ACDC 4.7

USER MANUAL

OpenSpatial

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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.

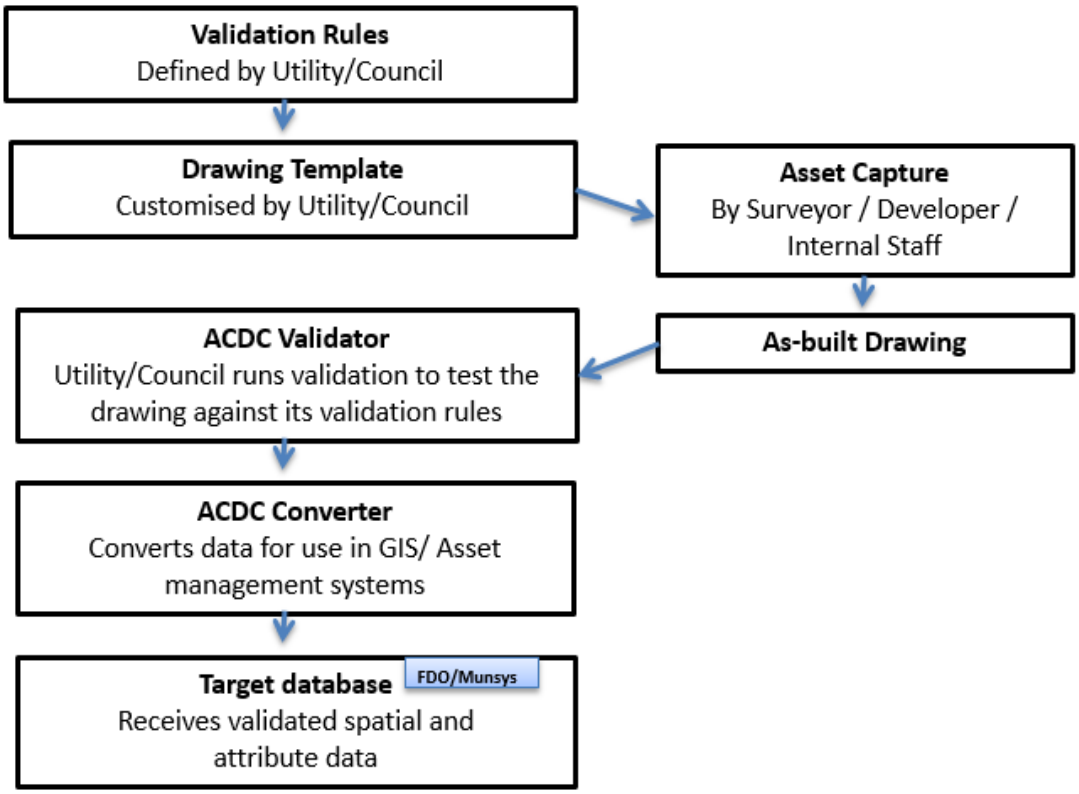


Figure 1 ACDC Process Overview

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.

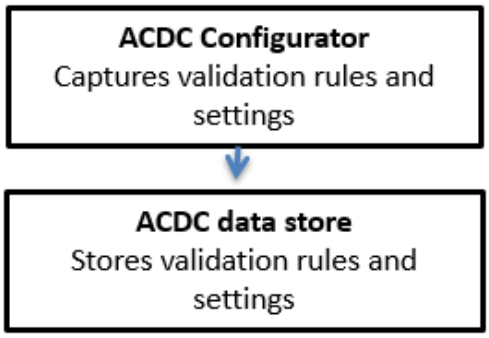


Figure 2 ACDC Configurator Process Overview

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
  - 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 FDO Layers** - Saves the definition of all current FDO layers and their connection information to the ACDC database.

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

Ribbon

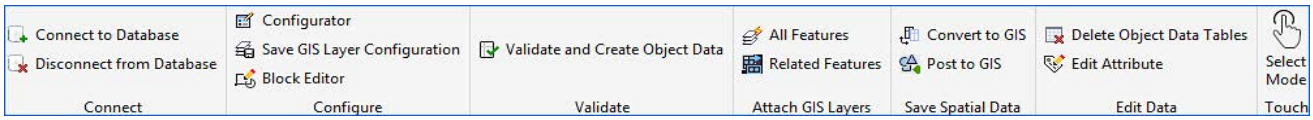


Figure 5 ACDC Ribbon

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

ACDC Drawing Template

An ACDC drawing template needs to be created for third parties to capture as-built data in AutoCAD to meet the needs of published industry standards and individual corporation's requirements. To make this possible an ACDC drawing template contains predefined attributed blocks and layers.

Predefined layers in the ACDC template are primarily used to draw specific asset types. Each 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 line drawing (representing a water pipe), after validation and conversion of that line in ACDC, the line will possess the attributes of the associated water pipe block.

Note that:

- 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.

The 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.

This 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).

These definitions form the basis of the 'validation rules' used in the Validation Process.

Configurator Buttons

Below is an explanation of the functionality of the buttons in the 'Configurator'.

 **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.

 **Refresh data.** Refreshes the 'Configurator' 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:

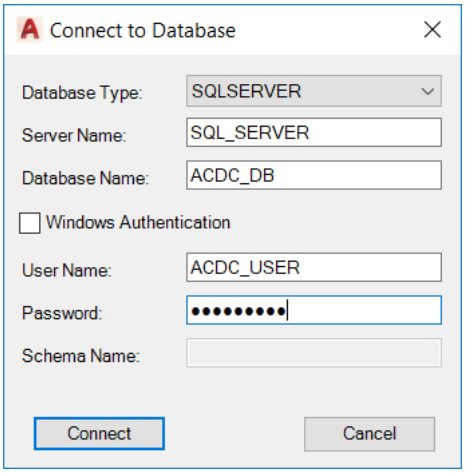


Figure 6 Connect to Database Dialog Box.

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.

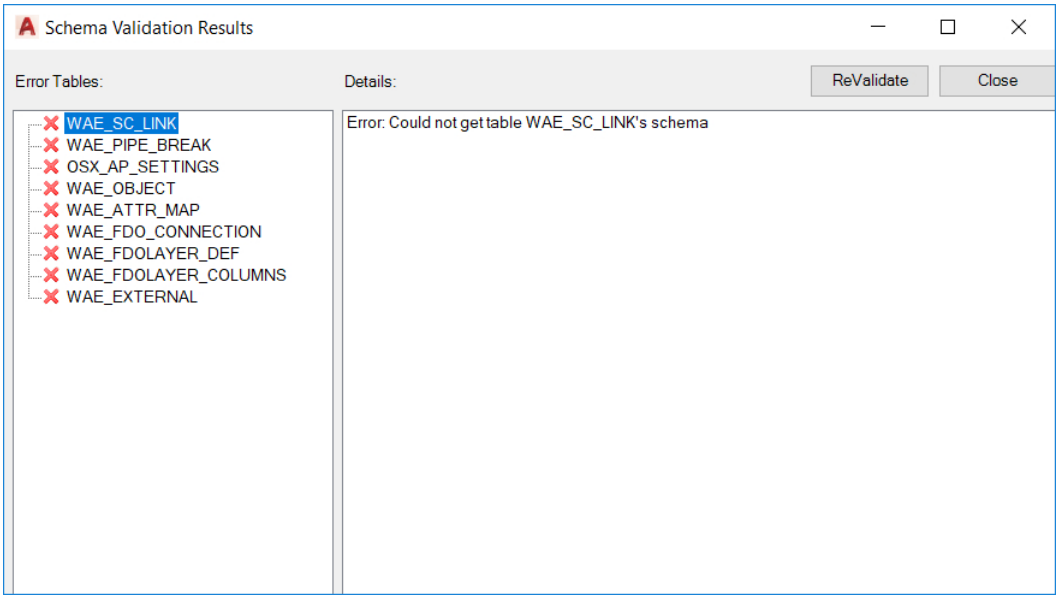


Figure 7 The Schema Validation Results dialog Box.

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.

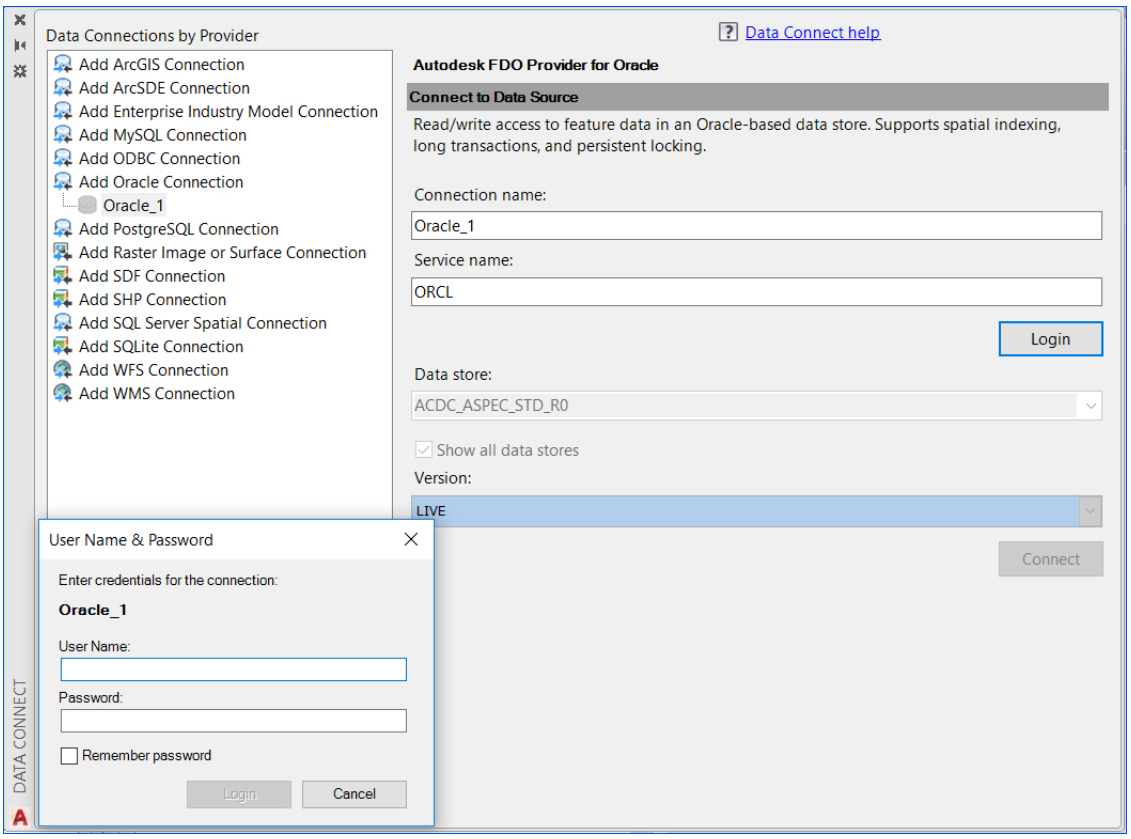


Figure 8 Adding a New Data Connection

- 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.

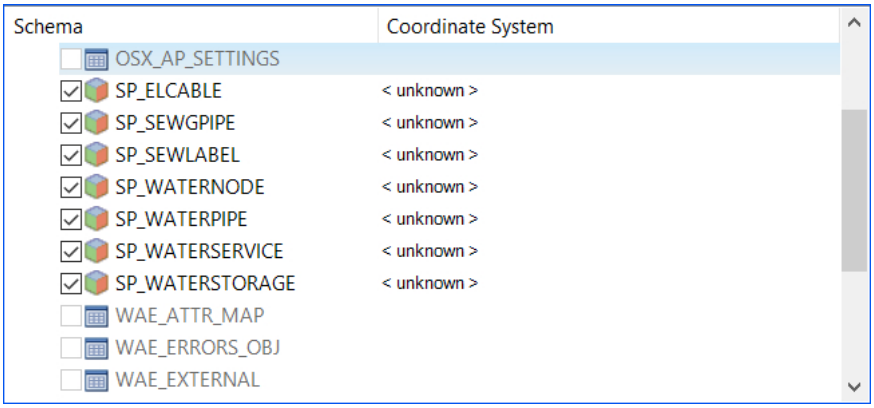


Figure 9 Adding Selected Layers to Map

- With the required destination layers in the 'Task Pane', press the **Save FDO Layers** 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 FDO Connections' dialog box which is populated with a list of FDO 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**.

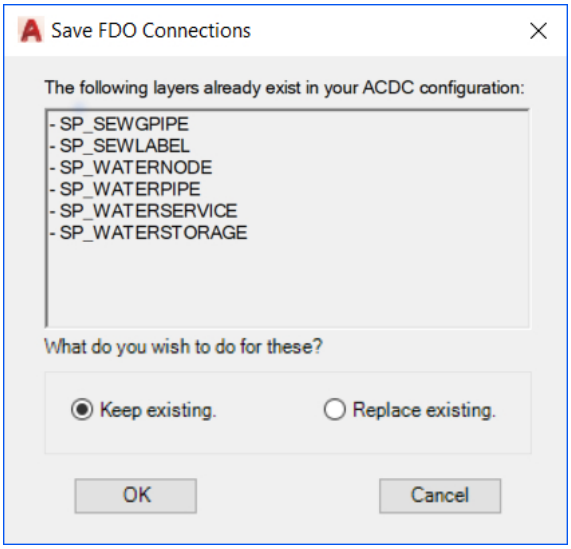


Figure 10 Save FDO Connections

- 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.

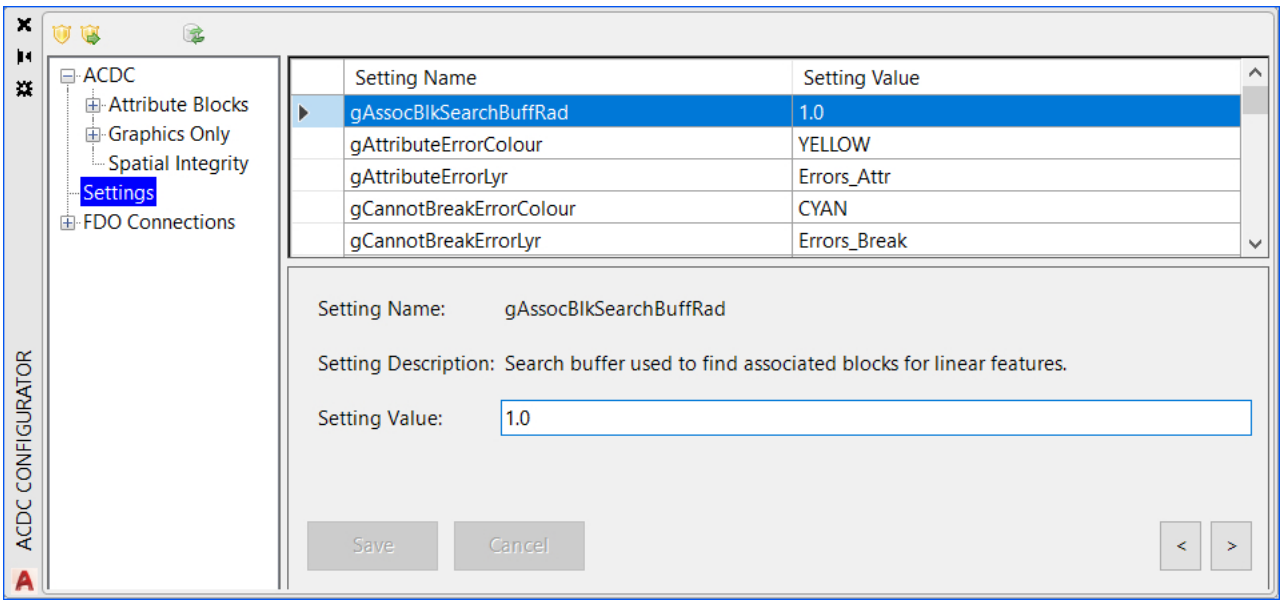


Figure 11 Settings in the ACDC Configurator

2. The following settings must be reviewed and defined specifically for your project before the Configuration can commence:
    - gCommonBlkName
    - gDateFormat
    - gGISType (must log out/log in for any change to this setting to take affect)
    - gExternalOutputTarget
    - gLookupFilter
    - gVerifyRealSize (See section 'CONFIGURING 'gVerifyRealValues').
    - gNodeSearchBuffRad

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 ie. 0.1 then an isolated block error will be displayed when an attribute block is placed on the arc section of a LWpolyline.

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.

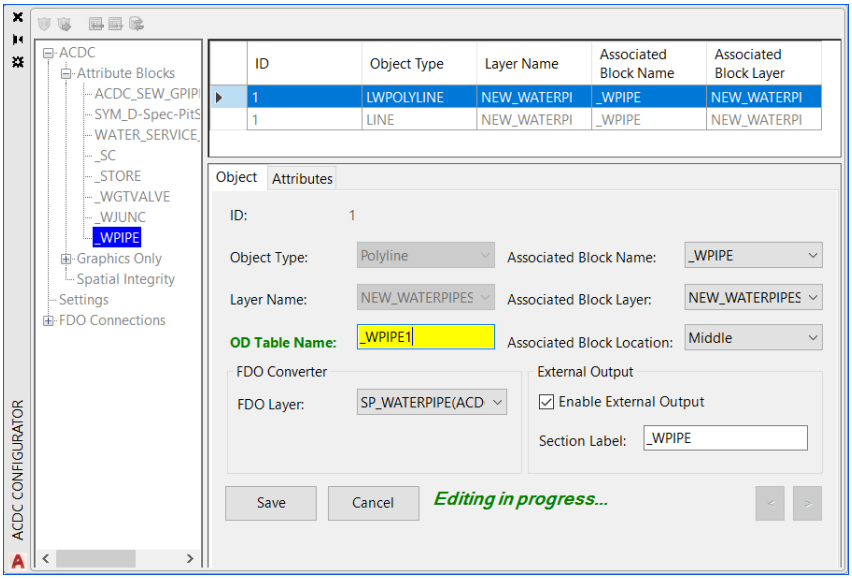


Figure 12 Editing in the ACDC Configurator

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.

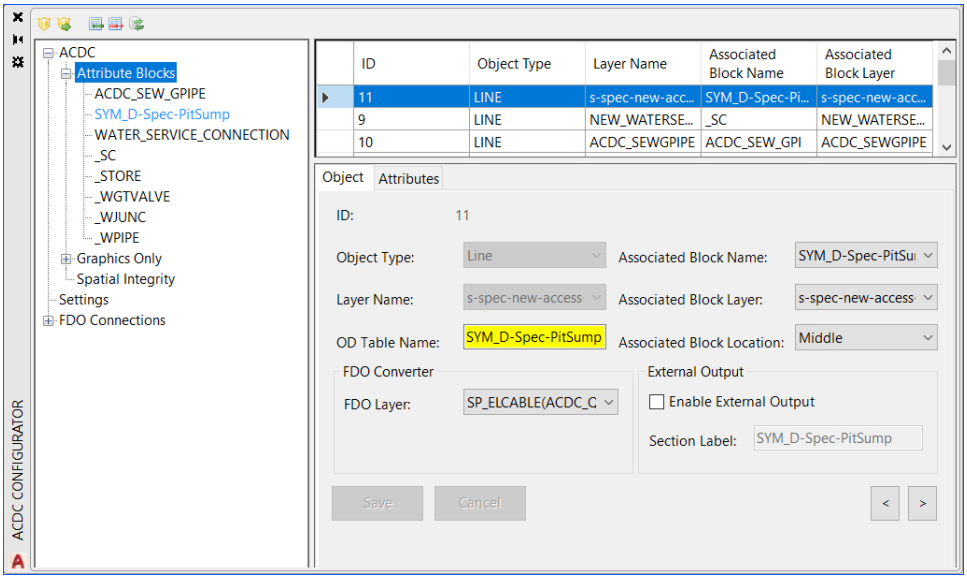


Figure 13 Attribute Blocks in the ACDC Configurator

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 dropdown 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 tank.
        - **Closed Polyline:** If the asset forms a closed polyline. For example, a water reservoir such as a dam.
        - **Line:** If the asset is represented as a line entity. For example, a water pipe that consists of only one line segment.
        - **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. Note that, if an asset can be represented by both lines and polylines, a separate record will have to be defined for each of these object types. Duplicating records in the 'Configurator' is addressed in Figure 15. Duplicating Records in the Configurator.
        - **Single Line Text:** For text within a drawing that needs to be displayed. For example, construction notes.
          Note that, Single Line Text objects do not have associated blocks.
    - **Layer Name:** The layer that the objects exist on in your drawing file.

Note that, 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' 'Line' or 'Polyline' but no other entries of 'Object Type' 'Line' or '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.

b. **End:** If the block has been snapped to the end of the object.

c. **Start or End:** If the block has been snapped to the start or end of the object.

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 line (but not on a vertex).

e. **Inside:** If the object is represented by a circle or closed polyline the block must be located inside the object.

- **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.

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:

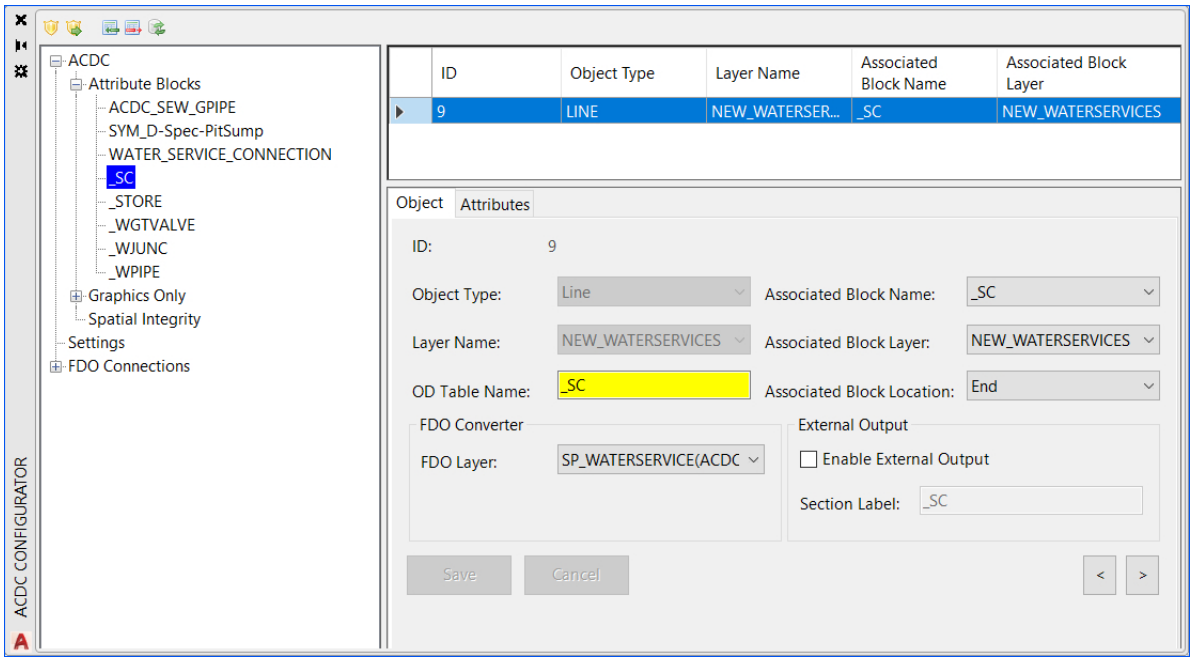


Figure 14 Completed Record in the ACDC Configurator

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.

Important: When an asset is represented by both lines and polylines a separate record will have to be defined for each of these object types. The 'Configurator' contains a tool to facilitate this process, the 'Duplicate' tool. This tool will duplicate the selected record and allows you to specify the additional 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** from the menu that appears.

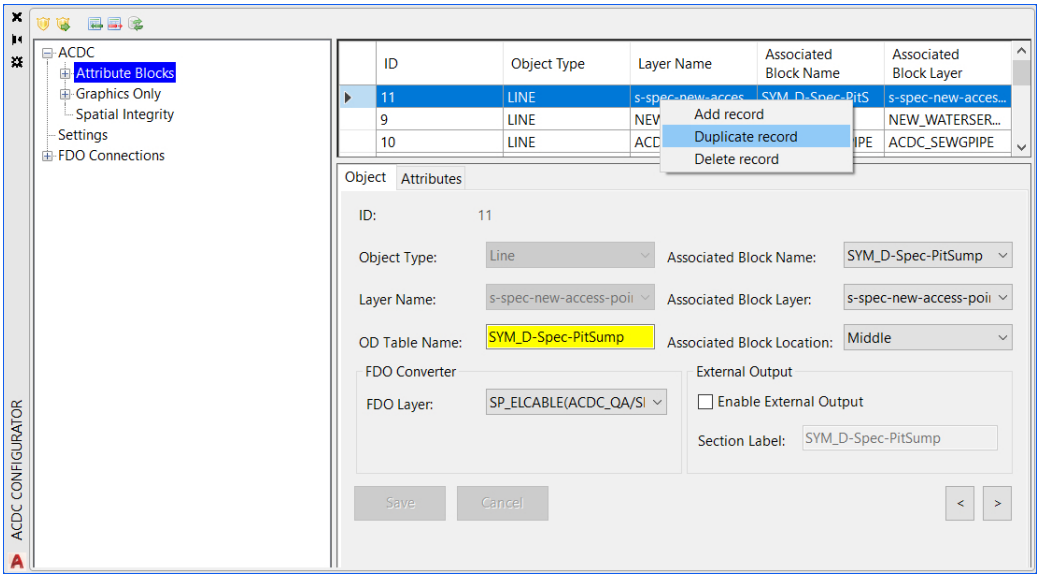


Figure 15 Duplicating Records in the Configurator

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. Only the 'Object Type' field requires populating.

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

The results of this duplicate process are shown in the below figure. After duplication, two records for water pipe assets exist – one for those represented by lines, and another for those represented by polylines. Notice these records have the same ID value. This indicates that they apply to the same asset.

ID	Object Type	Layer Name	Associated Block Name	Associated Block Layer
1	LWPOLYLINE	NEW_WATERPIPES	_WPIPE	NEW_WATERPIPES
1	LINE	NEW_WATERPIPES	_WPIPE	NEW_WATERPIPES
3	INSERT	NEW_JUNCTIONS	_WJUNC	NEW_JUNCTIONS

Figure 16 Duplicate Record in the ACDC Configurator

Note: This duplication process is advised where multiple Object Types can be used to represent an asset. For example, pipes can be represented by both line and polyline object geometries.

Attribute Blocks – Attributes Tab

The 'Object' tab defines how the Converter is to find and classify each of the assets within the open drawing file. The information you store in the 'Attributes' tab is used to tell the Converter which attributes to store against each asset, and exactly where to find these attributes.

The below steps detail 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.

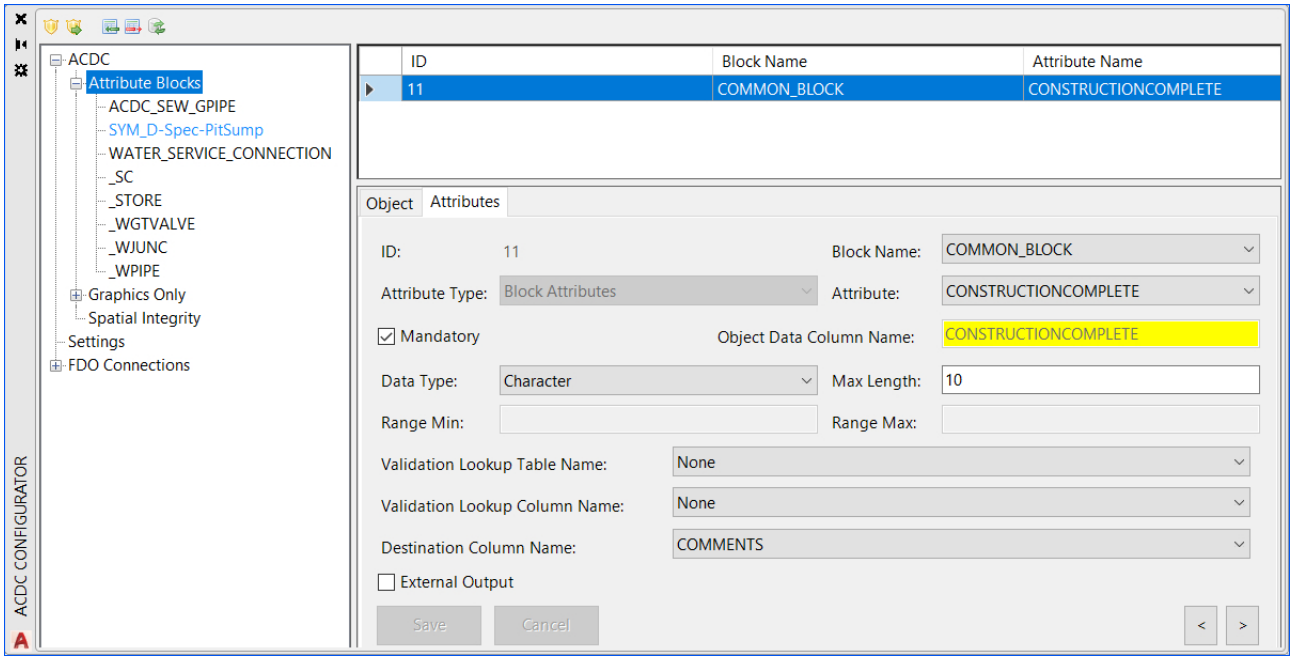


Figure 17 The Attributes Tab

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

    - **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.
- **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.
- **Object Data Column Name:** The name of the column in the object data table that will store this attribute. 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.

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.
- **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 that, 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.

As you are filling out 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 A**dd 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.

The Attribute definition will resemble the below upon completion:

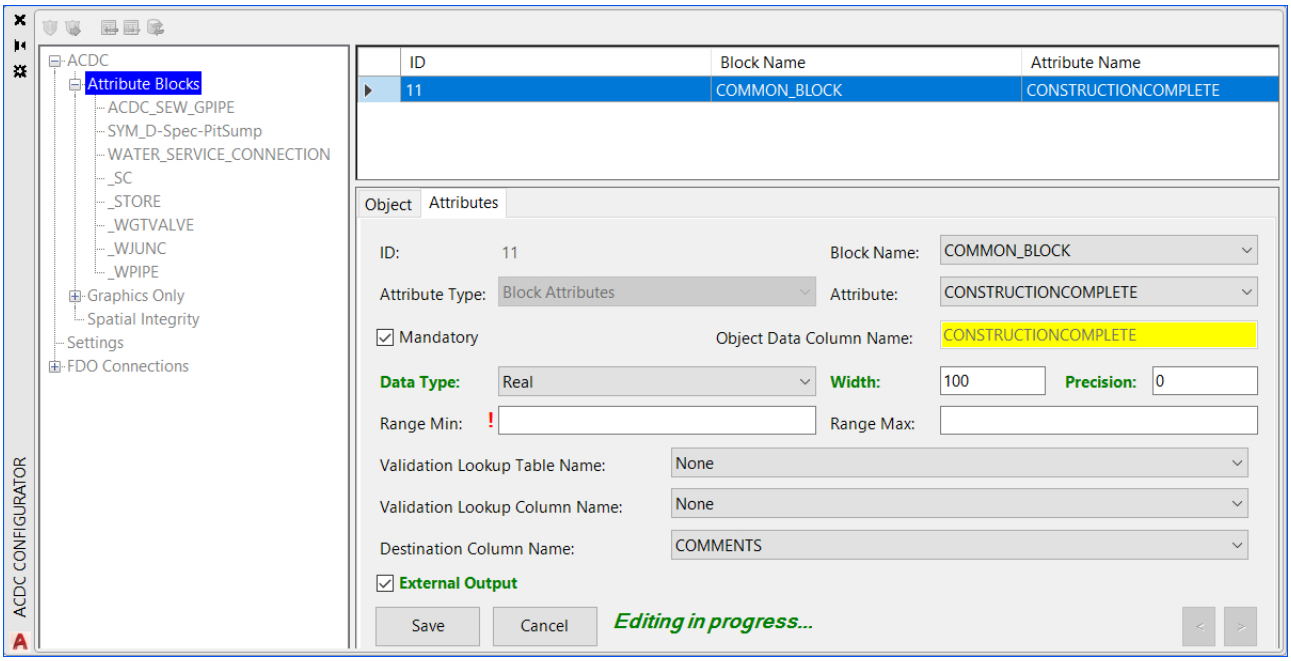


Figure 18 Attributes Tab

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

GRAPHICS ONLY – Object Tab

The 'Objects' tab of the 'Graphics Only' node is where you define the layers that contains no attribute data, and to which layers these graphics connections can be connected.

1. Select the 'Graphics Only' node in the left tree view pane.
2. Select the 'Objects' tab in the bottom right pane.

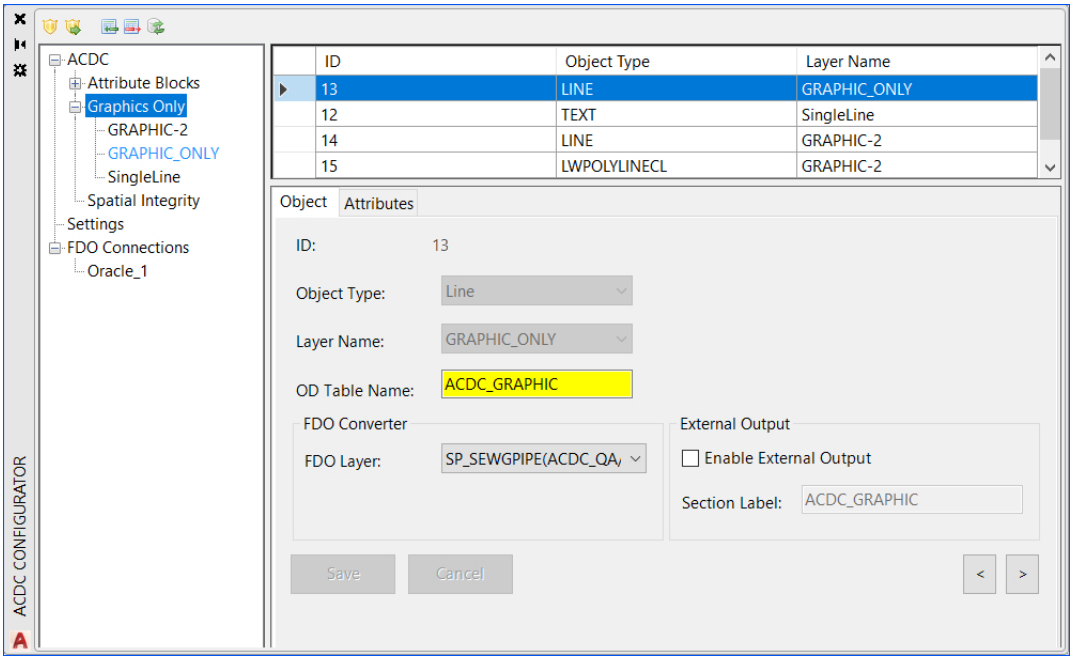


Figure 19 Object Tab for Graphics Only

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 dropdown menu. The 'Object Type' can be:
        - **Circle:** If the asset is represented by a circle. For example, a water reservoir such as a tank.
        - **Closed Polyline:** If the asset forms a closed polyline. For example, a water reservoir such as a dam.
        - **Line:** If the asset is represented as a line entity. For example, a water pipe that consists of only one line segment.
        - **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. Note that, if an asset can be represented by both lines and polylines, a separate record will have to be defined for each of these object types. Duplicating records in the 'Configurator' is addressed in Figure 15. Duplicating Records in the Configurator.

- **Single Line Text:** For text within a drawing that needs to be displayed. For example, construction notes.
  Note that, Single Line Text objects do not have associated blocks.

- **Layer Name:** The layer that the objects exist on in your drawing file.

Note that, 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' 'Line' or 'Polyline' but no other entries of 'Object Type' 'Line' or '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).

- **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.

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.

GRAPHICS ONLY – Attributes Tab

The 'Objects' tab of the 'Graphics Only' node is where you define the layers that contains no attribute data, and to which layers these graphics connections can be connected.

1. Select the 'Graphics Only' node in the left tree view pane.
2. Select the 'Attributes' tab in the bottom right pane.

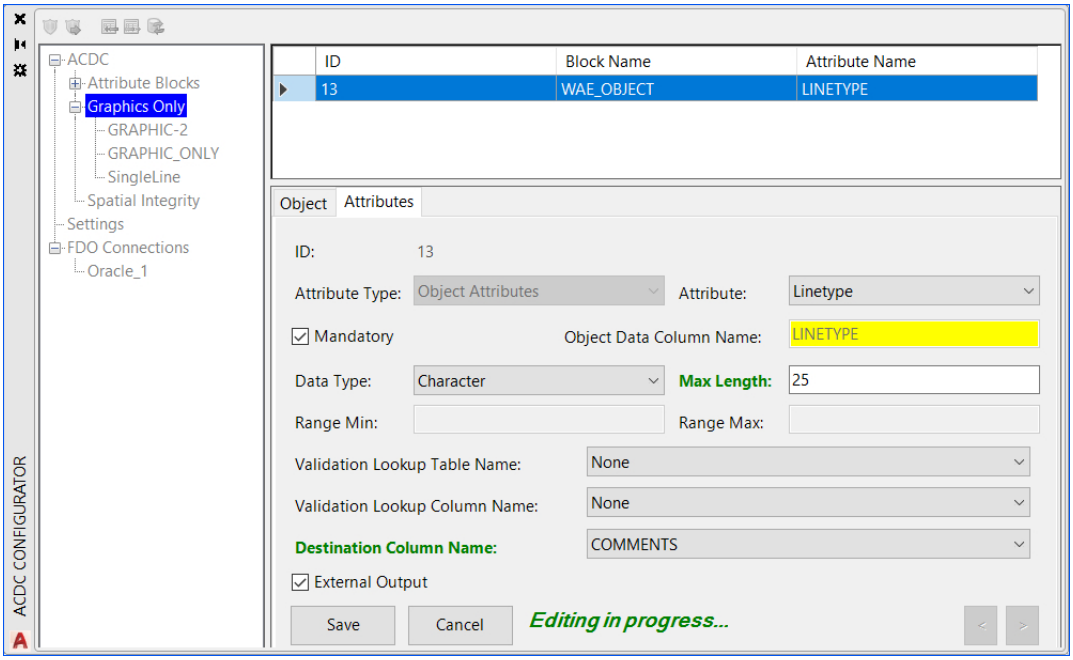


Figure 20 Attributes Tab for Graphics Only

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

    - **Attribute Type:** Defines the source of the attribute value. The available options are:
        a. **Database Sequences:** The attribute value will be supplied by a database sequence (for Oracle users).
        b. **Database Functions:** The attribute value will be supplied by a database function.
        c. **Object Attributes:** The attribute value will be determined from the geometry of the object (for example, length, rotation, area, circumference).
    - **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:** The name of the column in the object data table that will store this attribute. 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).

- **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.
- **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.

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.
- **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 that, 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.

As you are filling out 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.

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.

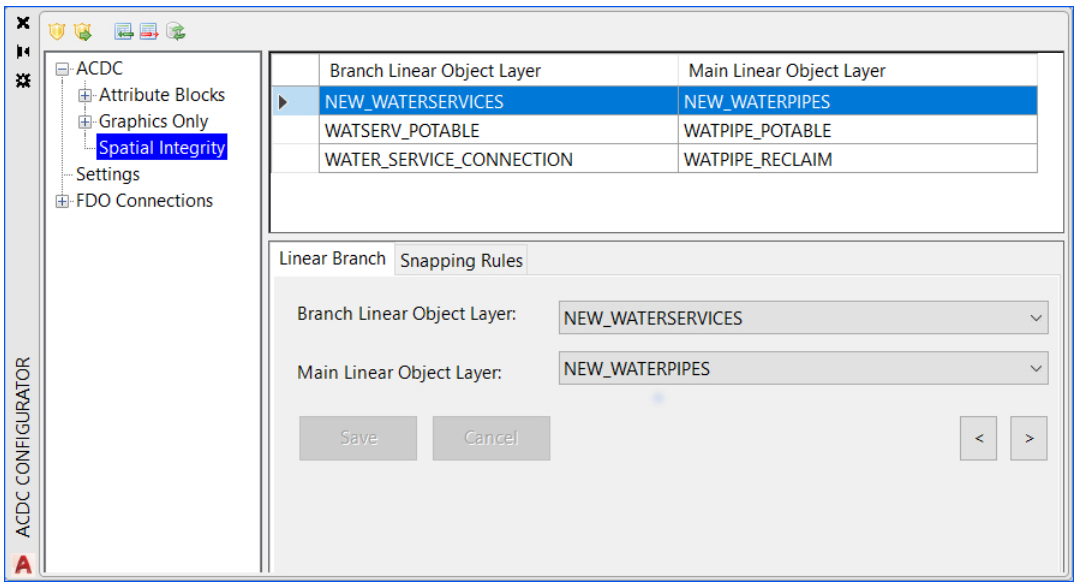


Figure 21 Linear Branch Tab for Spatial Integrity

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.

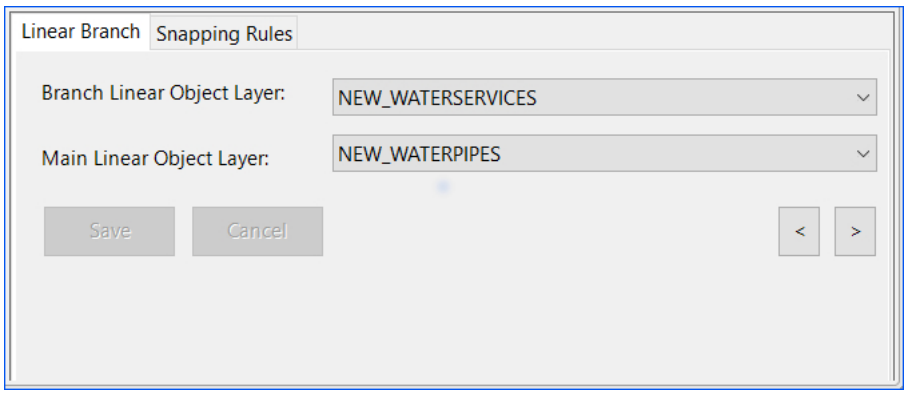


Figure 22 Linear Branch Options

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.

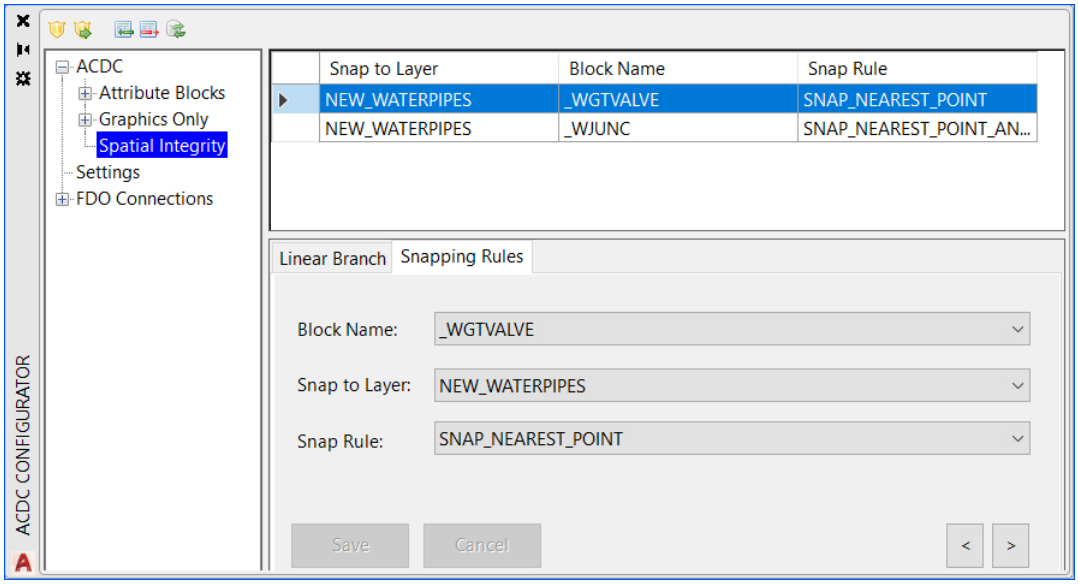


Figure 23 Snapping Rules Tab for Spatial Integrity

2. To define a new snapping rule, press the **Add new 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. To run the 'Verify configuration' tool, complete the steps below.

1. Press the **Verify configuration** button located in the top left corner of 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 it is possible to cease the current check by clicking the **Stop** button. However the 'Verify configuration' will cease and the check will not have 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. If you wish to save the results to a text file, press the **Save to file** button.
5. Close the 'Verify configuration' dialog, by pressing the **Close** button.
6. 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.

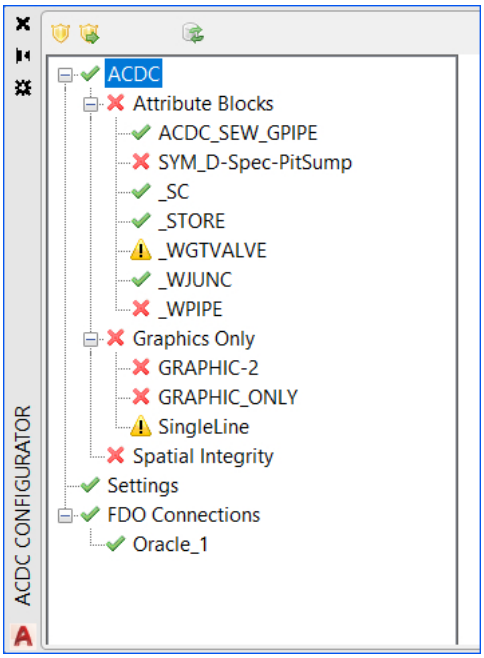
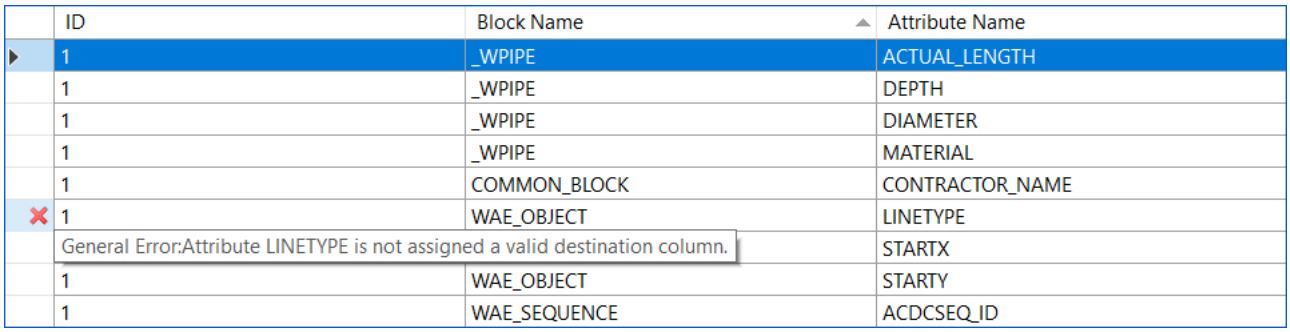


Figure 24 Verify Configuration Tree View

7. To investigate an error/warning select an item with a red cross (error) or exclamation mark (warning) in the left tree view pane.

8. 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 25 Configured Record with an invalid destination Column Name

9. Correct all of the errors as required.

10. 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'.

11. 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.

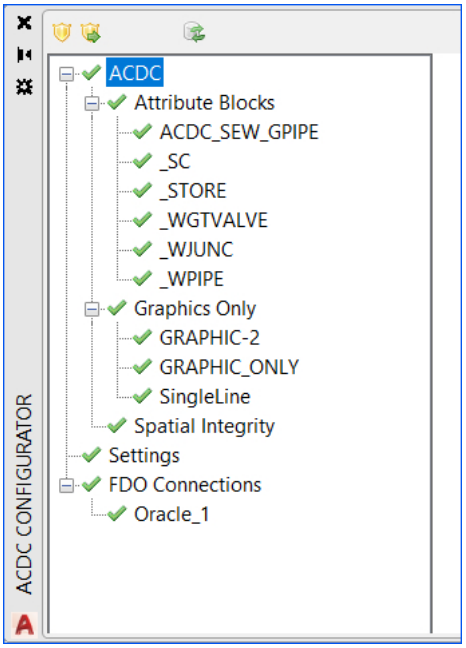


Figure 26 Successful Verify Configuration Tree View

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.
2.8	General Description: Checks that each 'OD Table Name' does not contain space character. 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 LINE, 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.

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.

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. If 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. If you are presented with a 3D Objects prompt, select the appropriate option (either 'Yes' or 'No').Currently, ACDC does not support 3D objects. Any 3D objects should be converted to 2D objects before validation/conversion. See the 'Tips and Tricks' sections of this document to see how to convert 3D objects to 2D objects.
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.

If errors were found, the following information will be written in 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 lines, point and polygons then the system will display an error in the validation results in the following syntax eg. **Incorrect Object Type (SPLINE). - [Layer: OSPEC_NEW_AREA_EXTENT].**

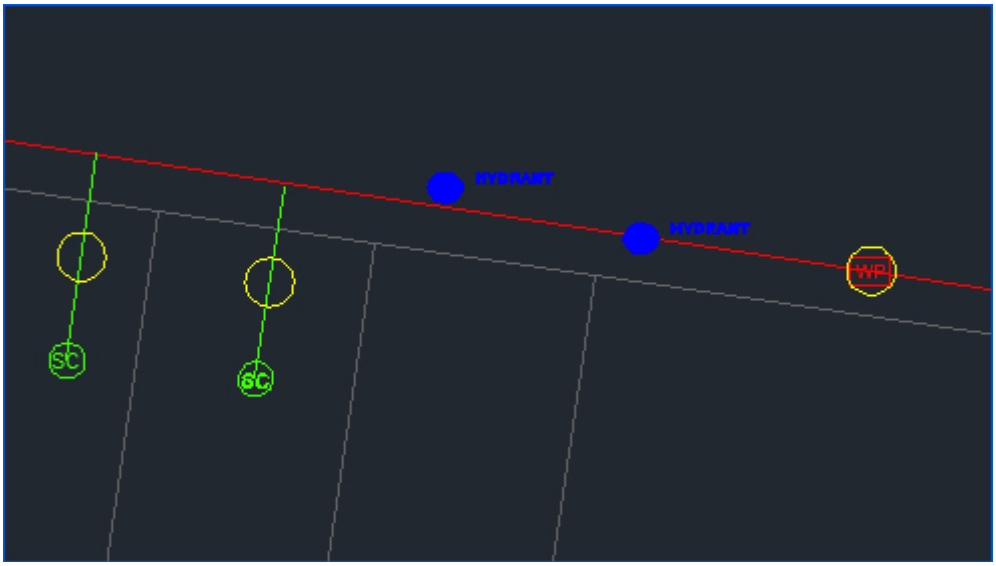


Figure 27 Objects with Attribute Errors Flagged with Yellow Circles

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.

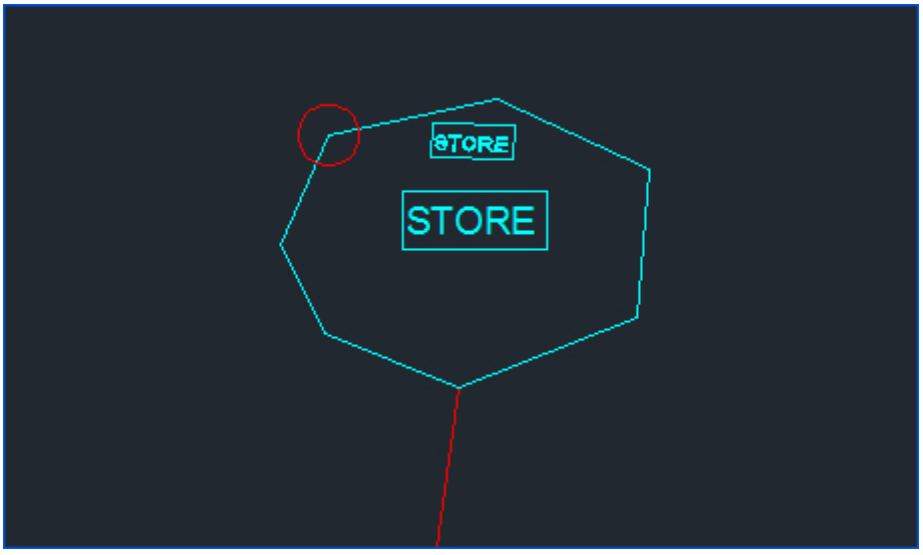


Figure 28 Red Circle Flagged Geometry Error

A report file (.CSV 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.

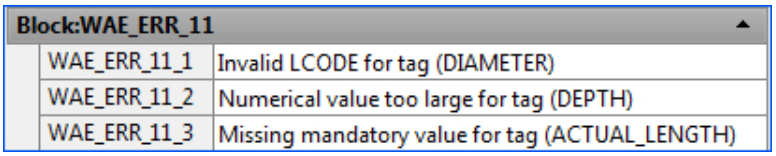


Figure 29 Error Properties

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.

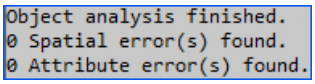


Figure 30 Error Free Verification

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 following syntax: Error Message - [Layer: xxx - Block: xxx], where the xxx variables indicate the Layer Name and Block Name respectively. This will be displayed in both the WAE_ERRORS_OBJ database table and the Log file.

Once a validation has been run, this table will be truncated automatically 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:

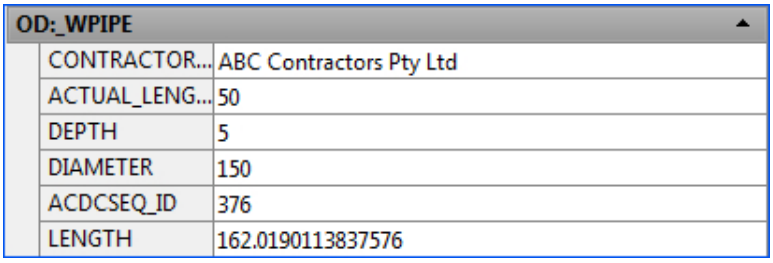


Figure 31 Validated Object Attributes

This is the information that 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.

Figure 32 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 is running a validation on 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.

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	Associated Block on incorrect layer	Geometry error flagged
2	No valid object layer/type combination found	Geometry error flagged
3	Associated Block is contained within more than one configured object	Geometry error flagged
4	Associated Block is not contained within configured object	Geometry error flagged
5	More than one object found with associated block	Geometry error flagged
6	No objects found on correct layer	Geometry error flagged
7	Object without associated block.	Geometry error flagged
8	Object with more than one associated block.	Geometry error flagged
9	Service connection that does not connect to a pipe.	Geometry error flagged
10	Attribute information found in drawing conflicts with attribute definitions in configuration.	Attribute error flagged
11	Lookup code or value incorrect.	Attribute error flagged

12	Cannot break pipe if breaking the pipe will produce a segment shorter than the value specified by gPipeLengthBreakTol setting.	Break error flagged
13	Node cannot break a pipe if snapped to multiple pipes.	Break error flagged

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 ("/"), is used in the object data field names, suggest the user utilizing 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.

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 **Generate FDO Layers**  button to recreate 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'.

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.

3. Press the **Convert ACDC Drawing**  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.

4. 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" to select all the objects within the drawing file.
5. Press the 'Enter' key on your keyboard, or press the right-button on your mouse to begin the conversion routine.
6. 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.
7. 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 ACDC Drawing** 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.

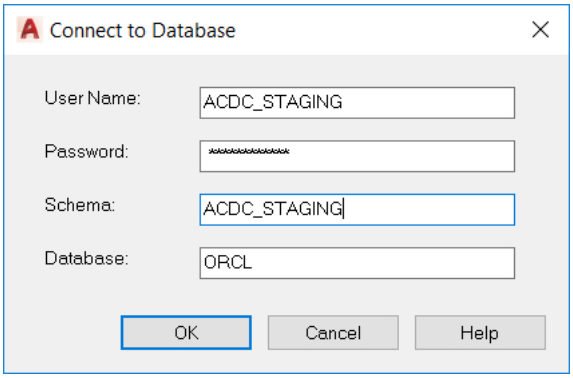


Figure 33 Munsys Connection Dialog Box

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" 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.

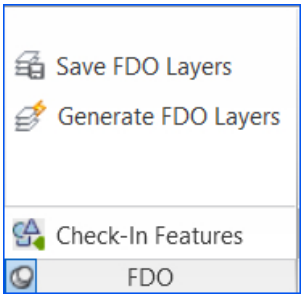


Figure 34 Check in Feature Menu Item

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.

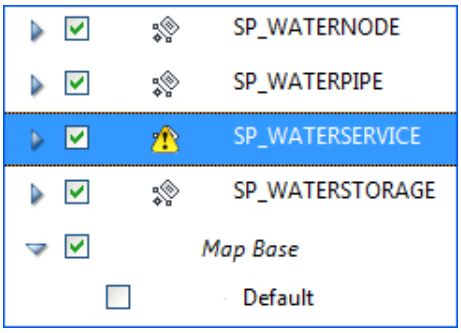


Figure 35 Layer Warning Graphic

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.

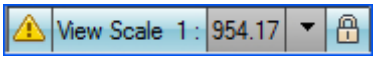


Figure 36 Review Error Log

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.

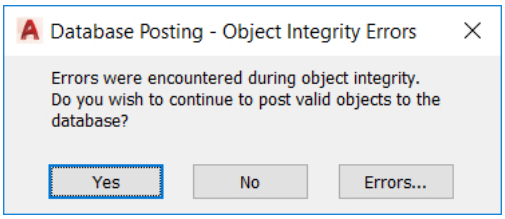


Figure 37 Object Integrity Error Dialog Box

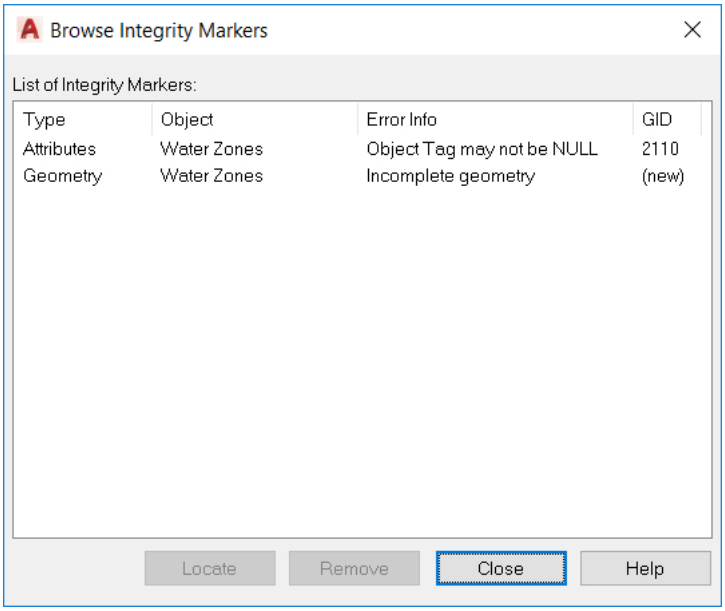


Figure 38 Browse Integrity Markers Dialog Box

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_EXTERNAL TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_FDO_CONNECTION 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_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_ERRORS_OBJ TO NewUser;
GRANT SELECT ON ALL LOOKUP TABLES TO NewUser;
GRANT EXECUTE ON ALL FUNCTIONS TO NewUser;
GRANT SELECT ON ALL SEQUENCES TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ALL DESTINATION TABLES TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON WAE_MUNSYS_NODE_MAPPING 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;

- 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_EXTERNAL TO NewUser;

GRANT SELECT ON WAE_FDO_CONNECTION TO NewUser;
GRANT SELECT ON WAE_FDOLAYER_COLUMNS TO NewUser;
GRANT SELECT ON WAE_FDOLAYER_DEF 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, 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 SELECT ON ALL SEQUENCES TO NewUser;
GRANT SELECT, INSERT, UPDATE, DELETE ON ALL DESTINATION TABLES TO NewUser;
GRANT SELECT ON WAE_MUNSYS_NODE_MAPPING 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;

Configurator Settings

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.
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.
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.
gDeleteODTables	True	Delete Object Data tables before validation.
gExtentsErrorColour	MAGENTA	Colour 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.
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)
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.
gGISType	FDO	The GIS type (available values: FDO or Munsys).
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	0	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	0.5	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	1.0	Minimum area of Polygon entities.
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.
gStandardVersion	ASPEC3	Name of the standard in use and its version number.
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	4.6	Defines the version of ACDC, will be modified by future upgrade scripts.

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_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_MUNSYS_NODE_MAPPING	Munsys node mapping is for Munsys ACDC customers and is used during the conversion process to munconvert data.
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.
ACDC_SEQ	This table is created for MS SQL Server installations only. It is used by the ACDCSEQ_ID stored procedure to generate unique numeric identifiers.
ACDC_SEQ_OBJ	This table is created for MS SQL Server installations only. It is used by the ACDCSEQ_OBJ_ID stored procedure to generate unique numeric identifiers.
ACDC_SEQ_DWG	This table is created for MS SQL Server installations only. It is used by the ACDCSEQ_DWG_ID stored procedure to generate unique numeric identifiers.

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_ATT_MAP

Column Name	Type	Description
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(30)	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(30)	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

WAE_ERRORS_OBJ

Table 12: WAE_ERRORS_OBJ

Column Name	Type	Description
DWG_NAME	VARCHAR2(150)	Name of DWG being analyzed.
DWG_ID	NUMBER(10)	Unique DWG ID
ENTITY_HANDLE	VARCHAR2(20)	Validation error block ID identifier
ERR_TYPE	VARCHAR2(4)	Error type. Allowable values: **GEOM**: For geometry related errors **ATTR**: For attribute errors **BRKP**: For pipe breaking related error
MESSAGE	VARCHAR2(150)	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.

PROCESS_DATE	DATE	The process date

WAE_EXTERNAL

Table 13: 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, 0)	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 14: 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 15: 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 16: 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_OBJECT

Table 17: WAE_OBJECT

Column Name	Type	Description
ID	NUMBER(10)	Record identifier. Not unique.
ACAD_OBJECT_TYPE	VARCHAR2(30)	AutoCAD object type. Allowable values: **INSERT** for block objects **LWPOLYLINE**, or **LINE** 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 an LWPolyline in the same drawing, multiple records are inserted in the table as separate records. **LWPOLYLINECL** for Polygon objects. This is a LWPolyline whose property set as Closed **CIRCLE** for circular objects. **TEXT** for Text objects to be converted as labels.
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.

WAE_PIPE_BREAK

Table 18: 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 19: 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_MUNSYS_NODE_MAPPING

Table 20: WAE_MUNSYS_NODE_MAPPING

Column Name	Type	Description
MUN_ID	NUMBER(10)	The Unique Munsys ID
TABLE_NAME	VARCHAR2(50)	The Table name
NODE_TYPE	VARCHAR2(100)	The Node type
SYMBOL_NAME	VARCHAR2(100)	The Symbol name

ACDC_SEQ (for MS SQL Server Installations Only)

Table 21: ACDC_SEQ (for MS SQL Server Installations Only)

Column Name	Type	Description
SEQID	INT	Reserved for Future use
SEQVAL	VARCHAR(1)	Reserved for Future use

ACDC_SEQ_OBJ (for MS SQL Server Installations Only)

Table 22: ACDC_SEQ_OBJ (for MS SQL Server Installations Only)

Column Name	Type	Description
SEQID	INT	Reserved for Future use
SEQVAL	VARCHAR(1)	Reserved for Future use

ACDC_SEQ_DWG (for MS SQL Server Installations Only)

Table 23: ACDC_SEQ_DWG (for MS SQL Server Installations Only)

Column Name	Type	Description
SEQID	INT	Reserved for Future use
SEQVAL	VARCHAR(1)	Reserved for Future use

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 24: 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 4.6\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

- For Oracle, three database sequences (ACDCSEQ_ID, ACDCSEQ_OBJ_ID and ACDCSEQ_DWG_ID) are also defined. These sequences are designed to provide a unique numeric identifier for each record that is converted.
- For MS SQL Server, three additional tables (ACDC_SEQ, ACDC_SEQ_OBJ and ACDC_SEQ_DWG) and stored procedures (ACDCSEQ_ID, ACDCSEQ_OBJ_ID and ACDCSEQ_DWG_ID) are defined. These provide the mechanism for creating a unique numeric identifier for each record that is converted.
- 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 ACDCMENULOAD 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 4.6 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 4.6.

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