

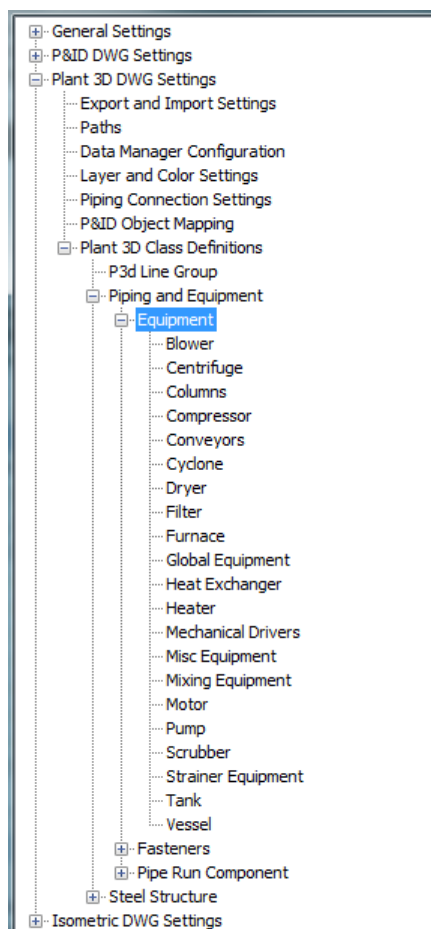
# Add New Equipment Class to AutoCAD Plant 3D 2013

**Project Setup** does not provide a mechanism for adding new types of equipment to the Plant 3D class hierarchy. This guide describes how to modify the database schema to do this.

Advanced Plant 3D Users / Administrators

## Introduction

The types of equipment that are defined in AutoCAD Plant 3D may be viewed through the Project Setup window.



This list is not exhaustive and very often it would be useful to be able to add new types of equipment to the list. Unfortunately, unlike the P&ID class hierarchy, the Project Setup user interface does not provide a mechanism for adding new entries to the Plant 3D class hierarchy.

Although the user interface does not allow it, it is possible to add new classes by modifying the database schema of the underlying Plant 3D Piping database.

This guide describes how to add a new type of equipment to a Plant 3D project that has been set up to use a default SQLite database.

SQLite is an in-process code library, one that implements an embedded database engine. It has no dedicated server so a SQLite database may be opened with any tool that can read SQLite format.

Tools that can be used to read a SQLite database include:

[SQLite Database Browser](#) – Standalone EXE to browse SQLite files.

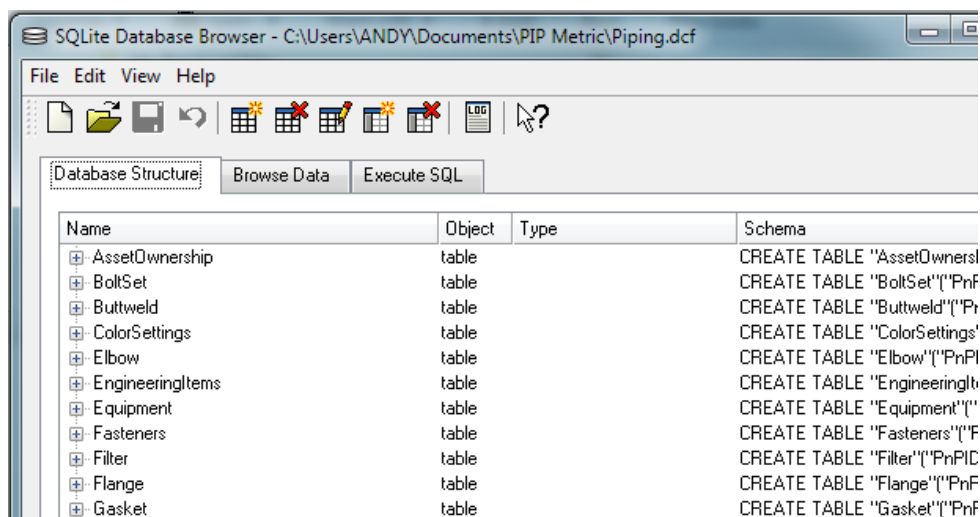
[SQLite Manager Add-on for Firefox](#) – Firefox Add-on.

*Note: The official way to access plant data is by using the Plant SDK. When accessing a Plant 3D database directly, there is always a risk of database corruption; anyone doing so does so at their own risk.*

## Plant 3D Piping Database

The piping database of an existing SQLite based Plant 3D project is stored in a file called piping.dcf and is located in the project folder.

The following screenshot shows a piping database opened in the SQLite Database browser.



It can be seen that each Plant 3D class has its own table (Boltset, Buttweld, Elbow, Filter, Flange etc).

Taking equipment items specifically, in addition to a class specific table, every equipment item is also referenced by a record in the following base tables: PnPBase, EngineeringItems and Equipment. The class table is linked to the records in the base tables through the PnPID field.

Taking a filter as an example, the following screenshots show the corresponding entries in each of the linked tables for the filter with the PnPID=3312.

Database Structure Browse Data Execute SQL					
Table: PnPBase					
PnPID	PnPClassName	PnPStatus	PnPRevision	PnPGuid	PnPTimeStamp
1066	3304 PnPDataLinks		0	0 ^7777777777777777	4798497679100831
1067	3305 Port		0	1 7777777777777777	4798497722603319
1068	3306 Nozzle		0	0 7777777777777777	4798497687121290
1069	3307 PnPDataLinks		0	0 7777777777777777	4798497680950937
1070	3308 PnPTagRegistry		0	0 7777777777777777	4798497681040942
1071	3309 Nozzle		0	0 7777777777777777	4798497687151291
1072	3310 PnPDataLinks		0	0 7777777777777777	4798497683801100
1073	3311 PnPTagRegistry		0	0 7777777777777777	4798497683881104
1074	3312 Filter		0	0 7777777777777777	4798498132656773

Database Structure Browse Data Execute SQL							
Table: EngineeringItems							
PnPID	PartFamilyId	PartFamilyLongD	CompatibleStand	Manufacturer	Material	MaterialCode	PartSizeLongDes
148	3113	Pipe DIN 2448	DIN 2448			1.0037	Pipe DIN 2448-1.0037
149	3116						Buttweld
150	3121						Buttweld
151	3126						Buttweld
152	3131						Buttweld
153	3303						Vertical Vessel
154	3306	Nozzle, flanged, RF,	ASME B16.5				Nozzle, flanged, 4" F
155	3309	Nozzle, flanged, RF,	ASME B16.5				Nozzle, flanged, 4" F
156	3312						Filter

Database Structure Browse Data Execute SQL				
Table: Equipment				
PnPID	Tag	Number	Type	Area
1	3303 TK-?		TK	
2	3312 ?-?			

Database Structure Browse Data Execute S		
Table: Filter		
PnPID	PartSubType	
1	3312 Filter	

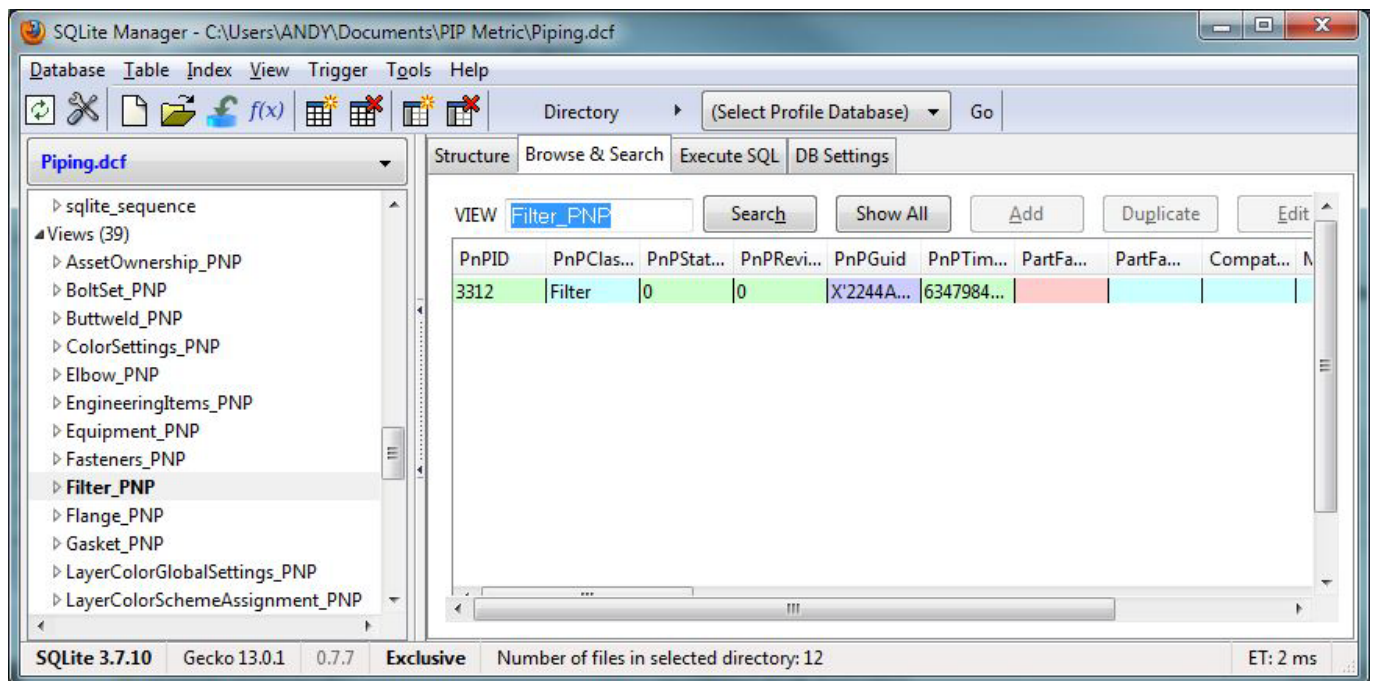
The relationship between the linked tables i.e. the Plant 3D class hierarchy is stored in the table PnPTables.

Database Structure Browse Data Execute SQL					
Table: PnPTables					
TableName	BaseTable	Abstract	PhysicalName	Revision	SyncTimestamp
1 PnPBase	PnPBase	TRUE	PnPBase		
2 PnPDataLinks	PnPBase	FALSE	PnPDataLinks		
3 PnPDrawings	PnPBase	FALSE	PnPDrawings	1	
4 PnPTagRegistries	PnPBase	FALSE	PnPTagRegistries		
5 PnPTagEnlistedCol	PnPBase	FALSE	PnPTagEnlistedCol		
6 RepositoryDescripto	PnPBase	FALSE	RepositoryDescripto		
7 EngineeringItems	PnPBase	FALSE	EngineeringItems		
8 Equipment	EngineeringItems	FALSE	Equipment		
9 Blower	Equipment	FALSE	Blower		
10 Centrifuge	Equipment	FALSE	Centrifuge		
11 Columns	Equipment	FALSE	Columns		
12 Compressor	Equipment	FALSE	Compressor		
13 Conveyors	Equipment	FALSE	Conveyors		
14 Cyclone	Equipment	FALSE	Cyclone		
15 Dryer	Equipment	FALSE	Dryer		
16 Filter	Equipment	FALSE	Filter		

One further table is required to fully define the filter class, this is PnPProperties. The PnPProperties table defines the properties of every field of every table in the Plant 3D class hierarchy as shown in the screenshot below.

Database Structure Browse Data Execute SQL											
Table: PnPProperties											
	New Record	Delete Rec									
TableName	PropertyName	PropertyType	IsObjectId	IsCounter	IsSystem	IsUnique	CheckConstraint	DefaultValue	Length	IsExpression	Expression
100	Dryer	PnPID	System.Int64	TRUE	FALSE	FALSE	FALSE			-1	FALSE
101	Dryer	PartSubType	System.String	FALSE	FALSE	FALSE	FALSE			255	FALSE
102	Filter	PnPID	System.Int64	TRUE	FALSE	FALSE	FALSE			-1	FALSE
103	Filter	PartSubType	System.String	FALSE	FALSE	FALSE	FALSE			255	FALSE

Finally, Plant 3D uses class specific views of the database to read / write data. The following view for the filter class is shown in a screenshot from the SQLite Manager Database browser.



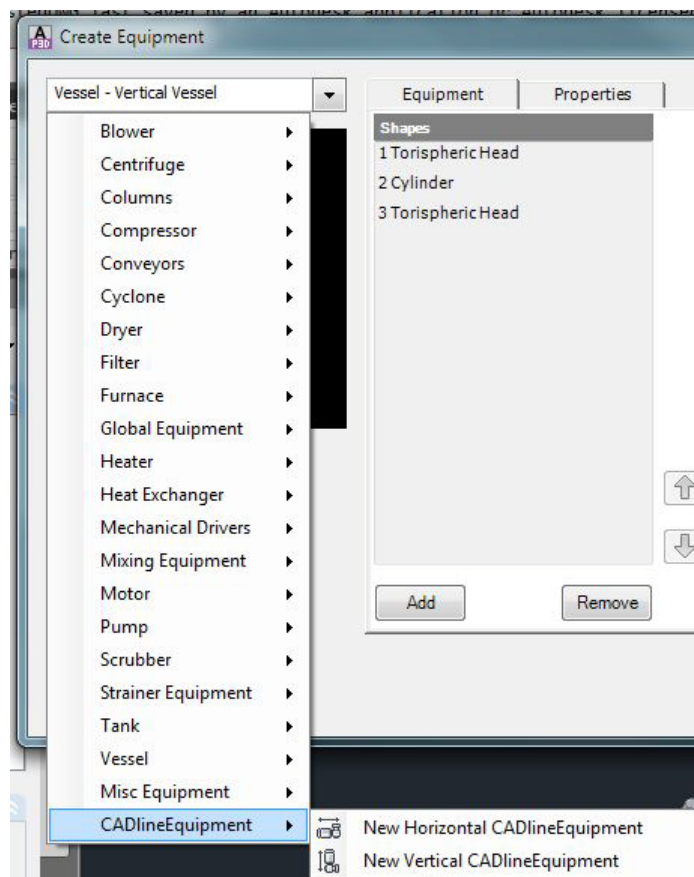
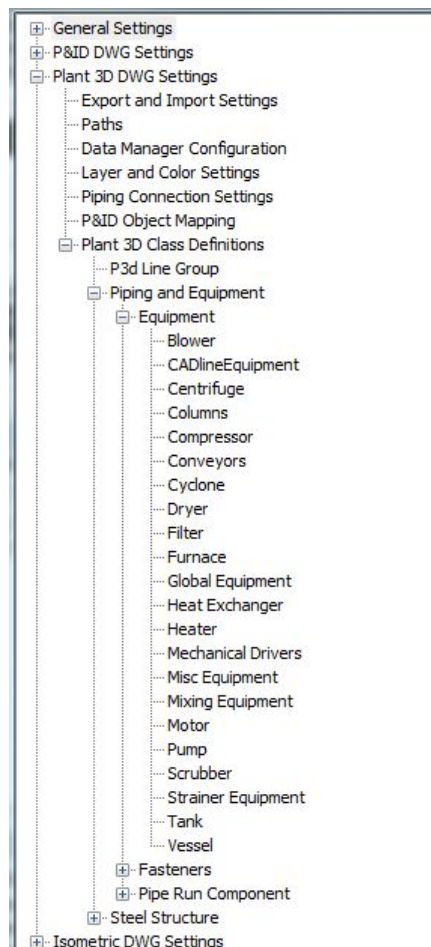
## Adding a New Equipment Class

The procedure to add a new equipment type to the Plant 3D class hierarchy is as follows:

1. Exit AutoCAD Plant 3D and ensure that no other users are accessing the project that is to be updated.
2. Take a backup of the entire project.
3. Open the piping database using a suitable database browser.
4. Create a new table in the piping Database containing an integer field named PnPID that is also the primary key.
5. Add a record to PnPTables to place the new table into the Plant 3D class hierarchy.
6. Add a record to PnPProperties to describe the PnPID field in the new table.
7. Create a view of the new table.
8. Save the changes to the database.
9. Launch AutoCAD Plant 3D and open the updated project.
10. Enter Project Setup, verify the new equipment type has been created and add any additional property fields as required.

## New Equipment Class

The following screenshots show the Plant 3D class hierarchy from a project modified to add a CADlineEquipment equipment class using the above procedure.





*Note: The list of available classes in the Create Equipment window is initialised with values from the first project that is opened after the launch of Plant 3D. If a project is opened subsequently that contains a different class hierarchy this window is not updated. To ensure that the list of equipment types is correct, re-launch the application before opening the next project.*

## Example SQL Statements

The following SQL statements may be used to add a new type of equipment called “CADlineEquipment” to a Plant 3D project.

- `CREATE TABLE "CADlineEquipment" ("PnPID" INTEGER , PRIMARY KEY ("PnPID") );`
- `INSERT INTO PnPTables ( "tablename" , "basetable" , "abstract" ,  
"physical name" ) VALUES ( 'CADlineEquipment' , 'Equipment' , 'FALSE' ,  
'CADlineEquipment' ) ;`
- `INSERT INTO PnPProperties ( "tablename" , "propertyname" , "propertytype" ,  
"isobjectid" , "iscounter" , "issystem" , "isunique" , "length" ,  
"isexpression" ) VALUES ( 'CADlineEquipment' , 'PnPID' , 'System.Int64' ,  
'TRUE' , 'FALSE' , 'FALSE' , 'FALSE' , -1 , 'FALSE' ) ;`
- `CREATE VIEW "CADlineEquipment_PNP" AS SELECT "Equipment_PNP" . * FROM  
"CADlineEquipment" , Equipment_PNP WHERE "Equipment_PNP". "PnPID" =  
"CADlineEquipment" . "PnPID" ;`