ACDC 5.0

USER MANUAL

Contents

Overview

ACDC (As Constructed Design Certification) automates and simplifies the process of uploading data from as-built drawings into an organizations GIS and asset management systems. ACDC operates within the framework of AutoCAD to store and enforce validation rules and drawing standards that a Utility/Council places on their as-built drawings to ensure that assets are accurately captured and maintained.

Drawing templates are customized by the Utility/Council and shared with respective Surveyors/ Developers who are responsible for capturing asset data. These templates consist of attributed blocks, validation rules, mapping rules and spatial integrity rules.

When an as-build drawing is handed from the Surveyor/Developer to a Utility/Council it must then pass the predefined rules and standards enforced by ACDC. The ACDC Validator compares the data within the as-built drawing with the stored configuration and validation rules. Elements that do not conform are highlighted allowing rapid correction of incorrect elements. This automated check significantly reduces the proofing process of as-built drawings and removes any errors that may be missed when manually checking drawings.

After all errors are fixed and the drawing is validated by ACDC, the line work and attributes contained within the drawing can be converted and uploaded to the organizations GIS and asset management systems. The ACDC Converter converts objects within the drawing to the target database via a Feature Data Objects (FDO) or Munsys connection.

The figure below provides an overview of this process.

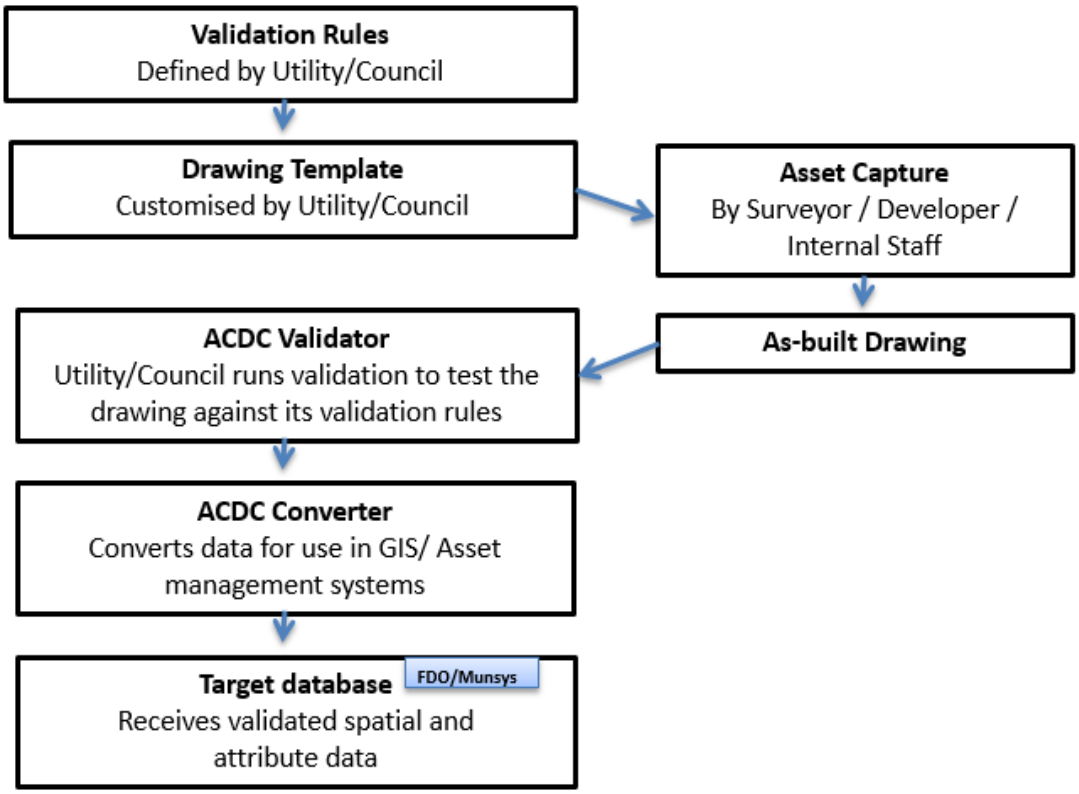


Figure 1 ACDC Process Overview

Feature Data Objects (FDO) is an API which caters for a generic interface to multiple database technologies for storing, updating, retrieving and analysing GIS data. It also provides access to the data stored within the database and allows for custom commands to be executed against a particular provider.

The ACDC 'Configurator' is used independently of the normal work-flow to capture and configure ACDC validation rules and settings that are used by the 'Validator' to validate the drawing. Initial configurations take place while setting up the drawing template after validation rules are defined. These configurations are then stored in a database.

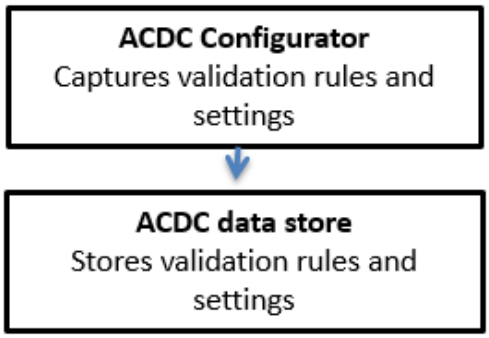


Figure 2 ACDC Configurator Process Overview

In this user manual, you will find instructions on how to use the functionality that ACDC provides:

- ACDC menu and toolbar functions
  - Configurator functionality including:
  - Configuration of the path of asset data (objects and attributes) from the objects and attributed blocks in a drawing file, through conversion to object data in the drawing, then FDO/Munsys objects and eventual target database records
  - Capture of validation rules for attributes and objects
  - Menu Configuration and Menu Generation functionality
  - ACDC settings
- Validation
- Conversion
- Tips and Tricks
- Administrator information

Menu and Toolbar Functions

ACDC adds two toolbars and a menu to AutoCAD. The toolbars are the ACDC Configuration toolbar and the ACDC toolbar. The ACDC Configuration toolbar contains tools specific to the configuration process. The ACDC toolbar contains tools used during the validation and conversion processes. Details of these tool bars are contained below. The ACDC menu contains all of the ACDC tools.

ACDC Toolbar

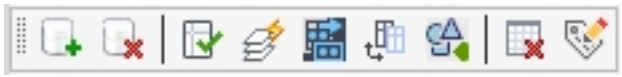


Figure 3 ACDC Toolbar

 **Connect to Database** – Connects to the database where ACDC stores configuration information and validation rules.

 **Disconnect from Database** – Disconnect from the database where ACDC stores configuration information and validation rules.

 **Validate and Create Object Data** – Validates the objects in the current open drawing against the stored configuration and validation rules.

 **Attach GIS Layers (All Features)** – Insert All GIS (FDO) layers into the current drawing using the definition and information from the ACDC Configuration Database.

 **Attach GIS Layers (Related Features)** - Insert only matching GIS (FDO) layers based on entities in the current drawing using the definition and information from the ACDC Configuration Database.

 **Convert to GIS** – Converts the validated AutoCAD objects and object data to the feature objects of the target database.

 **Post to GIS** - Checks in all features and saves changes to the feature source.

 **Delete Object Data Tables** - Deletes all object data tables in the drawing. Object data tables are created during validation.

 **Edit Attribute** – Edits the values, text options, and properties of each attribute in a block.

ACDC Configuration Toolbar

Figure 4 ACDC Configuration Toolbar

Configurator – Starts the ACDC Configurator. Use the 'Configurator' to configure ACDC validation rules, settings, and feature data.

Save GIS Layer Configuration - Saves the definition of all current GIS (FDO) layers and their connection information to the ACDC configuration database.

Block Editor - Opens the block definition in the AutoCAD Block Editor.

Ribbon Toolbar

Figure 5 ACDC Ribbon bar

The commands on the ACDC ribbon are the same commands which appear on the ACDC toolbar and the ACDC Configuration toolbar.

ACDC Drawing Template

ACDC Drawing templates, containing predefined attributed blocks and layers, are created per organisation to ensure external and internal developers conform to the specified industry standards and organisation requirements when capturing as-built data.

The predefined layers in the ACDC template are primarily used to draw specific asset types. The correct predefined layer MUST be used when drawing the desired asset type. For example, a WPIPE layer would be used to draw water pipes. This not only maintains a simple color theme for each asset but it is essential in The Configuration Process.

Predefined attributed blocks in the ACDC template can be attached to object entities that are drawn in AutoCAD. For example, when a water pipe block is attached to a polyline drawing (representing a water pipe), after validation and conversion of that polyline in ACDC, the polyline will possess the attributes of the associated water pipe block.

NOTE:

- Automated tools exist to mass create and define attributed blocks from Excel spreadsheets.
- AutoCAD 'Fields' can be used to populate default values into block 'tags'.
- When a block is inserted into a drawing, you can specify attribute values on the command line OR in a dialog box. By default, you specify them on the command line. To use a dialog box, change the value of the ATTDIA system variable to '1' by typing 'ATTDIA' on the command line and changing its value to '1'. Change it back to '0' to use the command line again.

Configuration Process

The Configuration process is where you specify exactly how spatial and attribute information is stored in the AutoCAD drawing file in terms of your destination database. The Configurator defines the AutoCAD template and ensures that it meets the needs of published industry standards and individual corporation's requirements. It provides an intuitive environment for defining corporate data requirements and performs a series of automated checks to assess the validity of configured data rules.

Configurator also provides users the ability to generate and organize the ACDC menu objects for AutoCAD, AutoCAD Map and BricsCAD. The Menu Mode incorporates some of the CUI commands into the Configuration Pane to allow users to have access to create menu groups, create and manage menu items and change the order in which the menu items appear in the menus.

The Configurator Pane displays the wording 'Configuration Mode' or 'Menu Mode' in the top right corner to assist users to know in which mode they are currently working to avoid any confusion.

The Configuration process involves defining:

- The location of the destination database.
- Where each object in the drawing is to be written in the destination database.
- Exactly where to find the attribute information for each object in the drawing.
- The required data format of each attribute value.
- The geometric requirements of the data (snapping, breaking, networking).
- Allow users to configure, preview and create their own ACDC menu content and layout.

These definitions form the basis of the 'validation rules' used in the Validation ProcessValidating DWG File.

Configurator Mode

When launching Configurator from the ACDC menu, it defaults to display the Configuration Mode and loads the ACDC Configuration components in the Tree Pane. Selecting the 'Edit ACDC menu layout configuration' button  will switch the Configuration screen to **Menu Mode** and load the ACDC Menu components in the tree pane. Conversely, if in Menu Mode, selecting the 'Edit ACDC configuration' button  will switch the Configuration screen back to Configuration Mode.

Configuration Mode enables the Administrator to capture and configure ACDC validation rules and settings that are used by the 'Validator' to validate the drawing. **Menu Mode** enables the Administrator to add or remove Menu Groups and manage menu items within the Menu Groups.

Configurator Buttons

Below is an explanation of the functionality of the buttons in 'Configuration Mode'.

 **Edit ACDC menu layout configuration**. Switches the Configurator to Menu Mode to enable menu layout edits.

Verify configuration. This tool runs a selection of checks on your configuration to assess its validity.

Clear verification results. Clears the tick and cross graphics from the left tree view pane that are created when the 'Verify Configuration' tool is run.

Add new record. Adds a record to the currently selected node/tab.

Delete selected records. Deletes the record currently selected in the top right grid view pane.

Preview menu layout. Displays a preview of the menu layout.

Generate menu. Generates the menu layout and allows the user to save as a .mnu file.

Refresh data. Refreshes the 'Configurator' pane with the data stored in the ACDC system tables. It also refreshes the left tree view pane with all the configured blocks.

Connect to ACDC Database

To commence the configuration process, you must be connected to the database that contains the ACDC system tables (WAE tables). To do this, complete the following steps:

1. Run **ACDC** by double clicking the desktop icon.
2. Once the applicable AutoCAD product opens, press the **Connect to Database** button from the ACDC Toolbar. This will open the **Connect to Database** dialog.
3. In the **Connect to Database** dialog, enter connection details for the database that contains the ACDC system tables. A completed login dialog should resemble the following:

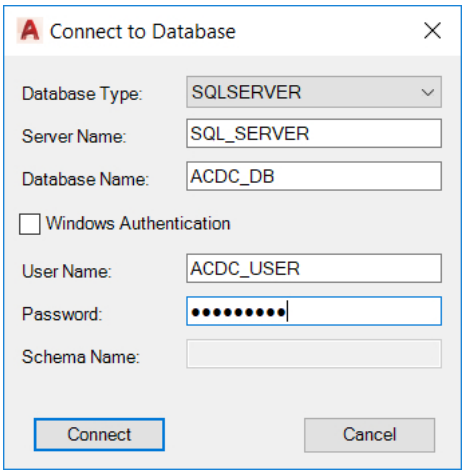


Figure 6 Connect to Database Dialog Box.

4. Once you have finished entering the database details, press the **Connect** button.

If a connection was able to be established with the database, you will see a 'Connected successfully' message on the AutoCAD command line. This connection is required to run any of the ACDC tools.

To view the current connection details at any time, press the **Connect to Database** button. This will display the connection details on the AutoCAD command line.

To disconnect from the database, simply press the 'Disconnect from Database' button . This will terminate any existing database connection that has been established by ACDC.

NOTE: The 'Schema Validation Results' dialog displays when you try to open the 'Configurator' and the schema you are logged in to has a structure that is not compatible with ACDC. Before attempting to configure data in AutoCAD, ensure you are connected to an ACDC compatible schema. If necessary, correct any errors and 'ReValidate'. In some cases, even after correcting and ReValidating an error in the schema it may be necessary to restart AutoCAD before the error will clear.

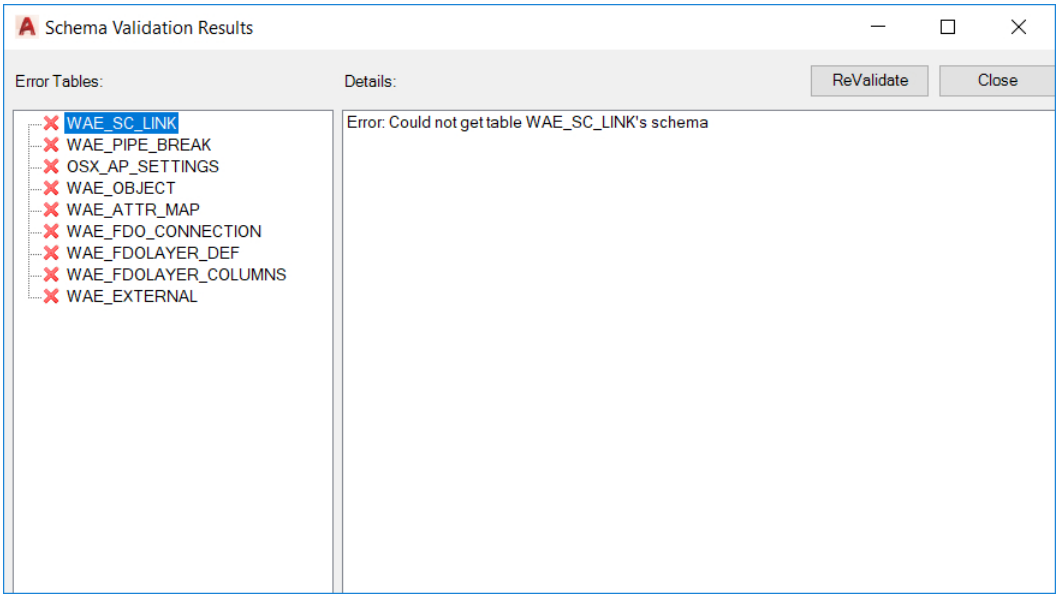


Figure 7 The Schema Validation Results dialog Box.

Save FDO Connections (Does Not Apply to Munsys Users)

This section of the manual does not apply to Munsys users.

The following steps describe how to establish the connections to the destination layers.

- Turn on the AutoCAD 'Task Pane' by typing the 'MAPWSPACE' command and selecting 'On'.
- Press the **Manage Data Content** button on the 'Task Pane' and select **Connect to Data**. This will open the 'Data Connect' dialog.
- In the 'Data Connect' dialog select the applicable connection type (Oracle, MySQL etc.) and complete the 'Connection name' and 'Service name' fields. Press the **Login** button.

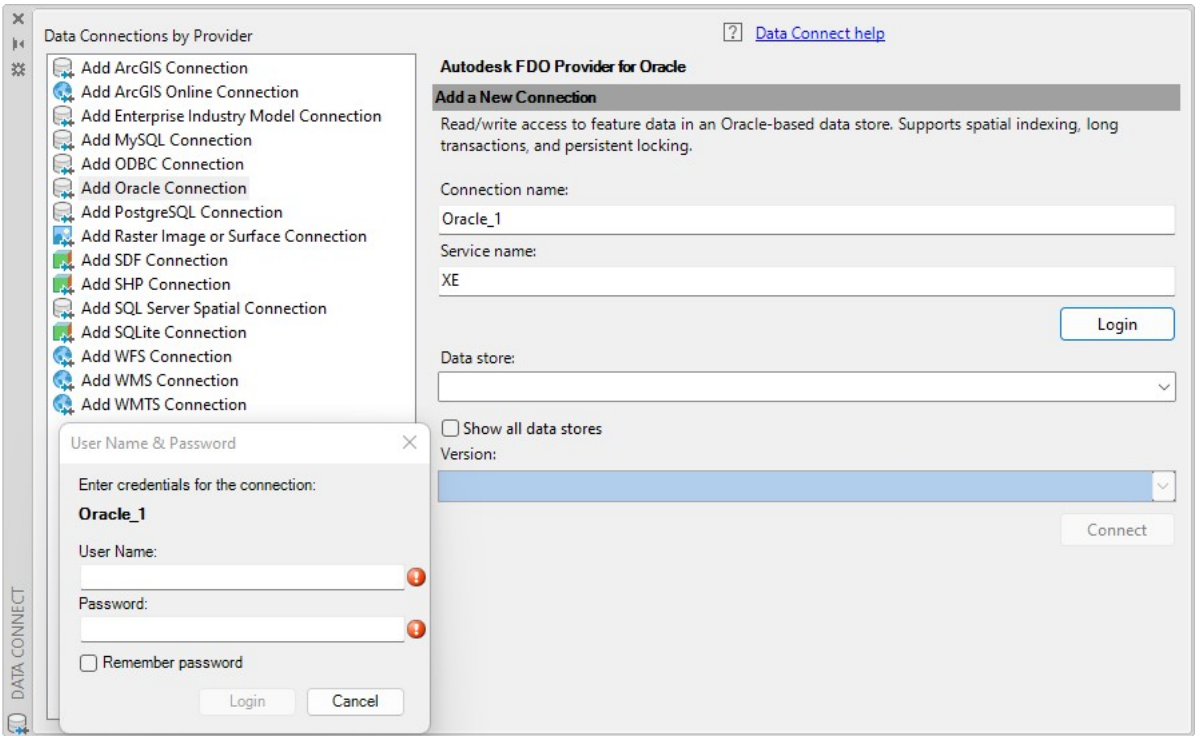


Figure 8 *Adding a New Data Connection*

- Enter your user name and password in the dialog that appears and press **Login**.
- Select the desired data store from the 'Data store' drop-down and press the **Connect** button (Ensure that the "Show all data stores" box is ticked).
- Tick the check boxes next to the layers you wish to add data to and press the **Add to Map** button. This will add the selected layers to the 'Task Pane'. You can now close the 'Data Connect' dialog.

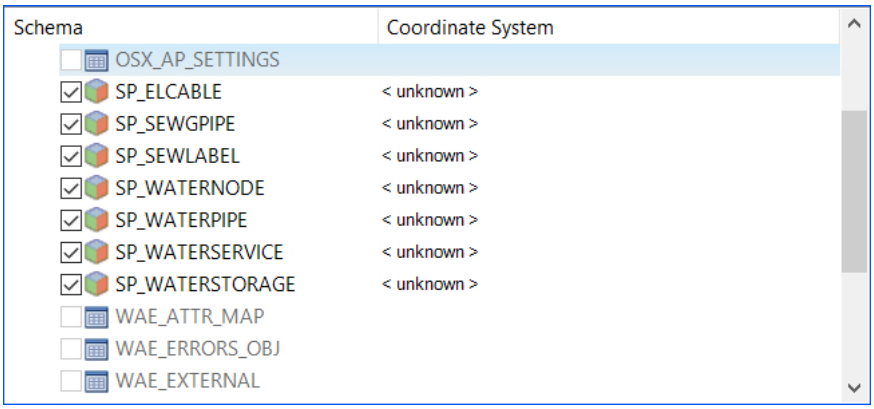


Figure 9 *Adding Selected Layers to Map*

- With the required destination layers in the 'Task Pane', press the **Save GIS Layer Configuration** button  on the ACDC Toolbar. This will save the data layer connections present in the 'Task Pane' to your ACDC configuration.

- You will be presented with the 'Save GIS Layer Configuration Connections' dialog box which is populated with a list of GIS layers if they already exist in your ACDC configuration.
- There are two radio buttons available for selection, namely:
  - **Keep existing** – This is the default option and the properties associated to the FDO layers will be kept as previously defined. Select **OK**.
  - **Replace existing** – If this option is selected, any changes made to the FDO Layer will overwrite those defined in the database. Select **OK**.

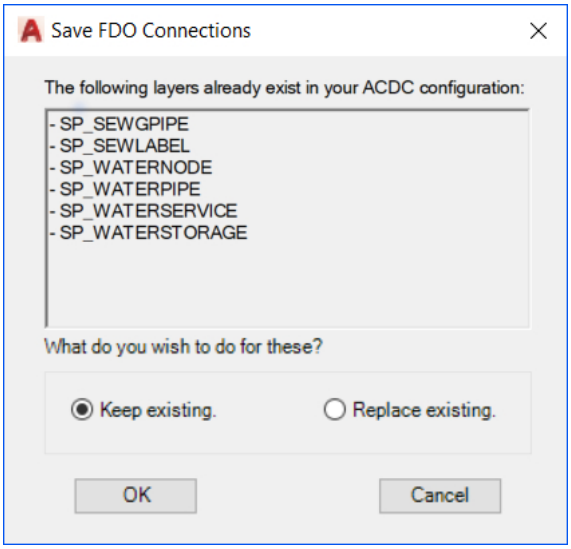


Figure 10 Save FDO Connections

- It is important that this process is done for ALL the required destination layers as this defines the destination layers that you can map your data to.
- The saved connections can be reviewed using the **FDO Connections** node of the 'Configurator'.

Initial Configurator Settings Review

1. Start the **ACDC Configurator** and select the **Settings** node in the left tree view pane.

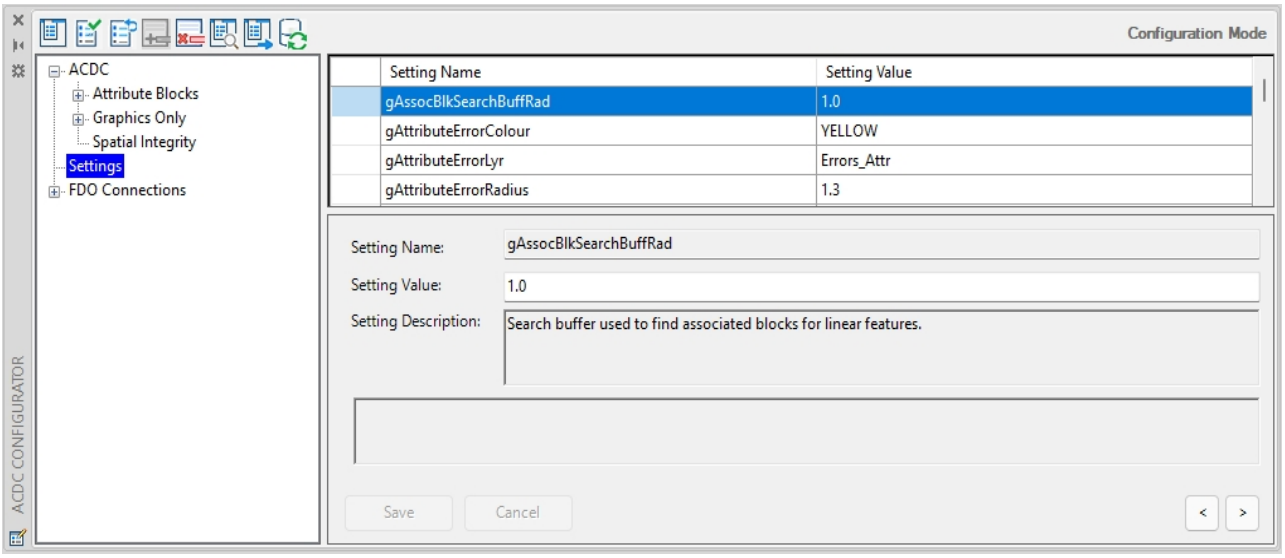


Figure 11 Settings in the ACDC Configurator

2. Although default values are assigned to each Configurator Setting when the database is originally created, it is recommended that the following Configurator Settings be reviewed and defined specifically for your project before the Configuration of the Attribute Blocks can commence:
    - gCommonBlkName - Common Block used for attributes
    - gDateFormat - Preferred date format DD/MM/YYYY or MM/DD/YYYY
    - gDrawingUnits - Preferred Drawing Units. Meters or Feet
    - gGISType - Select either Feature Data Objects (FDO) or Munsys (must log out/log in for any change to this setting to take affect)
    - gLookupFilter - QUery filter used to find lookup tables
    - gMaxXExtent, gMaxYExtent, gMinXExtent, gMinYExtent - Database Extents of Project Area
    - gProjection - Expected Projection for projects
    - gProjectionAttribute - Defined Projection Attribute in Common Block
    - gVersion - Database Schema Version
    - gVerifyRealSize (See section 'CONFIGURING 'gVerifyRealValues' for SQL Server only).

The following Tolerance Settings can also be checked and modified where applicable:

- gLinearChkTol - Tolerance used to flag linear object end points as errors if they are within this tolerance and fall outside of the defined 'gLinearSnapTol' setting.
  gNodeSearchBuffRad
- gLinearSearchBuffRad - Search buffer used by linear objects to detect nearby linear objects to snap to.

- gLinearShortTol - Shortest linear length allowed
- gLinearSnapTol - If linear objects are within this distance then they are automatically snapped together
- gNodeSearchBuffRad - Search buffer used by node objects to detect nearby objects
- gNodeSnapTol - If a node is within this distance of a linear object it is automatically snapped to that linear object.
- gPipeLengthBreakTol - Minimum allowable length of pipe to be created by a 'break' operation.
- gPipeSearchBuffRad - Search buffer used by blocks insertion points to detect pipes to snap to.
- gSCtoPipeSearchBuffRad - Search buffer used to find pipes to which a service connection should be attached

When logging onto an ACDC schema, the default Symbol path of 'Meters' will be updated to either Feet or Meters based on the **gDrawingUnits** setting. As part of the validation process, if the drawing being validated has the DWGUNITS set to Meters and the configuration **gDrawingUnits** setting is set to Feet, the following warning message will be displayed in the command line *'Warning: Drawing Units does not match setting (Feet)'*, and an entry will be written to the log file with the following description 'Drawing units does not match setting (Feet)'.

Conversely, if the drawing being validated has the **DWGUNITS** set to Feet and the configuration **gDrawingUnits** setting is set to Meters, the following warning message will be displayed in the command line *'Warning: Drawing Units does not match setting (Meters)'*, and an entry will be written to the log file with the following description 'Drawing units does not match setting (Meters)'.

The **gNodeSearchBuffRad** setting value can be increased/decreased based on the users needs, as it controls the distance/tolerance between objects of a block. If this setting is changed to anything below 0.2 i.e. 0.1 then an isolated block error will be displayed when an attribute block is placed on the arc section of a polyline.

As part of the initial Configurator Settings, the **gProjection** and **gProjectionAttribute** values must be set correctly. The **gProjection** uses the Drawing Projection set using the AutoCAD Map command '**mapcsassign**', while the **gProjectionAttribute** value is set to INACTIVE by default and must be updated in the Common Block ORIGIN variable.

As part of the validation process, checks are done to ensure the drawing coordinate system assigned in the TEMPLATE using the AutoCAD Map command '**mapcsassign**' matches the Projection assigned in the Common Block ORIGIN attribute.

If no Projection has been assigned in the drawing Template the validation will not be failed, and the resultant validation log file will be updated with a warning message indicating that No Projection has been assigned to the drawing.

If there is a difference between the drawing Template projection and the Common Block Projection, the validation will not be failed, and the resultant validation log file will be updated with a warning message indicating that the Drawing Projection does not match the Projection setting for the Common Block.

These settings are defined within the **OSX_AP_SETTINGS** database table.

Refer to the 'Configurator Settings' section of this manual for more information about these specific settings.

3. If you are required to change the value of any of the above settings from their default values, 'Editing mode' will automatically be enabled. You will need to either save or cancel/discard any changes you make.

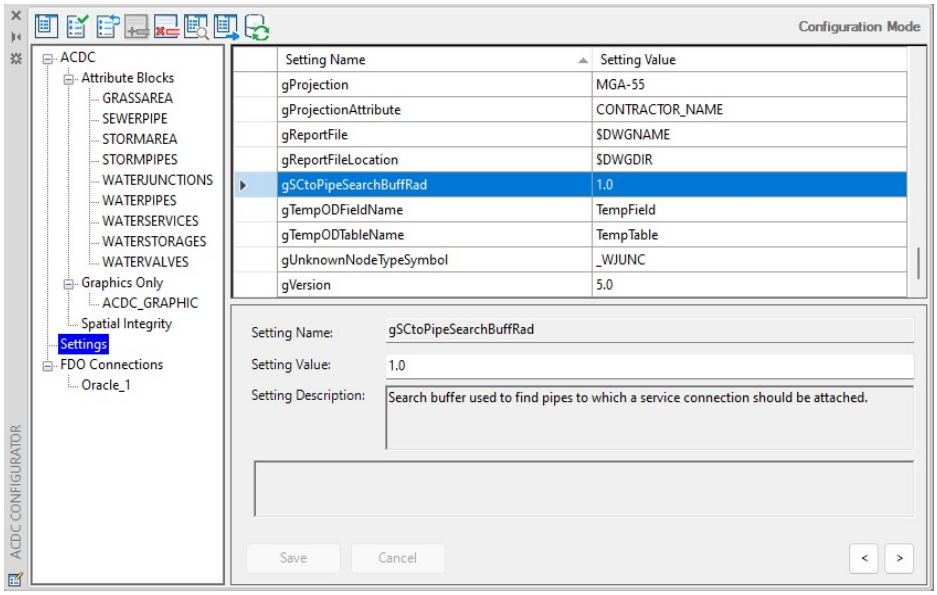


Figure 12 Editing in the ACDC Configurator

IMPORTANT: Once these settings have been correctly defined they MUST NOT BE CHANGED. Changing these settings after the configuration process has commenced may destroy the integrity of your configuration.

Attribute Blocks – Object Tab

The work carried out in the Attribute Blocks 'Object' tab of the 'Configurator' defines for ACDC exactly how each of your assets are stored in the drawing. This information is used by the Converter to locate and correctly classify each of your assets. This information will be verified at a later stage of the configuration process.

1. To begin the configuration process, start the **ACDC Configurator** and select the **Attribute Blocks** node in the left tree view pane.
2. Select the **Object** tab.

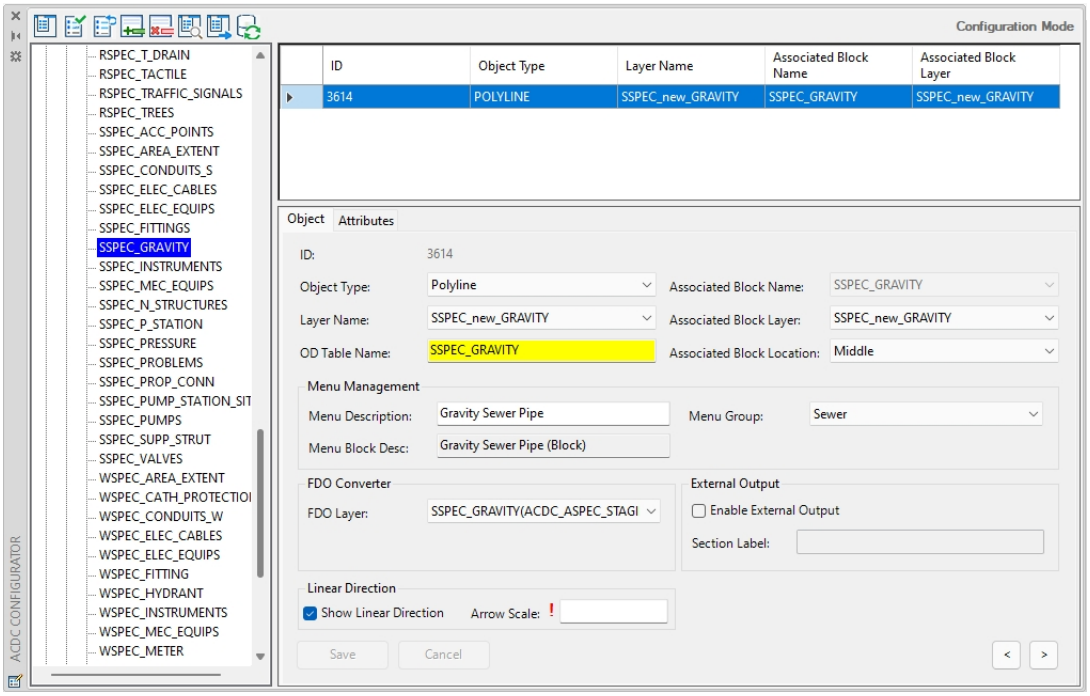


Figure 13 Attribute Blocks in the ACDC Configurator

3. To begin configuring your drawing, press the **Add new record** button located at the top of the 'Configurator' dialog. This will add a new record to the 'Object' tab.
4. You must now make selections for each of the attributes specified in the bottom right pane of the 'Configurator'. An explanation of each attribute is as follows:

    - **Object Type:** The AutoCAD object type that is used to represent the asset. Select from the drop-down menu. The 'Object Type' can be:
        - **Block:** If the asset is represented by a node / point entity. For example, a water hydrant.
        - **Circle:** If the asset is represented by a circle. For example, a water reservoir such as a water tank.
        - **Polygon:** If the asset is represented by a polygon. For example, a water reservoir such as a dam.
        - **Polyline:** If the asset is represented as a line entity with two or more series of lines or line segments. For example, a water pipe that consists of multiple line segments.
    - **Layer Name:** The layer on which the objects exist on in your drawing file.

NOTE: In an as-built drawing, each layer cannot contain more than one identical 'Object Type' except for 'Object Type' 'Block/INSERT'. For example, the layer 'WPIPE' can only contain one entry in the 'Configurator' for an 'Object Type' 'Polyline' but no other entries of 'Object Type' 'Polyline' can be recorded for the WPIPE layer even if it has a different associated block. The exception is that a layer of 'Object Type' 'Block/INSERT' can contain more than one record for the same 'Object Type'. See example in the 'Associated Block Layer' description.

- **OD Table Name:** The object data table that will be created in the validation process to store the configured attributes for the selected object. By default it will receive the associated block name. While it is strongly recommended to leave this at its default value, the OD Table Name must be less than 25 characters and cannot include any spaces. Please rename appropriately (if required).

- **Associated Block Name:** The block that contains the attributes for the object.
- **Associated Block Layer:** The layer that contains the associated blocks for the object. The layer is automatically populated for objects of type Block.

NOTE: For objects of type 'Block', a layer can have more than one associated block. For example, the layer name 'Valves' could be associated with blocks Gate Valve, Scour Valve, or Pressure Release Value (i.e. if the user did not want to create 3 separate layers for each value type).

- **Associated Block Location:** The location at which the associated block is located on the object (is automatically populated for objects of type 'Block'). The snapping possibilities will vary depending on the object. Choose from the below options:
    a. **Start:** If the block has been snapped to the start of the object. (Object Type = Polyline)
    b. **End:** If the block has been snapped to the end of the object. (Object Type = Polyline)
    c. **Start or End:** If the block has been snapped to the start or end of the object. (Object Type = Polyline)
    d. **Middle:** If the block has been snapped to the middle or a middle segment of the object. For a Polyline, the middle can be the midpoint between any vertexes along the Polyline (but not on a vertex). (Object Type = Polyline)
    e. **Inside:** If the object is represented by a circle or closed polyline the block must be located inside the object. (Object Type = Circle or Polygon)
- **Menu Description:** The menu description as displayed in ACDC Configurator.
- **Menu Group:** The name of the Menu Group to which the block item has been assigned. Select the group from the available drop-down list.
  If the Menu Group is nested below a Parent Menu Group, the Parent Menu Group and the nested Menu Group is displayed i.e. 'Water/Water Nodes'
- **Menu Block Desc:** The description of the block as displayed on the Menu bar.
- **FDO Layer:** The layer in your Oracle/MS SQL Server database to which the selected object is to be written.
- **Munsys Table:** (For Munsys users only). The layer in your Munsys Server database to which the selected object is to be written.
- **Type Definition:** (For Munsys users only). Select the Munsys 'Object Type'.
- **Enable External Output (check box):** Ticking the box with activate/deactivate the exporting of attributes to CSV/Table. The first column in the CSV/Table file created by ACDC is named 'SECTION_LABEL'. The value that will be written to this column for the current object is automatically defined here in the Section Label field. The file type, name and location are specified by the gExternalOutputTarget, gExternalFile and gExternalFileLocation settings respectively.

- **Show Linear Direction:** This is a setting used to toggle the display of linear direction arrows on those objects selected in the validation process (YES/NO). If the tick-box is checked, the arrows will display on the configured polyline objects.

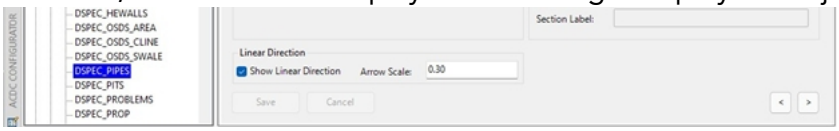


Figure 14 Linear Direction Settings set On

NOTE: Linear direction refers to the direction in which the polyline has been drawn in the CAD drawing. This is not to be confused with the flow direction which is validated using the attribute values captured for both the start and end invert levels.

- **Arrow Scale:** This setting sets the scale of the arrow to be displayed on the objects indicating linear direction. This setting uses the Drawing Units (gDrawingUnits) to determine which folder to use to locate the symbol "darrow.dwg", and display in either Feet or Meters.

Figure 15 Linear Direction Arrow Scale Settings

5. Once you have populated each of the attributes, press the **Save** button. This will add the record to the top right grid view pane. A completed record will typically resemble the below:

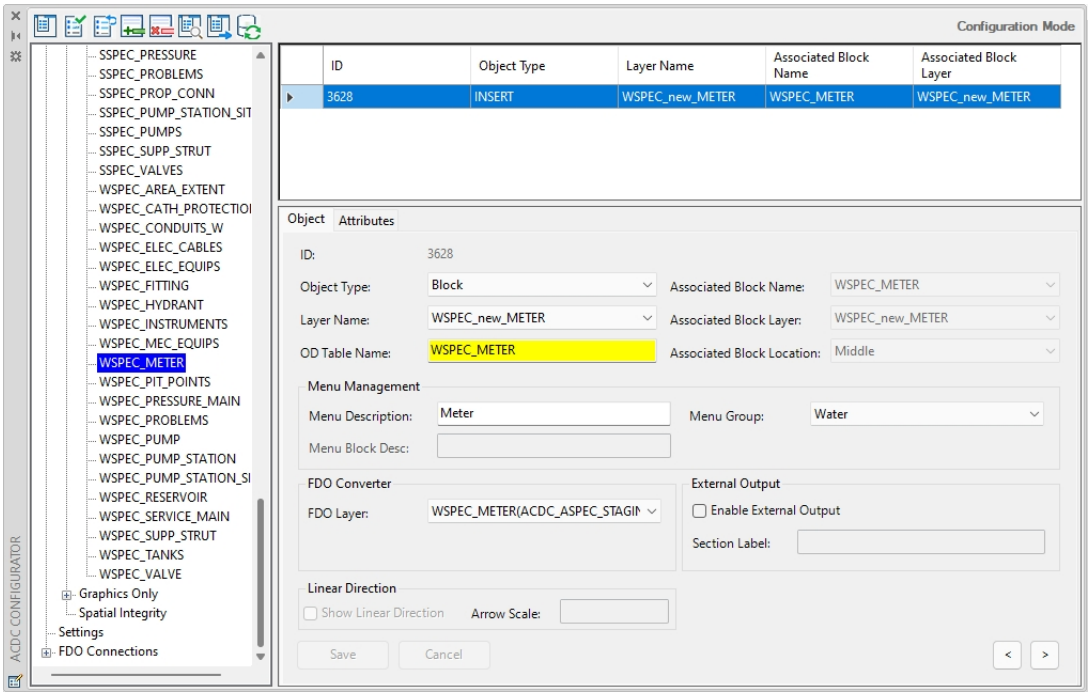


Figure 16 Completed Record in the ACDC Configurator

6. You must complete this process for each of the assets/object types you wish to convert in your drawing file.

7. Press the **Refresh** button  located at the top of the 'Configurator' dialog to update the left tree view with your defined assets.

Duplicate Record and Copy Attributes

When an asset can be represented by both blocks and polygons, a separate record must be defined for each of these object types. The 'Configurator' contains a tool to facilitate this process, the 'Duplicate Record and Copy Attributes' tool. This tool duplicates the selected record with the associated attribute values and allows you to edit the AutoCAD object type you require.

To use this tool, refer to the steps below:

1. In the top right grid view pane, select the record you wish to duplicate.
2. Right-click on this record and select **Duplicate Record and Copy Attributes** from the context menu that appears.

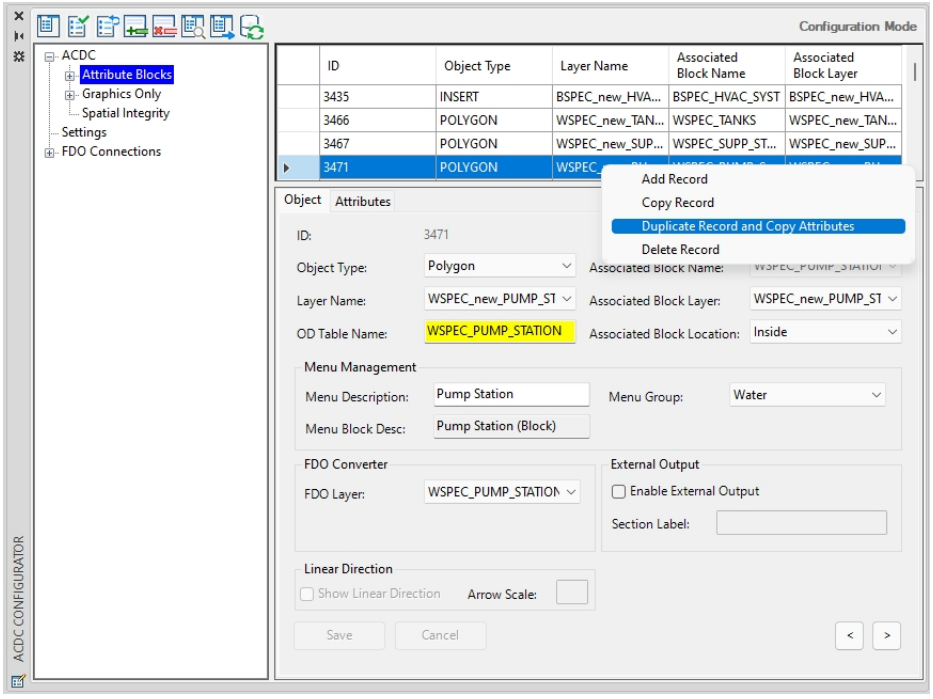


Figure 17 Duplicating Records in the Configurator

3. A new record will be created with all the fields set to the same values as those of the record you selected to duplicate. The user will only have access to Object Tab to change the 'Object Type' field, after which the record must first be saved to edit any further Attribute values.

Press the **Save** button once you have selected the required 'Object Type' to save the record.

4. The results of this duplication process is shown in the figure below. After duplication, two records for the pump station assets exist – one for those represented by block, and another for those represented by polygons.

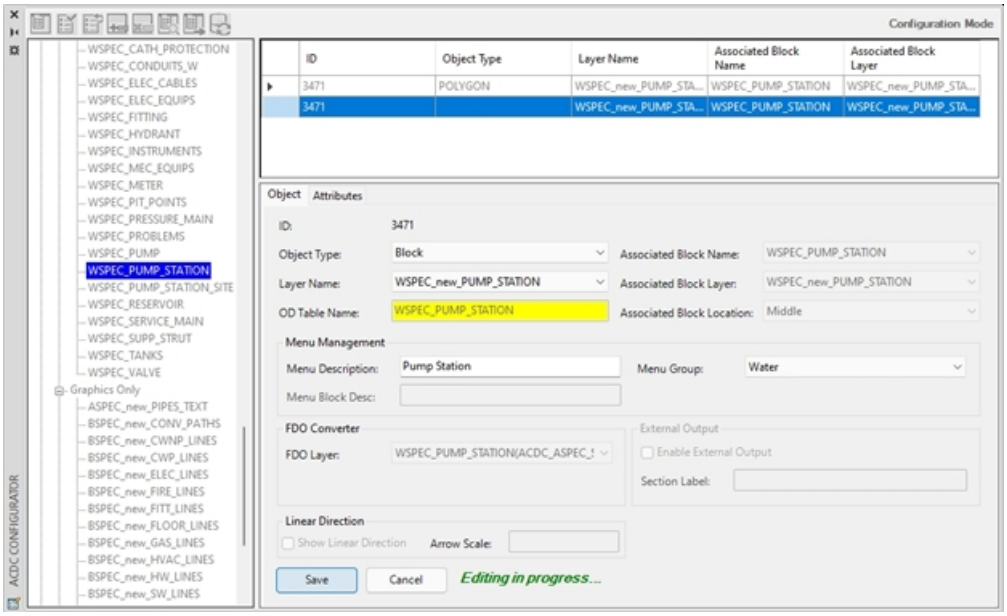


Figure 18 Duplicate Record in the ACDC Configurator

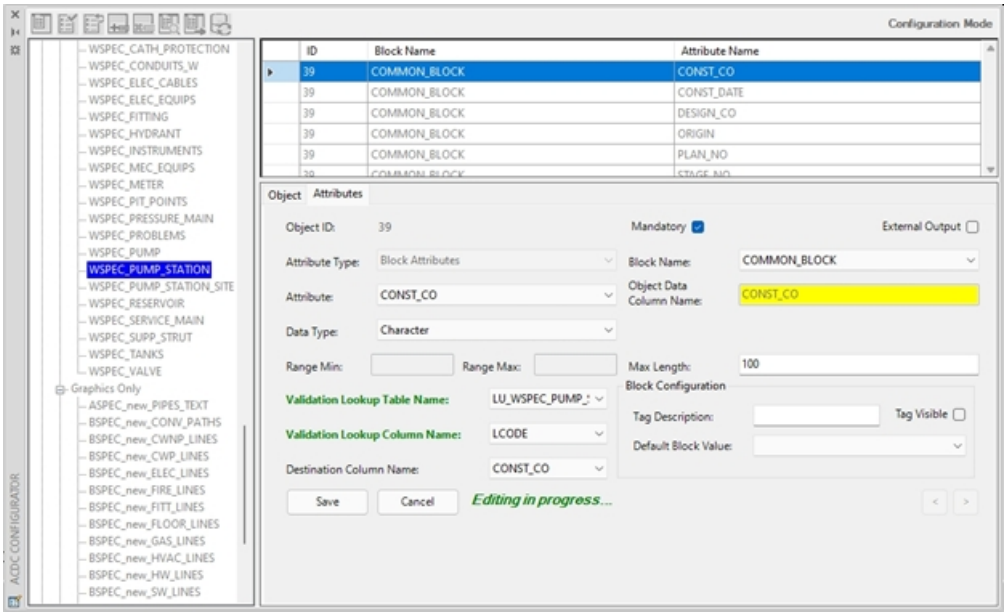


Figure 19 Editing Duplicate Record Attributes

NOTE: This duplication process is advised where multiple Object Types can be used to represent an asset. For example, a pump station can be represented by both block and polygon object geometries, where the block can represent the pump station's location as a single X;Y coordinate, and a polygon can represent the extents of the pump station structure.

Attribute Blocks – Attributes Tab

The information stored in the 'Attributes' tab is used to tell the Converter which attributes to store against each asset, and exactly where to find these attributes.

CAD Blocks, made up of a collection of geometries, can be placed to represent asset information in a CAD drawing. CAD symbols are often used to portray assets with a single X;Y;Z point location such as a Sanitary Sewer Manhole, and block attributes are captured to describe the asset's properties and store information relating to the asset. So a single Block object may have many attributes configured, including reference to the Common Block attributes.

In the example of using a block to represent a Sanitary Sewer Manhole, as part of the block definition you could setup a circle symbol (dwg file) to represent the manhole, define the base insertion point at the center of the circle to place the manhole on a line object to represent a pipe, and setup attributes to describe the properties of the manhole, such as the manhole reference number, depth, cover level, material, location, comments etc.

As per block attribute definitions in AutoCAD, each individual attribute describing an asset property has a unique tag name with a tag prompt/description to advise what information is required for capture. The Block Configuration enables users to define block attribute tags by capturing a Tag description/prompt, assign default values where applicable and set the Tag mode in terms of the tag being visible or not.

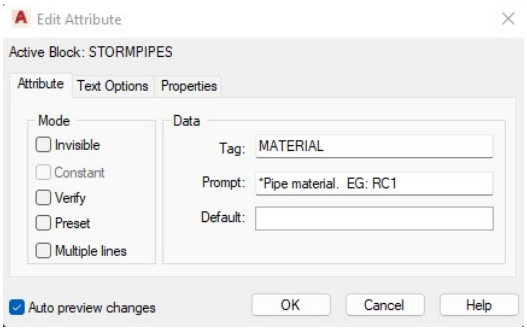


Figure 20 Editing CAD Block Attributes

The entire configuration can now be stored in the ACDC database, and using SQL Scripts, the blocks can be generated using this attribute information.

The steps detailed below indicate how to define the attributes to store against each of the asset/ object type combinations defined in the 'Object' tab.

1. Select a record in the 'Object' tab of the 'Attribute Blocks' node. This will be the asset against which you will define attributes.
2. Select the 'Attributes' tab.

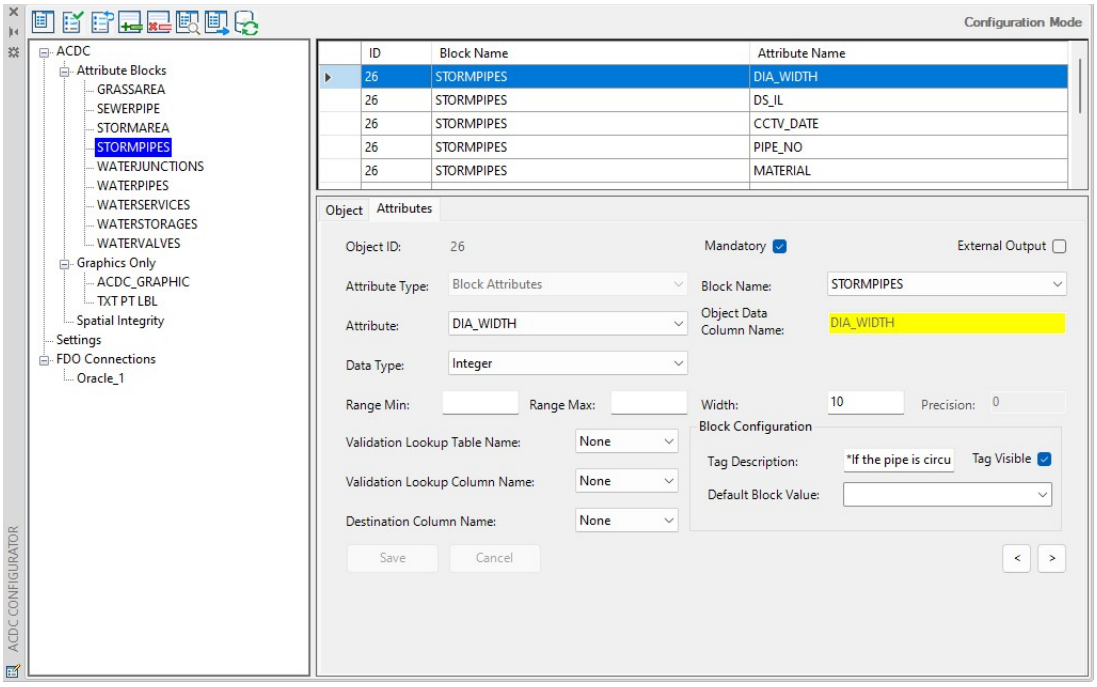


Figure 21 The Attributes Tab

3. Press the **Add new record** button  to begin defining an attribute. Once you press this button, a blank row will be added to the top-right grid view pane and the bottom-right pane will become a form, which is used to define the details of the attribute.

NOTE: The Object ID value will be the same as the selected ID value for the objected selected on the Object pane. This ID is used to link the attributes to object in the database.

4. You must now populate each of the fields in the bottom right pane of the 'Configurator'. An explanation of each is as follows:

- **Mandatory (check box):** Defines if the attribute is required. If this is checked, any objects of the defined type that contain blank/null values for this attribute will be flagged as errors. If the block is generated using the SQL Scripts, an * will automatically be appended to the start of the Tag Description indicating to the data capturer that the attribute is a mandatory field.
- **External Output (check box):** If this is checked, the attribute value will also be written to a separate CSV/or Table file during the Conversion process.

  NOTE: Attributes will only be exported if the 'Enable External Attributes' check box in the 'Object' tab is also ticked.The file type, name and location are specified by the gExternalOutputTarget, gExternalFile and gExternalFileLocation settings respectively.
- **Attribute Type:** Defines the source of the attribute value. The available options are:
  a. **Block Attributes:** The attribute value is currently held in a block in the drawing.
  b. **Database Sequences:** The attribute value will be supplied by a database sequence (for Oracle users).
  c. **Database Functions:** The attribute value will be supplied by a database function.
  d. **Database Procedures:** The attribute value will be supplied by a database procedure (for MS SQL Server users).
  e. **Object Attributes:** The attribute value will be determined from the geometry of the object (for example, length, rotation, area, circumference).
- **Block Name:** The name of the block that contains the value for this attribute. This is only applicable to attributes of type 'Block Attributes'.
- **Attribute:** The name of the block attribute/database sequence/database function/object geometry/ object location property to use to populate this attribute value.
- **Object Data Column Name:** This value is populated with the name of the column in the object data table that will store this attribute based on the selection of the Attribute above. While it is strongly recommended to leave this at its default value, the name must be less than 25 characters and cannot include any spaces. Please rename appropriately (if required).
- **Data Type:** The data type that will be used to store the attribute. Choose from Character, Real, Integer or Date.

  a. For **Character** specify:
  - **Max Length:** The maximum length that the attribute value can be in the 'Width' setting.

  b. For **Real** or **Integer** specify:

- **Width:** The maximum allowed number of whole number digits. For 'Real' this will be the maximum number of digits appearing before the decimal place. For example, a Width of 4 would cater for numbers with 4 or less whole digits, such as 10, 1000 but not 10000.
- **Precision (for 'Real' only):** This is the maximum allowed number of digits appearing after the decimal place. For Data Type 'Integer' the 'Precision' field will be greyed out and set to 0. For example, a Width=4 and Precision=2 would cater for numeric digits such as 10.824 and 1000.643423545 which would be truncated to 10.82 and 1000.64 respectively.
- **Range Min:** The minimum numeric value allowed for this field.
- **Range Max:** The maximum numeric value allowed for this field.

c. For **Date** specify:

- **Min Date:** The minimum permissible date in the format as specified in 'Configurator' settings.
- **Max Date:** The maximum permissible date in the format as specified in 'Configurator' settings.

- **Validation Lookup Table Name:** The lookup table that contains a list of predefined values for this attribute.
- **Validation Lookup Column Name:** The column in the selected validation lookup table that contains the actual attribute value to be stored.
- **Destination Column Name:** The column in your destination layer where this attribute value is to be placed.
- **Tag Description**: Block Attribute description / prompt
- **Default Block Value**: The Asset Owner can assign a default value which will be applied to all blocks captured. The default value can be updated using Block Editor on placement of the block in the drawing.

NOTE: A good example of assigning a Default Block Value would be if you had an 'Asset Owner' attribute where all assets belonged to the same organisation. To prevent the data capturer from having to capture the same Asset Owner details repeatedly for each placement of the same type of asset, the default 'Asset Owner' can be defined in the Attributes configuration, and updated at the point of capture where there is an exception, rather than the norm.

- **Tag Visible**: Determines if the tag description (prompt) is displayed or not when capturing or editing attributes.

IMPORTANT: As you are completing this form, make sure you consider each option carefully. The selections made here determine the nature of the rules used to validate the drawing and they define exactly how the final data is to be stored.

5. Press the **Save** button once you have completed the form for the new attribute. Repeat this process for all of the attributes that are to be stored against the current object.

IMPORTANT: If the destination tables contain a field for a unique identifier, you can create a record to populate this field in the 'Configurator' (it is highly recommended that the destination tables contain a unique identifier for each record). The steps to do this are listed below. This is not required for Munsys users as this is handled automatically by Munsys.

1. In the 'Attributes' tab, add a new record by pressing the **Add new record** button .
2. Complete the new attribute details as follows:

    - **Attribute Type:**
        a. Database Function (for MS SQL Server users)
        b. Database Sequence (for Oracle users)
    - **Attribute:** ACDCSEQ_ID

This is the predefined database sequence/function that is installed with the ACDC system tables. Its purpose is to create a unique numeric number for each record that is to be transferred to the defined destination tables.

- **Data Type:** Integer
- **Destination Layer Column Name:** Select the applicable 'ID' column for the destination table.

3. Press the **Save** button to store the new attribute definition in the database.

Graphics Only – Object Tab

Graphics Only blocks are typically where only the line work is required to represent an asset without any associated attribute information being captured. However, there may be instances where the Asset Owner may assign attributes to the block, but the data capturer is not prompted to add attributes. An example of this scenario would be if the Asset Owner were to add an attribute based on a sequence and the sequence number is assigned automatically when the asset is placed in the drawing.

The 'Objects' tab of the 'Graphics Only' node is where you define the layers that contain no attribute data, and to which layers these graphics connections can be connected.
Select the 'Graphics Only' node in the left tree view pane.

1. Select the 'Object' tab in the bottom right pane.

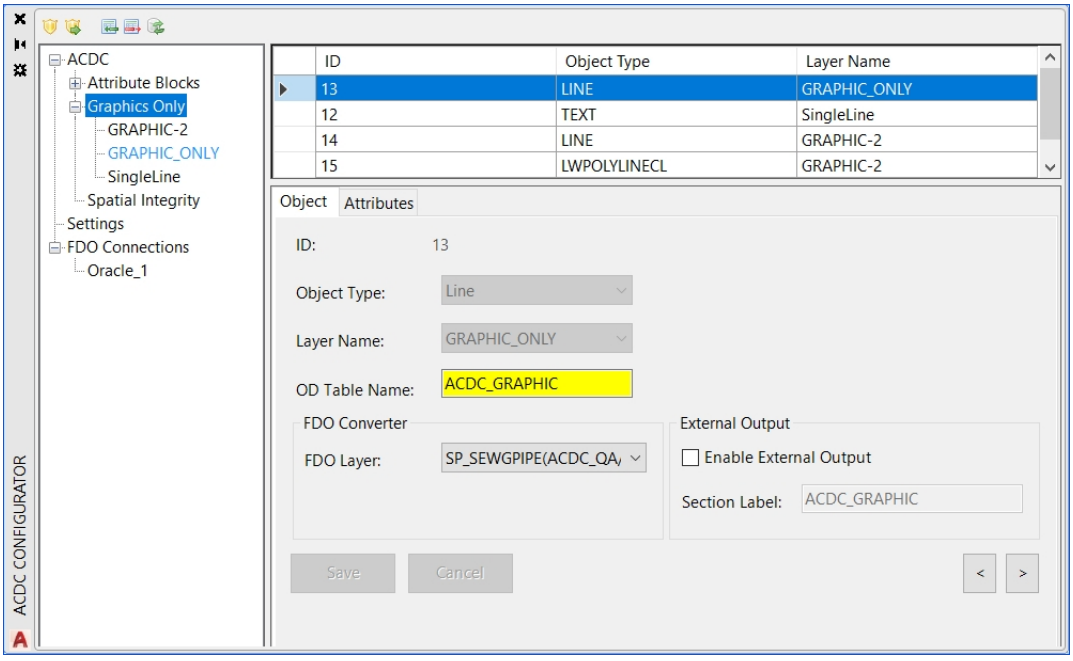


Figure 22 Object Tab for Graphics Only

2. To begin configuring your drawing, press the **Add new record** button  located at the top of the 'Configurator' dialog. This will add a new record to the 'Object' tab.
3. You must now make selections for each of the attributes specified in the bottom right pane of the 'Configurator'. An explanation of each attribute is as follows:
    - **Object Type:** The AutoCAD object type that is used to represent the asset.
      Select from the drop-down menu. The 'Object Type' can be:
        - **Block:** If the asset is represented as a block entity. For example, a Survey Point.
        - **Circle:** If the asset is represented by a circle. For example, a water reservoir such as a tank.
        - **Polygon:** If the asset forms a polygon. For example, a Water reservoir such as a dam.
        - **Polyline:** If the asset is represented as a line entity with two or more series of lines or line segments. For example, a water pipe that consists of multiple line segments.
        - **Single Line Text:** For text within a drawing that needs to be displayed. For example, construction notes.
          NOTE: Single Line Text objects do not have associated blocks.
    - **Layer Name:** The layer that the objects exist on in your drawing file.
    - **Menu Description:** The menu description as displayed in ACDC Configurator.
    - **Menu Group:** The name of the Menu Group to which the block item has been assigned. Select the group from the available drop-down list.
    - **Menu Block Description**: The description of the block as displayed in the Menu bar.
    - **OD Table Name:** The object data table that will be created in the validation process to store the configured attributes for the selected object. By default it will receive the associated block name. While it is strongly recommended to leave this at its default value, the OD Table Name must be less than 25 characters and cannot include any spaces. Please rename appropriately (if required).
    - **FDO Layer:** The layer in your Oracle/MS SQL Server database to which the selected object is to be written.
    - **Enable External Output (check box):** Ticking the box with activate/deactivate the exporting of attributes to CSV/Table. The first column in the CSV/Table file created by ACDC is named 'SECTION_LABEL'. The value that will be written to this column for the current object is automatically defined here in the Section Label field. The file type, name and location are specified by the gExternalOutputTarget, gExternalFile and gExternalFileLocation settings respectively.
4. Once you have populated each of the attributes, press the **Save** button. This will add the record to the top right grid view pane.

Graphics Only – Attributes Tab

The 'Attributes' tab for a 'Graphics Only' block is typically only used when there are default attributes assigned such as Database Sequences or Database Functions. An example of this is where the Asset Owner were to add an Attribute based on a Database Sequence and the next available sequence number is assigned automatically from the database when the asset is placed in the drawing. In this scenario the user is not prompted to capture any attributes.

The following Attribute settings would typically be defined for 'Database Sequence' type attributes for Graphics only Blocks:

- **Mandatory**: By default this is checked as being mandatory, and should remain checked for this scenario.
- **Attribute Type**: Set to Database Sequence
- **Sequence**: Select the appropriate sequence from the drop-down which is populated based on the connection to the database.
- **Data Type**: The data type that will be used to store the attribute. In this scenario for a sequence value, it would most likely be set to Integer.
- **Width**: The maximum allowed number of whole number digits. For 'Real' this will be the maximum number of digits appearing before the decimal place. For example, a Width of 4 would cater for numbers with 4 or less whole digits, such as 10, 1000 but not 10000.

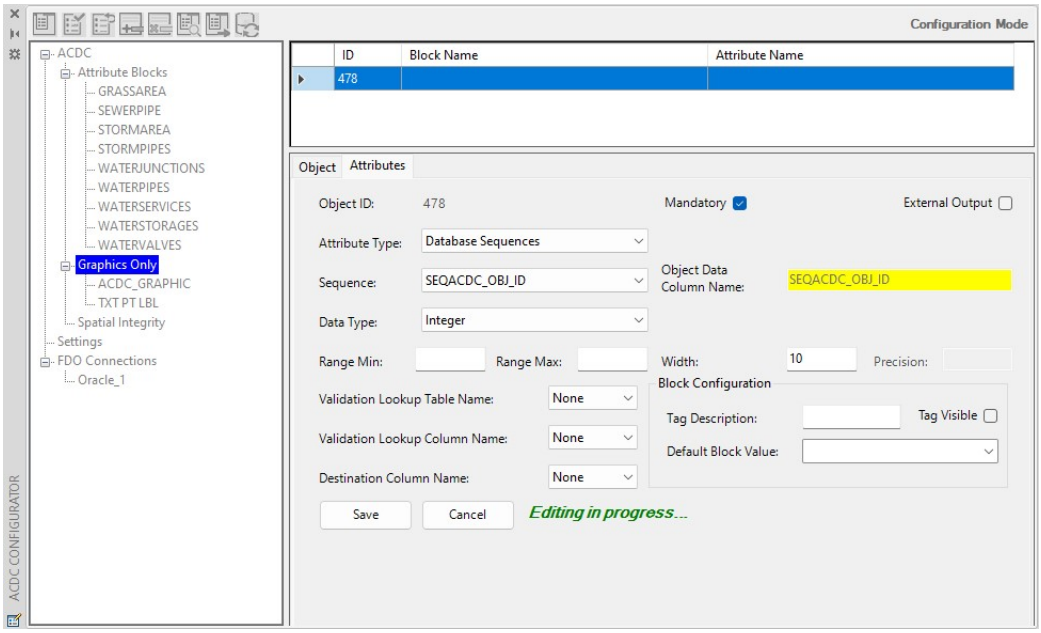


Figure 23 Database Sequence for Graphics Only Attributes

Spatial Integrity – Linear Branch Tab

The 'Linear Branch' tab of the 'Spatial Integrity' node is where you define the layers that contain service connections, and to which layers these service connections can be connected.

1. Select the 'Spatial Integrity' node in the left tree view pane.
2. Select the 'Linear Branch' tab in the bottom right pane.

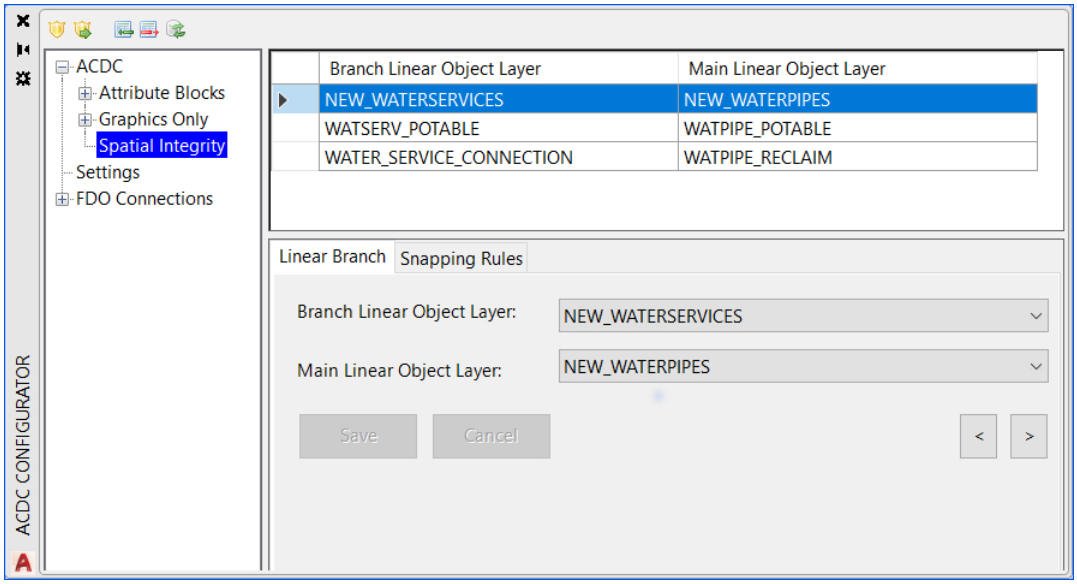


Figure 24 Linear Branch Tab for Spatial Integrity

3. To begin defining linear associations for service connections, press the **Add new record** button  . This will add a new blank record to the top right grid-view pane and two drop-down controls will appear in the bottom-right pane.
4. Select the layer that contains service connections in the 'Branch Linear Object Layer' drop-down.
5. In the 'Main Linear Object Layer' drop-down, select the layer that contains objects to which the service connections can be connected.
6. Press **Save** to save this rule. A new record will appear in the top-right grid view pane.

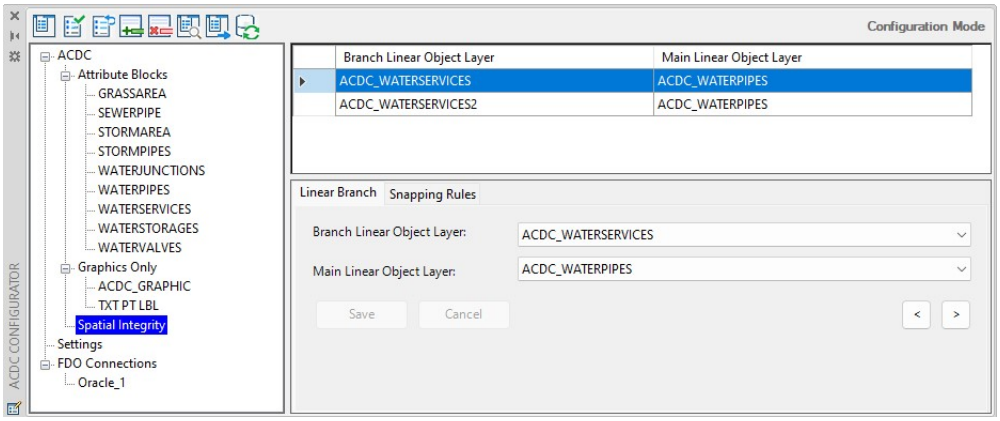


Figure 25 Linear Branch Options

7. Add a new record for each of the different branch/main linear object layer combinations.

Spatial Integrity – Snapping Rules Tab

The 'Snapping Rules' tab of the 'Spatial Integrity' node is where you define the snapping behavior for nodes (blocks) to linear objects. Nodes that fall within the gNodeSnapTol setting will be snapped as defined here.

1. Select the 'Spatial Integrity' node, then select the 'Snapping Rules' tab.

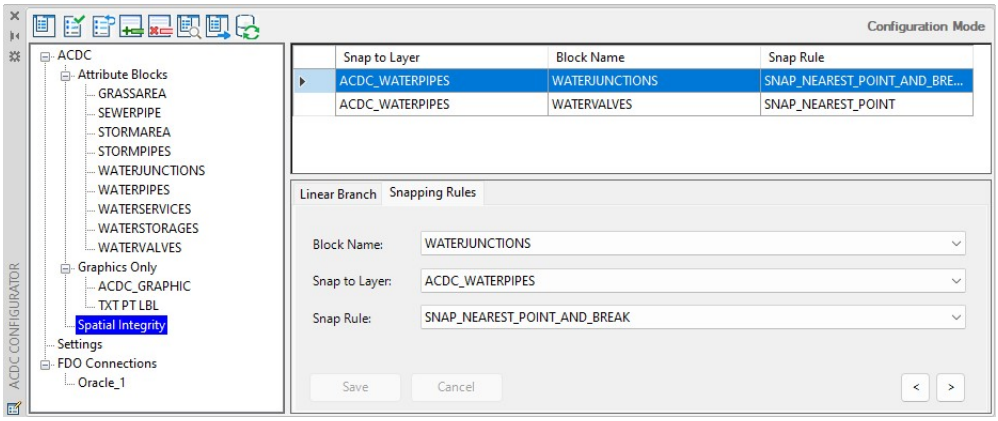


Figure 26 Snapping Rules Tab for Spatial Integrity

2. To define a new snapping rule, right-click and select the **Add Record** button  . This will add a new blank record to the top right grid-view pane and a series of blank drop-downs in the bottom right pane. You must populate each of these drop-downs to define a snapping rule. A definition of each of the drop-downs is as follows:
    - **Block Name:** The name of the block you want snapped.
    - **Snap to Layer:** The name of the layer that contains the linear objects you want the selected blocks to snap to.
    - **Snap Rule:** The snapping behavior. The options for this are:
        a. SNAP_NEAREST_END: This will snap the defined blocks to end points of linear objects in the selected layer.
        b. SNAP_NEAREST_POINT: This will snap the defined blocks to the nearest linear object within the selected layer.
        c. SNAP_NEAREST_POINT_AND_BREAK: This will snap the defined blocks to the nearest linear object within the selected layer, and break the linear object at the snapping location.
3. Press **Save** once you have made the required selections in the drop-downs. This will populate the fields of the new record in the top right grid-view pane.
4. Repeat this process for all the different node to linear object snapping combinations you require.

Verify Configuration

The 'Verify configuration' tool checks for inconsistencies in the configuration. The list of specific checks that this tool performs is located in Verify Configuration Test Details. You must complete this process before continuing on to the 'Validate ACDC Drawing' process.

Before this verification can be run, the user must be connected to the database, they must have loaded the drawing to be validated since some of the verification checks are against layers and blocks which must exist in the drawing, and the user must have opened the Configurator dialog box.

To run the 'Verify configuration' tool open the drawing that is to be verified complete the steps below.

1. Press the **Verify configuration** button  located on the 'Configurator' dialog. This will display the 'Verify configuration' dialog.
2. The 'Verify configuration' dialog will display (Depending on your requirement, select the **Comprehensive Check** box. See Verify Configuration Test Details.
3. On the 'Verify configuration' dialog, press the **Start** button. Once 'Verify configuration' has begun the user can stop the checks by clicking the **Stop** button. However the 'Verify configuration' check will cease without being completed.
4. A series of configuration checks will be performed and the results are displayed in the dialog. The test log is split into sections based on the ACDC systems tables that are being checked. Scroll down the results text box to view the test details. Tests that have "Check Successful" have passed. Tests that fail will contain "Check Failed" followed by a description of the error and a list of the specific objects that violate the check.
5. Monitor the Progress bar to see when the check is complete.

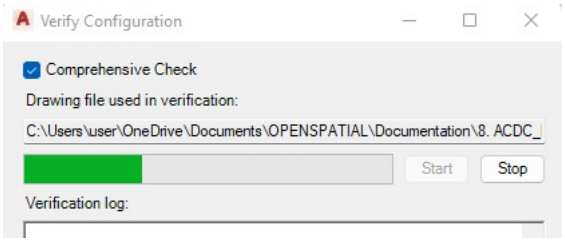


Figure 27 Verify Configuration progress bar

6. If you wish to save the results to a text file, press the **Save to file** button.
7. Close the 'Verify configuration' dialog, by pressing the **Close** button.
8. The results of the 'Verify configuration' process are displayed graphically in the left tree view pane of the 'Configurator' by a series of ticks  (success), exclamation marks  (warnings) and crosses  (errors). All items that have red crosses and exclamation marks beside them must be addressed before proceeding to the Validation Process.

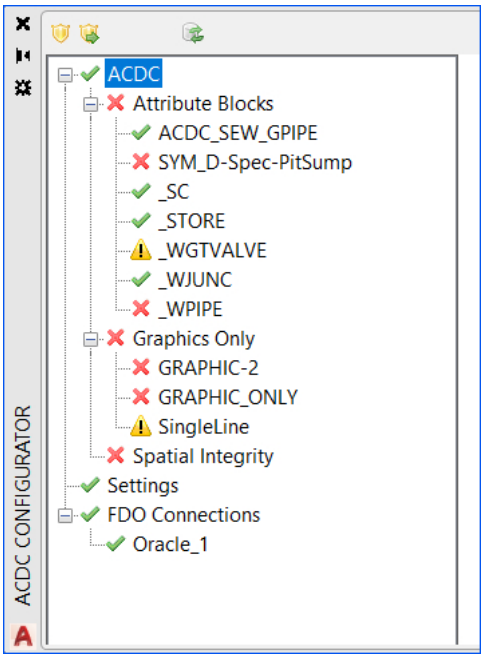


Figure 28 Verify Configuration Tree View

9. To investigate an error/warning, select an item with a red cross (error) or exclamation mark (warning) in the left tree view pane.
10. In the top left of the 'Object' tab grid-view pane, erroneous records that have failed the 'Verify configuration' are flagged by the red cross symbol. These will need to be addressed. Warning messages should also be investigated. You may have to switch tabs in the bottom right window to find the records containing errors/warnings. If you hover your cursor over the symbol in the grid view pane you will be given a description of the error/warning.

In the example below, the configured record is not assigned with a valid destination column name. This is not allowed, so its flagged as an error and must be addressed.

	ID	Block Name	Attribute Name
▶	1	_WPIPE	ACTUAL_LENGTH
	1	_WPIPE	DEPTH
	1	_WPIPE	DIAMETER
	1	_WPIPE	MATERIAL
	1	COMMON_BLOCK	CONTRACTOR_NAME
✖	1	WAE_OBJECT	LINETYPE
	General Error:Attribute LINETYPE is not assigned a valid destination column.		STARTX
	1	WAE_OBJECT	STARTY
	1	WAE_SEQUENCE	ACDCSEQ_ID

Figure 29 Configured Record with an invalid destination Column Name

11. Correct all of the errors as required.

12. Once you have addressed all the detected errors, press the **Clear verification results** button located in the top left corner of the 'Configurator' dialog. This will clear the 'Verify configuration' results graphics from the 'Configurator'.
13. Re-run the 'Verify configuration' tool. If no red crosses are generated in the left tree view pane, you can move on to the Validation Process.

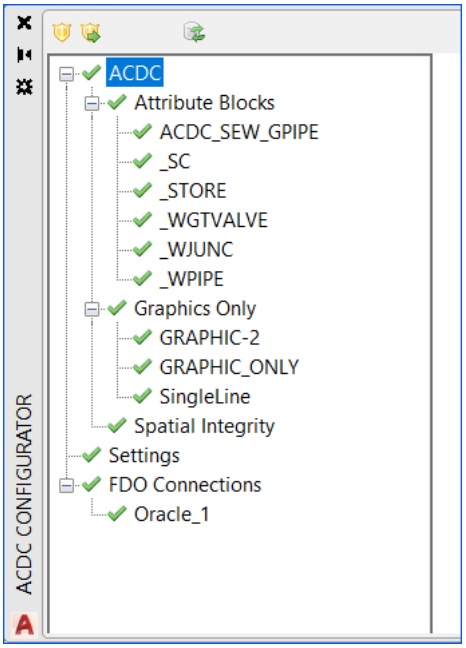


Figure 30 Successful Verify Configuration Tree View

Verify Configuration Test Details

The 'Verify Configuration' tool performs a series of tests on the configuration and the currently open drawing file. The 'Comprehensive Check' box exists to allow additional checking of data types and formats such as width, precision and max length against the destination table. If working with data types that use these parameters, it is a good idea to check the box as it will detect if the data format of an attribute can be written to the FDO data source. This option can slow the verification check. An explanation of each of the tests performed by the 'Verify Configuration' tool is listed below. The test details below are listed in the same order as in the 'Verify Configuration' log file.

The tests in this section verify the settings you specified in the 'Settings' node of the 'Configurator'.

Table 1: Validating OSX_AP_SETTING Table

Check No.	Description
1.1	This check verifies that all the saved settings values are valid.

This section refers to checks carried out on the records you created in the 'Object' tab of the 'Attribute Blocks' node.

Table 2: Validating WAE_OBJECT Table

Check No.	Description
2.1	General Description: Tests that features defined in the 'Object' tab have had attributes created for them in the 'Attributes' tab. Technical Description: Checks that ID values in WAE_OBJECT exist as FK_ID values in WAE_ATTR_MAP.

2.2	General Description: Tests that features defined in the 'Object' tab have had blocks created for them in the 'Attributes' tab. Technical Description: Checks that ASSOC_BLOCK_NAME values in WAE_OBJECT exist as BLOCK_NAME values in WAE_ATTR_MAP.
2.3	General Description: Checks that blocks referred to in the 'Object' tab exist in the currently open drawing. Technical Description: Checks ASSOC_BLOCK_NAME values in WAE_OBJECT exist in the currently open drawing.
2.4	General Description: Checks that layers selected in the 'Layer Name' drop-down in the 'Object' tab exist in the currently open drawing. Technical Description: Checks ACDC_LAYER values in WAE_OBJECT exist in the currently open drawing.
2.5	General Description: Checks that layers selected in the 'Associated Block Layer' drop-down in the 'Object' tab exist in the currently open drawing. Technical Description: Checks ASSOC_BLOCK_LAYER values in WAE_OBJECT exist in the currently open drawing.
2.6	General Description: Checks that records in the 'Object' tab that you used the 'Duplicate' tool on have the same 'OD Table Name' value. Technical Description: In WAE_OBJECT, this test checks that records with the same ID value also have the same OD_TABLE_NAME value.
2.7	General Description: Checks that each 'OD Table Name' has been assigned to only one object. Technical Description: Checks that each OD_TABLE_NAME value has only one corresponding ID value (unique).
2.8	General Description: Checks that each 'OD Table Name' does not contain any space characters. Technical Description: Checks that each OD_TABLE_NAME value does not contain space character.
2.9	General Description: Verifying Object Type in WAE_OBJECT.ACAD_OBJECT_TYPE. Technical Description: The purpose is to check if the column value of ACAD_OBJECT_TYPE is correct or not.
2.10	General Description: Verifying FDO layer geometry types against WAE_OBJECT.ACAD_OBJECT_TYPE. Technical Description: The purpose is to check if the FDO layer's geometry type is compatible with ACAD_OBJECT_TYPE (such as if FDO layer's geometry is POLYGON while ACAD_OBJECT_TYPE is POLYLINE, they are incompatible).

This section refers to checks carried out on the records you created in the 'Attributes' tab of the 'Attribute Blocks' node. Check number 3.10 is only run when the 'Comprehensive Check' box is checked on the 'Verify configuration' dialog.

Table 3: Validating WAE_ATTR_MAP Table

Check No.	Description
3.1	General Description: Checks that attributes defined in the 'Attributes' tab are referenced to an existing object in the 'Object' tab. Technical Description: Checks that FK_ID values in WAE_ATTR_MAP table have matching ID values in WAE_OBJECT table.
3.2	General Description: For attributes defined as type 'Block Attributes' in the 'Attributes' tab, this check verifies that blocks exist in the currently open drawing file that actually contain the defined attributes. Technical Description: BLOCK_NAME/TAG_NAME combinations in the WAE_ATTR_MAP table exist in the currently open drawing. This only applies where TAG_TYPE = BLOCK.
3.3	General Description: Checks that database sequences referenced in the 'Attributes' tab exist is the ACDC database/schema. Technical Description: For records in WAE_ATTR_MAP where TAG_TYPE = SEQUENCE, the associated TAG_NAME value exists as a sequence in the ACDC database/schema.
3.4	General Description: Checks that database functions referenced in the 'Attributes' tab exist is the ACDC database/schema. Technical Description: For records in WAE_ATTR_MAP where TAG_TYPE = FUNCTION, the associated TAG_NAME value exists as a function or stored procedure that does not accept any input variables in the ACDC database/schema.
3.5	General Description: For attributes of type 'Block Attributes', this test checks that the 'Block Name' selected in the 'Attributes' tab matches the 'Associated Block Name' from the 'Object' tab. Technical Description: Checks that the 'BLOCK_NAME' value in the WAE_ATTR_MAP table matches the ASSOC_BLOCK_NAME in the WAE_OBJECT table.
3.6	General Description: Checks that multiple attributes for a single object do not reference the same destination column. Technical Description: For each FK_ID in WAE_ATTR_MAP, this check searches for duplicate entries in the TAB_FLD_NAME column.
3.7	General Description: Checks that the lookup tables referenced in the 'Attributes' tab exist in the ACDC schema. These can be tables, views, or materialized views. Technical Description: Checks for lookup tables specified in LU_TABLE_NAME column of WAE_ATTR_MAP in the ACDC schema/database.
3.8	General Description: Checks that all attributes have been assigned to a destination column or been set to "External Output".
3.9	General Description: Checks length of column name in Object Data Table. Technical Description: Checks if the length of each column name in the Object Data Table is less than or equals to 30.

3.10	General Description: Checks data type (character, integer, real or date) is compatible with the destination table column. Checks if the Precision and Width of 'Real' and the Max length of 'Character' data types does not exceed the size of the destination table column. Technical Description: Checks that DATA_TYPE + DATA_SIZE is valid for the TAB_FLD_NAME of TABLE_NAME defined in WAE_OBJECT when the TAB_FLD_NAME is not null.

This section refers to checks carried out on the records created in the 'Linear Branch' tab of the 'Spatial Integrity' node.

Table 4: Validating WAE_SC_LINK Table

Check No.	Description
4.1	General Description: Checks that all Branch Linear Object Layers in the 'Linear Branch' tab of the 'Spatial Integrity' node exist in the currently open drawing. Technical Description: Checks that each layer specified in the SC_LAYER column of the WAE_SC_LINK table exist in the currently open drawing.
4.2	General Description: Checks that all Main Linear Object Layers in the 'Linear Branch' tab of the 'Spatial Integrity' node exist in the currently open drawing. Technical Description: Checks that each layer specified in the MAIN_PIPE_LAYER column of the WAE_SC_LINK table exist in the currently open drawing.

This section refers to checks carried out on the records you created in the 'Snapping Rules' tab of the 'Spatial Integrity' node.

Table 5: Validating WAE_PIPE_BREAK Table

Check No.	Description
5.1	General Description: Checks that layers selected as 'Snap to Layer' in the 'Snapping Rules' tab of the 'Spatial Integrity' node exist in your configuration. Technical Description: Checks that layers specified in the PIPE_LAYER_NAME column of the WAE_PIPE_BREAK table exist in the ACAD_LAYER column of WAE_OBJECT.
5.2	General Description: Checks that blocks selected as 'Block Name' in the 'Snapping Rules' tab of the 'Spatial Integrity' node exist in your configuration. Technical Description: Checks that layers specified in the BLOCK_NAME column of the WAE_PIPE_BREAK table exist in the ASSOC_BLOCK_NAME column of WAE_OBJECT.
5.3	General Description: Checks that all layers selected as 'Block Name' in the 'Snapping Rules' tab of the 'Spatial Integrity' node exist in the currently open drawing. Technical Description: Checks that each layer specified in the BLOCK_NAME column of the WAE_PIPE_BREAK table exist in the currently open drawing.

5.4	General Description: Checks that all layers selected as 'Snap to Layer' in the 'Snapping Rules' tab of the 'Spatial Integrity' node exist in the currently open drawing. Technical Description: Checks that each layer specified in the PIPE_LAYER_NAME column of the WAE_PIPE_BREAK table exist in the currently open drawing.

This section refers to checks carried out on the drawing file.

Table 6: Validating DWG File

Check No.	Description
6.1	General Description: Checks for blocks and block attributes in the drawing that are not referred to in your configuration. Technical Description: Checks for blocks and block attributes in the drawing that are not referred to in the BLOCK_NAME and TAG_NAME columns of the WAE_ATTR_MAP table.
6.2	General Description: For all blocks within the currently open drawing file, this test checks for duplicate attribute names within the same block.
6.3	General Description: Checks for layers in the currently open drawing file that have not been selected in the 'Layer name' drop-down in the 'Object' tab of the 'Attribute Blocks' node. Technical Description: Checks for layers in the currently open drawing file that are not in the ACAD_LAYER column of WAE_OBJECT.
6.4	General Description: Checks for layers in the currently open drawing file that have not been selected in the 'Associated Block Layer' drop-down in the 'Object' tab of the 'Attribute Blocks' node. Technical Description: Checks for layers in the currently open drawing file that are not in the ASSOC_BLOCK_LAYER column of WAE_OBJECT.
6.5	General Description: Checks that all attribute names for all blocks in the currently open drawing are valid. Technical Description: Checks that all attribute names for all blocks in the currently open drawing are less than 32 characters long, unique per block, contain no spaces, and start with an alphanumeric character.

Menu Mode

Menu Mode allows Administrator users to configure and generate menus for the configuration of different AutoCAD and BricsCAD versions. It also enables the Administrator to add or remove Menu Groups, manage nested Menu Groups within the Parent Menu Group, and add separators between the various Menu Groups.

This functionality provides the mechanism to configure, re-order and create customized menus consisting of menu groups, and nested menu groups, to generate a .mnu file. In Configuration Mode, each of the Attribute Blocks can then assigned to the respective Menu Group so that they appear as a menu item for placement within the CAD drawing.

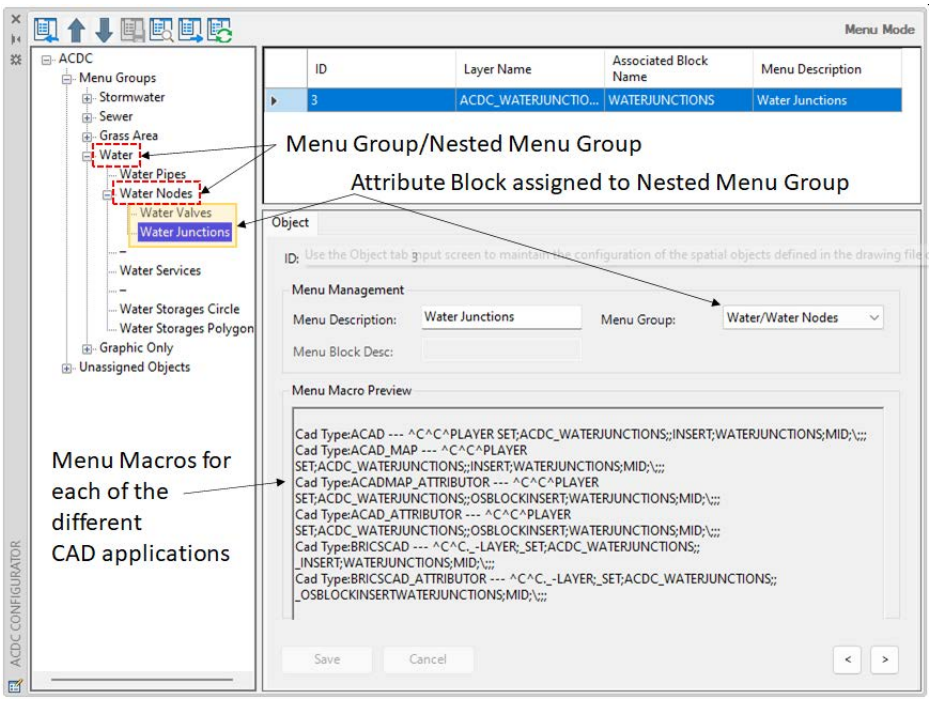


Figure 31 Menu Mode displaying Menu Groups and Nest Menu Groups with assigned Attribute Blocks

Once the Menu is generated as a .mnu and loaded in AutoCAD / BricsCAD using the 'MENULOAD' command, the menu is compiled, and the Attribute Blocks are displayed as menu items so they can be placed in the drawing by simply selecting the required menu option.

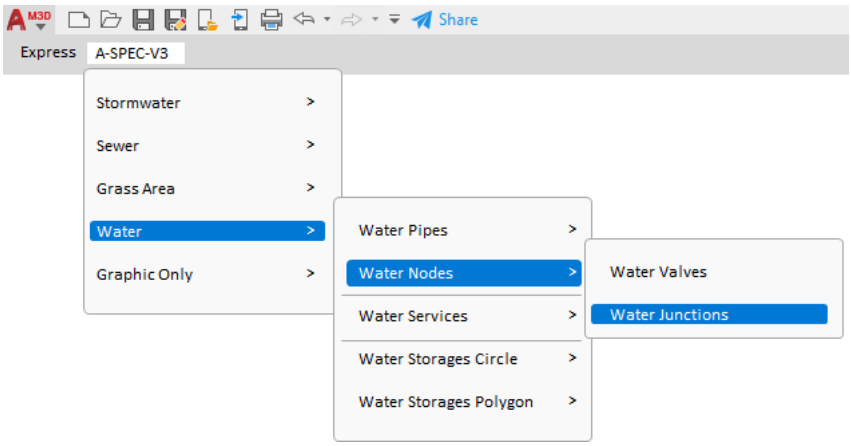


Figure 32 Resultant Menu layout when loaded in AutoCAD

Menu Buttons

Below is an explanation of the functionality of the buttons in 'Menu Mode'.

Edit ACDC Configuration. Switches the Configurator to Configuration Mode if in Menu Mode.

Move menu item/group up. Moves selected Menu Group or Separator up the menu structure tree.

Move menu item/group down. Moves selected Menu Group or Separator down the menu structure tree.

Save menu layout. Saves the menu layout to the database. This button is only available once a change has been made.

Preview menu layout. Displays a preview of the configured menu layout.

Generate menu. Generates the menu as a .mnu file.

Refresh data. Refreshes the 'Menu Mode with the data stored in the ACDC system tables. It also refreshes the left tree view pane with all the Menu Groups.

Tree Pane

The ACDC Tree Pane displays two branches, namely Menu Groups and Unassigned Objects.

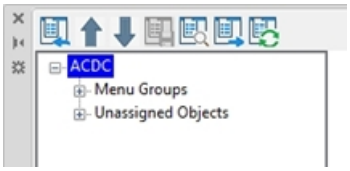


Figure 33 ACDC Tree Pane

The **Menu Groups** branch can be expanded to display the various menu groups configured in the menu structure.

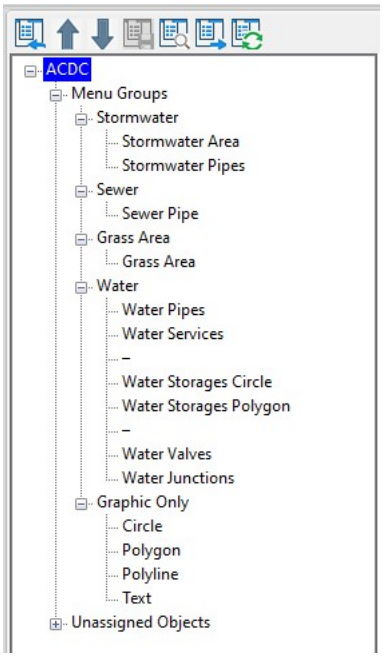


Figure 34 Expanded Menu Groups

The **Unassigned Objects branch** can be expanded to display Menu items which have not yet been assigned to a Menu Group.

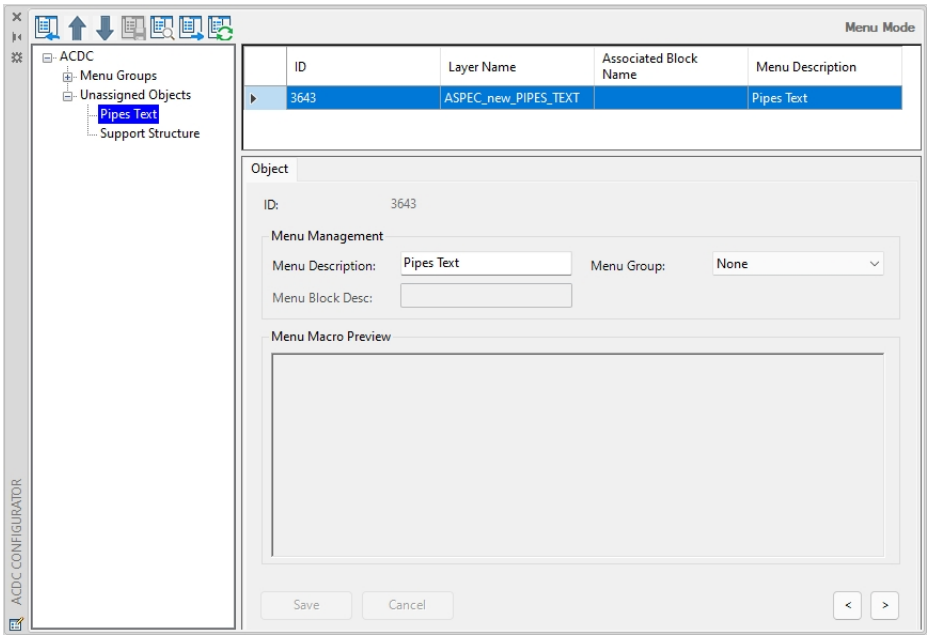


Figure 35 Expanded Unassigned Objects

Menu Mode Tree Pane Context Menu

The following context menu options are available when right clicking inside the Tree Pane:

- **Refresh Data:** Refreshes the Tree Pane with the data stored in the ACDC system tables.
- **Sort Ascending:** Sorts the Tree Pane in Ascending order.
- **Sort Descending:** Sorts the Tree Pane in Descending order.
- **Expand All:** Expands all branches in the Tree Pane.
- **Collapse All:** Collapses all branches in the Tree Pane.

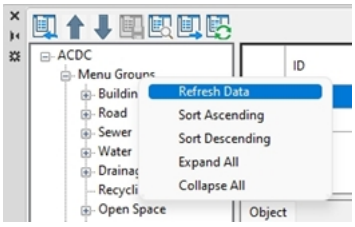


Figure 36 Menu Mode Right Click Context Menu

NOTE: Ordering the Menu Groups by 'Ascending Order' or 'Descending Order' will change and retain the order of the Menu Groups in the menu structure if the user were to select the 'Save Menu Layout'  button after sorting.

Adding a New Menu Group

To add a new Menu Group, complete the steps below:

1. Select the Menu Groups node in the left tree pane view.
2. Right-click in the content pane and select the 'Add Record' option.

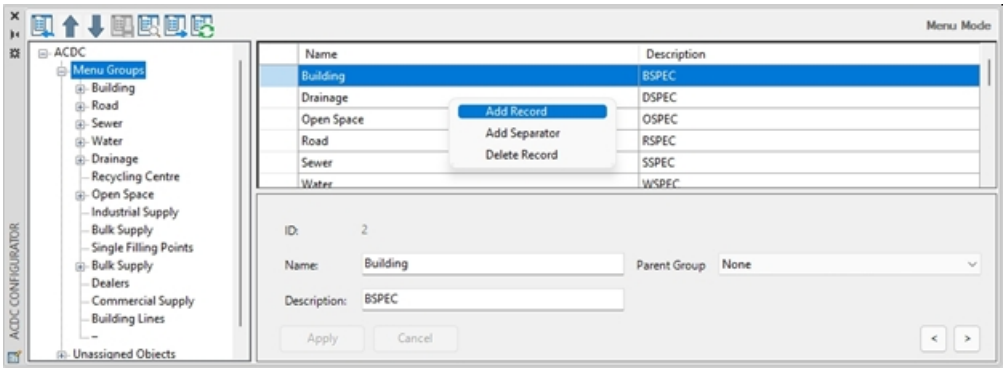


Figure 37 Adding a New Menu Group

3. Enter a unique Menu Group Name and meaningful Description whilst leaving the Parent Group as the default value of 'None'.

NOTE: In terms of Menu hierarchy, in order to create the Parent Menu Group, it is necessary to leave the Parent Group value as 'None'.

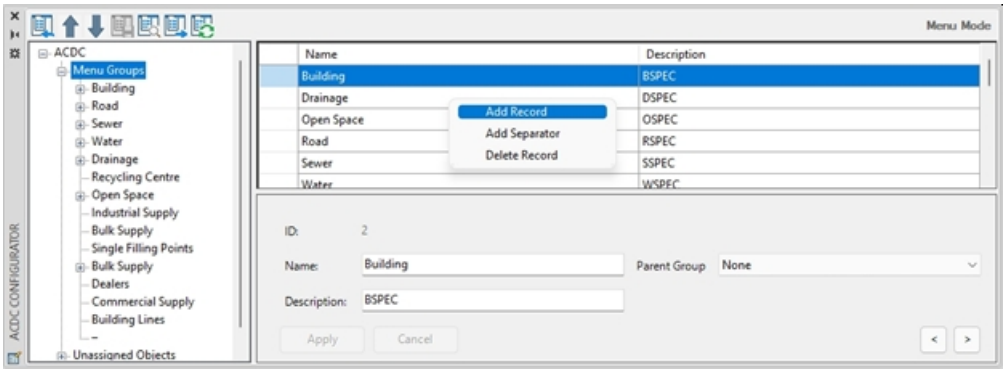


Figure 38 Capture Menu Group Details

4. Once complete, select the 'Apply' button where the dialog box will automatically refresh and display the new Menu Group in the tree pane.
5. Selecting the 'Cancel' button will prompt the user to confirm they want to discard the changes.

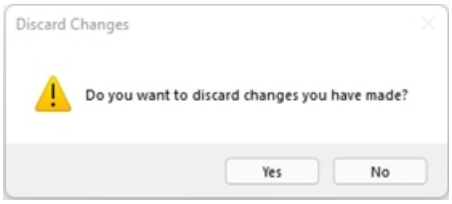


Figure 39 Selecting the Cancel option when creating a new Menu Group

6. You can change the order of the Menu Group records by using the  or  arrow buttons.

7. Select the 'Save Menu Layout' button  to save the menu configuration changes to the ACDC configuration database.

Adding a Nested Menu Group

To add a nested Menu Group to an existing Menu Group, complete the steps below:

1. Select the Menu Groups node in the left tree pane view.
2. Right-click in the content pane and select the 'Add Record' option.
3. Enter a unique Menu Name and meaningful Description and select the Parent Group to which you want the menu item to be assigned to from the list in drop-down list.

NOTE: The Parent Group drop-down list corresponds to the Parent Group menus listed in the Menu Groups node in the left tree pane view.

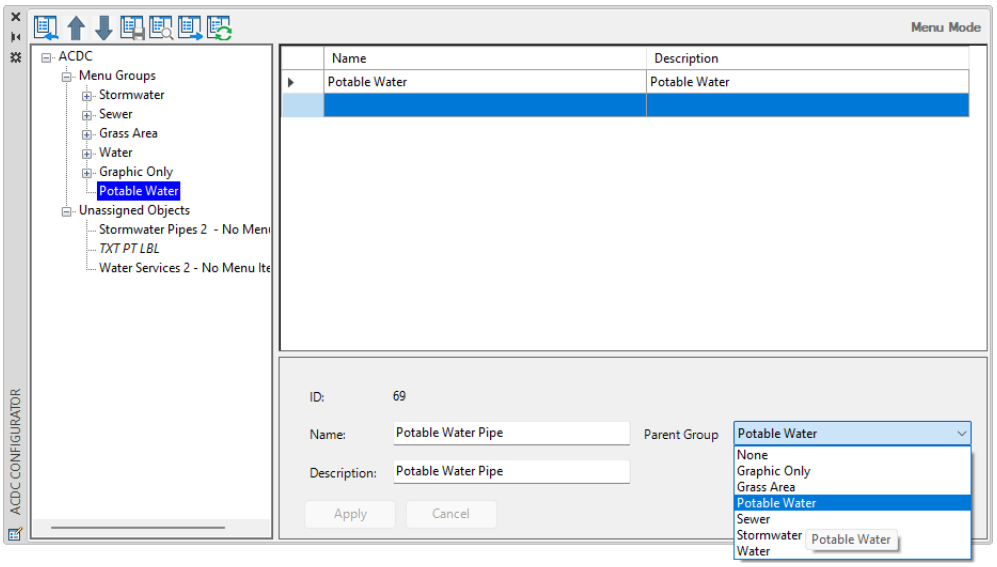


Figure 40 Adding a New Menu item and assigning to a Menu Parent Group

4. Once complete, select the 'Apply' button where the dialog box will automatically refresh and display the nested Menu Group under the selected Parent Group in the tree pane.

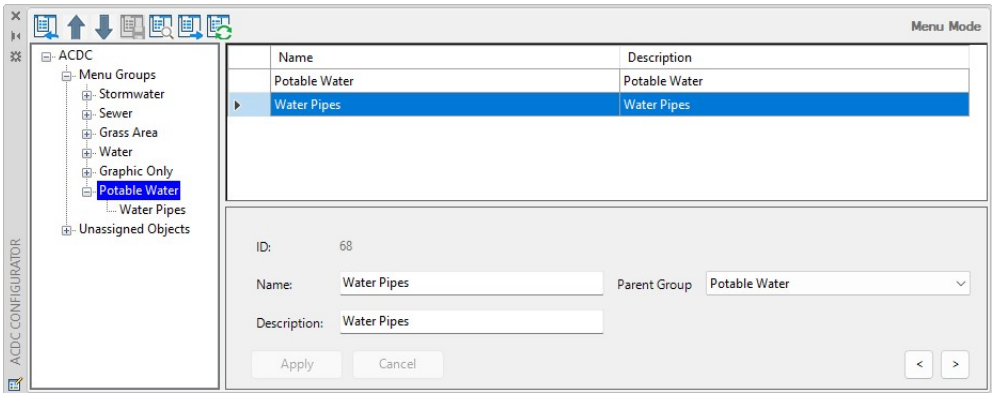


Figure 41 Result of adding new Menu item and assigning to a Menu Group

5. You can preview the layout of the menu by selecting the 'Preview menu layout' button  and navigate through the menu groups and associated menu items.

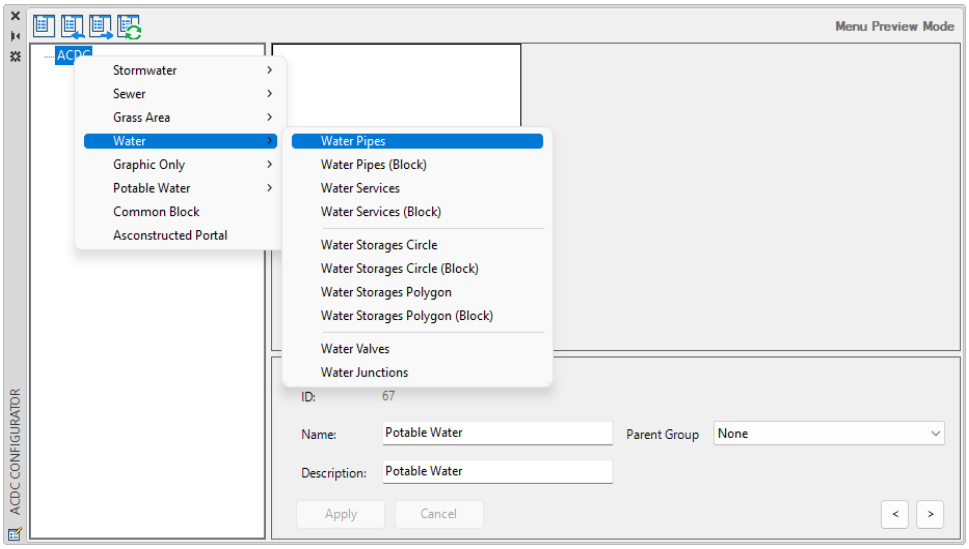


Figure 42 Preview menu layout

6. Select the 'Edit ACDC menu layout configuration' button  to return to Menu Mode.

Delete a Menu Group

To delete a Menu Group, complete the steps below:

1. Expand the Menu Groups node in the left tree pane view.
2. Select the Menu Group to be deleted. The Menu Group record will be populated in the content pane.
3. In the content pane, select the record to delete so that it is highlighted, and then right click and select the 'Delete Record' option.

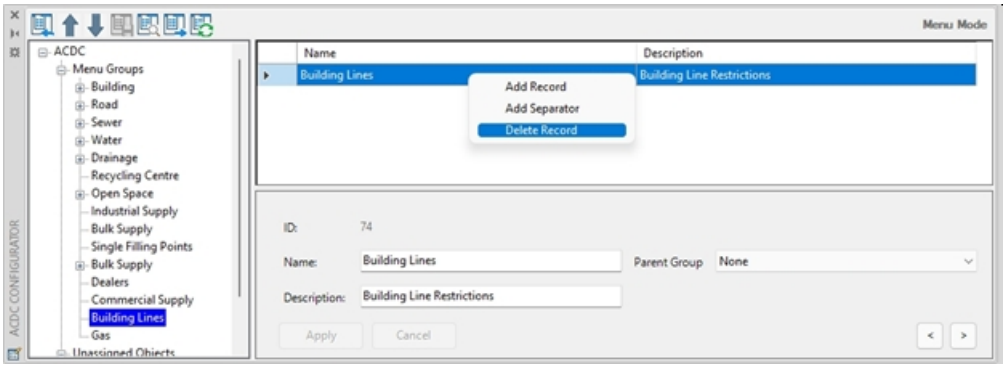


Figure 43 Delete a Menu Group

4. The user is presented with the 'ACDC Configurator – Delete Menu Group' confirmation message. Select **Yes** to confirm deletion or **No** to cancel and return to the content pane.

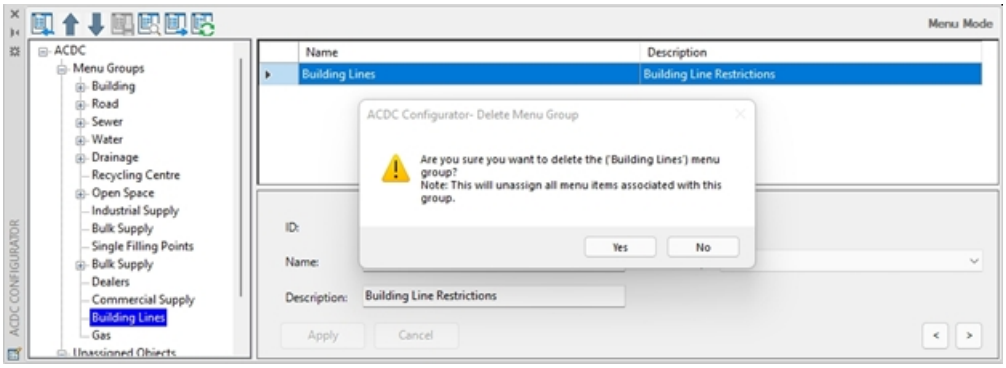


Figure 44 Delete Menu Group confirmation message

5. Upon successful deletion, the Tree Menu is automatically refreshed, and the deleted Menu Group record is removed.
6. Select the 'Save Menu Layout' button to save the changes to the ACDC configuration database.

NOTE: When deleting a Menu Group the deletion process unassigns all menu items associated with the Menu Group. These menu items can be viewed under the 'Unassigned Objects' node in the tree pane.

Add Menu Separator

To add a new separator between Menu Groups or nested Menu Groups, complete the steps below:

1. Select the Menu Groups node in the left tree pane view.
2. Right click in the content pane and select the 'Add Separator' option.

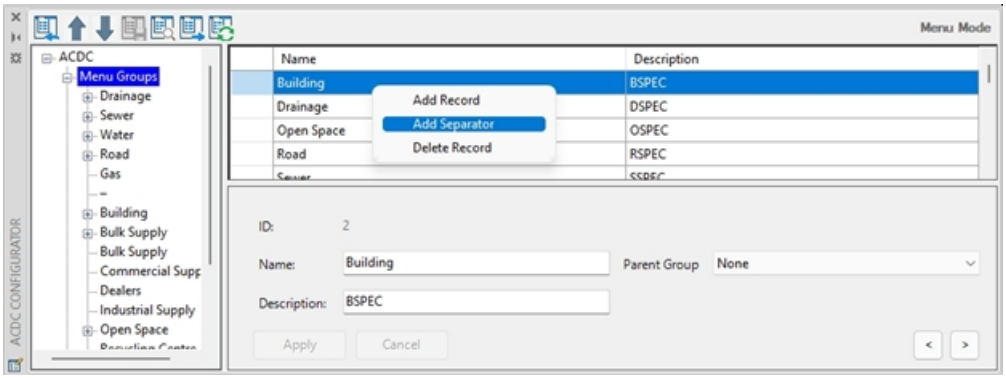


Figure 45 Add Separator from context menu

3. This will add a new Separator node to the bottom of the list of Menu Groups.

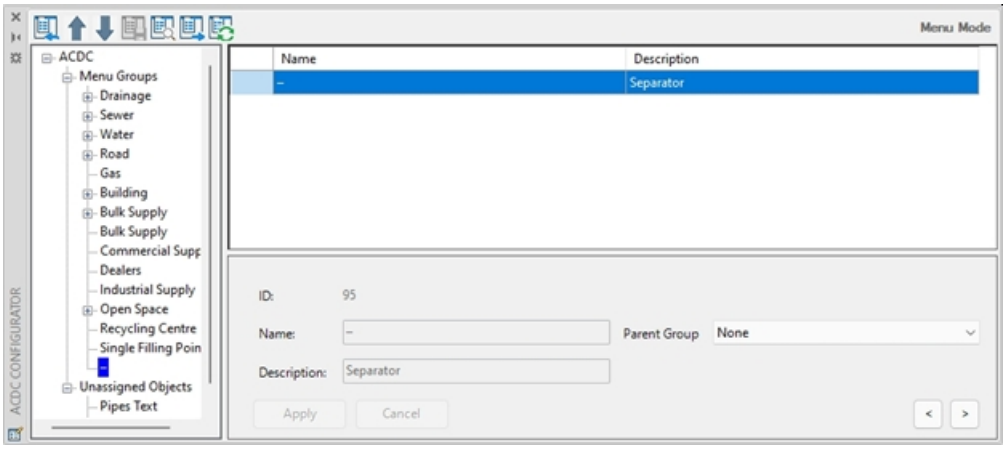


Figure 46 Add Separator record

4. The Separator node can be moved up or down the menu structure using the Up or Down arrow buttons.

5. Select the 'Save Menu Layout' button to save the changes to the ACDC configuration database.

6. The Separator will display as a separation line when selecting the Preview Menu option.

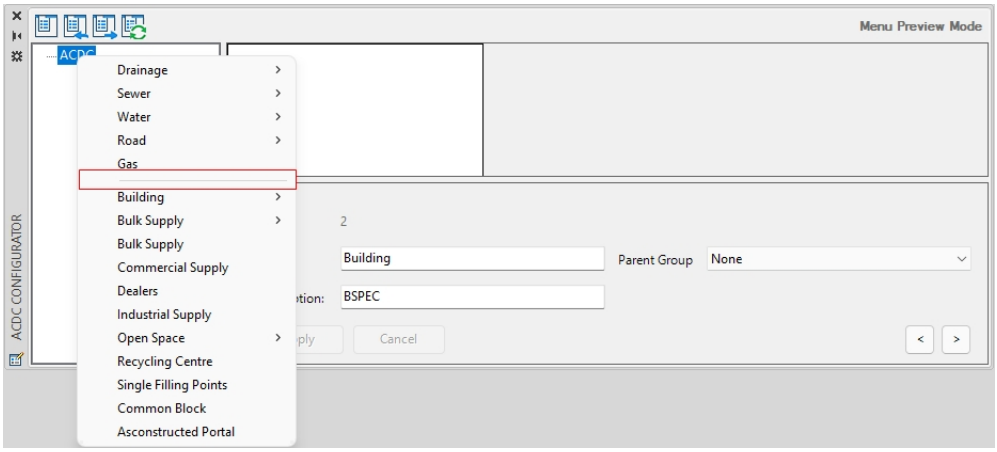


Figure 47 Separator in Preview Menu

Generate Menu

Selecting the 'Generate Menu' icon generates the menu layout and allows the user to save as a menu (.mnu) file. The user is prompted to add the following:

- **Menu Type:** The user must select one option from the drop-down list which consists of the following Menu Types:
  - ACAD
  - ACAD_ATTRIBUTOR
  - ACAD_MAP

- ACADMAP_ATTRIBUTOR
- BRICSCAD
- BRICSCAD_ATTRIBUTOR

- **Group Name**: Partial customization File name, for example ‘ASPEC_V3’
- **Menu Name**: Menu Name which is displayed on the Menu bar when the menu is loaded within AutoCAD or BricsCAD, for example ‘A-SpecV3’.

The user is then prompted to ‘Save’ the .mnu file by typing in a Menu File name and the location where the menu file can be loaded into AutoCAD, AutoCAD Map to BricsCAD.

Once the menu is loaded in AutoCAD or BricsCAD using ‘MENULOAD’ command, the menu is compiled and appears in the Menu Bar at the top of the screen.

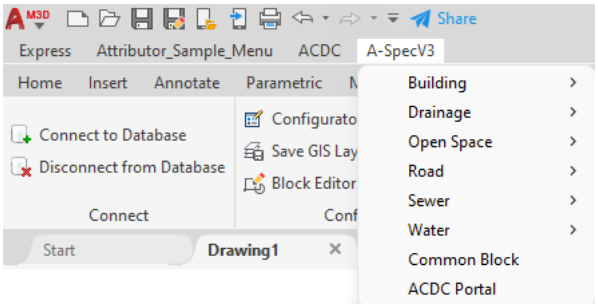


Figure 48 AutoCAD Menu bar displaying Partial Customized Menu A-SpecV3

The ‘MENULOAD’ command generates the Customized User Interface menu files (.cuix for AutoCAD or .cui for BricsCAD) which can be opened and tweaked in AutoCAD or BricsCAD using the ‘CUI’ command.

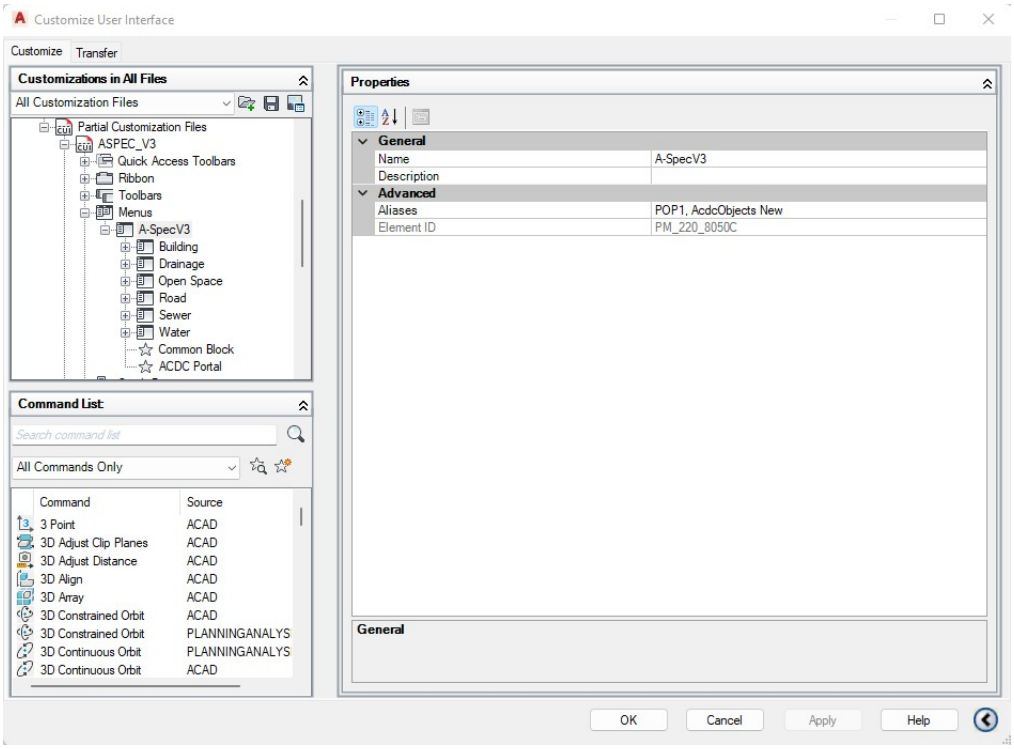


Figure 49 AutoCAD Customize User Interface (CUI) in AutoCAD

Using AutoCAD's CUI command (Customize in BricsCAD) the Macros assigned to the various menu items can also be edited.

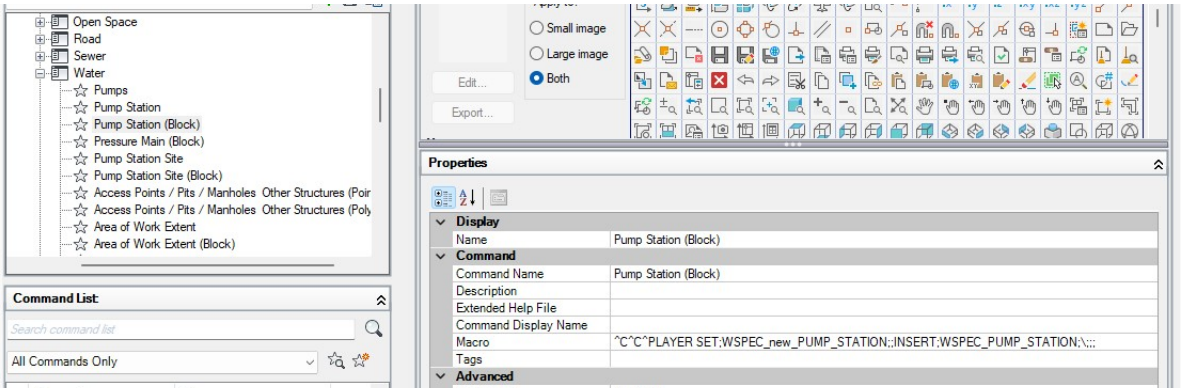


Figure 50 AutoCAD CUI to edit Macros.

Validation Process

The Validation process compares the data within the currently open drawing file with the stored configuration and validation rules. These rules are constructed during the configuration process. Data that violates the defined rules will be flagged as errors and must be address before the data can be converted. Once all errors are addressed, the Validator will construct all the required attribute information into the format defined in your configuration. The attribute information for each asset in the open drawing will be stored in object data tables created on each applicable object in the drawing.

If a drawing has already been validated then the system will display the following message on the command line: "**Drawing already validated - exiting routine**". The routine automatically exits and does not delete the Object Data tables.

If the user clicks on cancel, while it is still processing objects then orphan records will also now be removed from the WAE_ERRORS_OBJ database table.

If the drawing has not yet been validated then the system will proceed with validation and delete the object data tables.When this happens drawings which has previously been validated may have changed geometry objects such as splitting of linear objects.

Compound Validations

Compound Validations allow users to configure additional attribute, spatial or a combination of attribute and spatial rule checks based on comparisons, ranges, limits, multi value lists etc. These additional Compound Validations can be categorized into three main types:

- Compound Attribute Validations
- Compound Spatial Validations
- Compound Spatial/Attribute Validations

The table **WAE_ATTR_RULEMAP** maps the various Compound Validations error types (WARNING or ERROR) for different rule type configurations. This table also sets the order in which the rules are applied. The rule parameters determine what criteria the rules must meet in order to pass or fail.

There are various Rule Types that can be configured as per the examples provided below:

- Compound Attribute Validations (Examples)
  - **FORMATSTR** - Checks for a single character in a text string and if matches returns True, no match returns False.
  - **SUBSTR** - Checks for a specific character, or string of characters in a sequence, applies the operator defined and returns a False if criteria is not met, and the Error is logged.

NOTE: See the list of permitted operators include: equal to (**EQ**), not equal to (**NEQ**), greater than (**GT**), less than (**LT**), greater than and equal to (**GTE**), and less than and equal to (**LTE**).

  - **MVCHECK** - Used for scenarios where if a pipe is captured with a certain material, then the permitted pipe diameter must match what is configured.

NOTE: Where the rule type is configured as MVCHECK, the list of configured multi value attributes are stored in the table WAE_ATT_MVRULECHECK.

  - **COMPARECHECK** - Used for scenarios where if, in the example of gravity mains, the upstream manhole invert level must be greater than the downstream invert level

- **MULTICHECK** - Used for scenarios where if a Storm water manhole is captured exceeding a specific depth, there needs to be a certain number of rungs captured for access to the pipe.
- **RANGEEX** - Checks if a value falls within a specified minimum and maximum range of values. Exception values can also be specified.
- **VALUECHECK** - Checks if a number value is equal to (EQ), not equal to (NEQ), greater than (GT), less than (LT), greater than and equal to (GTE) or less than and equal to (LTE) a specified numeric value.

- Compound Spatial Validations (Examples)
  - **ISINSIDE** - Checks to make sure there is a certain object within another object, for example: a Road Centerline must be captured within a Road Surface Area.
  - **LINKLIMIT** - Checks if more than one pipe exits from a single node such as a manhole.
  - **NODELIMIT** - Checks on a pipe with connecting valves that the minimum number of valves permitted is one and maximum is 2.
- Compound Spatial/Attribute Validations (Examples)
  - **RACHECK** - Related Attribute checks for example: The diameter of a fitting must match the diameter of the pipe
  - **CHECKLINK** - Checks where an attribute value assigned to one object matches another object's attribute value based on a spatial link between the two objects such as object one being INSIDE, or CROSSING the second object.
  - **DISTCHECK** - Checks the number of secondary objects WITHIN/MAX/MIN distance of the primary object. Used in scenarios to generate warning/error messages if a road centerline within a road polygon does not have matching road name.

NOTE: Currently, the compound validations are configured on the customer database by means of SQL scripts. It is recommended that you contact the Support Team at Open Spatial to assist with determining and configuring these validation rules.

Run the 'Validate ACDC Drawing' Tool

To complete the validation process, follow the steps below.

1. Press the **Connect to Database** button  and connect to the database that contains the ACDC system tables.
2. Press the **Validate ACDC Drawing** button  located on the ACDC toolbar.
3. When prompted to overwrite the validation report file, select the appropriate option ('Y' will overwrite all data in the report file, while 'N' will add the new information to the end of the file). You can inspect this file for a list of all the validation errors.
4. When prompted to select the objects based on 'Current' or 'All' configured layers, if the selection parameter is set to 'All' then all configured layers present in the drawing will be turned on (thawed). If the selection is set to 'Current' then only layers which are not configured will be turned off/frozen.
5. Select the objects you wish to validate against your stored configuration. You can do this by either manually selecting the objects in your drawing using the mouse, or you can simply type "all" to

select all the objects within the drawing file. It is recommended that you always run the Validator on ALL objects in your drawing.

6. Press the 'Enter' key on your keyboard, or press the right-button on your mouse to begin the validation routine.
7. Upon completion, the results of the validation routine will be printed on the command line. Select F2 button to display an expanded view of the Command Line to be able to view the results.

If errors were detected, the following information will be written to the log file, in the following syntax: **[Number of objects] [Entity Type(s)] on layer [Entity Layer] skipped. Entity Type not valid in configuration**.

An error message will also be printed on the command line and error circles will be placed in the open drawing file.

If any errors are picked up during the validation process then the Enhanced Attribute Editor dialog will be displayed. In this the error blocks will be displayed with the entity name (blockname) and layer name. This will avoid any confusion the user may have as to which error pertains to which block.

When validating a geometry type, if the drawn geometry type does not match the configured geometry types for line, point and polygon objects, the system will display an error in the validation results in the following syntax e.g. **Incorrect Object Type (SPLINE). - [Layer: OSPEC_NEW_AREA_EXTENT].**

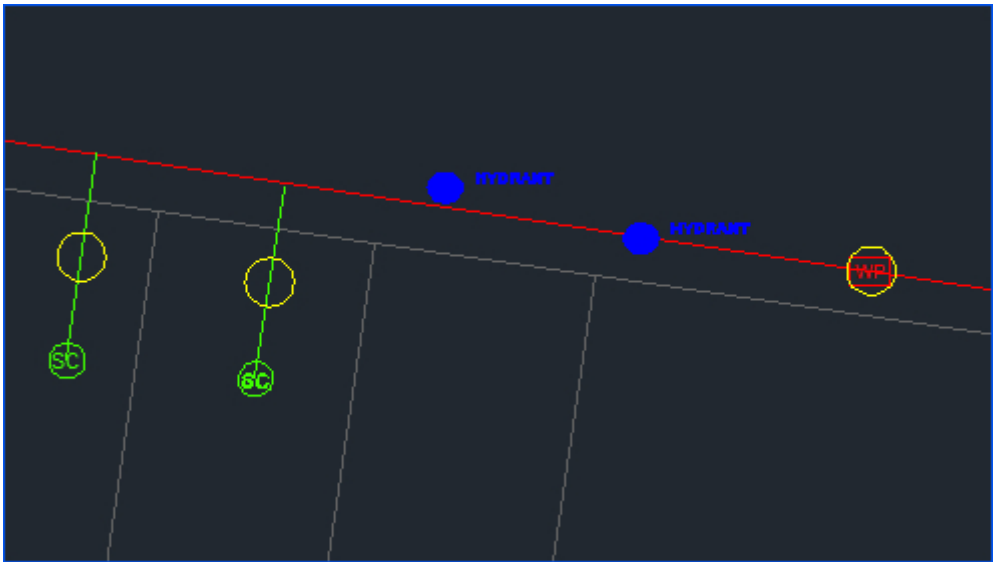


Figure 51 Objects with Attribute Errors Flagged with Yellow Circles

As part of the Configurator Settings, the default color of the Error and Warning circles can be set for Attribute Errors/Warnings, Geometry Errors/Warnings, Break Errors/Warnings and Database Extents Errors/Warnings.

- **gAttributeErrorColour** - Default color set to Yellow
- **gAttributeWarningColour** - Default color set to Yellow
- **gCannotBreakErrorColour** - Default color set to Cyan
- **gCannotBreakWarningColour** - Default color set to Cyan
- **gExtentsErrorColour** - Default color set to Magenta
- **gExtentsWarningColour** - Default color set to Magenta

- **gGeometryErrorColour** - Default color set to Red
- **gGeometryWarningColour** - Default color set to Red

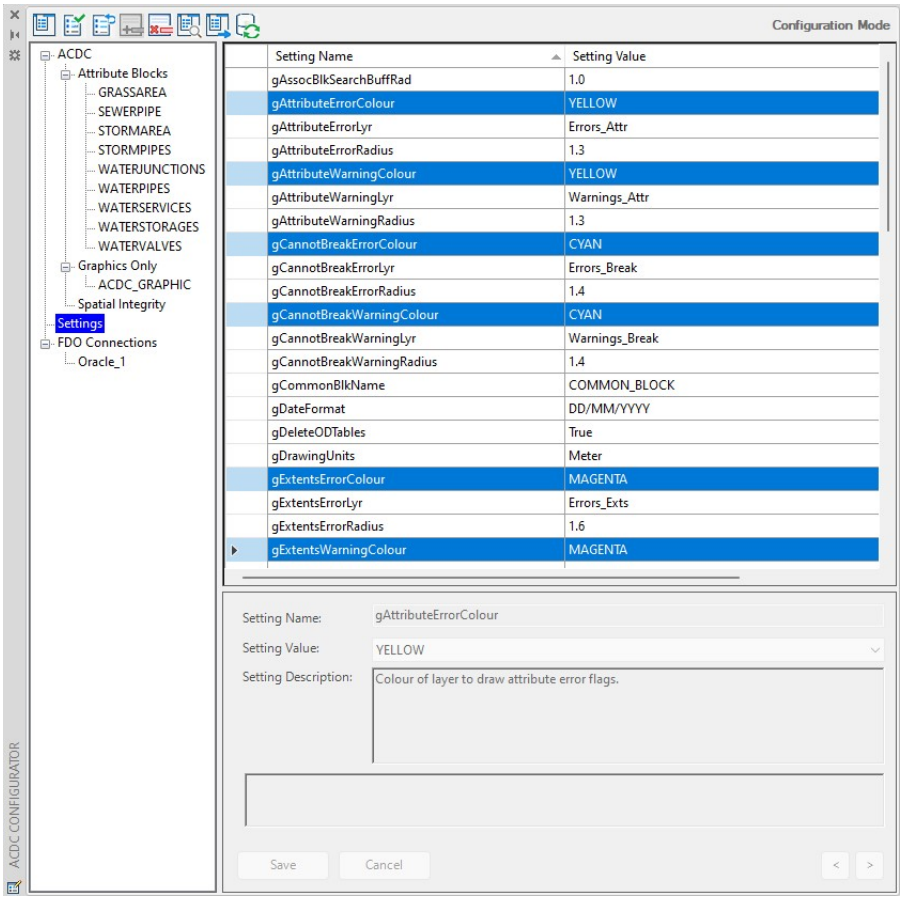


Figure 52 Configurator Error and Warning Circle default settings

Below is a screen shot of a flagged geometry error (red circle). In this case the error is that the closed polyline object contains two attributed blocks.

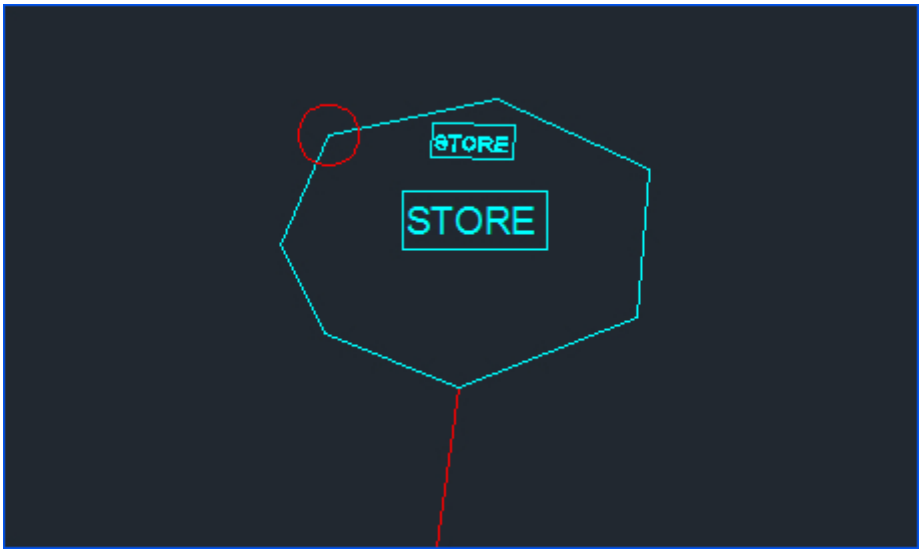


Figure 53 Red Circle Flagged Geometry Error

A report file (.log file) is also created by the 'Validate ACDC Drawing' tool. The report file is given the name specified by the **gReportFile** setting and is placed in the directory specified by the **gReportFileLocation** setting. By default, the report file name and location are set to be the same as the currently open drawing file. The report file contains a log of all the errors found during validation. For each error the report file will contain its coordinates, the created error block name, and the associated error message.

8. To view the details of an error, simply select an error circle and view its properties. The error information is contained in the 'Block' section of the properties dialog.

Block:WAE_ERR_4	
WAE_ERR_4_1	Error: Value is not an integer for tag (GRADE) - [Layer: ACDC_SEWERPIPE - Block: SEWERPIPE]
WAE_ERR_4_2	Error: Numerical value too small for tag (START_CL) - [Layer: ACDC_SEWERPIPE - Block: SEWERPIPE]
WAE_ERR_4_3	Error: Width of number too large for tag (END_IL)
WAE_ERR_4_4	Error: Numerical value too large for tag (PIPE_DIAM) - [Layer: ACDC_SEWERPIPE - Block: SEWERPIPE]
WAE_ERR_4_5	Error: Invalid numerical value for tag (END_CL) - [Layer: ACDC_SEWERPIPE - Block: SEWERPIPE]

Figure 54 Error Properties

9. Address each error and fix accordingly.
10. Once you have addressed each flagged error, run the Validator once again on all of the data in the drawing. If all errors have been fixed successfully, you should see zero counts against the different error types in the command line and should check the number of objects selected vs the number of objects passed.

```
Object analysis finished.
Result Summary
2 Processed object(s).
1 Analysed object(s).
0 Spatial error(s) found.
0 Attribute error(s) found.
0 Break error(s) found.
0 Extents error(s) found.
0 Associated Block error(s) found.
2 Common Block Spatial error(s) found.
0 Spatial warning(s) found.
0 Attribute warning(s) found.
0 Break warning(s) found.
0 Extents warning(s) found.
0 Associated Block warning(s) found.
0 Common Block Spatial warning(s) found.
0 Total Entities with errors found.
0 Total Entities with warnings found.
1 Total Entities passed.
Clear temporary error records from database...
Clearing error records from database...
```

Figure 55 Successful Validation Run

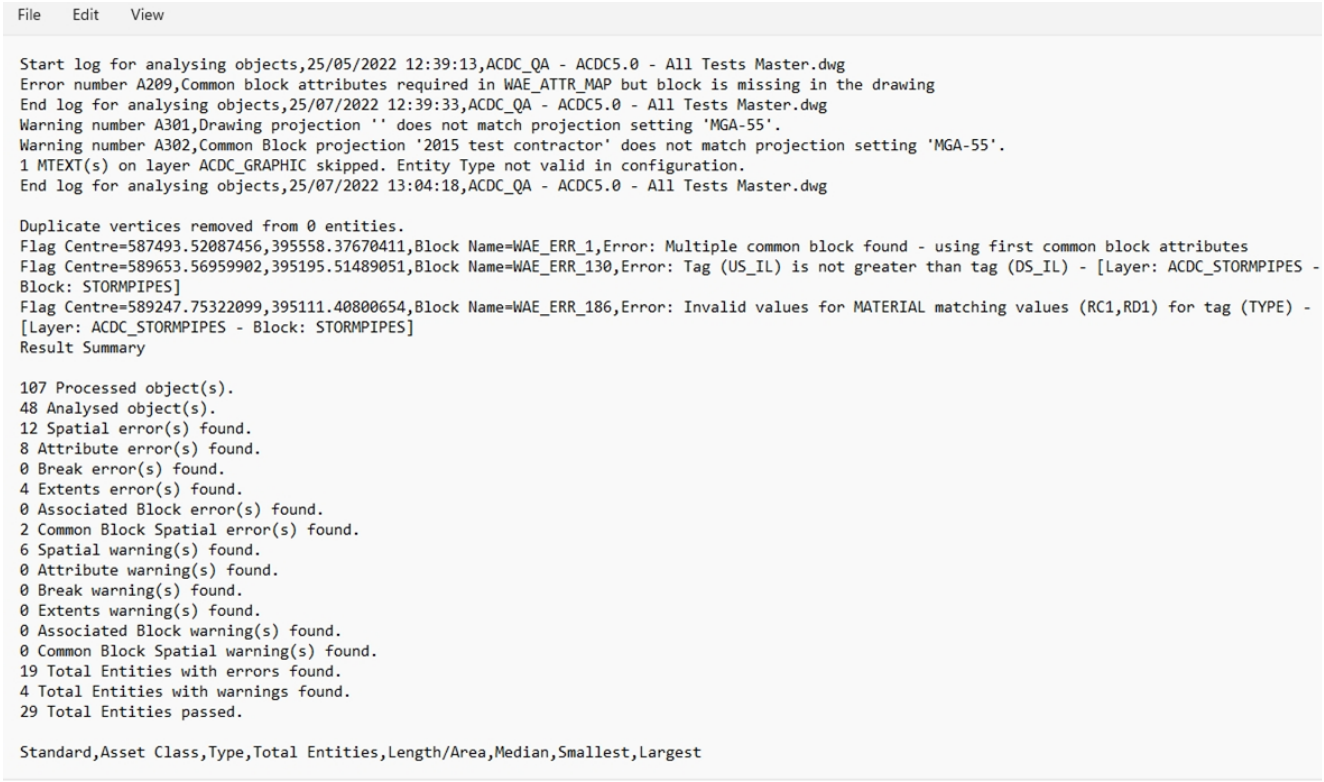
The above command line feedback indicates a successful validation run. On a successful validation run, the data within your initial selection passes all validation checks. As such, these objects are recorded as validated and will not be re-inspected by the Validator on subsequent validation runs.

Errors which are picked up during validation are stored within WAE_ERRORS_OBJ database table. When an error is flagged, it will be displayed in the below syntax, where the xxx variables indicate the Layer Name and the yyy variables the Block Name respectively. This will be displayed in both the WAE_ERRORS_OBJ database table and the resultant Log file.

Error Message - [**Layer: xxx - Block: yyy**]

for example:

WAE_ERR_190,Error: Invalid substring (RD) compare for tag (MATERIAL) - [Layer: ACDC_STORMPIPES - Block: STORMPIPES]

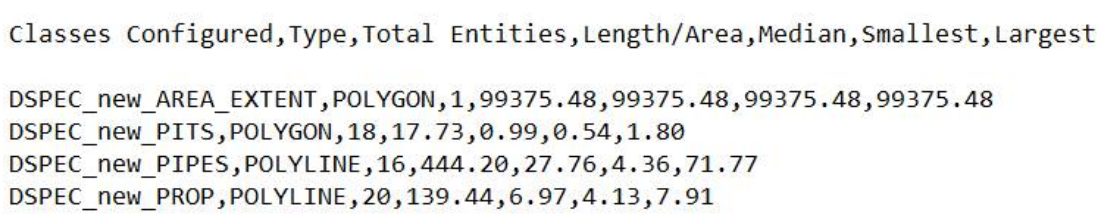


```
File    Edit    View

Start log for analysing objects,25/05/2022 12:39:13,ACDC_QA - ACDC5.0 - All Tests Master.dwg
Error number A209,Common block attributes required in WAE_ATTR_MAP but block is missing in the drawing
End log for analysing objects,25/07/2022 12:39:33,ACDC_QA - ACDC5.0 - All Tests Master.dwg
Warning number A301,Drawing projection '' does not match projection setting 'MGA-55'.
Warning number A302,Common Block projection '2015 test contractor' does not match projection setting 'MGA-55'.
1 MTEXT(s) on layer ACDC_GRAPHIC skipped. Entity Type not valid in configuration.
End log for analysing objects,25/07/2022 13:04:18,ACDC_QA - ACDC5.0 - All Tests Master.dwg

Duplicate vertices removed from 0 entities.
Flag Centre=587493.52087456,395558.37670411,Block Name=WAE_ERR_1,Error: Multiple common block found - using first common block attributes
Flag Centre=589653.56959902,395195.51489051,Block Name=WAE_ERR_130,Error: Tag (US_IL) is not greater than tag (DS_IL) - [Layer: ACDC_STORMPIPES -
Block: STORMPIPES]
Flag Centre=589247.75322099,395111.40800654,Block Name=WAE_ERR_186,Error: Invalid values for MATERIAL matching values (RC1,RD1) for tag (TYPE) -
[Layer: ACDC_STORMPIPES - Block: STORMPIPES]
Result Summary

107 Processed object(s).
48 Analysed object(s).
12 Spatial error(s) found.
8 Attribute error(s) found.
0 Break error(s) found.
4 Extents error(s) found.
0 Associated Block error(s) found.
2 Common Block Spatial error(s) found.
6 Spatial warning(s) found.
0 Attribute warning(s) found.
0 Break warning(s) found.
0 Extents warning(s) found.
0 Associated Block warning(s) found.
0 Common Block Spatial warning(s) found.
19 Total Entities with errors found.
4 Total Entities with warnings found.
29 Total Entities passed.

Standard,Asset Class,Type,Total Entities,Length/Area,Median,Smallest,Largest
```

Figure 56 Errors written to Log file

The log file also contains a detailed report on all Asset classes that are in the project and are listed according to the Layer and Geometry type with the following extended information:

- Class
- Type
- Total Entities
- Length / Area
- Median
- Smallest
- Largest



```
Classes Configured,Type,Total Entities,Length/Area,Median,Smallest,Largest

DSPEC_new_AREA_EXTENT,POLYGON,1,99375.48,99375.48,99375.48,99375.48
DSPEC_new_PITS,POLYGON,18,17.73,0.99,0.54,1.80
DSPEC_new_PIPES,POLYLINE,16,444.20,27.76,4.36,71.77
DSPEC_new_PROP,POLYLINE,20,139.44,6.97,4.13,7.91
```

Figure 57 Detailed Asset Classes report

Once a validation has been run, the table WAE_ERRORS_OBJ will be automatically truncated to prevent historic errors from being flagged. Validated objects will have their final attribute information

recorded in object data tables. To view this information, select a validated object in your drawing and view its properties. You will see that an 'OD' section has been added to the feature that contains all applicable attribute information:

OD:_WPIPE	
CONTRACTOR...	ABC Contractors Pty Ltd
ACTUAL_LENG...	50
DEPTH	5
DIAMETER	150
ACDCSEQ_ID	376
LENGTH	162.0190113837576

Figure 58 Validated Object Attributes

This information is what will be transferred across to your destination tables in the conversion process.

In the properties dialog of a validated object you will also see a section titled 'OD: ACDC_VALIDATED'. This indicates that the object has been validated.

OD:ACDC_VALIDATED	
Validated	

Figure 59 Validation Confirmation

In the successful validation run, snapping and breaking rules will be carried out on all the selected objects.

- Repeat the above process until all the objects in the drawing file have been validated. As a final check, run the Validator on ALL objects in your drawing. If you see the zero count information on the command line, your drawing is free of errors and you can move on to the Conversion phase.

Validation Checks

When the user selects the "Validate and Create Object Data" option, the validation process first loads and initializes the various configurations to be applied to the validate selected objects as per the list of system tables below:

- **OSX_AP_SETTINGS**: Holds settings information used during the Validation and Conversion processes.
- **WAE_OBJECT**: Defines the objects to be Validated/Converted, their geometry types, associated blocks, and destination layers.
- **WAE_ATTR_MAP**: Holds the definition of attributes to be stored for each defined object type.
- **WAE_PIPE_BREAK**: Lists the details of defined snapping rules.
- **WAE_SC_LINK**: Defines the layers that contain objects to which service connection can connect.

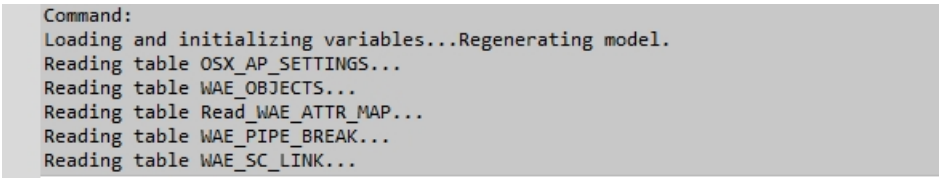


Figure 60 Configurations loaded at the start of Object Validation

The user is then prompted to overwrite the report log file or not. By default "No" will append the entries from the validation process to the existing log file. If the user selects "Yes" to overwrite, the log file is re-created during the validation process.

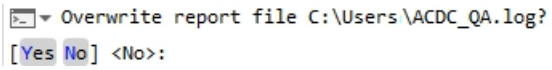


Figure 61 Overwrite log file

When the user is running a validation on the selected objects, the system will display a prompt: Select objects based on current or all configured layers?

- The **Current** option will turn off all layers and only displays those layers that have been configured as part of the Configurator.
- If **All** is selected then the routine will not change any layers (turning them on or off) when the user is prompted to select objects to validate.

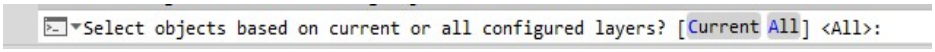


Figure 62 Later selection for Validation

Below is a list of the checks performed by the 'Validate ACDC Drawing' tool.

Table 7: Validate ACDC Drawing Checks

No.	Description	Expected result
1	Error: [count] attribute blocks found	Geometry error flagged
2	Error: [count] attribute blocks found at end of this SC	Geometry error flagged
3	Error: [count] attribute blocks found at start of this SC	Geometry error flagged
4	Error: Associated block is contained within more than one configured object	Geometry error flagged
5	Error: Associated block is not contained within configured object	Geometry error flagged
6	Error: Associated Block on incorrect layer- [Layer Name - Block Name]	Geometry error flagged
7	Error: Cannot break pipe as new segments too short	Break error flagged
8	Error: Cannot break pipe at this location	Break error flagged
9	Error: Cannot break. Ambiguous destination points	Break error flagged
10	Error: Cannot retrieve function for [TagName]	Attribute error flagged
11	Error: Cannot retrieve procedure for [TagName]	Attribute error flagged

12	Error: Cannot retrieve sequence for [TagName]. Check ACDC configuration.	Attribute error flagged
13	Error: Cannot retrieve tag [TagName]	Attribute error flagged
14	Error: Cannot snap block. Ambiguous destination points	Break error flagged
15	Error: Configuration indicates LWPolylines on this layer should be closed.	Geometry error flagged
16	Error: Date value is in an invalid format for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
17	Error: Entity area [area] is less than minimum tolerance [tolerance] allowed	Geometry error flagged
18	Error: Entity found outside of configured ACDC extents.	Geographic extents exceeded
19	Error: Entity length [Length] is less than minimum tolerance [Tolerance] allowed	Geometry error flagged
20	Error: Incorrect Object Type [ObjectType] on layer [Layer Name]	Geometry error flagged
21	Error: Invalid LCODE for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
22	Error: Invalid numerical value for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
23	Error: Invalid string value for tag [TagName] - [Layer Name- Block Name]	Attribute error flagged
24	Error: Invalid values for [Tag] matching values [Tag Values] for tag [TagName] - [Layer Name- Block Name]	Attribute error flagged
25	Error: Isolated configured block found	Geometry error flagged
26	Error: Missing mandatory value for tag [TagName] - [Layer Name- Block Name]	Attribute error flagged
27	Error: More than one object found with associated block [Layer Name]	Geometry error flagged
28	Error: Multiple common block found - using first common block attributes	Geometry error flagged
29	Error: No attribute block found - [Layer Name]	Geometry error flagged
30	Error: No attribute block found - [Layer Name] at end of this SC	Geometry error flagged
31	Error: No attribute block found - [Layer Name] at start of this SC	Geometry error flagged
32	Error: No main pipe found at end of this SC	Geometry error flagged
33	Error: No main pipe found at start of this SC	Geometry error flagged

34	Error: No main pipe found to connect to this SC	Geometry error flagged
35	Error: No objects found on correct layer	Geometry error flagged
36	Error: No valid object layer/type combination found	Geometry error flagged
37	Error: Numerical value too large for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
38	Error: Numerical value too small for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
39	Error: Point within Snap Tolerance	Geometry error flagged
40	Error: String too long for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
41	Error: Value is not an integer for tag [TagName] - [Layer Name - Block Name]	Attribute error flagged
42	Error: Width of number too large for tag	Attribute error flagged
43	Warning: Common block could not be found in the drawing.	Warning
44	Warning: Drawing Projection does not match projection setting	Warning
45	Warning: Common Block Projection does not match projection setting	Warning

Notes on Object Data

- Validated objects (as indicated by the ACDC_VALIDATED object data table) are not reviewed by the 'Validate ACDC Drawing' tool on subsequent validation runs. If you need to re-validate an object, you must remove its existing object data. To remove existing object data, use the 'Delete Object Data Tables' button  . When you press this button, you are presented with two options:
  - **Tables:** This option will remove all object data tables from all objects in the drawing. You must use this option if you have made some changes to your configuration.
  - **Selection:** This option will remove object data tables from only the selected objects.

    With object data removed, the 'Validate ACDC Drawing' tool will view the selected objects as un-validated and will subject them to a complete validation check.
- Care must be taken when using the 'Delete Object Data Tables' tool. If you remove object data from an object that has been split (broken) by the 'Validate ACDC Drawing' tool, these objects will be viewed as two completely separate objects by the Validator on subsequent validation runs. The Validator will now expect both of these objects to have their own associated blocks, which will not be the case because they were a single object in the original drawing. This means that objects that have been split by the Validator and then have their object data removed will not pass subsequent validation runs. Therefore, you should not ever remove object data from objects that have been split by the 'Validate ACDC Drawing' tool.

- The user must ensure that no forward slash character ("/"), is used in the object data field names, suggest the user uses the underscore instead (“_”).
- ACDC Validator now also handles MPOLYGON object class type, where object data can be copied over to the MPOLYGON.
- The Validator now has improved performance where the selection is improved on common block entities when attaching attributes, and now only selects a block once and not every time attributes are attached to an object.
- Ability to handle MTEXT features are catered for, to prevent the user from exploding these features and losing the core benefits of formatting etc. This function now generates a line from the base-point to position 1 of the block. It also inserts a small circle at the base-point with an arrow-head on the other side of the line. This arrow-head has the capacity to resize itself based on the percentage of the line length to handle short lines more effectively. Fundamentally this functionality also allows for the incorporation into both straight lines and multi-segment lines.
- Additional related attribute validations are done on sewer and drainage pipe directions based on Start and End Invert Levels to ensure the pipe flow direction is correct in terms of the linear direction of the line object.

Conversion Process for ACDC

The Conversion process is where objects within the currently open drawing are translated to the defined destination format. Only objects that have been validated will be converted.

The steps required to complete the conversion process are listed below.

Run Convert Tool

1. Press the **Connect to Database** button  and connect to the database that contains the ACDC system tables.

2. Press the **Attach GIS Layers (All Features)**  button to recreate all the target layers in the AutoCAD Task Pane. The saved FDO layers must be present in the Task Pane for the Convert tool to run. If you cannot see the AutoCAD Task Pane, type 'MAPWSPACE' in the command line and select 'On'.

3. Press the **Attach GIS Layers (Related Features)** button  to recreate the only related target layers in the AutoCAD Task Pane. The saved FDO layers must be present in the Task Pane for the Convert tool to run. If you cannot see the AutoCAD Task Pane, type 'MAPWSPACE' in the command line and select 'On'.

When loading the staging database via Generation of FDO layers, only tables which correspond with those present in the drawing will be queried out. This is done to prevent excessive time being lost via the querying from the staging database.

If there are no asset present within the model space, then everything will be queried out from the staging database, as this is needed during the template validation.

4. Press the **Convert to GIS**  button to commence the conversion process.

If prompted to overwrite the external (CSV) file, select the appropriate option ('Y' will overwrite all data in the external file, while 'N' will add the new information to the end of the file). The external CSV file is created if you selected to save any of your attributes to a CSV file.

5. Select the objects you wish to convert. You can do this by either manually selecting the objects in your drawing using the mouse, or you can simply type "all" and then press the 'ENTER' key on your keyboard to select all the objects within the drawing file.
6. Press the 'Enter' key on your keyboard, or press the right-button on your mouse to begin the conversion routine.
7. If the Conversion routine has executed successfully, you will see command line status messages for successful conversion. All the validated objects within your selection will now be displayed as:
    a. FDO objects (for FDO users), or
    b. Records in a CSV file/table depending on configuration.
8. You now need to commit the converted data to your destination tables. To do this, see the steps outlined in the Post FDO Features to Database section.

Conversion Process for ACDC with Munsys

The Conversion process is where objects within the currently open drawing are translated to the defined destination format. Only objects that have been validated will be converted.

The steps required to complete the conversion process are listed below.

Run Convert Tool

1. Press the **Connect to Database** button and connect to the database that contains the ACDC system tables.
2. Press the **Convert to GIS** button to commence the conversion process.

At this stage you may be presented with a 'Connect to Database' dialog. This connection dialog refers to your Munsys database, not the ACDC database. Enter your Munsys database login details here and press the **OK** button.

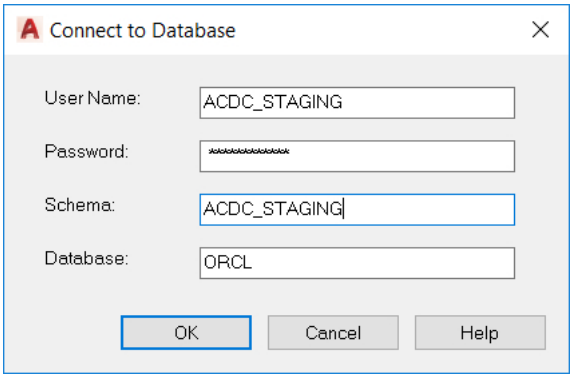


Figure 63 Munsys Connection Dialog Box

If prompted to overwrite the conversion report file, select the appropriate option ('Y' will overwrite all data in the report file, while 'N' will add the new information to the end of the file).

If prompted to overwrite the external (CSV) file, select the appropriate option ('Y' will overwrite all data in the external file, while 'N' will add the new information to the end of the file). The external CSV file is created if you selected to save any of your attributes to a CSV file.

3. Select the objects you wish to convert. You can do this by either manually selecting the objects in your drawing using the mouse, or you can simply type "all" and then press the 'ENTER' key on your keyboard to select all the objects within the drawing file.
4. Press the 'Enter' key on your keyboard, or press the right-button on your mouse to begin the conversion routine.
5. If the Conversion routine has executed successfully, you will see command line status messages for successful conversion. All the validated objects within your selection will now be displayed as:
    a. Munsys objects, or
    b. Records in a CSV file/table depending on configuration.
6. You now need to commit the converted data to your destination tables. To do this, see the steps outlined in the Post Munsys Features to Database section below.

Post FDO Features to Database

To commit converted features to your defined destination tables follow the steps outlined below.

1. Make sure the AutoCAD Task Pane is turned on. To turn the Task Pane on type 'MAPWSPACE' in the command line, and select 'On'.
2. On the ACDC ribbon bar select 'Check in Features' in the FDO menu. This will save all the converted features on all layers to the defined destination table.

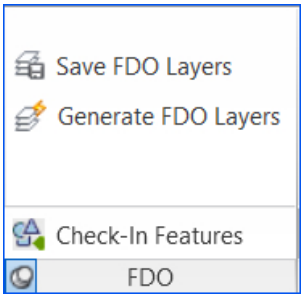


Figure 64 Check in Feature Menu Item

3. If any errors occur during the data transfer, the affected destination layer will have a warning graphic displayed against it. If you do not see a warning graphic, the 'Check in Features' process has completed successfully.

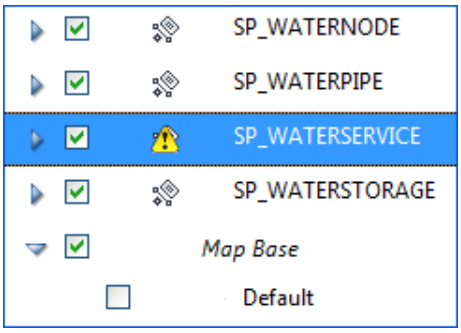


Figure 65 Layer Warning Graphic

4. If errors have occurred, click the AutoCAD warning message button  to review the error log. Address the listed errors as required and re-convert the data for the affected destination layer.

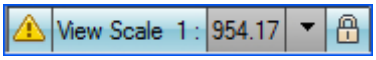


Figure 66 Review Error Log

5. Once the 'Check in Features' tool executes without producing any errors (i.e. there are no warning graphics displayed against the selected destination layer), the Conversion process is complete for that destination layer.

Repeat this process for each of the destination layers with errors in the AutoCAD Task Pane.

Post Munsys Features to Database

To post converted features to your Munsys database, follow the steps outlined below.

1. Press the **Post to Database** button , located on the Munsys 'Integrity' toolbar.
2. If there are data compatibility issues between the converted features and the destination Munsys database, you will be presented with an 'Object Integrity Errors' prompt. Press the **Errors** button on this dialog to view the details of the errors. You must address all of these issues before the data will post successfully to the database.

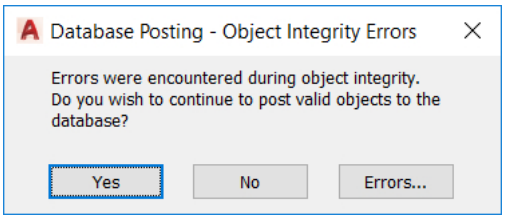


Figure 67 Object Integrity Error Dialog Box

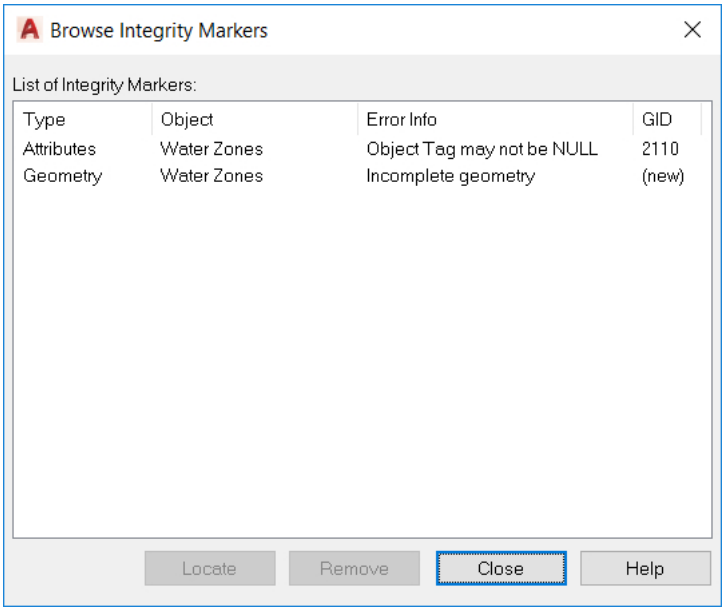


Figure 68 Browse Integrity Markers Dialog Box

Administrator Information

Creating ACDC Users

Note for Munsys users: Use the Munsys Management Console to create new users and then assign the additional privileges listed below.

- To create an **ACDC administrator user**, the database administrator must grant the following privileges:

GRANT SELECT, UPDATE ON OSX_AP_SETTINGS TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_ATTR_MAP TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_ATTR_MVRULECHECK TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_ATTR_RULEMAP TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_ERRORS_OBJ TO New User;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_EXTERNAL TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_FDOLAYER_COLUMNS TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_FDOLAYER_DEF TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_FDO_CONNECTION TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_MENU_GROUP TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_LNK_GROUP_OBJECT TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_MENU_MACRO TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_MENU_ORDER TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_MUNSYS_NODE_MAPPING TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_OBJECT TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_PIPE_BREAK TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_SC_LINK TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_SPA_RULEMAP TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ACDCSEQ_ID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_MVID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_OBJ_ID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_DWG_ID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_ATTRMAP_ID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_GROUP_OBJECT_ID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_MENU_MACRO TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_MENU_GROUP TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_MENU_ORDER TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_SPA_RULEMAP TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON SEQACDC_ATTR_RULEMAP TO NewUser;

Additional privileges for MS SQL Server users:

GRANT EXECUTE ON ACDCSEQ_ID TO NewUser;
GRANT EXECUTE ON ACDCSEQ_OBJ_ID TO NewUser;
GRANT EXECUTE ON ACDCSEQ_DWG_ID TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ACDC_SEQ TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ACDC_SEQ_OBJ TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ACDC_SEQ_DWG TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_ERRORS_OBJ TO NewUser;
GRANT SELECT ON ALL LOOKUP TABLES TO NewUser;
GRANT EXECUTE ON ALL FUNCTIONS TO NewUser;
GRANT EXECUTE ON ALL PROCEDURES TO NewUser;
GRANT SELECT ON ALL SEQUENCES TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ALL DESTINATION TABLES TO NewUser;

- To create an **ACDC general user,** the database administrator must grant the following privileges:

GRANT SELECT ON OSX_AP_SETTINGS TO NewUser;
GRANT SELECT ON WAE_ATTR_MAP TO NewUser;
GRANT SELECT ON WAE_ATTR_MVRULECHECK TO NewUser;
GRANT SELECT ON WAE_ATTR_RULEMAP TO NewUser;
GRANT SELECT ON WAE_EXTERNAL TO NewUser;
GRANT SELECT ON WAE_FDOLAYER_COLUMNS TO NewUser;
GRANT SELECT ON WAE_FDOLAYER_DEF TO NewUser;
GRANT SELECT ON WAE_FDO_CONNECTION TO NewUser;
GRANT SELECT ON WAE_MENU_GROUP TO NewUser;
GRANT SELECT ON WAE_LNK_GROUP_OBJECT TO NewUser;
GRANT SELECT ON WAE_MENU_MACRO TO NewUser;
GRANT SELECT ON WAE_MENU_ORDER TO NewUser;
GRANT SELECT ON WAE_MUNSYS_NODE_MAPPING TO NewUser;
GRANT SELECT ON WAE_OBJECT TO NewUser;
GRANT SELECT ON WAE_PIPE_BREAK TO NewUser;
GRANT SELECT ON WAE_SC_LINK TO NewUser;
GRANT SELECT ON WAE_SPA_RULEMAP
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_ERRORS_OBJ TO NewUser;
GRANT SELECT ON ALL LOOKUP TABLES TO NewUser;
GRANT EXECUTE ON ALL FUNCTIONS TO NewUser;
GRANT EXECUTE ON ALL PROCEDURES TO NewUser;

GRANT SELECT ON ALL SEQUENCES TO NewUser;

GRANT SELECT, INSERT, UPDATE, DELETE ON ALL DESTINATION TABLES TO NewUser;

Table 8: Configurator Settings

Setting Name	Default Value	Description
gAssocBlkSearchBuffRad	1.0	Search buffer used to find associated blocks for linear features.
gAttributeErrorColour	YELLOW	Color of layer to draw attribute error flags.
gAttributeErrorLyr	Errors_Attr	Name of layer to draw attribute error flags.
gAttributeErrorRadius	1.3	Radius of Attribute Error Circles.
gAttributeWarningColour	CYAN	Color of layer to draw attribute warning flags.
gAttributeWarningLyr	Warnings_Attr	Name of layer to draw attribute warning flags.
gAttributeWarningRadius	1.2	Radius of Attribute Warning Circles.
gCannotBreakErrorColour	CYAN	Color of layer to draw break failure error flags.
gCannotBreakErrorLyr	Errors_Break	Name of layer to draw pipe-breaking error flags.
gCannotBreakErrorRadius	1.4	Radius of Break Error Circles.
gCannotBreakWarningColour	CYAN	Color of layer to draw break failure warning flags.
gCannotBreakWarningLyr	Warnings_Break	Name of layer to draw pipe-breaking warning flags.
gCannotBreakWarningRadius	1.4	Radius of Break Warning Circles.
gCommonBlkName	COMMON_BLOCK	Common block used for attributes that will be common for all objects in the drawing. E.g. Contractor name, drawing name etc.
gDateFormat	DD/MM/YYYY	Date format: Can be DD/MM/YYYY or MM/DD/YYYY. (Warning changing this setting will reformat any existing date ranges).
gDeleteODTables	True	Delete Object Data tables before validation.
gDrawingUnits	Meters	Setting for Units in drawing. (Is also referenced at login to the ACDC Schema to determine which default Symbol path to use)
gExtentsErrorColour	MAGENTA	Color of layer to draw extent error flags.

gExtentsErrorLyr	Errors_Exts	Name of layer to draw extent error flags.
gExtentsErrorRadius	1.6	Radius of Extents Error Circles.
gExtentsWarningColour	MAGENTA	Color of layer to draw extent warning flags.
gExtentsWarningLyr	Warnings_Exts	Name of layer to draw extent warning flags.
gExtentsWarningRadius	1.6	Radius of Extents Warning Circles.
gExternalFile	$DWGNAME (currently open drawing file name)	Name of the file created by the Converters when saving external output.
gExternalFileLocation	$DWGDIR (currently open drawing file directory)	File path used to specify the external file location.
gExternalOutputTarget	TABLE	Format that external attributes will be exported to (CSV or Table)
gGISType	FDO	The GIS type (available values: FDO or Munsys).
gGeometryCircle	Arc	Circle geometries in FDO are not permitted choose an alternative geometry to represent this shape Polyline (32 segment) or Arc.
gGeneralCircleRad	2.0	Radius of error circles.
gGeometryErrorColour	RED	Color of layer to draw geometry error flags.
gGeometryErrorLyr	Errors_Geom	Name of layer to draw geometry error flags.
gGeometryErrorRadius	1.2	Radius of Geometry Error Circles.
gGeometryWarningColour	YELLOW	Color of layer to draw geometry warning flags.
gGeometryWarningLyr	Warnings_Geom	Name of layer to draw geometry warning flags.
gGeometryWarningRadius	1.15	Radius of Geometry Error Circles.
gLinearChkTol	0.02	Tolerance used to flag linear object end points as errors if they are within this tolerance and fall outside the defined 'gLinearSnapTol' setting.
gLinearSearchBuffRad	1.0	Search buffer used by linear objects to detect nearby linear objects to snap to.
gLinearShortTol	0.5	Shortest linear length allowed.

gLinearSnapTol	0.001	If linear endpoints are within this distance then they are automatically snapped together.
gLookupFilter	OBJECT_NAME not like 'WAE_%'	Query filter used to find lookup tables (do not include ‘where' statement).
gLookupCaseSensitive	True	Setting to determine whether lookup codes validation should be case sensitive or not.
gMaxXExtent gMaxYExtent gMinXExtent gMinYExtent	NULL	Defines the extents/boundaries for the drawing that all validated objects must be within. Objects outside this range will fail validation. If all values are set to 0 then ACDC will ignore this setting.
gNodeSearchBuffRad	0.25	Search buffer used by nodes objects to detect nearby objects.
gNodeSnapTol	0.1	If a node is within this distance of a linear object it is automatically snapped to that linear object.
gODFieldNameMaxSize	31	Maximum length of an object data field name.
gODTableNameMaxSize	25	Maximum length of an object data table name.
gPipeLengthBreakTol	0.5	Minimum allowable length of a pipe to be created by a 'break' operation.
gPipeSearchBuffRad	1.0	Search buffer used by block insertion points to detect pipes to snap to.
gPolyMinArea	0.25	Minimum area of Polygon entities.
gProjection	INACTIVE or Autocad Projection Code (i.e. MGA-55)	Expected Projection for projects. Drawing projection (Coordinate System assigned in AutoCAD Map using 'mapcsassign')
gProjectionAttribute	INACTIVE	Common block attribute projection tag. (''ORIGIN'' set to INACTIVE if not defined)
gReportFile	$DWGNAME (currently open drawing file name)	Name of CSV report file used by Validator and Munsys Converter to log errors.
gReportFileLocation	$DWGDIR (currently open drawing file directory)	Directory that the file specified in gReportFile will be saved to.
gSCtoPipeSearchBuffRad	1.0	Search buffer used to find pipes to which a service connection should be attached.
gTempODFieldName	TempField	Name of temporary object data field used to identify valid text and symbols.

gTempODTableName	TempTable	Name of temporary object data table used to identify valid text and symbols.
gUnknownNodeTypeSymbol	_WJUNC	Name of symbol to use for unknown node types.
gVerifyRealSize	Width and Precision (exclude decimal point)	Setting to manage the way different databases handle real values (See section CONFIGURING 'gVerifyRealValues')
gVersion	5.0	Schema Version

The ACDC system tables overview

Table 9: System Tables Overview

Table Name	Description
OSX_AP_SETTINGS	Holds settings information used during the Validation and Conversion processes.
WAE_ATTR_MAP	Holds the definition of attributes to be stored for each defined object type.
WAE_ATTR_MVRULECHECK	Holds the settings for compound validations processes.
WAE_ATTR_RULEMAP	Holds the settings for Attribute validation rules.
WAE_ERRORS_OBJ	This table is temporarily populated with errors encountered during the validation process.
WAE_EXTERNAL	This table is temporarily populated with attributes to be written to an external CSV file.
WAE_FDO_CONNECTION	Contains the saved FDO connection details.
WAE_FDOLAYER_COLUMNS	Contains a definition of all the layers/columns of the saved FDO connections.
WAE_FDOLAYER_DEF	Contains layers details for saved FDO connections.
WAE_LNK_GROUP_OBJECT	Mapping table linking the objects to the Menu Groups
WAE_MENU_GROUP	Contains the Menu Groups and their respective Menu Names.
WAE_MENU_MACRO	Stores the macro (series of commands) which defines the action that should be performed when the menu item is selected per Menu Type. The different Menu Types supported include: ACAD ACAD_ATTRIBUTOR ACAD_MAP ACADMAP_ATTRIBUTOR BRICSCAD BRICSCAD_ATTRIBUTOR
WAE_MENU_ORDER	Stores the order in which the object items are displayed within the Menu Groups

WAE_MUNSYS_NODE_MAPPING	Munsys node mapping is for Munsys ACDC customers and is used during the conversion process to munconvert data to determine which symbol is assigned to the node type.
WAE_OBJECT	Defines the objects to be Validated/Converted, their geometry types, associated blocks, and destination layers.
WAE_PIPE_BREAK	Lists the details of defined snapping rules.
WAE_SC_LINK	Defines the layers that contain objects to which service connection can connect.
WAE_SPA_RULEMAP	Holds the settings for Spatial validation rules.

OSX_AP_SETTINGS

Table 10: OSX_AP_SETTINGS

Column Name	Type	Description
OSX_TYPE	CHAR(1)	Reserved for Future use
OSX_CATEGORY	VARCHAR2(10)	Application using this table. Currently supported values are: 1- **QIF**: For the QIF Translator 2- **HAN**: For the Hansen integration 3- **WAE**: For ACDC (Work As Executed) 4- **LV_TRANSL**: For LandVic Translator
OSX_VARIABLE	VARCHAR2(30)	Name of setting used in application
OSX_VALUE	VARCHAR2(100)	The value assigned to the setting
OSX_DEFAULT	VARCHAR2(40)	Reserved for Future use
LU_TABLE	VARCHAR2(30)	Reserved for Future use
DISPLAY_GROUP	VARCHAR2(20)	Reserved for Future use
IS_EDITABLE	CHAR(1)	Reserved for Future use
SHORT_DESC	VARCHAR2(40)	Short description of setting
LONG_DESC	VARCHAR2(255)	Long description of setting

WAE_ATTR_MAP

Table 11: WAE_ATTR_MAP

Column Name	Type	Description
ATTRMAP_ID	NUMBER(10)	Unique Identifier from sequence SEQACDC_ATTRMAP_ID
FK_ID	NUMBER(10)	Foreign Key: Referencing column ID in WAE_OBJECT

BLOCK_NAME	VARCHAR2(100)	AutoCAD block name
TAG_NAME	VARCHAR2(30)	AutoCAD attribute tag name
TAG_TYPE	VARCHAR2(30)	AutoCAD attribute tag type
MANDATORY	VARCHAR2(3)	Allowable values: **0** = Value not required **1** = Value required
DATA_TYPE	VARCHAR2(30)	Type of data expected in attribute. Allowable values: **CHARACTER**, **NUMBER**, **DATE** See also parameter (gDateFormat) in the details of table OSX_AP_SETTINGS
DATA_SIZE	VARCHAR2(30)	Length of string for DATA_TYPE = CHARACTER
RANGE_MIN	VARCHAR2(30)	Lower limit of a range of numerical value for DATA_TYPE = INTEGRER or REAL
RANGE_MAX	VARCHAR2(30)	Upper limit of range of numerical value for DATA_TYPE = INTEGRER or REAL
TAB_FLD_NAME	VARCHAR2(30)	Destination table column
CALC_FLD	VARCHAR2(30)	Reserved
EXT_OUTPUT_REQ	VARCHAR2(3)	Allowable values: **YES**= Output to CSV or Table is required **(**Null: Output to CSV or Table is not required)
LU_TABLE_NAME	VARCHAR2(30)	Lookup table that contain values that must be validated against. If Null, do not validate.
LU_COLUMN	VARCHAR2(30)	Lookup column that contain values that must be validated against. If Null, do not validate
BLOCK_VISIBLE	NUMBER(10)	Determines if the Attribute is displayed or not when the block is placed in the drawing.
DESCRIPTION	VARCHAR2(120)	Description that is displayed as a prompt when the block is placed in the drawing.
BLOCK_DEFAULT_VALUE	VARCHAR2(120)	A default attribute value assigned to the Block when it is placed in the drawing
DISPLAY_ORDER	NUMBER(10)	The order in which the attribute tag is displayed.

WAE_ATTR_MVRULECHECK

Table 12: WAE_ATTR_MVRULECHECK

Column Name	Type	Description

MV_ID	NUMBER(10)	Multi-attribute validation unique ID from sequence SEQACDC_MVID
MV_DESC	VARCHAR2(100)	Multi-attribute validation description
REF_VALUE	VARCHAR2(50)	Reference value to which the comparison applies to.
COMPARE_TAG	VARCHAR2(50)	Column value/s to be checked
COMPARISON_VALUES	VARCHAR2(500)	Permitted value/s
COMPARE_TYPE	VARCHAR2(40)	Comparison Type operator. Permitted values: **GT** - Greater Than **LT** - Less Than **GTE** - Greater than or Equal to **LTE** - Less than or Equal to **EQ** - Equal **NEQ** - Not Equal

WAE_ATTR_RULEMAP

Table 13: WAE_ATTR_RULEMAP

Column Name	Type	Description
ATTR_RULEMAP_ID	NUMBER(10)	Attribute Rule Map unique ID from the sequence SEQACDC_ATTRMAP_ID
FK_ATTRMAP_ID	NUMBER(10)	Foreign Key: Referencing column ID in WAE_ATTR_MAP
ERROR_TYPE	VARCHAR2(10)	Type of error, either 'ERROR' or 'WARNING'
CUSTOM_MESSAGE	VARCHAR2(250)	Custom error message when validation failed
RULE_ORDER	NUMBER(10)	Order in which the rule is applied
RULE_DESC	VARCHAR2(60)	Rule description
RULE_TYPE	VARCHAR2(40)	Rule Type. Permitted values: CHECKLINK COMPARECHECK DISTCHECK FORMATSTR ISINSIDE LINKLIMIT MULTICHECK MVCHECK NODELIMIT RACHECK RANGEEX SUBSTR VALUECHECK

RULE_PARAM	VARCHAR2(500)	Parameters against which the values are validated.

WAE_ERRORS_OBJ

Table 14: WAE_ERRORS_OBJ

Column Name	Type	Description
DWG_NAME	VARCHAR2(150)	Name of DWG being analyzed.
ERR_TYPE	VARCHAR2(20)	Error type. Allowable values: **GEOM**: For geometry related errors **ATTR**: For attribute errors **BRKP**: For pipe breaking related error **CONFIG_ERR:** For Configuration errors **CMMBLK_ERR:** For Common Block errors **EXTS_ERR:** For Database Extents errors
MESSAGE	VARCHAR2(250)	Message associated with error. This will be produced as an attribute tag value in the error block.
OBJ_IDENTIFIER	VARCHAR2(30)	The error identifier flag. This determines the information that will be recorded in the log file for each error. Allowable values: **FLAG_COORD_AND_BLOCK**: Record the coordinates and error block name for each error in the log file.
OBJ_IDENTIFIER _NAME	VARCHAR2(30)	The name of the created error block.
PARAMETER	VARCHAR2(150)	Stores the error information indicated by the value in the 'OBJ_IDENTIFIER' column. Information recorded for the different 'OBJ_IDENTIFIER' values are: **FLAG_COORD_AND_BLOCK**: X, Y values of insertion point of the error object.
ENTITY_HANDLE	VARCHAR2(20)	Validation error block ID identifier
DWG_ID	NUMBER(10)	Unique DWG ID from Sequence SEQACDC_DWG_ID
PROCESS_DATE	DATE	The process date

WAE_EXTERNAL

Table 15: WAE_EXTERNAL

Column Name	Type	Description
SECTION_LABEL	VARCHAR2(30)	Name of attributed block.
FIELD	VARCHAR2(30)	Name of attribute tag.
VALUE	VARCHAR2(150)	Attribute tag value.
OBJ_ID	NUMBER (10)	Unique identifier of entities processed to extract their object data to external file.
DWG_NAME	VARCHAR2(250)	Name of current drawing.
OUTPUT_DATE	DATE	Stores a record of the export date/time.

WAE_FDO_CONNECTION

Table 16: WAE_FDO_CONNECTION

Column Name	Type	Description
CONN_NAME	VARCHAR2(128)	Saved FDO connection name.
CONN_DEF	CLOB	FDO connection details.

WAE_FDOLAYER_COLUMNS

Table 17: WAE_FDOLAYER_COLUMNS

Column Name	Type	Description
COLUMN_NAME	VARCHAR2(128)	Name of the columns in the destination table.
FDO_LAYER_NAME	VARCHAR2(128)	Name of the destination table.

WAE_FDOLAYER_DEF

Table 18: WAE_FDOLAYER_DEF

Column Name	Type	Description
FDO_LAYER_NAME	VARCHAR2(128)	Name of the destination layer.
TABLE_NAME	VARCHAR2(128)	Name of the destination table.
LAYER_DEF	CLOB	Layer details.
CONN_NAME	VARCHAR2(128)	Name of the FDO connection in which the layer exists.

WAE_LNK_GROUP_OBJECT

Table 19: WAE_LNK_GROUP_OBJECT

Column Name	Type	Description
GROUP_OBJECT_ID	NUMBER(10)	Unique Identifier from the sequence SEQACDC_GROUP_OBJECT_ID
GROUP_ID	NUMBER(10)	Relates to the Unique Identifier ID column for the table WAE_MENU_GROUP
WAE_OBJECT_ID	NUMBER(10)	Relates to the Unique Identifier ID column for the table WAE_OBJECT

WAE_MENU_GROUP

Table 20: WAE_MENU_GROUP

Column Name	Type	Description
MENU_GROUP_ID	NUMBER(10)	Unique Identifier from the sequence SEQACDC_MENU_GROUP
GROUP_NAME	VARCHAR2(100)	Group Name assigned to the menu group item.
DESCRIPTION	VARCHAR2(120)	Group Name description
PARENT_ID	NUMBER(10)	The MENU_GROUP_ID of the Parent Group to which the Menu Group is associated to.

WAE_MENU_MACRO

Table 21: WAE_MENU_MACRO

Column Name	Type	Description
MENU_MACRO_ID	NUMBER(10)	Unique Identifier from the sequence SEQACDC_MENU_MACRO
MACRO_DESCRIPTION	VARCHAR2(250)	Macro Description
ACAD_OBJECT_TYPE	VARCHAR2(100)	The Object Type to which the Macro is associated to. The permitted Object Types include: CIRCLE INSERT POLYLINE POLYGON SINGLE LINE TEXT (GRAPHICS ONLY)

MENU_TYPE	VARCHAR2(100)	Stores the menu type value to know which CAD application The different Menu Types supported include: ACAD ACAD_ATTRIBUTOR ACAD_MAP ACADMAP_ATTRIBUTOR BRICSCAD BRICSCAD_ATTRIBUTOR
MACRO_GEOMETRY	VARCHAR2(200)	Stores the Object Type associated to the macro.
MACRO_BLOCK	VARCHAR2(200)	Stores the macro syntax (Series of commands and expected options and values) which defines the action that is performed when the menu item is selected.

WAE_MENU_ORDER

Table 22: WAE_MENU_ORDER

Column Name	Type	Description
MENU_ORDER_ID	NUMBER(10)	Unique identifier from the sequence SEQACDC_MENU_ORDER
MENU_OBJECT_TYPE	NUMBER(10)	Permissible values are 0, 1 or 2 0 indicates a separator line if 1, then refer to WAE_MENU_GROUP. if 2, then refer to WAE_OBJECT
WAE_GROUP_ID	NUMBER(10)	Relates to the Unique Identifier ID column for the table WAE_MENU_GROUP
WAE_OBJECT_ID	NUMBER(10)	Relates to the Unique Identifier ID column for the table WAE_OBJECT
MENU_ORDER	NUMBER(10)	Stores the menu order number where the value 1 indicates that this menu item should be displayed first.

WAE_MUNSYS_NODE_MAPPING

Table 23: WAE_MUNSYS_NODE_MAPPING

Column Name	Type	Description
MUN_ID	NUMBER(10)	The MUN_ID value for the spatial table i.e. 43
TABLE_NAME	VARCHAR2(50)	The Table name for the Node , i.e. SP_WATNODE
NODE_TYPE	VARCHAR2(100)	The Node type description, i.e. CLOSED_VALVE
SYMBOL_NAME	VARCHAR2(100)	The Symbol name used to represent the Node, i.e. _WCLVALVE

WAE_OBJECT

Table 24: WAE_OBJECT

Column Name	Type	Description
ID	NUMBER(10)	Record identifier from sequence SEQACDC_OBJ_ID
ACAD_OBJECT_TYPE	VARCHAR2(30)	AutoCAD object type. Allowable values: **INSERT** for block objects **POLYLINE** for linear objects such as water and sewer pipes. For multiple valid types, e.g. when a water pipe is to be represented by a line or a LWPolyline in the same drawing, multiple records are inserted in the table as separate records. **POLYGON** for Polygon and MPolygon objects. For AutoCAD Lite, these are LWPolylines whose property is set as Closed **CIRCLE** for circular objects. **SINGLE LINE TEXT** for Text objects to be converted as labels - available for GRAPHICS ONLY
ACAD_LAYER	VARCHAR2(100)	AutoCAD layer on which the target objects are located.
ASSOC_BLOCK_NAME	VARCHAR2(100)	AutoCAD block name. This is the name of the block that contains attribute values for the object. This will be blank for TEXT objects.
ASSOC_BLOCK_LAYER	VARCHAR2(100)	AutoCAD layer where a block associated with an object is located. This will be blank for TEXT objects.

ASSOC_BLOCK_LOCATION	VARCHAR2(30)	Place where the attribute block belonging to relevant object (e.g. water or sewer pipe) is expected to be found. Allowed values: **MID**: The block is expected to be snapped to the midpoint of a line or a segment of an LWPolyline. This is also used for blocks. **STARTEND**: The block is expected to be found at either start or end of a linear object. **START**: The block is expected to be found at the start of a linear object. This setting provides an added functionality where the application will search for an object at the end of the object under consideration. This can be used to validate that a SC has a block at the start and a main pipe at the end **END**: This is the reverse of the functionality provided with the 'START' setting **INSIDE**: The block is expected to be inside the circle or the closed LWPolyline object
TABLE_NAME	VARCHAR2(30)	Destination table name.
OBJ_TYPE	VARCHAR2(30)	Munsys PIPE_TYPE or NODE_TYPE or blank if not applicable.
SECTION_LABEL	VARCHAR2(30)	Section name for a CSV file under which attribute values are listed.
OD_TABLE_NAME	VARCHAR2(30)	Table name for Object Data (must be 25 characters or less).
EXIT_OUTPUT_REQ	VARCHAR2(3)	Object attribute will also be written to a separate CSV file or Table.
DESCRIPTION	VARCHAR2(120)	The menu description as displayed in ACDC Configurator
SHOW_LINEARDIR	VARCHAR2(3)	Setting used to toggle ON/OFF the display of linear direction arrows (YES or <null>)
GRAPHIC_ONLY	VARCHAR2(3)	Setting to determine if the Attribute is Graphic Only for layers that contain no attribute data.
ARROW_SCALE	NUMBER(5,2)	This setting sets the scale for the Linear Direction Arrow. This setting uses the Drawing Units (gDrawingUnits) to determine which folder to use to locate the symbol "darrow.dwg", and display in either Feet or Meters.

STANDARD_SUBGROUP	VARCHAR2(250)	This setting contains the name of the specification against which the objects are verified against, for example: BSPEC - Building Specification DSPEC - Drainage Specification OSPEC - Open Space Specification RSPEC - Roads Specification SSPEC - Sewer Specification WSPEC - Water Specification

WAE_PIPE_BREAK

Table 25: WAE_PIPE_BREAK

Column Name	Type	Description
PIPE_LAYER_NAME	VARCHAR2(100)	AutoCAD layer name for the linear features that will be snapped to/broken.
BLOCK_NAME	VARCHAR2(100)	Name of the AutoCAD block that will snap to/ break the linear features.
SNAP_RULE	VARCHAR2(30)	Allowable values: **SNAP_NEAREST_END**: The block will be snapped to the nearest end of the relevant linear feature. **SNAP_NEAREST_POINT**: The block will be snapped to the nearest point on the relevant linear feature, measuring perpendicular to the linear feature. **SNAP_NEAREST_POINT_AND_BREAK**: Same as 'SNAP_NEAREST_POINT', but the linear feature will also be broken at this location.

WAE_SC_LINK

Table 26: WAE_SC_LINK

Column Name	Type	Description
SC_LAYER	VARCHAR2(100)	AutoCAD layer name that contains service connections.
MAIN_PIPE_LAYER	VARCHAR2(100)	AutoCAD layer name that contains pipes relevant to the service connections.

WAE_SPA_RULEMAP

Table 27: WAE_SPA_RULEMAP

Column Name	Type	Description
SPA_RULEMAP_ID	NUMBER(10)	Unique Rule Map ID from sequence SEQACDC_SPA_RULEMAP
PRI_FKID	NUMBER(10	Foreign Key: Referencing column ID in WAE_OBJECT
PRI_ACAD_OBJECT_TYPE	VARCHAR(30)	AutoCAD Entity Type of Object e.g. LINE,LWPOLYLINE,MPOLYGON
PRI_ACAD_LAYER	VARCHAR(100)	AutoCAD Layer the object is on
SEC_ACAD_OBJECT_TYPE	VARCHAR(30)	AutoCAD Entity Type of Object e.g. LINE,LWPOLYLINE,MPOLYGON
SEC_ACAD_LAYER	VARCHAR(100)	AutoCAD Layer the object is on
ERROR_TYPE	VARCHAR(10)	Denotes type of Error, either ERROR or WARNING
CUSTOM_MESSAGE	VARCHAR(250)	User defined Error message which overrides system Error messages
RULE_ORDER	NUMBER(10)	Order in which the rule is processed during validation
RULE_DESC	VARCHAR(60)	Rule Description
RULE_TYPE	VARCHAR(40)	Contains the Rule Type value advising which rule is to be applied during validation, for example: FORMATSTR SUBSTR MVCHECK MULTICHECK RANGEX VALUECHECK LINKLIMIT ISINSIDE LINKLIMIT NODELIMIT RACHECK CHECKLINK DISTCHECK
RULE_PARAM	VARCHAR(500)	Parameters to apply for the rule type defined.

ACDC_SEQ (for MS SQL Server Installations Only)

IMPORTANT: Table has been deprecated - See Sequence ACDCDSEQ_ID

ACDC_SEQ_OBJ (for MS SQL Server Installations Only)

IMPORTANT: Table has been deprecated - See Sequence SEQACDC_OBJ_ID

ACDC_SEQ_DWG (for MS SQL Server Installations Only)

IMPORTANT: Table has been deprecated - See Sequence SEQACDC_DWG_ID

CONFIGURING 'gVerifyRealValues'

'Real' data types have a maximum specified 'width' and 'precision' stored in the 'Configurator' which determines the accuracy of numerical data and ensures that any input data is not larger than what the destination column(s) allows. However, it is possible that maximum allowable size of these configured real data types exceeds that of the destination column(s).

The 'Configurator' setting 'gVerifyRealValues' helps ACDC to manage the way different databases store real values. This is important because the size of 'real' data values are interpreted differently by FDO sources. For example, dBase (database for managing SHP files) includes the decimal and minus sign in the numeric data size for real values but Oracle and SQL Server do not. It is therefore recommended that the 'gVerifyRealValues' setting is configured for the appropriate database (E.g. Oracle, SQL, SHP), to allow ACDC to accurately perform a 'Comprehensive Check' in 'Verify Configuration' (See section Verify Configuration Test Details). This will ensure that the destination column size is not too small for the configuration stored in the 'Configurator'; thus preventing errors when validating drawings.

Real data types that are stored in a database have a specified precision and scale. The precision is the total number of digits to the left and right of the decimal point, and, depending on the database, can include the decimal and any minus sign. The scale is the number of digits to the right of the decimal point. This is recoded in the format 'Precision.Scale' (E.g. 5.3). The following table provides examples of how real values are interpreted by their database.

Table 28: Real Value Databases Comparisons

'Real' Value	ACDC Configurator	Oracle	SQL Server	SHP
E.g. 5.3	12345.123	-12.123 or 12.123 are valid.	-12.123 or 12.123 are valid.	-0.21 or -1.12 or 2.123 are valid.
E.g. 7.2	1234567.12	-12345.12 or 12345.12 are valid	-12345.12 or 12345.12 are valid	-1234.1 or -123.12 or 1234.12 are valid

The Configurator setting 'gVerifyRealValues' provides 3 selectable options to handle the way databases manage real values. Select the 'Setting Value' appropriate to your FDO Source/database, according to how it interprets the data size for real values.

- Width and Precision (exclude decimal point) (E.g. Oracle, SQL Server)
- Width and Precision (include decimal point)

- Width and Precision (include decimal point and sign) (E.g. dBase/SHP).

For more information on data types refer to the respective database documentation (or see links below):

ORACLE: http://docs.oracle.com/cd/B28359_01/server.111/b28318/datatype.htm

SQL Server: http://msdn.microsoft.com/en-us/library/ms187746.aspx

Dbase: http://msdn.microsoft.com/en-us/library/windows/desktop/ms713987%28v=vs.85%29.aspx

CONFIGURING Log4Net TO PRODUCE A LOG

Log4Net is a highly configurable logging mechanism that it can be used for debugging and troubleshooting.

If system issues are encountered the Log4Net error report logs can be submitted to Open Spatial Support. For the log to work, the location of the output log and the type of debugging must be specified.

To do this, follow the steps below:

1. Open the 'LogConfig.xml' located in the install directory in a text editor.
   E.g. C:\Program Files\OpenSpatial\ACDC 5.0\Autodesk2021\LogConfig.xml
2. Change the 'file value' (the location of the log output file) to a convenient location outside of the install location.
   E.g. <file value=" C:\temp\logACDC.txt" />
3. Change the 'level value' from Debug value from 'OFF' (default) to 'DEBUG' (recommended) or another 'level value' as required. The available types are OFF, FATAL, ERROR, WARN, INFO, DEBUG, and ALL. These levels function are hierarchically, so that a debug level set to "WARN" will log any WARN, ERROR, or FATAL log events.
   E.g. <level value="DEBUG" />
4. Save the changes and close

Additional Notes

- Database sequences have been defined to provide a unique numeric identifier (Primary Key) for each record that is converted.
  - ACDCSEQ_ID
  - SEQACDC_ATTR_RULEMAP
  - SEQACDC_ATTRMAP_ID
  - SEQACDC_DWG_ID
  - SEQACDC_GROUP_OBJECT_ID
  - SEQACDC_MENU_GROUP
  - SEQACDC_MENU_MACRO
  - SEQACDC_MENU_ORDER
  - SEQACDC_MVID
  - SEQACDC_OBJ_ID

- SEQACDC_SPA_RULEMAP

- ACDC supports stored procedures/functions in Oracle and MS SQL Server databases. For use with ACDC, the stored procedures/functions cannot accept any input variables and must return a value.
- .shp file export process has been improved to ensure the attributes are ordered as per the block, instead of having them ordered alphabetically. This process also now ensures that the attribute fields are the correct type, rather than standardizing to just character.

Tips and Tricks

3D Objects

For 3D linear features:

1. Select the 3D object (make sure it is the only feature you have selected).
2. Type “FLATTEN” in the AutoCAD command line.
3. Choose not to remove hidden lines (if you are prompted for this).

For associated blocks and nodes:

1. Select the required block and view its properties.
2. In the properties dialog, change the ‘Position Z’ value to zero (0).

Do not use the ‘FLATTEN’ command on block features. This command changes their block name to BlockName-flat-1. This name change will cause the selected block to be ignored by the current configuration.

Empty FDO Layers

The ‘Validate ACDC Drawing’ tool cannot be run if the drawing contains FDO layers with no data records in the tables.

Supported FDO Object Types

When writing records to a 'FDO connection', Lines, Polylines, Closed Polylines, and Polygons are all supported object types. Circles, however, are not supported by FDO and an Arc needs to be a segment of a LWPLOLINE. See below for more details.

- **CIRCLES:** Circle geometries are not permitted in FDO so they will be represented by 2 arc geometries (by default). Alternatively, the user can choose to have a circle geometry converted to a 32 segment polyline. The ‘Arc’ or ‘Polyline’ Circle option is available in 'Configurator' settings under ‘gGeometryCircle’.
- **ARCS:** Any arc needs to be a segment of a LWPLOLINE in order for ACDC to recognize them. Because arcs are drawn (and used) based on the scale you are at in AutoCAD, it can happen that a valve configured to break a LWPOLYLINE containing an arc segment pipe does not break the arc segment. You can increase the setting gPipe2BreakSearchBuffRad; however the default of 0.1m should be okay.

Extended Attribute Information in the Configurator

To view extended attribute information in the ‘Configurator’, double-click the top left square of the grid view. This will display all of the columns of the target table in the grid view. To go back to the abbreviated column view, just double-click the top left square of the grid view again.

Date Field Requirements

For MS SQL Server databases, any date field must be of type datetime. If date fields are of any other date type, the 'Configurator' will not recognize them.

Reflect Destination Database Changes in Configurator

If changes have been made to the destination database's structure, you must refresh the saved FDO connection in your configuration before this change will be reflected in the ACDC Configurator. To do this, disconnect and delete the applicable connection in the 'FDO Connections' node of the 'Configurator' (right click 'disconnect' then right click 'delete'. Then reconnect to the specific data connection, add the specific data layer(s) to AutoCAD and press the **Save FDO Layers** button (on the ACDC toolbar). The destination database changes will now be reflected in the 'Configurator'.

Configurator User Interface: Attribute Configuration Seems to Disappear or is Different

Note that, if you have the following case:

1. An 'Attributed Block' is selected in the left pane
2. The 'Object' tab is selected
3. In the grid view, records have different IDs.
    - That happens when some were 'Added' (creates a new ID) and some were 'Duplicated' (reuse the same ID)
4. Now, different attributes are displayed in the following two cases:
    - You highlight a record with say ID = 1 in the grid view and then select the 'Attributes' tab
    - You highlight a record with say ID = 2 in the grid view and then select the 'Attributes' tab

ACDC Menu Not Visible

If the ACDC menu is not visible, execute MENUBAR on the AutoCAD command line and set the value to 1.

Validation unable to detect block

To ensure block can be detected the user should place a point (using the AutoCAD "Point" function), at 0,0 within the block definition (BEDIT).

Corrupt ACDC Menus within ACDC/Munsys Profile

If the menus are corrupt within ACDC, and the user is running ACDC on an ACDC/Munsys Profile, then it is recommended that the user execute the Restore Munsys Menus function. This function will enable the menus to be restored back to default however the ACDC menus will be removed as a result. Hence the user should:

- Execute the Restore Munsys Menu function first.
- Type MENULOAD and load the ACDC menu.

This will then ensure that the ACDC menus are loaded correctly for the user to continue using the application.

Known Issues

Attribute Blocks – 'Single Line Text' Objects Not Displayed in Left Tree View.

Objects of type 'Single Line Text' do not appear in the left tree view under 'Attribute Blocks'. This occurs because 'Single Line Text' objects do not have any attribute blocks associated with them, so there is nothing to display in the list of Attribute Blocks. As a result, the only way to select 'Single Line Text' objects is to go to the 'Object' tab of the 'Attribute Blocks' node and select them in the top right grid view.

High-DPI Scaling for Desktop Applications on Windows 10 and AutoCAD 2021

Windows 10 and AutoCAD 2021 has a known issue with desktop application icons that can be blurry or sized incorrectly when run on high-DPI displays. This is especially noticeable when docking and undocking or when using remoting technologies such as Remote Desktop Protocol (RDP).

The problem can be addressed by the following workaround:

1. Right click on the ACDC 5.0 Icon.
2. Select Properties.
3. Go to Compatibility Tab / Settings Category.
4. Select Override high DPI scaling behavior and select System or System (Enhanced).
5. Select OK and re-open ACDC 5.0.

Appendix

Table of Figures

Appendix

List of Tables