

NCS Symbols for Civil 3D



Symbol Set Documentation

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1 Overview

1.1 The NCS Symbol Set

The National CAD Standards (NCS) includes as part of the Uniform Drawing Standards (UDS) a set generic symbols that may be employed in a wide range of Architectural, Engineering, and Construction (AEC) disciplines that are employed in typical building projects and mapping. The Civil, Survey and Mapping symbols included in the NCS (in all versions) were initially produced by the US Coast Guard.

1.2 The NCS and Civil Engineering Symbols

We have included in the Symbol Set AutoCAD block representations of many of the UDS symbols that may be used in typical and various civil engineering and surveying projects.

Architectural, Structural, and Building Services symbols are NOT included.

Typical graphic Scales, title blocks, airport lighting, port, and USCG specialized mapping symbols are NOT included.

1.3 Intent

The intent of the Symbol Set is to provide a standard basis of typical engineering and survey symbols that conform where possible to UCS conventions but provide reasonable in-depth coverage based on typical general civil engineering and survey project work.

The default set of NCS 5.0/4.0 blocks includes many, but certainly not all typical surveying and civil engineering symbols.

Therefore, we have added other typical civil engineering and survey symbols from other common national civil engineering standards to fill out the included selection.

1.4 Versions and Compatibility

Release specific versions of Symbol Set products are supplied for each specific Autodesk Civil 3D release. Symbol Sets for older release drawings may be manually upgraded to another release. Upgraded Point Style files and drawings may NOT be employed in older releases.

1.5 Blocks Only Product

We may produce Blocks Only versions of the NCS 5.0/4.0 Symbol Set. That product includes NO Autodesk Civil 3D Point Styles. Only AutoCAD drawings containing the blocks are included. Specific versions are each produced for a specific AutoCAD DWG file formats.

1.6 Block Origins

Our basis was a collection of AutoCAD blocks and Microstation cells found in public domain and/or published versions of

- The National CAD Standard NCS 3.1 and 4.0
- The National CAD Standard NCS 5.0
- The National CAD Standard NCS 6.0
- The Autodesk version of American Public Works Associations (APWA)
- Common Autodesk block libraries delivered with older AutoCAD Civil 3D and AutoCAD Land Desktop products over multiple releases.
- A number of State DOT cell libraries available in multiple graphic and digital formats
- Contributions from our customers

1.7 CSI Number Usage

The UDS includes the Construction Standards Institute (CSI) numbering scheme to its supplied generic symbols.

The intent is to allow better quantity estimate information to be supplied on a by block instance basis. The UDS supplied CSI numbers are generalized as a matter of course.

The current Symbol Set does not employ the UDS/CSI numbers in any of the supplied Civil 3D Points Styles nor is this information included in the supplied underlying blocks.

Currently Autodesk Civil 3D supplies a number of better and easier methods of attaching this type of estimating information to Civil 3D Features via Quantity Take Off.

2 Block Graphic Assessment

1.8 The Block Naming Convention

The UDS symbols do NOT employ a standardized naming convention, nor does the Standard make recommendations for the same.

However, because names play a very significant role in the user identification of symbols and Autodesk Civil 3D employs exact name matching principals in much of its functionality, a naming convention based on Rules is used in the Symbol Set.

The blocks in the Symbol Set employ an “NCS like” naming convention based on the typical NCS concept of the Major Key as these are used the NCS Layer Naming Convention.

Where possible the standard Block Naming Convention used employs typical NCS Major or Minor Key abbreviations.

1.9 The Symbol Set Naming Convention

The actual employed Symbol Set AutoCAD Block and Civil 3D Point Style naming convention is:

<Discipline>-<Group>-<Contents>

See the specific Code Rules details below.

We employ a standard method to assess symbol graphic contents. It is used to CODE existing graphic symbols for comparison purposes.

The methodology allows us to generalize and compare graphics between multiple published graphic standards.

This produces a standardized and generic block name like **C-PONT-Benchmark-SDT**

The ENTIRE classification name is NOT used in delivered products.

You may also find the following block classification method useful to employ to categorize your blocks and compare them to the supplied Symbol Set blocks or other Standards you need to match.

2.1 Block Classification

The block classification naming convention using the full categorization is:

**<Discipline>-<Group>-<Contents>-
<Block Type><Shape><Graphic>**

2.1.1 Discipline Code

The Discipline code employed conforms to the NCS Discipline Codes. “C” and “V” Discipline codes are employed.

2.1.2 The Group Code

We categorize blocks based on usage.

In other words, the symbol receives a Group code based on how it may be employed on typical plan sheets.

For example:

It represents a utility structure, property corner, etc.

Typical National CAD Standard Layer scheme Major Group Key codes are used to gather symbol Groups.

A symbol Group may be represented on multiple NCS Layer Major Keys as shown in the table below.

The NCS Layer Naming Conventions do not perfectly match to blocks that may be used for different purposes.

In general, the NCS Major Keys from the Layer scheme Group together the collections of symbols reasonably well.

Some common symbols can be categorized in multiple Major Keys (they may appear on Layers in multiple Major Groups).

Therefore, the Group Code provides the important structure in the block and Point Style classification system.

2.1.3 The Symbol Group Keys

The Keys employed in Symbol Set products are a subset of the Standard Keys employed throughout the entire Framework for Civil 3D product line.

The complete Standard Keys list is supplied with product documentation separately.

The following table reflects typical Named GROUPS identified and employed for blocks and Civil 3D Point Styles.

NCS Layer Major Key	Group	Description
ANNO	A----	Annotative
ANNO	AMRK	Mark
ANNO	ATRM	Terminator
ANNO	ALIN	Line
ANNO	ASYM	Symbol
ANNO	AIDN	Identify
ANNO	ANOT	Note
ANNO	ANAR	North Arrow
ANNO	ASCL	Scale
SITE, TOPO	BORE	Test Boring
EROS	EROS	Erosion Control
CTRL,PROP,TOPO,NODE	PONT	Point
	P---	Point or Property
PROP	PCNR	Corner
PROP	PMON	Monument
PROP	PSEC	Section
PVMT, ROAD,PKNG	PVMT	Pavement Marks
SITE	SITE	General Site
SITE, TOPO	FEAT	Surface Features
VEGE	PLNT	Shrubs
	TREE	Tree
TRAF	TRAF	Traffic
	TRSG	Traffic Signal
	TRSN	Traffic Sign
RAIL	RAIL	Railroad
UTIL and more	UT--	Utility
UTIL	UTIL	General
POWR	UTEL	Power
WATR	UTWR	Water
SSWR	UTSS	Sanitary
STORM	UTSD	Storm
NGAS	UTNG	Natural Gas
FUEL	UTFO	Fuel Oil
PHON	UTPH	Phone Communications
INDW	UTIW	Industrial Waste
IRRG	UTIR	Irrigation Water
NPOT	UTRW	Recycled Water
COMM	UTCA	Communications Cable
COMM	UTCO	Communications Cable
COMM	UTFB	Communications Fiber
POWR	UTST	Power – Street Lighting

2.1.4 Content Code

This is typically a common English wording or an obvious abbreviation of the same.

The purpose of the Content code is to allow a user to identify the Block or Civil 3D Point Style quickly by Name.

2.2 Detailed Block Graphic Typing

The following detailed graphic typing rules are NOT employed in typical AutoCAD block and Civil 3D Point Style names.

The UDS justifiably asserts that many plan symbols represent real world objects.

2.2.1 Symbolic Graphic Representation

The UDS classifies symbols as being Symbolic or Actual Sized.

2.2.1.1 Block Type Codes

The current Symbol Sets considers all blocks supplied to be “symbolic” representations and not actual sized.

Therefore, all the supplied blocks classified in the Block Classification system with a “S” Block Type code.

2.2.1.2 Dynamic Blocks

Current Civil 3D Feature and Label Styles object model does not fully support the use of parametric or Dynamic Blocks or even Multi-View blocks in Feature and Label Styles.

Hopefully, future releases of Civil 3D will effectively support these technologies.

2.2.2 Shape and Graphic Codes

The following Graphic Classification details further type the block based on both common SHAPES and more specific GRAPHIC content.

For example: a symbol is Square, using a Cross symbol or a Circle, Solid filled.

The purpose of the secondary graphic assessment is to help identify consistent and inconsistent application of standard general graphic display methods both within a single Standard (like the NCS) and also make generic comparisons between multiple Standards (CADOT and TXDOT and NCS). The graphic assessment allows us to answer questions like: *“Do the symbols employ filled and unfilled symbols to clarify the difference between existing and proposed conditions.”*

Or

“Do these two Standards employ similar methods of utility structure symbology and/or how to do the two standards generally differ.”

The Shape and Graphic Codes are the last two characters in the block name.

Our example block name “C-PONT-Benchmark-SDT” is a Small Circle Shape using Text

The following table reflects typical graphic assessment Shape and Graphic codes identified and employed.

Shape Code	Shape Description	Graphic Code	Graphic Description
1	Point	S	Solid
C	Circle	O	Open
D	Small Circle	F	Filled
V	Oval	T	Text
T	Triangle	H	Hatched
3	Small Triangle	P	Part Fill
Q	Square	C	Cross
S	Small Square	X	X
I	Diamond	G	Target Cross
R	Rectangle	R	Target X
E	Rect Elliptical Top	L	Lines Horz
F	Filletted Rectangle	V	Lines Vert
4	Horizontal Rectangle	D	Gradient
5	Pentagon	M	Mask
6	Hexagon	N	Not Apply
7	Septagon		
8	Octagon		
Y	Butterfly		
2	Horizontal Line		
L	Line		
A	Arrow		
Z	Characters		
N	Numbers		
G	Graphic		
B	Combination		
O	Object		

While the Shape and Graphic codes are shown in a single table above, the Shape and Graphic codes are completely independent of one another.

2.3 Block Construction Standards

2.3.1 Generic Scale

Blocks are constructed as much as possible within 1 unit square template.

Blocks may therefore be employed in different unit measurement systems with appropriate scaling.

The typical block insertion point in at 0,0,0 and at the center of the 1 unit square.

2.3.2 AutoCAD Textstyles

The Symbols supplied employ NCS compliant Windows Arial True Type fonts.

“Proposed”, “Existing” and “PVMT” named textstyles are employed exclusively.

Text height in Symbols is established to respect NCS text height standards that basically exist to allow for ½ scale plot and print readability standards.

2.3.3 Attributes

Symbols supplied do NOT employ AutoCAD Attributes.

A couple of exceptions exist to support AutoCAD Sheet Set Callouts and Title representations. The attributes employed in these symbols also employ AutoCAD Sheet and/or Sheet Set property fields.

See the Standards document for additional caveats about Attribute usage in Symbols in Autodesk Civil 3D.

2.3.4 Layers

All block CAD primitives are routed to Layer “0”

2.3.5 Common Graphic Standards

The basic graphic primitive arrangement for most Symbols is supplied from symbols from the root ASYM symbols library.

In other words, previously constructed linework graphics is employed to construct all similar but different symbols.

(See above)

3 Symbol Set Usage

3.1 AutoCAD Tool Palette Construction

AutoCAD will allow you to produce Tool Palettes from folder subdirectories of any of the supplied Symbol drawings. Build these Tool Palettes from a common local folder or common network folder location.

3.2 By Name Symbol Substitution

The basic principal of Block substitution by name matching may be employed to change the graphic Symbol (block) content on any template drawing.

The Symbols supplied employ the common naming conventions and construction specifications outlined above.

3.2.1 Change the Symbol Graphics

Any supplied Symbol can be revised graphically inside AutoCAD with the BEDIT command.

- Be aware the Autodesk Civil 3D does not support AutoCAD Dynamic block functionality inside Point Styles.

You can rebuild the graphics to your specifications and then replace the blocks in template drawings.

The supplied Point Styles reference the same AutoCAD blocks by name.

Inserting a drawing that contains Point Style (with Explode) will produce a drawing then employs the new and/or revised Symbols in the Point Styles.

3.2.2 Script Files and Microsoft Excel Spreadsheets

See the **Spreadsheet Tools** help in the **Members** section of the website for updated Help.

The full complement of the Script and Spreadsheet additional resources files are only supplied in the full Symbol Set product. Spreadsheets may be supplied to generate prototype AutoCAD Script (.scr) files from the supplied named symbols.

- Simple cell formulas construct the prototype scripts.
- Any range of cells can be copied from a Sheet to and pasted into an ASCII editor and the range will generate the basis for a functional script.

The copied cells will not produce a functional script without some essential Find and Replace actions.

- Replace the enclosing quote "" characters with nothing before doing any other changes.
- Replace the beginning C:\ and ending .dwg strings in paths with "C:\ and .dwg" respective strings. AutoCAD scripts are sensitive to space characters in paths and block names.

Basic AutoCAD script files are supplied to INSERT selected Symbols into drawings.

- These script files must be edited to account for your local or network installation path to the resource folders and files.
- You may also modify the scripts to replace common named graphic symbols with different versions of the same symbol. For example instead of hexagonal meter symbols you want to employ pentagonal versions. A simple path modification of any supplied Insert script will accomplish this task.

3.2.3 ASCII Editor

Any common ASCII editor may be employed to make changes to the supplied scripts.

We recommend employing the Notepad2 ASCII editor which is available as a free download via the Internet.

3.3 Purge and Audit

Beware of employing older blocks and or graphics.

- All drawing primitives, AutoCAD references (blocks, layers, linetypes, textstyle, etc.) should be carefully checked before inclusion in graphic Symbols that will be referenced by an Autodesk Civil 3D Point Style or other Feature or Label Style.
- Run the –PURGE command and remove all the registered applications (REAPPS) from the source drawings.
- AUDIT the drawings before including primitives in new or edited Symbols.

If you make modification to the symbols, you should remember to employ the –PURGE command and remove the registered applications (REAPPS) from the drawings.

- It is recommended that you PURGE all unemployed AutoCAD references from Symbol drawings.
- Check for employed AutoCAD references carefully.
- An Audit of each symbol drawing is also recommended.

4 Symbols

4.1 General Remarks

Each symbol (block) drawing included was constructed from scratch or from other root symbols included in this library.

Each symbol employs no references or unnecessary AutoCAD primitives.

All text employed in symbols employs standard textstyles for Proposed and Existing conditions.

All text employs the Windows Arial True Type fonts and therefore conforms to NCS and ISO font compatibility recommendations.

All text heights employed in symbols respect NCS and ISO text height recommendations for readability if scaled appropriately.

4.1.1 Autodesk Civil 3D Point Styles

It should be noted that the Framework products supply addition generic and specialized Point Styles based on the Civil 3D (and AutoCAD) point marker capabilities. These Civil 3D Point Styles, other Feature Styles and related Label Styles are available in the Jump Kit library storage location for the Framework product.

4.1.2 Representative Images

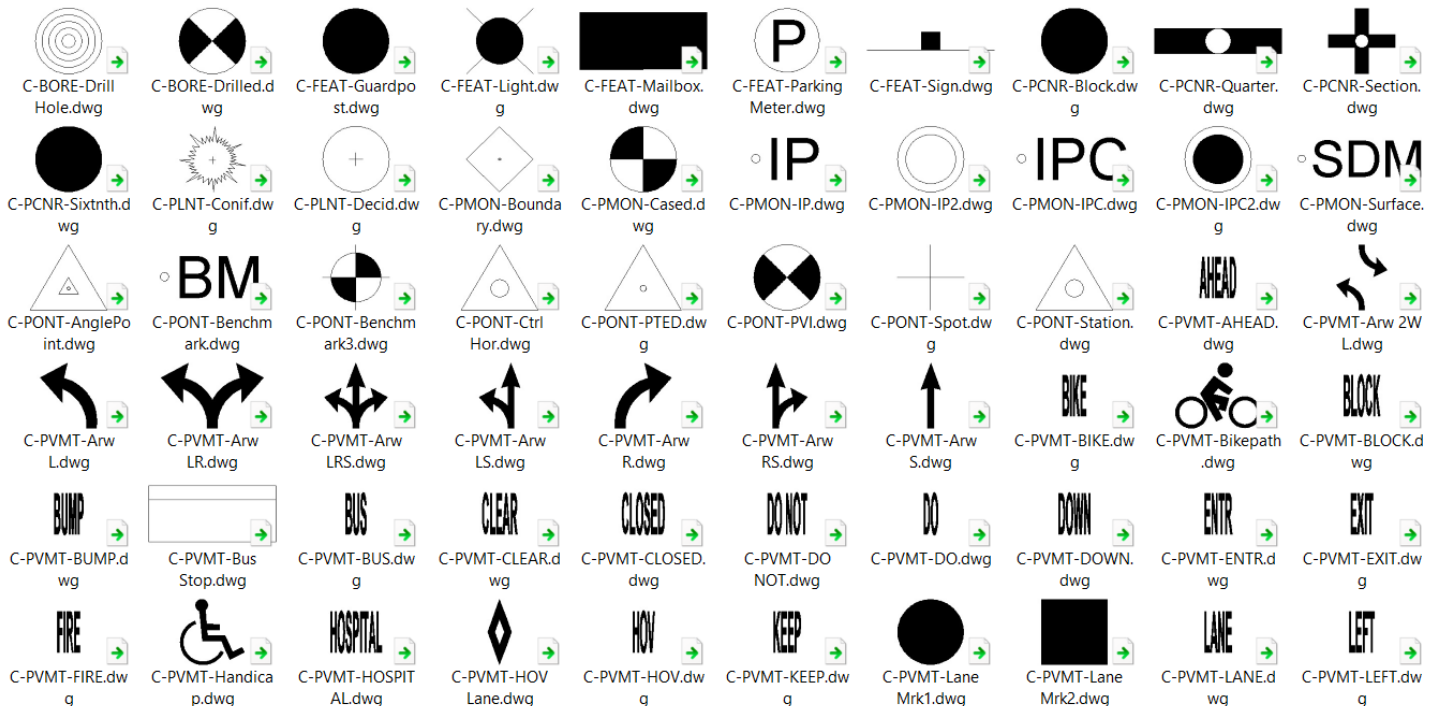
The following images are representative of the Block Library of the NCS 5.0/4.0 Symbol Set.

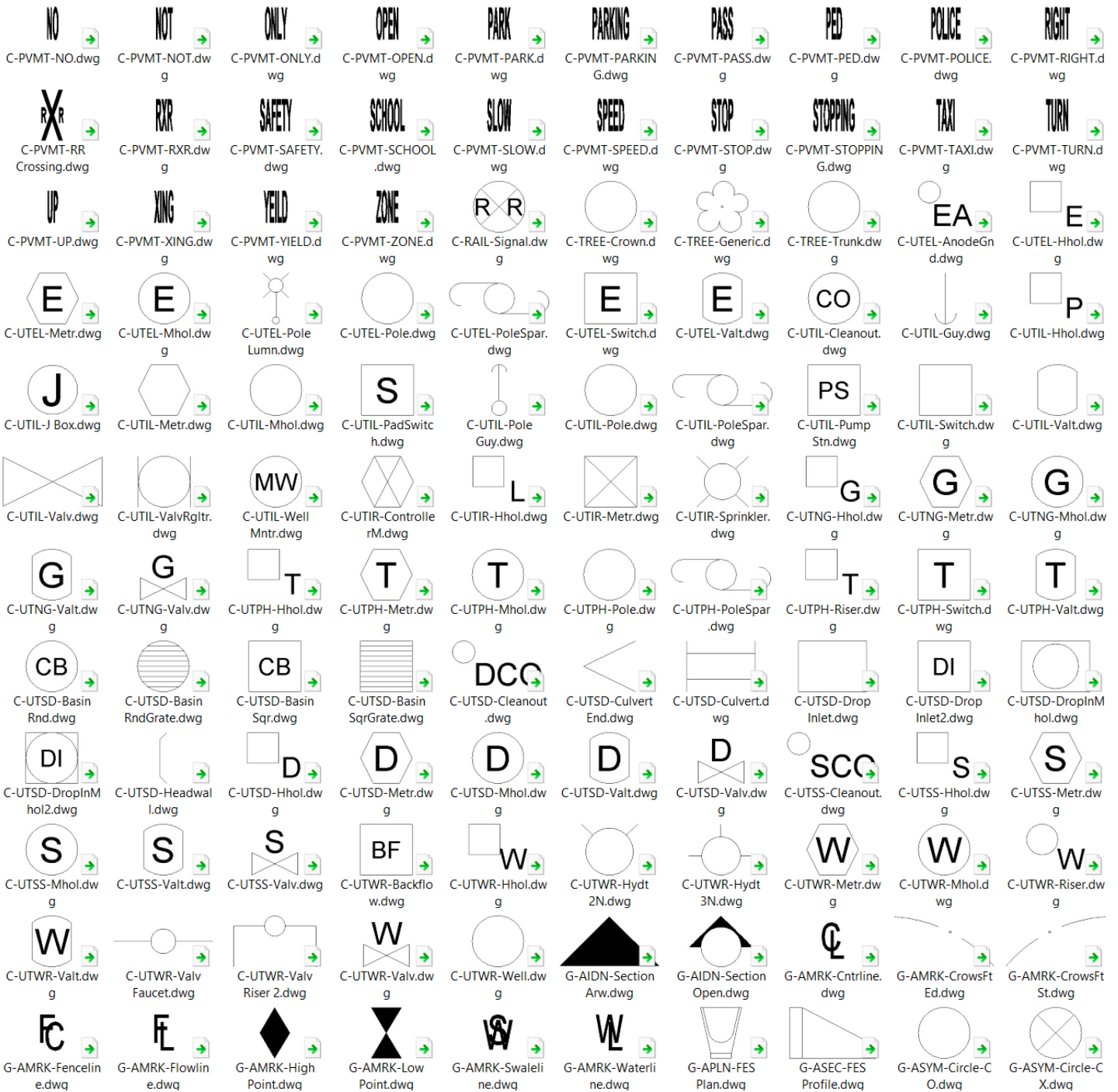
The Images below are a basic graphic overview of the Symbol content included.

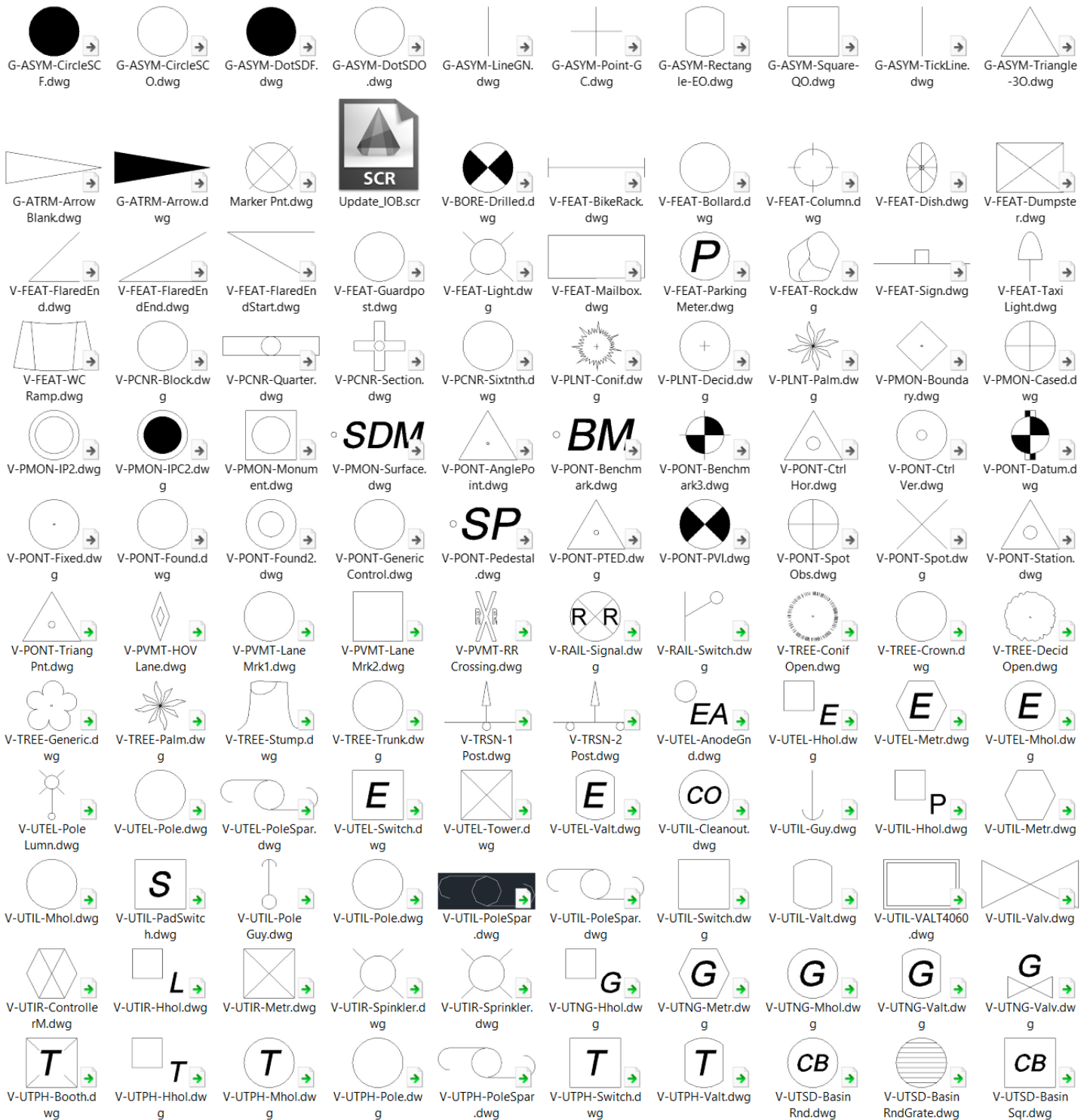
Minor variations of the specific content may exist.

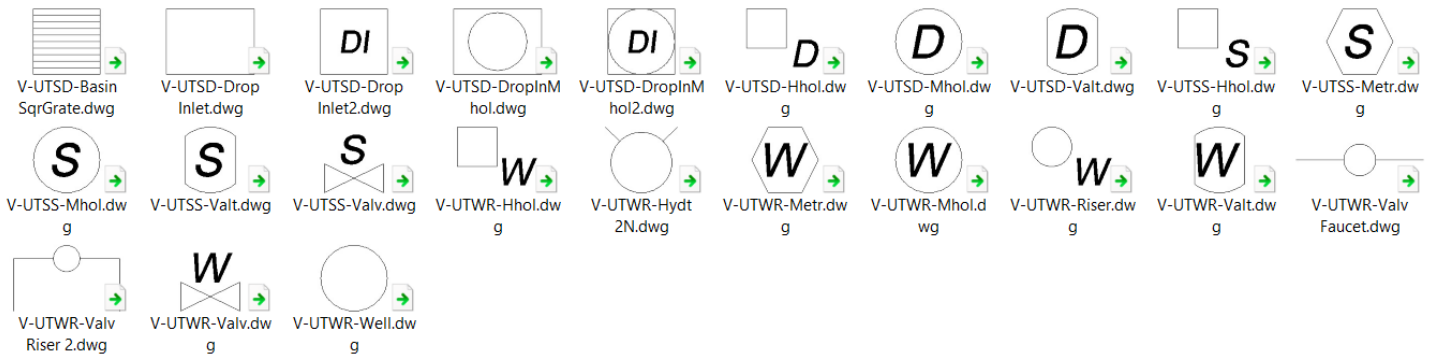
4.2 InstantOn Symbols

Default symbols employed in Framework templates may be included in a separate IOB folder.





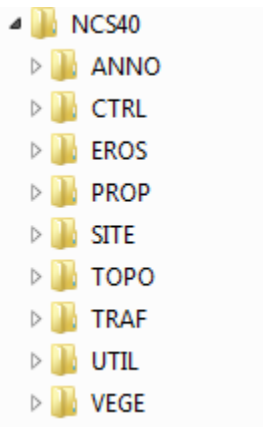




4.3 Structure of Block Library of the Symbol Set

4.3.1 NCS 5.0/4.0 Folder Structure

The **NCS** root folder name is employed to maintain consistency in all supported and delivered versions of the Symbol Set products. Block drawings are named by subfolder to differentiate them from the supplied Civil 3D Point Styles resource drawings. The Blocks Only product DOES NOT include Autodesk Civil 3D Point Styles resource drawings.

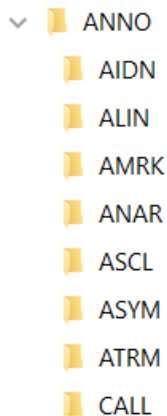


The Release 6 update moved EROS from a subfolder of TOPO.

The Release 7 ANNO, TRAF, and UTIL-STLT folders all have new folders and additional symbols.

4.4 ANNO Annotative Symbols

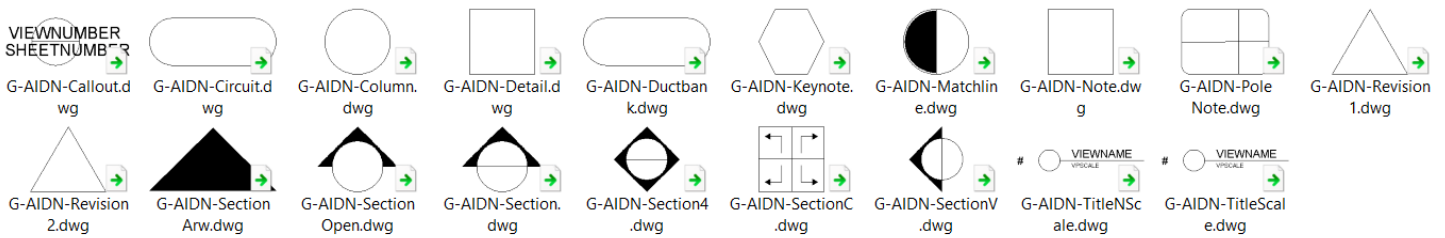
The root folder of this section includes drawings that include only blocks and drawings with Civil 3D Point Styles and blocks where appropriate.



4.4.1 AIDN – Identification Symbols

Civil 3D COGO points and appropriate Point Label Styles may be employed with many of the symbols below to produce the appropriate Tables and/or Legend like Tables.

The Callout and Title scale symbols included here reference typical AutoCAD Sheet and Sheet Set property fields in their attributes.



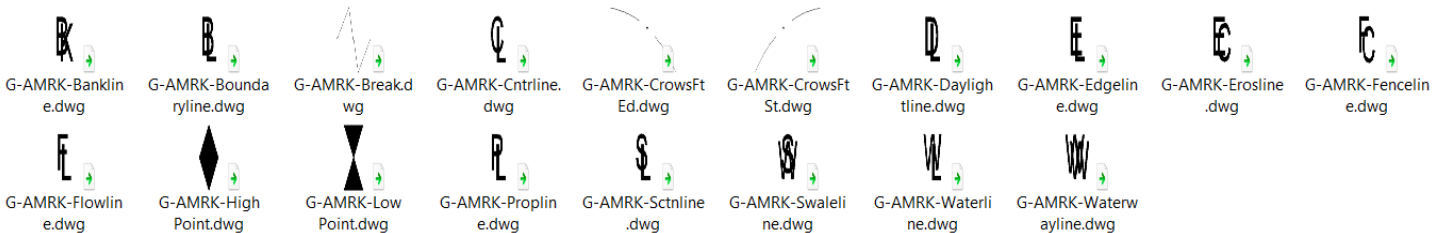
4.4.2 ALIN – Linework

None Currently Included.

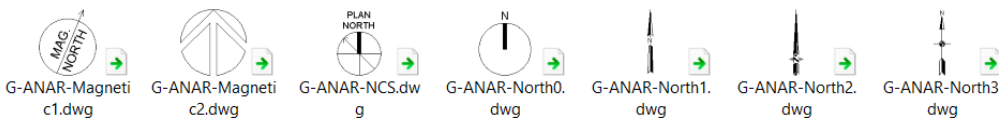
The Framework products include an extensive AutoCAD linetype resource files that include many NCS and older Autodesk product compliant linetypes.

The Framework products also include many Alignment Styles that do employ graphic symbols and may be employed to annotate typical civil engineering and survey linework appropriately.

4.4.3 AMRK- Annotative Marks



4.4.4 ANAR – Annotative North Arrows



4.4.5 ASCL- Annotative Graphic Scales

None Currently Included.

The AutoCAD supplied block library resources that ship with all versions of Civil 3D include a dynamic graphic scale which is essentially NCS compliant.

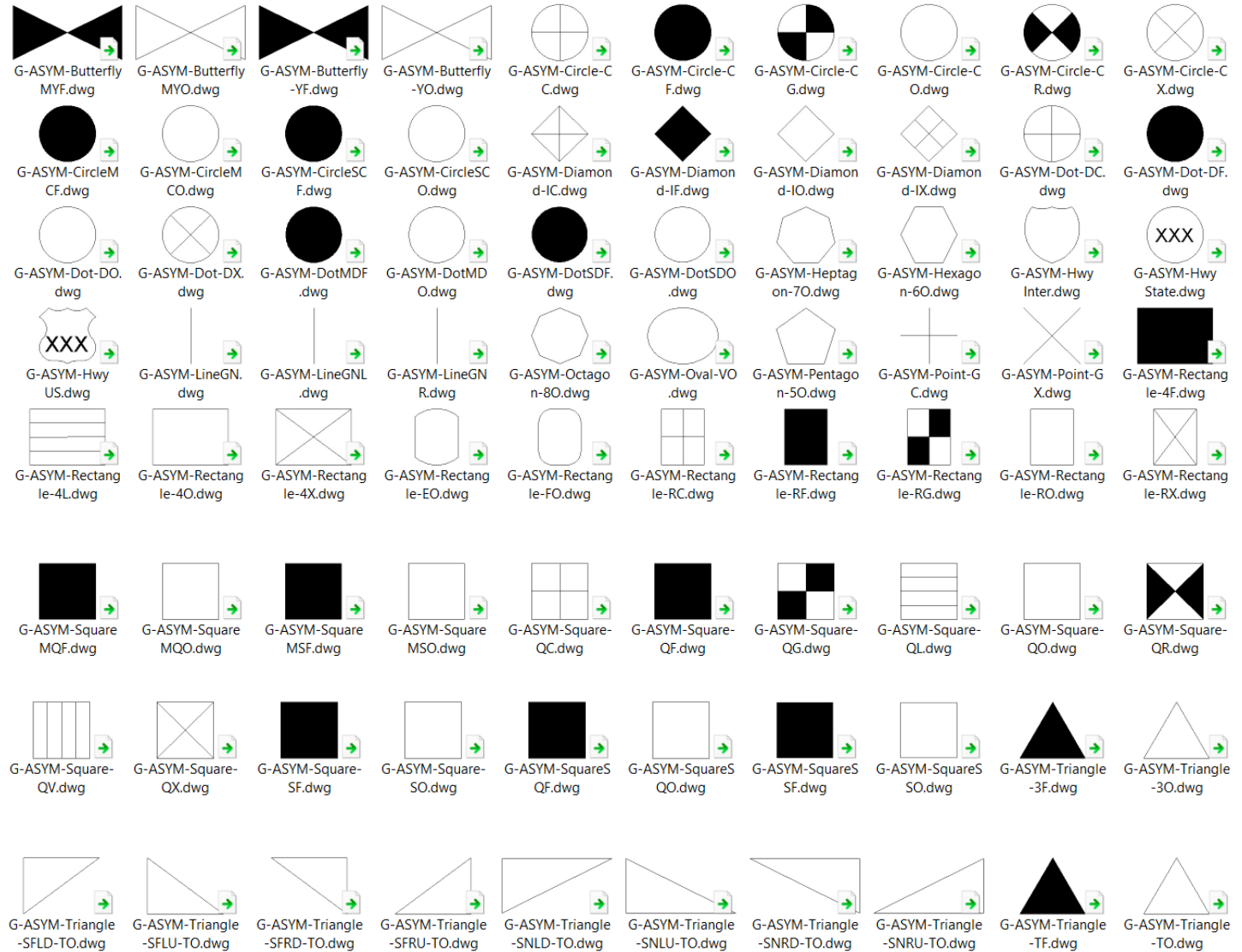
4.4.6 ASYM – General Annotative Symbols

Generic Symbols used to construct other symbols.

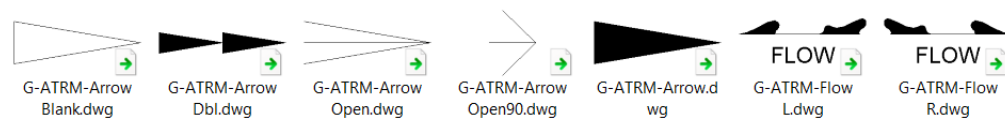
Note that the Generic Symbol names employ the detailed Shape and Graphic Codes of the full Block Classification System.

A few of these symbols are employed in Marker Styles in all Framework products for Civil 3D.

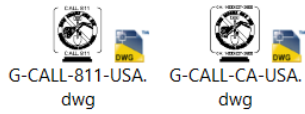
These block drawings may also be used as a basis for constructing new symbols that are in compliance with typical platform standards.



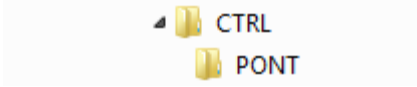
4.4.7 ATRM – Annotative Arrow Terminators



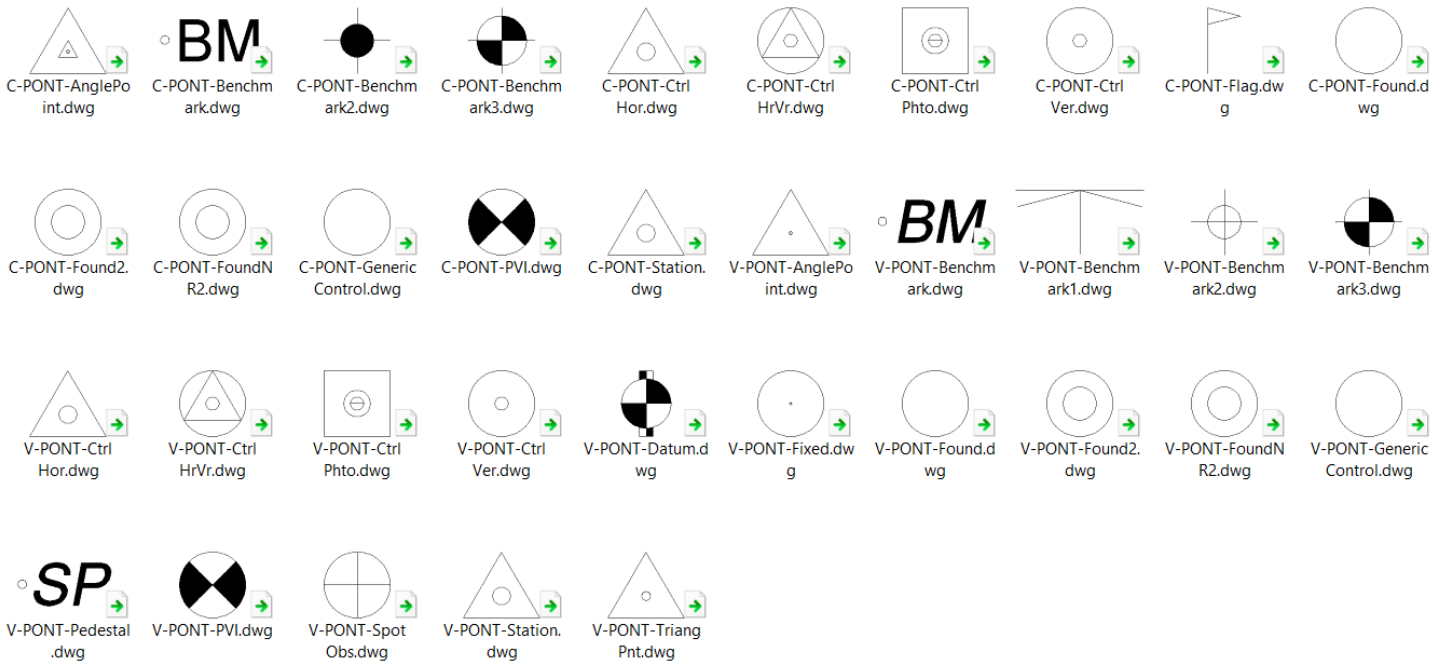
4.4.8 CALL – Call Before You Dig



4.5 CTRL - Survey Control



4.5.1 PONT

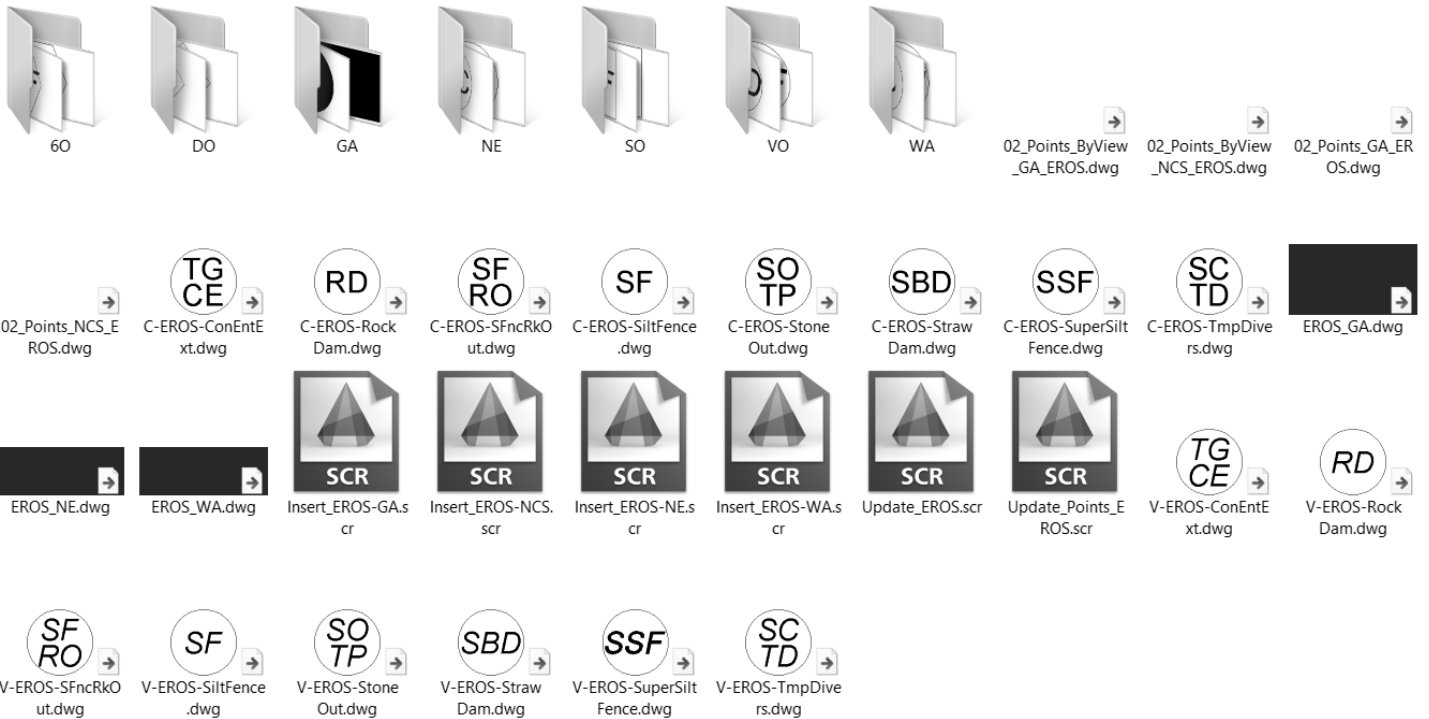
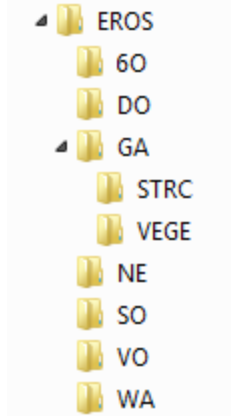


4.6 EROS – Erosion Control

Additional symbols added and moved from TOPO.

Open Oval symbols were added

US State symbols were added for GA, NE, and WA



4.6.1.1 60

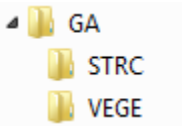


4.6.1.2 DO

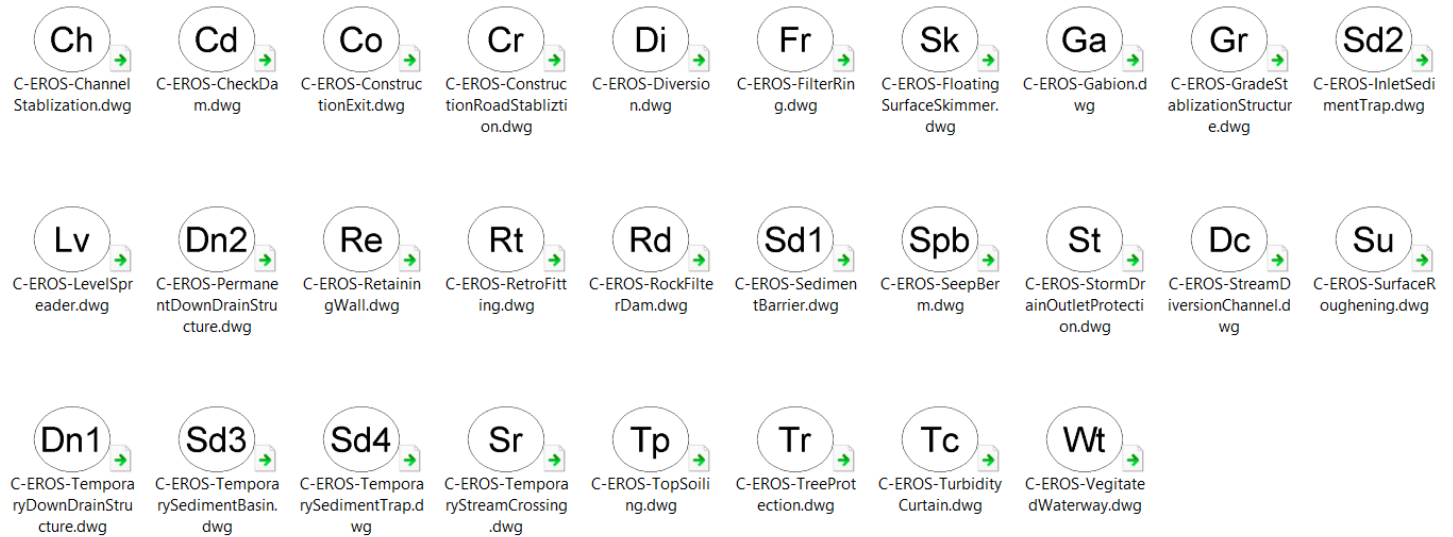


4.6.1.3 GA

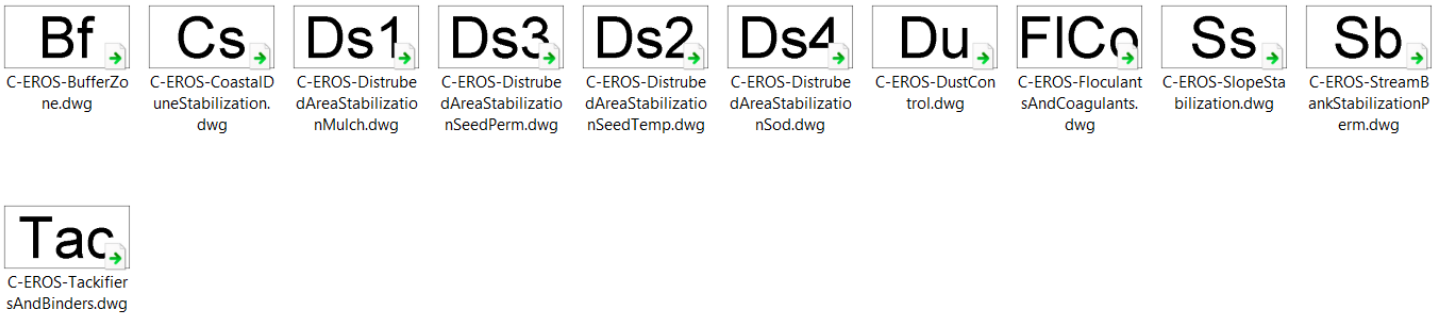
Georgia subdivides erosion control into Structure and Vegetation classes



STRC

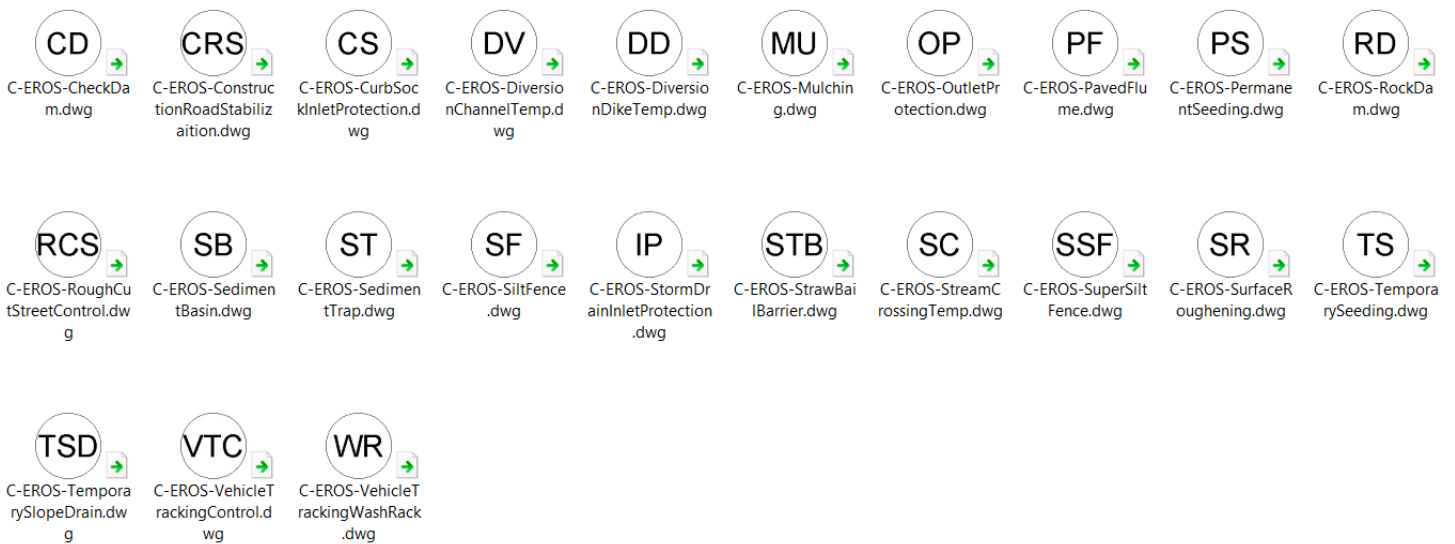


VEGE

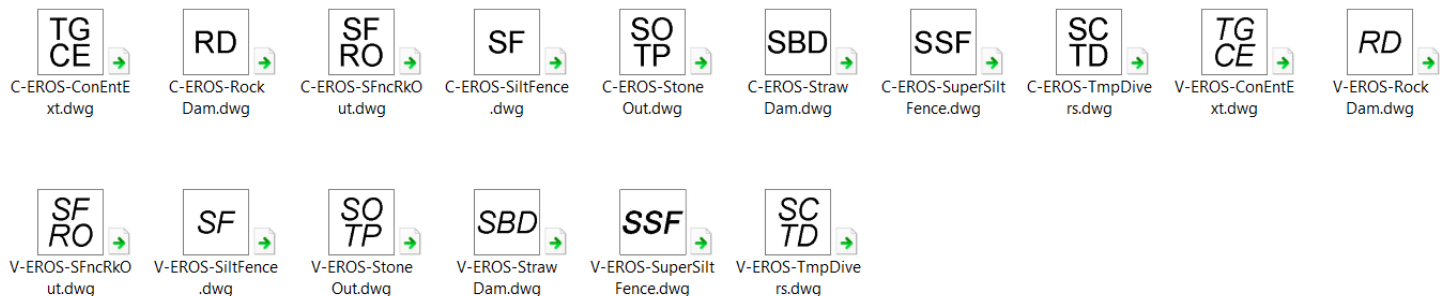


4.6.1.4 NE

Nebraska erosion control symbols from public sources



4.6.1.5 SO

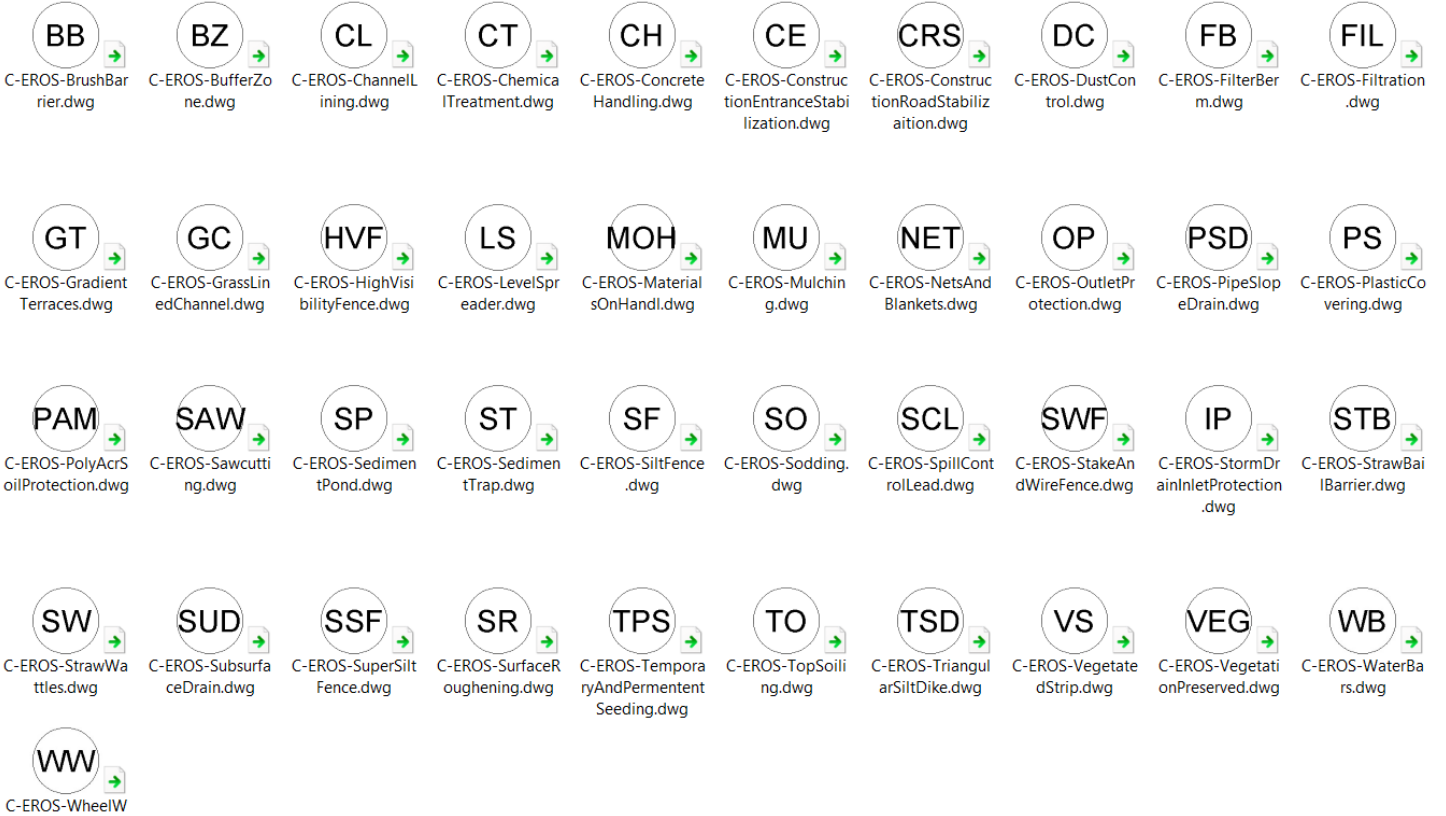


4.6.1.6 VO

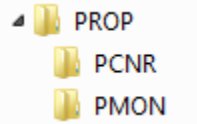


4.6.1.7 WA

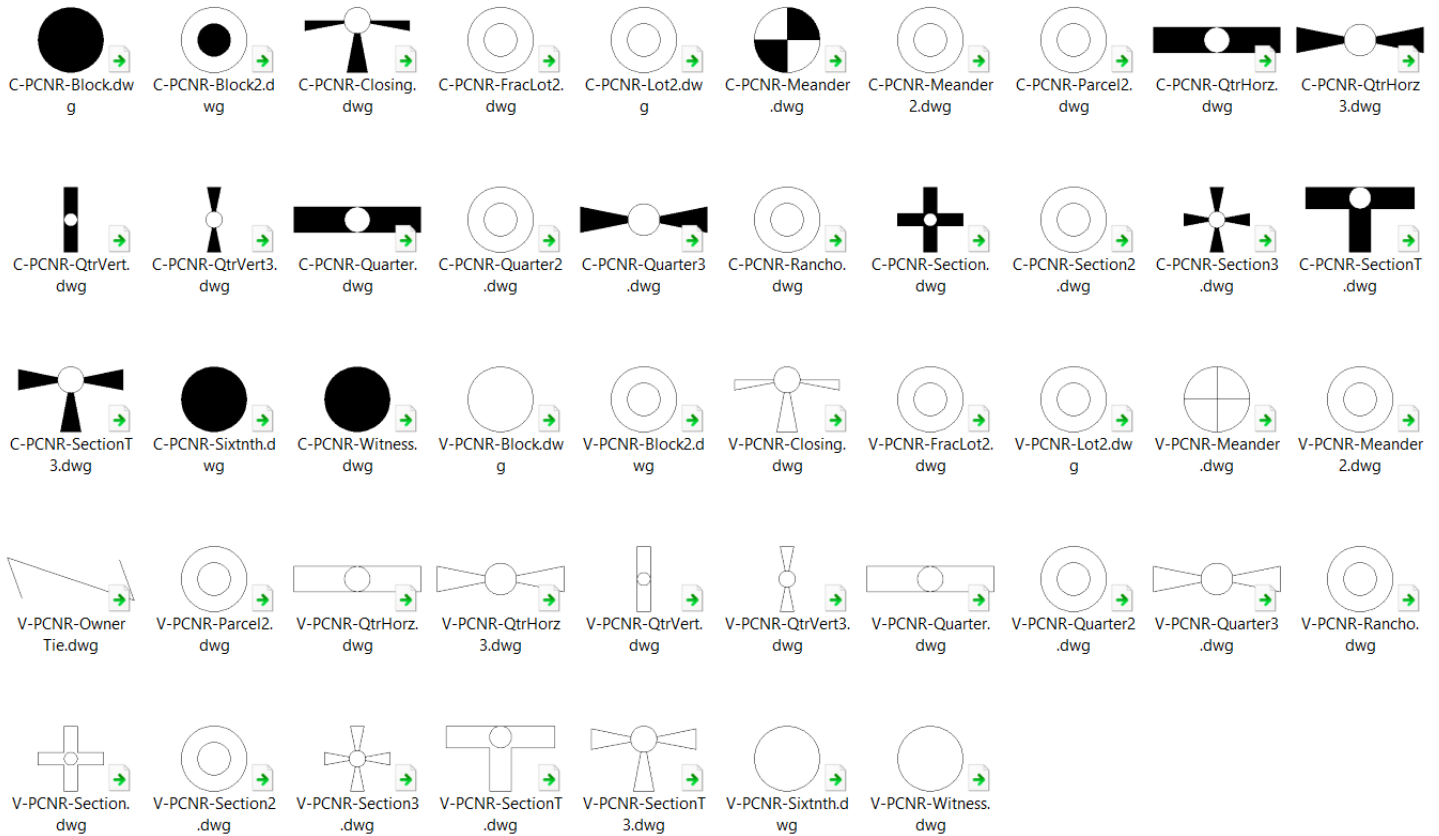
Washington State erosion symbols from public sources



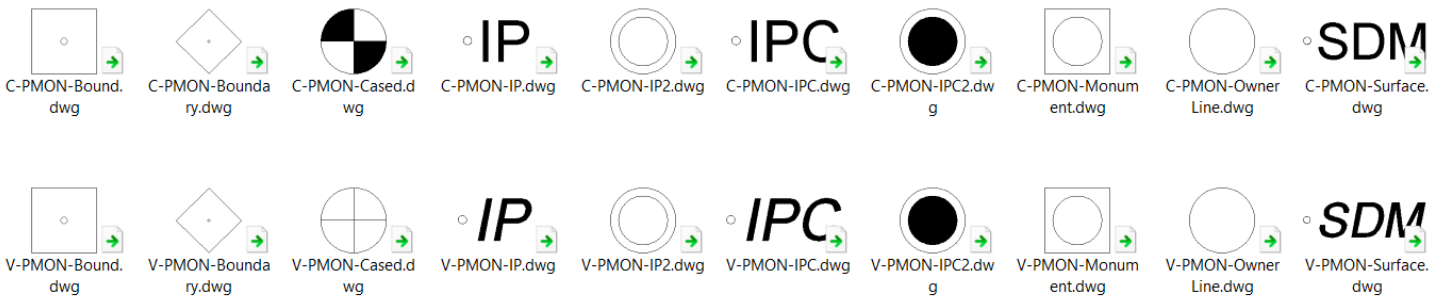
4.7 PROP – Property



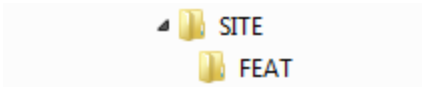
4.7.1 PCNR – Property Corners



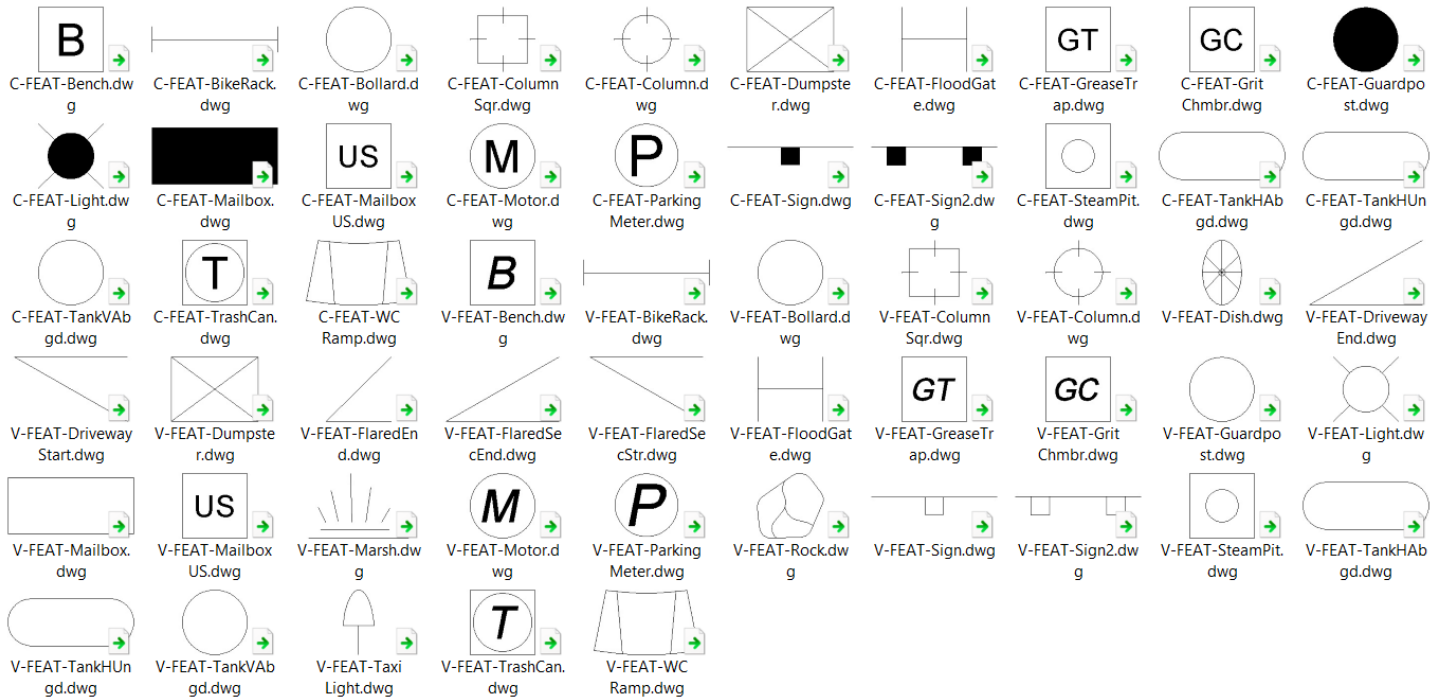
4.7.2 PMON – Property Monuments



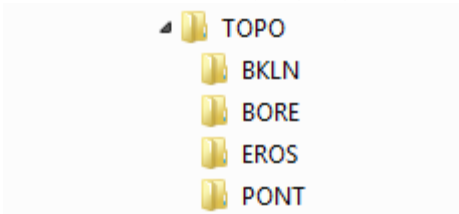
4.8 SITE – Site Features



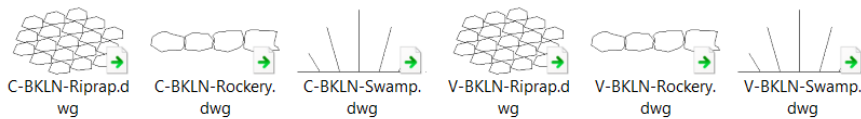
4.8.1 Feat – Site and Topo Features



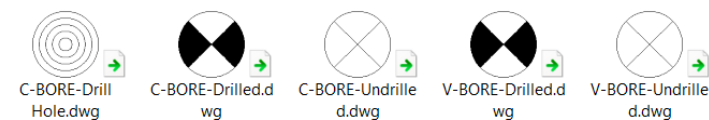
4.9 TOPO - Topographic



4.9.1 BKLN – Breaklines



4.9.2 BORE – Geotechnical Borings



4.9.3 POINT – Topo Points

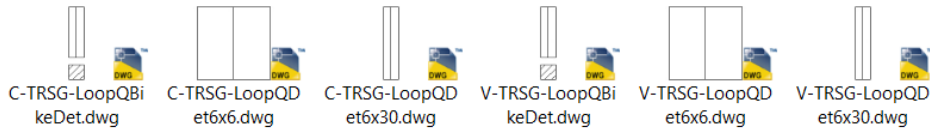


4.10 TRAF – Traffic Control

- ▼ TRAF
 - DETR
 - HEAD
 - > MAST
 - PVMT
 - RAIL
 - TRSG
 - TRSN

4.10.1 DETR – Detectors

Note the DETR symbols include symbols created in **real world scale** for usage in Traffic control signal diagrams.



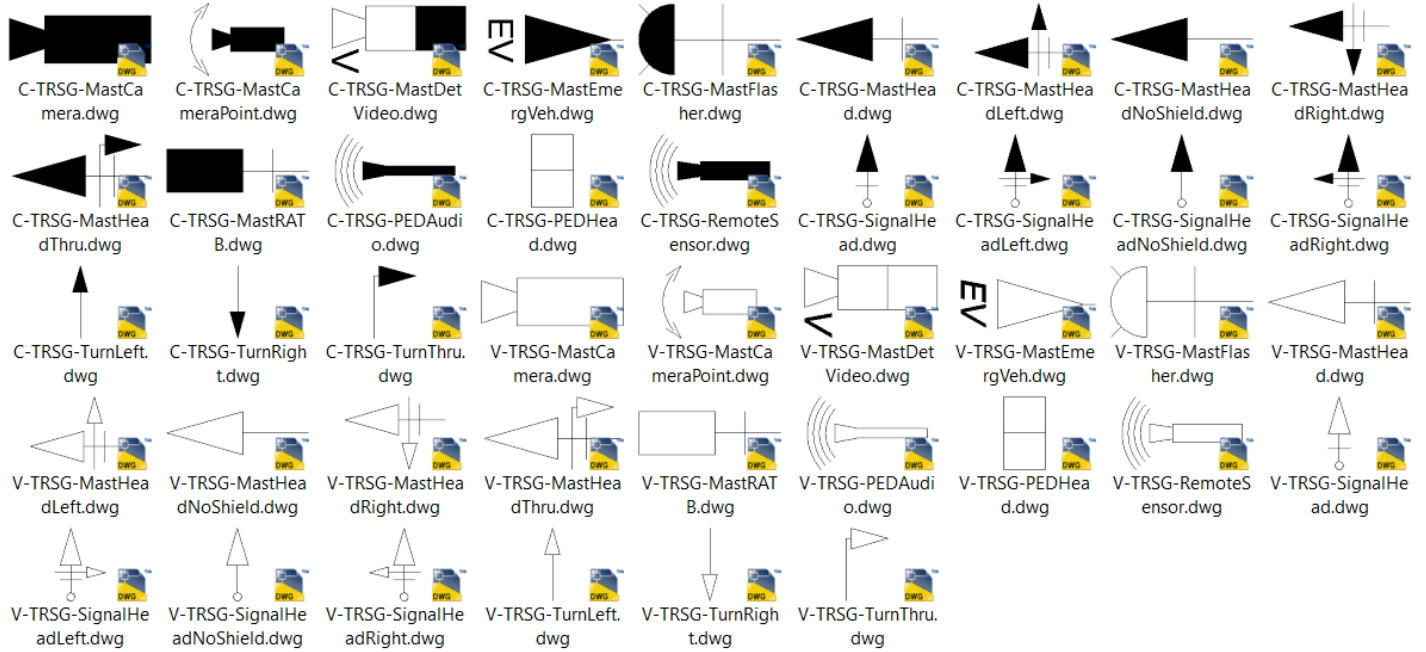
4.10.2 Head – Traffic Signal Heads

Note: the HEAD symbols include symbols created in **real world scale** for usage in Traffic control signal diagrams Design versions (C-) of these symbols include fills. Hatches are all individualized for easy editing

Signal parts for Left Turn, Right Turn, Thru, and both shielded and unshielded signals are included

MastHead symbols are for use on Masts

SignalHead symbols are for use at pole locations



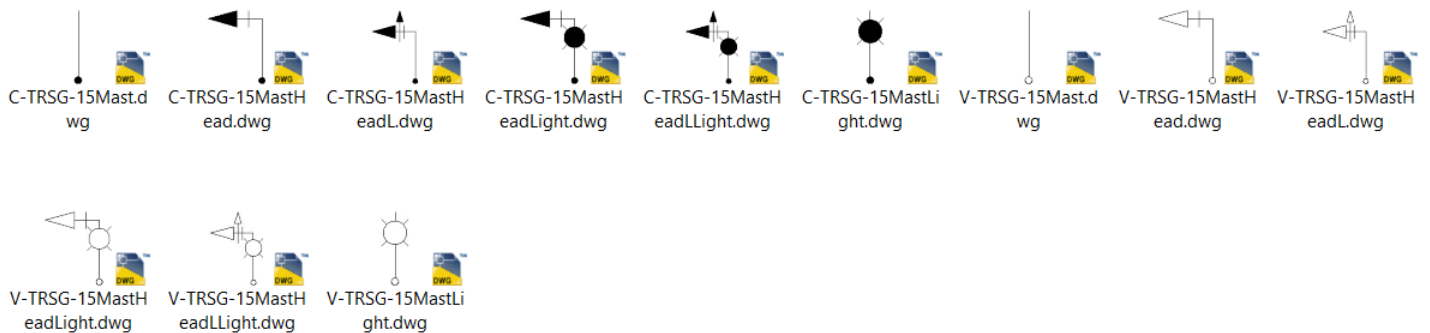
4.10.3 Mast - Traffic Signal Mast and Poles

Note: the MAST symbols include symbols created in **real world scale** for usage in Traffic control signal diagrams.

Design versions (C-) of these symbols include fills. Hatches are all individualized for easy editing.

This section contains symbols in mast length folders for 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, and 65' mast lengths.

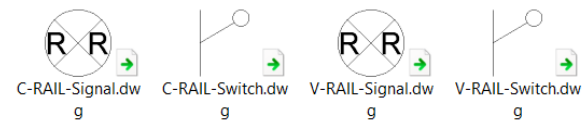
The 15' mast length symbols shown below as an example.



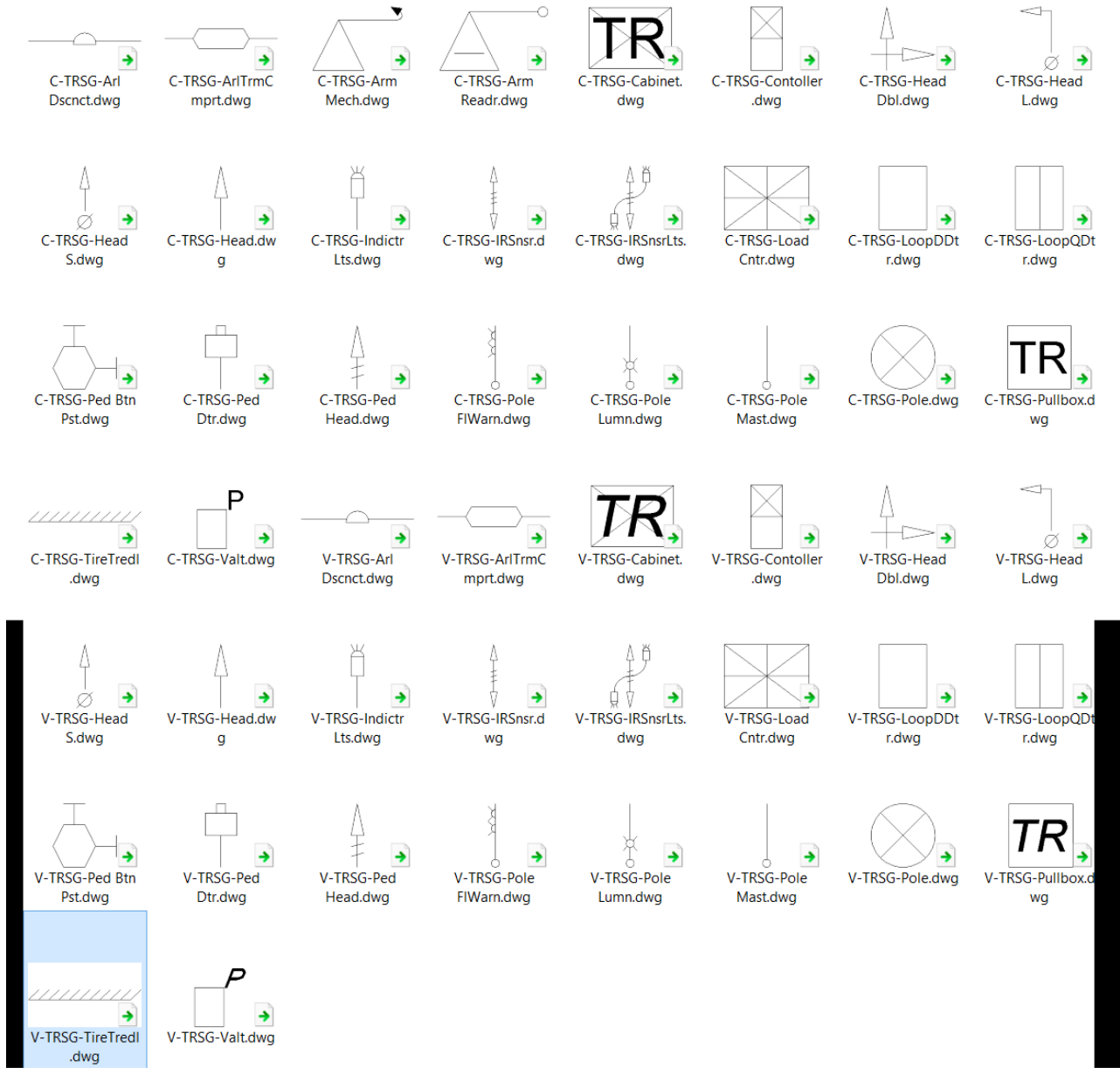
4.10.4 PVMT – Pavement Markings



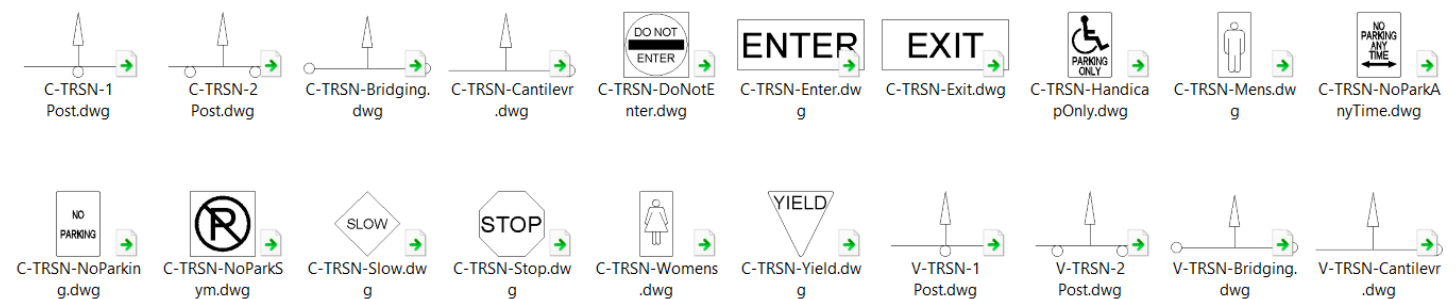
4.10.5 RAIL – Rail Control



4.10.6 TRSG- Traffic Control

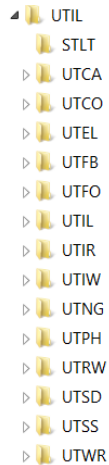


4.10.7 TRSN – Traffic Signage

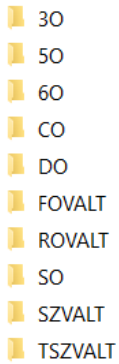


4.11 UTIL – Utilities

Included in subfolders for each utility type:



Included in following subfolder structure for each utility type:



- FILL – Design variations with individual Hatch fills (same block name as primary variation)
- 3O – Triangular variations (same block name as primary variation)
- 5O – Pentagonal variations (same block name as primary variation)
- 6O – Hexagonal variations (same block name as primary variation)
- CO – Circular variations (same block name as primary variation)
- DO – Diamond variations (same block name as primary variation)
- FOVALT - Filleted vault variations (same block name as primary variation)
- ROVALT - Rectangular vault variations (same block name as primary variation)
- SO – Square variations (same block name as primary variation)
- SZVALT - A selection of common sized vaults for selected utilities in both 0 and 90 degree rotations
Sized vaults are not supplied for all utilities
- TSZVALT - A selection of common sized vaults for selected utilities in both 0 and 90 degree rotations with NCS letters. Sized vaults are not supplied for all utilities

Symbol Set Point Style resource drawings

Civil 3D Point Style drawings with root symbols for each Utility are supplied

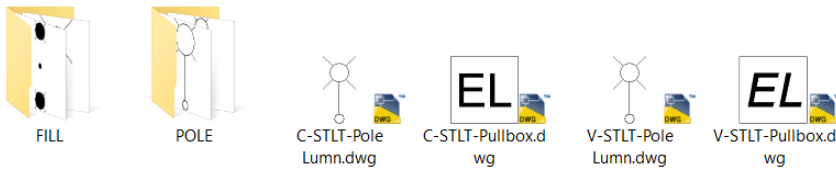
Civil 3D Point Style drawings with symbols referenced By View are supplied

Civil 3D Point Style drawings with the FOVALT and ROVALT variations for the above are also supplied

4.11.1STLT – Street Lighting

FILL and POLE symbols are in real world scale

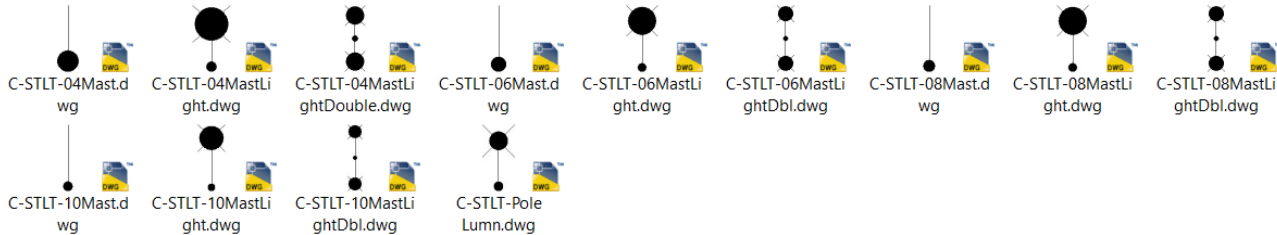
STLT folder symbols in Unitless format



Note FILL symbols are in **real world scale**

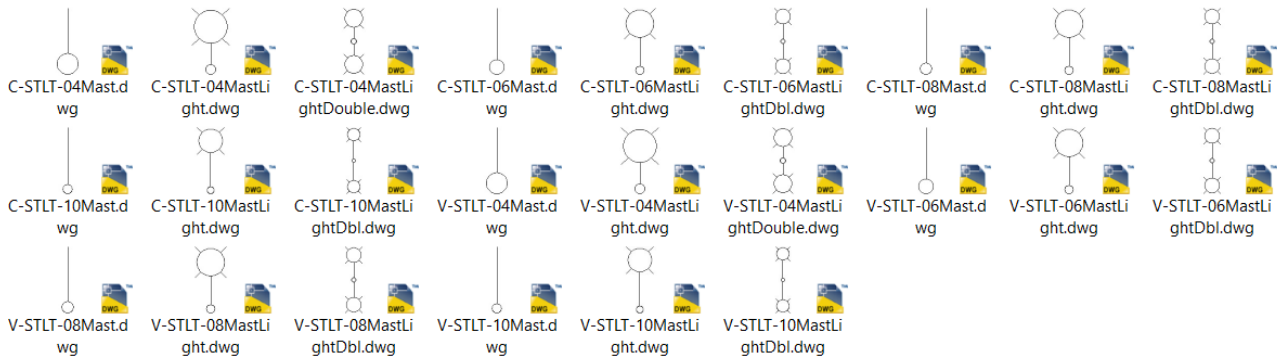
FILL folder includes pole mast length variations in 4, 6, 8, and 10' mast lengths

FILL folder includes Design variations with individual pole and lumen fills



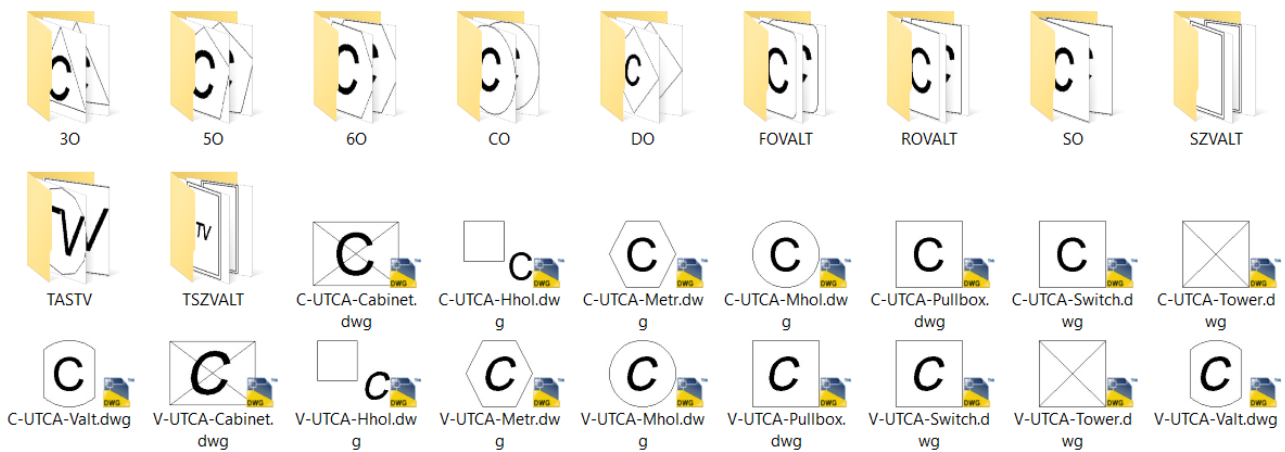
Note POLE symbols are in **real world scale**

POLE folder includes pole mast length variations in 4, 6, 8, and 10' mast lengths

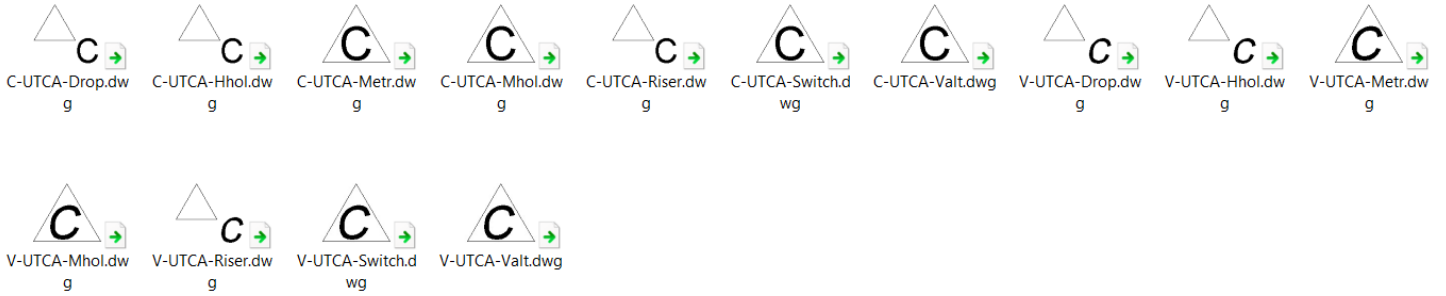


4.11.2UTCA – Cable & Communications

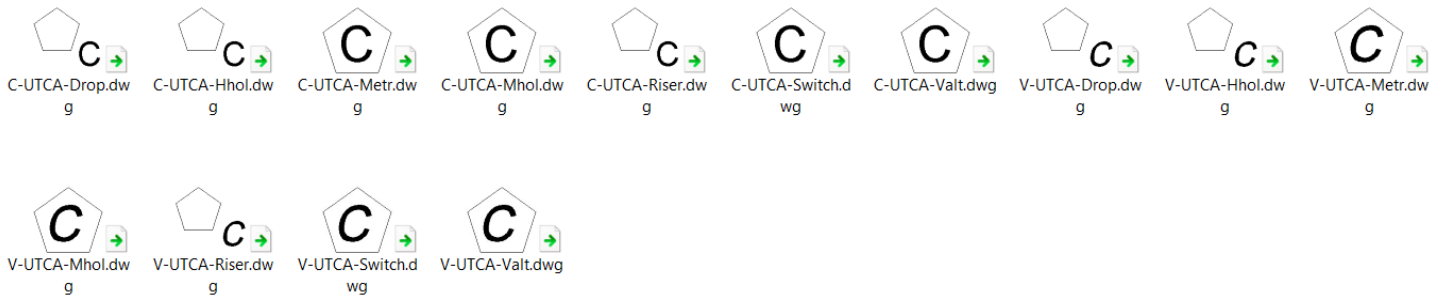
Variations supplied with NCS “C” and “TV”



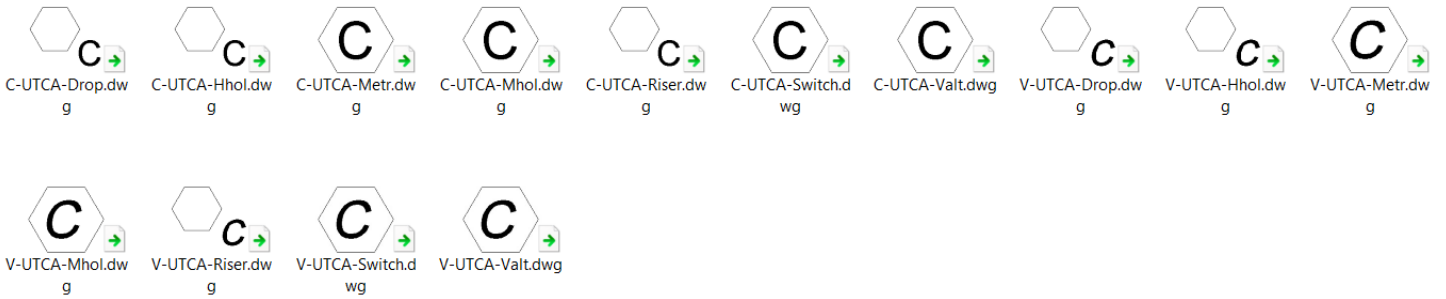
4.11.2.1 UTCA – 30



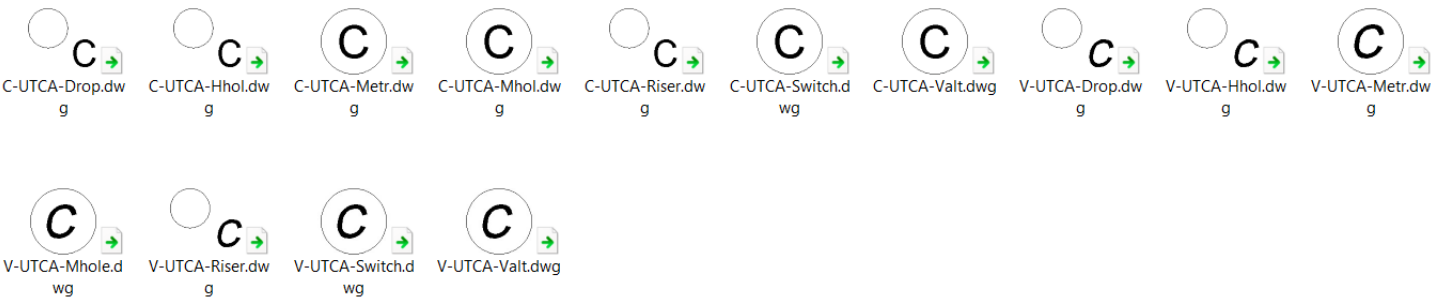
4.11.2.2 UTCA – 50



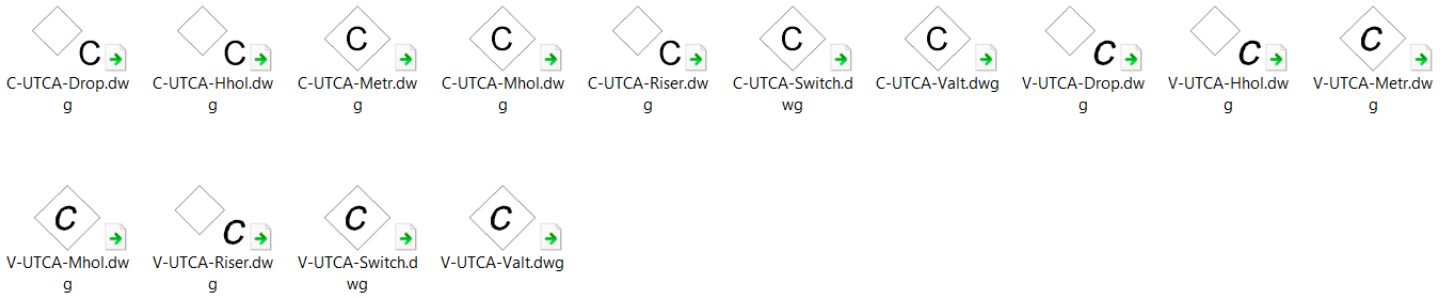
4.11.2.3 UTCA – 60



4.11.2.4 UTCA – CO



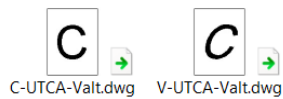
4.11.2.5 UTCA – DO



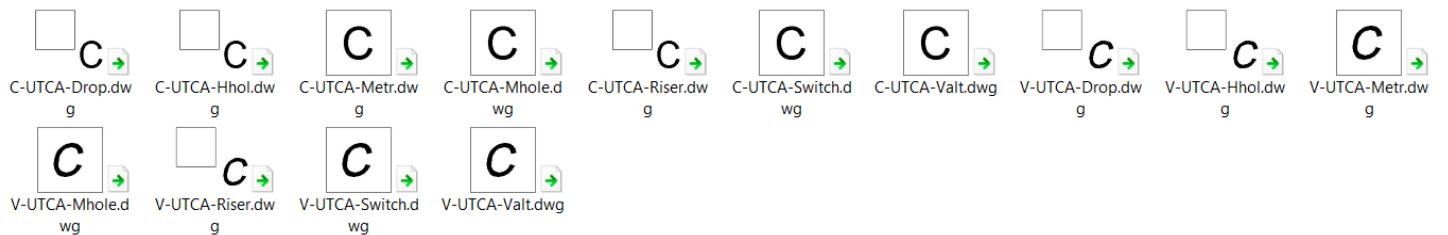
4.11.2.6 UTCA – FOVAULT



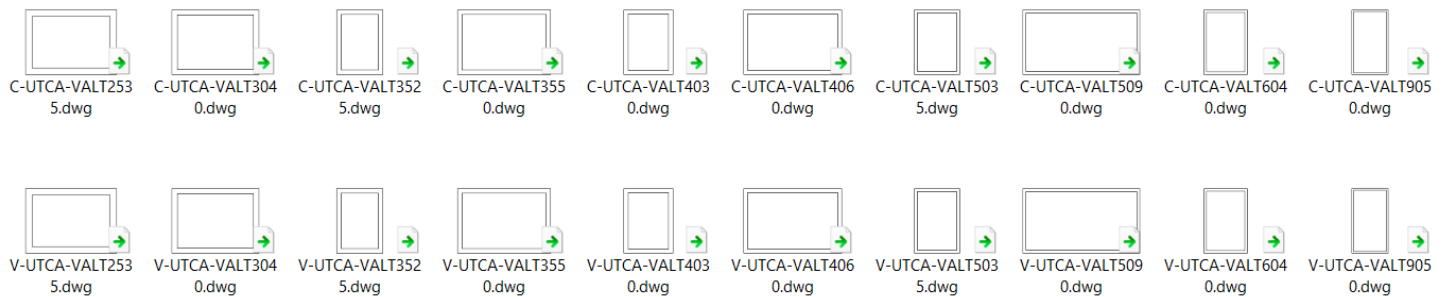
4.11.2.7 UTCA – ROVAULT



4.11.2.8 UTCA – SO



4.11.2.9 UTCA – SZVAULT

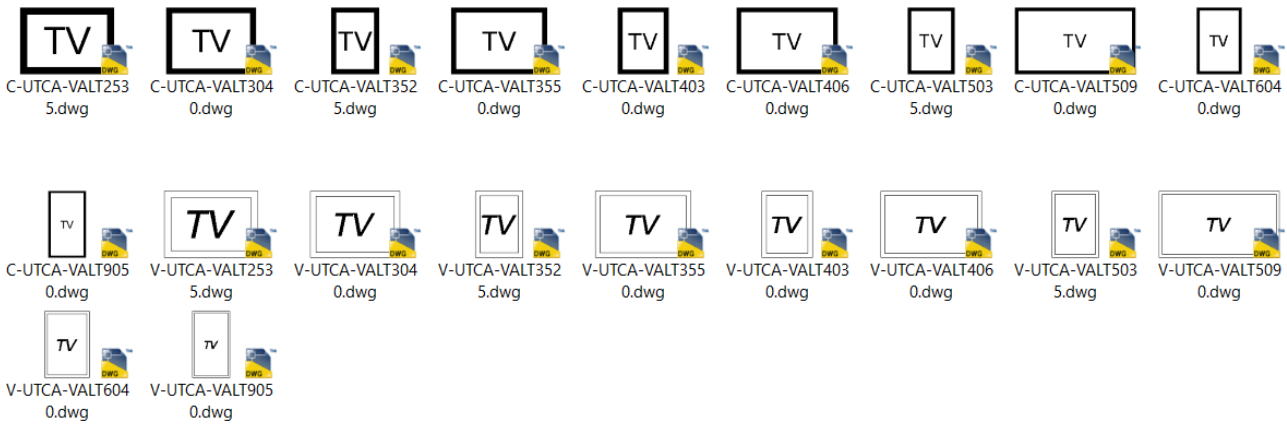


4.11.2.10 UTCA as TV

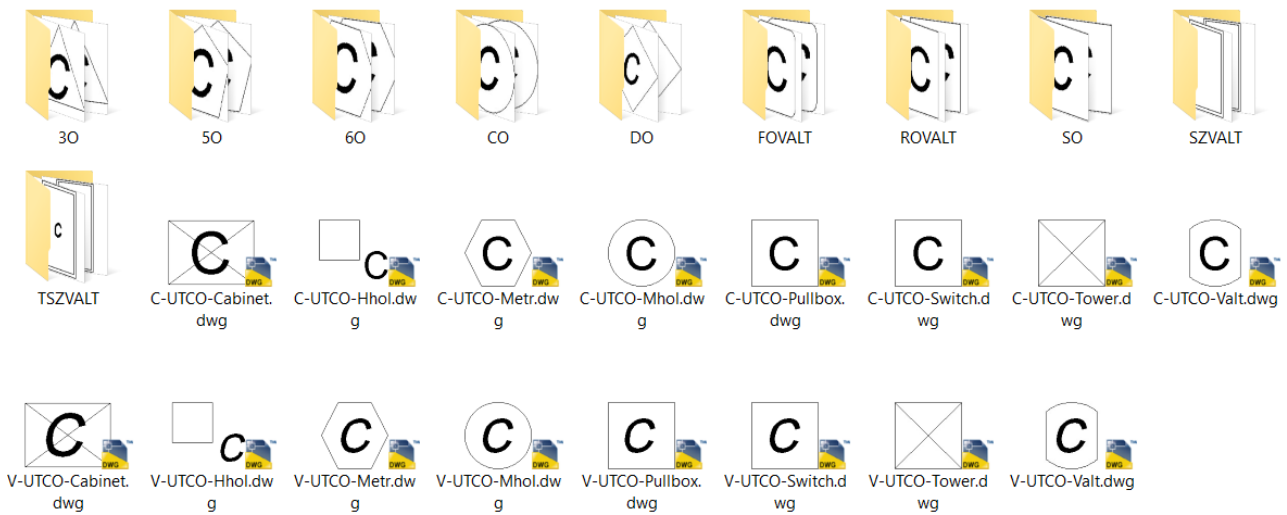


4.11.2.11 UTCA – TSZVAULT

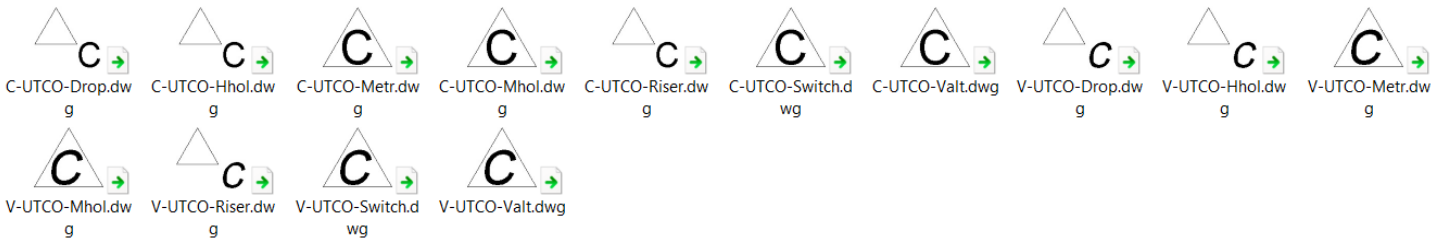
Sized Cable Vaults lettered as TV – see UTCO for variations with C
 Design variations include hatch fills



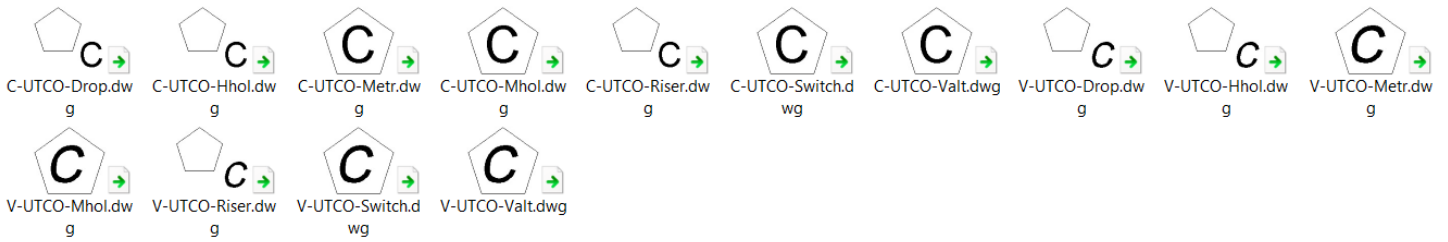
4.11.3 UTCO - Communications & Cable



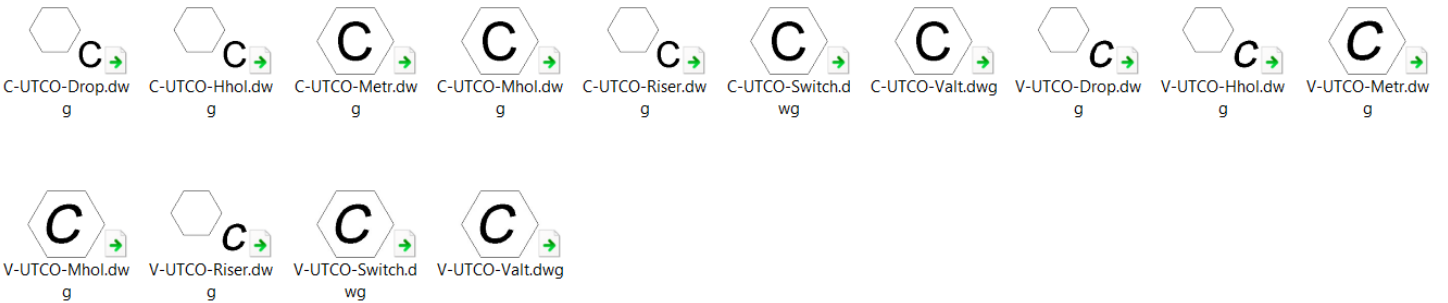
4.11.3.1 UTCO - 30



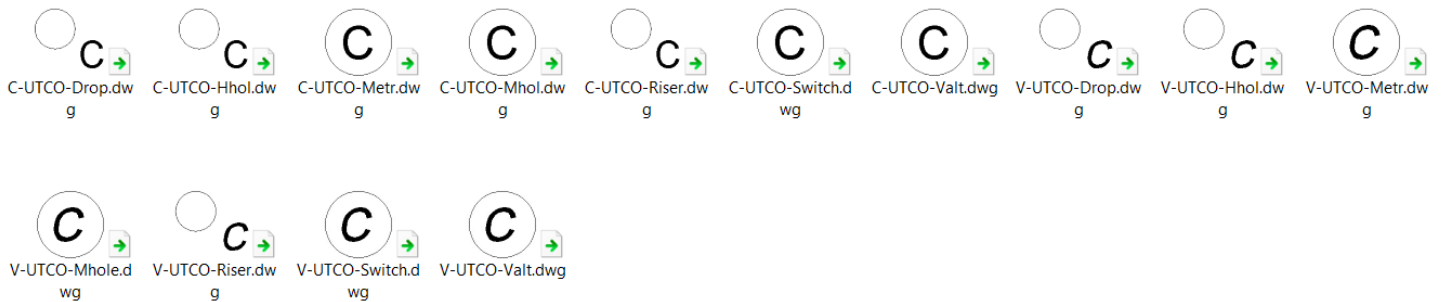
4.11.3.2 UTCO - 50



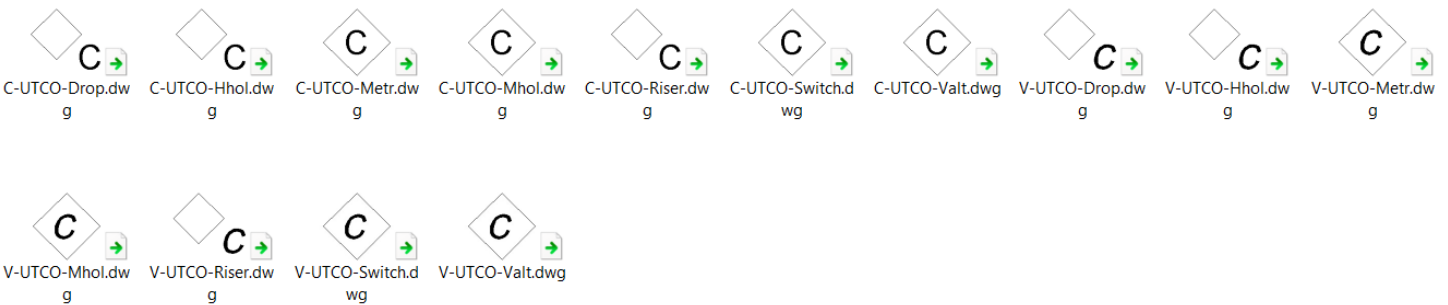
4.11.3.3 UTCO - 60



4.11.3.4 UTCO - CO



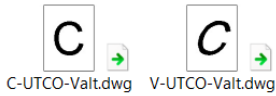
4.11.3.5 UTCO - DO



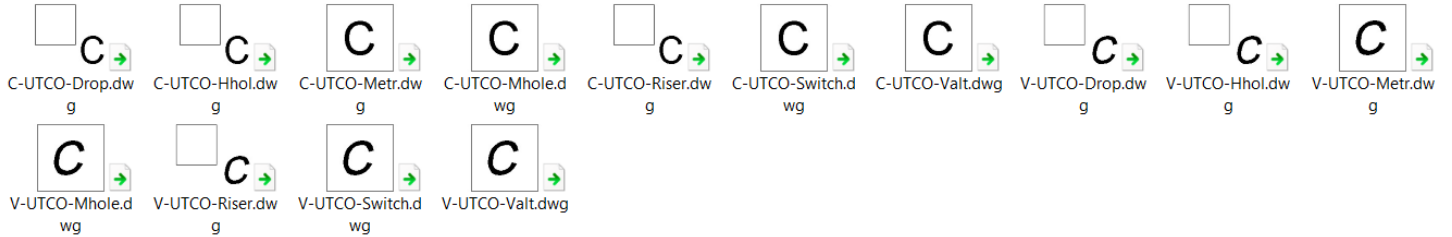
4.11.3.6 UTCO - FOALT



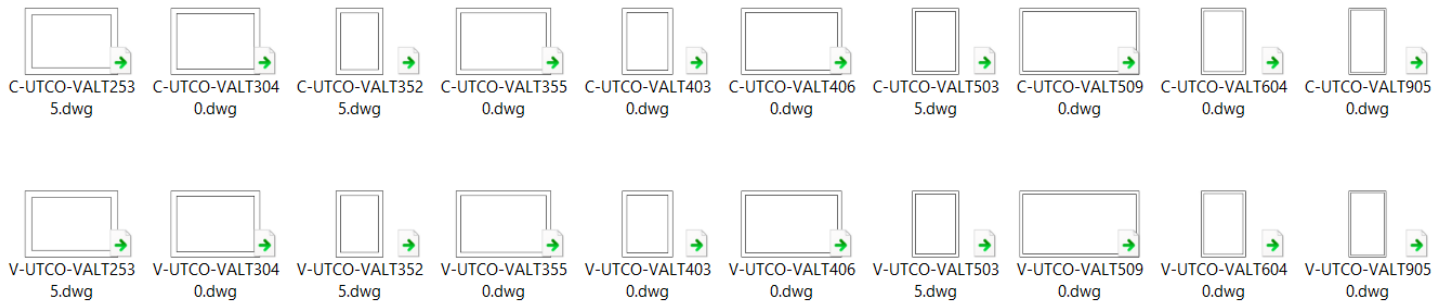
4.11.3.7 UTCO - ROVALT



4.11.3.8 UTCO - SO

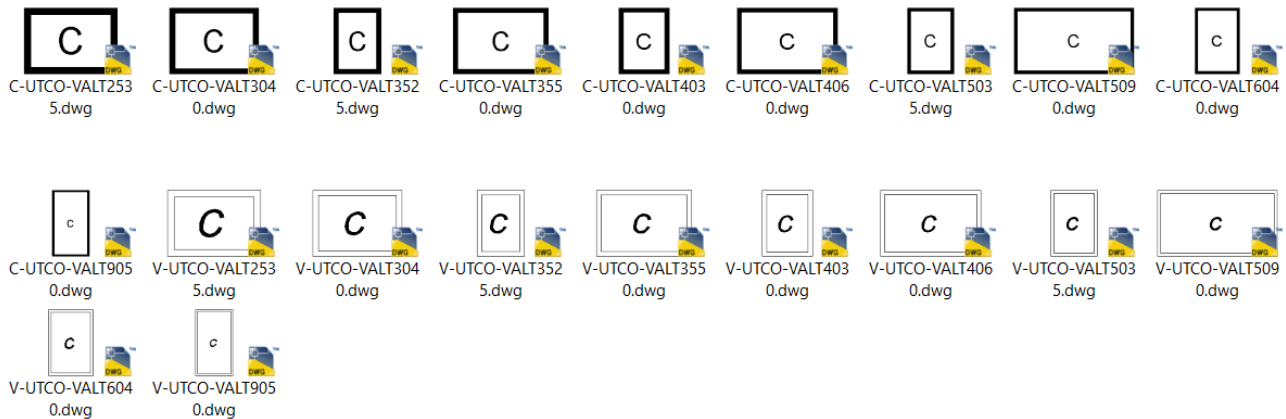


4.11.3.9 UTCO - SZVALT



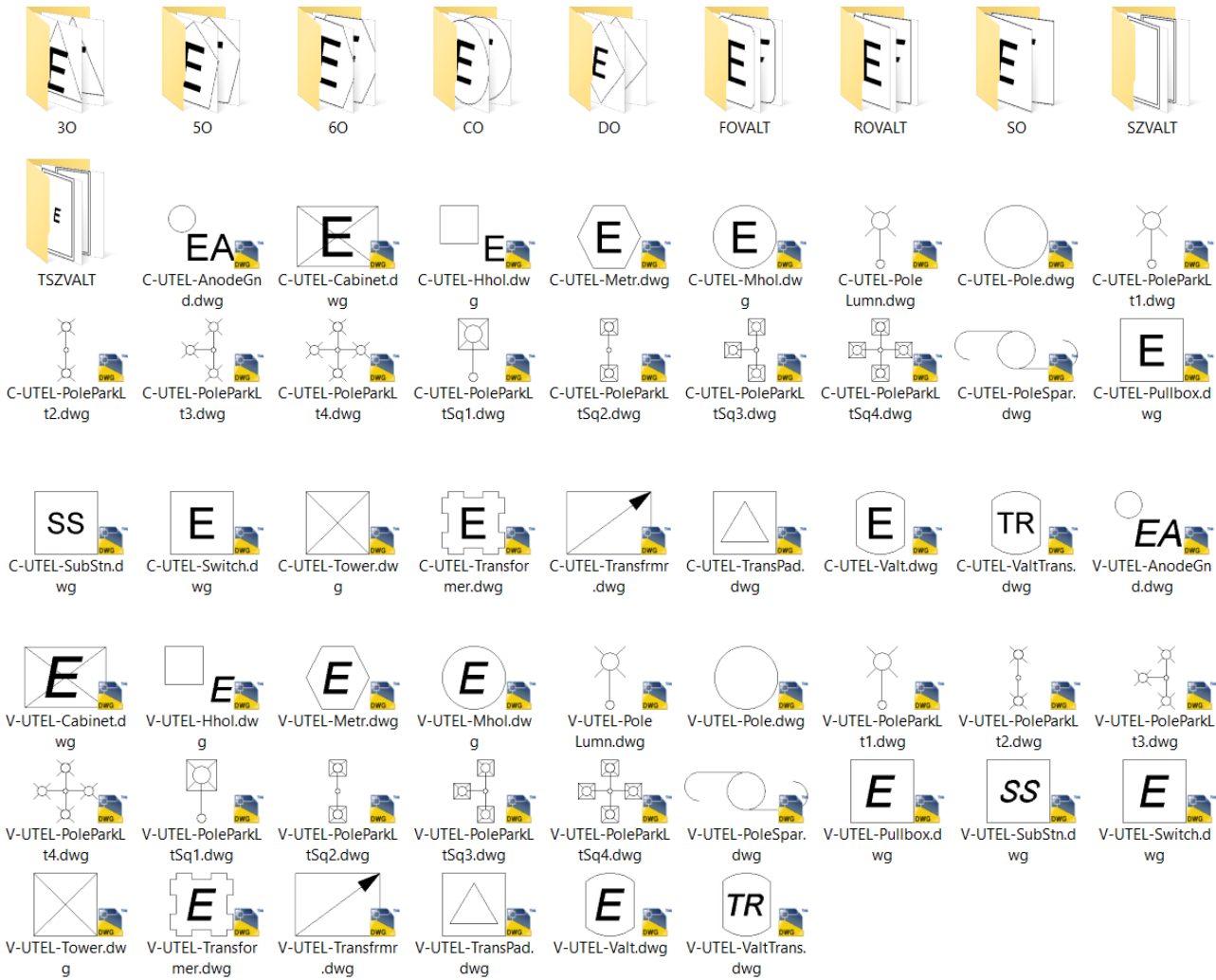
4.11.3.10 UTCO - TSZVALT

Design variations include hatch fills



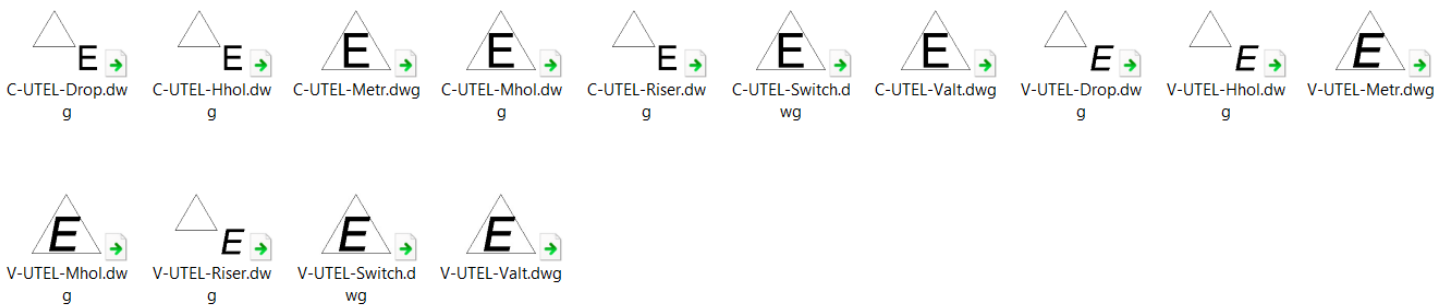
4.11.4

UTEL - Power

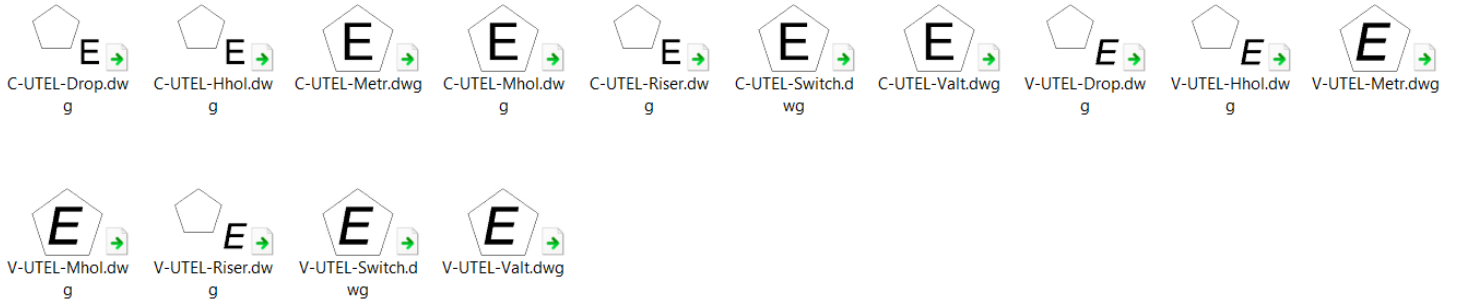


4.11.4.1

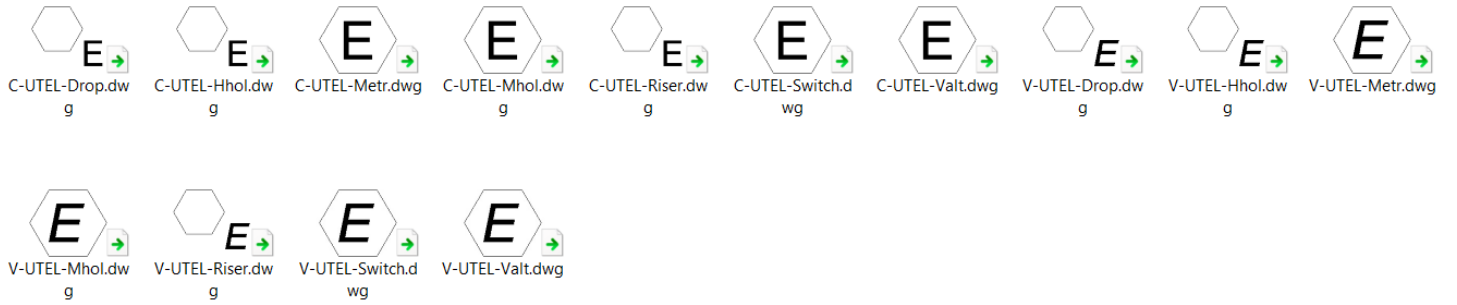
UTEL - 30



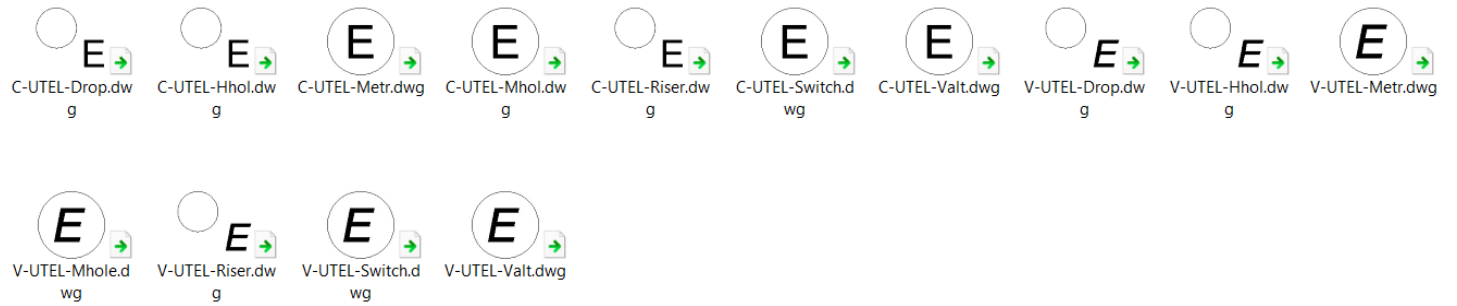
4.11.4.2 UTEL - 50



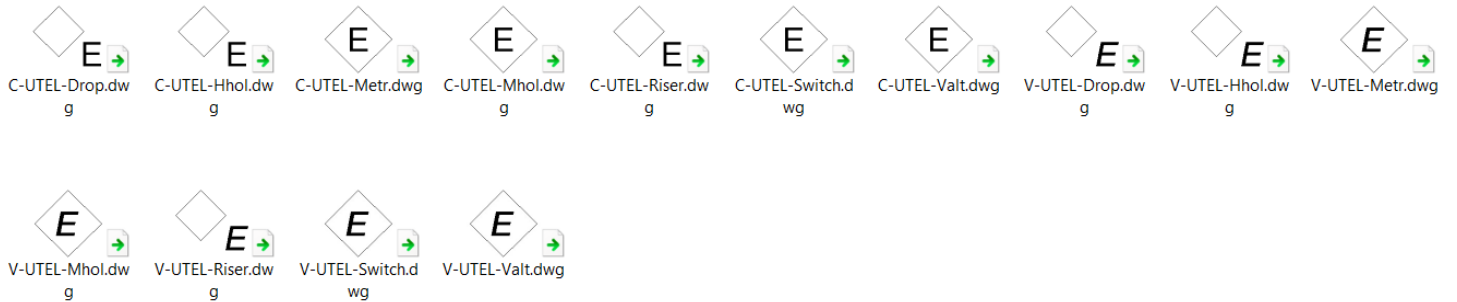
4.11.4.3 UTEL - 60



4.11.4.4 UTEL - CO



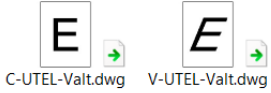
4.11.4.5 UTEL - DO



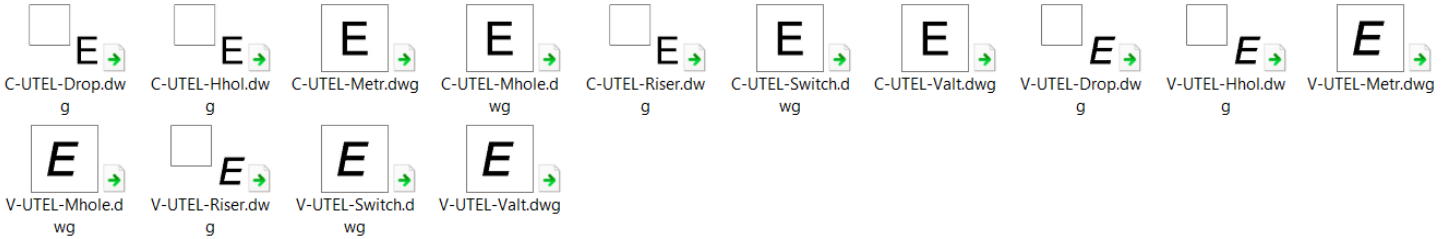
4.11.4.6 UTEL - FOVALT



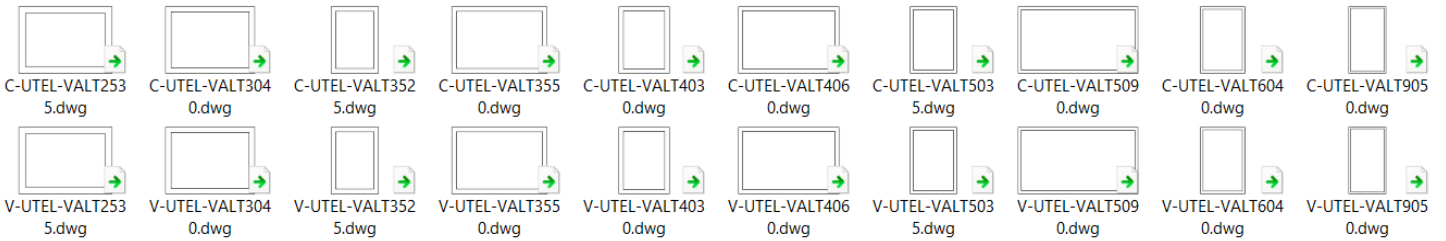
4.11.4.7 UTEL - ROVALT



4.11.4.8 UTEL - SO

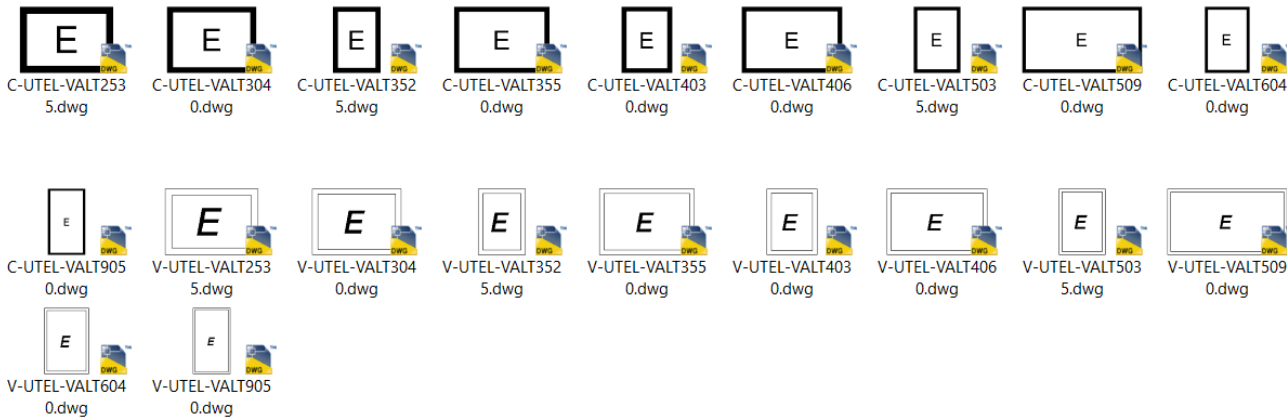


4.11.4.9 UTEL - SZVALT



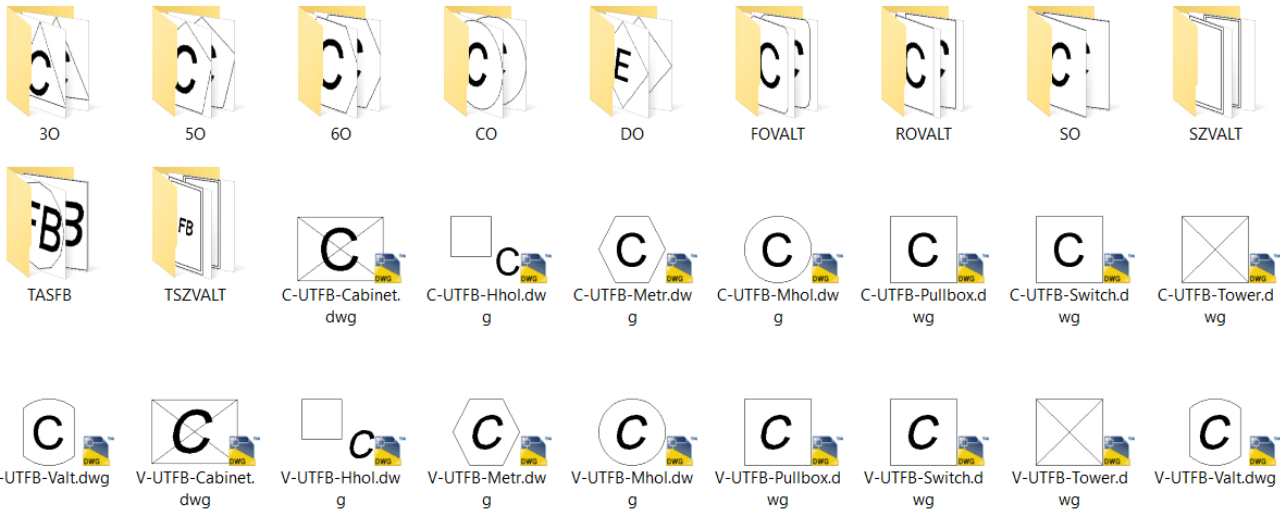
4.11.4.10 UTEL - TSZVALT

Design variations include hatch fills

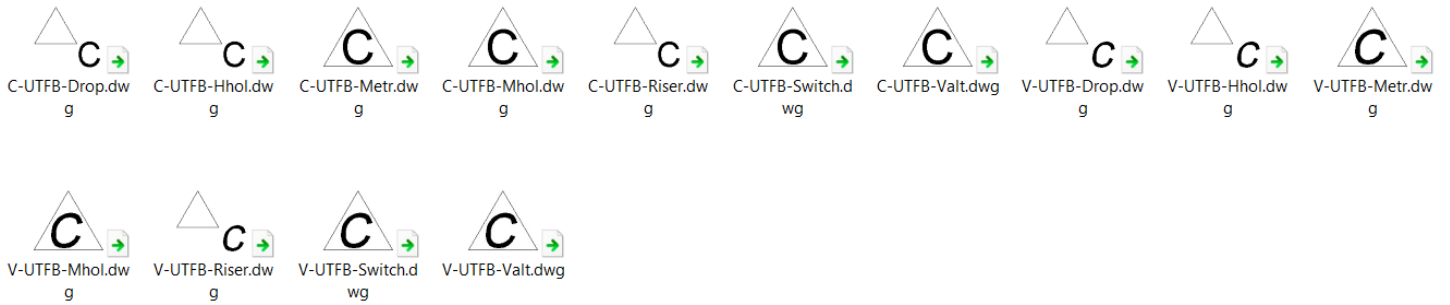


4.11.5

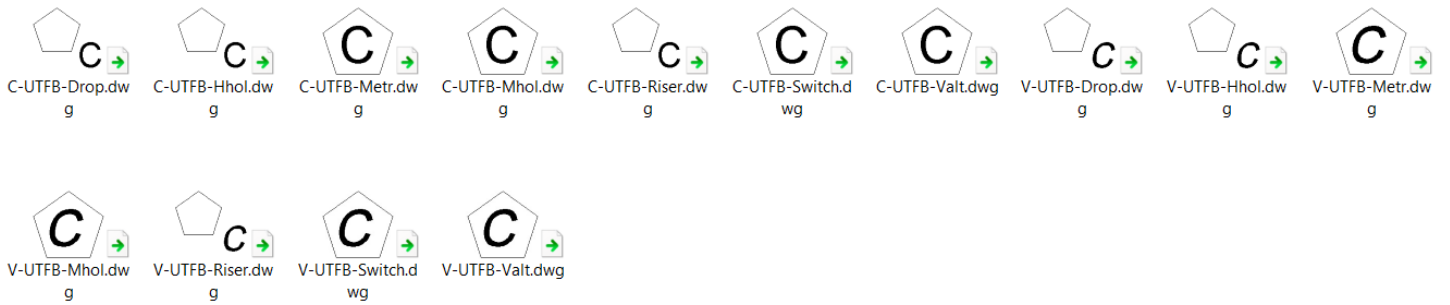
UTFB – Fiber & Communications



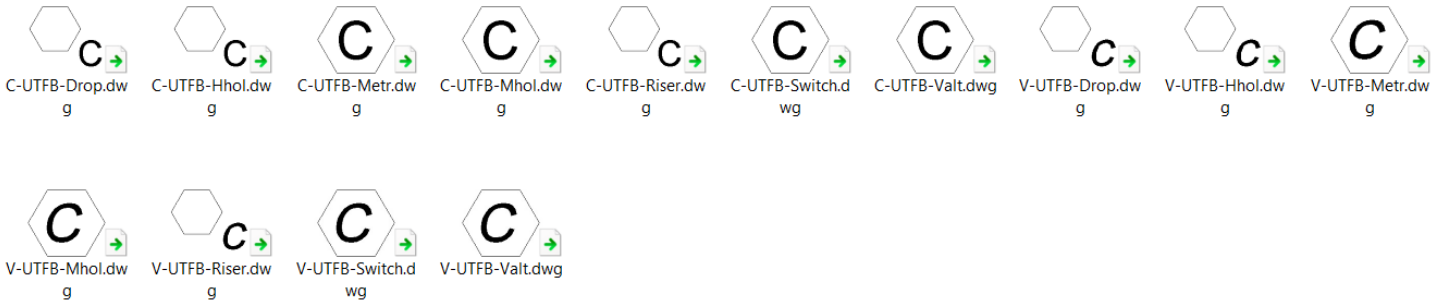
4.11.5.1 UTFB - 30



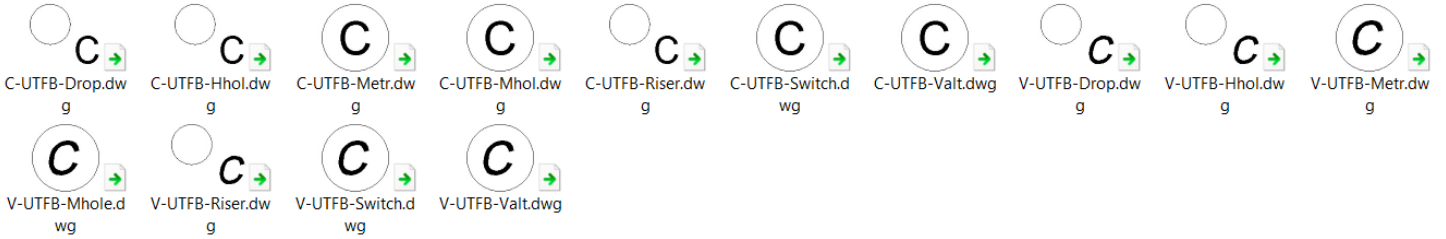
4.11.5.2 UTFB - 50



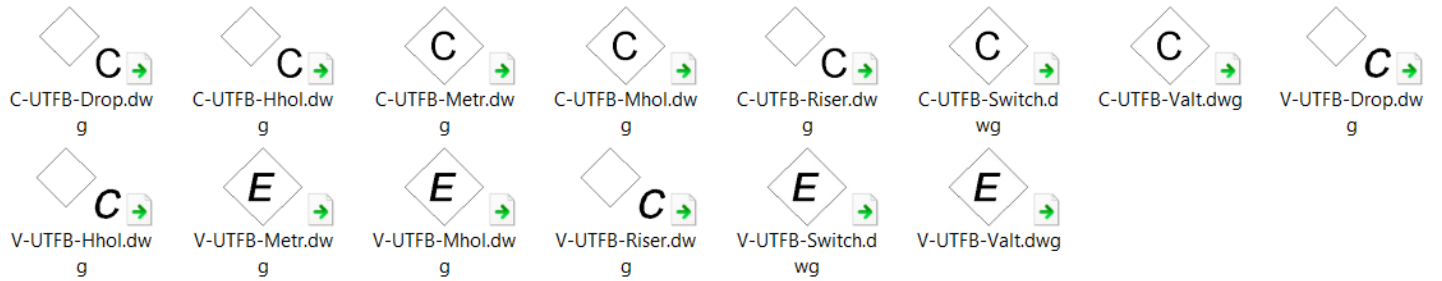
4.11.5.3 UTFB - 60



4.11.5.4 UTFB - CO



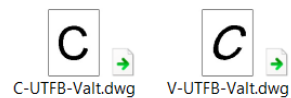
4.11.5.5 UTFB - DO



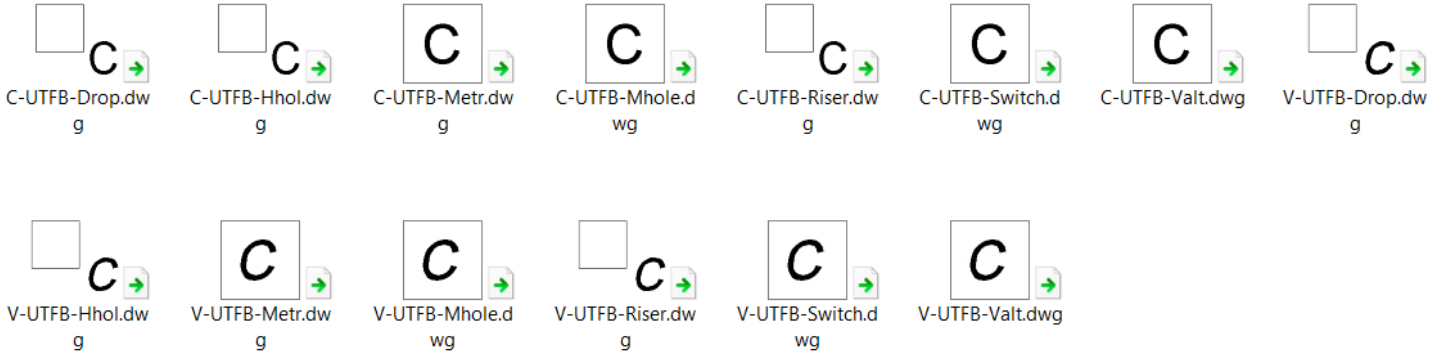
4.11.5.6 UTFB - FOVAULT



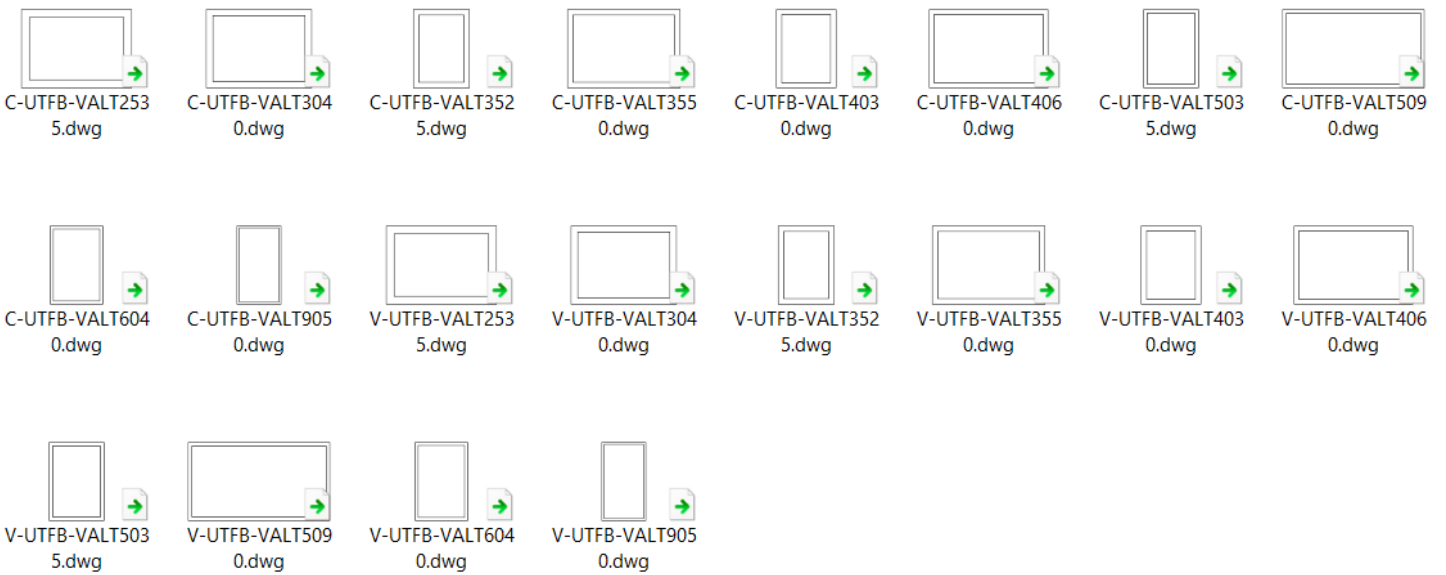
4.11.5.7 UTFB - ROVAULT



4.11.5.8 UTFB - SO

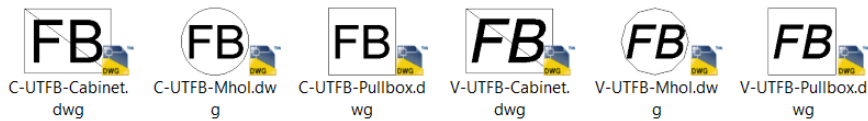


4.11.5.9 UTFB - SZVAULT

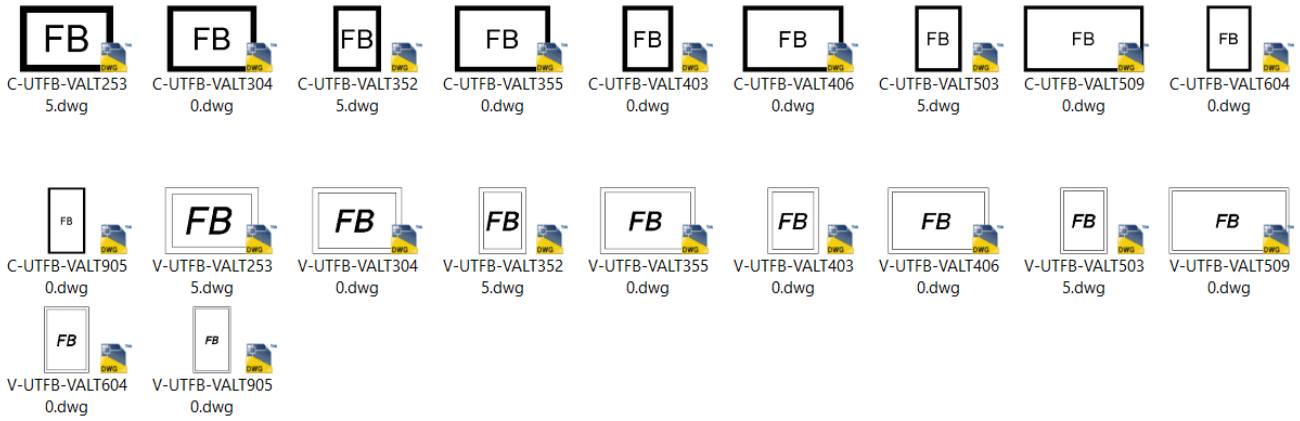


4.11.5.10 UTFB - TASFB

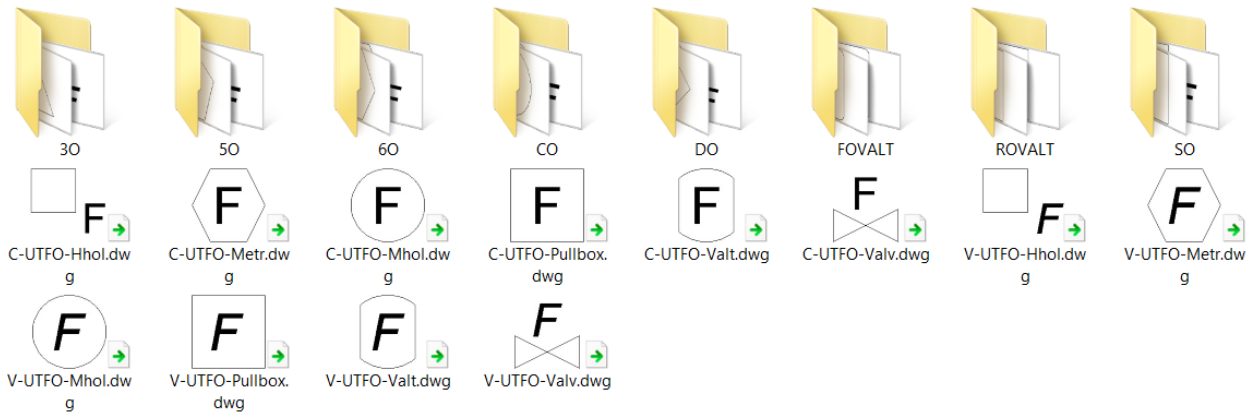
Vault Variations with FB



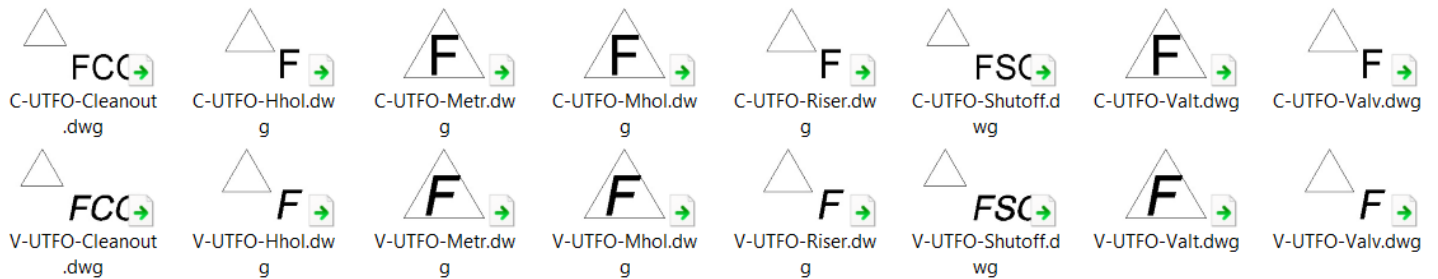
4.11.5.11 UTFB - TSVVAULT



4.11.6 UTFO – Fuel Oil

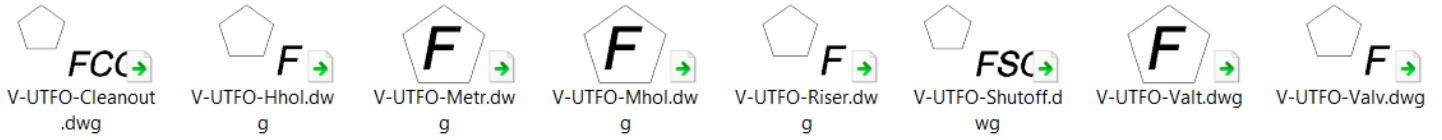
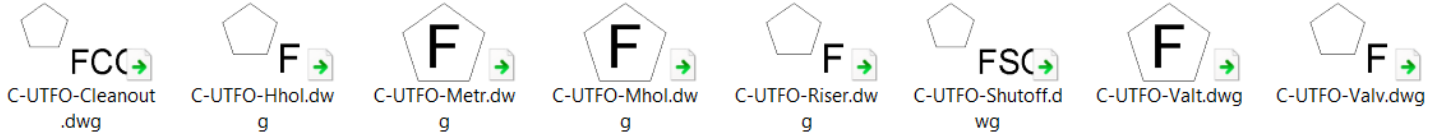


4.11.6.1 UTFO - 30



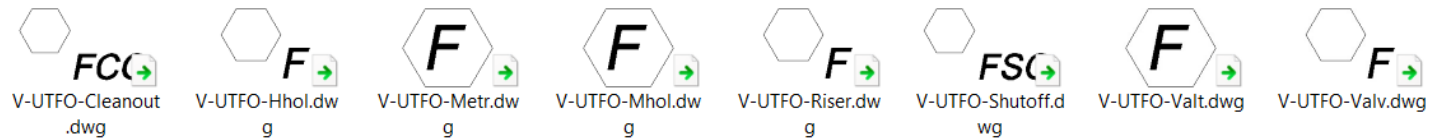
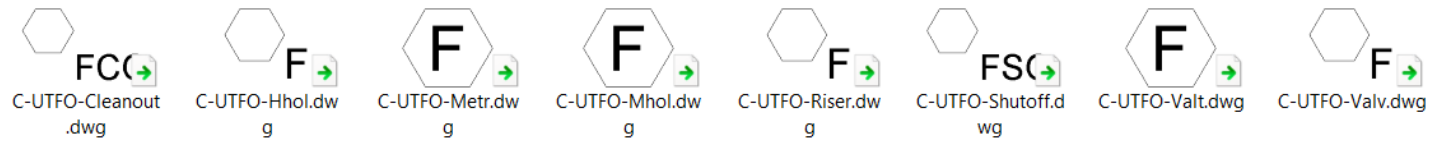
4.11.6.2

UTFO - 50



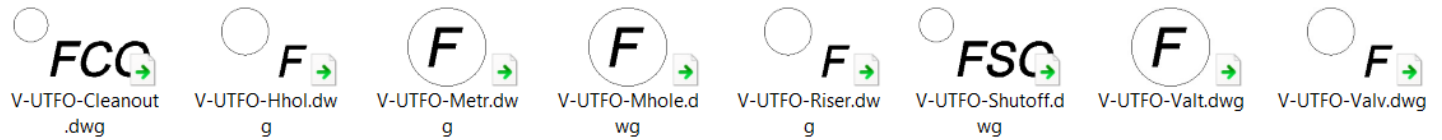
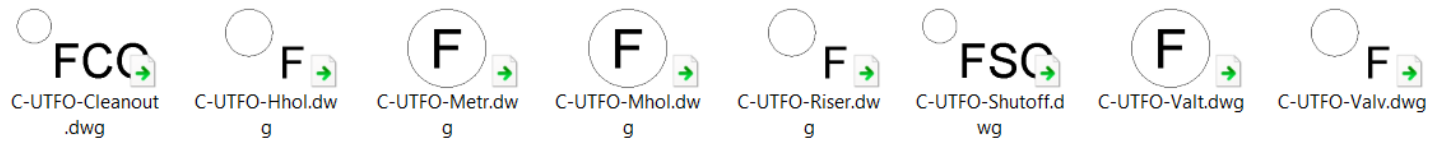
4.11.6.3

UTFO - 60

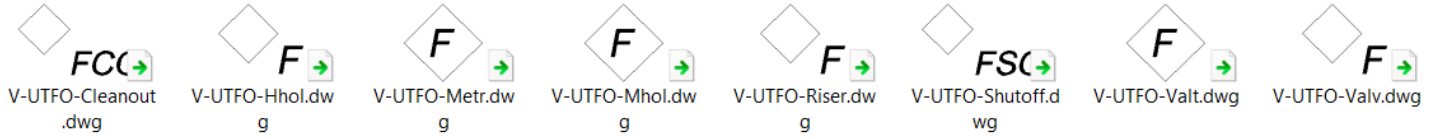
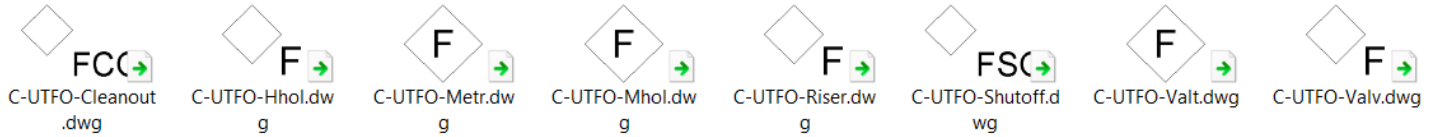


4.11.6.4

UTFO - CO



4.11.6.5 UTFO - DO



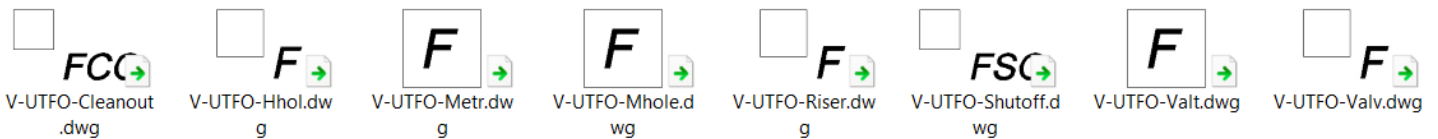
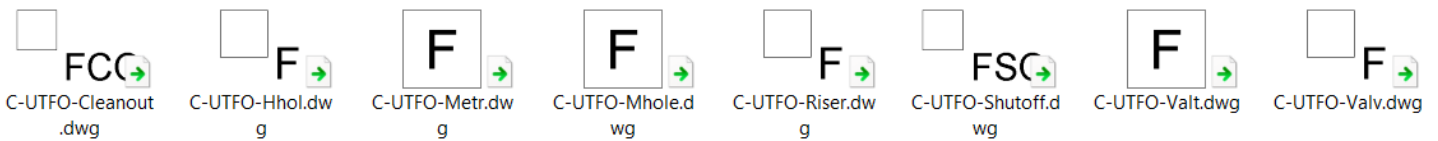
4.11.6.6 UTFO - FOVALT



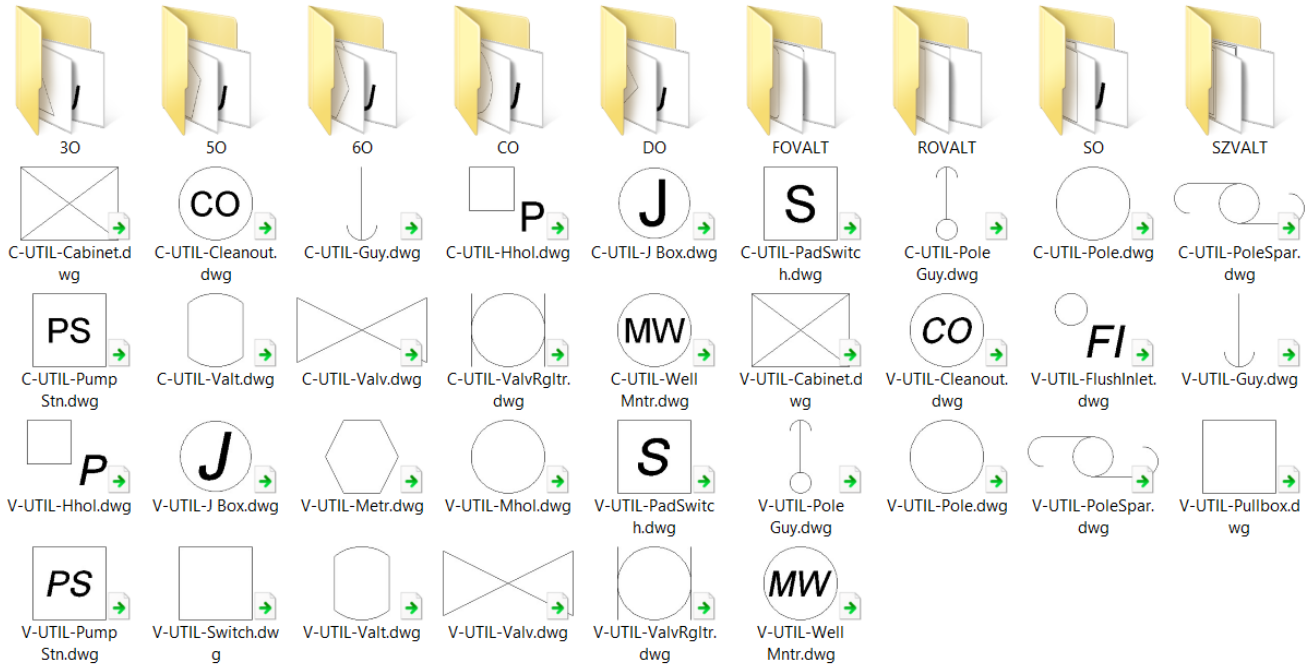
4.11.6.7 UTFO - ROVALT



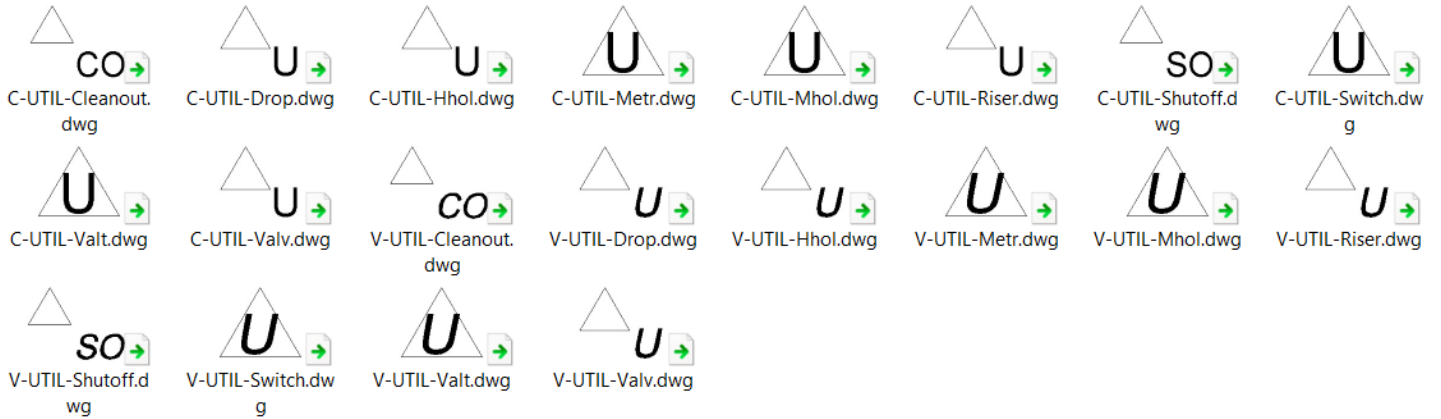
4.11.6.8 UTFO - SO



4.11.7UTIL – General Utilities

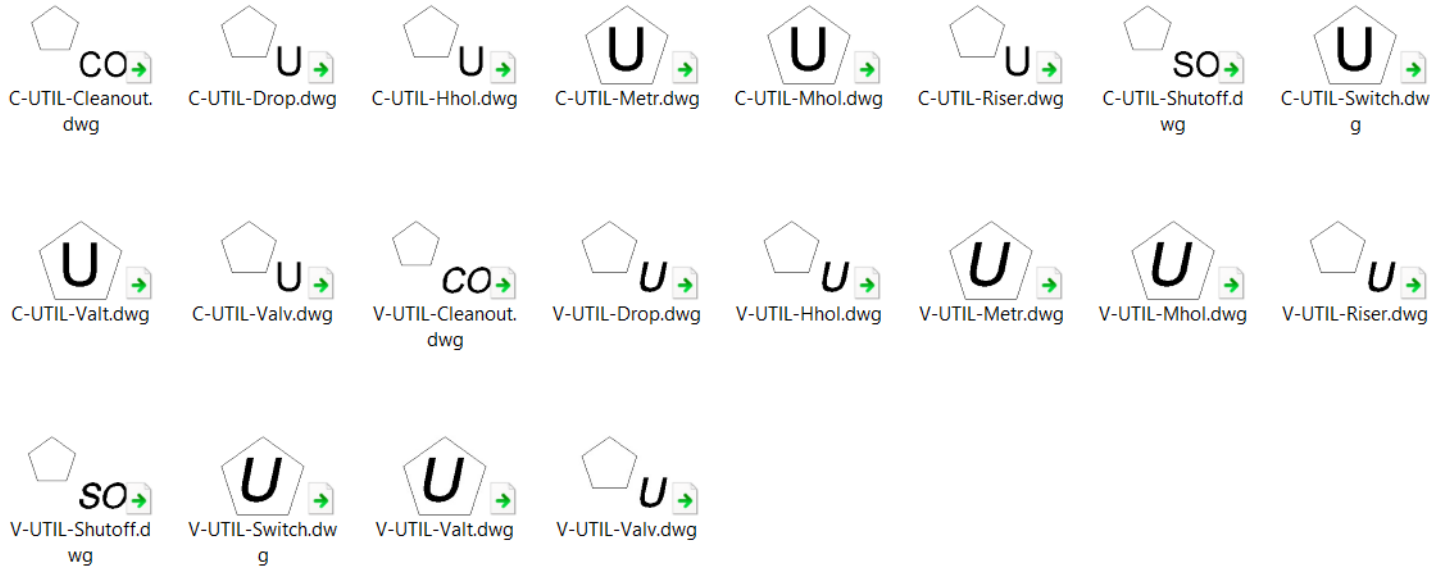


4.11.7.1 UTIL - 30



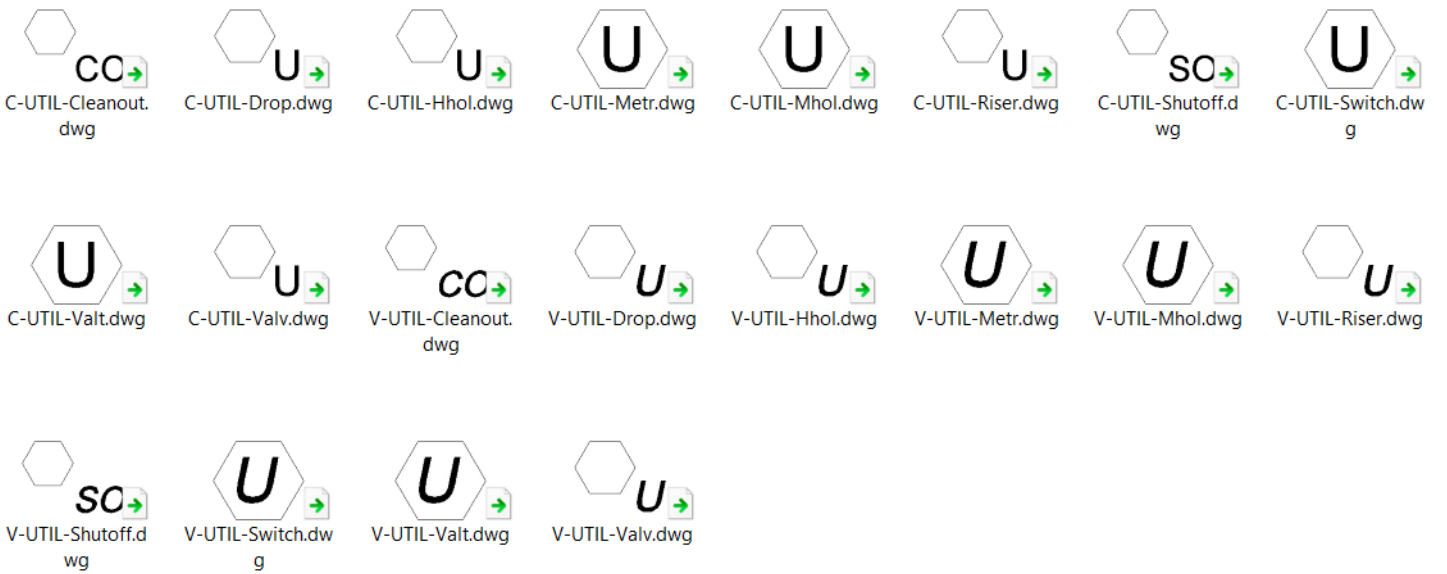
4.11.7.2

UTIL - 50

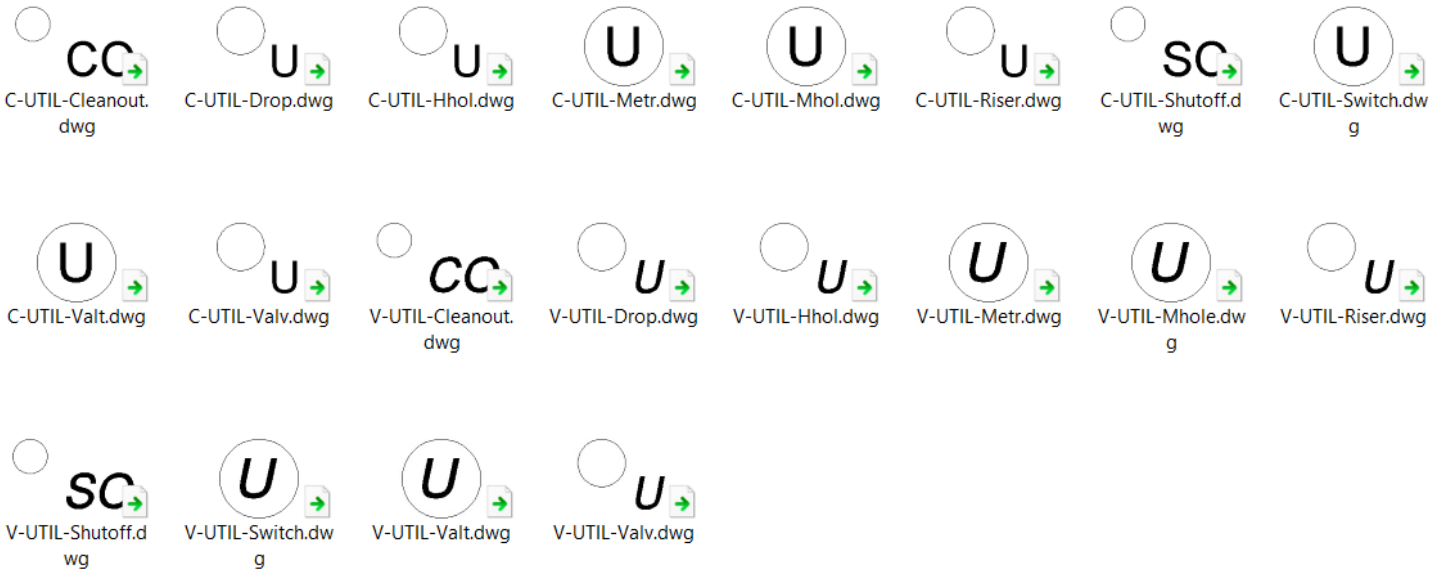


4.11.7.3

UTIL - 60



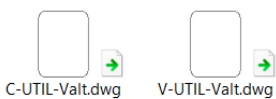
4.11.7.4 UTIL - CO



4.11.7.5 UTIL - DO



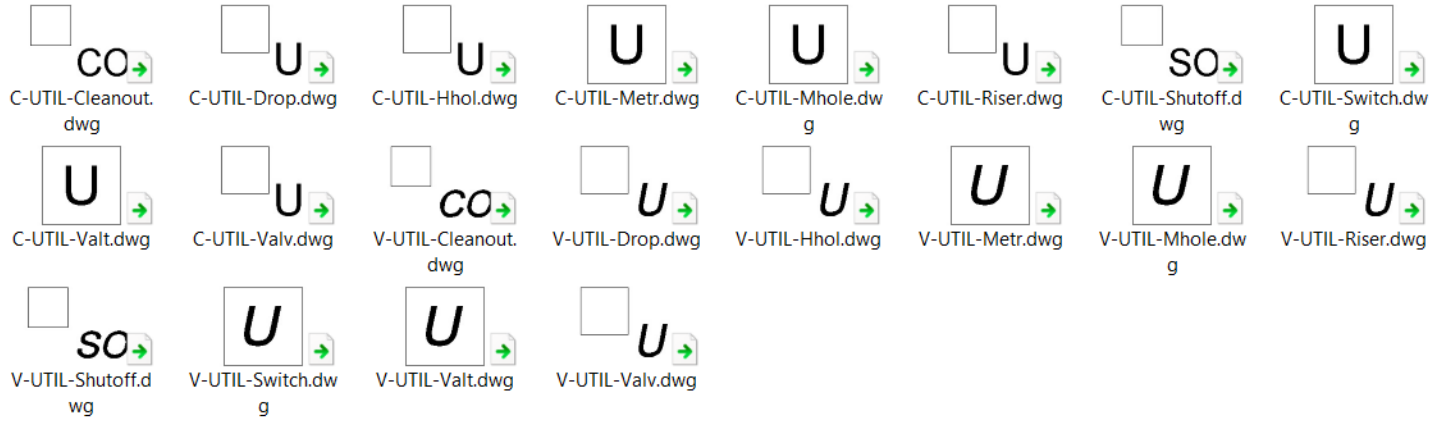
4.11.7.6 UTIL - FOVALT



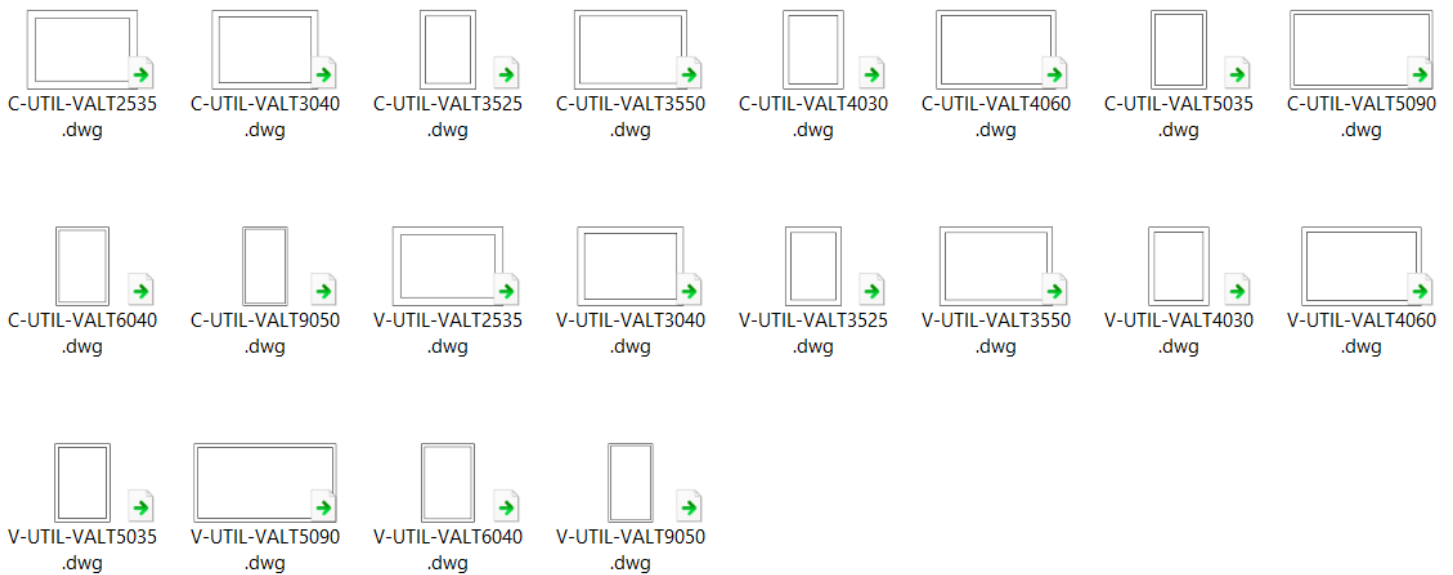
4.11.7.7 UTIL - ROVALT



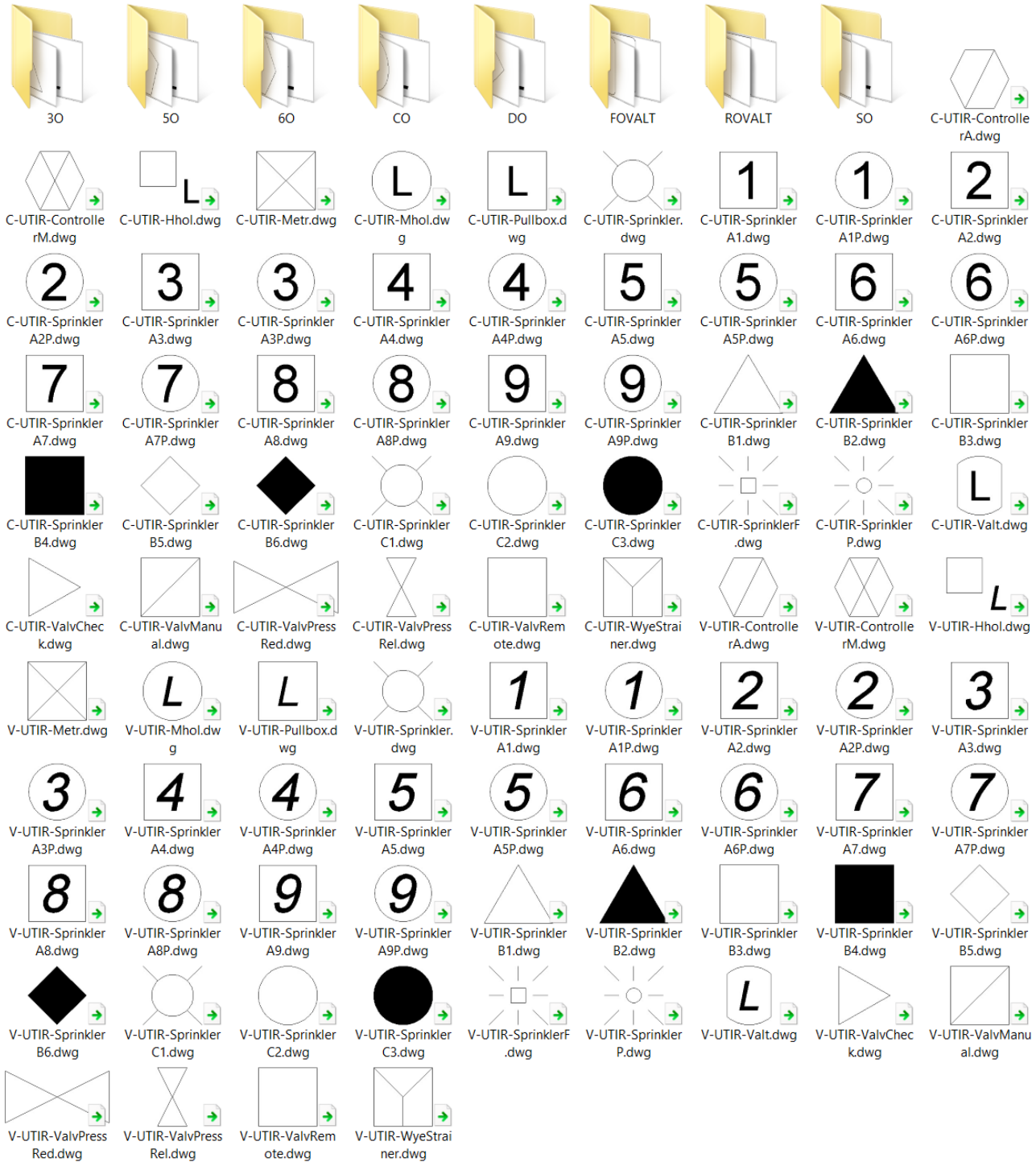
4.11.7.8 UTIL - SO



4.11.7.9 UTIL - SZVALT

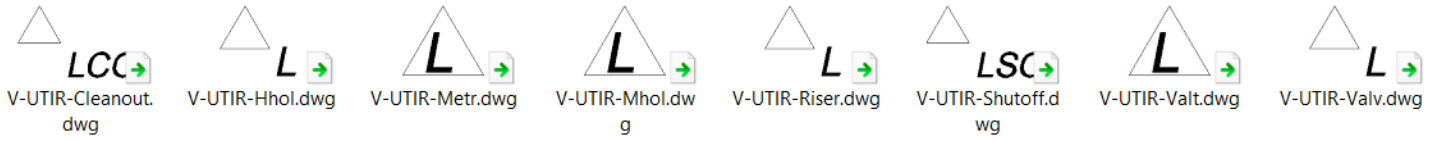
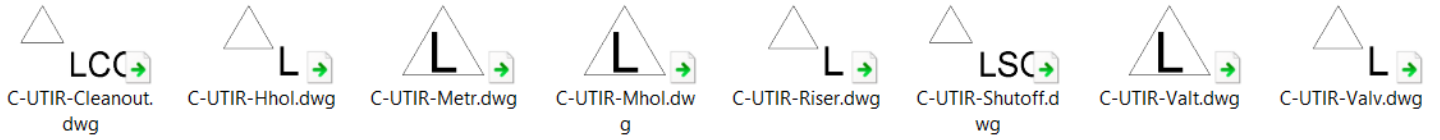


4.11.8 UTIR – Irrigation Water



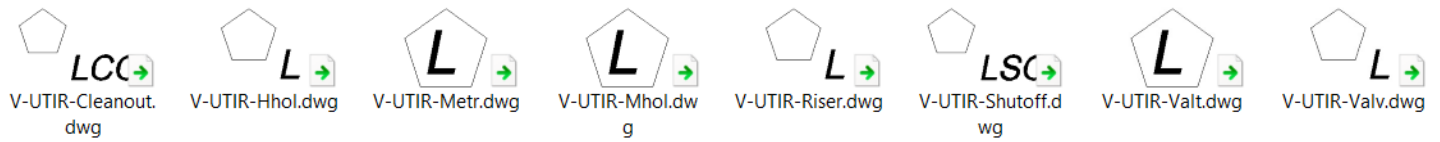
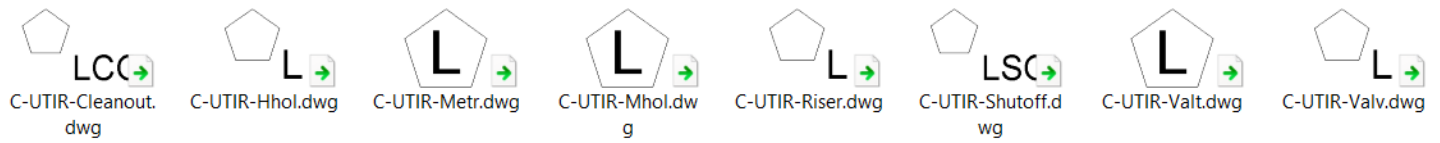
4.11.8.1

UTIR - 30



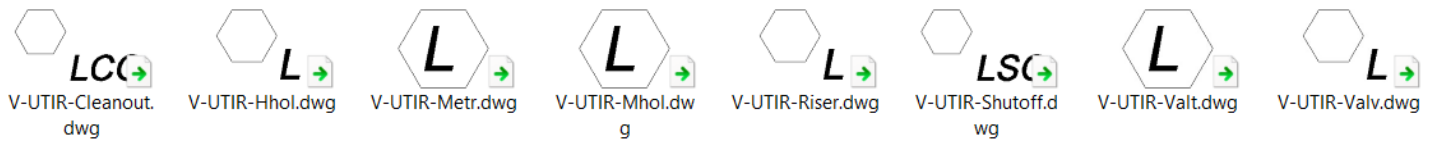
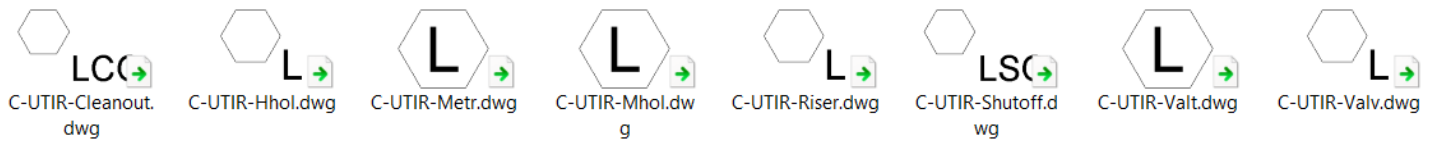
4.11.8.2

UTIR - 50

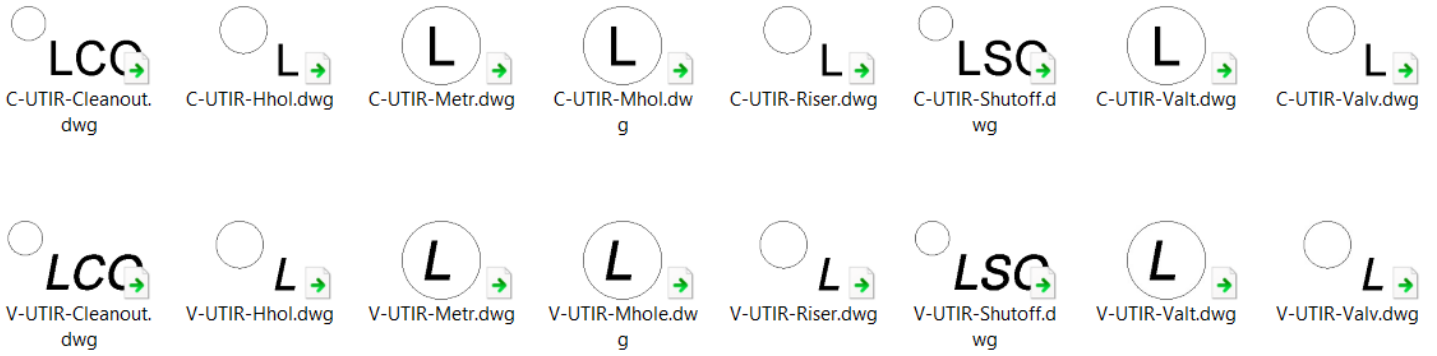


4.11.8.3

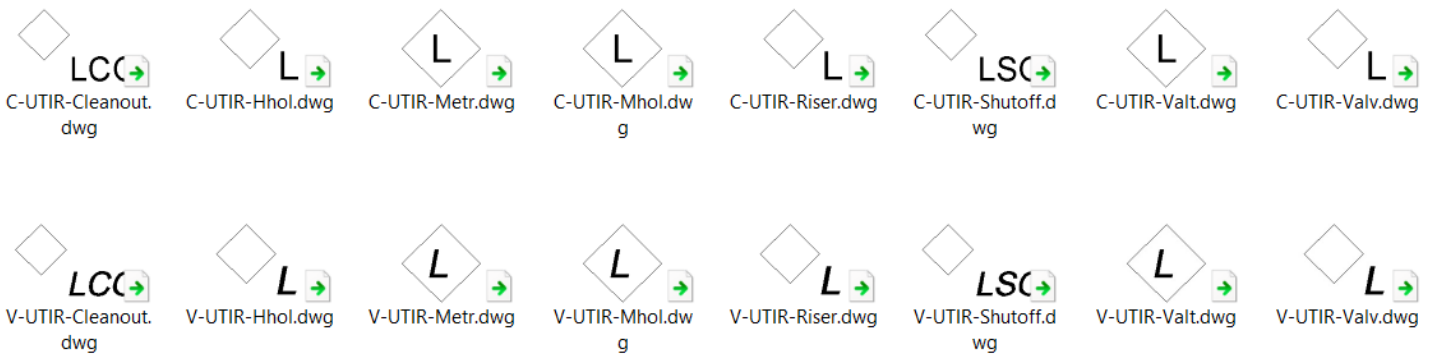
UTIR - 60



4.11.8.4 UTIR - CO



4.11.8.5 UTIR - DO



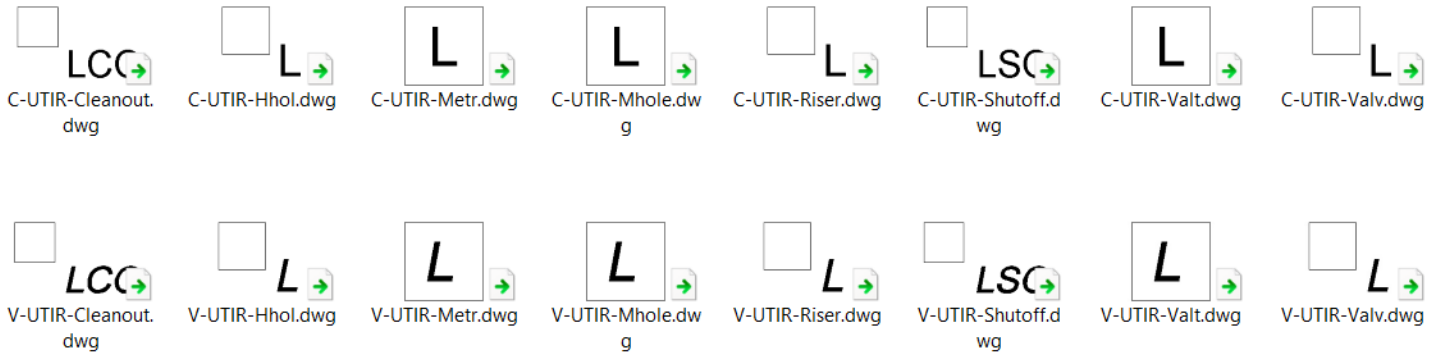
4.11.8.6 UTIR - FOVALT



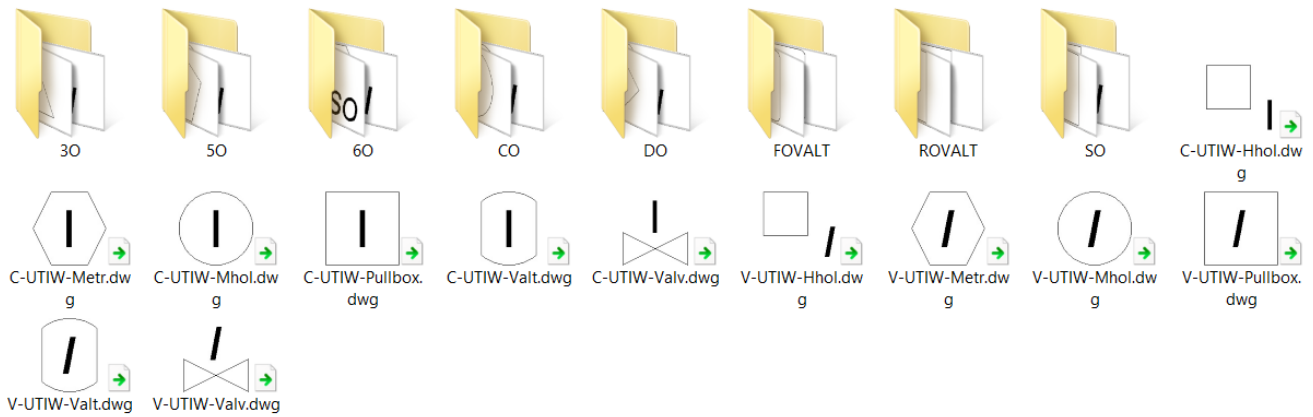
4.11.8.7 UTIR - ROVALT



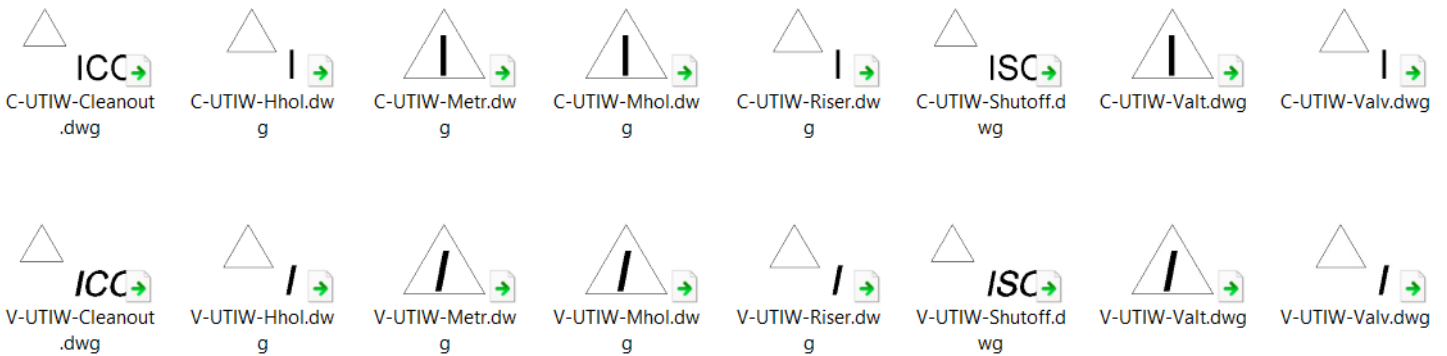
4.11.8.8 UTIR - SO



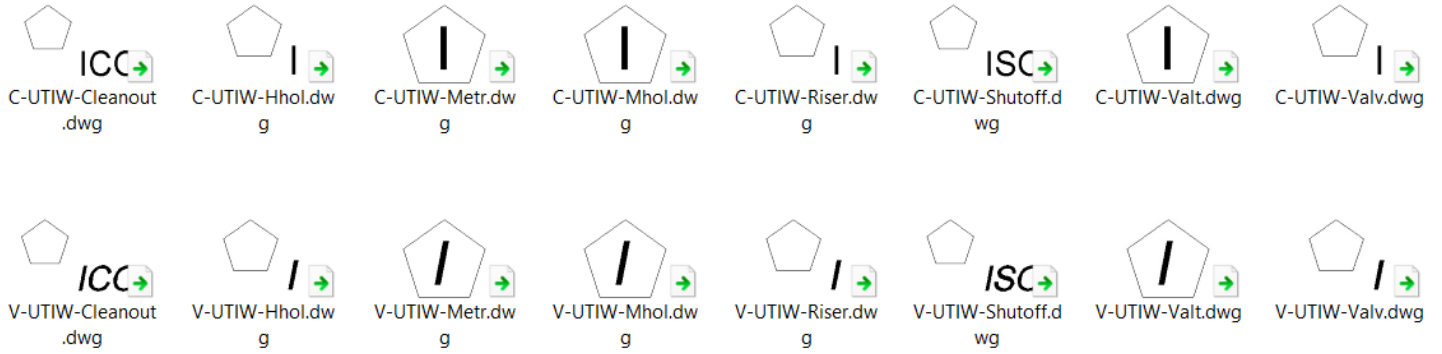
4.11.9 UTIW – Industrial Waste



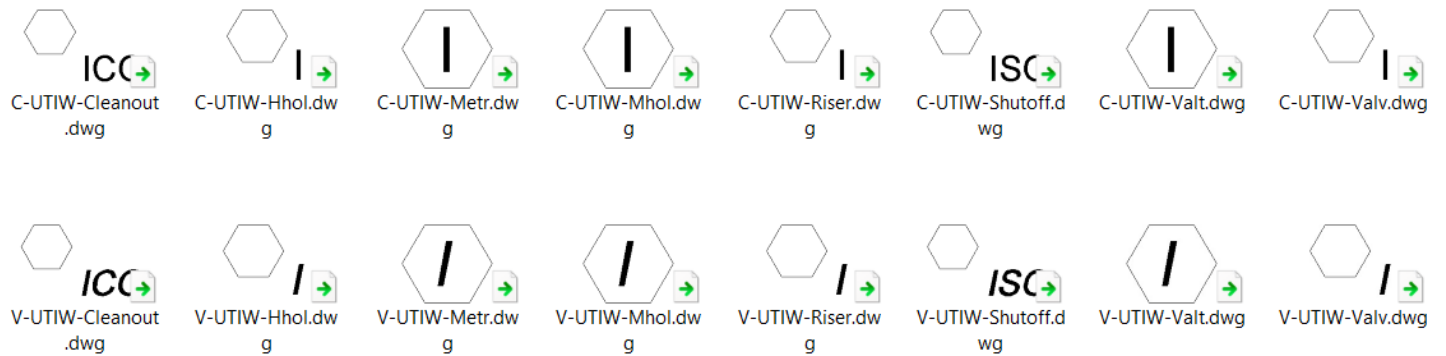
4.11.9.1 UTIW - 30



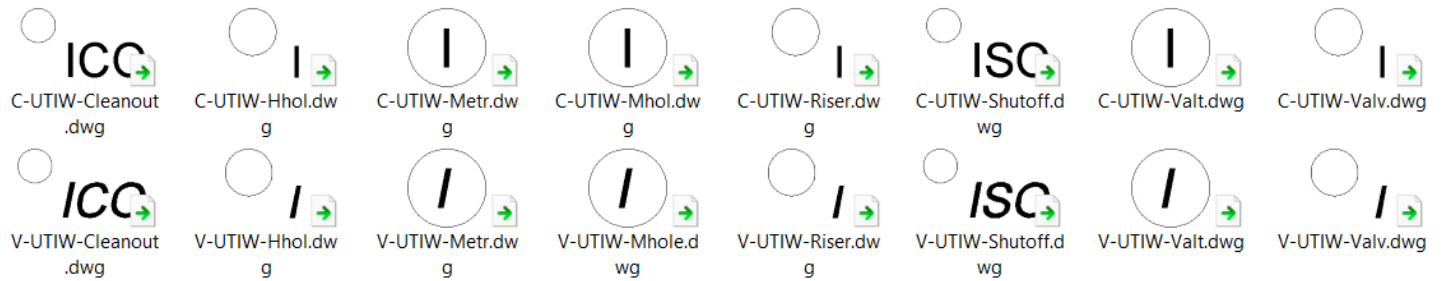
4.11.9.2 UTIW - 50



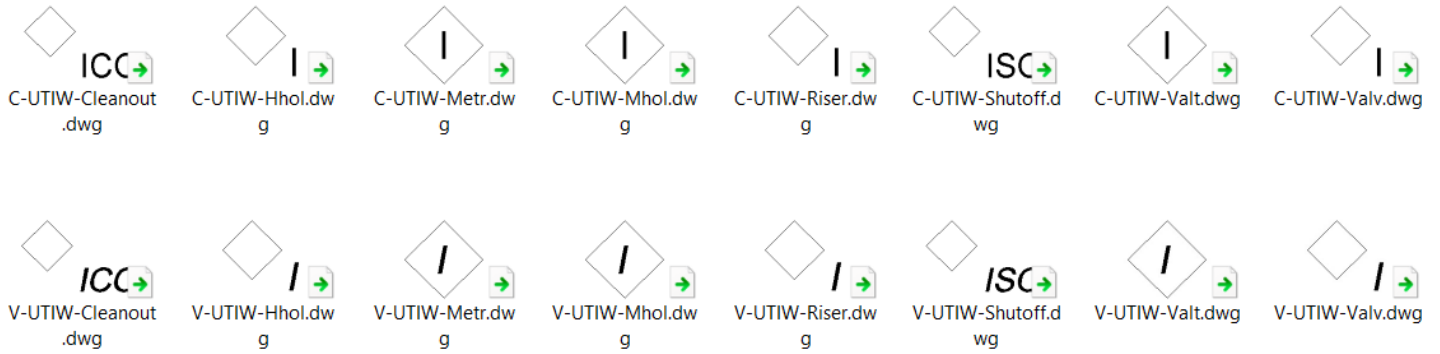
4.11.9.3 UTIW - 60



4.11.9.4 UTIW - CO



4.11.9.5 UTIW - DO



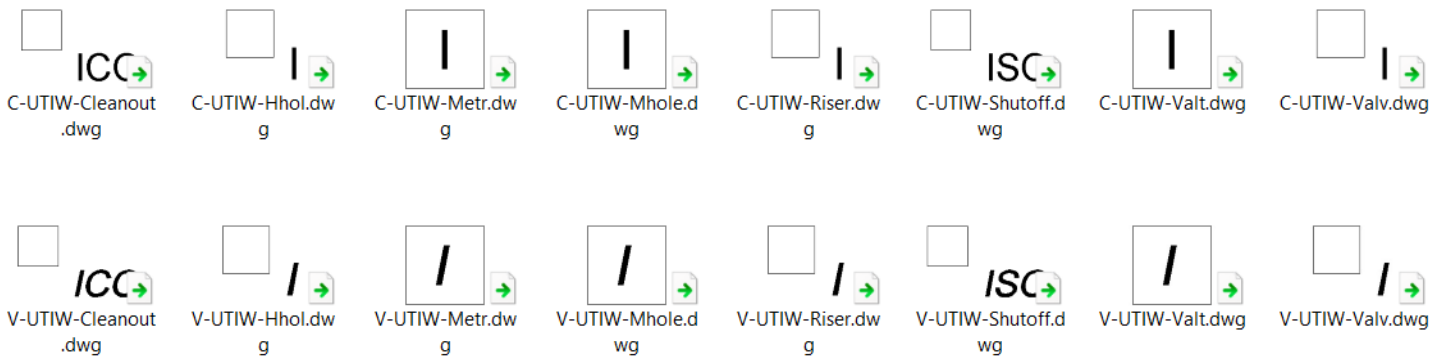
4.11.9.6 UTIW - FOVALT



4.11.9.7 UTIW - ROVALT



4.11.9.8 UTIW - SO

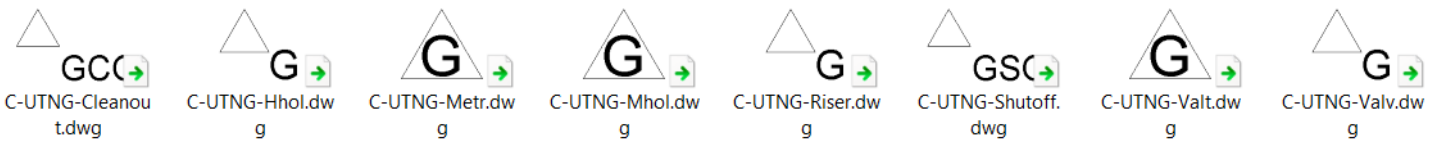


4.11.10

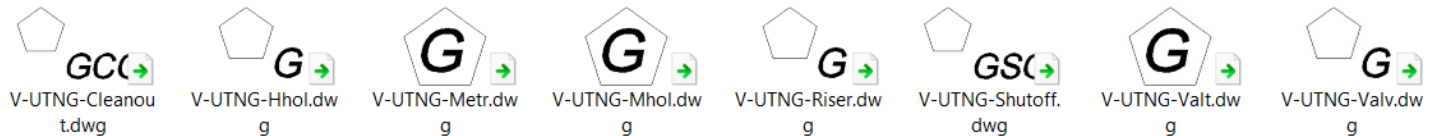
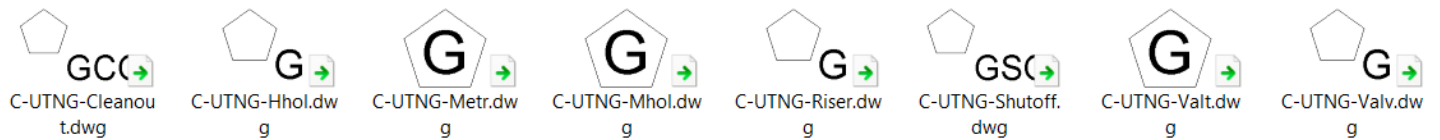
UTNG – Natural Gas



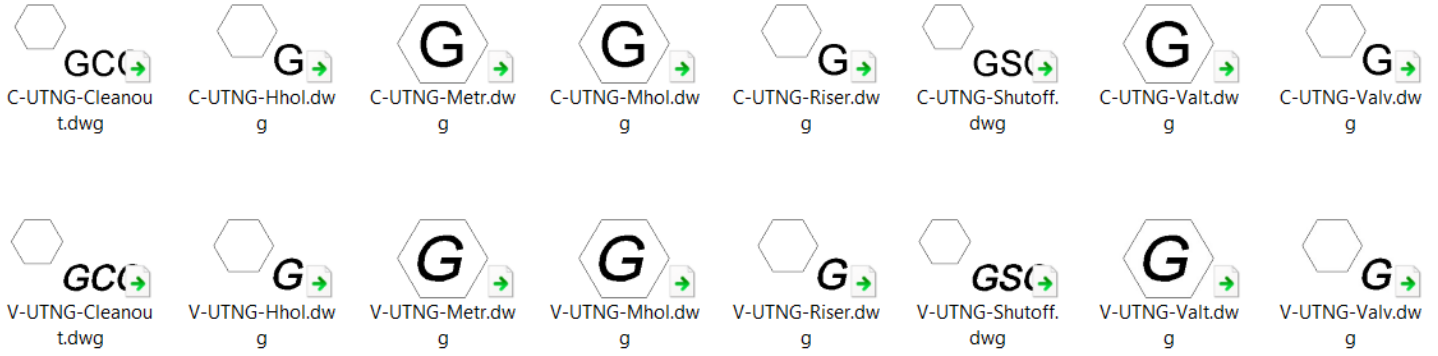
4.11.10.1 UTNG - 30



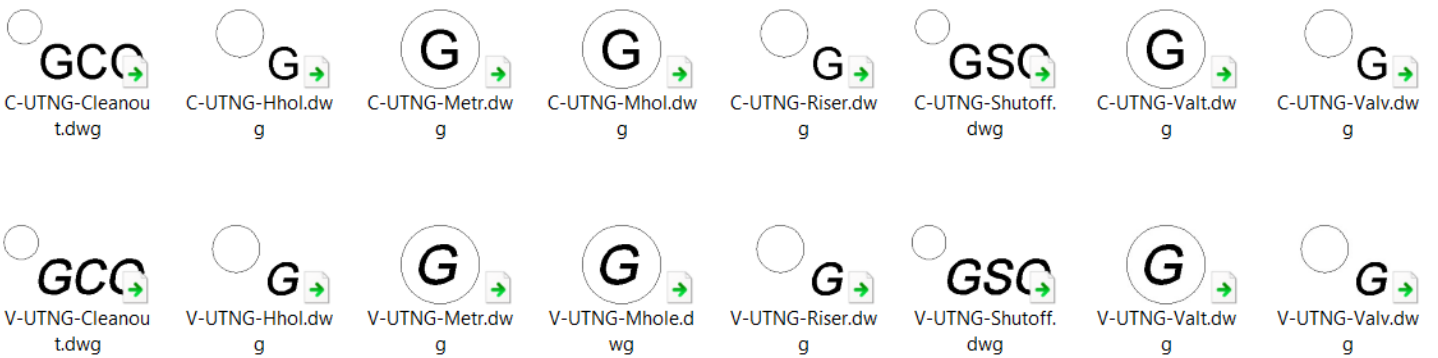
4.11.10.2 UTNG - 50



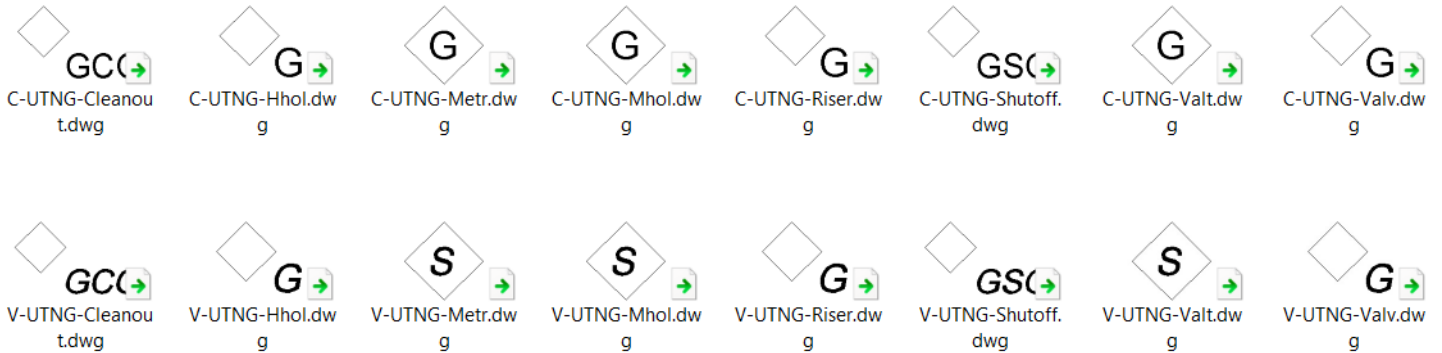
4.11.10.3 UTNG - 60



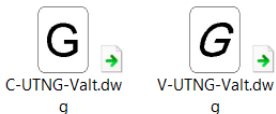
4.11.10.4 UTNG - CO



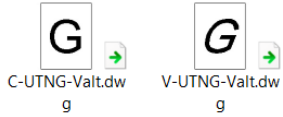
4.11.10.5 UTNG - DO



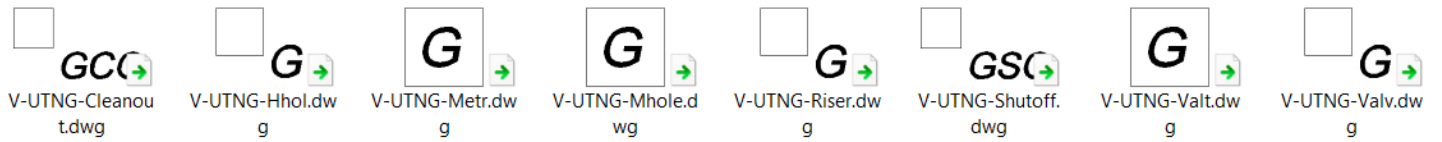
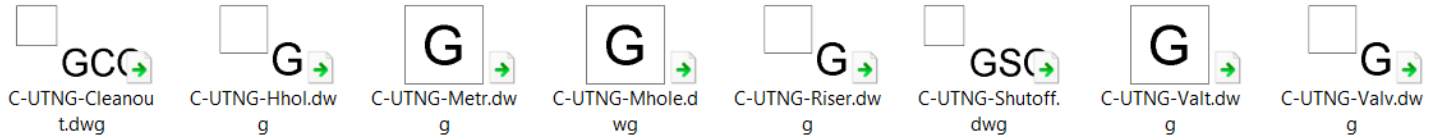
4.11.10.6 UTNG - FOVALT



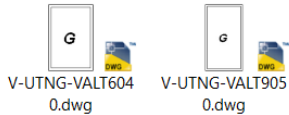
4.11.10.7 UTNG - ROVALT



4.11.10.8 UTNG - SO

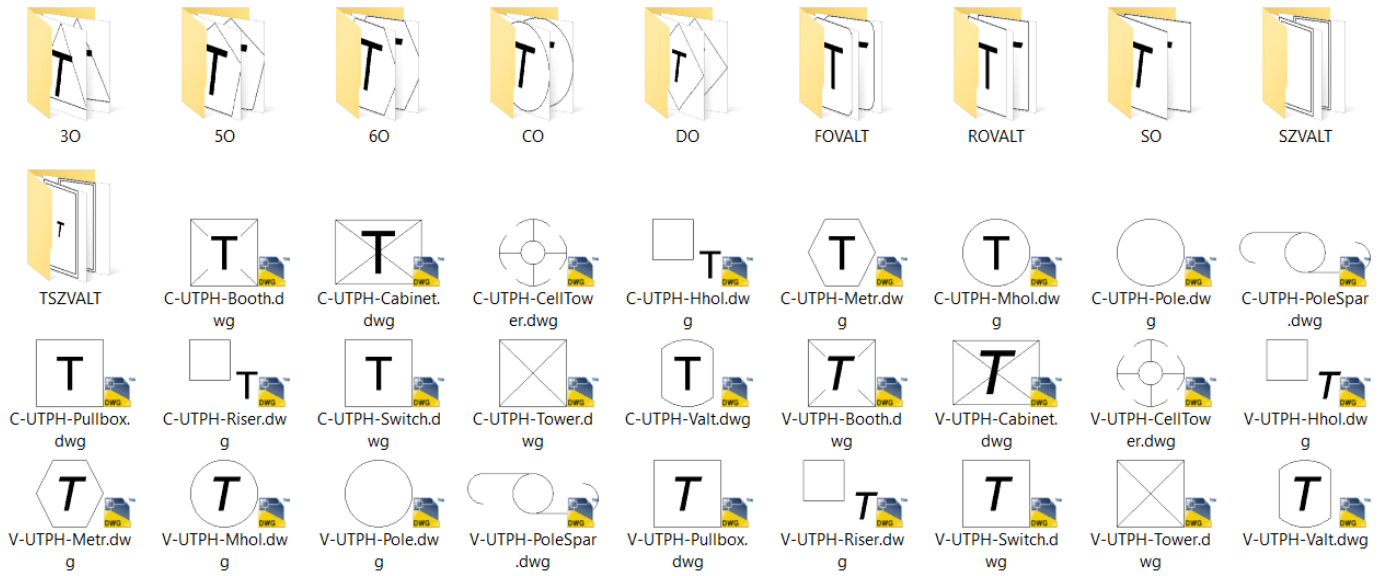


4.11.10.9 UTNG - TSZVALT

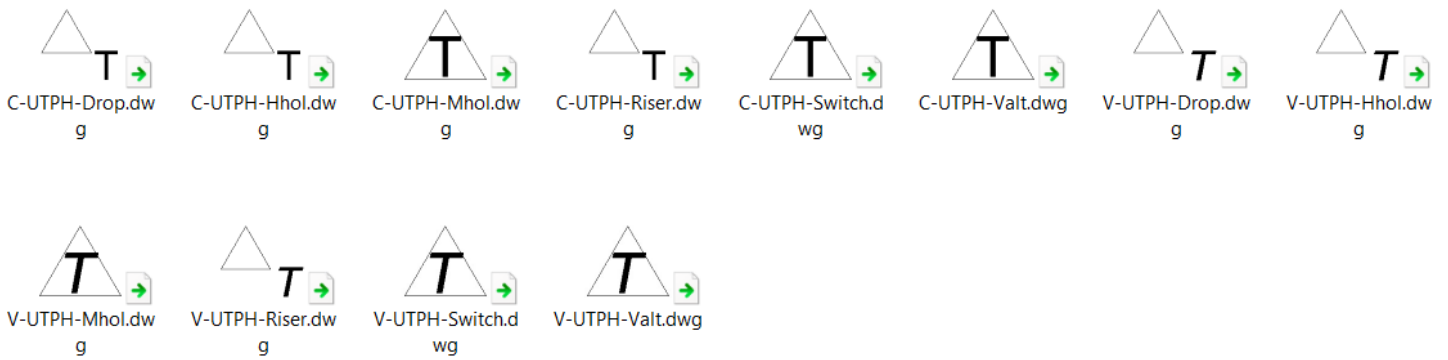


4.11.11

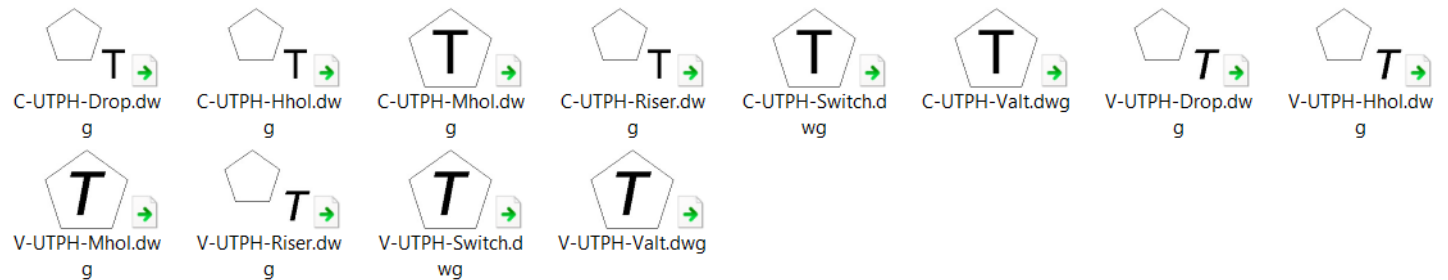
UTPH - Phone



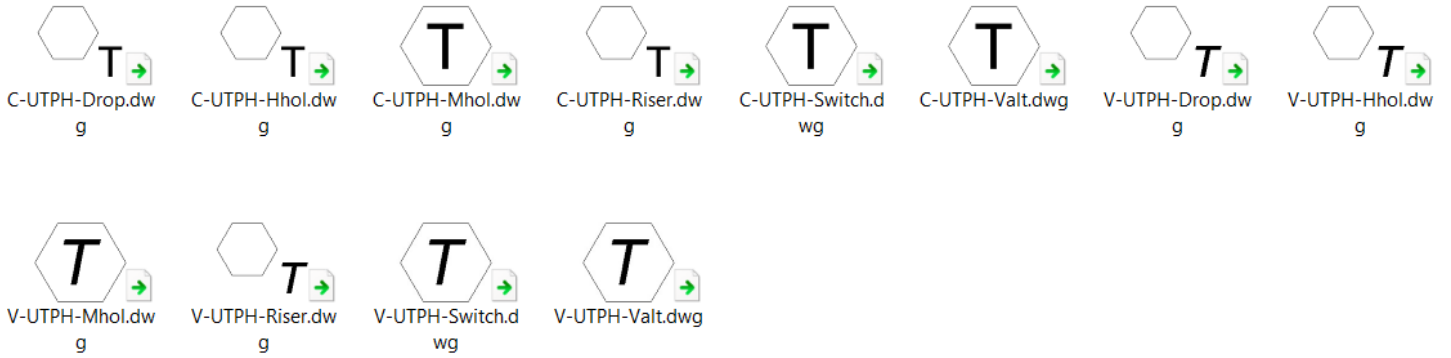
4.11.11.1 UTPH - 30



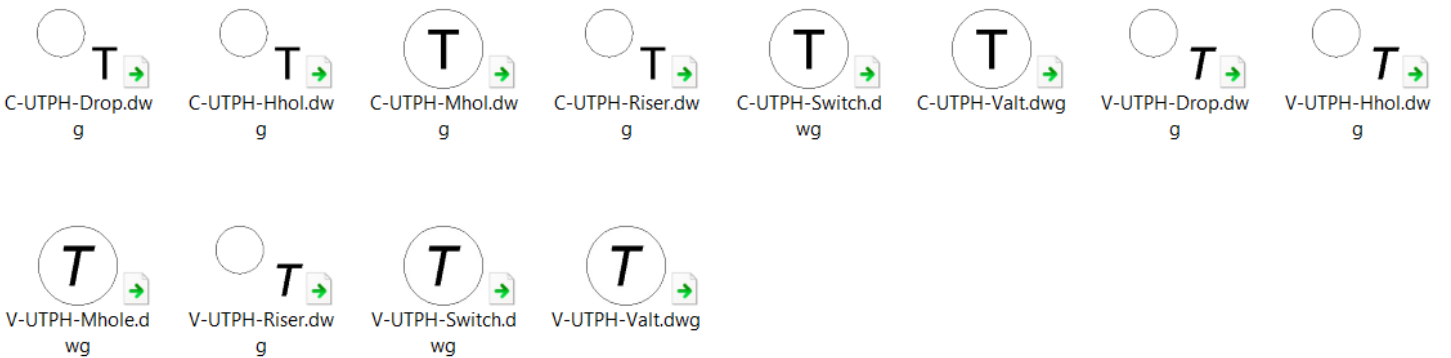
4.11.11.2 UTPH - 50



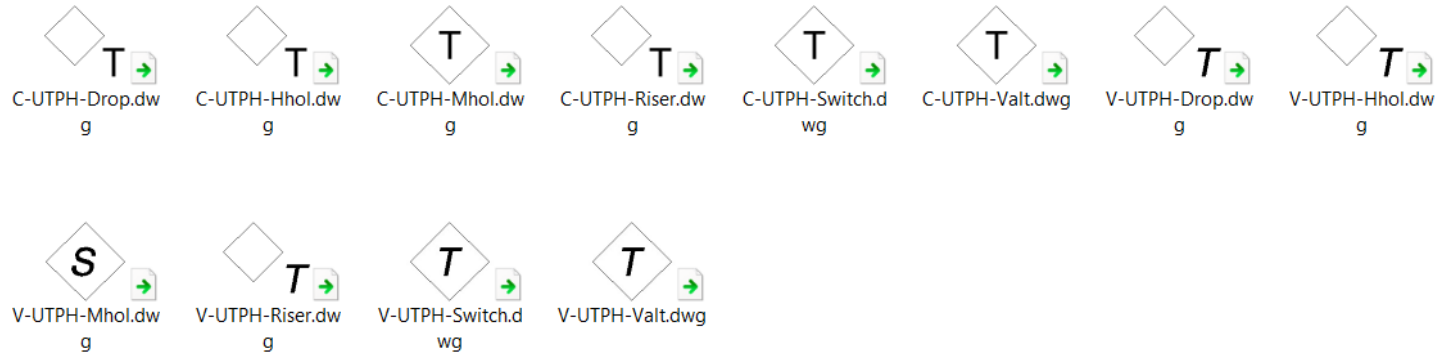
4.11.11.3 UTPH - 60



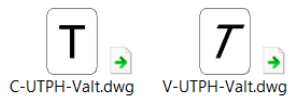
4.11.11.4 UTPH - CO



4.11.11.5 UTPH - DO



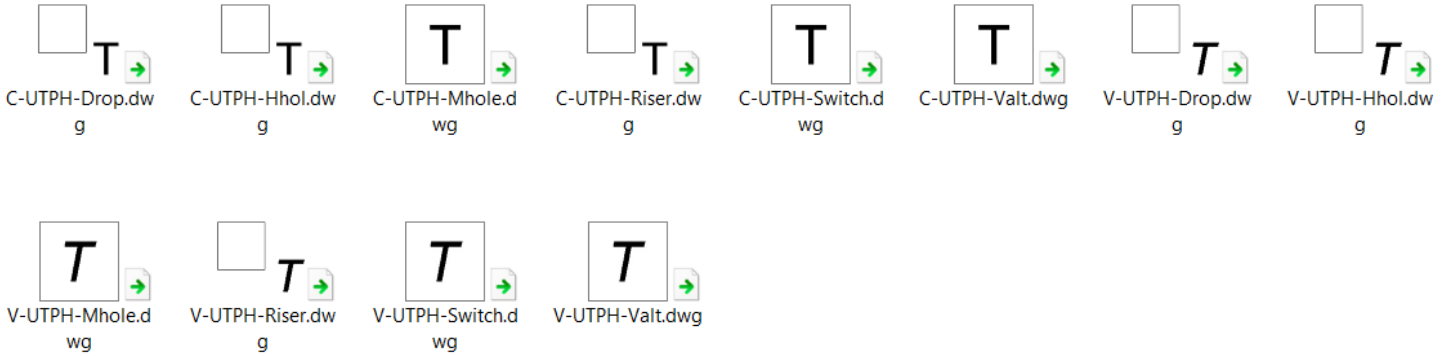
4.11.11.6 UTPH - FOVALT



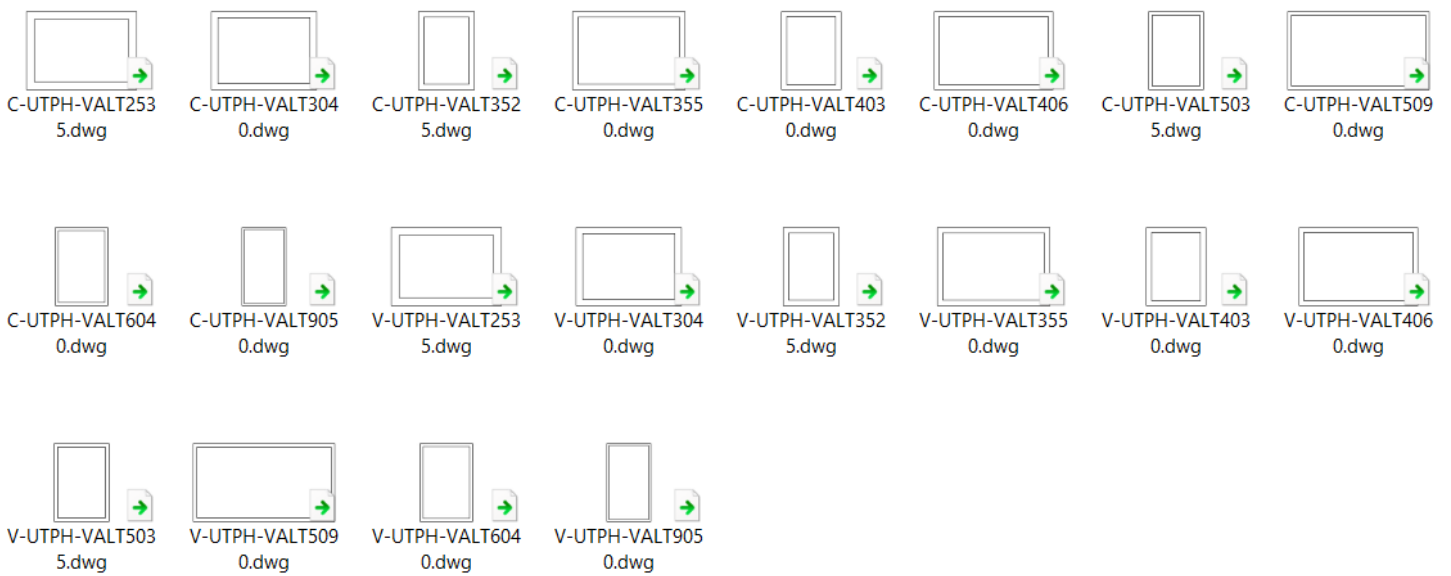
4.11.11.7 UTPH - ROVALT



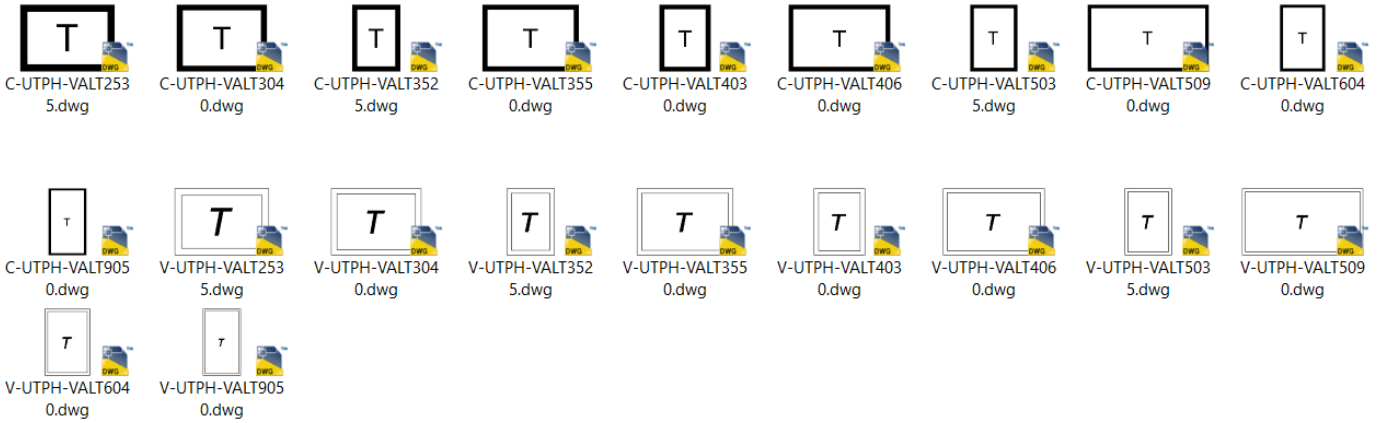
4.11.11.8 UTPH - SO



4.11.11.9 UTPH - SZVALT



4.11.11.10 UTPH - TSZVALT

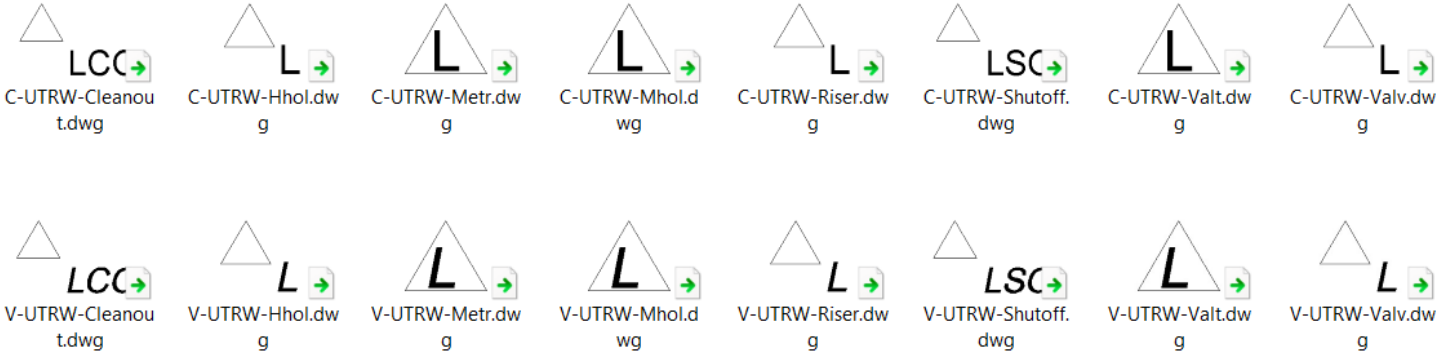


4.11.12

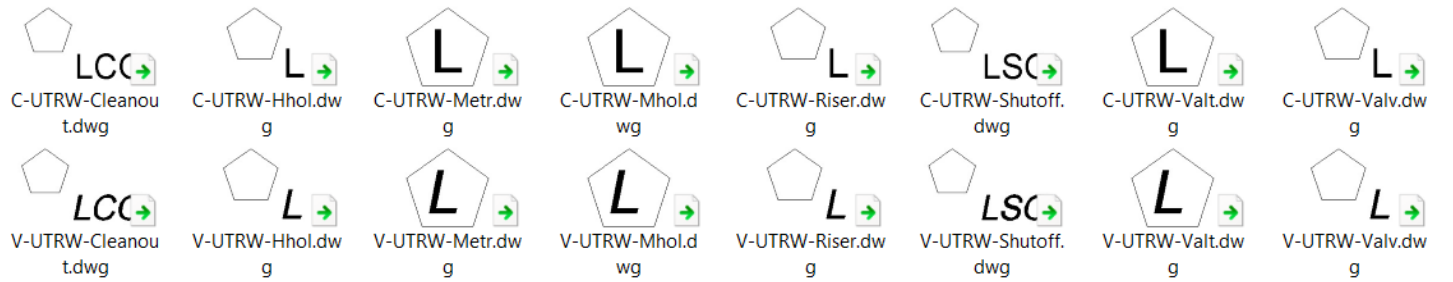
UTRW – Recycle Water



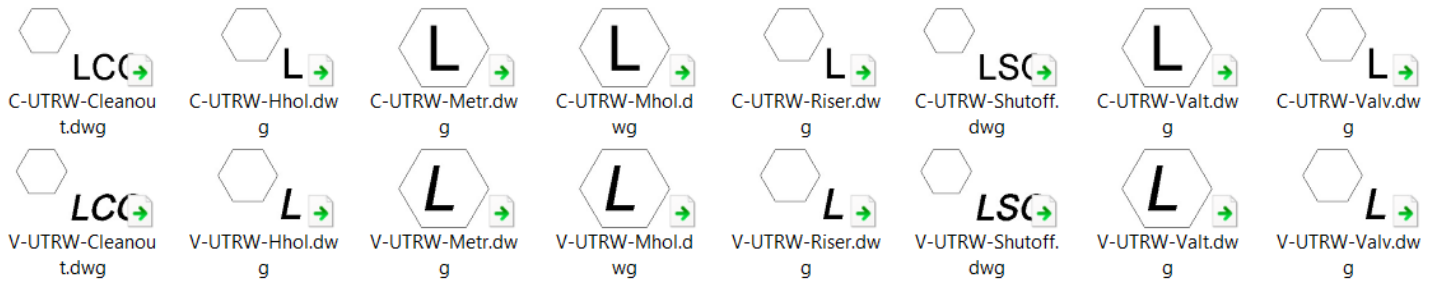
4.11.12.1 UTRW - 30



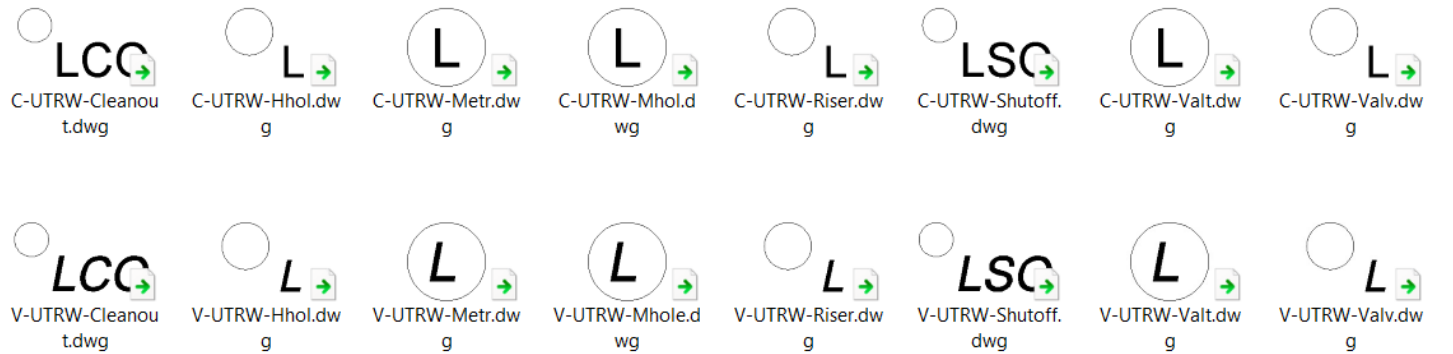
4.11.12.2 UTRW - 50



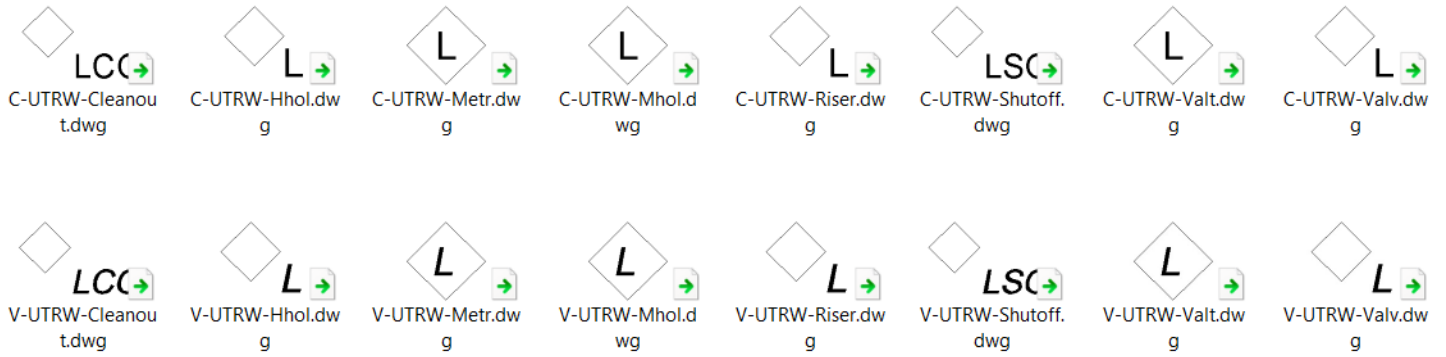
4.11.12.3 UTRW - 60



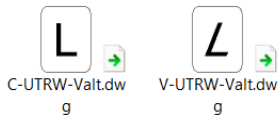
4.11.12.4 UTRW - CO



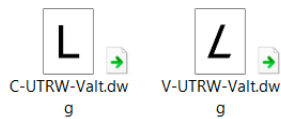
4.11.12.5 UTRW - DO



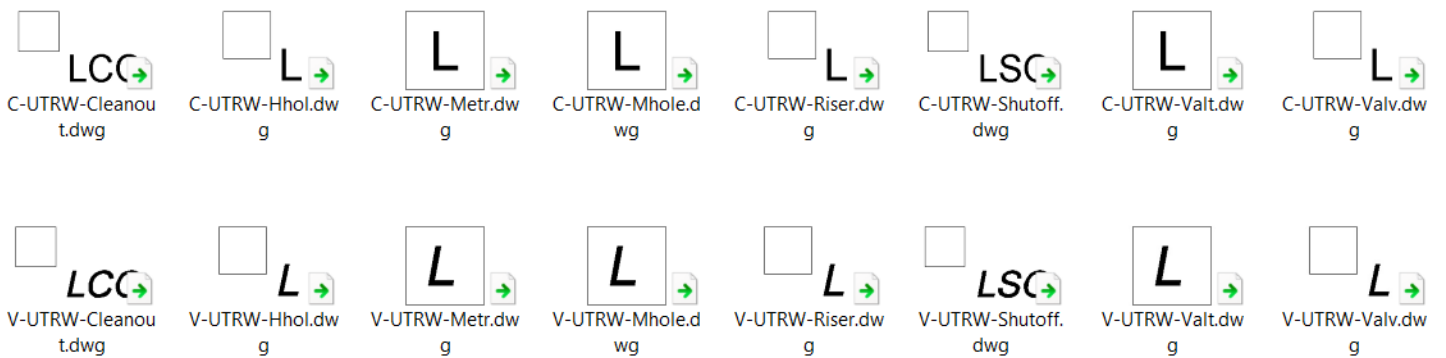
4.11.12.6 UTRW - FOVAULT



4.11.12.7 UTRW - ROVAULT

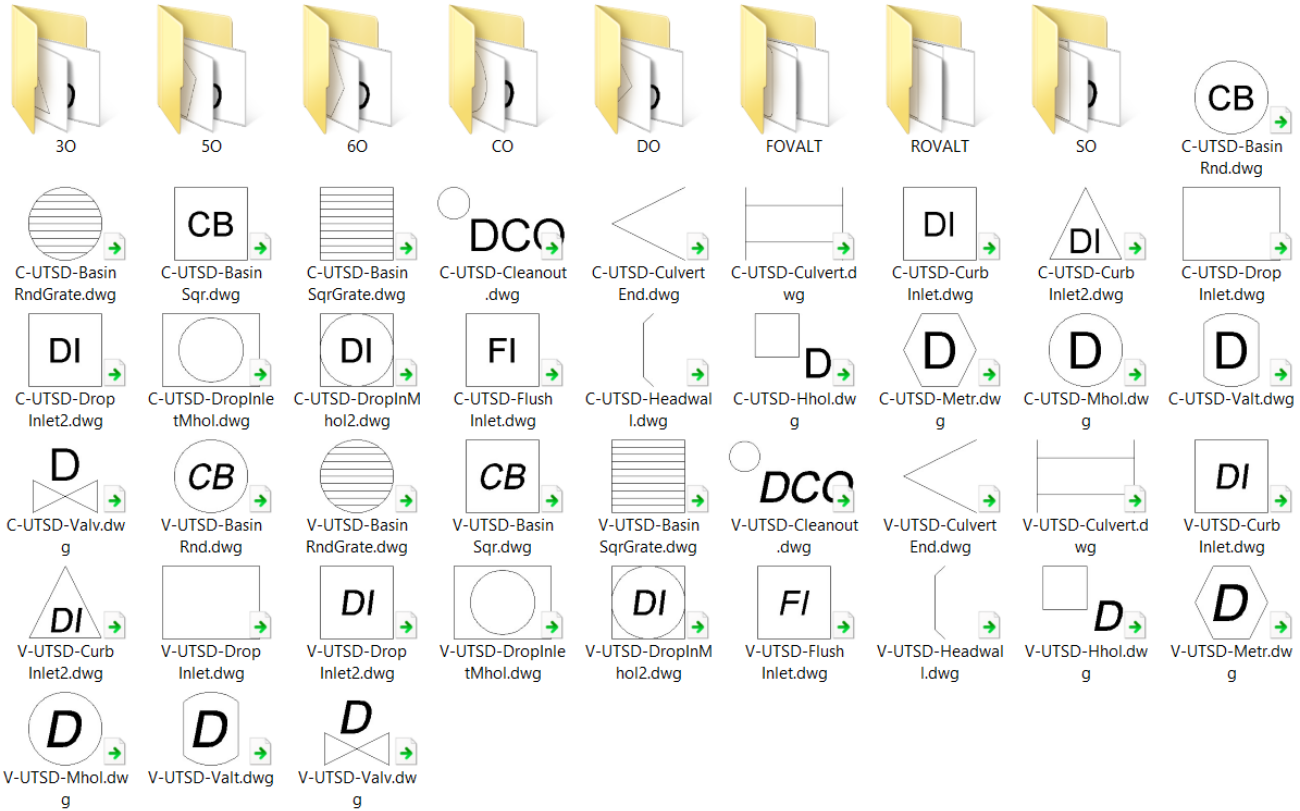


4.11.12.8 UTRW - SO



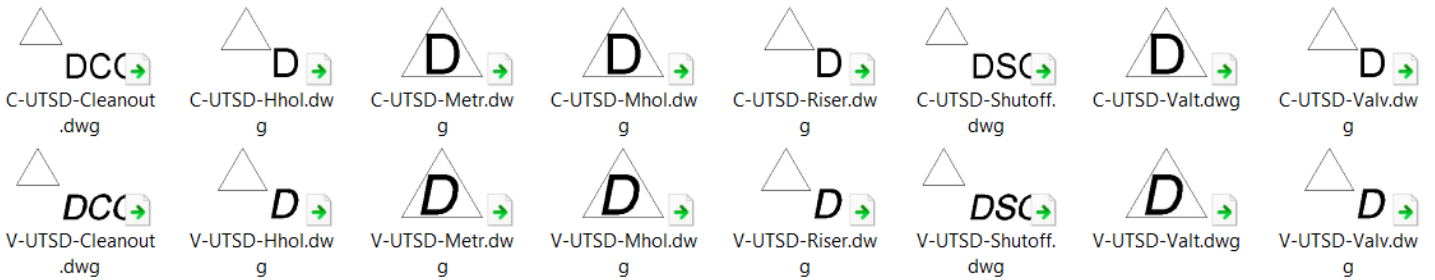
4.11.13

UTSD – Storm Drainage

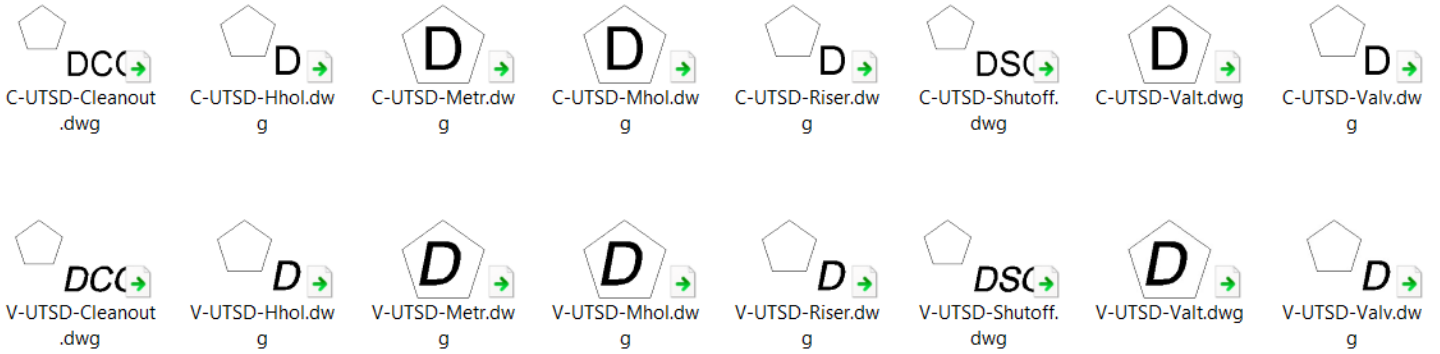


4.11.13.1

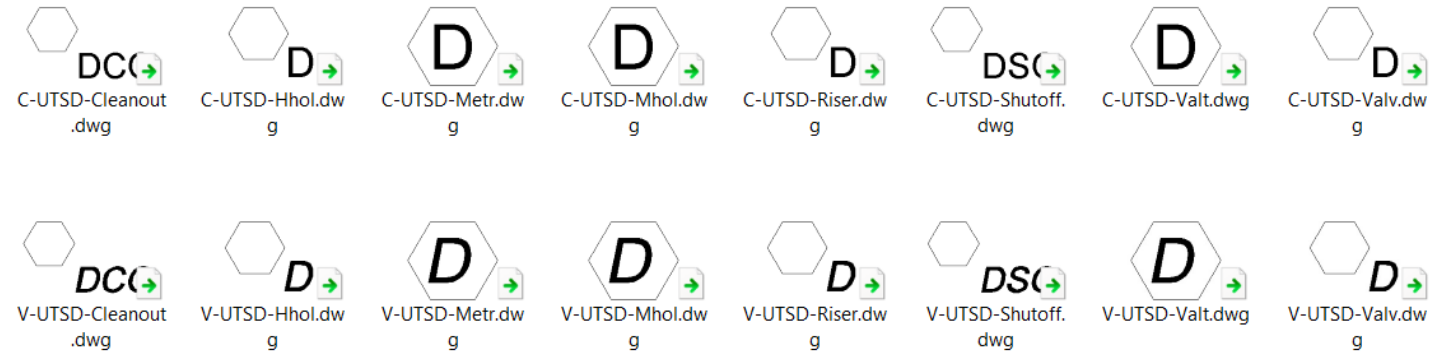
UTSD - 30



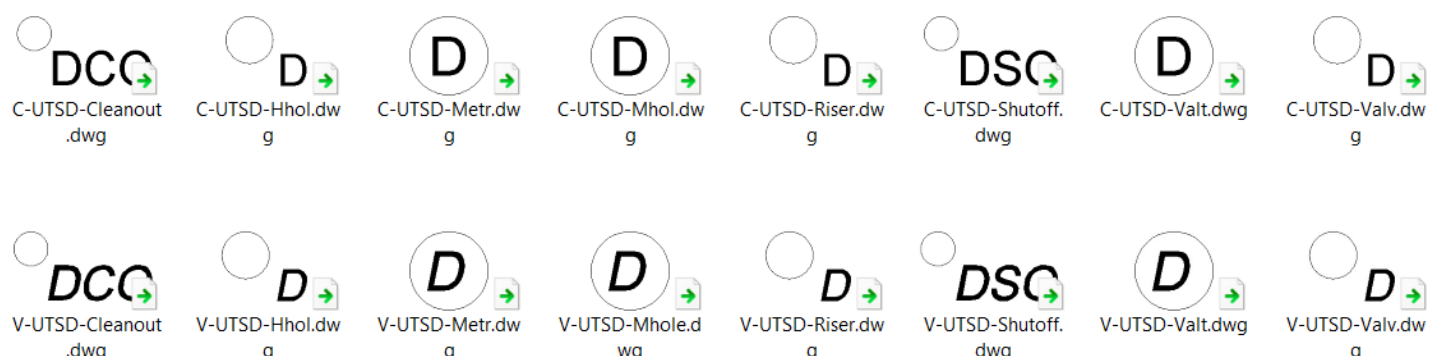
4.11.13.2 UTSD - 50



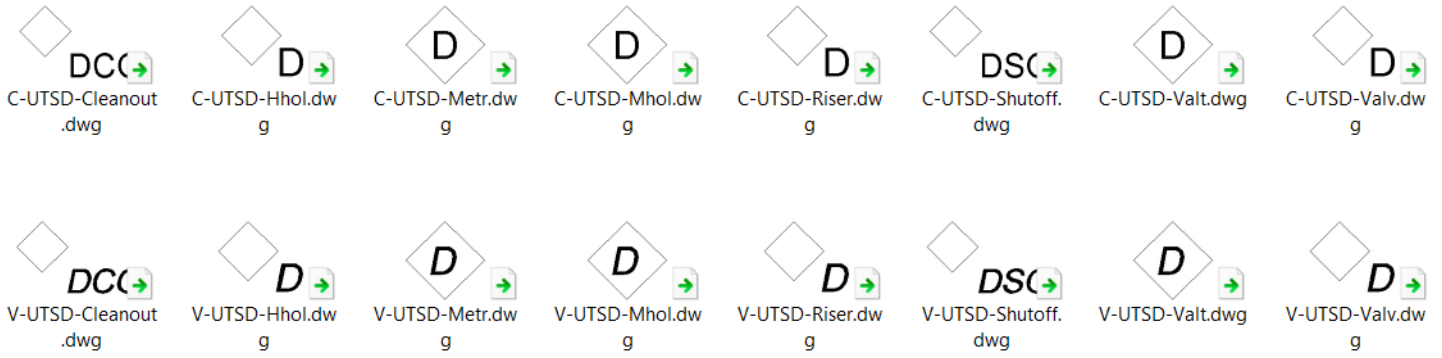
4.11.13.3 UTSD - 60



4.11.13.4 UTSD - CO



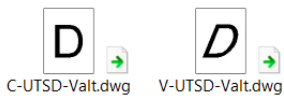
4.11.13.5 UTSD - DO



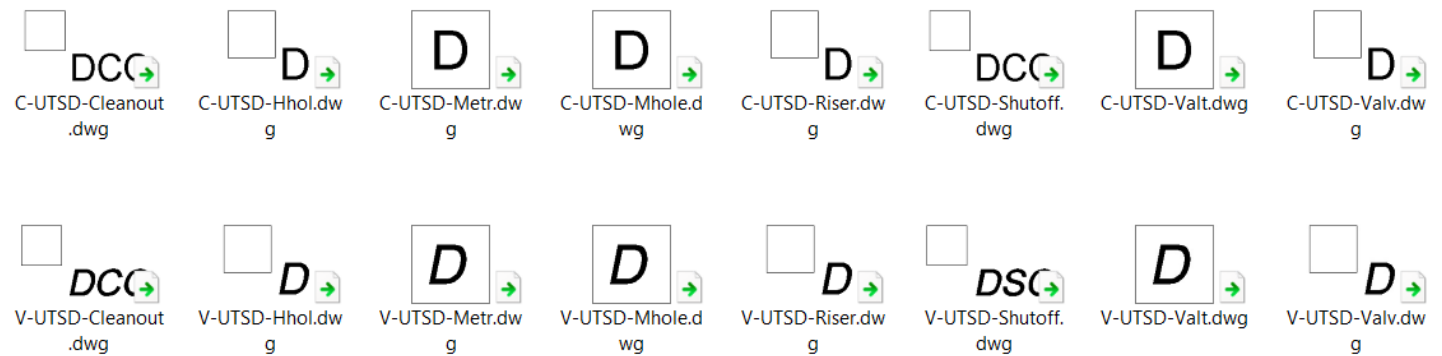
4.11.13.6 UTSD - FOVALT



4.11.13.7 UTSD - ROVALT

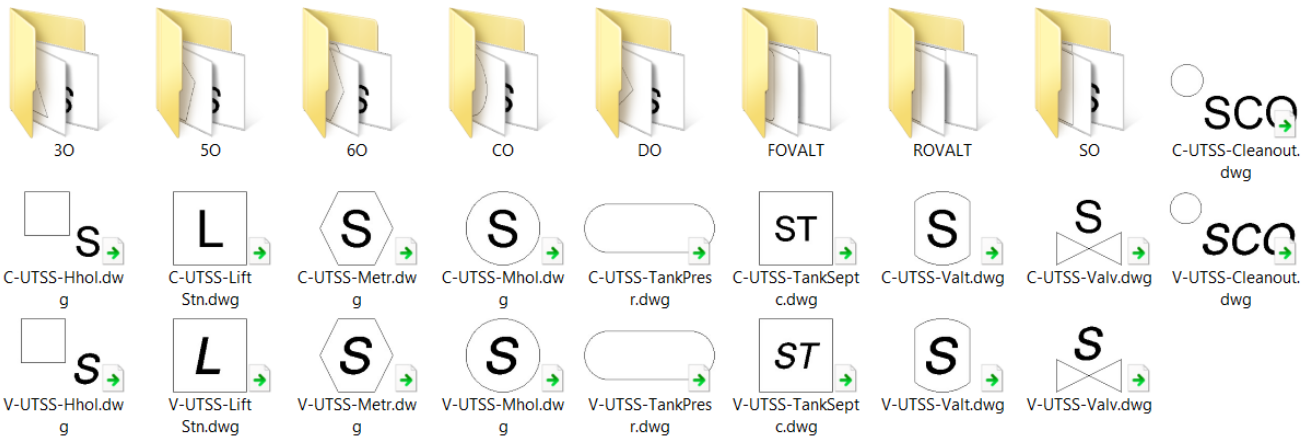


4.11.13.8 UTSD - SO

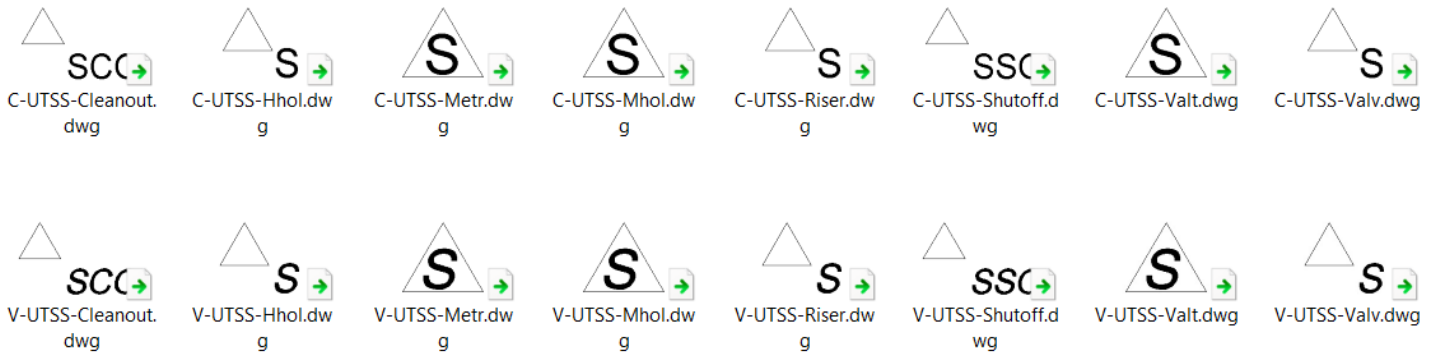


4.11.14

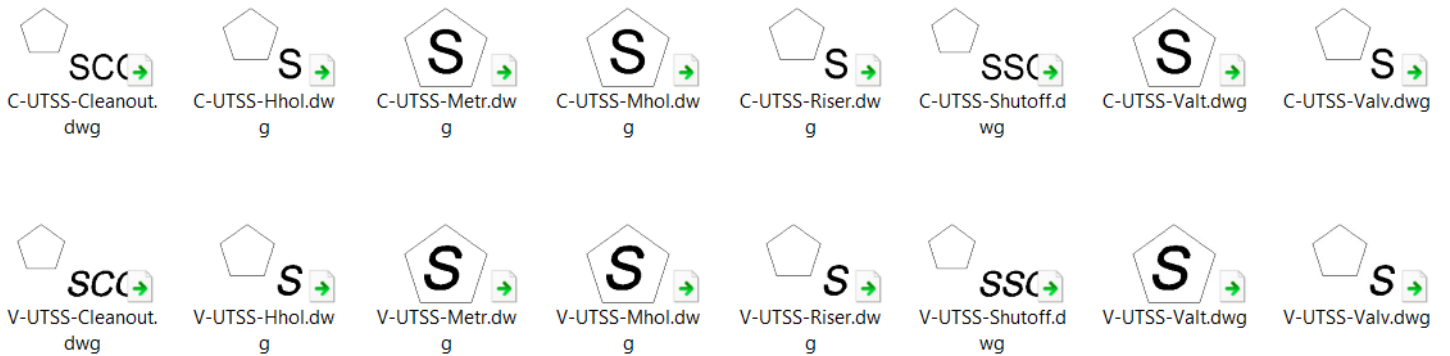
UTSS – Sanitary Sewer



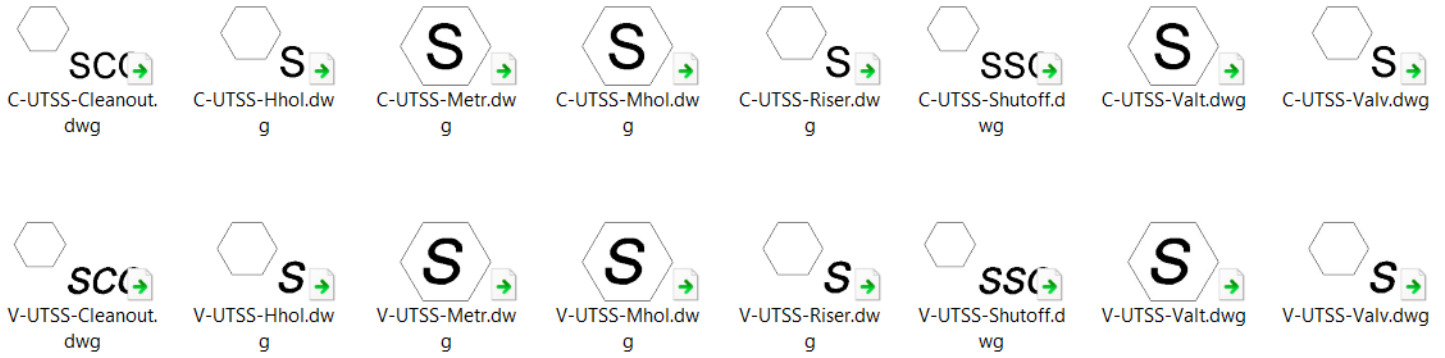
4.11.14.1 UTSS - 30



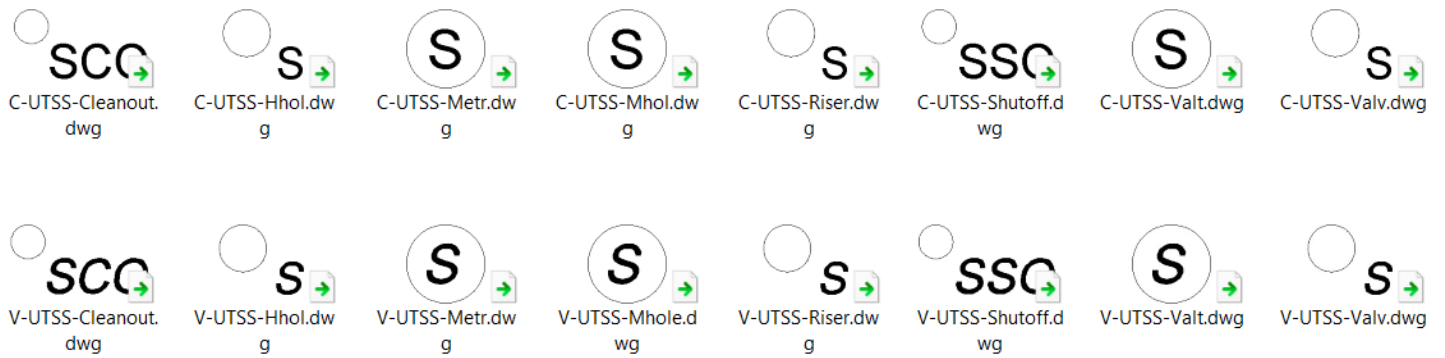
4.11.14.2 UTSS - 50



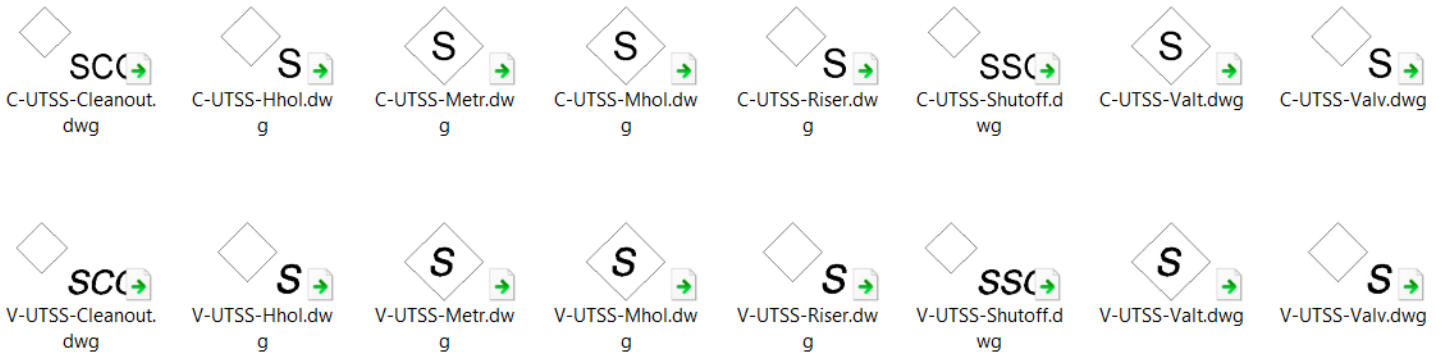
4.11.14.3 UTSS - 60



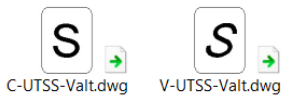
4.11.14.4 UTSS - CO



4.11.14.5 UTSS - DO



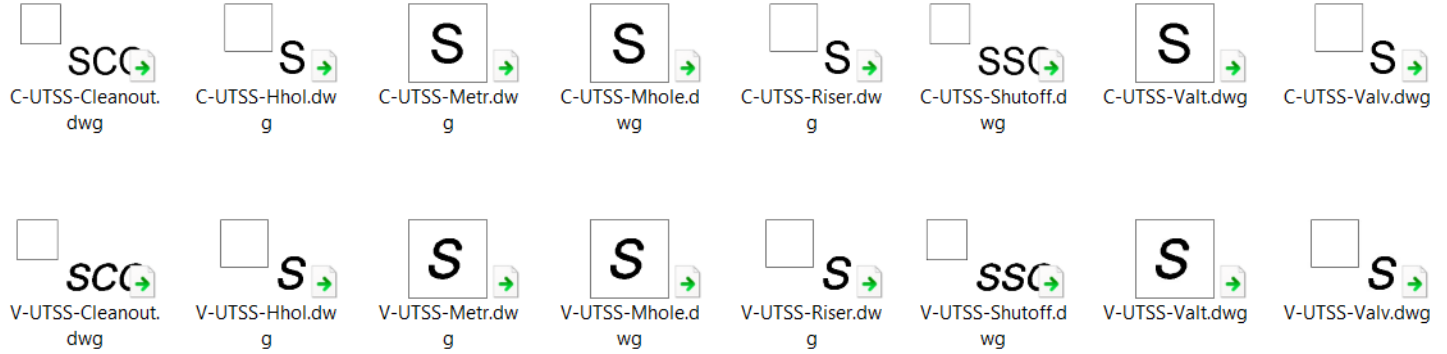
4.11.14.6 UTSS - FOVALT



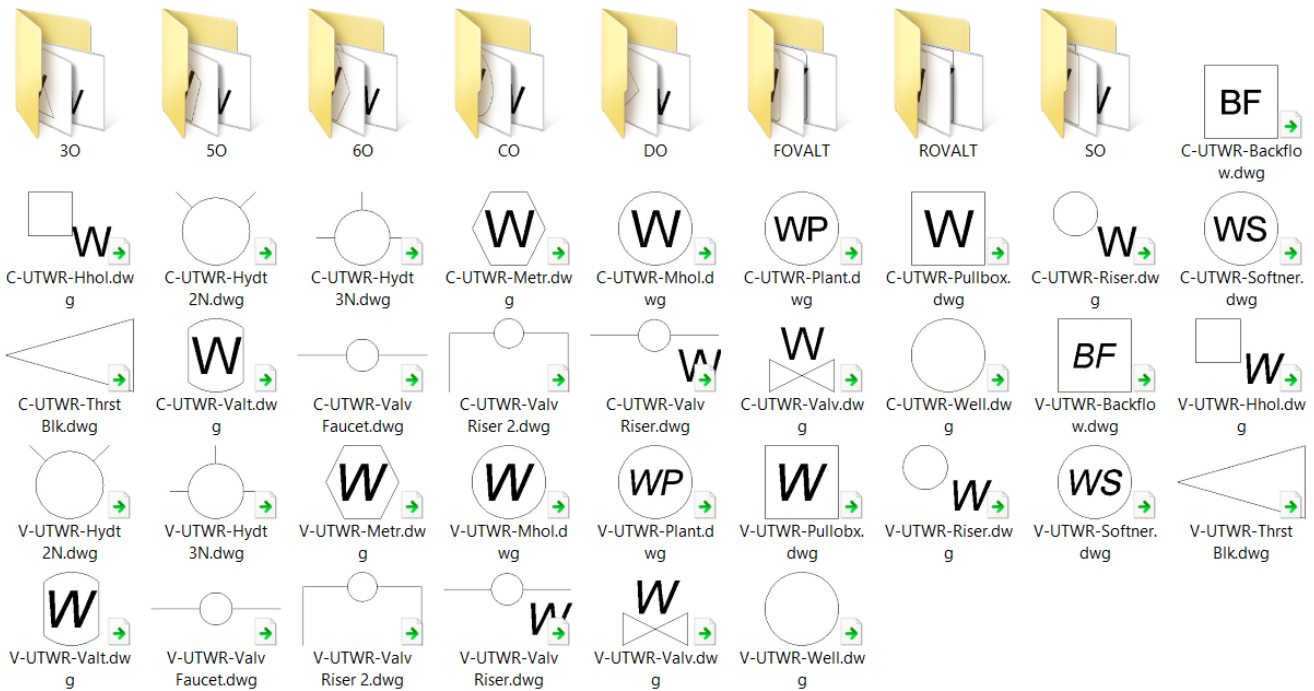
4.11.14.7 UTSS - ROVALT



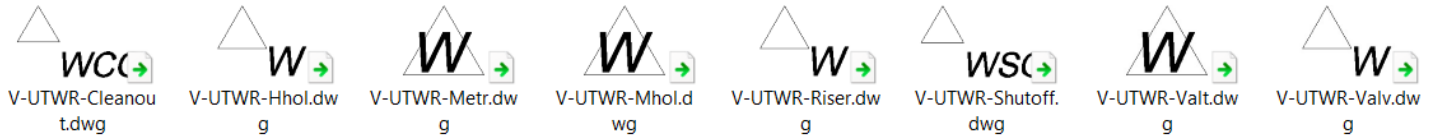
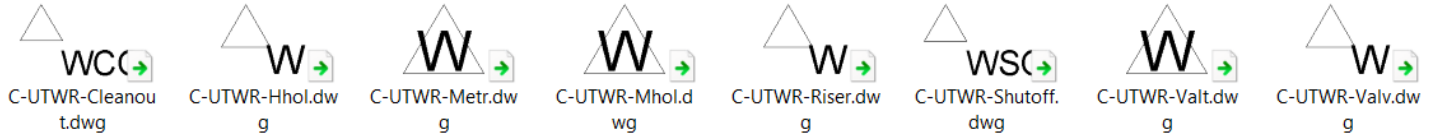
4.11.14.8 UTSS - SO



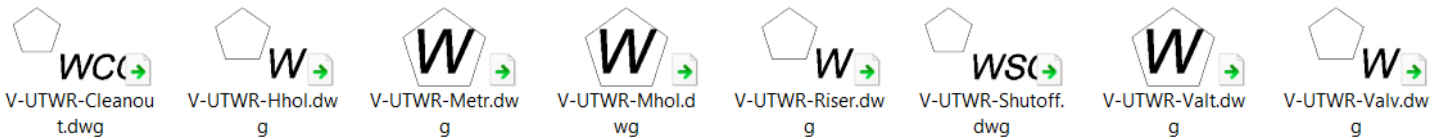
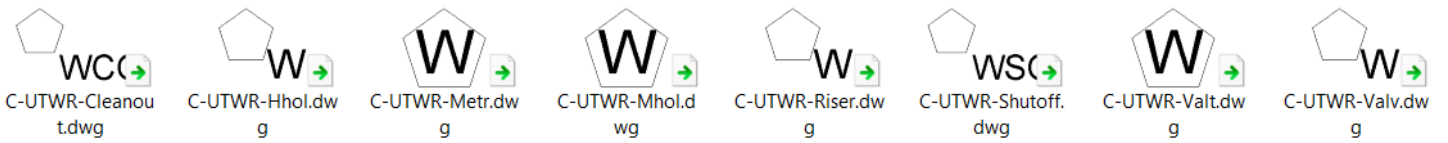
4.11.15 UTWR - Water



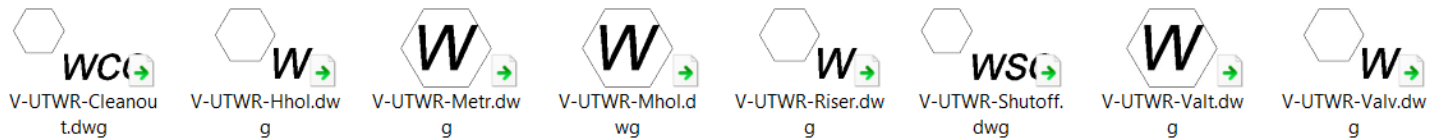
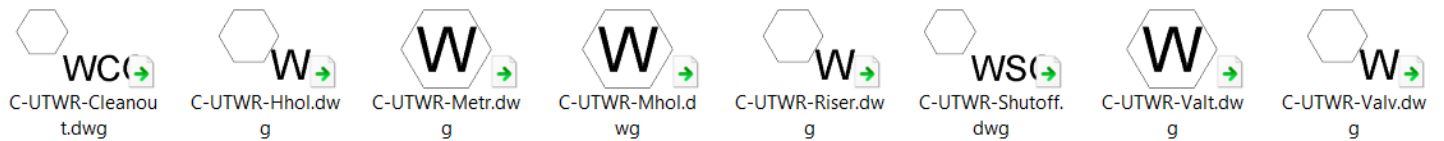
4.11.15.1 UTWR - 30



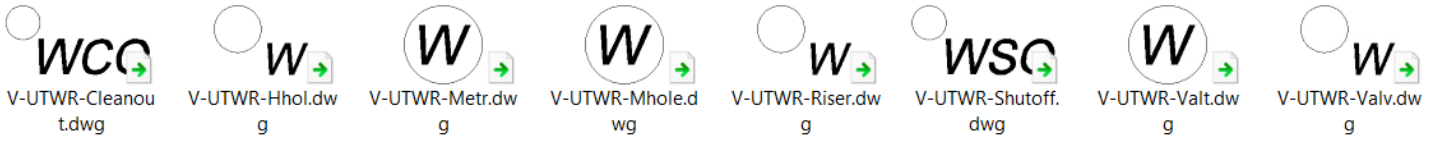
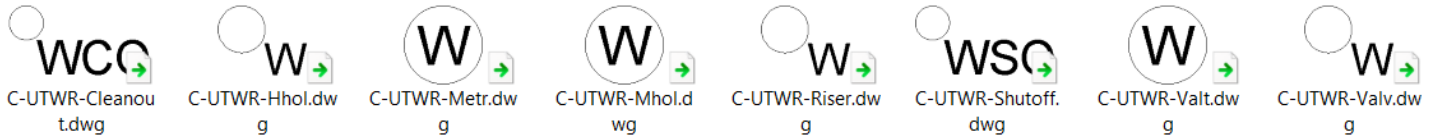
4.11.15.2 UTWR - 50



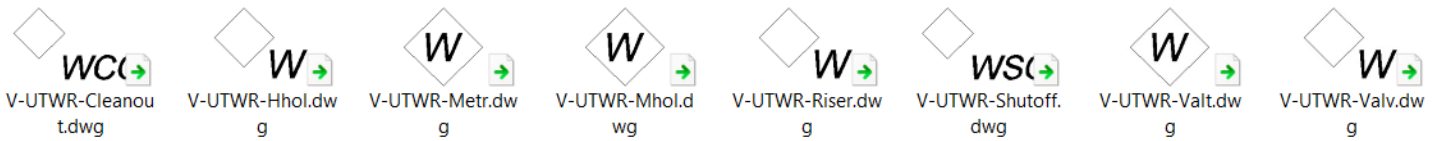
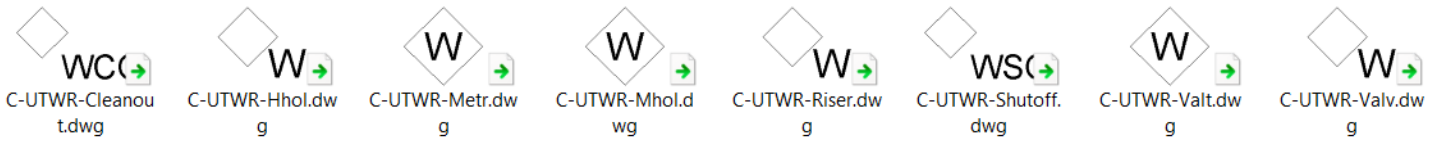
4.11.15.3 UTWR - 60



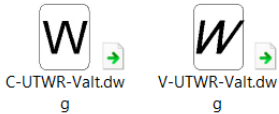
4.11.15.4 UTWR - CO



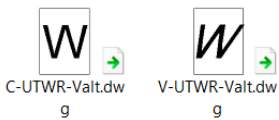
4.11.15.5 UTWR - DO



4.11.15.6 UTWR - FOVALT

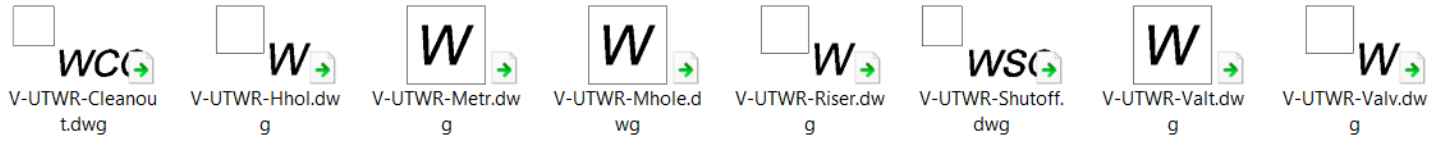
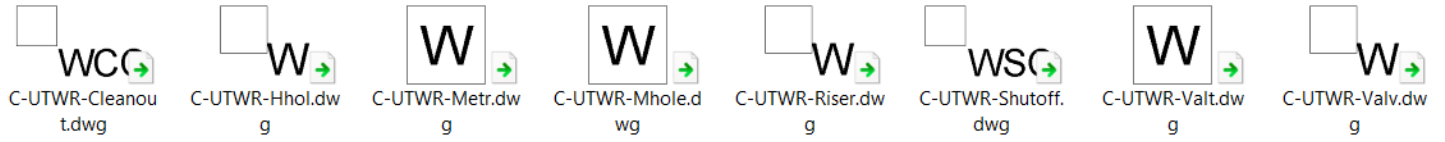


4.11.15.7 UTWR - ROVALT

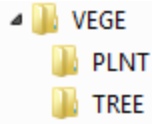


4.11.15.8

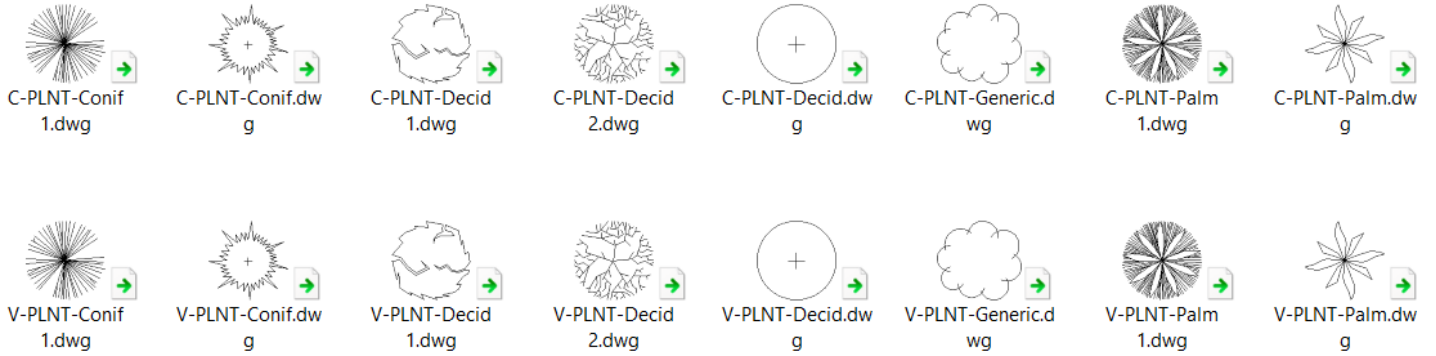
UTWR - SO



4.12 VEGE - Vegetation



4.12.1 PLNT – Plants



4.12.2 TREE – Trees

