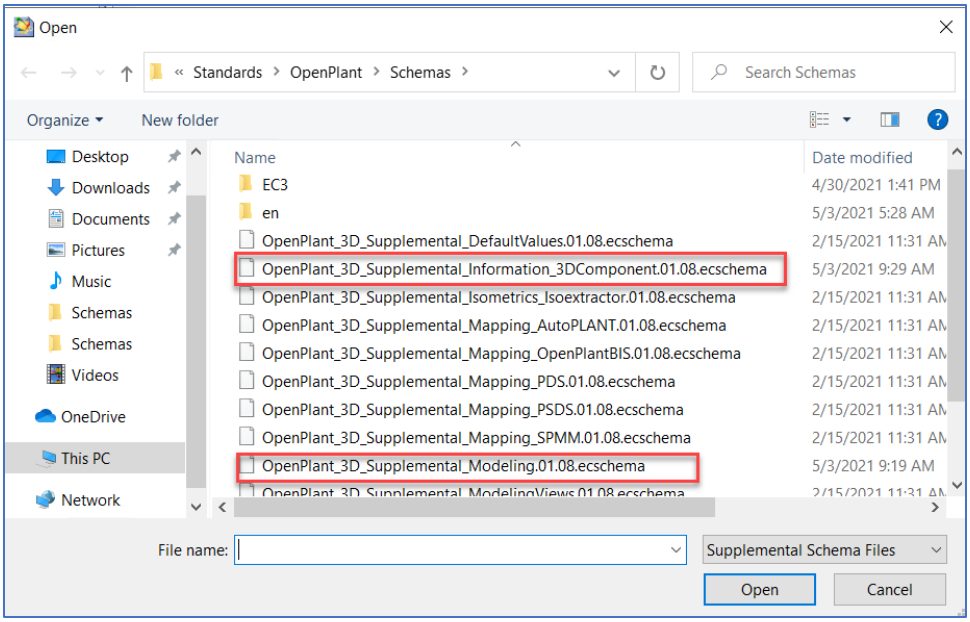
Can be found at this link
C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

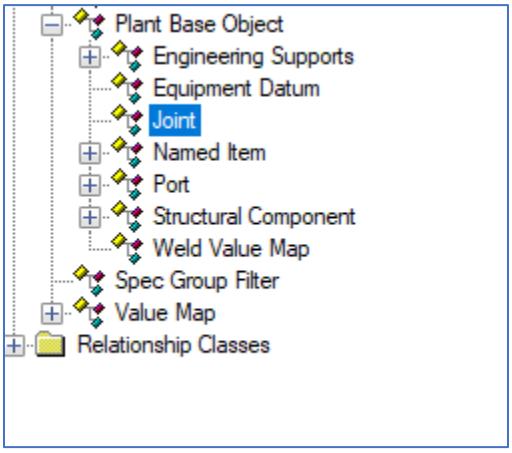


4. Add following two Supplemental schemas:
   - Supplemental_Information_3DComponent
   - Supplemental Modeling

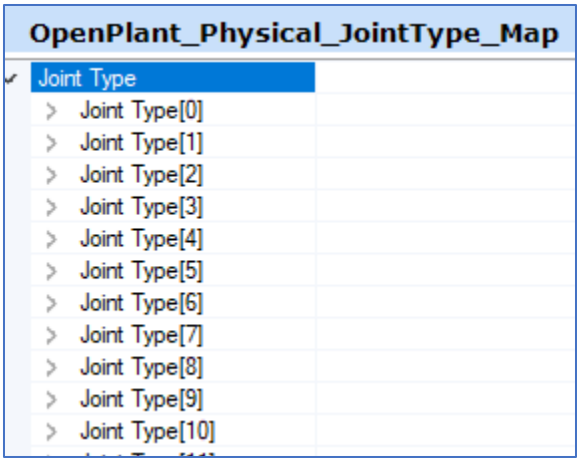


Use the same Reference schemas as used in **Step:2** and press **OK.**

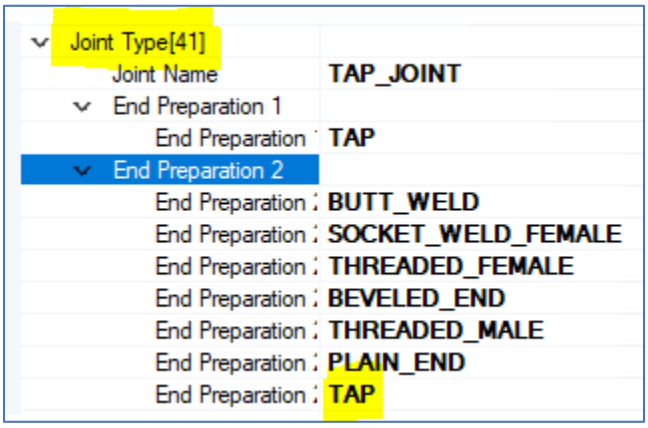
5. Under the ‘Plant Base Object’ click on ‘Joint’



6. Expand the ‘Joint Type’ from ‘OpenPlant_Physical_JointType_Map’.



7. Please look for the 'TAP_JOINT' (can be found at [8] position).
8. Expand the 'End Preparation 2' and add 'TAP' (as a new End Condition 2) as shown below.



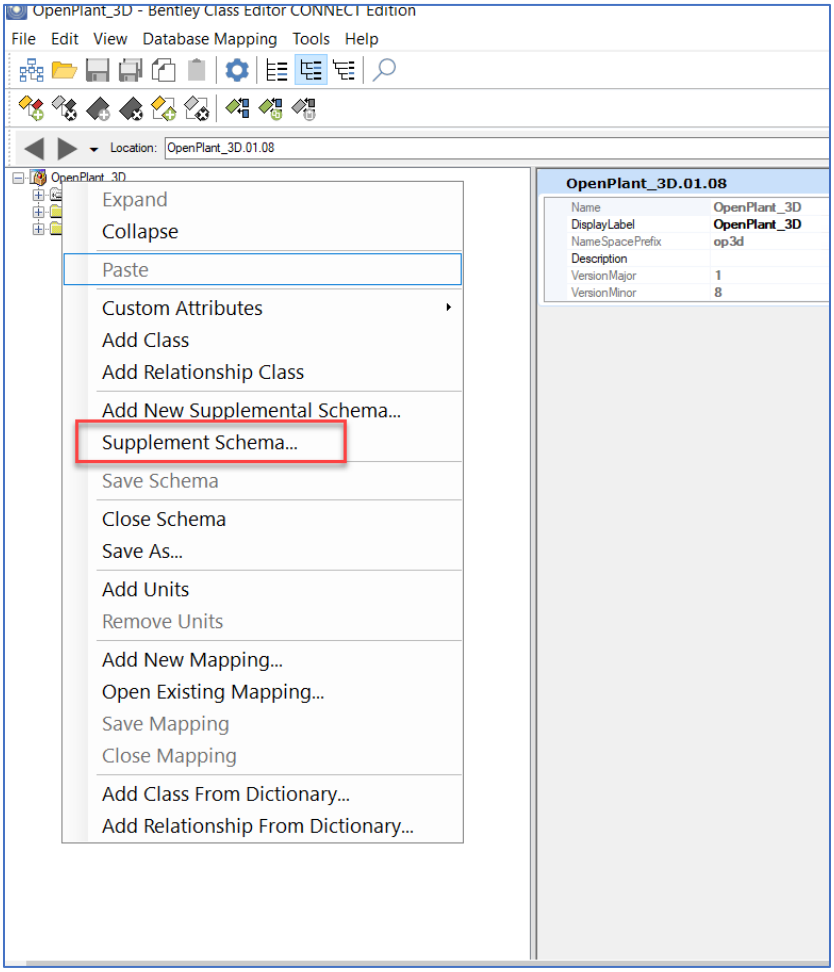
9. As a result, we can now incorporate 'TAP-TAP' End Conditions for 'Tap_Joint'

4.2.13. Incorporating 'Straightway Y Check Valve' and 'Relief Change Over Valve APM'

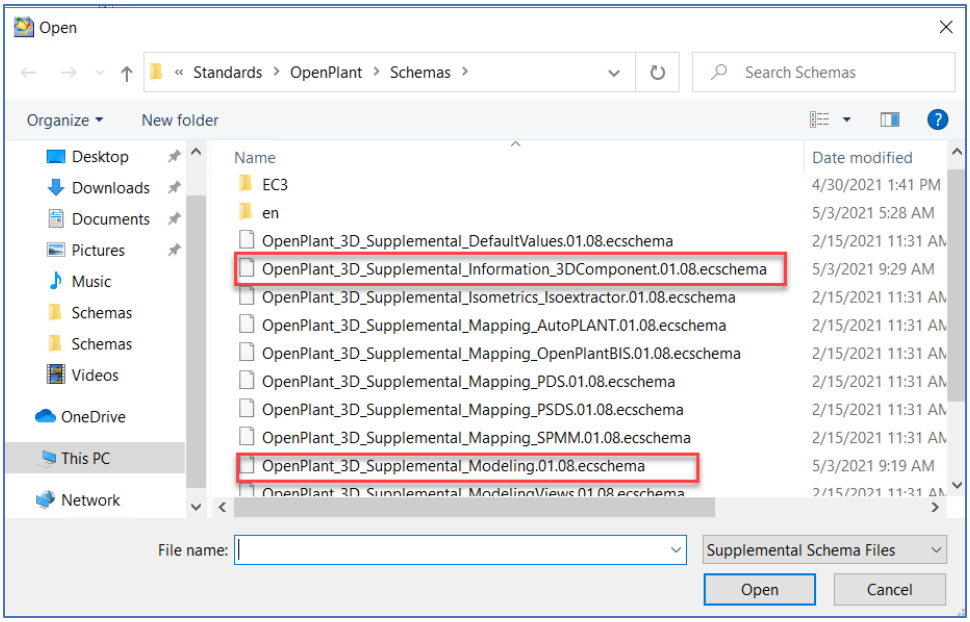
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

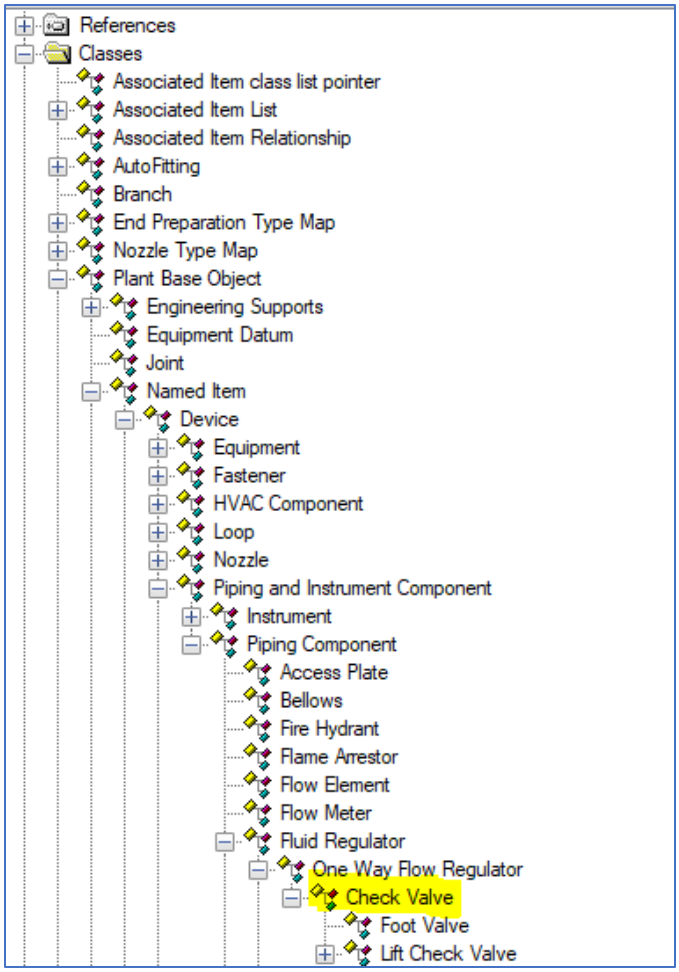


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling

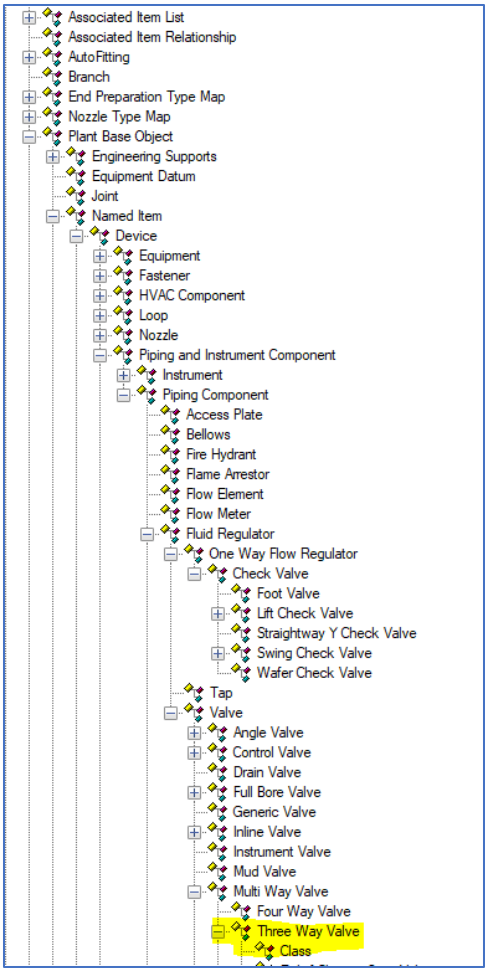


Use the same Reference schemas as used in **Step:2** and press **OK.**

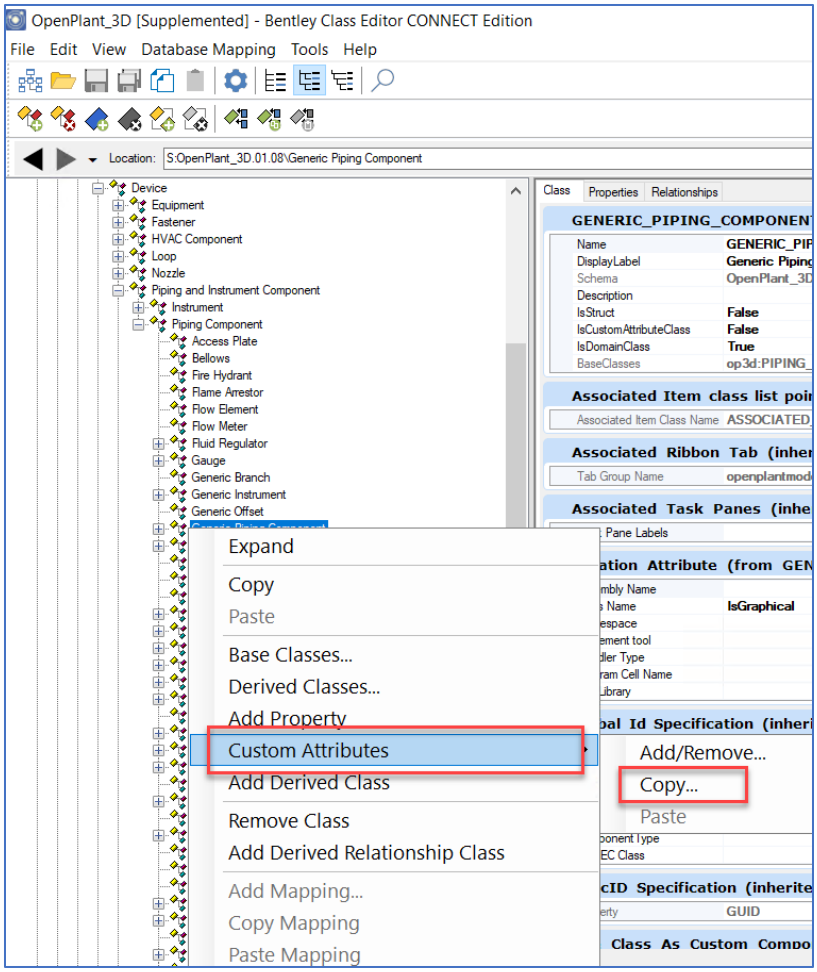
5. Navigate to ‘Plant Base Object > Named Item > Device > Piping and instrument Component > Piping Component > Fluid Regulator > One Way Flow Regulator > Check Valve.



6. Right Click on 'Check Valve' and select **'Add Derived Classes.'**
7. Specify its 'Name' and 'Display Label' as 'VALVE_YCHECK' and "Straightway Y Check Valve" respectively.
8. Similarly Navigate to 'Plant Base Object > Named Item > Device > Piping and instrument Component > Piping Component > Valve > Multi Way Valve > Three Way Valve.



9. Right Click on 'Three Way Valve' and select **'Add Derived Classes.'**
10. Specify its 'Name' and 'Display Label' as 'CHANGE_OVER_VALVE_AP' and "Relief Change Over Valve APM" respectively.
11. Go to the class **'Generic Piping Component'** and Right click to copy **'Creation Attribute'** as a **'Custom Attributes'.**



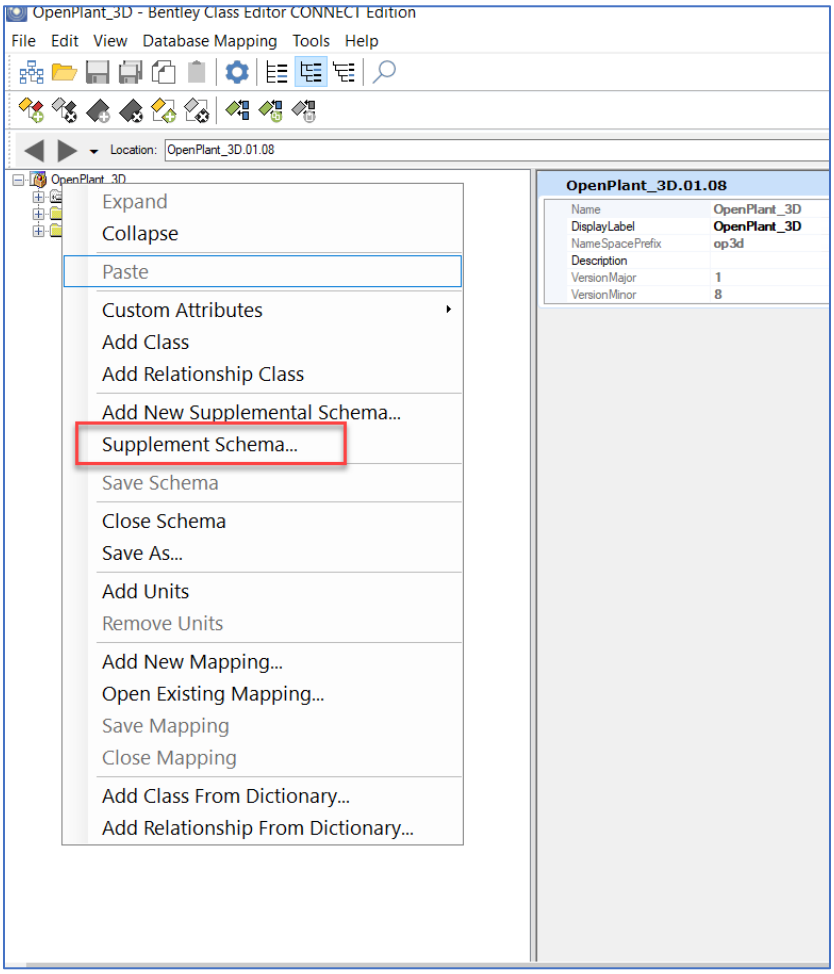
12. Paste this ‘Creation Attribute’ into the newly created classes ‘VALVE_YCHECK’ and ‘CHANGE_OVER_VALVE_AP’
13. As a result, we can now incorporate ‘Straightway Y Check Valve’ and ‘Relief Change Over Valve APM’ into the OP world.

4.2.14. Incorporating ‘THREADED_WELD_JOINT'

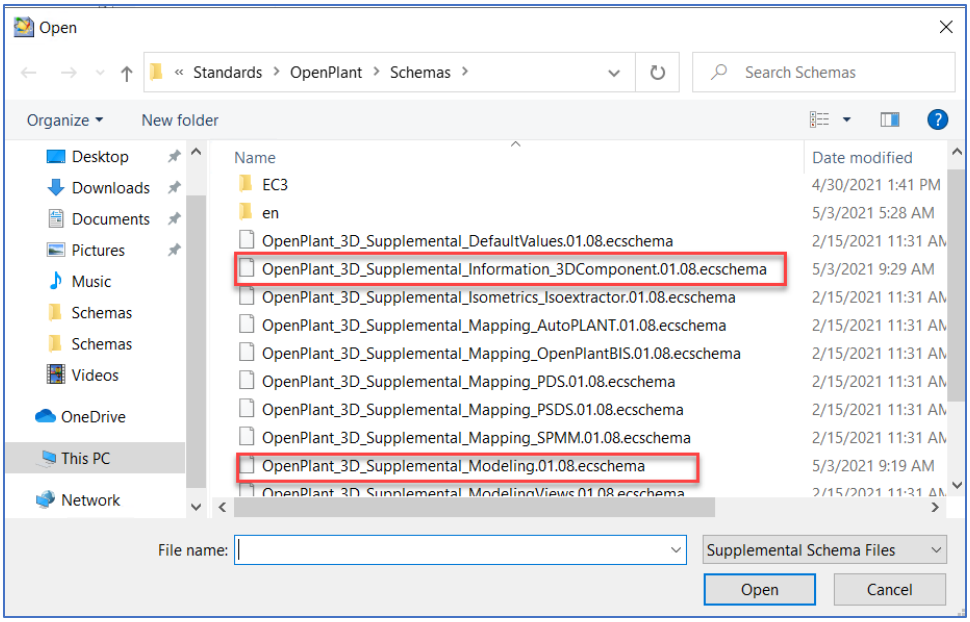
1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

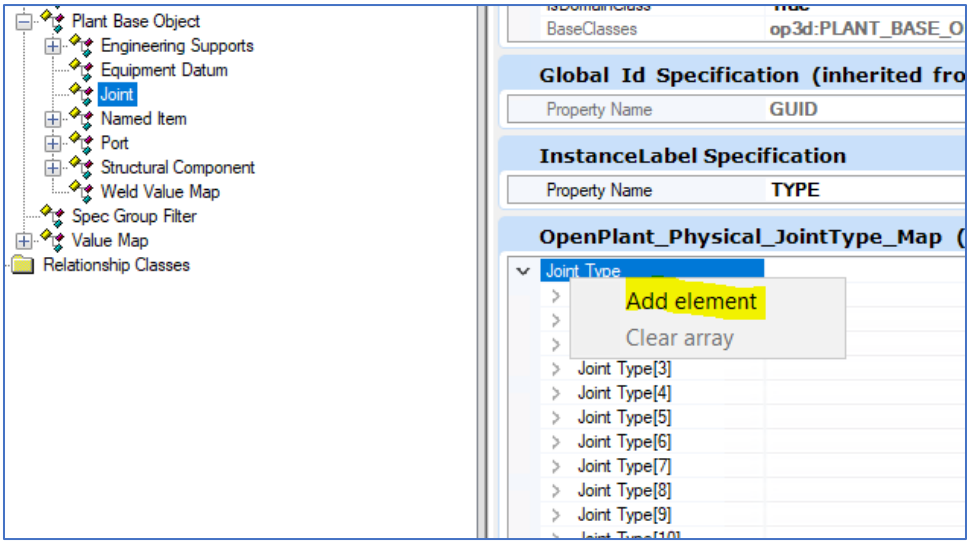
3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’



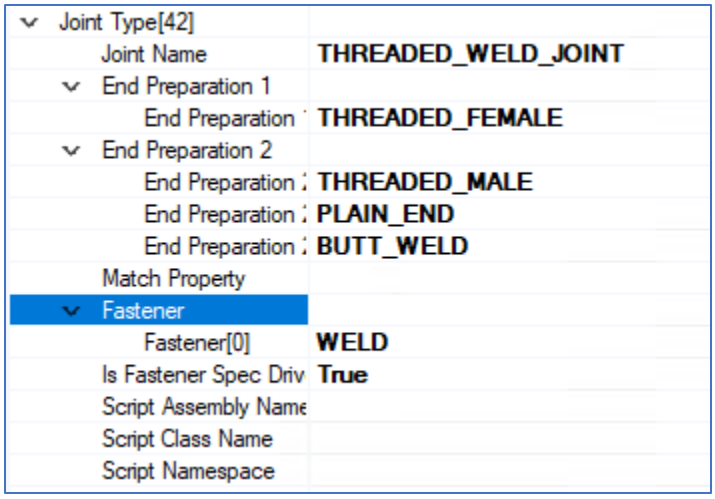
4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



5. Navigate to ‘Plant Base Object > Joint’ and expand the ‘OpenPlant_Physical_JointType_Map’.
6. Right Click on ‘Joint Type’ and select ‘Add element’ to add a new joint.
7. Scroll down and notice that a new empty Joint has been created. (If it does not appear, please refresh or click on any other node)



8. Please Fill the information of ‘THREADED_WELD_JOINT’ as shown below:



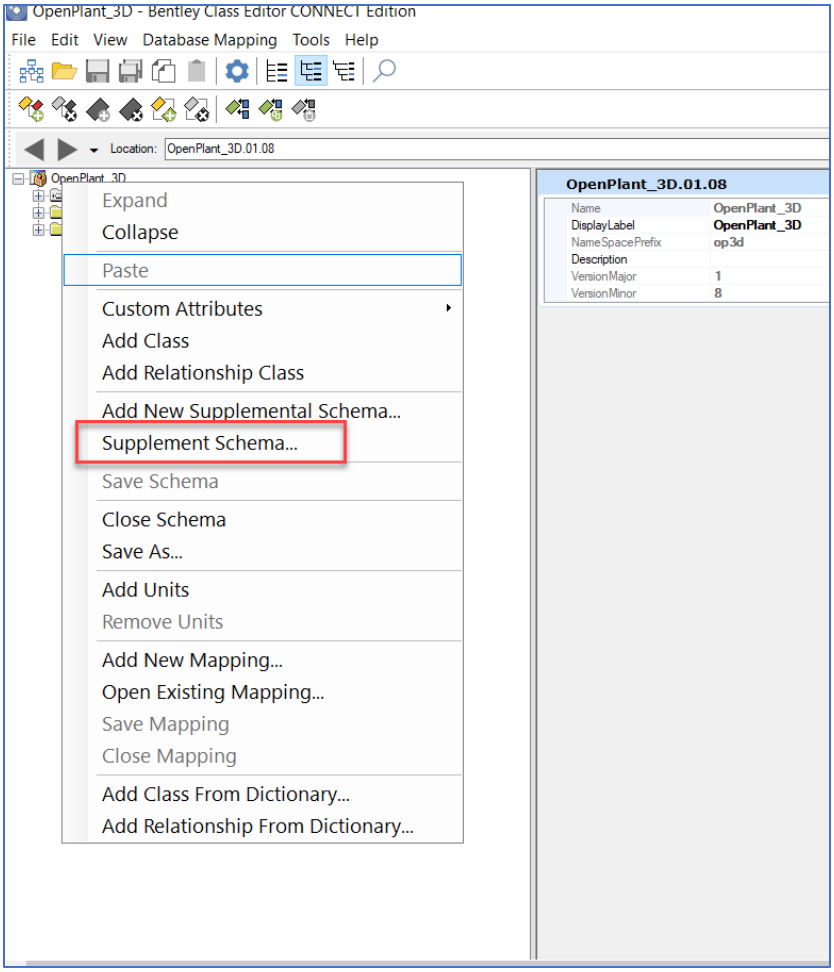
9. Save all the changes.
10. As a result, we can have now incorporated 'THREADED_WELD_JOINT' into the OP world.

4.2.15. Incorporating 'CLAMP_GASKET' and 'CLAMP_BOLT':

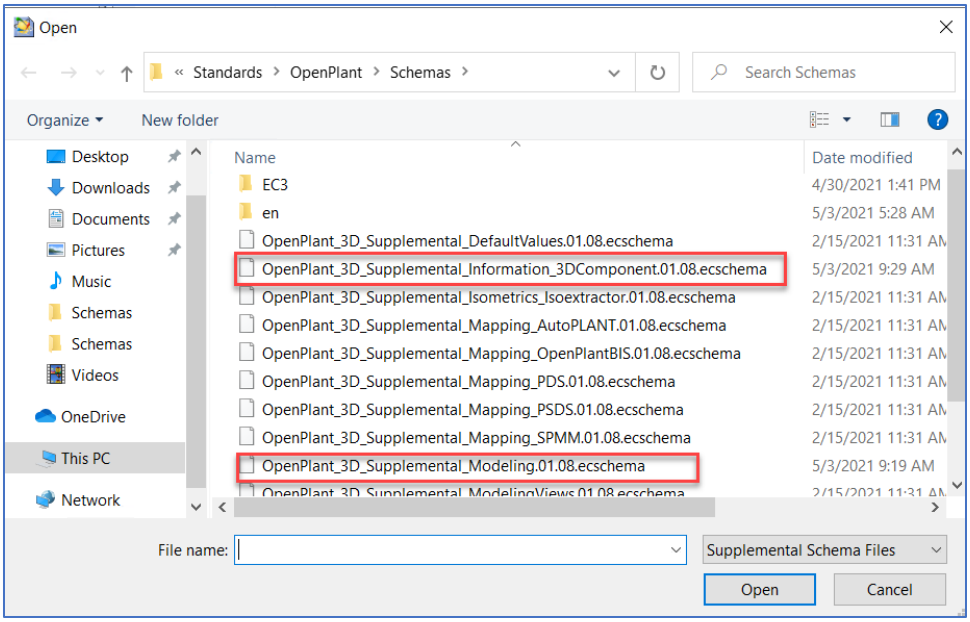
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

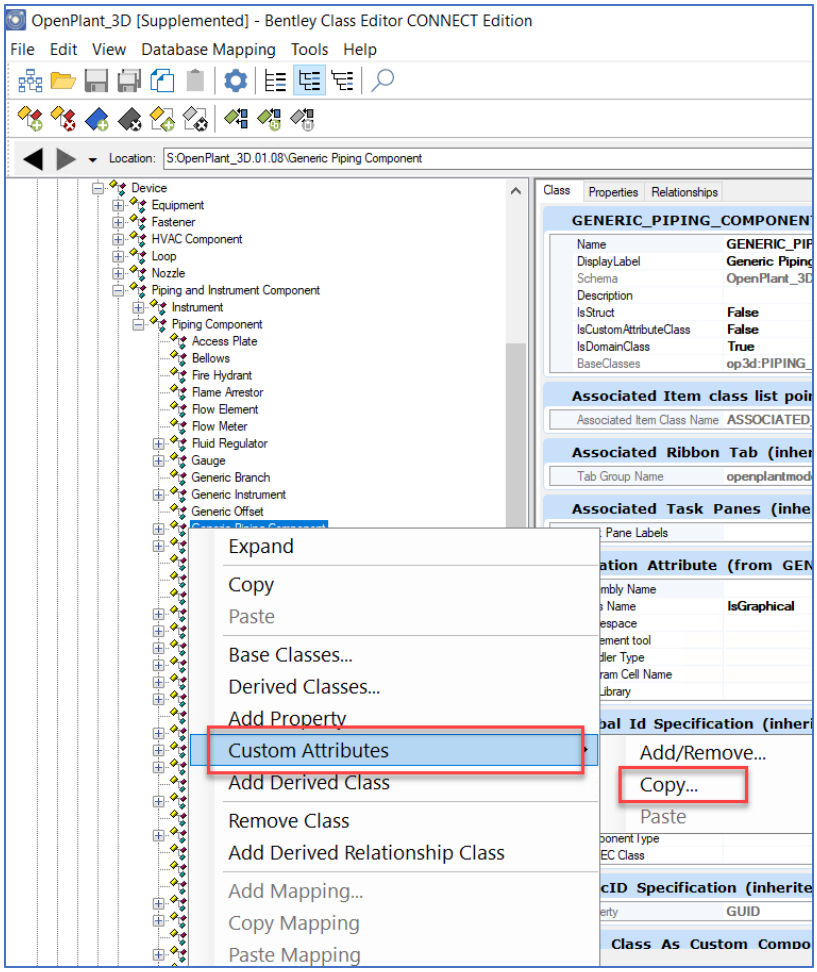


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling

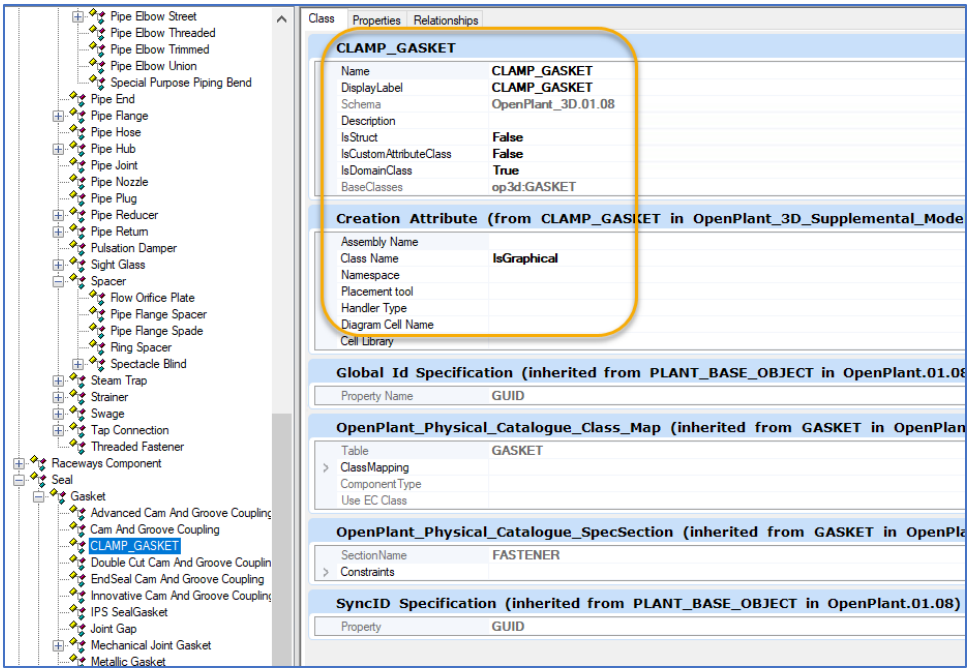


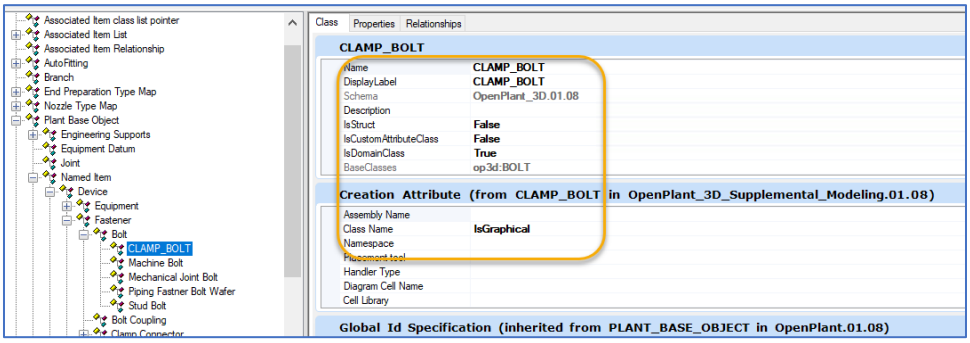
Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Navigate to ‘Plant Base Object > Named Item > Device > Piping and instrument Component > Seal >Gasket.
6. Right Click on ‘Gasket’ and select **‘Add Derived Classes’.**
7. Specify its ‘Name’ and ‘Display Label’ as ‘CLAMP_GASKET’ and “CLAMP_GASKET” respectively.
8. Navigate to ‘Plant Base Object > Named Item > Device > Fastener > Bolt
9. Right Click on ‘Bolt’ and select **‘Add Derived Classes’.**
10. Specify its ‘Name’ and ‘Display Label’ as ‘CLAMP_BOLT’ and “CLAMP_BOLT” respectively.
11. Go to the class **‘Generic Piping Component’** and Right click to copy **‘Creation Attribute’** as a **‘Custom Attributes’.**



12. Paste this ‘Creation Attribute’ into the newly created classes ‘CLAMP_GASKET’ and ‘CLAMP_BOLT’.





13. As a result, we can now incorporate ‘CLAMP_GASKET’ and ‘CLAMP_BOLT’ into the OP world.

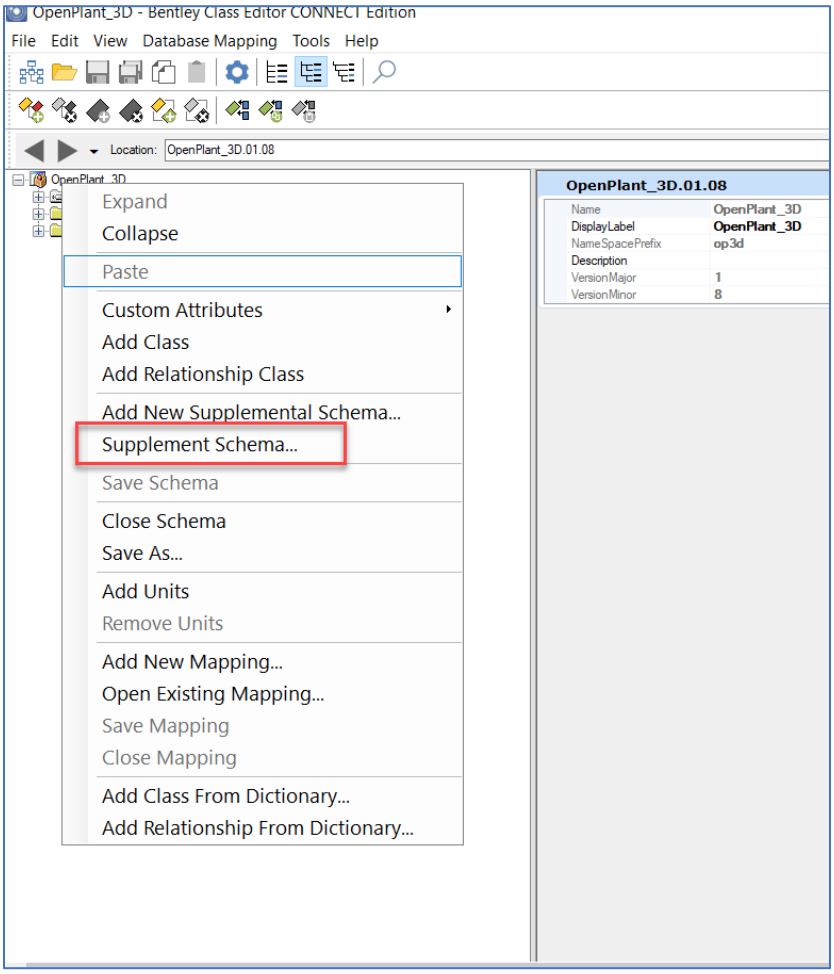
4.2.16. Introducing ‘UPDATE_GRAPHICS’ property inside ‘Fastener’ and ‘Seal’ classes:

1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\…….\Metric\Standards\OpenPlant\Schemas

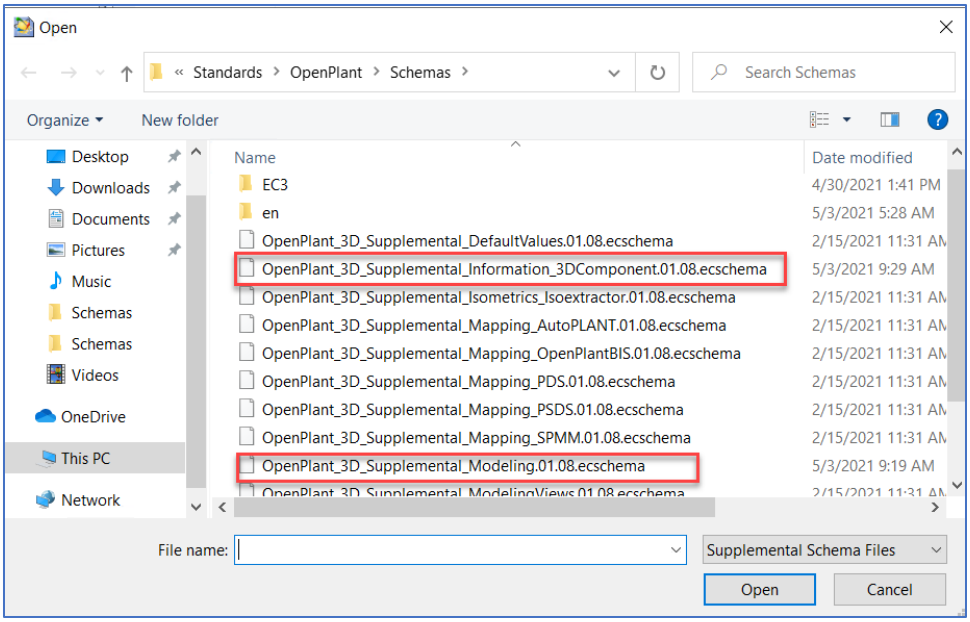
2. Load all Reference schemas from this location:

C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

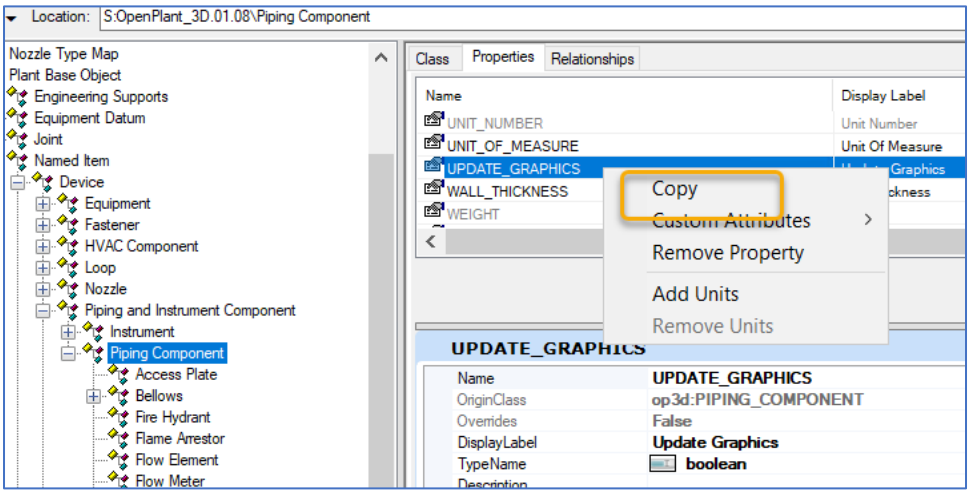


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Navigate to 'Plant Base Object > Named Item > Device > Piping and instrument Component > Piping Component
6. Copy the 'Update_Graphics' property from the 'Property' tab.



7. Paste this property to the 'Fastener' and 'Seal' class.
8. Finally, we are now able to use 'Update_graphics' property inside all of the Derived class from 'Fastener' and 'Seal'

4.2.17. Some Corrections required inside the 'Modeler.cfg' file:

1. Launch the 'Modeler.cfg' file from the following location:

C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\AP2OP Base Metric\Standards\OpenPlant\Modeler

2. Find 'OPM_AP2OP_ALWAYS_TREAT_AS_CUSTOM_COMPONENT' inside this file.
3. Add 'MITERED_PIPE' like:

SUPPORT;**MITERED_PIPE**;INSTRUMENT;T_STRAINER;

4. Introduce a new variable inside the 'Modeler.cfg' file as

'OPM_AP2OP_POST_UPGRADE_KEYINS = mechaddin deleteemptylines PIPING_NETWORK_SYSTEM'

5. Remove the following variable from 'Modeler.cfg' file:

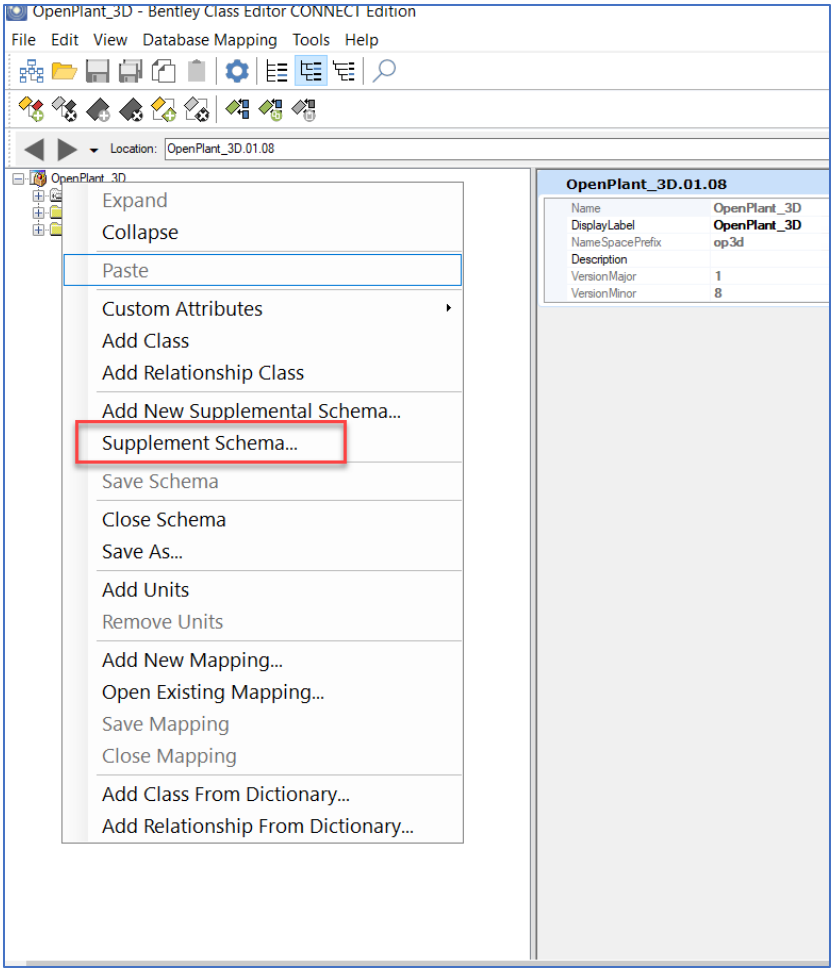
OPM_AP2OP_DISABLE_CROSS_MODEL_RELS=1

4.2.18. Fixing 'PIPE_ELBOW' Ports information:

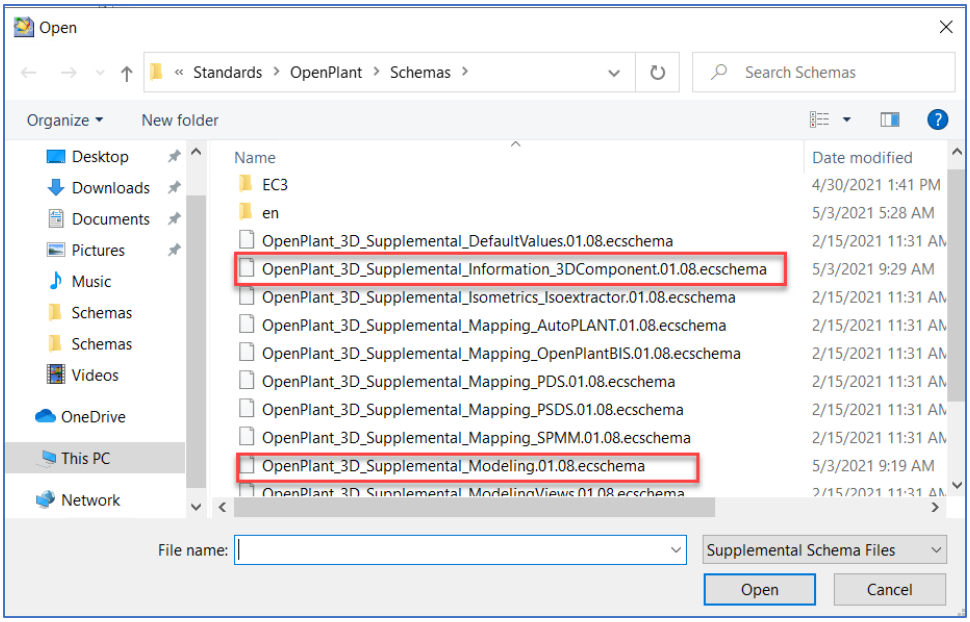
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

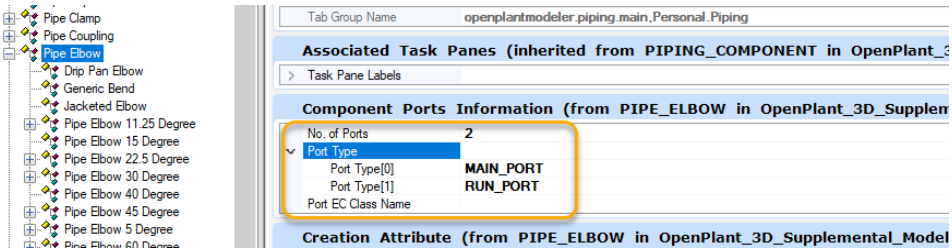


4. Add following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Search for the class ‘PIPE_ELBOW’.
6. Update the Port information to 2 –Ports.
7. Please make sure that the Two –Port types are present,
    - MAIN_PORT
    - RUN_PORT



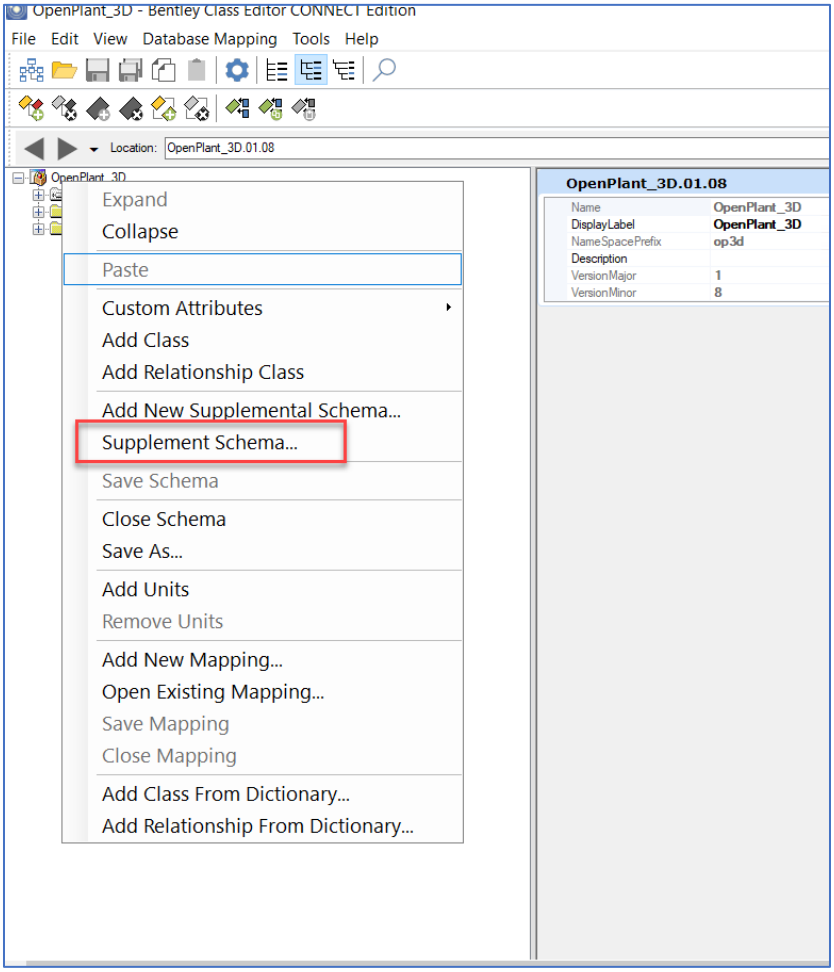
8. Save the changes to Bentley Class Editor.

4.2.19. Fixing ‘PIPE_FLANGE_SPADE’ Creation Attribute:

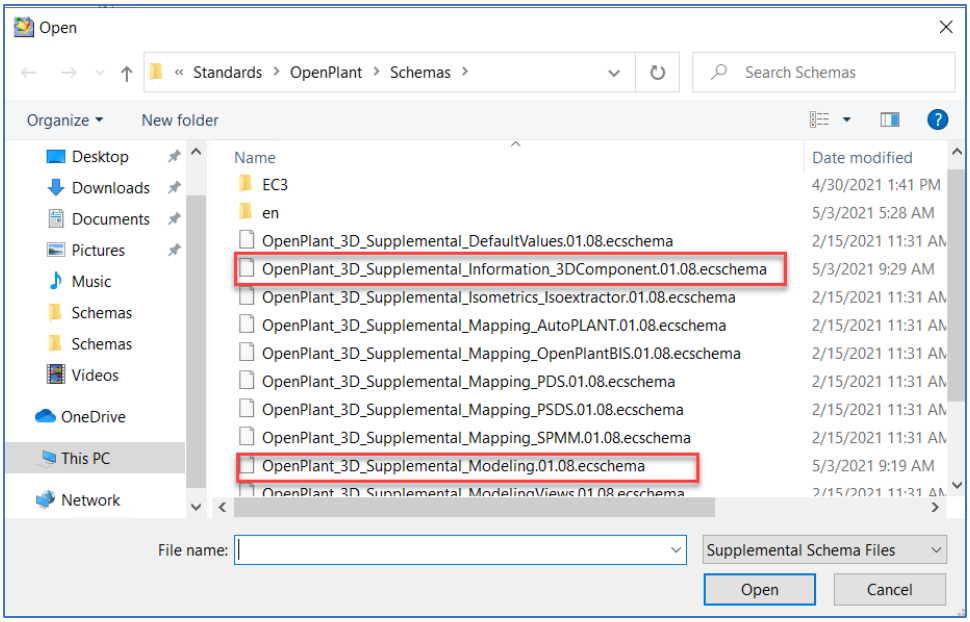
1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’

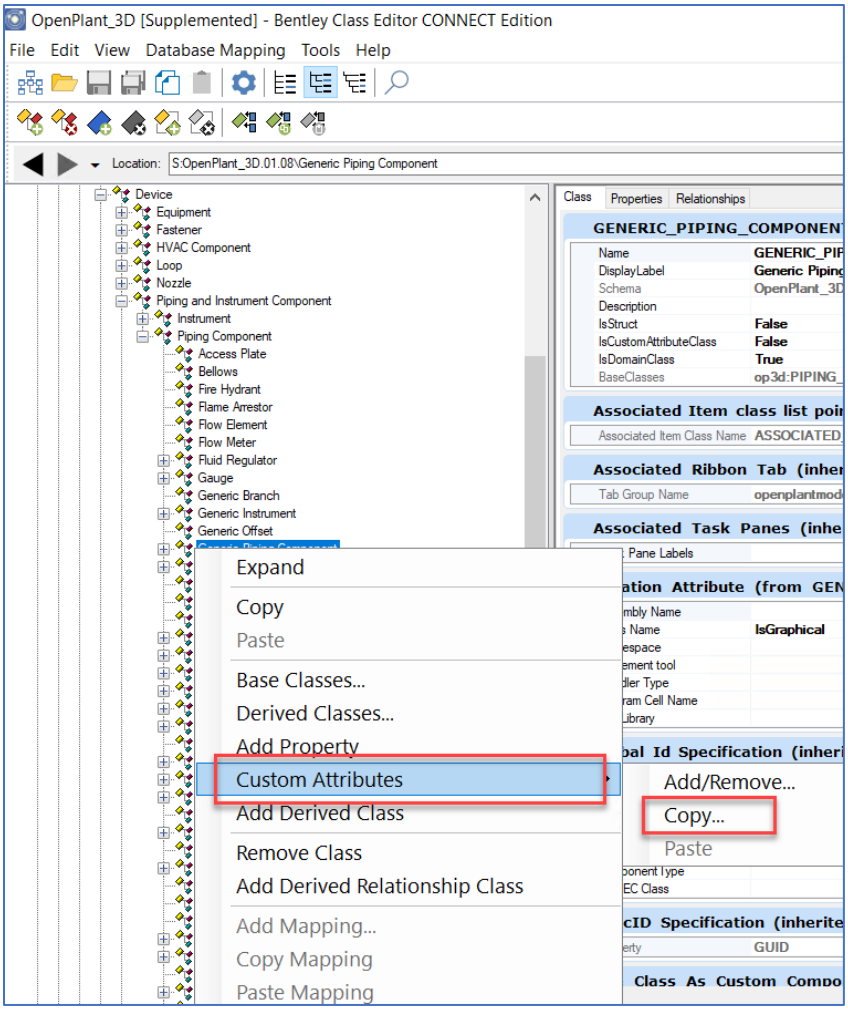


4. Add following two Supplemental schemas:
   - Supplemental_Information_3DComponent
   - Supplemental Modeling

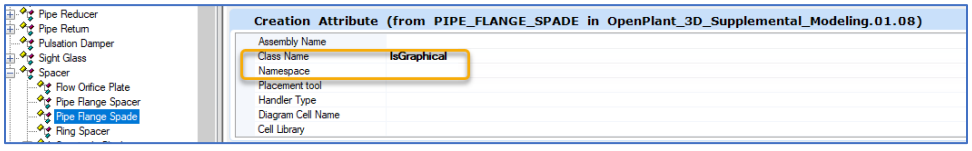


Use the same Reference schemas as used in **Step:2** and press **OK.**

5. Search for the class ‘PIPE_FLANGE_SPADE’ and select it
6. Go to the class ‘Generic Piping Component’ and Right click to copy ‘Creation Attribute’ as a ‘Custom Attributes’.



7. Paste this ‘Creation Attribute’ into the ‘PIPE_FLANGE_SPADE’ class.



9. Save the changes to Bentley Class Editor.

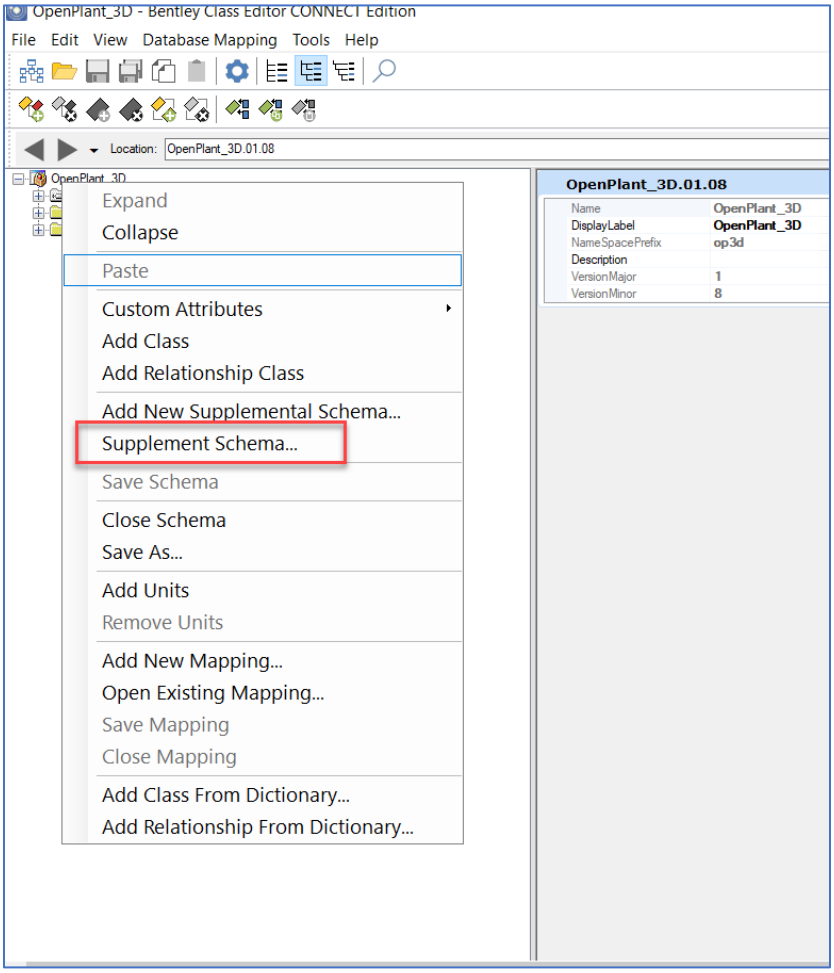
4.2.20. Fixing ‘JOINT_GAP’ BUG: 598573:

1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link

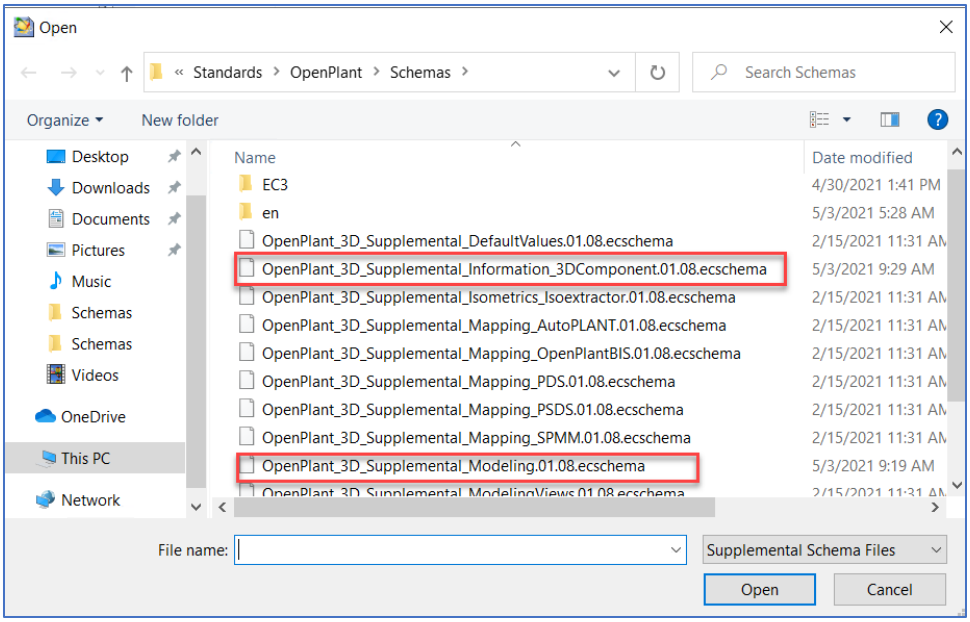
C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemas from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'

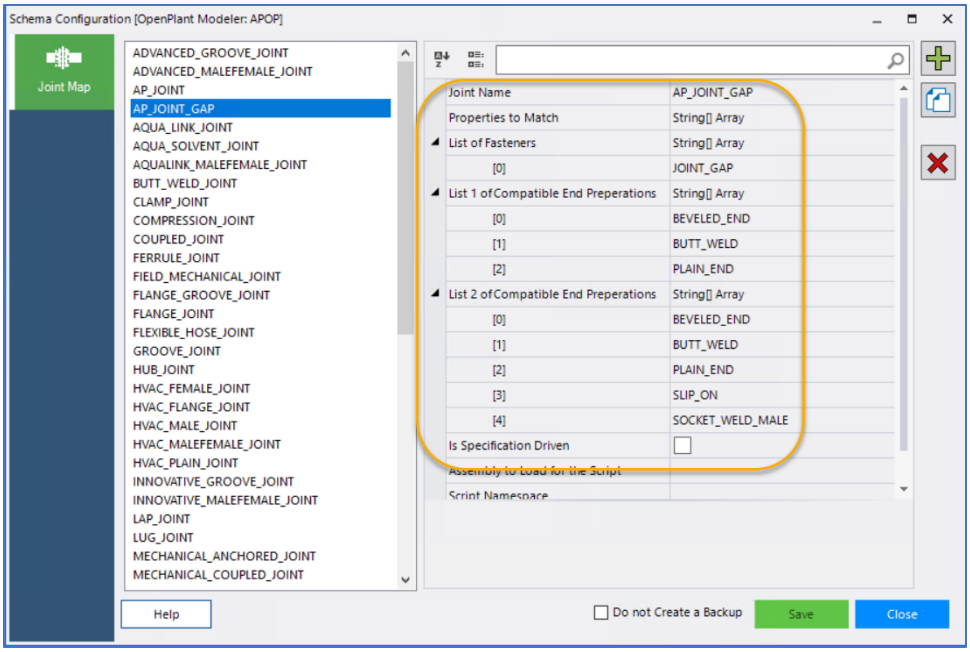


4. Add the following two Supplemental schemas:
   - Supplemental_Information_3DComponent
   - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK**

5. Search for the ‘Gasket’ Class
6. Right Click on ‘Gasket’ class and select ‘Add Derived Class’.
7. Name this newly created class as ‘JOINT_GAP’.
8. Save the changes on Bentley Class Editor.
9. Launch OPPA and navigate to the recently opened AP2OP Base Workset.
10. Navigate to the ‘Joint Map’ option inside the ‘Settings’ tab.
11. Create a new joint named ‘AP_JOINT_GAP’ with details as follows:



12. Save the changes in OPPA

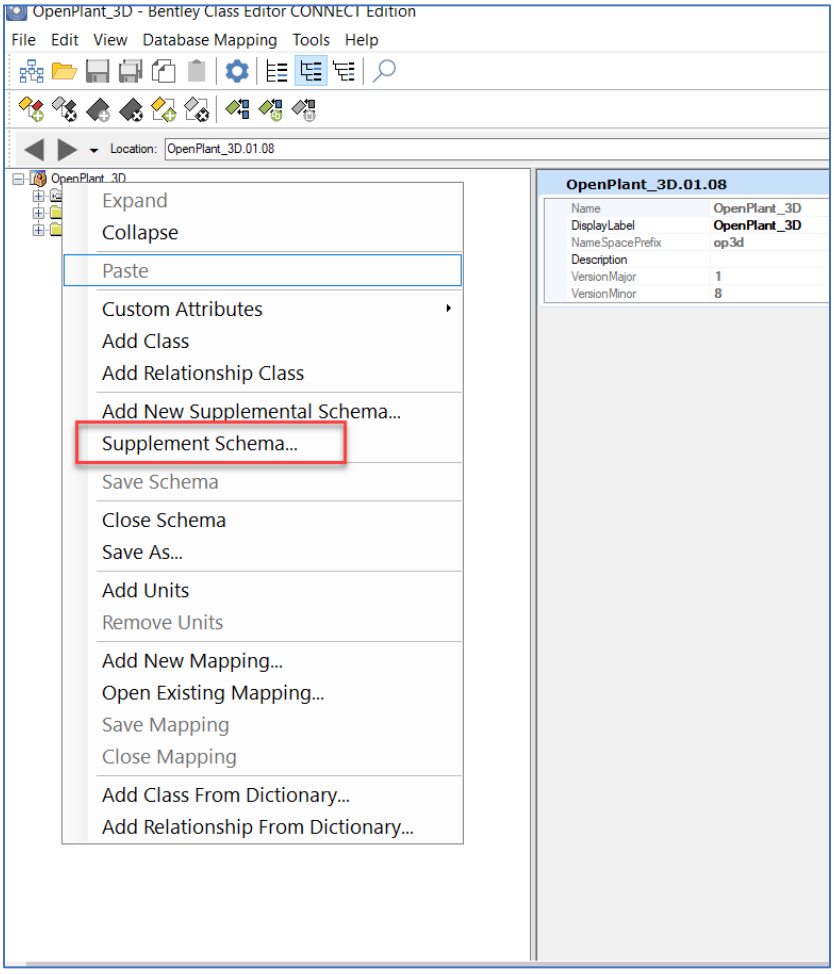
13. Now we have successfully incorporated ‘JOINT_GAP’ inside the AP2OP workflow.

4.2.21. Incorporating ‘Equipment’ from APM inside the AP2OP Schemas

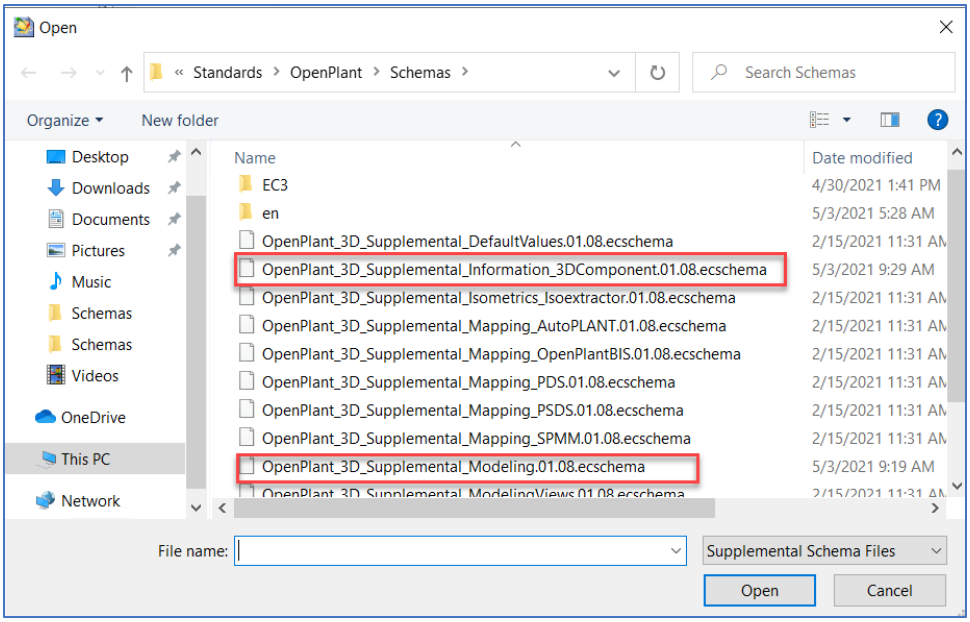
1. Launch ‘Bentley Class Editor’ and Open **‘OpenPlant_3D.01.08.ecschema’** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemes from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on ‘OpenPlant 3D’ schema and select ‘Supplement Schema.’



4. Add the following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



Use the same Reference schemas as used in **Step:2** and press **OK**

5. To incorporate diverse varieties of Equipment from APM, we need to add new classes for them inside the AP2OP Schema.

Classes can be added by selecting '**Add Derived Class'** from the **right click context menu** of the **parent class**

Parent Class	**Derived Class**	**Description**	**Display - Label**
EQUIPMENT	APEQPPRIM	AutoPLANT equipment primitives	AP Equipment Primitives
APEQPPRIM	APEQPPRIM_CYL	AutoPLANT equipment primitives - cylinders	Cylinders
APEQPPRIM	APEQPPRIM_CON	AutoPLANT equipment primitives - cones	Cones
APEQPPRIM	APEQPPRIM_RECT	AutoPLANT equipment primitives - rectangular solid	Rectangular Solids
EQUIPMENT	APASSOCPRIM	AutoPLANT assosiative primitives	AP Associative Primitives
EQUIPMENT	APSPECREAC	AutoPLANT assosiative primitives	AP Spec Reactors
APASSOCPRIM	APASSOCPRIM_CYL	AutoPLANT assosiative primitives - cylinders	Cylinders
APASSOCPRIM	APASSOCPRIM_CON	AutoPLANT assosiative primitives - cones	Cones

APASSOCPRIM	APASSOCPRIM_HEAD	AutoPLANT assosiative primitives - heads	Heads
EQUIPMENT	APSTRUCT	AutoPLANT structures	AP Structures
EQUIPMENT	APTRANSCMP	AutoPLANT structures - Transition Components	AP Transition Components
EQUIPMENT	APMATHANDLING	AutoPLANT structures - Material Handling	Material Handling
EQUIPMENT	APUNDEGREQP	AutoPLANT structures - Undeground Equipment	AP Underground Equipment
APSTRUCT	APLADDERS	AutoPLANT structures - Ladders	Ladders
APSTRUCT	APRECTPLATF	AutoPLANT structures - Rectangular Platform	Rectangular Platform
APSTRUCT	APDAVIT	AutoPLANT structures - davits	Davits
APDAVIT	APRADDAVIT	AutoPLANT structures - radial davits	Radial Davits

6. Then Add Sub Classes inside the following previously derived classes:

Parent Class	**Derived Class**	**Description**	**Display - Label**
APASSOCPRIM_CYL	PRRELCYL_AP	Attached Axial Cylinder	Attached Axial Cylinder
APASSOCPRIM_CYL	PRRADCYL_AP	Attached Radial Cylinder	Attached Radial Cylinder
APASSOCPRIM_CYL	PRTANCYL_AP	Attached Tangential Cylinder	Attached Tangential Cylinder
APASSOCPRIM_CYL	PRRELBDYFLNG_AP	Body Flange	Body Flange
APASSOCPRIM_CYL	RELHORCYL_AP	Attached Horizontal Cylinder	Attached Horizontal Cylinder
APASSOCPRIM_CYL	RELVERCYL_AP	Attached Vertical Cylinder	Attached Vertical Cylinder
APASSOCPRIM_CYL	PROTHCYL_AP	Attached Skewed Cylinder	Attached Skewed Cylinder
APASSOCPRIM_CON	PRRELCON_AP	Attached Axial Cone	Attached Axial Cone
APASSOCPRIM_CON	ASSOCOFFCONE_AP	Attached OffsetAxial Cone	Attached OffsetAxial Cone
APASSOCPRIM_CON	PRRELTORICON_AP	Attached Axial Tori-Conical	Attached Axial Tori-Conical
APASSOCPRIM_CON	PRRADCON_AP	Attached Radial Cone	Attached Radial Cone
APASSOCPRIM	PRSPHERE_AP	Sphere	Sphere
APASSOCPRIM	RECTEQ_AP	Associative Rectangle	Associative Rectangle

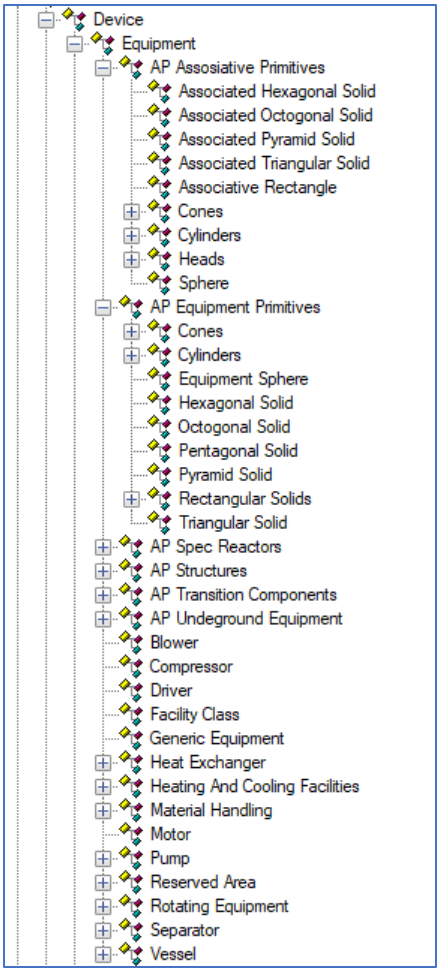
APASSOCPRIM_HEAD	PRRELHEMIHD_AP	Hemi-Spherical Head	Hemi-Spherical Head
APASSOCPRIM_HEAD	PRRELASMEHD_AP	Semi-Elliptical (2:1) Head	Semi-Elliptical (2:1) Head
APASSOCPRIM_HEAD	PRRELELHD_AP	Elliptical Head	Elliptical Head
APASSOCPRIM_HEAD	PRRELNUKLHD_AP	Tori-Spherical Head	Tori-Spherical Head
APASSOCPRIM_HEAD	PRRELTCONEHD_AP	Tori-Conical Head	Tori-Conical Head
APASSOCPRIM_HEAD	PRRELASMEFDHD_AP	ASME Flanged and Dished Head	ASME Flanged and Dished Head
APASSOCPRIM	ASSOCOCT_AP	Associated Octagonal Solid	Associated Octagonal Solid
APASSOCPRIM	ASSOCHEX_AP	Associated Hexagonal Solid	Associated Hexagonal Solid
APASSOCPRIM	ASSOCTRI_AP	Associated Triangular Solid	Associated Triangular Solid
APASSOCPRIM	ASSOCPYR_AP	Associated Pyramid Solid	Associated Pyramid Solid
APEQPPRIM_CYL	PRHORCYL_AP	Horizontal Cylinder	Horizontal Cylinder
APEQPPRIM_CYL	PRVERCYL_AP	Vertical Cylinder	Vertical Cylinder
APEQPPRIM_CYL	OTHERCYL_AP	Cylinder other orientation	Skewed Cylinder
APEQPPRIM_CON	PRHORCON_AP	Horizontal Cone	Horizontal Cone
APEQPPRIM_CON	PRVERCON_AP	Vertical Cone	Vertical Cone
APEQPPRIM_CON	PRHSETCONE_AP	Offset Horizontal Cone	Offset Horizontal Cone
APEQPPRIM_CON	PROFFSETCONE_AP	Offset Vertical Cone	Offset Vertical Cone
APEQPPRIM_RECT	PRHORRECT_AP	Horizontal Rectangle	Horizontal Rectangle
APEQPPRIM_RECT	PRVERRECT_AP	Vertical Rectangle	Vertical Rectangle
APEQPPRIM	PRSPHEREE_AP	Equipment Sphere	Equipment Sphere
APEQPPRIM	PROCTSOL_AP	Octagonal Solid	Octagonal Solid
APEQPPRIM	PRHEXSOL_AP	Hexagonal Solid	Hexagonal Solid
APEQPPRIM	PRPENTSOL_AP	Pentagonal Solid	Pentagonal Solid
APEQPPRIM	PRTRISOL_AP	Triangular Solid	Triangular Solid
APEQPPRIM	PRPYRSOL_AP	Pyramid Solid	Pyramid Solid
HEAT_EXCHANGER	FINFAN_AP	Air Cooled Heat Exchanger	Air Cooled Heat Exchanger
PLATE_TYPE_HEAT_EXCHANGER	PLTEXCH_AP	Plate Exchanger	Plate Exchanger
DOUBLE_PIPE_HEAT_EXCHANGER	EXDBLPIP_AP	Double Pipe Exchanger	Double Pipe Exchanger
HEAT_EXCHANGER	EXVERTUP_AP	Vertical Up Heat Exchanger	Vertical Up Heat Exchanger
HEAT_EXCHANGER	EXVERTDN_AP	Vertical Down	Vertical Down Heat Exchanger
HEAT_EXCHANGER	EXSURFCOND_AP	Surface Condenser	Surface Condenser

HEAT_EXCHANGER	EXBRCHLCK_AP	Horizontal Breech Lock Exchanger	Horizontal Breech Lock Exchanger
COOLER	LFINFAN_AP	Louvered Fin Fan Air-Cooler Exchanger	Louvered
APLADDERS	STRLDDRREC_AP	Ladder On Rectangular Shapes	On Rectangular Shapes
HEATING_AND_COOLING_FACILITIES	HEATCYL_AP	Cylindrical Heater	Cylindrical Heater
HEATING_AND_COOLING_FACILITIES	HEATBOX_AP	Box Heater	Boxed Heater
APMATHANDLING	CASCADEMAGNET_AP	Cascade Magnet	Cascade Magnet
APMATHANDLING	BUCKETELEVATOR_AP	Bucket Elevator	Bucket Elevator
APMATHANDLING	FLIGHTCONVEYOR_AP	Flight Conveyor	Flight Conveyor
SKID_PUMP	PMP_HSC_AP	Horizontal Split-case Pump	Horizontal Split-case Pump
SKID_PUMP	PMP_HSCG_AP	Horizontal Split Case with Gear Pump	Horizontal Split Case with Gear Pump
CENTRIFUGAL_PUMP	TURBINE_C_AP	Turbine Centrifugal Pump	Turbine Centrifugal Pump
CENTRIFUGAL_PUMP	TURBINE_S_AP	Turbine Split Case Pump	Turbine Split Case Pump
PUMP	PMPCAN_AP	Can Pump	Can Pump
VINLINE_PUMP	PMPVIN_AP	Vertical Inline Pump	Vertical Inline Pump
PUMP	PMPSSUMP_AP	Simplex Sump Pump	Simplex Sump Pump
CENTRIFUGAL_PUMP	PMPWASTM_AP	AP Centrifugal Pump	AP Centrifugal Pump
PUMP	PMPPROP_AP	Propeller Pump	Propeller Pump
PUMP	PMPMIX_AP	Mixed Flow Pump	Mixed Flow Pump
PUMP	PUMPHOSE_AP	Hose Pump	Hose Pump
PUMP	PUMPCHMMET_AP	Metering Pump	Metering Pump
CENTRIFUGAL_PUMP	PMPSPC_AP	Spec Centrifugal Pump	Spec Centrifugal Pump
CENTRIFUGAL_PUMP	WPUMPC_AP	Waukesha C-Series Centrifugal Pump	Waukesha C-Series Centrifugal Pump
CENTRIFUGAL_PUMP	WPUMP200_AP	Waukesha Pump 200 Series	Waukesha Pump 200 Series
VERTICAL_PUMP	PUMPVMF_AP	Vertical Mixed Flow and Axial Flow Pump (VMF/VAF)	VMF Pump

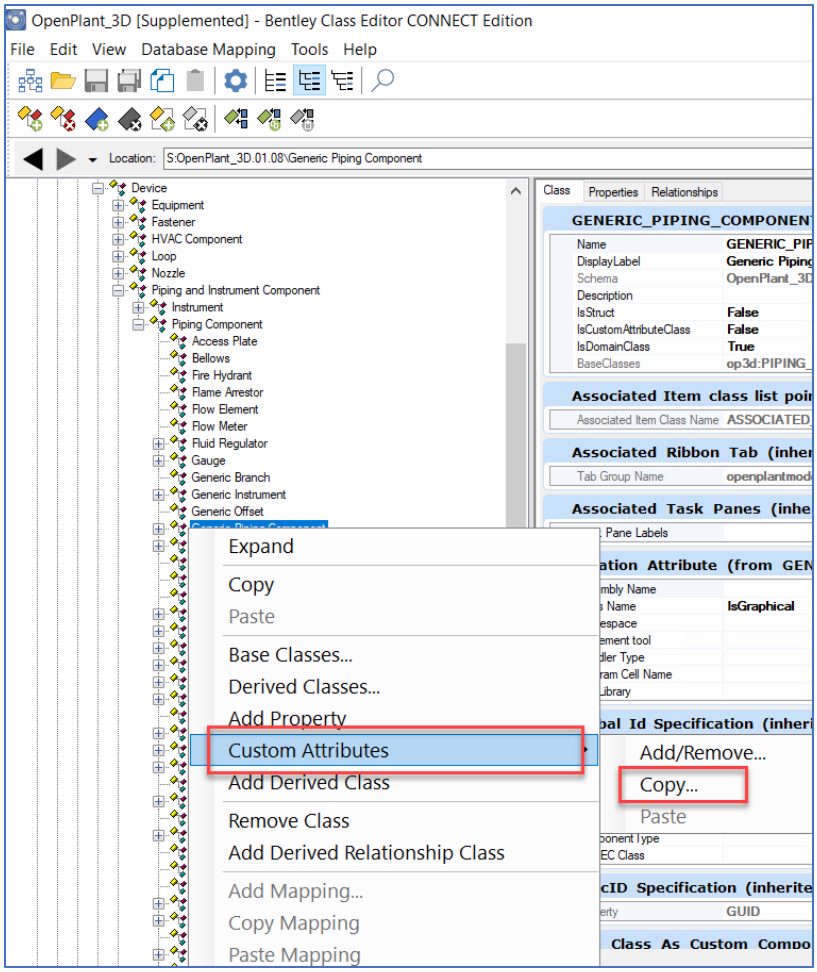
VERTICAL_PUMP	VMOTORPUMP_AP	Vertical mounted motor pump	Vertical mounted motor pump
SKID_PUMP	HMOTORPUMP_AP	Horizontal mounted motor pump	Horizontal mounted motor pump
APSPECREAC	RA45REACTOR_AP	RA Series Reactor	RA Series Reactor
APSPECREAC	RT14REACTOR_AP	RT Series Reactor	RT Series Reactor
STORAGE_TANK	STGTNKSF_AP	Storage Tank with a Sloped Foundation	Storage Tank with a Sloped Foundation
STORAGE_TANK	STGTNKRF_AP	Storage Tank with a Ring Foundation	Storage Tank with a Ring Foundation
STORAGE_TANK	STGTNKOF_AP	Storage Tank with an Octagonal Foundation	Storage Tank with an Octagonal Foundation
APTRANSCMP	PRRELRND2RND_AP	Round To Round Transition	Round To Round Transition
APTRANSCMP	PRRELSQ2RND_AP	Square To Round Transition	Square To Round Transition
APTRANSCMP	PRRELSQ2SQ_AP	Square To Square Transition	Square To Square Transition
APDAVIT	DAVITEQAX_AP	Axial Davit	Axial Davit
APRADDAVIT	DAVITEQRAS_AP	Radial Davit (Standard)	Radial Davit (Standard)
APRADDAVIT	DAVITEQRAP_AP	Radial Davit (Projection)	Radial Davit (Projection)
APRADDAVIT	DAVITNZRA_AP	Radial Davit on Nozzle	Radial Davit On Nozzle
APSTRUCT	VERTDOOR_AP	Vertical Vessel Manway Door	Vertical Vessel Manway Door
APSTRUCT	PRRELBDYRING_AP	Body Ring	Body Ring
APUNDEGREQP	POSTINDCTR_AP	Post Indicator	Post Indicator
APUNDEGREQP	HYDRNT_AP	Water Hydrant	Water Hydrant
APUNDEGREQP	HYDMNTR_AP	Water Hydrant w/ Monitor	Water Hydrant w/ Monitor
APUNDEGREQP	ELEVMNTR_AP	Elevated Monitor	Elevated Monitor
APSPECREAC	HORIZREACTOR_AP	Horizontal Reactor	Horizontal Reactor
HORIZONTAL_VESSEL	HORZVAP_AP	Vapor Column On Horizontal Vessel	Vapor Column On Horizontal Vessel
HORIZONTAL_VESSEL	HORZBOOT_AP	Boot on Horizontal Vessel	Boot on Horizontal Vessel
HORIZONTAL_VESSEL	HORIZCLIPS_AP	Horizontal Vessel Clips	Horizontal Vessel Clips
VERTICAL_VESSEL	VERTLEG_AP	Vertical Vessel Legs	Vertical Vessel Legs
VERTICAL_VESSEL	VERTANGLELEG_AP	Vertical Vessel Angle Legs	Vertical Vessel Angle Legs

VERTICAL_VESSEL	VERTCLIPS_AP	Vertical Vessel Clips	Vertical Vessel Clips
VERTICAL_VESSEL	VERTLUG_AP	Vertical Vessel Lugs	Vertical Vessel Lugs
APLADDERS	STRLDDRH_AP	Ladder On Horizontal Vessel	Ladder On Horizontal Vessel
APLADDERS	STRLDDRV_AP	Ladder On Vertical Vessel	Ladder On Vertical Vessel
APLADDERS	STRLDDRS_AP	Spiral Ladder On Vertical Vessel	Spiral Ladder On Vertical Vessel
APRECTPLATF	STRPLTRH_AP	Rectangular Platform On Horizontal Vessel	Rectangular Platform On Horizontal Vessel
APSTRUCT	STRPLTC_AP	Circular Platform On Vertical Vessel	Circular Platform On Vertical Vessel
APRECTPLATF	STRPLTRV_AP	Rectangular Platform On Vertical Vessel	Rectangular Platform On Vertical Vessel
VERTICAL_PUMP	PUMPVIS_AP	Vertical Industrial Submersible Pump (VIS)	VIS Pump
VERTICAL_PUMP	PUMPVIT_AP	Vertical Inline Turbine Pump	Vertical Inline Turbine Pump
VERTICAL_PUMP	PUMPVMP_AP	Vertical Marine Pump (VMP)	VMP Pump
VERTICAL_PUMP	PUMPVIC_AP	Vertical Industrial Can Type Pump (VIC)	VIC Pump

7. In the end the Equipment would look like this:



8. Go to the class **'Generic Piping Component'** and right click to copy **'Creation Attribute'** as a **'Custom Attributes'.**



9. Paste this ‘Creation Attribute’ to the following classes one by one.

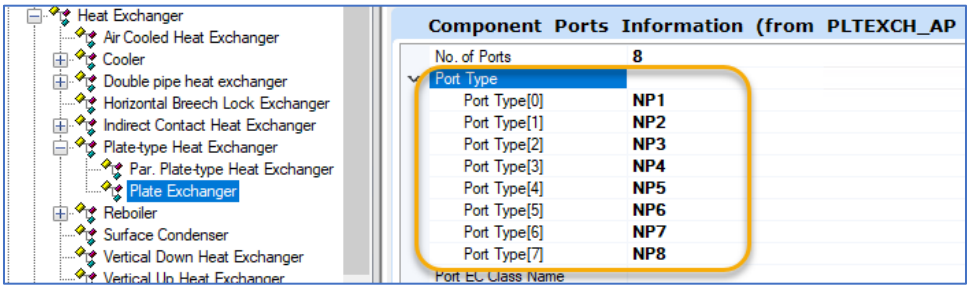
Class name	Display-Label
PRRELCYL_AP	Attached Axial Cylinder
PRRADCYL_AP	Attached Radial Cylinder
PRTANCYL_AP	Attached Tangential Cylinder
PRRELBDYFLNG_AP	Body Flange
RELHORCYL_AP	Attached Horizontal Cylinder
RELVERCYL_AP	Attached Vertical Cylinder
PRRELCON_AP	Attached Axial Cone
ASSOCOFFCONE_AP	Attached OffsetAxial Cone
PRRELTORICON_AP	Attached Axial Tori-Conical
PRRADCON_AP	Attached Radial Cone
PRSPHERE_AP	Sphere
RECTEQ_AP	Associative Rectangle
PRRELHEMIHD_AP	Hemi-Spherical Head
PRRELASMEHD_AP	Semi-Elliptical (2:1) Head
PRRELELHD_AP	Elliptical Head
PRRELNUKLHD_AP	Tori-Spherical Head

PRRELTCONEHD_AP	Tori-Conical Head
PRRELASMEFDHD_AP	ASME Flanged and Dished Head
ASSOCOCT_AP	Associated Octogonal Solid
ASSOCHEX_AP	Associated Hexagonal Solid
ASSOCTRI_AP	Associated Triangular Solid
ASSOCPYR_AP	Associated Pyramid Solid
PRHORCYL_AP	Horizontal Cylinder
PRVERCYL_AP	Vertical Cylinder
PRHORCON_AP	Horizontal Cone
PRVERCON_AP	Vertical Cone
PRHSETCONE_AP	Offset Horizontal Cone
PROFFSETCONE_AP	Offset Vertical Cone
PRHORRECT_AP	Horizontal Rectangle
PRVERRECT_AP	Vertical Rectangle
PRSPHEREE_AP	Equipment Sphere
PROCTSOL_AP	Octogonal Solid
PRHEXSOL_AP	Hexagonal Solid
PRPENTSOL_AP	Pentagonal Solid
PRTRISOL_AP	Triangular Solid
PRPYRSOL_AP	Pyramid Solid
FINFAN_AP	Louvered Air Cooled Heat Exchanger
EXDBLPIP_AP	Double Pipe Exchanger
EXVERTUP_AP	Vertical Up Heat Exchanger
EXVERTDN_AP	Vertical Down Heat Exchanger
EXSURFCOND_AP	Surface Condenser
EXBRCHLCK_AP	Horizontal Breech Lock Exchanger
LFINFAN_AP	Louvered Air Cooled Heat Exchanger
STRLDDRREC_AP	Ladder On Rectangular Shapes
HEATCYL_AP	Cylindrical Heater
HEATBOX_AP	Box Heater
CASCADEMAGNET_AP	Cascade Magnet
BUCKETELEVATOR_AP	Bucket Elevator
FLIGHTCONVEYOR_AP	Flight Conveyor
PMP_HSC_AP	Horizontal Split-case Pump
PMP_HSCG_AP	Horizontal Split Case with Gear Pump
TURBINE_C_AP	Turbine Centrifugal Pump
TURBINE_S_AP	Turbine Split Case Pump
PMPCAN_AP	Can Pump
PMPVIN_AP	Vertical Inline Pump
PMPSSUMP_AP	Simplex Sump Pump
PMPWASTM_AP	Centrifugal Pump
PMPPROP_AP	Propeller Pump
PMPMIX_AP	Mixed Flow Pump

PUMPHOSE_AP	Hose Pump
PUMPCHMMET_AP	Metering Pump
PMPSPC_AP	Spec Horizontal Pump
WPUMPC_AP	Waukesha C-Series Centrifugal Pump
WPUMP200_AP	Waukesha Pump 200 Series
PUMPVMF_AP	Vertical Mixed Flow and Axial Flow Pump (VMF/VAF)
VMOTORPUMP_AP	Vertical Reciprocating Multiplex Pump
HMOTORPUMP_AP	Horizontal Reciprocating Multiplex Pump
RA45REACTOR_AP	RA Series Reactor
RT14REACTOR_AP	RT Series Reactor
STGTNKSF_AP	Storage Tank with a Sloped Foundation
STGTNKRF_AP	Storage Tank with a Ring Foundation
STGTNKOF_AP	Storage Tank with an Octogonal Foundation
PRRELRND2RND_AP	Round To Round Transition
PRRELSQ2RND_AP	Square To Round Transition
PRRELSQ2SQ_AP	Square To Square Transition
DAVITEQAX_AP	Axial Davit
DAVITEQRAS_AP	Radial Davit (Standard)
DAVITEQRAP_AP	Radial Davit (Projection)
DAVITNZRA_AP	Radial Davit on Nozzle
VERTDOOR_AP	Vertical Vessel Manway Door
PRRELBDYRING_AP	Body Ring
POSTINDCTR_AP	Post Indicator
HYDRNT_AP	Water Hydrant
HYDMNTR_AP	Water Hydrant w/ Monitor
ELEVMNTR_AP	Elevated Monitor
HORIZREACTOR_AP	Horizontal Reactor
HORZVAP_AP	Vapor Column On Horizontal Vessel
HORZBOOT_AP	HORZBOOT_AP
HORIZCLIPS_AP	Horizontal Vessel Clips
VERTLEG_AP	Vertical Vessel Legs
VERTANGLELEG_AP	Vertical Vessel Legs
VERTCLIPS_AP	Vertical Vessel Clips
VERTLUG_AP	Vertical Vessel Lugs
STRLDDRH_AP	Ladder On Horizontal Vessel
STRLDDRV_AP	Ladder On Vertical Vessel
STRLDDRS_AP	Ladder On Vertical Vessel
STRPLTRH_AP	Rectangular Platform On Horizontal Vessel
STRPLTC_AP	Circular Platform On Vertical Vessel
STRPLTRV_AP	Rectangular Platform On Vertical Vessel
PUMPVIS_AP	Vertical Industrial Submersible Pump (VIS)
PUMPVIT_AP	Vertical Inline Turbine Pump
PUMPVMP_AP	Vertical Marine Pump (VMP)

PUMPVIC_AP	Vertical Industrial Can Type Pump (VIC)
PROTHCYL_AP	Attached Skewed Cylinder
PLTEXCH_AP	Plate Exchanger

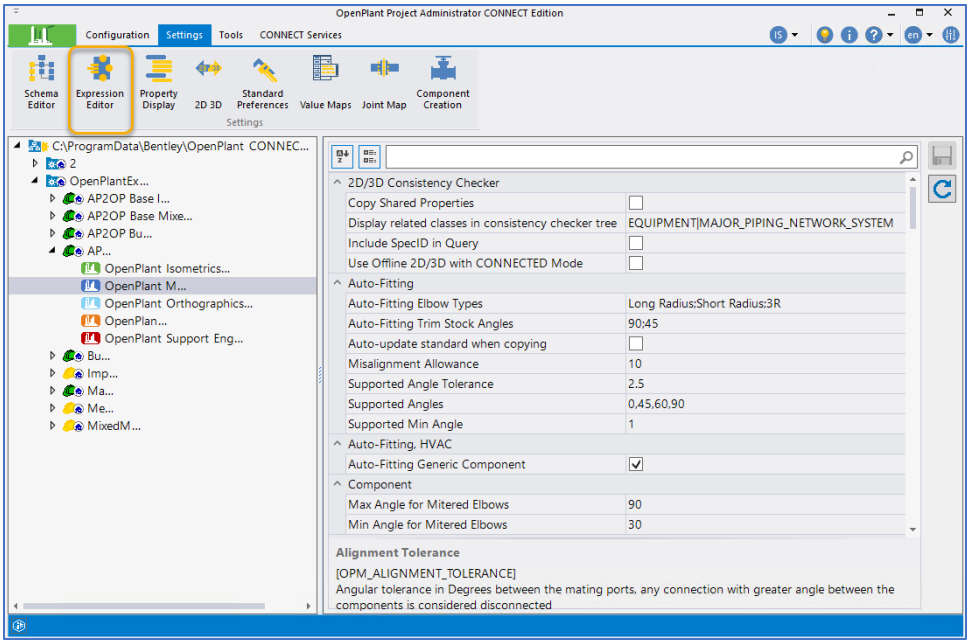
10. Now copy the '**Component Port Information'** from **GENERIC_PIPING_COMPONENT_TWO_PORT.**
11. Paste it into the following classes:
    a. PUMPVIC_AP with display Label="Vertical Industrial Can Type Pummp (VIC)"
    b. PUMPVIS_AP with display Label="Vertical Industrial Submersible Pump (VIS)"
    c. PUMPVIT_AP with display Label="Vertical Inline Turbine Pump"
    d. PUMPVMP_AP with display Label="Vertical Marine Pump (VMP)"
12. Edit the No.of Ports from **2** to **1**.
13. Delete the 'Run_Port' from 'Port Type'.
14. Navigate to the 'Plate Exchanger'.
15. Create 8 Ports, in the following order:



16. As a result, we can now incorporate all Equipment from AP world into the OP world.

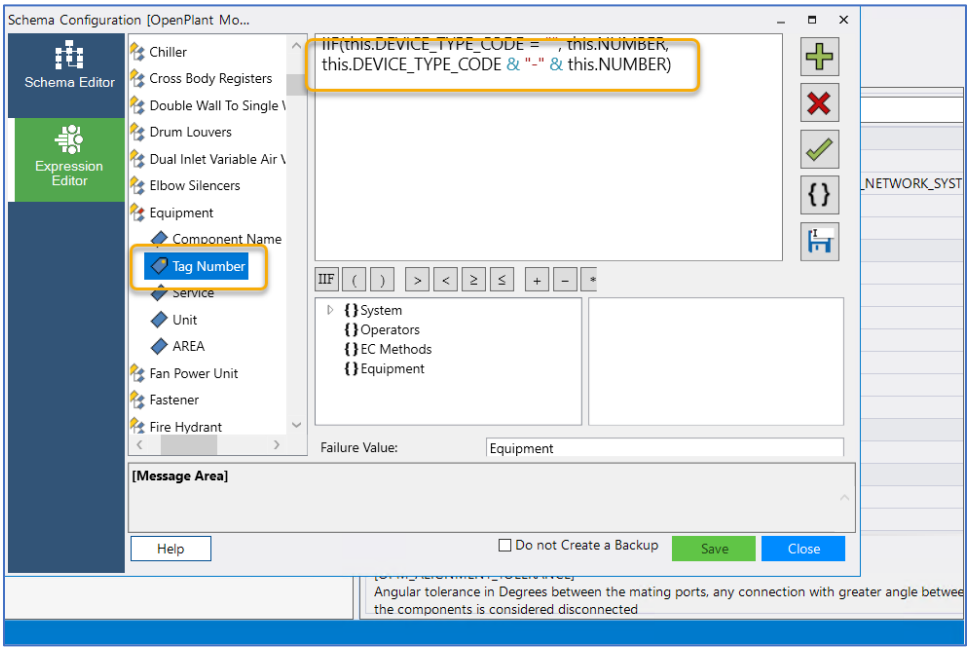
4.2.22. Solving the Hyphen (-) issue for Equipments by configuring AP2OP Schemas

1. Launch OPPA and Navigate to the latest AP2OP Workset.
2. From the Drop-down select the 'OpenPLANT Modeler'
3. Then within the 'Settings' tab, select 'Expression Editor' as shown in the below image:



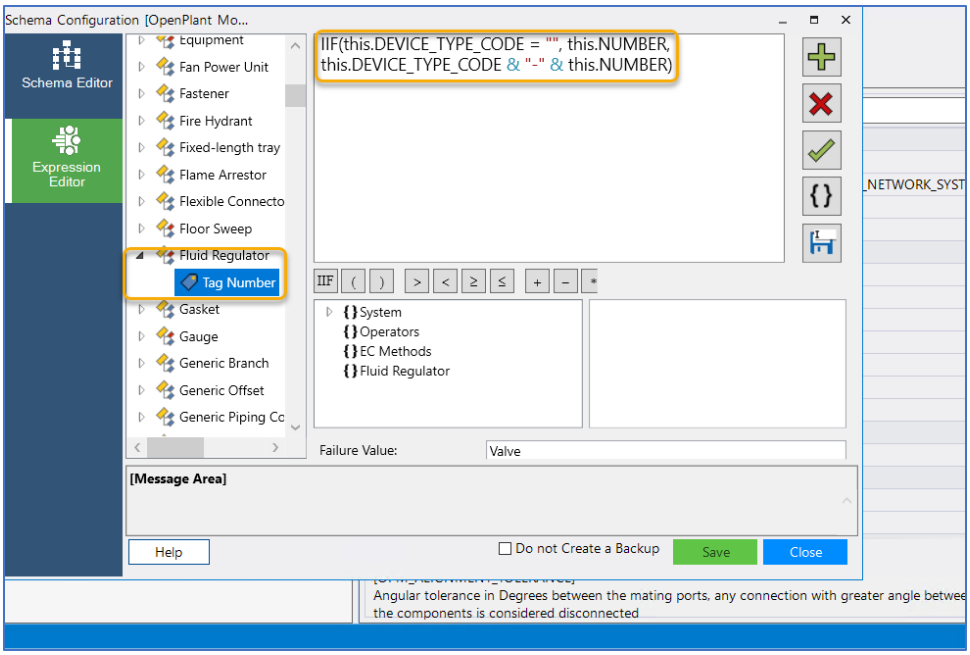
4. Navigate to the **'Equipment**' Class and select the 'Tag Number'.
5. Enter the following values in the empty field as shown in the image below:

IIF(this.DEVICE_TYPE_CODE = "", this.NUMBER, this.DEVICE_TYPE_CODE & "-" & this.NUMBER)



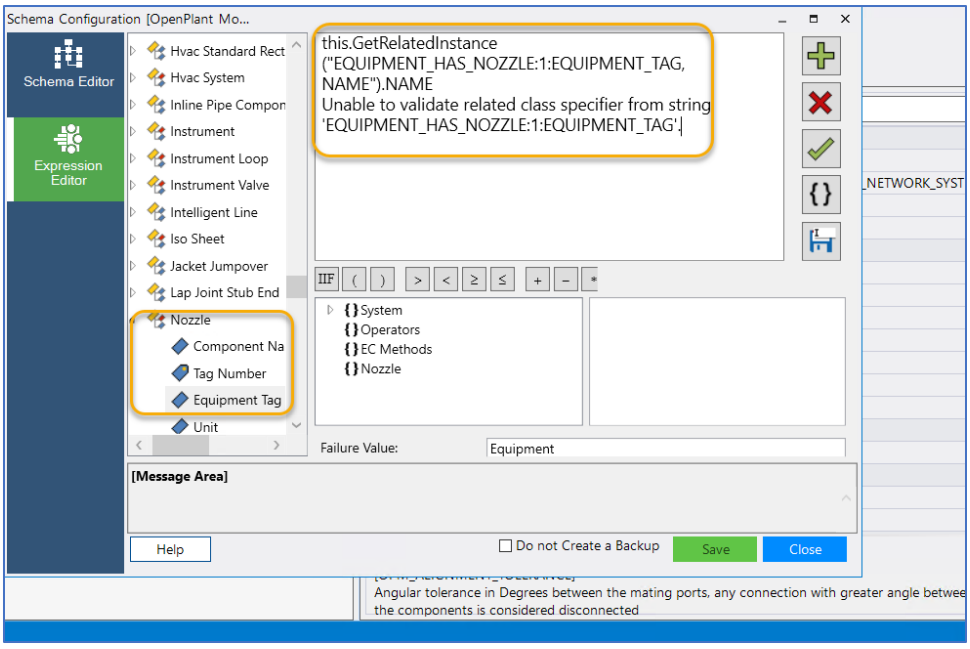
6. Save the changes.
7. Navigate to the **'Fluid Regulator**' Class and select the 'Tag Number'.
8. Enter the following values in the empty field as shown in the image below:

IIF(this.DEVICE_TYPE_CODE = "", this.NUMBER, this.DEVICE_TYPE_CODE & "-" & this.NUMBER)



9. Save the changes.
10. Navigate to the **'Nozzle'** Class and select the 'Equipment_tag'.
11. Enter the following values in the empty field as shown in the image below:

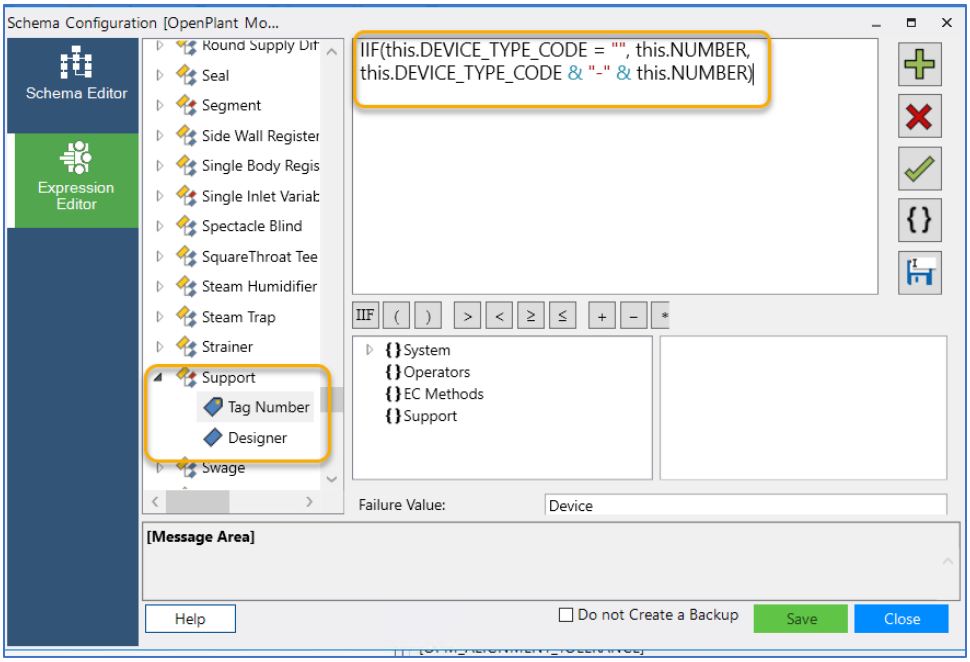
this.GetRelatedInstance("EQUIPMENT_HAS_NOZZLE:1:EQUIPMENT_TAG, NAME").NAME Unable to validate related class specifier from string 'EQUIPMENT_HAS_NOZZLE:1:EQUIPMENT_TAG'.



12. Save the changes.
13. Navigate to the **'Support'** Class and select the 'Tag Name'.

14. Enter the following values in the empty field as shown in the image below:

IIF(this.DEVICE_TYPE_CODE = "", this.NUMBER, this.DEVICE_TYPE_CODE & "-" & this.NUMBER)



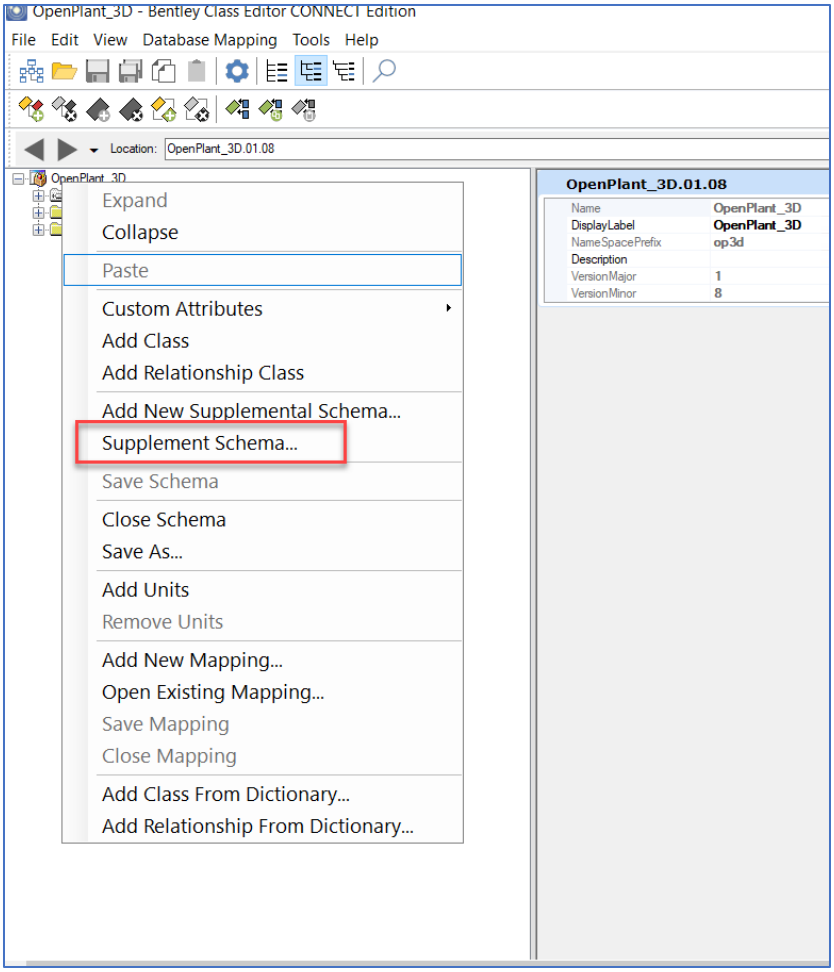
15. Save the changes.
16. In this way the hypen issue would be fixed.

4.2.23. Incorporating 'ELBOWPIPET' from APM inside the AP2OP Schemas

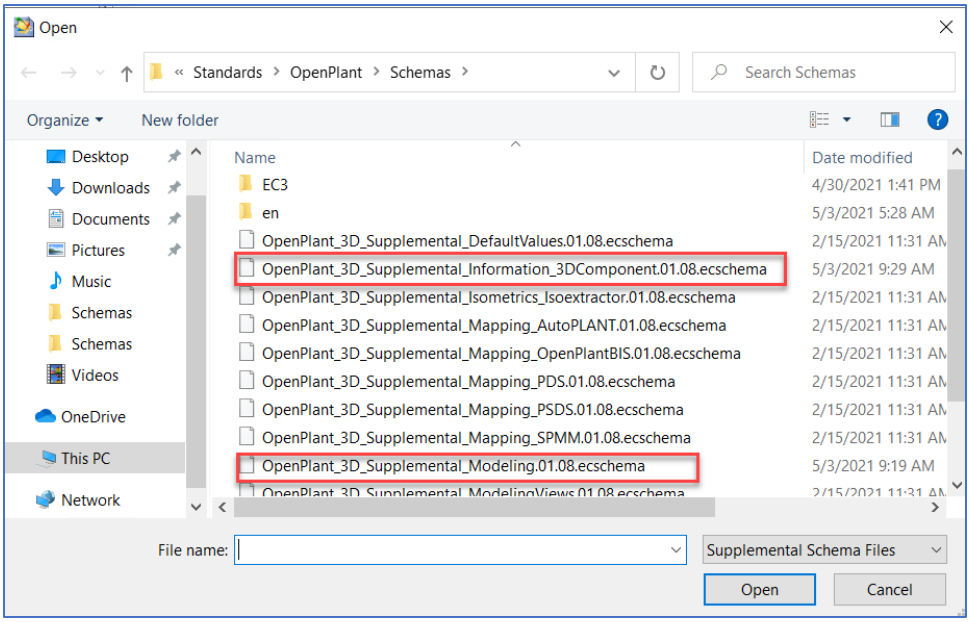
1. Launch 'Bentley Class Editor' and Open **'OpenPlant_3D.01.08.ecschema'** the latest AP2OP Workset.
   Can be found at this link
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\.....\Metric\Standards\OpenPlant\Schemas

2. Load all Reference schemes from this location:
   C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\Standards\OpenPlant\Schemas

3. Right Click on 'OpenPlant 3D' schema and select 'Supplement Schema.'



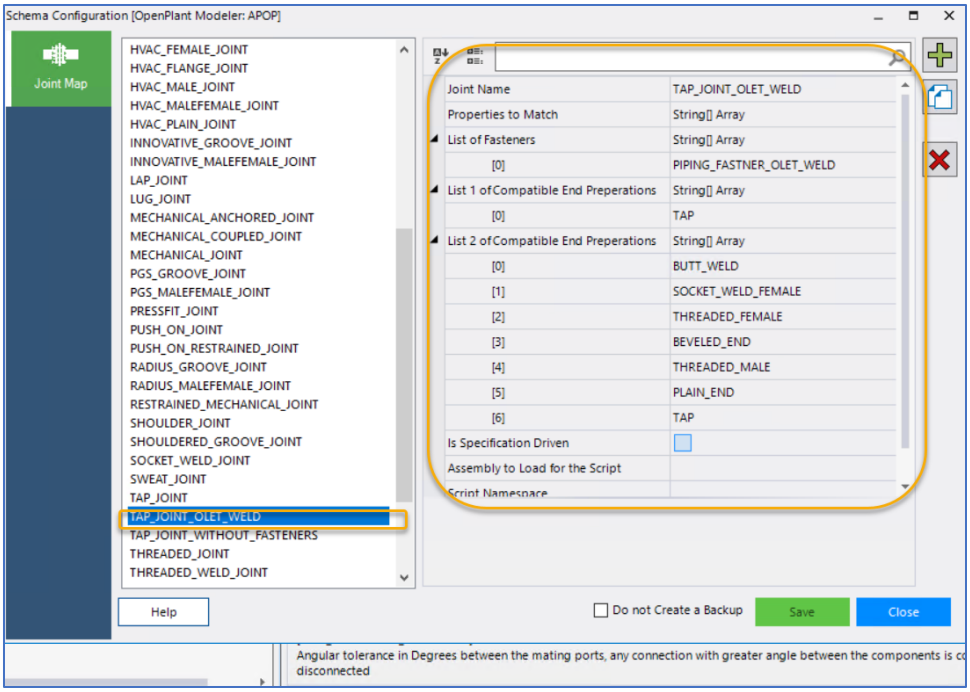
4. Add the following two Supplemental schemas:
    - Supplemental_Information_3DComponent
    - Supplemental Modeling



5. Navigate to the ‘Elbolet’ class via Search.
6. Create a new Derived Class by selecting **‘Add Derived Class’** from the **right click context menu** of the **parent class ‘Elbolet’.**
7. Give the name ‘ELBOWPIPET", description "elbow pipet" and display_Label "Elbow pipet".
8. So finally we have incorporated ‘ElbowPipet’ class inside the AP2OP Schemas

4.2.24. Introducing ‘TAP_JOINT_OLET_WELD’ for Olet Connection:

1. Launch OPPA and Navigate to the latest AP2OP Workset.
2. From the Drop-down select the ‘OpenPLANT Modeler’
3. Then within the ‘Settings’ tab, select ‘Joint_Map'.
4. Create a new Joint named ‘TAP_JOINT_OLET_WELD’
5. Enter Fasteners, End preparation 1 and End preparation 2 values as shown in the image below.



6. Save the changes.
7. So after following these basic steps, we have introduced a new joint for Olet Connection named ‘TAP_JOINT_OLET_WELD’

4.2.25. Fixing the ‘Gasket’ issue while generating isometrics:

1. Launch the ‘Modeler.cfg’ file from the following location:

C:\ProgramData\Bentley\OpenPlant CONNECT Edition\Configuration\WorkSpaces\OpenPlantExample\WorkSets\AP2OP Base Metric\Standards\OpenPlant\Modeler

2. Introduce a new variable in the bottom of the file as ‘**OPM_AP2OP_UPGRADE_CALC_GASKET_ORIGIN=1**’