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1.0 PURPOSE AND SCOPE
(5.1.2)

This standard establishes Tank Operations Contractor (TOC) requirements, conventions, and practices (standards) for preparing and revising engineering drawings entered into SmartPlant® Foundation (SPF). These standards apply to engineering drawings prepared by and for the TOC that depict facilities, systems, and components. (5.1.1, 5.1.3)

2.0 IMPLEMENTATION

This standard is effective on the date shown in the header.

Deviations to any requirements of this standard shall be requested from the standard document owner. Approved deviations shall be documented in the accompanying standard basis document (e.g., RPP document). A standard basis document shall be established prior to approval of any new deviations.

3.0 STANDARD

3.1 Control of Original CAD Data Sets and Manual Drawings

The TOC Design Engineering (DE) organization manages access to the original computer-aided design (CAD) data sets. DE identifies the custodians who have editing (revision) access to the original data sets.

3.2 Drawing Categories

3.2.1 General

This standard applies to the engineering drawings that represent the technical information for the structures, systems, and components (SSC) required by the TOC. Drawings are identified by the "H-series" or "SK-series" drawing categories. The H-series drawings are for permanent facility SSC and usually include the drawings associated with modification, design, construction, and fabrication activities. The SK-series drawings involve temporary SSC that usually include the drawings for conceptual design, interface control, and equipment with a limited life.
See Attachment A for historical drawing numbering system guidance.

3.2.2 H-Series Drawings

These drawings are permanent records and are subject to as-built requirements once field work is complete. For the assignment of H-series drawing numbers, see TFC-ENG-DESIGN-C-09, Section 4.2. The H-series drawings include several different drawing types, such as arrangement, assembly, detail, schematic, wiring diagram, block diagram, flow diagram, installation, layout, plot plan, piping and instrumentation diagram (P&ID), and altered-item drawings. This list is not all-inclusive, and other types of drawings may be necessary for particular purposes.

3.2.3 SK-Series Drawings

These drawings are prepared as temporary drawings for SSCs that will not become part of the permanent facility. The SK-series drawing numbers are obtained from the Hanford Document Numbering System (HDNS). These drawings are record information and are subject to the same control requirements as H-series drawings. Examples of SK-series drawings:

- Experimental/prototypical equipment
- Limited-use test equipment
- Conceptual designs
- Interface control
- Temporary equipment supporting operations (usually in-service for less than two years).

If the depicted information (i.e., all or part) on an SK-series drawing is determined to be needed as part of the permanent facility SSC, then that information is integrated into the drawing baseline by one of the following methods:

1. Complete Drawing Transfer - Convert the SK-series drawing to a new H-series drawing by obtaining an entirely new drawing number to replace the SK-series drawing number. If the converted SK-series drawing is being added as a new sheet(s) to an existing H-series drawing, then the new drawing sheet number is obtained from SPF. Provide two-way traceability between the newly created H-series drawing and the SK-series drawing. Supersede the SK-series drawing through the drawing change notice (DCN) or Engineering Data Transmittal (EDT) process.

2. Partial Drawing Transfer - Integrate the needed portion of SSC details from the SK-series drawing on to the affected H-series drawing through a drawing revision. Identify the two-way traceability between the affected H-series drawing and the SK-series drawing. Supersede the remaining portion of the SK-series drawing through the DCN or EDT process.

3.2.4 Vendor Drawings

This standard does not specify requirements for vendor drawings required to be submitted as part of a submittal or for a certified vendor information (CVI) file as part of a project. Vendor-supplied drawings that are intended to be released into SPF as an H-series drawing will meet the drawing requirements as specified in this standard. Vendor-supplied drawings that are submitted to the IRM Service Provider for inclusion in a CVI file shall be in accordance with TFC-BSM-IRM_DC-C-07.

An altered-item drawing (see definition in Section 4.0) must be developed for vendor items that require modification as part of a design, or modification to items covered by a vendor item file. See Section 3.21.10.

3.2.5 Vendor Item Control Drawing

NOTE: A vendor item control drawing was formerly called a specification control drawing or vendor item drawing.

3.2.5.1 Description

A vendor item control drawing provides an engineering description and acceptance criteria for commercial items or vendor-developed items that are procurable from a specialized segment of industry. The vendor's part or identifying number (PIN), along with the vendor information (VI) file number, is the item identification. It provides a list of suggested source(s) of supply, the vendor's item identification, and sufficient engineering definition for acceptance of interchangeable items within specified limits. The vendor item control drawing number with suffixed identifier, if applicable, establishes the administrative control number(s) for identifying the item(s) on engineering documentation. See Figure 1.

3.2.5.2 Application Guidelines

A vendor item control drawing is used to provide:

- A means of documenting engineering requirements for a purchased item
- Documentation to ensure interchangeability of items each time purchased
- Coverage of items developed at private expense where the design is controlled by the originating design activity. It is not the intent of a vendor item control drawing to portray a complete design disclosure.

A vendor item control drawing shall not be used to delineate:

- An item requiring qualification in advance of a procurement action
- An altered item, selected item, or an item delineated by a nationally recognized standard. (e.g., the design parameters/specifications for schedule 40 pipe, wire, etc.).

The suggested source(s) listed on a vendor item control drawing, if provided, are not intended to represent the only sources for the item.

3.2.5.3 Requirements

A vendor item control drawing discloses sufficient information to ensure identification and re-procurement of interchangeable items.

The drawing includes, as applicable:

- Configuration, defined pictorially or by description
- Dimensions of the item envelope and applicable limits
- Mounting and mating dimensions and applicable limits

- Interface characteristics and applicable limits
- Acceptance criteria as necessary for product performance verification
- Performance, maintainability, reliability, environmental
- Schematic, interconnection, or other appropriate diagram to define item function or provide interconnection information.

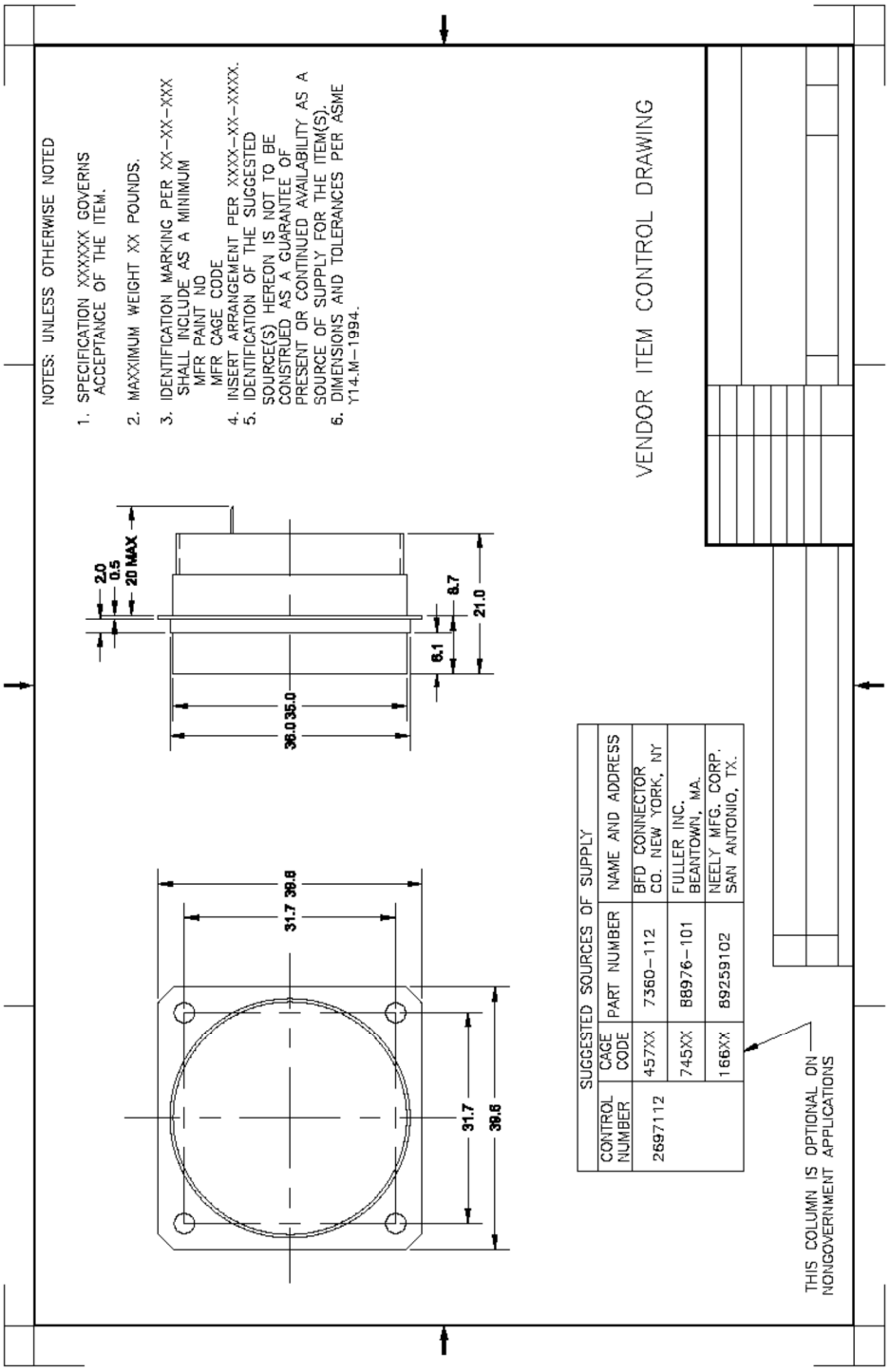
The drawing may include:

- The vendor and item identification listed under the heading SUGGESTED SOURCES OF SUPPLY. Two or more sources are desirable
- The following note:

  "IDENTIFICATION OF THE SUGGESTED OF SUPPLY HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM(S)."

- The notation "VENDOR TEM CONTROL DRAWING" placed adjacent to the drawing title block.

Figure 1. Vendor Item Control Drawing



3.3 Computer-Aided Drafting

3.3.1 CAD Program

The current version of AutoCAD[1] that is approved and supported for Hanford Site use by the IRM contractor is the standard for all engineering drawings that will be released into SPF. Drawings developed on CAD programs other than AutoCAD must be converted to the standard AutoCAD program ".DWG" format prior to releasing the data files to the IRM contractor. Drawings developed on Autodesk programs other than AutoCAD (such as AutoCAD Civil 3D, Inventor, mechanical desktop, REVIT, AutoCAD architecture, AutoCAD P&ID, etc.) must be converted to the standard AutoCAD program ".DWG" format prior to releasing the data files to the IRM contractor. Drawings converted to the ".DWG" format from other CAD programs or other Autodesk programs will meet the drafting and layering requirements as specified in this standard. 3D models used to produce drawings with isometric views must be submitted with the drawings and must be in Autodesk Inventor or Inventor supported format. All drawings submitted for release into SPF must be editable using generic "out of the box" AutoCAD. Final plots will be generated by SPF from the ".DWG" formatted file.

3.3.2 AutoCAD Discipline Layering Standards

Uniform layering standards are established to make it easier to exchange AutoCAD data sets among organizations and companies. Consistency allows logical separation and identification of drawing data, and permits the user to view and plot related aspects of a drawing separately or in combination.

3.3.2.1 Layering

Designating layers by color and line type is the required standard. This section and Attachment B describe the standards to be used when assigning layers.

Drawing setup files (also identified in AutoCAD documentation as "template drawings") establish specific discipline layers for routine use. Attachment B, Tables B-1 through B-10, covers the following:

- Table B-1, General Layering for All Disciplines
- Table B-2, Architectural Drawings
- Table B-3, Structural Drawings
- Table B-4, Civil Drawings
- Table B-5, Electrical Drawings
- Table B-6, Fire Protection Drawings
- Table B-7, HVAC Drawings
- Table B-8, Instrumentation & Control (I&C) Drawings
- Table B-9, Mechanical Drawings
- Table B-10, Piping Drawings.

For mapping and mapping related drawings, use the computer automated mapping and information system (MAPMAX) layering standards.

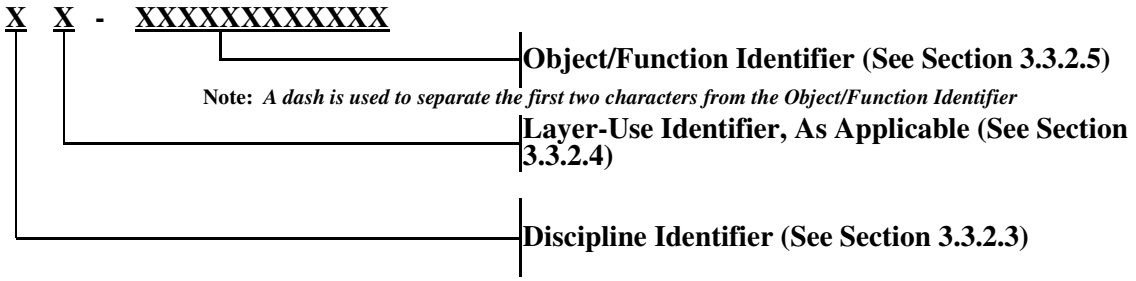
1 Registered trademark of Autodesk.

Third-party software approved for use by the TOC, with built-in layering standards, is exempt from this layering standard requirement. However, to support third-party software, a special plotter configuration may be required.

3.3.2.2 Layer Naming Standard

Figure 2 shows the layer-naming standard that is to be used on AutoCAD-developed drawings.

Figure 2. Layer Naming Standard.



3.3.2.3 Discipline Identifier

This identifier defines the specific engineering discipline. A unique identifier enables users to quickly distinguish discipline layers within a drawing file and provides a logical separation of discipline information, as defined by Figure 3 (also see Figure 2).

Figure 3. Discipline Identifiers.

Identifier	Discipline	Identifier	Discipline
A	Architectural	H	HVAC
C	Civil	I	Control Systems
E	Electrical	M	Mechanical/Machine
F	Fire Protection	P	Piping
G	General (non-specific applications)	S	Structural

3.3.2.4 Layer-Use Identifier

The layer-use identifier designates what the layer depicts (e.g., primary objects, existing equipment, hidden objects, or text). The layer-use identifier is used only when a single line type and color is assigned to an individual layer as defined by Figure 4 (also see Figure 2). Normally, this identifier is not used for entity-based layers.

Figure 4. Layer-Use Identifiers.

Identifier	Layer-Use	Line Type
O	New or main object, visible lines, primary line work	Continuous
E	Existing equipment - Use to depict existing facility/equipment	Phantom
F	Future items - Use to depict future items	Dashed
D	Demolition - Use to depict demolition information	Dashed
T	Text	Continuous
M	Dimensioning	Continuous
C	Center Lines	Center
H	Hidden items/lines	Hidden
X	Hatching	Continuous
P	Mechanical details depicting repeated details (e.g., spring and screw thread details or alternate positioning of absent parts)	Phantom
R	Reused equipment – Use to depict reused facility/equipment	Continuous
V	Viewing and cutting planes	Varies

NOTE: Selecting the Polyline feature will limit the minimum polyline width to the plotter line width that is established by the line color.

Certain conditions may make it desirable to link layer data together but still keep the data separate. For example, if a piping modification required new equipment to be installed after the old equipment is removed, the layer-use identifier could be used to separate data as follows:

- Add auxiliary details, as needed. Example: 3DET
- PE-PIPING - Existing piping
- PD-PIPING - Piping to be removed (demolition)
- PO-PIPING - New piping to be installed
- PF-PIPING - Piping to be considered for future installation.

3.3.2.5 Object/Function Identifier

The object/function identifier provides a semi-descriptive name of layer contents or function. The identifier may be as many as 28 characters in length and may contain letters, numbers, and special characters, such as $ (dollar), - (hyphen), and _ (underscore). (See Figure 2 and Attachment B, Tables B-1 through B-10.)

When words used in the object/function identifier are abbreviated, use of the latest edition of American Society of Mechanical Engineers (ASME) Y14.38, “Abbreviations and Acronyms,” is the preferred standard.

3.3.2.6 Plotter Pen Assignments

Plotters are configured to produce line widths based on colors. Designating specific AutoCAD colors to the plotter pens does this. This allows specific line weights to be generated by the plotter. The use of polylines for new TOC drawings is permitted on an individual line basis when required to graphically represent an item not possible by using plotter pen assignments.

Care should be taken to ensure that the selected color/line weight will produce the desired line width on the final drawing plot. The line type and color should provide the optimum contrast with the visible/object line width on the drawing. See Figure 5 for available plotter line widths.

3.3.2.7 New-Drawing Setup Files

New-drawing setup files, also identified in AutoCAD documentation as Template drawings, are pre-configured by means of this layering convention. (See Attachment B, Tables B-1 through B-10.)

The startup files are not all-inclusive of required layers. Additional layers may be created, as needed, to provide for specific drawing needs. In addition, layers that are included in the template drawing that are not used may be purged from the drawing. The specified naming standard described here is to be used to develop additional layers.

Figure 5. Plotter Pen Assignments.

Pen No. 1 **Full Size** **.25mm (0.010in.)** **B Size** **.10mm (.004in.)**	**Pen No. 2** **Full Size** **.35mm (0.014in.)** **B Size** **.15mm (.006in.)**	**Pen No. 3** **Full Size** **.50mm (0.020in.)** **B Size** **.20mm (.009in.)**	**Pen No. 4** **Full Size** **.70mm (0.028in.)** **B Size** **.30mm (.012in.)**	**Pen No. 5** **Full Size** **.90mm (0.035in.)** **B Size** **.40mm (.016in.)**
Color Assignment	Color Assignment	Color Assignment	Color Assignment	Color Assignment
Primary Color	Primary Colors	Primary Color	Primary Colors	Primary Color
8 (8)	5 (Blue) 6 (Magenta) 7 (White)	4 (Cyan)	2 (Yellow) 3 (Green)	1 (Red)
Optional Colors	Optional Colors	Optional Colors	Optional Colors	Optional Colors
X3 (e.g., 13, 53, 123, 243)	X2 (e.g., 12, 22, 32, 152, 222) 252-75% screen	X1 (e.g., 11, 71, 181, 241)	X0 (e.g., 10, 90, 100, 230) X5, X6, X7, X8, X9	X4 (e.g., 14, 64, 134, 214)

3.3.2.8 Layering Modification

Anyone may request additions or revisions to the Hanford Site discipline-layering standard. A request for changes must be submitted to the DE in writing. The request must provide justification and specific changes.

3.3.3 X-Reference Files

Prior to submitting files to the IRM Service Provider, all X-Reference (see definition in Section 4.0) files used in the creation of the drawing must be bonded or inserted into the AutoCAD ".DWG" drawing file.

3.3.4 Manual Modification or Revision of CAD-Generated Drawings

When a drawing is released, the CAD data set must reflect the released drawing. If a CAD-generated plotted drawing is changed (e.g., field of the drawing is changed) before it is issued, then the CAD data set must be updated to reflect the changes before issuing the drawing to the IRM contractor for release.

Manual changes to CAD drawings are not allowed.

3.3.5 Non-Generic CAD Software

Non-generic software or Autodesk software used in the development of AutoCAD-based drawings must be the type that does not require access to the third-party or Autodesk software to revise the drawings.

3.3.6 Shape Files and Non-Standard Fonts

Data sets of released engineering drawings are not to use nonstandard shape files and fonts (i.e., font files not supplied by AutoCAD) (see Section 3.14.2).

3.3.7 CAD Auxiliary Support Files/Information

Auxiliary support files/information is available on request from DE. The available files and information include:

- Drawing start models (AutoCAD template drawings)
- Drawing Title block formats
- Symbol libraries (see Section 3.16) (e.g., architectural, electrical, control systems; heating, ventilation, and air conditioning [HVAC]; and P&ID).

3.4 Drawing Sizes

Drawings are sized in accordance with ASME Y14.1, "Decimal Inch Drawing Sheet Size and Format."

The ASME "F" size drawing (28" x 40") is the preferred inch size for all drawings except for panel schedules. The ASME "B" size drawing (11" x 17") is the required size for panel schedules. Use of the International Standards Organization (ISO) standard paper sizes is optional. The ISO "A1" size drawing (594 mm x 841 mm) is the preferred metric size. The ANSI "E" size, ISO "A0" size, and roll or elongated size drawings may be used with the authorization of TOC DE.

3.5 Drawing Material

CAD drawings are plotted on bond paper that is a minimum of 20 lb opaque paper.

3.6 Drawing Arrangement

The general drawing arrangement must conform to ASME Y14.1, except for the location of the parts/materials list and the REVISIONS block and as modified by this standard (see Figure 6). Configure drawing arrangement for "F" size drawings as shown in Figure 6 and as defined in this standard. Configure drawings arrangement for panel schedules "B" size drawings as shown in Figure 7 and as defined in this standard.

3.7 Title Block

Standard, discipline specific, AutoCAD start models developed for TOC drawings must be used (e.g., AutoCAD template drawings). The start models are available from DE. The "PLOT ID" information in the start model is added when the drawing is plotted as final from SPF.

3.7.1 Title Block Configuration

The Title block must conform to ASME Y14.1, except as defined by this standard. Additional spaces in the Title block have been reserved for unique items. A complete Title block, as shown in Figure 8, is required for each drawing sheet.

3.7.2 Company Name

The acronym of the contractor for each identified name is placed in the block next to the name and date (see Figure 8). For Architect Engineering (A-E) contract drawings, the name of the firm may be placed above the Title block.

3.7.3 Drawing Title

The title must clearly identify the subject matter.

For Example:
Line 1: PIPING
Line 2: SY TANK FARM EXHAUSTER
Line 3: DRAIN SYSTEM SEAL POT

- The title does not include capital project numbers, building numbers (e.g., W-120) or tank farm numbers.
- The area number is used only for area-wide presentations.
- The total number of characters, including spaces, cannot exceed 60.
- Height of the lettering in the title shall be 0.24" for ISO A1 and ASME D and F size drawings. Height of the lettering in the title shall be 0.15" for B size drawings. Minimum height of lettering 0.12" for all other drawings.

Figure 6. Block Locations and Drawing Arrangement for "F" Size Drawings.

All new "F" size drawings being released into SPF for the first time shall use the border, Title block, and format shown below. All existing "F" size drawings that are being revised and reissued to the next revision number shall have their border and title block replaced with the current ORP format shown below if not already done. The CADFILE and CADCODE shown on older title blocks is obsolete information and is no longer required on any CAD drawings.

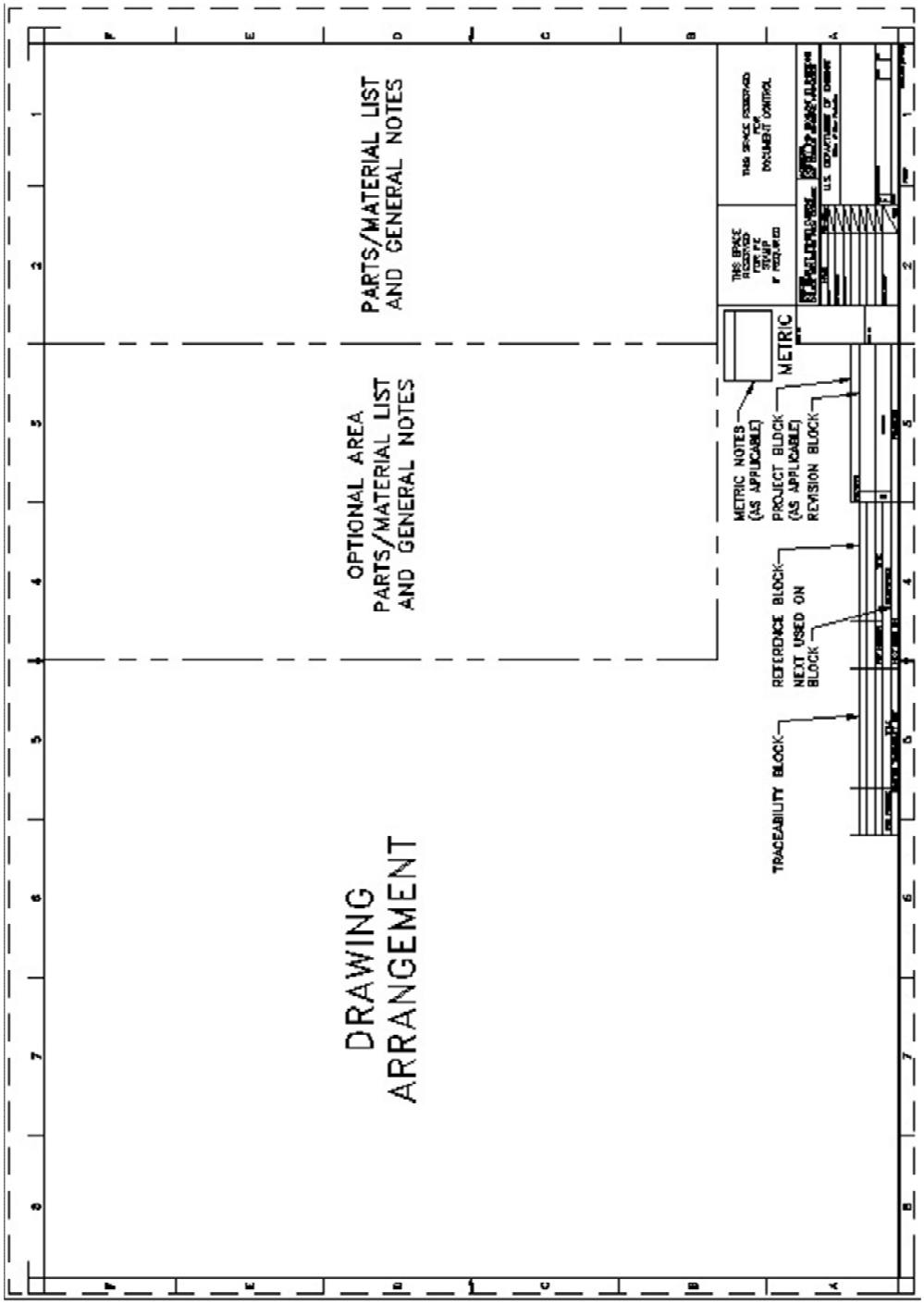


Figure 7. Block Locations and Drawing Arrangements for "B" Size Panel Schedule Drawings.

All new "B" size panel schedule drawings being released into SPF for the first time shall use the border, Title block, and format shown below. All existing "B" size panel schedule drawings that are being revised and reissued to the next revision number shall have their border and title block replaced with the current ORP format shown below if not already done.

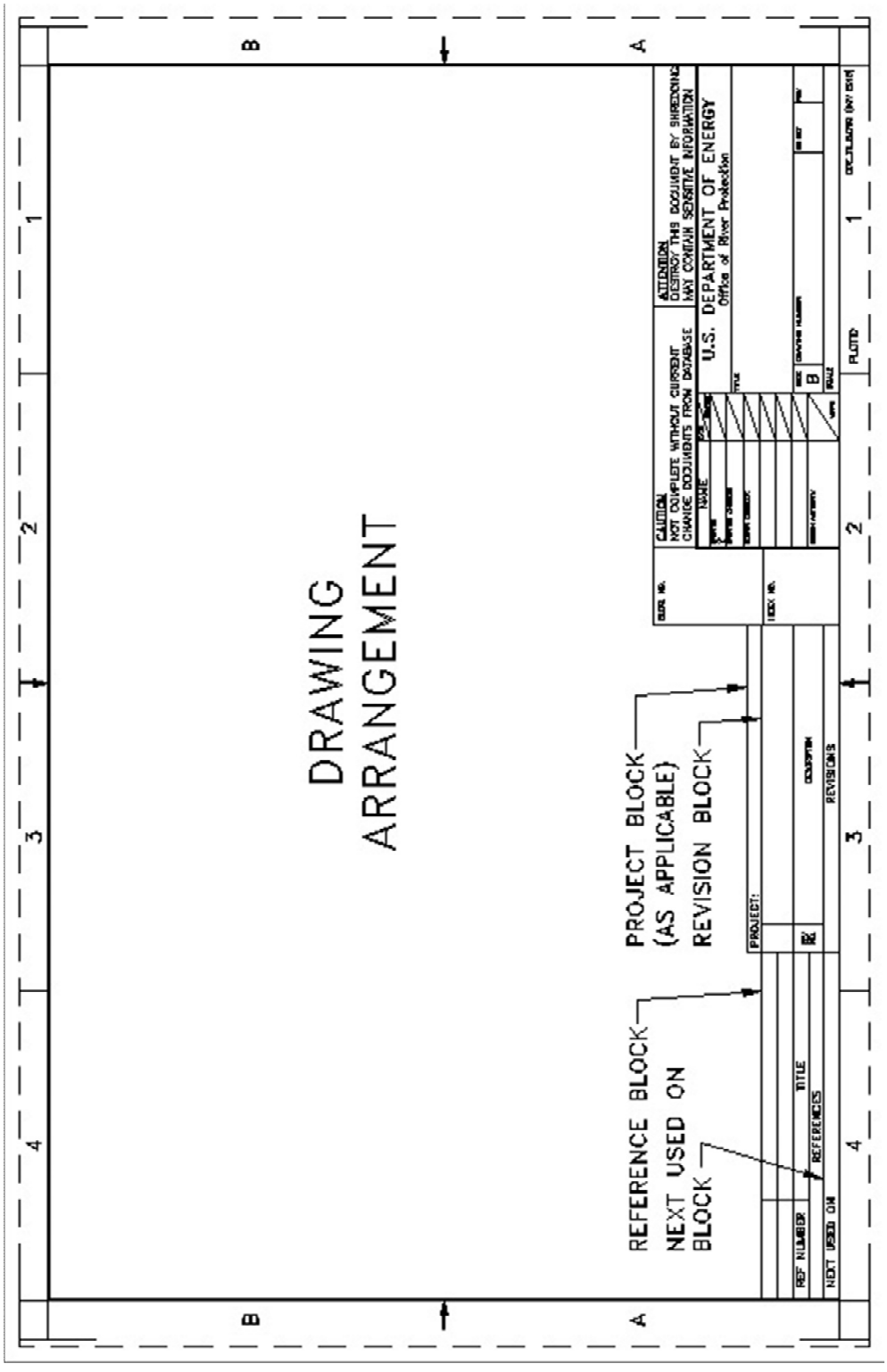
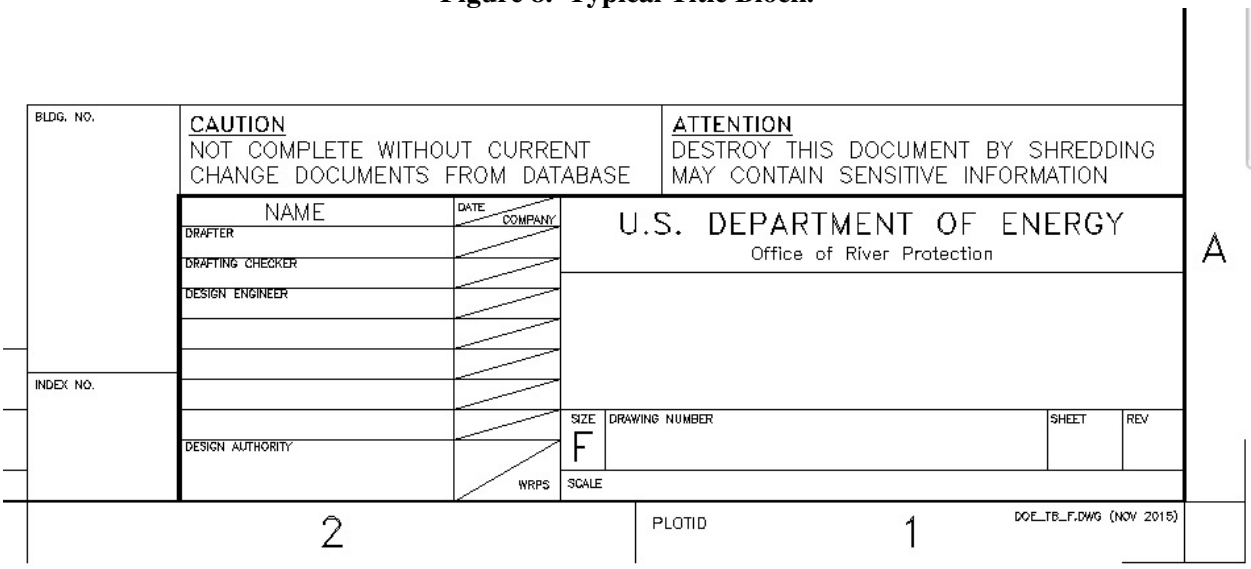


Figure 8. Typical Title Block.

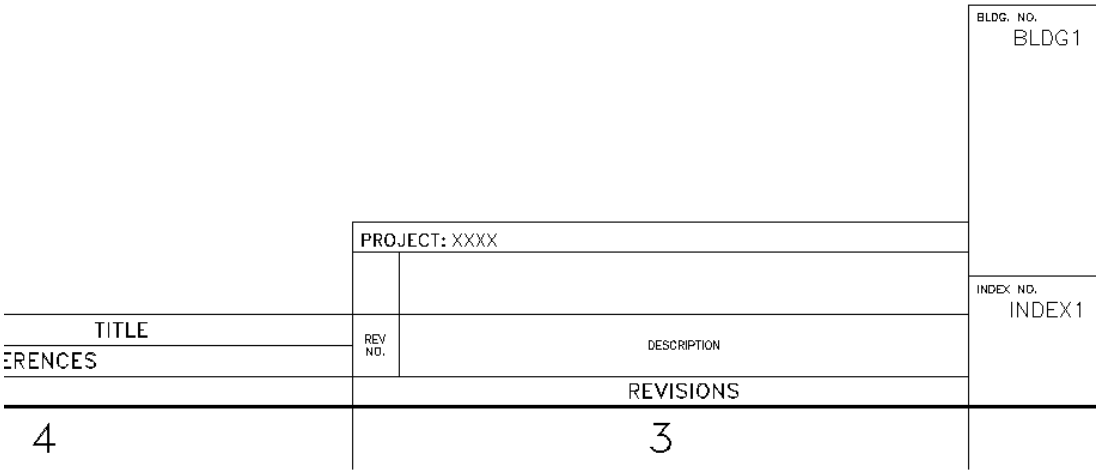


- Titles are arranged in one, two, or three lines centered in the block. On drawings with multiple sheets, the first line of the title shall be the same on all sheets. The second and third lines may differ to describe the contents of each sheet.

- Data fields to be filled in on the Title block within AutoCAD are: "SCALE;" "NEXT USED ON;" and "REVISION DESCRIPTION." The remaining data fields, "DRAWING NUMBER," "SHEET," "REV," "DRAWING TITLE," "APPROVERS" (titles, names and dates), "BLDG. NO.," and "INDEX NO" are filled in by Smartplant with metadata entered into Smartplant. The Drawing Traceability List and References are not data fields and are placed on the drawing within AutoCAD.

- For capital projects, the project number and project title may be entered in a supplemental block above the REV block (see Figure 9).

Figure 9. Title Block with Supplemental Block for Project Identification.



3.7.4 Building Number

The building or area number is identified in the Title block.

Off-site A-Es obtain building numbers from the specified TOC project/task contact.

3.7.5 Index Number

The Drawing Index System uses numerical digits to categorize TOC drawings for storage and retrieval purposes. An index number is required on each drawing. The number is shown in the INDEX NO block of each drawing.

Index numbers are listed in Attachment C, "Index Number System for Engineering Drawings, Alphabetic Listing," and Attachment D, "Index Number System for Engineering Drawings, Numeric Listing." An index number is assigned for each major category covered by the drawing. Non-essential numbers are not shown (e.g., 0801 and 0802 are not shown along with 0800 on a single drawing).

Offsite A-Es obtain index numbers from the designated TOC point of contact.

3.7.5.1 Index System

The complete index number comprises four or six numerical digits. The first two digits identify the primary subject (i.e., 00 to 99). The next two digits identify the subcategory or secondary information (i.e., 01 to 99). The last two digits cover a further breakdown, if needed, of the information or tertiary subject (i.e., 01 to 99). An index number will have a minimum of four digits (e.g., 0804, Architectural Equipment Locations), or if the subject requires a further breakdown, the index number may require six digits (e.g., 590315, Control Systems, Wiring Diagrams, Safety Circuits).

3.7.5.2 Primary Subjects

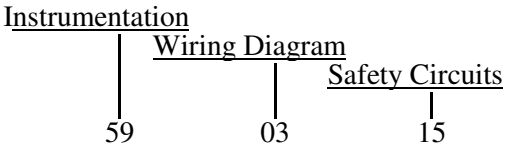
Index Number	Subject
00	- Listing or Index
01 through 07	- Civil
08 through 14	- Architectural and Structural
15 through 58	- Mechanical
59 through 64	- Instrumentation
65	- Electronics
70	- Flow Diagrams
71 through 81	- Electrical
82	- Insulation and Heat Tracing
83	- Future
84 through 88	- Piping
89	- Heating, Ventilating, and Exhaust
90	- Air Conditioning Systems
91 through 98	- Future
99	- Miscellaneous Equipment not Identifiable or Related to Assembled Equipment

3.7.5.3 Secondary Subjects

The primary subjects are divided further into details or secondary subjects (e.g., 0804, Architectural Equipment Locations, or 7005, Piping and Instrument Diagram Closed Loop System [CLS]. The 04 and 05 digits are added to denote the details).

3.7.5.4 Tertiary Subjects

The tertiary subjects, containing two digits, are used only in conjunction with the primary subjects and secondary subjects, 49, 50, 59, 60, and 85, to indicate the type of drawing. The complete six-digit index number for a drawing showing a wiring diagram for safety circuits would be:



The number is written as 590315.

3.7.5.5 Multiple Index Numbers

In some instances, a drawing may contain two or more index categories (e.g., Cranes [3900] and Electrical Power Plans [7301]). In this instance, place both index numbers in the Title block.

3.7.6 Drawing Number

The drawing number for F size drawings shall be 0.24" high and shall be 0.15" high for B size drawings. For assignment of H-series numbers, see TFC-ENG-DESIGN-C-09, Section 4.2. The drawing prefix series and the representative areas are listed in Figure 10.

For historical drawing number information, see also Attachment A, "Guide for Historical Drawing Numbers."

3.7.7 Revision Number

Numeric revision numbers are used. The current revision number is noted in the Title block and the REV block (see Figures 8 and 17). Zero is normally used for the initial release; also see Section 3.24.3.

3.7.8 Scale

When the entire drawing is to the same scale, either enter that scale in this block or enter the word SHOWN. When there are multiple scales shown on an individual drawing sheet, enter the word "SHOWN" in this block. Enter the word "NONE" where there is no scale or a scale is not applicable.

3.7.9 Sheet Number

For single sheet drawings, a "1" is entered in the SHEET block. For multiple-sheet drawings, the sheets are in sequence starting with 1. The total number of sheets is no longer required on any drawing sheet. For multiple-sheet drawings, the drawings may be released into SPF out of order. Each subsequent sheet shows only the next sequential sheet number.

3.7.10 Drawn by & Approval Signatures

Drawn by and approval signatures are in accordance with TFC-ENG-DESIGN-C-09.

3.8 References Block

3.8.1 Construction or Detailed Design

Only the reference documents required by the construction contractors are listed (see Figure 10). New drawings depicting new construction or detailed design are not required to be listed in the REFERENCES block, but are shown on the drawing. List the Vendor Information (VI) file number of supplied/existing equipment as a reference. National consensus standards are not listed in the REFERENCES block.

Figure 10. Areas Represented by Drawing Prefixes.

Drawing Prefix	Area
H-1	100 Area
H-2	200 Area
H-3	300 Area
H-4	400 Area; Fast Flux Test Facility (FFTF)
H-5	Unassigned except for electrical drawings not specifically applicable to other areas
H-6	General area, not included in other defined areas, usually civil drawings and maps
H-7	700 Area and City of Richland (RCHN, RCHC, and RCHS)
H-8	800 Area, Exploratory Shaft Site
H-9	Vendor Item Control Drawings formerly Specification Control Drawings
H-10	Not Used
H-11	1100 Area
H-12	3000 Area
H-13	General mapping of the Hanford Site; Environmental Permitting
H-14	Waste Tank Farm (200 East, 200 West, transfer lines, and associated electrical and instrumentation)
H-16	LAWPS Project

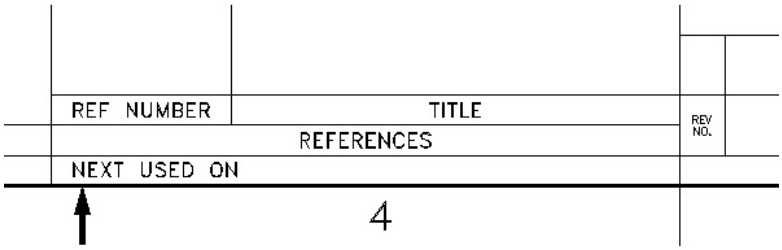
3.8.2 Reference Document Number and Title

The reference document number is entered in the REF NUMBER block (see Figure 11). The actual title is entered in the Title block and may be abbreviated.

3.9 Next Used On Documentation

The NEXT USED ON block (see Figure 11) is used to document drawings that are linked together (e.g., a subassembly, detail, and installation drawings). Link these drawings by referencing the next higher level or generation (e.g., a subassembly drawing will list the drawing number of the assembly or the installation drawing). If the drawing is the top drawing, the words "END ITEM" are entered. If the drawing is for an item that is used in several locations or in several different assembly drawings, the words "AS ALLOCATED" are entered.

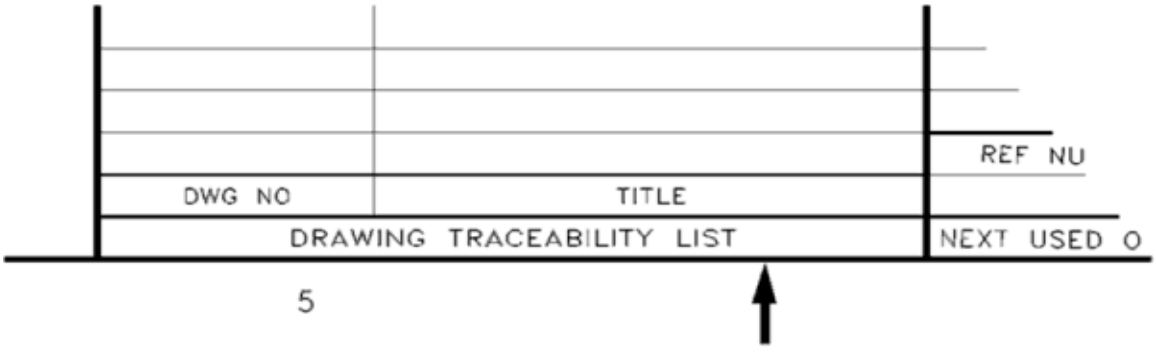
Figure 11. Typical Reference Block.



3.10 Drawing Traceability List

The DRAWING TRACEABILITY LIST block itemizes the existing drawings affected by changes in design (see Figure 12). Show all affected drawings. The drawings are not to be duplicated in the REFERENCES block. All drawings are required to provide two-way traceability. Two-way traceability is cross-referencing existing engineering drawings affected by a new design or modification and vice versa.

Figure 12. Drawing Traceability List.

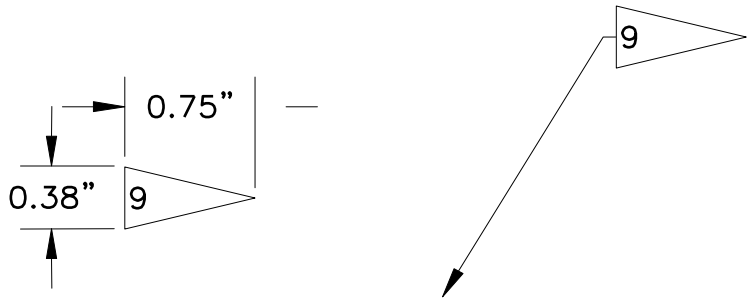


3.11 General Notes

The preferred location of the general notes is above the Title block. Other locations may be used when additional space is required. On multiple-sheet drawings, General Notes start on sheet 1 and may continue on subsequent sheets.

When a reference back to the General Notes is required, a "Flag Note" or notation (e.g., "SEE GENERAL NOTE 5") is placed in the body of the drawing near the affected area. Leader lines from the flag note or notation is used when clarification of the reference is required. If a flag note symbol is used, it is sized and configured as shown in Figure 13. A flag note symbol is also placed in the General Notes to indicate that a general note is flagged in the body of the drawing.

Figure 13. Flag Note Size and Configuration.



3.12 Drawing Status Area

Reserve a space approximately 3 inches high above the Title block on the drawing for recording additional Title block information and for the application of A-E stamps according to individual contractor procedures.

3.13 Parts/Material List

The Parts/Material List is located, or begins, in the upper right-hand corner on the first sheet of the drawing. For additional parts/material list requirements, see Section 3.21.

3.14 General Drawing Configuration

Drafting is done according to applicable ASME Y14-series standards except where denoted and detailed differently in this standard. Dimensioning and tolerancing is done according to ASME Y14.5 except where denoted differently in this standard.

3.14.1 Paper Space/Model Space

All drawings shall make use of AutoCAD standard paper space/model space layout. All views, details, plans, layouts, etc. shall be drawn in model space and shall be drawn full scale. The viewports in paper space shall be used to set the proper scale for plotting of views and drawings. All tables, parts lists, general notes, and similar text items will be placed in model space at full scale. All dimensioning, leadered notes, and callouts will be placed in model space at the appropriate scale to be viewed properly through the view port. The only items that shall be placed in paper space are the drawing border, the title blocks, and, if required, a Professional Engineer (PE) stamp.

3.14.2 Lettering

Lettering used in TOC drawings shall be AutoCAD-supplied fonts ROMANS and ROMAND. All lettering shall be vertical style. All text on drawings shall be color white. All text on drawings shall be upper case except where specifically required for symbols, formulae, etc. When bold text is required, it shall be achieved by using the font ROMAND. The text used on

"F" size drawings for notes, dimensions, and callouts shall be 0.12" high. The text used for titles and view callouts on "F" size drawings shall be 0.24" high. Text height of .18" may be used for intermediate titles. The text used on "B" size drawings for panel schedules shall be 0.075." The normal width factor of all text shall be 1, but the width factor may be reduced down to 0.75 minimum if required for individual fit problems.

3.14.3 Dimensioning

All dimensions on TOC drawings shall have white numerals and/or letters with AutoCAD color 253 dimension lines and extension lines. Leadered notes shall have white text with AutoCAD color 253 leader lines. Associative dimensioning is the normal style for all drawings. Non-associative dimensioning is allowed for views that are drawn "not to scale," or for split views or exploded views where correct dimensions need to be manually placed. All dimensioning will be placed directly on the object being dimensioned in model space. The correct dimension scale will be applied to all dimensions so that they appear and plot correctly through the viewports. All arrowheads on dimensions and leaders shall be 3/16" in length when plotted at full scale.

3.15 Abbreviations and Acronyms

3.15.1 Abbreviations

Abbreviations should conform to the latest edition of ASME Y14.38, "Abbreviations and Acronyms." Abbreviations on a drawing are used only when space does not permit the word(s) to be spelled out, such as in the drawing title, parts list, or a reference drawing list. Industry-accepted abbreviations, such as DIA, SCH, and REF are to be used to the fullest extent. The face of the drawing should be planned and drafted to provide ample space so that abbreviations can be held to a minimum for clarity and interpretation.

Punctuation marks, except the slant (/) and the hyphen (-), are not to be used when abbreviations are used on drawings. A period (.) is added to an abbreviation only if in its context does not obviously represent an abbreviation (e.g., ADD indicates addition or addendum). Duplicate abbreviations are specified in the latest edition of ASME Y14.38. Before such abbreviations are used, care should be exercised to ensure that the proper meaning will be correctly interpreted.

3.15.2 Acronyms

Acronyms should conform to the latest edition of ASME Y14.38. Other acronyms should be avoided. However, if repeated use of a word in text (e.g., General Notes) makes the use of an acronym an obvious advantage, the acronym may be created. Hanford Site-specific acronyms should be clearly defined by spelling out the acronym in the LEGEND or by using a General Note.

3.16 Symbology

Symbology used on drawings that defines components needs to be traceable to an engineering drawing (see Section 3.16.1) or a LEGEND placed on the drawing. If additional symbology is required, which is not covered by the TOC-specific symbology or Hanford Site symbology listed below, industry accepted standards will be used to the fullest extent possible with the symbology placed in a LEGEND on the drawing.

For additions or modifications of TOC specific symbology, see Section 3.16.3.

3.16.1 TOC-Specific Symbology

The uniform drawing specific symbology for the TOC is specified on H-14-020000, sheet 4.

3.16.2 Hanford Site Symbology

For symbology not covered by H-14-020000, sheet 4, the following DOE-approved site symbology should be used wherever and whenever possible.

- H-6-14982 Hanford Standard, General Symbology
- H-6-14983 Hanford Standard, Civil Symbology
- H-6-14984 Hanford Standard, Structural Symbology
- H-6-14985 Hanford Standard, Architectural Symbology
- H-6-14986 Hanford Standard, Machine Symbology.

3.16.3 Creation or Modification of Symbology Drawings

Additions or changes to the drawing symbols contained on drawing H-14-020000 are made in accordance with the DCN or EDT process.

3.16.3.1 AutoCAD Symbol Naming Standards

All AutoCAD symbology uses the naming standards listed in Attachment E, “Hanford Drawing Symbology Standards.”

3.17 Legibility

Drawings must be prepared so that prints are legible when reduced on microfilm and then re-enlarged. As an example, parallel lines have at least 0.06” spacing on the hard copy drawing to maintain distinction. The final released drawing must be capable of passing a fifth-generation copy test (see definition in Section 4.0). It is common practice to use 11” x 17” size reductions for review, planning, construction, etc. All F size drawings should be prepared so they are clearly understood and readable at that reduction size.

3.18 Drawing List

A drawing list is placed on the first drawing in a project set of 20 or more drawings. The drawing list may be placed on a separate or title sheet. The list contains the following information:

- Drawing numbers
- Drawing index number
- Building numbers (if more than one building is involved in the project)
- Title of each drawing
- VI lists
- Specifications.

For multiple-sheet drawings, the number of sheets may be shown without repeating the rest of the information (e.g., H-1-12345, SH 6), provided that all the information is identical. When listing a specification or vendor information, the Hanford retrieval number is also listed next to the title.

3.19 Drawing Orientation

North should be oriented to the top or left side of the sheet. Exceptions are allowed where modifications are being made to existing facilities for which the orientation of the existing drawings is different or where industry practices dictate (e.g., civil drawings showing plan view strips with corresponding profiles). All plans on a given set of drawings need to be oriented the same and match the existing plant drawing orientation. A north arrow is placed and properly oriented on all maps, plans, layouts, and other drawings depicting spatial orientation.

3.20 Coordinate System and Geodetic Elevation Data

For new construction, the coordinates and elevation are as follows:

- Coordinates - The Washington Coordinate System of 1983, south zone (1991) (WCS83S[1991])

- Elevation Data - The North American Vertical Datum of 1988 (NAVD88).

3.21 Parts/Material List

A parts/material list is used on fabrication and assembly drawings, but not on project construction drawings as depicted on Figure 14 (see also Attachment F).

3.21.1 Arrangement and Size

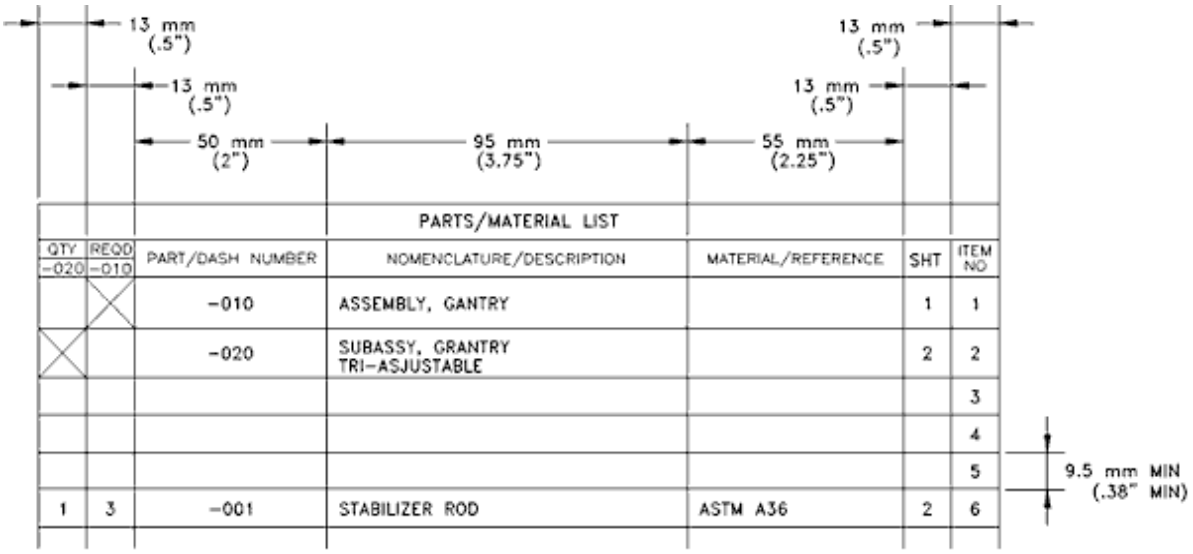
The minimum width of the Parts/Material List block having one quantity column is 9.5” (see Figure 15). The standard parts list is available as a block on drawing H-6-14982, Hanford Standard General Symbology. Quantity columns may be added as necessary. The parts/material list is located, or begins, in the upper right-hand corner on the first sheet of the drawing.

Figure 14. Drawing Types and Classifications.

Engineering Drawing Type	Parts/Material List Not Used	Formal Parts/Material List, Required (see Code Key Below)	Material Call-out on Field of Drawing (see Code Key Below)
Architectural			All
Civil			All
Structural		1	2
Electrical		1-2-4	7
Piping		1-3-5	2
Instrumentation		1-2-3-4	7
Heating, Ventilation, and Air Conditioning		1-3-8	2-7
Mechanical		1	2
DRAWING CLASSIFICATION			
Fabrication		All	
Construction		6	All
Altered Item		1	2
Vendor Item Control			All
Non-Fabrication/Construction, i.e., maps, conceptual layouts, cell arrangements, diagrams, schematics, wire run list, drawings made for operational use.	All		

1. Fabrication or shop-oriented drawings.
2. Construction field-installation-oriented drawings.
3. In parts/material list description column, enter all pipe ells, tees, etc., as “size of pipe and miscellaneous fittings.”
4. In parts/material list description column, enter all conduit lugs, pull boxes, etc., as required by National Electrical Code.
5. Prefabricated.
6. Electrical, instrumentation, and HVAC disciplines (non-project).
7. Project construction type drawings only.
8. Process hood systems (supply and exhaust) and process exhaust systems drawings only.

Figure 15. Parts/Material List Placement.



3.21.2 Contents

The parts/material list contains all material and separable components on the drawing. The individual pieces of weldments or other inseparable assemblies need not be numbered separately if the individual pieces are made of the same material and the detail of weldment/inseparable assembly can fully and clearly show all required dimensions and welding to fabricate the piece.

3.21.3 Part Arrangement/Order

The parts/material list should be arranged in a hierarchy (i.e., assemblies, subassemblies, detail parts, catalog items). It is not necessary to rearrange the parts/material list merely to add a later entry.

3.21.4 Part Number

Unique part numbers are assigned where a design configuration (i.e., assembly, subassembly, and detail) is controlled on an H-series drawing. A part number is used to uniquely identify a specific item. Items that are not interchangeable are identified with separate and unique part numbers.

The official part number is the drawing number and the assigned dash number (see Section 4.0). When a part number is referenced, both the drawing number and the dash number are identified.

3.21.5 Parts and Assembly Numbers

Each assembly, subassembly, and detailed part is assigned a separate and unique part (dash) number. The primary assembly is assigned the -010 dash number. Additional assemblies and subassemblies are assigned every tenth number consecutively (e.g., -020, -030, -040, etc.). The first detailed part is assigned the -001 dash number. Additional detailed parts are assigned -002, -003, -004, etc., with every tenth digit reserved for assemblies. The sheet number column is to only be used to designate the sheet number where the assemblies, subassemblies, or

individual fabricated parts identified with dash numbers are shown. The sheet number column should be left blank for all other parts.

3.21.6 Interchangeable Parts

Interchangeable parts are equivalent in performance and durability. They are capable of being exchanged one for the other without alteration of the item or of adjoining items, except for nominal adjustment. They are also interchangeable in terms of fit and performance. Interchangeability is also explained in General Notes with a statement in the parts/material list to see the applicable general note.

3.21.7 Part Number Revisions

The parts/materials list periodically requires revisions and/or material deletions due to fabrication changes, modifications to the original design, or changes made by the parts supplier. The following are accepted methods for changing the parts/material list, when accompanied by a DCN; see TFC-ENG-DESIGN-C-61:

- Remove a part or material item by placing a double line through the part or material item (e.g., CAD or manual drawings).

- Remove a part or material item and add the word “Deleted” in place of the part or material item (e.g., CAD revision).

3.21.8 New Part Number

New part numbers, including applicable altered item part numbers (see Section 3.21.10), are assigned when the design of a part, fabricated assembly, or procured item is changed so that any of the following conditions could result:

- Performance or durability is affected to the extent that superseded items must be discarded for reasons of safety, failure, or malfunction.

- Parts, assemblies, or subassemblies are changed so that the new designs are not directly and completely interchangeable with respect to installation and/or specified performance.

- When replaced/redesigned parts are limited to use in specific applications and the newly designed items are not so limited.

- When an existing Hanford item, or vendors’ purchased item, requires alteration.

- When existing items cannot be reworked to be directly and completely interchangeable with the new design.

NOTE: New materials are added at the end of the parts/materials list using sequential part numbers. Part numbers cannot be reused for new or different parts/material; new part numbers are required.

3.21.9 Purchased Items

Purchased items are identified in the parts/materials list with the manufacturer’s part number or VI number. These items are normally controlled by the vendor, by industrial or government

codes, standards, or file number. The part/dash number column should show the part number. The nomenclature/description column should adequately describe the part.
The material/reference column should indicate the manufacturer's or vendor's name.

3.21.10 Altered Item

If the design of a vendor-supplied item is altered after purchase for an existing Hanford Site application (documentation may be contained in a VI file), or for use in a new engineering design, the following requirements apply:

- "ALTERED FROM" (manufacturer's part number and part name or existing Hanford part number and part name) is recorded in the description column of the parts list.
- Assign a new Hanford part number and place it in the part number column.
- The alteration is detailed by visible lines in accordance with ASME Y14.2. Reference features (features not requiring alteration) are limited to orientation for describing where designated alterations are required. Reference features are shown by phantom lines in accordance with ASME Y14.2.

3.21.11 Quantities and Customary Trade Units

Quantities are counted accurately and shown in customary trade units.

3.21.12 As Required Designation

The letters AR (as required) are used where the quantity is not known or where the quantity could vary.

3.21.13 Part Description

The part description should be generic, except where a specific item is required, and the design depends on or is tailored to the specific item. The name of the item is listed first followed by supplemental descriptive words. The description of an item must be complete and provide specifications sufficient to procure the item.

The material type and designation for non-commercially supplied parts shall be called out in the material/reference column using nationally accepted standards (ANSI, ASME, etc.). The designating of a part material as "commercial" is not allowed.

Standard industry language is used to define the item. If the item can be completely described in the parts/materials list, it need not be delineated on the drawing. If description/specification is lengthy, it may be in the general notes or in a separate specification. If the description/ specification is placed in the General Notes or in a separate specification, the general note or separate specification is referenced in the description column of the parts list.

3.22 Component Numbering

Structures, systems, and components are numbered in accordance with TFC-ENG-STD-12.

Coordinate assignment of component numbers with Production Operations Engineering to avoid duplication of component numbers.

3.23 Measurement System

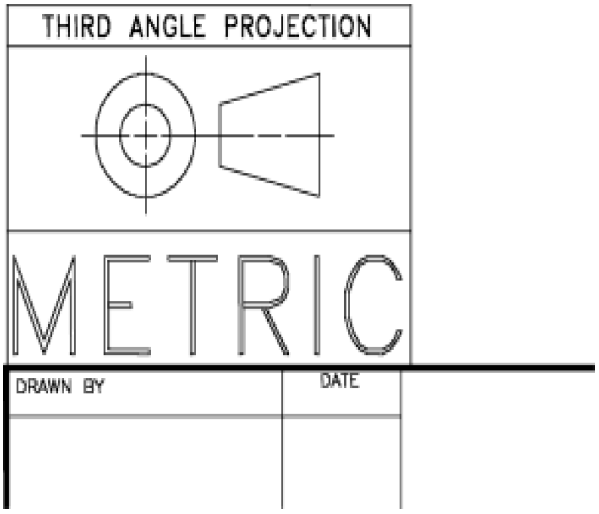
3.23.1 General

English customary units (inch-pound system) are used for measurements shown on drawings, unless otherwise directed by the TOC Chief Engineer. Alternate units, such as metric (SI) equivalents, are not required to be shown. Modifications to drawings that contain English customary units use those units unless otherwise directed.

3.23.2 Metric Notation

If drawings are directed to be done in the metric (SI) system, the word "METRIC" (see Figure 16 and Figure 6) is placed directly above the Title block in 6 mm bold Gothic lettering as defined by ASME Y14.2.

Figure 16. International Projection Symbol.



3.23.3 Third Angle Projection

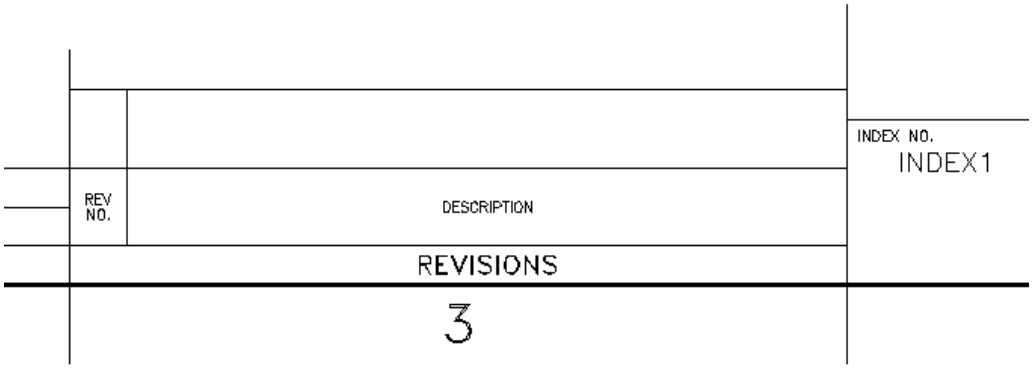
All drawings developed using the multi-view system of orthographic presentation as specified in ASME Y14.3, "Multi and Sectional View Drawings," are to use the third-angle projection method.

3.24 Revisions

3.24.1 Revisions Block Size and Location

The REV block is configured as shown in Figure 17.

Figure 17. Typical Revision Block.



3.24.2 Description

The authorizing engineering change document (for revised drawings) or the authorizing releasing document (for new drawings) is entered in the revision description (e.g., Engineering Change Notice [ECN], DCN, or EDT). Drawings with work completed change documents (ECN/DCNs) must have the changes incorporated when revising the drawing to release via an EDT. See also Section 3.28. Conservation of space is essential; therefore, ANSI abbreviations are used while keeping the meaning clear.

3.24.3 Revision Numbers

When revising multiple-sheet drawings, each sheet is considered a separate drawing. Revision numbers are advanced only on the sheet being affected by the change.

3.24.4 Change Incorporation - For Drawings Maintained in the Hanford Drawing System

Show the authorizing ECN/DCN number in the REV block (e.g., REVISED PER ECN [number]).

3.24.4.1 Incorporation of Engineering Change Notices

Drawings being released after ECN/DCN incorporation shall utilize the EDT. During ECN incorporation, the following non-technical items can/shall be changed without needing an additional DCN (any change of a technical nature that differs from the ECN shall require an additional new DCN to modify and correct the drawing):

- Removing “Essential Drawing,” “As-Built,” “Impact Levels,” “Confidence Levels,” “For Field Verification,” block, offsite A&E logos, vendor logos, and PE stamp
- Correcting non-technical drafting errors such as misspelled words, text size, arrowhead size, line type scale, and line weights
- Updating/replacing the existing Title block with the current approved ORP Title block
- Graphically rearranging the drawing to accommodate the new views, sections, details, or changes

- Reassigning detail callouts, section callouts, note numbers, and part numbers when the callout or number has already been used on the drawing or drawing set

- Correcting the circuit totals on panel board schedules to ensure they are the sum of the individual breaker circuit values

- Adding or revising related/referenced arrangements, views, sections, details, and/or tables to accurately delineate the approved ECN incorporation on an affected drawing.

If during an ECN incorporation, there is insufficient room on the referenced drawing sheet to show added views, sections, details, etc., the added views, sections, details, etc. may be incorporated on a different sheet of the same drawing number without needing an additional DCN in the following two ways:

- A new additional sheet may be added to the drawing set to be able to show the new data. The original ECN will be the authorizing document for creating and releasing the new drawing sheet.

  A statement shall be placed in the REV block of the original sheet revised by the ECN describing the variance such as "INCORPORATED ECN-XXXXX, DATA SHOWN ON SHEET X DUE TO LACK OF SPACE."

  A statement shall be placed in the REV block of the new sheet describing the variance such as "INCORPORATED ECN-XXXX, ADDED NEW SHEET X."

- If there is found to be an existing sheet of the drawing set that has sufficient room to incorporate the added views, sections, details, etc., the new data may be incorporated on that sheet.

  A statement shall be placed in the REV block of the existing sheet referenced by the ECN describing the variance such as "INCORPORATED ECN-XXXXX, DATA SHOWN ON SHEET X DUE TO LACK OF SPACE."

  A statement shall be placed in the REV block of the existing sheet where the new data will be incorporated describing the variance such as "INCORPORATED ECN-XXXXX, DATA SHOWN ON THIS SHEET DUE TO LACK OF SPACE ON SHEET X."

If during ECN incorporation, the data being modified by the ECN is found to be on a different sheet from that referenced by the ECN, the ECN can be incorporated on the sheet where the effected data is actually shown without needing an additional DCN per the following examples:

- Example 1 – ECN-XXXXX written against sheet 1 of a drawing set added new sheet number XX. The ECN was signed off work completed and was incorporated adding and releasing the new drawing sheet XX. After the new drawing sheet XX was released into the system, an additional ECN written against sheet 1 modifying the data on the original ECN was signed off work complete. The data it modifies are now on the new drawing sheet XX. The modifications from the most recent work completed ECN can be incorporated on the correct drawing sheet without requiring an additional DCN.

  Document the variance on sheet 1 and on the new drawing sheet per the following:
  A statement shall be placed in the REV block of sheet 1 describing the variance such as

"INCORPORATED ECN-XXXXX – ORIGINAL DATA AND REVISIONS NOW SHOWN ON SHEET XX."

A statement shall be placed in the REV block on the new sheet XX describing the variance such as "INCORPORATED ECN-XXXXX – REVISIONS ORIGINALLY WRITTEN AGAINST SHEET 1."

- Example 2 – ECN-XXXXX written against sheet X of a drawing adding new details and views. When the ECN is work completed, there is insufficient room on sheet X so the ECN is incorporated on a new sheet XX. New sheet XX is released into SPF with the ECN as the authorizing document. After the new sheet XX is released, another ECN against the original sheet X is work completed. The data the latest work completed ECN modifies are the data that is now on the new sheet XX. The modifications from the most recent work completed ECN can be incorporated on the correct drawing sheet without requiring an additional DCN. Document the variance on the original sheet X and on the new drawing sheet XX per the following:

  A statement shall be placed in the REV block of the original sheet X describing the variance such as "INCORPORATED ECN-XXXXX – ORIGINAL DATA AND REVISIONS NOW SHOWN ON SHEET XX."

  A statement shall be placed in the REV block on the new sheet XX describing the variance such as "INCORPORATED ECN-XXXXX – REVISIONS ORIGINALLY WRITTEN AGAINST SHEET X."

- Example 3 – ECN-XXXXX written against sheet X of a drawing adding new details and views. When the ECN is work completed, there is insufficient room on sheet X so the ECN is incorporated on a different existing sheet XX where there is sufficient room to show the changes/additions. After the existing sheet XX is released, another ECN against the original sheet X is work completed. The data the latest work completed ECN modifies are the data that is now shown on existing sheet XX. The modifications from the most recent work completed ECN can be incorporated on the correct drawing sheet without requiring an additional DCN. Document the variance on the original sheet X and on existing sheet XX per the following:

  A statement shall be placed in the REV block of the original sheet X describing the variance such as "INCORPORATED ECN-XXXXX – ORIGINAL DATA AND REVISIONS NOW SHOWN ON SHEET XX". A statement shall be placed in the REV block on sheet XX describing the variance such as "INCORPORATED ECN-XXXXX – REVISIONS ORIGINALLY WRITTEN AGAINST SHEET X."

3.24.4.2 Revision Numbering and Release

List each new revision in numerical sequence. Only released (issued) drawings are revised. Each subsequent revision is released before another revision is made. The latest revision number is shown in the Title block (see Section 3.7.7 and Figures 8 and 17).

3.24.4.3 CAD-Revised Drawings

CAD-developed drawings do not require approval signatures from previous revisions to be printed in the spaces of the Title block.

3.24.4.4 Removing Revisions

Drawings in the Hanford system that have been previously approved will have revision descriptions removed from the drawing(s) REV block on subsequent revisions.

3.24.4.5 Revision Documentation and Approval

The responsible engineer signs and enters the company acronym in the ENGR/COMPANY block of the REV block, see Figure 17. Drawing revision requirements and results are documented and approved by an ECN prior to the release of a drawing that has been revised.

3.24.4.6 Change After Approval

Changes made to drawings after approval and before formal release require complete re-approval of the drawings. All existing approval signatures and dates are removed and new approval signatures are obtained.

3.24.4.7 Adding Additional Sheets

Additional sheet(s) that are added are released as Revision "0." The ECN number being incorporated is placed in the description REV block. See Section 3.24.2.

3.25 Official Use Only and Export Controlled Drawings

The originating organization marks the drawing in accordance with MSC-PRO-RM-184 and MSC-PRO-SEC-54603 to reflect OUO or ECI markings or other required controls as needed; contacts Subject Matter Experts, Derivatives Classifiers, or Legal Services as required to establish accountability; and protects the document using security and handling requirements appropriate for the level marked on the drawings.

3.26 Superseded Drawings, Voided Drawings, and Title Block Changes

When drawings are superseded or voided, or when a building, index, or drawing number is changed, the affected drawings are revised with a DCN.

3.26.1 Superseding Drawing with Different Existing Drawing Number or Sheet Number

When an existing drawing is to be superseded either wholly or in part by a different existing drawing number or sheet number, either a DCN or ECN is required. Both the superseded drawing and the superseding drawing are required to be released at the same time.

3.26.1.1 The Superseded Drawing

When a drawing is to be superseded in whole or in part by another existing drawing or sheet, none of the outstanding work completed ECNs are to be incorporated on the superseded drawing or portion of the drawing being superseded. A note stating, "SUPERSEDED BY or PARTIALLY SUPERSEDED BY DWG (number) SHEET (number) REV (number)," is to be placed above the Title Block in 0.24" high lettering. Under the above note, in .12" high lettering, place the words "OUTSTANDING ECNS" followed by a listing of all of the ECNs, both work and non-work completed, against the drawing. In the REV block, the supersedure should be documented per the following: "SUPERSEDED PER DCN or ECN-XXXXX."

3.26.1.2 The Superseding Drawing

All ECNs written against the superseded drawing will have to be reconciled in the following two ways: 1) All work completed ECNs against the original drawing will need to be incorporated on the superseding drawing or sheet. This will be accomplished by adding all of the work completed ECN drawing modification data to the new DCN that supersedes the original drawing; and/or 2) A new ECN will be written, if required, against the superseding drawing that captures all of the changes shown in the existing non-work completed ECNs that are still applicable. A note stating, "SUPERSEDES DWG (number) SHEET (number) REV (number)," is to be placed above the Title block in 0.24" high lettering. In the REV block, the supersedure should be documented per the following: "SUPERSEDED DRAWING H-XX-XXXXX SH X PER DCN or ECN-XXXXX," then list all ECNs being incorporated in the standard approved format.

3.26.1.3 Superseding Drawing with New Drawing Number

When an existing drawing is to be superseded by a new drawing number or sheet number, a DCN is required to revise the superseded drawing. The new superseding drawing will be released using an EDT. Both the superseded drawing and the superseding drawing are required to be released at the same time.

3.26.2 Manual to CAD Conversion (Redraw) of Approved Drawing with Drawing of the Same Drawing Number and Higher Revision

The conversion of a manual drawing to an AutoCAD file does not require the use of an ECN. For these drawing conversions, the drawing revision number shall be incremented, and the revision description on the drawing sheet shall include the following description: "Manual to AutoCAD conversion." If there are outstanding work completed ECNs against the drawing, they shall be incorporated at the same time the manual drawing is converted to CAD. Incorporated ECNs shall be listed in the REV block in the standard accepted format. Manual to CAD conversions shall meet the following requirements.

- Layering standards, text size and styles, and dimension styles shall conform to this standard.

- All plans, views, sections, and details shall be drawn to scale to the degree possible. It is recognized that not all drawings to be converted will have all items on the original drawing scaled accurately or at all. Care should be taken to avoid "just tracing" the original when drawing the object to scale is possible. Plans, views, sections, and details that are drawn so small on the original drawing as to make it difficult to clearly read and understand the drawing may be redrawn at a larger scale for clarity and ease of incorporating changes. Plans, views, sections and details drawn to a larger scale shall be drawn using standard accepted scales.

- The general arrangement of the drawing may be changed in order to incorporate outstanding changes or to more logically present the design data.

- The general symbology for plan views, section views, detail views, section callouts, and detail callouts shall be modified to meet the current standards specified in this standard. When updating section and detail views and callouts, maintain the existing pattern used on the original for designating sections and details with numbers and letters.

- Parts list on manual to CAD conversions shall be updated to the current standard. The existing part numbering scheme shall be maintained and no reassigning of part numbers shall be allowed.

- If the manual drawing being converted to CAD is found to be congested to the point where the drawing cannot be clearly read or it is advantageous to increase the size of the views, the drawing may be expanded onto as many sheets as needed to clearly delineate the design. If an outstanding ECN is being incorporated, that ECN may be the authorizing document for adding additional sheets. If no outstanding work completed ECN exists, then an additional DCN will be required to add the new sheets.

3.26.3 Voided Drawings

Place the word "VOID" near the Title block in 0.5" high lettering. The revision of the drawing is advanced with the authorizing DCN or ECN number identified in the REV block (e.g., VOID PER DCN or ECN number). The use of a microfilm copy of the affected drawing may be used in place of the original drawing for this voiding process.

3.26.4 Changing Drawing Numbers, Index Numbers, or Building Numbers

3.26.4.1 Changing Drawing Numbers

Drawing numbers are created by the Hanford Document Numbering System (HDNS) and entered into SmartPlant. These assigned drawing numbers cannot be changed. Drawings that have not been released can be deleted or terminated. Drawings that have been released can be superseded.

3.26.4.2 Changing Index Numbers

Add or delete Index Numbers by revising the drawing.

3.26.4.3 Changing Building Numbers

Add or delete Building Numbers by revising the drawing.

3.27 Changing the Title of a Drawing

Changes in the title of an approved drawing require a revision. All current requirements apply to revised drawing titles (see Section 3.7.3).

3.28 Direct Revisions

For designers and drafters who directly revise a drawing (a Direct Revision), the drawings will be reviewed, approved, and released via the EDT in accordance with TFC-ENG-DESIGN-C-09. Work completed change documents (ECN/DCNs) will be incorporated prior to release.

3.29 Interface Control

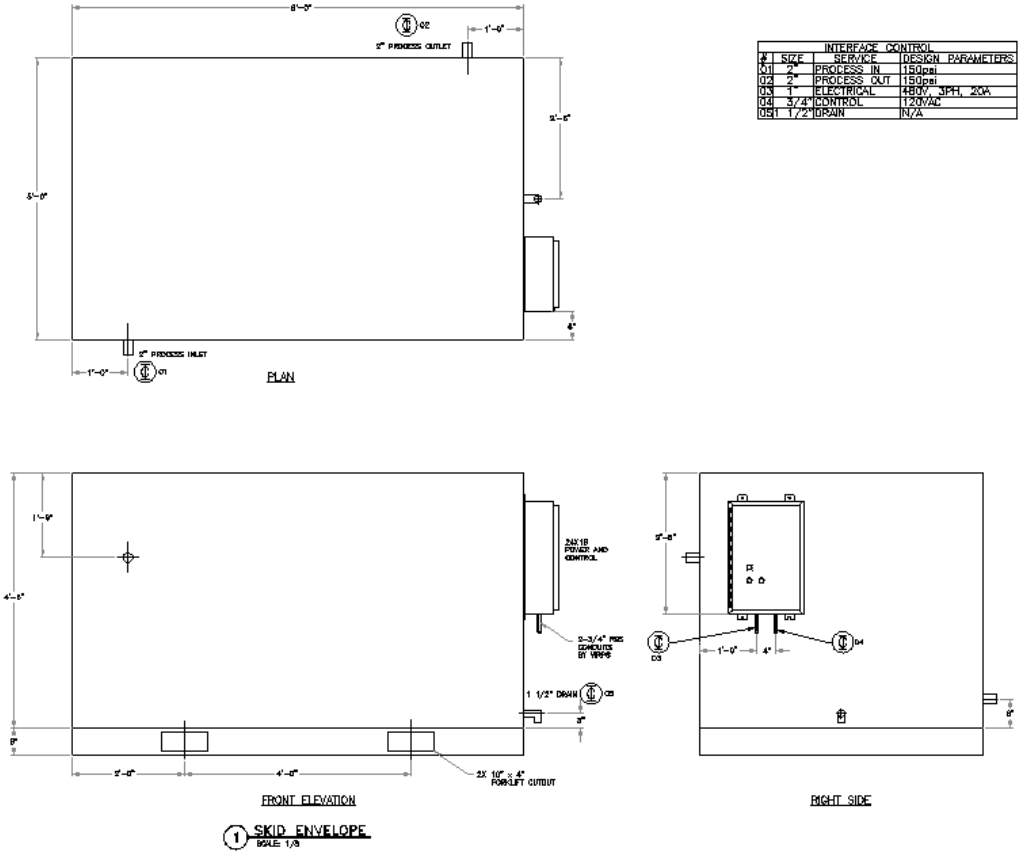
Interface control is the establishment and preservation of design features and controls between co-functioning systems or components shared typically by two or more prime contractors or between an engineering contractor and equipment supplied by a vendor. All design interfaces

shall be identified, defined, and controlled. This design interface information is identified on the appropriate engineering drawing(s) by an interface control symbol.

The interface control symbol (defined on drawing H-14-020000, sheet 4) is used to recognize the point of demarcation and maintain the compatibility of the design features at these interface boundaries that require control. This symbol provides the physical location for the design features (e.g., electrical terminations, power requirements, size and locations of connection points, flow rates) that are subject to control.

Two methods are available to depict the interface control boundary and their associated design features. The first and preferred method is to display the interface control symbol at the appropriate drawing location. The symbol includes a reference to the unique and retrievable number of the authorizing interface control document (ICD); e.g., ICD 01. This referenced ICD provides the detailed information on the design features for this controlled interface. Interfaces between prime contractors where physical systems or physical interfaces work in concert with one another across company boundaries are managed through ICDs in accordance with TFC-BSM-CP_CPR-C-17. Interfaces between engineering contractors and vendor supplied equipment are to be managed in the same manner (see Figure 18).

Figure 18. Example of Interface Control.



The second method is to identify the responsible organization (owner) at the interface control system or in the General Notes section of the drawing rather than in an ICD.

Add an interface control note to the General Notes section of the affected drawing (applies to either method used) to identify that the information on this drawing contains controlled interface design features. This general note should read as follows:

"Interface control information impacted on this drawing requires change approval."

3.30 Safety Significant Safety Instrumented System (SIS/SIA) Equipment

Drawings that show the installation of safety instrumented system (SIS) or safety instrumented alarm (SIA) components on the drawing will include a note referring to the Safety Requirement Evaluation Document (SRED) requirements.

3.31 Cloud Use

Clouds are used to indicate HOLDS or changes made on the IS sheets in ECNs and DCNs. When identifying a HOLD place a cloud around the area affected by the HOLD and add the RPP-HOLD number assigned by Smartplant with a leader to the cloud. For clouding changes on ECNs and DCNs refer to the Smartplant form instruction pages SPF-002i and SPF-003i respectively.

4.0 DEFINITIONS

Altered-item drawing. An engineering drawing used to control and depict the alterations to a commercial item. An altered-item drawing reflects only the change and is not intended to show complete fabrication details. The altered item drawing may modify an existing commercial item already installed or may alter a new item.

Applied material. Material that is not normally shown on the graphic presentation of a drawing (e.g., glues, adhesive, paint, cleaner). It may or may not have a manufacturer's identification number. Applied material normally is identified in the General Notes and its application explained, as required. Weld rod is excluded from this definition.

Arrangement/Installation drawing. The top level drawing where multiple related details, assemblies, subassemblies, and certain connecting parts and/or instructions are shown depicting the final arrangement.

As required (AR). A notation used when an exact quantity is not known or cannot be easily predetermined. The notation is placed in the "Quantity Required" column of the parts list.

Assembly. A term used to describe parts and/or subassemblies joined to complete a designed relationship.

NOTE: In view of the difficulty, in some cases, in establishing a clear distinction between the terms "assemblies" and "subassemblies," these two terms may be considered to have the same meaning and may be used interchangeably.

Brand name. Brand name implies the manufacturer, model, catalog name/number, trademark, or identifying name other than generic.

Computer-Aided Design (CAD) Data Set. The CAD data set is the computer data file used to produce a hard copy engineering drawing.

Dash number. A dash number is a unique numerical identification assigned to an item whose design is controlled by the drawing. When suffixed to the drawing number, the dash number provides a unique part number (see Part Number definition) for that item. A dash number is assigned where two or more items or an assembly are depicted on a drawing. The dash number will consist of three digits and be assigned as follows:

Assemblies. Every tenth number is reserved for assemblies (e.g., -010, -020, -030, -040).

Parts. -001 for the first part and consecutively for all others, reserving every tenth number for assemblies (e.g., -001 through 009; -011 through -019; etc.).

Detailed (piece parts) item. An individual item or units of material that requires specific part (dash) number identification because of traceability and accountability requirements for that item.

Fifth-generation copy test. For the purposes of this standard, a fifth-generation copy test consists of making a full size copy (first-generation copy) from the original document, using a high quality copier. Then making a copy of the copy (second-generation); then a copy of that copy (third-generation copy), etc., until the fifth-generation copy is achieved. The graphics and text of the fifth-generation copy must be clearly legible without magnification, special lenses, or editing.

Hardware item. Fasteners that may or may not require material identification (e.g., ASTM, SAE).

Inch/Pound measurement. Inch/pound measurements are units of the English measurement system (e.g., inches, pounds, degrees Fahrenheit, gallons). The formally recognized inch/pound units are the foot and the pound as defined by the National Institute of Standards and Technology (NIST).

Inseparable assembly. Parts/material joined in such a manner that they are incapable of being disassembled without destroying the intended function of the item (e.g., weldments, bonded assembly).

Item number. A number assigned to every line entry of a Parts/Materials Lists to tabulate items in the list. It is also used to locate an item in the field of the drawing and is not used for unique identification purposes.

Material item. Material used in an inseparable assembly whose final configuration is contained within the configuration of that assembly (e.g., a weldment). Also, see Inseparable Assembly definition.

Part number. A part number consists of letters, numbers, or combinations of letters and numbers, that may or may not be separated by dashes and are assigned to uniquely identify a specific item. Part numbers assigned to Hanford "H" series drawings consist of the drawing number plus a dash number.

EXAMPLE: H-3-60670-010
-010 is the Dash Number
H-3-60670 is the Drawing Number

Parts/Materials list. A tabulation of parts and/or material required for constructing, fabricating, or procuring the items depicted on a drawing.

Subassembly. An assembled unit designed to be incorporated with other units (see Assembly definition).

X-Reference. This is an AutoCAD program feature that allows drawing data to be shared between data files. The shared data are not permanently part of the drawing until the X-Reference data are inserted into the master (main) data file.

5.0 SOURCES

5.1 Requirements

1. Contract number DE-AC27-08RV14800.
2. DOE O 252.1A, "Technical Standards Program."
3. TFC-PLN-02, "Quality Assurance Program Description."

5.2 References

1. ASME Y14.38 (latest edition), "Abbreviations and Acronyms."
2. ASME Y14.1 (latest edition), "Decimal Inch Drawing Sheet Size and Format."
3. ASME Y14.5 (latest edition), "Dimensioning and Tolerancing."
4. ASME Y14.2 (latest edition), "Line Conventions and Lettering."
5. ASME Y14.3 (latest edition), "Multi and Sectional View Drawings."
6. MSC-PRO-RM-184, "Information Clearance."
7. MSC-PRO-SEC-54603, "Identifying, Marking, and Protecting Official Use Only (OUO) Information."
8. TFC-BSM-CP_CPR-C-17, "Interface Management."
9. TFC-BSM-IRM_DC-C-02, "Records Management."
10. TFC-BSM-IRM_DC-C-07, "Vendor Processes."
11. TFC-ENG-DESIGN-C-06, "Engineering Change Control."
12. TFC-ENG-DESIGN-C-09, "Engineering Drawings."
13. TFC-ENG-DESIGN-C-61, "Fabrication Change Control."
14. TFC-ENG-STD-12, "Tank Farm Equipment Identification Numbering and Labeling Standard."
15. TFC-OPS-OPER-C-32, "Tank Farm Temporary Component Identification Tags."

ATTACHMENT A – GUIDE TO HISTORICAL DRAWING NUMBERS

The Hanford drawing system has a legacy of drawings that do not conform to current practices. This guide will assist in interpreting the drawing numbering system from the early days of Hanford and from irregularities in the drawing tracking system

A. The following designations are a legacy of Hanford's early days.

- AEC - Used for 700 and 1100 Areas (Atomic Energy Commission drawing file)
- SP and P - Used for 100 H and 100 C Areas
- M-Series - Used for Hanford area maps
- D and W - Used for original DuPont drawings (W = Arrangements/Profiles; D = Details)
- SK-Series - Assigned to temporary drawings for offsite procurement, experimental equipment, limited-use test equipment and conceptual designs.

The 400 Area, FFTF facility, has a number of Architectural-Engineering (A-E) drawings that have various drawing number assignments. These drawings are maintained as a special case in the Hanford drawing system. Some examples of the drawing numbers are: 00369, 30703726-000, 375, 6083-01-301, 671C499, 6MD13007-2D1, A888-6001, AA-4698, P-C418, SKT-241, T73065-300, W-22027-17-20, W-26007, S-06-07-1.

NOTE: Drawing prefixes AEC, SP, P, M, D, W, and SK are record drawings only; all new drawings use an "H" prefix.

B. Drawing number irregularities include the following:

- Certain 202-A building drawing numbers (200 Area) -

  Example: H-2-53505-M. Disregard the letter designator "M" in this example. These letters are to be removed as part of the next regular revision. New drawings calling out these drawings as a reference will omit the letter designator.

- Certain 222-S, 284-E, and 284-W building drawing numbers (200 Area) - Example: H-II-4428-10.

  The "H-II" was intended to be Roman numeral II, and may be confused with "H-11" (1100 Area drawings). The "-10" suffix is the sheet number. All references to these drawings on new drawings should be, for example, "H-II-4428 sheet 10." Revisions to these drawings do not require that the Roman numerals be changed to Arabic. New drawings developed for these buildings use "H-2" prefixes and conventional sheet identification.

- Certain "H-4" drawings and some early instrument drawings using "H-4" drawing numbers were used for site-wide applications.

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE

Table B-1. Startup Layer Naming Standard - General Layering For All Disciplines.

Note: Selected layers from the general layering for all disciplines are added to the drawing setup models as necessary to define and separate drawing data.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
	AUTOCAD PROGRAM			
0	AutoCAD generated. Not for project drawings; used for standard symbol creation	White	Continuous	Pen No. 2
DEFPOINTS	AutoCAD generated; associative dimensioning definition points automatically on this layer; used for display only, as AutoCAD will not print.	White	Continuous	Pen No. 2
GENERAL LAYERS				
?O-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
[2]?T-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
[2]?T-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
[2]?M-DIM	Dimensions	253	Continuous	Pen No. 1
[2]?O-VPT	Paper space Viewport border	25	Continuous	Non-print
[2]?O-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
[2]?E-EXST	Anything existing to remain	8	Phantom	Pen No. 1
[2]?D-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
[2]?C-CLINE	Center line	Blue	Center	Pen No. 2
[2]?X-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
[2]?H-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
[2]?V-MLN	Matchlines	Red	Phantom	Pen No. 5

The "?" is replaced with the correct Discipline Identifier; see Section 3.3.2.

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-2. Startup Layer Naming Standard - Architectural Drawings.

Note: When additional layers are created to specify discipline information, other than architectural, the object/function identifier from the appropriate discipline table should be used to define the drawing data. The architectural discipline identifier should be used and the applicable plotter pen number assigned.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
AO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
AT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
AT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
AM-DIM	Dimensions	253	Continuous	Pen No. 1
AO-VPT	Paper space Viewport border	25	Continuous	Non-print
AO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
AE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
AD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
AC-CLINE	Center line	Blue	Center	Pen No. 2
AX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
AH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
AV-MLN	Matchlines	Red	Phantom	Pen No. 5
ARCHITECTURAL DRAWING SPECIFIC LAYERS				
AO-ACCESSORY	Accessory items - including furniture, HVAC equipment, plumbing fixtures, people, trees, vehicles, etc.	White	Continuous	Pen No. 2
AO-CEILING	Ceiling - SATC, hanger wires, etc.	White	Continuous	Pen No. 2
AC-COLUMN	Building column lines	White	Center	Pen No. 2
AO-DOOR	Interior and exterior	Magenta	Continuous	Pen No. 2
AO-DOORSPEC	Door tag (Architectural Steering Group users only)	White	Continuous	Pen No. 2
AO-FLOOR	Floor plan and background	8	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-2. Startup Layer Naming Standard - Architectural Drawings. (cont.)

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
ARCHITECTURAL DRAWING SPECIFIC LAYERS (Continued)				
AO-HEADER	Door header (use with ceiling plan)	White	Continuous	Pen No. 2
AO-SCHEDULE	Room, door, finish, and window	Cyan	Continuous	Pen No. 3
AO-STAIR	Interior and exterior	White	Continuous	Pen No. 2
AO-TAG	Tags for miscellaneous equipment, windows, etc.	White	Continuous	Pen No. 2
AO-WALLS	Interior and exterior	Cyan	Continuous	Pen No. 3
AO-WINDOWS	Interior and exterior	White	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-3. Startup Layer Naming Standard - Structural Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
SO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
ST-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
ST-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
SM-DIM	Dimensions	253	Continuous	Pen No. 1
SO-VPT	Paper space Viewport border	25	Continuous	Non-print
SO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
SE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
SD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
SC-CLINE	Center line	Blue	Center	Pen No. 2
SX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
SH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
SV-MLN	Matchlines	Red	Phantom	Pen No. 5
STRUCTURAL DRAWING SPECIFIC LAYERS				
SC-GRID	Building column grid	253	Center	Pen No. 1
SO-GND	Grade or earth shown on sections	Green	Continuous	Pen No. 4
SO-CONC	Concrete	Yellow	Continuous	Pen No. 4
SO-FRWK	Framework	Cyan	Continuous	Pen No. 3
SO-RBR	Rebar	130	Continuous	Pen No. 4
SO-MECH	Piping or other mechanical	11	Continuous	Pen No. 3
SO-EMBED	Embedments	131	Continuous	Pen No. 3
SO-STL	Steel	130	Continuous	Pen No. 4

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-4. Startup Layer Naming Standard - Civil Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
CO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
CT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
CT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
CM-DIM	Dimensions	253	Continuous	Pen No. 1
CO-VPT	Paper space Viewport border	25	Continuous	Non-print
CO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
CE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
CD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
CC-CLINE	Center line	Blue	Center	Pen No. 2
CX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
CH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
CV-MLN	Matchlines	Red	Phantom	Pen No. 5
CIVIL DRAWING SPECIFIC LAYERS				
CO-GRID	Site Grids, Profile Grids, etc.	253	Continuous	Pen No. 1
CO-SITE	Property lines, boundaries, fences, etc.	60	Continuous	Pen No. 4
CO-ROAD	Roads, trails, parking, etc.	10	Continuous	Pen No. 4
CO-STRL	Structural work	210	Continuous	Pen No. 4
CO-GND	Contours, grade breaks, etc.	Green	Continuous	Pen No. 4
CO-EX-CONT	Existing contours	252	Continuous	Pen No. 2
CO-NEW-CONT	New contours	92	Continuous	Pen No. 2
CO-PIPE	Pipelines and piping	Yellow	Continuous	Pen No. 4

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-5. Startup Layer Naming Standard - Electrical Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
EO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
ET-TXT	General text, notes, callouts and dimensions	White	Continuous	Pen No. 2
EV-MLN	Matchlines	Red	Phantom	Pen No. 5
EH-HIDL	Hidden Lines	Blue	Hidden	Pen No. 2
EO-SYMB	General Hanford Symbology	White	Continuous	Pen No. 2
EX-HATCH	Cross-section Lines	Blue	Continuous	Pen No. 2
EC-CLD	Clouded areas for hold, ECN and Revision	Magenta	Continuous	Pen No. 2
EC-CLINE	Center line	Blue	Center	Pen No. 2
EE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
EM-DIM	Dimensions	253	Continuous	Pen No. 1
EO-VPT	Paper space Viewport layer	25	Continuous	Non-print
ELECTRICAL DRAWING BLDG PLANS, SITE PLANS, ELEVATIONS & DETAILS SPECIFIC LAYERS				
EO-CND	Wire, Cable and Conduit	51	Continuous	Pen No. 3
EO-LTG	Lighting	Cyan	Continuous	Pen No. 3
EO-OHD	Overhead lines	11	Continuous	Pen No. 3
EO-RCP	Switches, Receptacles, Boxes & Wiring Devices	242	Continuous	Pen No. 2
EO-SYMB	Electrical Symbology	White	Continuous	Pen No. 2
EO-UGD	Underground lines (hidden)	132	Hidden	Pen No. 2
ELECTRICAL DRAWING DIAGRAMS, SCHEMATICS & PANEL SCHEDULES SPECIFIC LAYERS				
EO-DIA	Diagrams, one-line, elementary, etc.	91	Continuous	Pen No. 3
EO-SIG	Signal and Interlocks	42	Dashed	Pen No. 2
ES-SCHED	Schedules and Tables	White	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-6. Startup Layer Naming Standard - Fire Protection Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
FO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
FT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
FT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
FM-DIM	Dimensions	253	Continuous	Pen No. 1
FO-VPT	Paper space Viewport border	25	Continuous	Non-print
FO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
FE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
FD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
FC-CLINE	Center line	Blue	Center	Pen No. 2
FX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
FH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
FV-MLN	Matchlines	Red	Phantom	Pen No. 5
FIRE DETECTION DRAWING SPECIFIC LAYERS				
FO-AD	Alarm and detection system	211	Continuous	Pen No. 3
FO-FW	Fire water underground	211	Hidden	Pen No. 3
SPRINKLER DRAWING SPECIFIC LAYERS				
FO-FW	Fire water underground	211	Hidden	Pen No. 3
FO-SS	Sprinkler system	211	Continuous	Pen No. 3
FO-HS-1	Standpipe hose system	211	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-7. Startup Layer Naming Standard - HVAC Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
HO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
HT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
HT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
HM-DIM	Dimensions	253	Continuous	Pen No. 1
HO-VPT	Paper space Viewport border	25	Continuous	Non-print
HO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
HE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
HD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
HC-CLINE	Center line	Blue	Center	Pen No. 2
HX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
HH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
HV-MLN	Matchlines	Red	Phantom	Pen No. 5
HVAC DRAWING SPECIFIC LAYERS				
HO-Phant	HVAC moving parts, alternate positions, etc.	58	Phantom	Pen No. 1
HO-EQP	HVAC or piping equipment	51	Continuous	Pen No. 3
HO-EXH	HVAC exhaust system	171	Continuous	Pen No. 3
HO-PIP	Piping and piping fixtures and hardware	51	Continuous	Pen No. 3
HO-PLM	Plumbing and plumbing fixtures and hardware	201	Continuous	Pen No. 3
HO-RTN	HVAC return system	Cyan	Continuous	Pen No. 3
HO-SUP	HVAC supply system	51	Continuous	Pen No. 3
HVAC/INSTRUMENTATION DRAWING SPECIFIC LAYERS				
IO-ELEC	Electrical equipment	71	Continuous	Pen No. 3
IO-DCS	Distributed control system instruments	Cyan	Continuous	Pen No. 3
IO-ELINE	Electrical signal lines	42	Hidden	Pen No. 2
IO-ILINE	Instrument lines, such as pneumatic	Magenta	Continuous	Pen No. 2
IO-CVAL	Control valves	Cyan	Continuous	Pen No. 3
IO-SLINE	Software link line	Magenta	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-8. Startup Layer Naming Standard - Instrumentation & Control (I&C) Drawings.

Note: When creating additional layers to specify existing and future layers, the preferred color is 8, which is designated to Plotter Pen No. 1.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
IO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
IM-DIM	Dimensioning	253	Continuous	Pen No. 1
IT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
IT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
IO-VPT	Paper space Viewport border	25	Continuous	Non-print
IO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
IE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
ID-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
IC-CLINE	Center line	Blue	Center	Pen No. 2
IX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
IH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
IV-MLN	Matchlines	Red	Phantom	Pen No. 5
P&ID DRAWING SPECIFIC LAYERS				
IO-ELEC	Electrical equipment	71	Continuous	Pen No. 3
IO-INS	Instruments	211	Continuous	Pen No. 3
IO-DCS	Distributed control system instruments	Cyan	Continuous	Pen No. 3
IO-ELINE	Electrical signal lines	42	Hidden	Pen No. 2
IO-ILINE	Instrument lines, such as pneumatic	Magenta	Continuous	Pen No. 2
IO-CVAL	Control valves	Cyan	Continuous	Pen No. 3
IO-SLINE	Software link line	Magenta	Continuous	Pen No. 2
IO-EQP	Equipment	141	Continuous	Pen No. 3
IO-MAJ	Major process lines	Red	Continuous	Pen No. 5
IO-MIN	Minor process lines	Yellow	Continuous	Pen No. 4
IO-PROC	Process line	152	Continuous	Pen No. 2
IO-PIP	Piping valves, fittings and equipment	121	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-8. Startup Layer Naming Standard - Instrumentation & Control (I&C) Drawings. (cont.)

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
PLANS, ELEVATIONS, DETAILS, AND ASSEMBLY DRAWING SPECIFIC LAYERS				
IO-TUBE	Tubing	52	Continuous	Pen No. 2
IO-BGND	Background	8	Continuous	Pen No. 1
IO-PIPE	Piping	12	Continuous	Pen No. 2
IO-BLDG	Building	8	Continuous	Pen No. 1
IO-EQP	Equipment	143	Continuous	Pen No. 1
IO-INS	Instruments	210	Continuous	Pen No. 4
IO-FRM	Panels, racks and cabinets	32	Continuous	Pen No. 2
IO-WRG	Wiring	92	Continuous	Pen No. 2
IO-GND	Grounding	Green	Phantom	Pen No. 4
WIRING/TUBING DIAGRAM DRAWING SPECIFIC LAYERS				
IO-WRG	Wiring	Green	Continuous	Pen No. 4
IO-INS	Instruments	Magenta	Continuous	Pen No. 2
IO-DCS	Distributed control system instruments	132	Continuous	Pen No. 2
IO-TBLK	Terminal blocks	152	Continuous	Pen No. 2
IO-SLINE	Software lines	12	Continuous	Pen No. 2
IO-TUBE	Tubing	Yellow	Continuous	Pen No. 4
LOGIC/BLOCK DIAGRAM DRAWING SPECIFIC LAYERS				
IO-GATE	Logic gate/memory latch	Green	Continuous	Pen No. 4
IO-SPATH	Software signal path	12	Continuous	Pen No. 2
IO-HPATH	Hardware signal path	152	Continuous	Pen No. 2
IO-INS	Instruments	211	Continuous	Pen No. 3
IO-DCS	Distributed control system instruments	Cyan	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-9. Startup Layer Naming Standard – Mechanical Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
MO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
MM-DIM	Dimensioning	253	Continuous	Pen No. 1
MT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
MT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
MO-VPT	Paper space Viewport border	25	Continuous	Non-print
MO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
ME-EXST	Anything existing to remain	8	Phantom	Pen No. 1
MD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
MC-CLINE	Center line	Blue	Center	Pen No. 2
MX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
MH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
MV-MLN	Matchlines	Red	Phantom	Pen No. 5
MN-EQPT	Equipment	White	Continuous	Pen No. 2
MECHANICAL DRAWING SPECIFIC LAYERS				
MO-1DET	Detail	Yellow	Continuous	Pen No. 4
MO-2DET	Detail	Green	Continuous	Pen No. 4
MO-FAST	Fasteners	Cyan	Continuous	Pen No. 3
MO-VEND	Vendor information	8	Continuous	Pen No. 1
MO-SYMB	Mechanical Symbology (true dimensioning and tolerancing)	White	Continuous	Pen No. 2
MP-PHANT	Moving parts, alternate positions, simplified drafting techniques, e.g., screw threads, springs	8	Phantom	Pen No. 1

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-10. Startup Layer Naming Standard - Piping Drawings.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
PO-BRD	Title block, associated blocks, and drawing border	White	Continuous	Pen No. 2
PM-DIM	Dimensioning	253	Continuous	Pen No. 1
PT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
PT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
PO-VPT	Paper space Viewport border	25	Continuous	Non-print
PO-CLD	Clouded areas for Hold, ECN, and revision	Magenta	Continuous	Pen No. 2
PE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
PD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
PC-CLINE	Center line	Blue	Center	Pen No. 2
PX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
PH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
PV-MLN	Matchlines	Red	Phantom	Pen No. 5
PIPING DRAWING SPECIFIC LAYERS				
PO-PIPINGS	Single-line pipe, valves and fittings	Yellow	Continuous	Pen No. 4
PO-PIPINGD	Double-line pipe, valves and fitting	52	Continuous	Pen No. 2
PO-PSUPT	Pipe Supports	White	Continuous	Pen No. 2
PO-GND	Grade	8	Continuous	Pen No. 1
PO-CONC	Concrete	8	Continuous	Pen No. 1
PO-STRUCT	New structures	8	Continuous	Pen No. 1
PP-PHANT	Moving parts, alternate positions, simplified drafting techniques, e.g., screw threads, springs	8	Phantom	Pen No. 1
PO-SYMB	Piping Symbology	White	Continuous	Pen No. 2

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING

- A -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- B -

- C -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- I -

- J -

- K -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- L -

- M -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- P -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- Q -

- R -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- S -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- T -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- W -

- Z -

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING

Civil

0000 .....Drawing List
0100 .....Project Key Map
0101 .....Area Key Maps
0102 .....Area Electrical Key Maps
0103 .....Topography
0104 .....Outside Lines-Water and Gases
0105 .....Outside Lines-Sewers and Piping
0106 .....Overhead Piping, Steam Condensate, Air and Chemicals
0107 .....Outside Lines-Electrical
0108 .....Outside Lines-Telephone and Fire Alarm
0209 .....General Maps
0110 .....Layout or Plot Plans-General Facility
0111 .....Excavation and Finishing Grading
0200 .....Roads, Walks, Parking Areas, Fences, and Airport Runways-Details and Profiles
0201 .....Railroads-Plans, Details, and Profiles
0202 .....Railroad Structures and Details
0300 .....Overhead Lines-Piping-Including Steam, Air, Gas, and Acids
0301 .....Underground Sanitary Water-Piping
0302 .....Underground Process Water-Piping
0303 .....Sewer Lines-Sanitary
0304 .....Sewer Lines-Process
0305 .....Composite of Overhead and Underground Piping
0306 .....Underground Lines, Steam, Air, Gas, and Acids
0307 .....Fuel Oil Storage and Lines
0308 .....Outside Lines-Steam, Air, Gas, and Acids
0400 .....Waste Disposal System-Sanitary: Septic Tanks, Tile Fields, Sewage Disposal Plant, Open Ditches, and Surface Drainage and Storm Drainage
0401 .....Waste Disposal Systems and Burial Grounds-Process: Cribs, Scavenging Impounding Areas and Waste Facility Maps
0402 .....Waste Storage-Tank Farms (including all drawings, except electrical and instrumentation and jumpers)
0403 .....Waste Line Encasements-Diversion Boxes and Related Components
0404 .....Sodium Disposal Area-Burial Grounds
0405 .....Waste Storage Process Underground Tanks
0500 .....Wells, Well Fields-Irrigation Ditches and Water Supply
0501 .....Miscellaneous Survey Data-Columbia River Data, Civil Data
0600 .....Rock Boring
0701 .....Essential Drawings - Simplified
0702 .....Essential Drawings - Fire Walls
0703 .....Essential Drawings – Evacuation

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

Architectural and Structural

0800 .....Architectural-Plans-May include other 0800 Category
0801 .....Architectural-Elevations, Section and Details-Miscellaneous Steel for Stairs, Railing, etc.
0802 .....Architectural-Other (includes schedules, architectural equipment details, such as bins, signs, cabinets, laboratory equipment, etc.)
0803 .....Architectural Doors-Shielding-Windows
0804 .....Architectural-Equipment Locations
0900 .....Concrete Structural-Plans
0901 .....Concrete Structural-Elevations, Sections, and Details
0902 .....Concrete Structural-Shop, Reinforcing and Pour Drawings
0903 .....Concrete Structural-Penetrations, Sleeve and Block out
0904 .....Concrete Structural-Penetrations Embedment Schedules
0905 .....Concrete Structural-Demolition
1000 .....Steel Structural-Plans, Details, Schedules, Equipment Supports, Platforms
1001 .....Steel Structural-Shop or Fabrication Drawings
1002 .....Steel Structural-Penetrations
1100 .....Steel Structural-Other Stop Logs, Underwater Doors, Trap Gates, Special Non-shield Doors, Allowable Floor Load Data
1101 .....Steel Structural-Bench Marks and Control
1201 .....Fire Protection, Fire Barrier Walls

Mechanical

1500 .....Test or Special Purpose Reactor
1501 .....Production or Power Reactor
1502 .....Reactor Fuel Transfer
1507 .....Reactor In-Vessel Storage Model
1503 .....Reactor Instrument Tree and Drive Mechanism
1504 .....Reactor Control Rod and Drive Mechanism
1505 .....Reactor In-Vessel Handling and Drive Mechanism
1506 .....Reactor Core Restraints
1508 .....Reactor Out Shield
1509 .....Reactor Inner Shield
1510 .....Reactor Ex-Vessel Fuel Handling Equipment
1550 .....Reactor Vessels-Arrangements Plans, Elevations, and Sections
1551 .....Internal Structural Component Including Reactor Head
1552 .....Internals, Nonstructural Items Excluding Controls and Fuel Associated Equipment
1553 .....Guard Vessel-Exterior Shields and Other Cavity Components
1575 .....Equipment Outline and Interface Requirement
1600 .....Moderator-Other than Graphite
1601 .....Moderator-Graphite
1800 .....Shielding-Biological
1801 .....Shielding-Thermal
1802 .....Radiation Dose Rates

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

1900 .....Control Systems-Horizontal Rods
1901 .....Control System-Vertical Rods
1902 .....Control System-Poison
1903 .....Tools and Equipment for Horizontal Control Rods and Vertical Safety Rods Renovation
1905 .....Control Rods
1906 .....Control Rods, Assembly Tooling and Handling Equipment
1907 .....Control Rod, Absorber, Drive, Disconnect
1909 .....Rods Safety (SR)
1911 .....Rods Scram (CR)
2100 .....Third Safety System-Ball 3X
2200 .....Process Tubes (This covers all phases or process tubes from entry of water from common header to exit of water to common discharge header also tubes from point charging machine connects to the point that fuel is discharged.)
2201 .....Tools and Equipment (necessary for installation or removal of process tubes and their associated parts. Includes tool dolly)
2202 .....Tools and Equipment for Process Tube Growth Correction
2204 .....Tools and Equipment for Decontamination
2205 .....Tools and Equipment for Over Boring Program
2250 .....Poison Column and Associated Items
2300 .....All Test Equipment Where Operation of Pile is Essential to Operation of Test
2301 .....All Facilities Build into Pile for Testing Purposes
2302 .....Containers for Disposal of Contaminated Equipment (does not include metal handling buckets and shipping casks)
2303 .....Experimental Test Facilities, Excluding Fuel Specimens
2400 .....Charging Machines
2401 .....Discharging and Manipulator for Rear Face Work
2450 .....Fuel Handling-Irradiated (transfer, etc.)
2452 .....Ex-Vessel Irradiated Fuel Handling Equipment
2451 .....In-Vessel Fuel Handling Equipment
2500 .....Vessels, Columns, Tanks, Dissolvers, Heat Exchangers (no moving parts)
2501 .....Sodium Storage Tanks
2502 .....Waste Storage Tanks (contaminated waste)
2504 .....Gas Storage Tanks
2505 .....Sodium Processing Tanks
2600 .....Machines-Process: Agitators, Pumps, Scales, Pulse Generators (moving parts)
2700 .....Machines and Equipment (non-contaminated zones) Shop or General Purpose
2800 .....Cell Equipment Fastened to Cell for Mounting Vessels, Nozzles, Dunnage, Y Pads, etc.
2900 .....Reactor Gas Seal, Including Boots Strips, etc.
2901 .....Gas Seal Tools
3000 .....Fire Protection Sodium Systems
3900 .....Cranes (all types)
3901 .....Elevators
3902 .....Material Handling Equipment such as Conveyors, Pallets, Monorail Systems, Casks, Buckets
3903 .....Crane Doors, Shielded, Non-Shielded
4000 .....Power House Equipment (associated with steam generation)

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

4050 .....Emergency Power Generation Equipment (mechanical)
4100 .....Railroad Equipment and Rolling Stock (including cask car)
4101 .....Motor Vehicles and Modifications
4300 .....Mechanical Equipment for Treatment of Water (other than piping)
4500 .....Impact Wrenches
4501 .....Remotely Operated Connectors
4600 .....Samplers (process, air, stack, gas, etc.)
4700 .....Hoods, Caves, Enclosures (remotely operated equipment)
4701 .....Tools and Equipment Necessary to Operate Equipment in Hoods, Caves, and Enclosures
4702 .....Manipulators
4703 .....Testing Equipment-Destructive
4704 .....Testing Equipment-Nondestructive
4705 .....Equipment Located in Hoods, Caves, Enclosure where Operation is Remote
4706 .....Reactor Capsules-Metallurgical Tests
4727 .....Metallurgical Test Materials, Destructive and
4750 .....Machines and Equipment-Contaminated Zones
4800 .....Laboratory Apparatus
4900 .....Fuel Element Production-General
490010 .....Aluminum Uranium Fuel Elements and Related Components-Caps, Spires, Cans, Sleeves, Cores, Hollow Pieces, or Perfs, Dummies, Spaces, Wafers, Self-Supports
490020 .....Zircaloy-Uranium Fuel Elements, Billets, and Related Components-Cores, Copper or Zircaloy Components, End Caps or Plates, Brazing Rings, Self-Supports, Mixers, Perfs, Dummies
490030 .....Ceramic Fuel Elements and Related Components
490040 .....Plutonium Fuel Elements and Related Components
490050 .....Other Fuel Elements, as Cluster
4901 .....Fuel Element Production-Cleaning and Preparation
490102 .....Core Preparation-Pickle Machine-Etch Machine, Nickel Plating
490104 .....Aluminum Component Preparation-Caps and Can Cleaning Machine, Methanol Still, Detrex Trichlor Still, Trays, Baskets, Racks
490106 .....Sleeve Preparation-Sleeve Cleaning Machine, Baskets
490108 .....Penetration, Loader, Baskets
490110 .....Billet Core Preparation
490112 .....Zircaloy Component Preparation
490114 .....Nose and Cutoff Preparation
490116 .....Other
490118 .....Chemical Tanks and Piping
4902 .....Fuel Element Production-Fuel Element Assembly Equipment
490202 .....Duplex Furnace and Equipment-Ajax Induction Furnaces, Duplex Agitators, Agitator Baskets, Loader Shields, Tools
490204 .....Canning Furnace and Equipment-Canning Jacks, Canning Baskets, Tongs, Shields, Tools
490206 .....Canning Cycle Control, Flex-O-Timer, Valves, etc.
490208 .....Quench Machines, Tanks, and Equipment
490210 .....Machining, Forming, Including Tooling-Acme Gridley Cut-Off Lathes: Monarch Lathe
490212 .....Welders, Buffers, Controls, Collets, and Vacuum Welders
490220 .....Co-extrusion Component and Billet Assembly

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

490222 .....Extrusion Presses, Containers, Dies, and Tools
490224 .....Other, Including Triple Dip, Hot Press, Heat Treatment, Hydraulic Press, Hevi-Duty Resistance Furnaces
4903 .....Fuel Element Production-Testing and Inspection
490302 .....Component Mechanical Inspection-Pickle Inspection, Statistical Sampling, Recovered Core Inspection, Gages
490304 .....Component Electronic or Ultrasonic Testing-Transformation Test, Sort Tester, etc.
490306 .....Fuel Element Inspection-Radiography Inspection, Final Inspection Station, Weld Inspection, Length, Braze and Contour Inspection, Film Developing Equipment
490308 .....Fuel Element Testing, Bond and Pen Tester, Autoclave Test, Bubble Tester
4904 .....Fuel Element Production-Component Salvage and Recover: Scrap Recovery
4905 .....Fuel Element Production-Component Testing (not for new drawings)
4906 .....Fuel Element Production-Component Supporting Facilities (not for new drawings)
4907 .....Fuel Element Production-Special Items-Stampers; Tables; Bins; Mechanical Counters
4920 .....Capsule Storage for Strontium
4921 .....Capsule, Storage for Cesium
4922 .....Fuel Driver Assembly
4925 .....Fuel Closed-Loop In-Reactor Assembly
4928 .....Fuel Special-Purpose Assembly
4931 .....Fuel Material Open Test Assembly
4933 .....Post-Irradiation Open Test Assembly
4934 .....Fuel Open Test Assembly
4935 .....Open Test Assemblies-Tooling
4936 .....Materials Open Test Assembly
4937 .....Reflector Assembly
5000 .....Optical Systems and Devices (including TV devices)
5001 .....Viewing Windows and Ports
5002 .....Periscopes
5003 .....Fuels Development
500301 .....Machines, Mechanisms, and Dies for Forming, Fabricating, or Assembling
500302 .....Mechanisms for Testing, Inspection, Calibration, etc.
500303 .....Special Tools, Wrenches, etc.
500304 .....Baskets, Tubes, Containers, and Component Parts
500305 .....Vacuum Chambers and Component Parts and Equipment
500306 .....Equipment Support, Storage Racks, Hand Trucks, Tables, etc.
5010 .....Shipping Containers, Boxes, Pallets Conforming to DOT and RDT Regulations

Control Systems

5900 .....Instrumentation-General, Index, Notes, Listings
5901 .....Plans, Section, Elevations and Details (including conduit and tubing)
5902 .....Panel Schedules, Wire Run Lists
5903 .....Wiring Diagrams (connections and inter-connections), Elementary
5904 .....Cable Schedules 5905 Tubing Run List
5906 .....Equipment Requirements

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

5907 .....Equipment Arrangements
5908 .....Schematic Diagrams

Sub-Subject

04.....Process Radiation Monitor
05.....Personnel Radiation Monitor
06.....Underwater Monitor
07.....Fuel Monitor
08.....Pressure Monitor
09.....Temperature
10.....Process Water Monitor and Sampling
11.....Process Water
12.....Process Gas
13.....Pile Motion
14.....Calculator (Power)
15.....Safety Circuits
16.....Biological and Thermal Shield T/C System
17.....Ventilation Controls
18.....Power Plant Controls
19.....Dissolver Cells
20.....Metal Solution Feed Preparation
21.....Aqueous Make-Up
22.....Solvent Treatment
23.....Waste Treatment
24.....Pre-cycle
25.....Partition
26.....Plutonium Decontamination
27.....Uranium Decontamination
28.....Recovered Acid Storage
29.....UNH Storage
30.....Chemical Storage
31.....Outside Catch Tanks
32.....Tank Farms
33.....Off-Gas Treatment
34.....Extractors
35.....Stack Sampling
36.....Test Hole Facilities
37.....Seismoscope
38.....Optical
39.....Sodium Systems
40.....Flow and Temperature Monitor Data Logging System
41.....Main Data-Logging System
42.....Rod Control System
43.....Primary and Secondary Loop Instrumentation
44.....Control Room and Miscellaneous Instrumentation
45.....Moisture Detection

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

46.....Argon Systems
47.....Helium Systems
48.....Products of Combustion Detectors
49.....Instrumentation Service Piping, System SDD No. 23
50.....Instrumentation Radioactive Waste, System SDD No. 24
51.....Instrumentation Heating and Venting, System SDD No. 25
52.....Instrumentation Plant Fire Protection, System SDD No. 26
53.....Instrumentation Reactor Containment System SDD No. 27
54.....Instrumentation Reactor, System SDD No. 31
55.....Instrumentation Heat Transport System, SDD No. 51
56.....Instrumentation Closed Loop, System SDD No. 61
57.....Instrumentation Aux. Liquid Metal System, SDD No. 81
58.....Instrumentation Inert Gas Receiving and Processing, System SDD No. 82
59.....Instrumentation Impurity Monitoring and Analysis, System SDD No. 85
60.....Instrumentation Reactor Plant Control, System SDD No. 90
61.....Digital Data Handling and Display, System 91
62.....Reactor and Vessel Instrumentation, System 92
63.....Process Monitoring and Control Containment System 93-1
64.....Process Monitoring and Control Heat Transport System 93-2
65.....Process Monitoring and Control Closed Loop System 93-3
66.....Process Monitoring and Control Service Piping, System 93-4
67.....Process Monitoring and Control Radioactive Waste, System 93-5
68.....Process Monitoring and Control Heating and Vent, System 93-6
69.....Process Monitoring and Control Fire Protection System 93-7
70.....Process Monitoring and Control Inert Gas Receiving and Processing, System 93-8
71.....Process Monitoring and Control Aux. Liquid Metal, System 93-10
72.....Process Monitoring and Control Refueling, System 93-11
73.....Process Monitoring and Control Maintenance, System 93-12
74.....Process Monitoring and Control Leak Detection, System 93-13
75.....Process Monitoring and Control Annunciator, System 93-14
76.....Process Monitoring and Control Piping and Equipment Electrical Heating, System 93-15
77.....Fuel Failure Monitoring, System 94
78.....Flux Monitor, System 95
79.....Radiation Monitoring, System 96
80.....Plant Protection, System 99
5975 .....Equipment Outline and Interface Requirement

Control Systems - General

6000 .....Instruments-General
6001 .....Temperature
6002 .....Flow
6003 .....Level
6004 .....Pressure
6005 .....Density

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

6006 .....Humidity
6007 .....Moisture
6008 .....Conductivity
6009 .....Speed
6010 .....Viscosity
6011 .....Weight
6012 .....Specific Gravity
6013 .....Weight Factor
6014 .....Radiation
6015 .....Differential Pressure
6016 .....Acidity
6017 .....Interface
6018 .....Vibration
6019 .....Sound
6020 .....Component of a Mixture

Sub-Subject
39.....General
40.....Recorder
41.....Controller
42.....Indicator
43.....Alarm
44.....Recorder Controller Alarm
45.....Indicator Controller Alarm
46.....Integrator
47.....Self-Actuated Regulating Valve
48.....Transmitters
49.....Primary Elements
50.....Accelerator
51.....Alpha
52.....Amplifier
53.....Analyzer
54.....Calculator
55.....Calibrator
56.....Camera
57.....Chambers
58.....Checkers
59.....Counters
60.....Probes

Electronics - General

6500 .....Electronics-General (wave type-includes radio, TV, microwave and laser)
6501 .....Electronics-Plans, Elevations, Sections, and Details
6502 .....Electronics-Wiring Diagrams (elementary, connection, and inter-connections)
6503 .....Electronics-Transmitters Amplifiers, Receivers, and Control Consoles

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

6504 .....Electronic-Wave Guides and Antennas
6505 .....Electronic-Drill and Trim

Flow Diagrams

7000 .....Process Flow Diagrams
7001 .....Engineering Diagrams
7002 .....Instrument Engineering Diagrams
7003 .....Logic Diagrams
7004 .....Piping and Instrument Diagram
7005 .....Piping and Instrument Diagram CLS

Electrical

Numerical Subject Series: 73, 74, 75, 76, and 77 (Cover Inside Building - Electrical) 78 and 80 (Cover Outside Building - Electrical)

7100 .....Electrical-General, Wiring Requirements (This series includes drawings of a composite nature. A drawing which shows a complete installation for a facility.)
7101 .....Block Outs, Sleeves, Plans, and Details
7107 .....Studies-General
7108 .....Material Lists-General
7109 .....Indices
7201 .....One-Line Diagrams
7301 .....Power-Plans, Elevations, Sections, and Details (including grounding, block diagrams, and engineering diagrams)
7302 .....Power-Wiring Diagrams (elementary, connection, and inter-connection)
7303 .....Power-Motor Control Centers, Switchgear, Transformers, and Control Panels
7304 .....Power-Panel Schedules
7305 .....Power-Wire Run Lists, Conduit, Cable, Wire Schedules, and Tray Schedules
7306 .....Power-Grounding Junction, Pull Boxes, Ducts, Raceways
7307 .....Power-Motor and Control Station Schedules
7308 .....Power-Electrical Equipment (motors, heaters, etc.)
7309 .....Power-Lighting Protection
7401 .....Lighting-Plans, Elevations, Sections, and Details
7402 .....Lighting-Wiring Diagrams (elementary, connections, and inter-connections)
7404 .....Lighting-Panel, Schedules
7405 .....Lighting-Wire Run Lists, Conduit, Cable and Wire Schedules
7406 .....Lighting-Junction Pull Boxes, Ducts
7501 .....Electrical Control-Control Panel Arrangements, Signal Plans, Elevations, Sections, and Details
7502 .....Electrical Control-Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7503 .....Electrical Control-Timing Charts
7504 .....Electrical Control-Panel Schedules
7505 .....Electrical Control-Wire Run Lists, Conduit, Cable and Wire Schedules

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

7506 .....Electrical Control-Junction Pull Boxes, Ducts (This series includes remote signaling door bells, buzzers, annunciators.)
7507 .....Electrical Control-Relay and Switch Schedules
7508 .....Electrical Control-Control Equipment and Devices
7575 .....Equipment Outline and Interface Requirement
7601 .....Communications-Plans, Elevations, Sections, and Details
7602 .....Communications-Wiring Diagrams (elementary, connections, and inter-connection) Block Diagrams
7604 .....Communications-Panel Schedules, Equipment, and Devices
7605 .....Communications-Wire Run Lists, Conduit, Wire Schedules, Cables
7606 .....Communication-Junction Pull Boxes, Ducts (This series includes sound-powered telephone and central station system telephones.)
7607 .....Communications-Station Schedules
7701 .....Fire Alarm-Plans, Elevations, Sections and Details
7702 .....Fire Alarm-Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7704 .....Fire Alarm-Panel Schedules
7705 .....Fire Alarm-Wire Run Lists, Conduit, Cable and Wire Schedules
7706 .....Fire Alarm-Junction Pull Boxes, Ducts
7801 .....Cathodic Protection-Plans, Elevations, Sections and Details
7802 .....Cathodic Protection-Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7806 .....Cathodic Protection-Junction Pull Boxes, Ducts
7810 .....Lighting Protection-Plans, Elevations, Sections and Details
7900 .....Criticality Monitoring Systems
7901 .....Plans, Elevations, Sections, and Details
7902 .....Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7904 .....Panel Schedules
7905 .....Wire Run Lists, Conduit, Cable and Wire Schedules
7906 .....Junction Pull Boxes, Ducts
8000 .....Electrical Utilities Transmission and Distribution Operating Drawings (including switching diagrams and distribution maps)
8001 .....Electrical-Maps, Plot Plans, Plans and Profiles, Plans, Elevations, Sections, and Details (includes substation structures)
8002 .....Electrical Only-Wiring Diagrams (elementary, connection, and inter-connection) Area One-Line Diagram
8003 .....Electrical Only-Pole Line Details, Sag Curves
8004 .....Electrical Only-Pole Schedules
8005 .....Electrical Only-Cable Schedules
8009 .....Electrical Only-Transformer Schedules (This series includes all electrical maps other than the "Civil" map series.)

Insulation and Heat Tracing

8200 .....Insulation and Heat-Tracing Reference Designs
8201 .....Insulation and Heater Arrangements

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

8202 .....Insulation Arrangements
8203 .....Heater Applications-Piping
8204 .....Heater Applications-Equipment
8205 .....Heater Schedules
8206 .....Insulation Schedules

Piping

8400 .....Piping-Process Water
8401 .....Piping-Process Water-Front or Rear Face
8402 .....Piping-Process Water-Foundation Cooling, Shielding, Horizontal Rods, Risers, and Cross headers
8403 .....Piping-Process Water-Valve Pits or Tunnels
8404 .....Piping-Cell Arrangements (includes diversion boxes and trenches)
8405 .....Piping-Jumpers
8406 .....Piping-Process-Operating or Sample Galleries
8407 .....Piping-Process-All other to include: Buried or Exposed Inside Piping, Wash Down, Fog Spray, Solvent Blend, Slug Storage, Hot Shop, Utility Outlets Relative to Process Piping: Also Jets, Valves, Miscellaneous Process Piping
8408 .....Piping-Water Drain and Waste (non-contaminated)
8409 .....Piping-Radioactive Liquid Waste (water)
8500 .....Piping-Water-Other than Process
8501 .....Piping-Steam Radiators, Coils, and Condensate
8502 .....Piping-Steam-All Others
8503 .....Piping-Acids and Chemicals
8504 .....Piping-Gas Decay and Disposal
8505 .....Piping-Compressed Air
8506 .....Piping-Vacuum
8507 .....Piping-Refrigeration, Argon
8508 .....Piping-Sprinkler Systems
8509 .....Piping-Drains and Waste Inside-Other than Process
8510 .....Piping-Service (includes grouped services, viz., water, air, steam, drains, etc.; show on the same drawing)
8511 .....Piping-Hangers, Support, Anchors, Guards
8512 .....Piping-Hydraulic
8513 .....Piping-Demineralized and Distilled Water
8514 .....Piping-Fuel Oil
8515 .....Piping-Fire Extinguishing Gas, Vapor, Chemical, or Powder
8516 .....Piping-Heating and Cooling Water
8517 .....Piping-Heating and Cooling NA and NAK, Insulating Requirements
8518 .....Piping-Heating and Cooling Gas
8519 .....Piping-Cover Gas, Argon
8520 .....Piping-Propane
8548 .....Piping-Isometric
8550 .....Piping-NA Reactor Primary

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

8551 .....Piping-NAK Reactor Secondary
8552 .....Piping-NA Receiving and Processing
8553 .....Piping-NA Closed Loop
855301 .....Piping and Mechanical Sections A1, 2, 3
855302 .....Piping and Mechanical Sections B1, 2, 3, 4
855303 .....Piping and Mechanical Sections C1, 2, 3, 4, 5, 6, 7, 8, 9
855304 .....Piping and Mechanical Sections D1, 2, 3, 4, 5, 6
855305 .....Piping and Mechanical Sections E1, 2
855306 .....Piping and Mechanical Sections F1, 2
855307 .....Piping and Mechanical Sections G1, 2, 3
855308 .....Piping and Mechanical Sections H1, 2, 3, 4, 5, 6, 7
855309 .....Piping and Mechanical Sections J1, 2
855310 .....Piping and Mechanical Sections K1, 2, 3, 4, 5, 6, 7
855311 .....Piping and Mechanical Sections L1, 2, 3
8554 .....Piping-NA all Other
8555 .....Piping-Special Loop
8556 .....Piping-NA Piping Components, Traps, Cold, Freeze, and Vapor
8557 .....Piping-Equipment Outline and Interface Requirements
8576 .....Piping-Reference Drawings
8601 .....Essential Drawings - Water
8602 .....Essential Drawings - Fire Protection
8603 .....Essential Drawings - Safety Showers/Eye washes
8604 .....Essential Drawings - Gas
8605 .....Essential Drawings - Steam
8606 .....Essential Drawings - Air
8607 .....Essential Drawings - Vacuum
8608 .....Essential Drawings - Waste

Heating, Venting, Exhaust

8900 .....Ventilation Exhaust and Heating System-Plans, Section Details
8901 .....Heating and Ventilating Equipment Location
8902 .....Heating and Ventilating Schedules, Notes

Air Conditioning Systems

9000 .....Air Conditioning Systems-Plans, Sections, Details

Miscellaneous

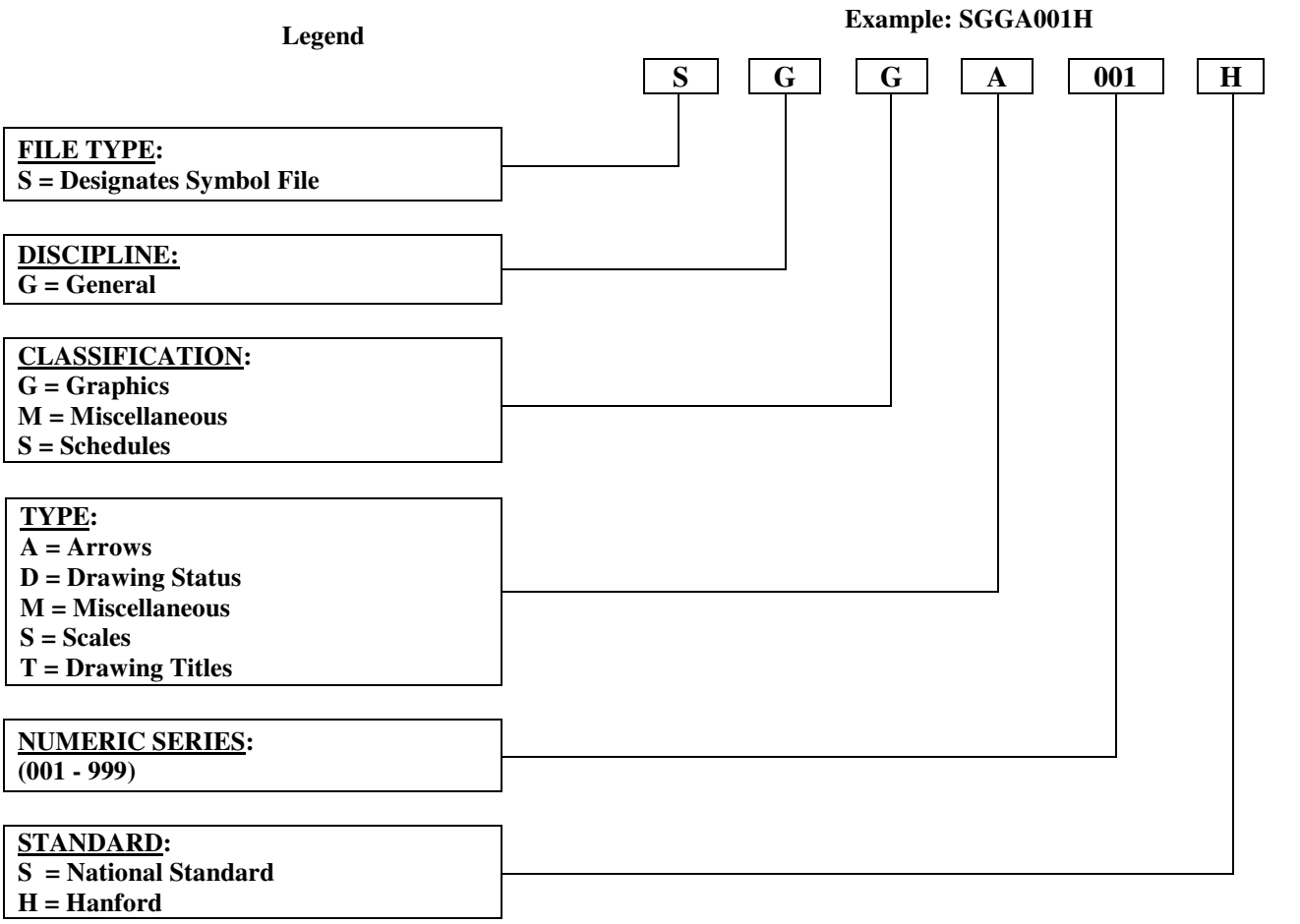
9900 .....Miscellaneous Equipment Pieces or Parts-Not Identifiable as Electrical, Instrument or Mechanical Category; Unrelated to the Assembled Equipment
9901 .....Mechanical
9902…….Electrical
9903…….Instrument

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

Sub-Subject
01.....Scope
02.....Vendor Information
03.....Special Tools

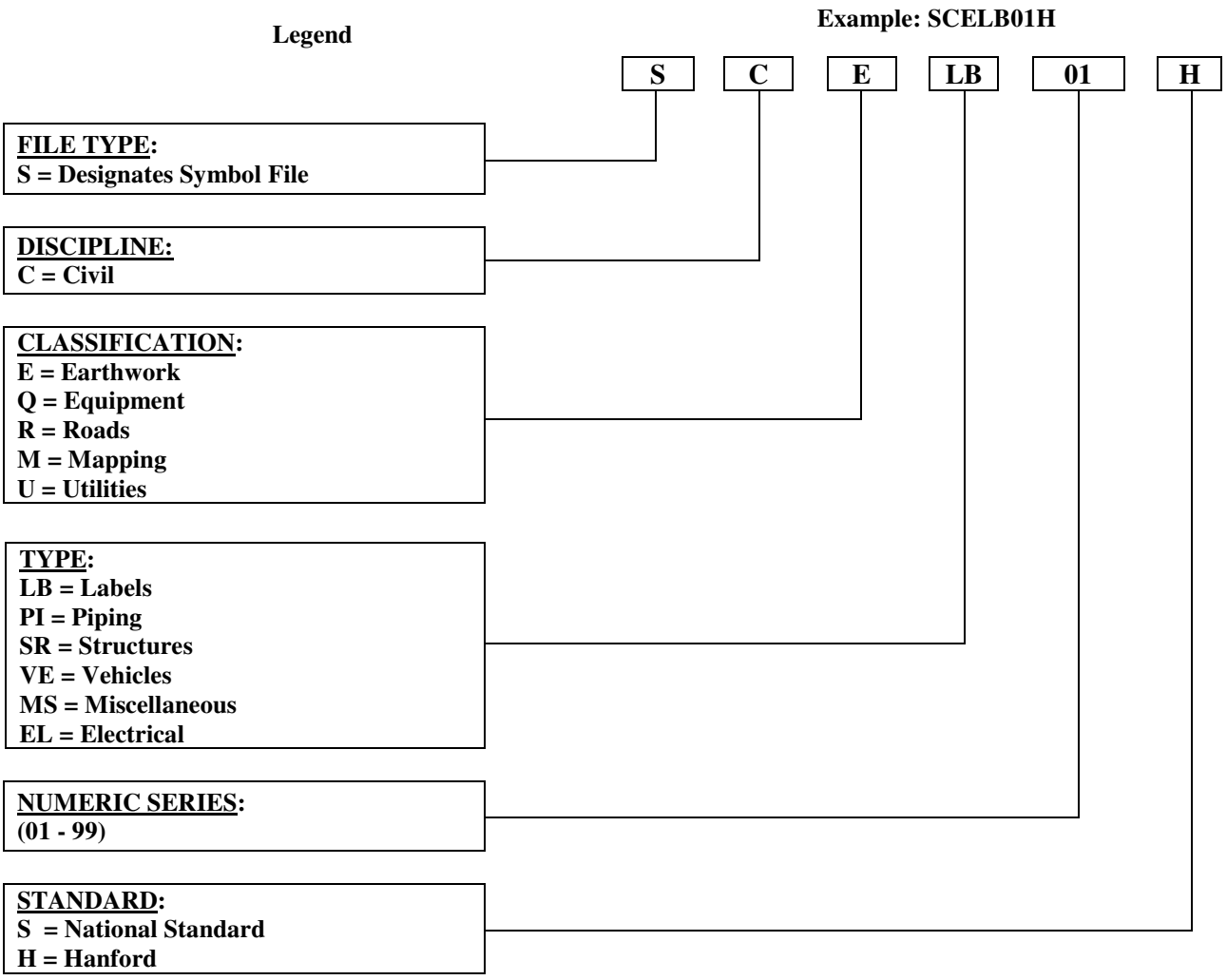
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS

Figure E-1. General Symbology Naming Standards.



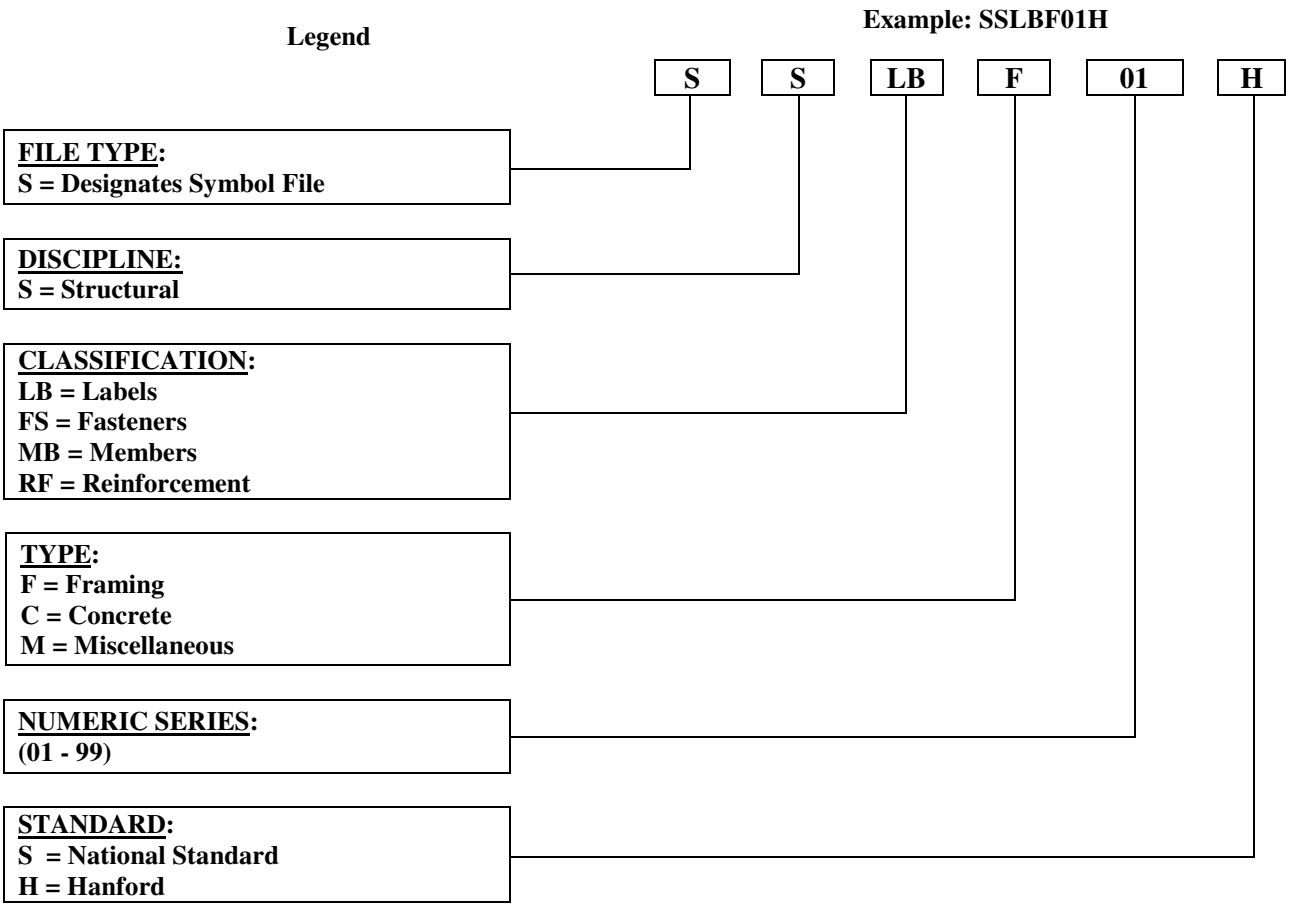
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-2. Civil Symbology Naming Standards.



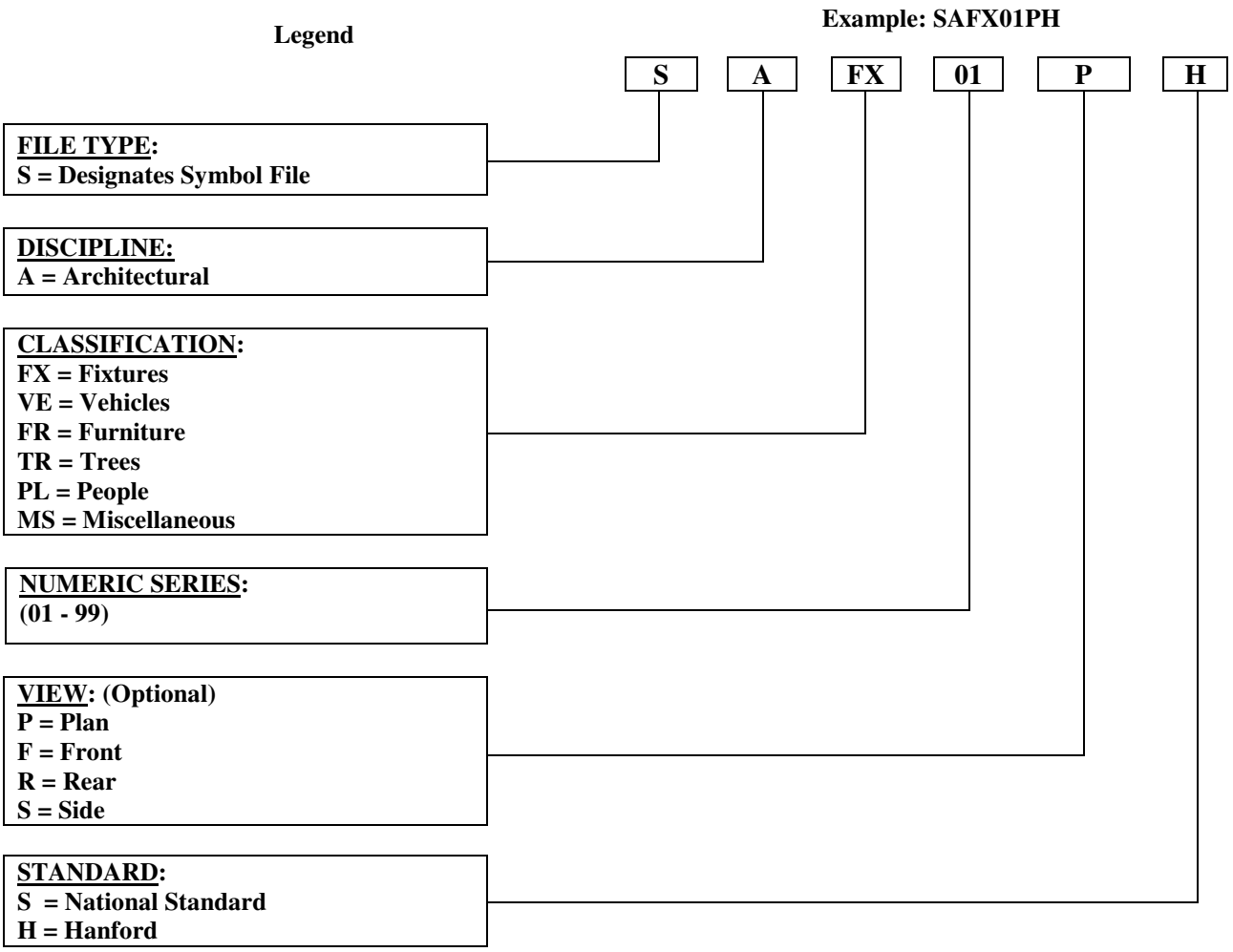
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-3. Structural Symbology Naming Standards.



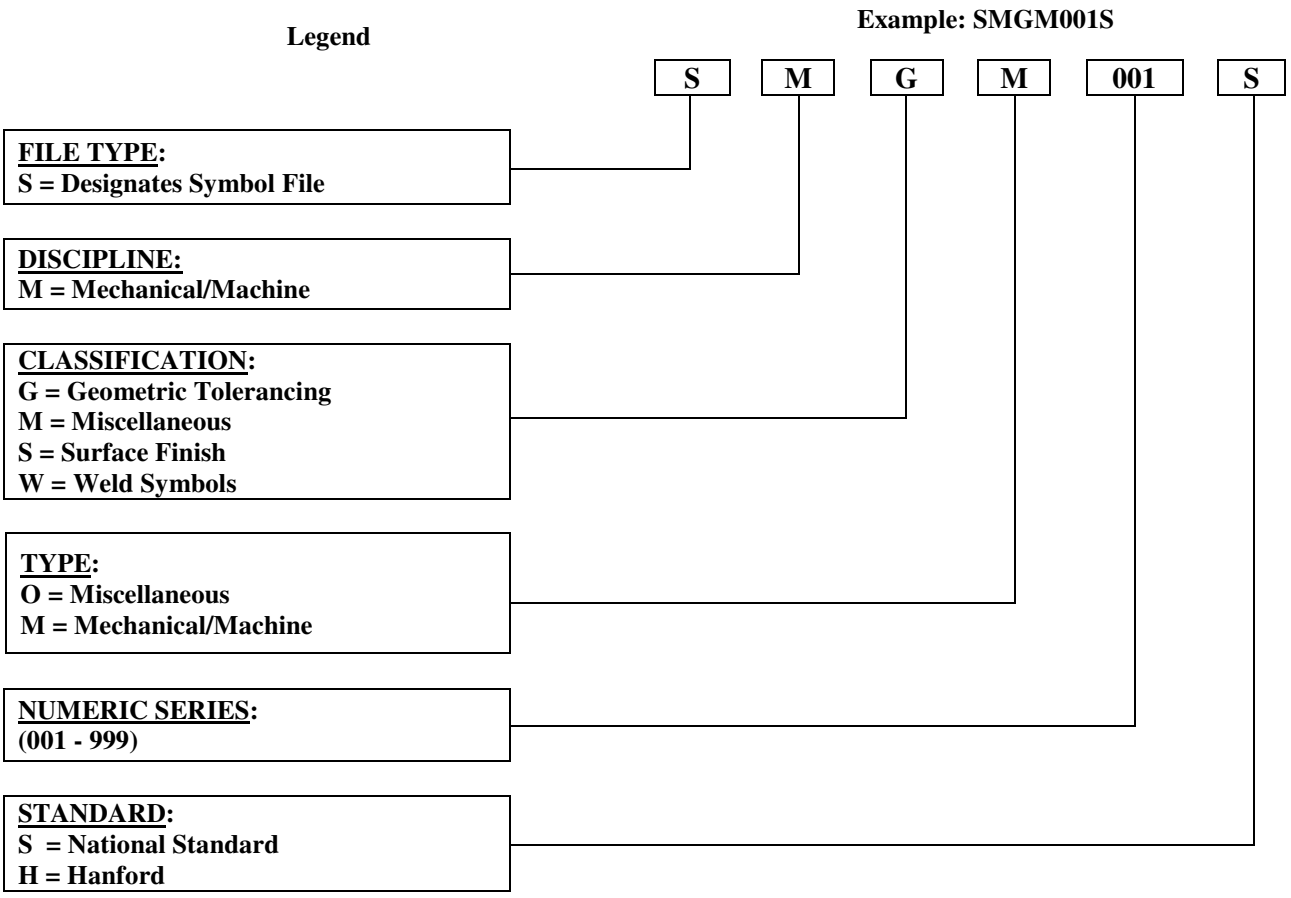
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-4. Architectural Symbology Naming Standards.



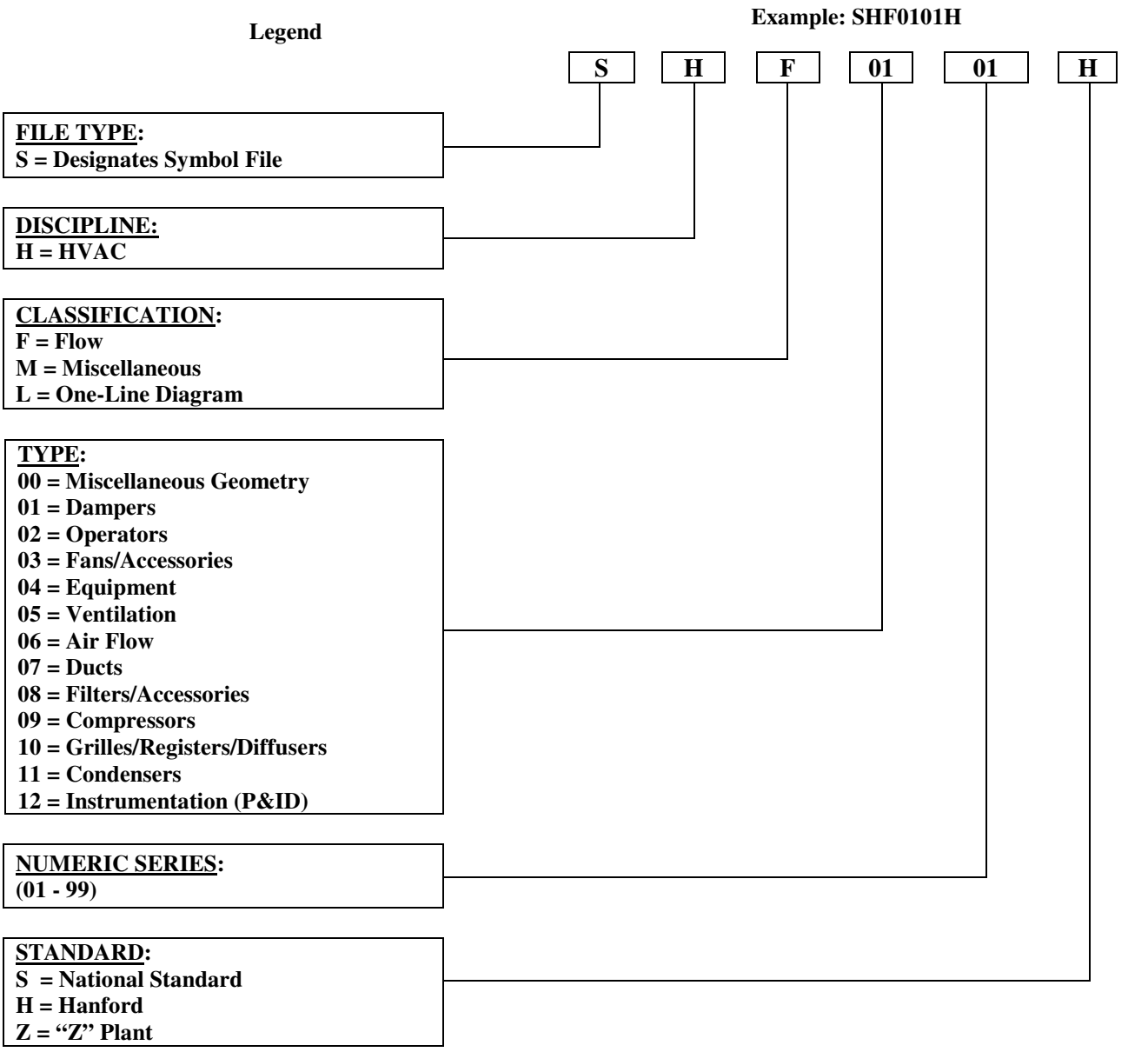
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-5. Mechanical/Machine Symbology Naming Standards.



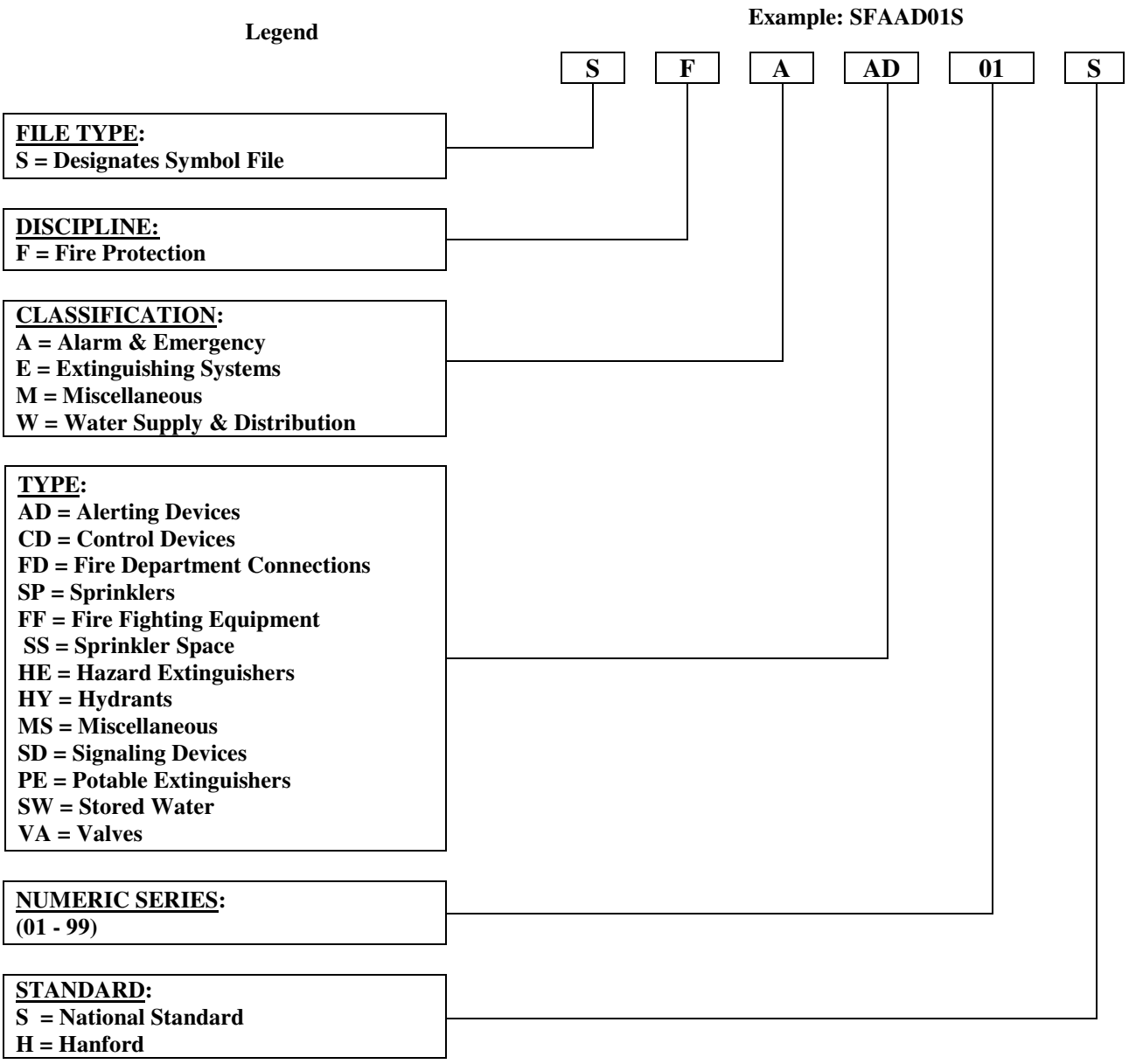
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-6. HVAC Symbology Naming Standards.



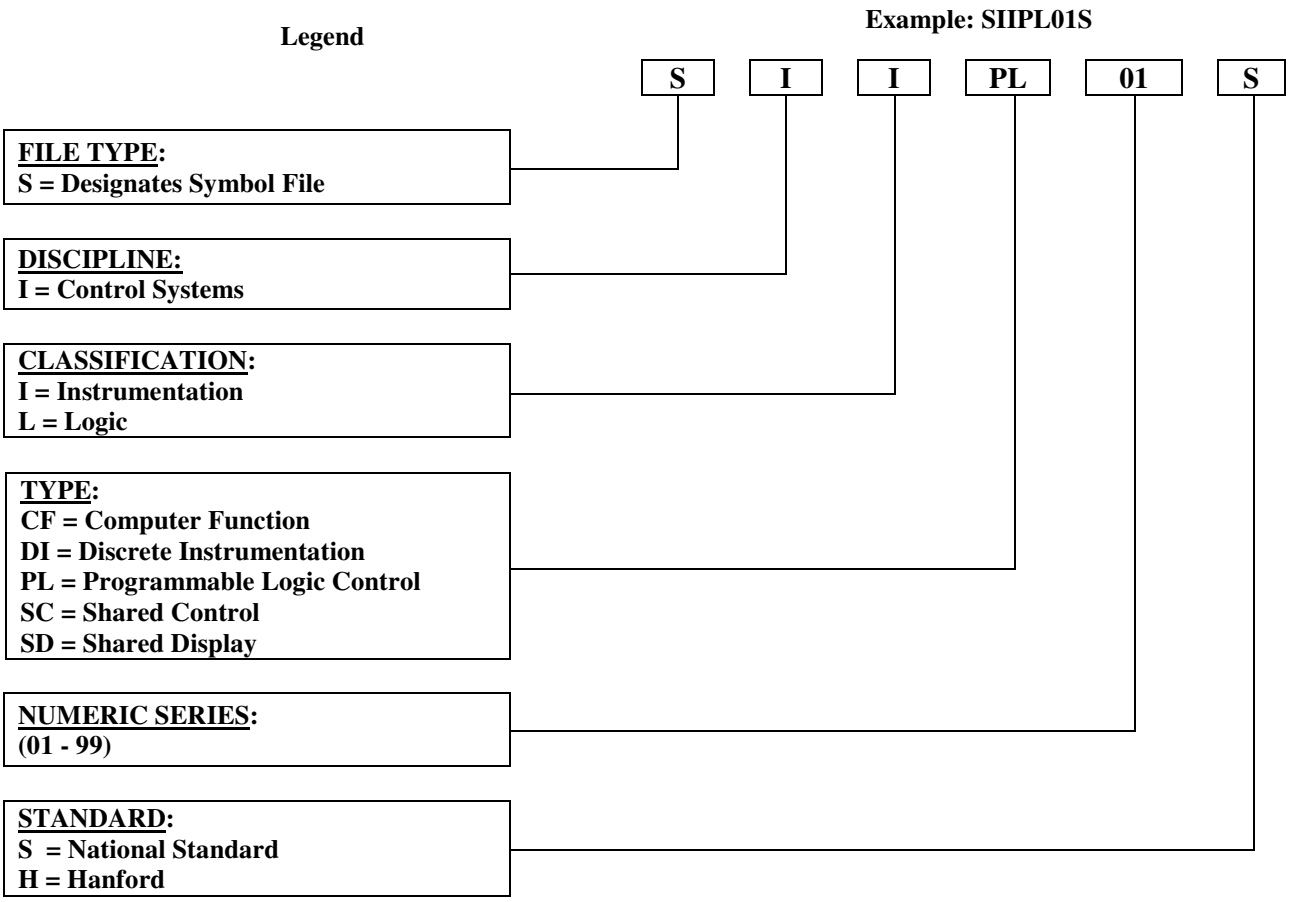
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-7. Fire Protection Symbology Naming Standards.



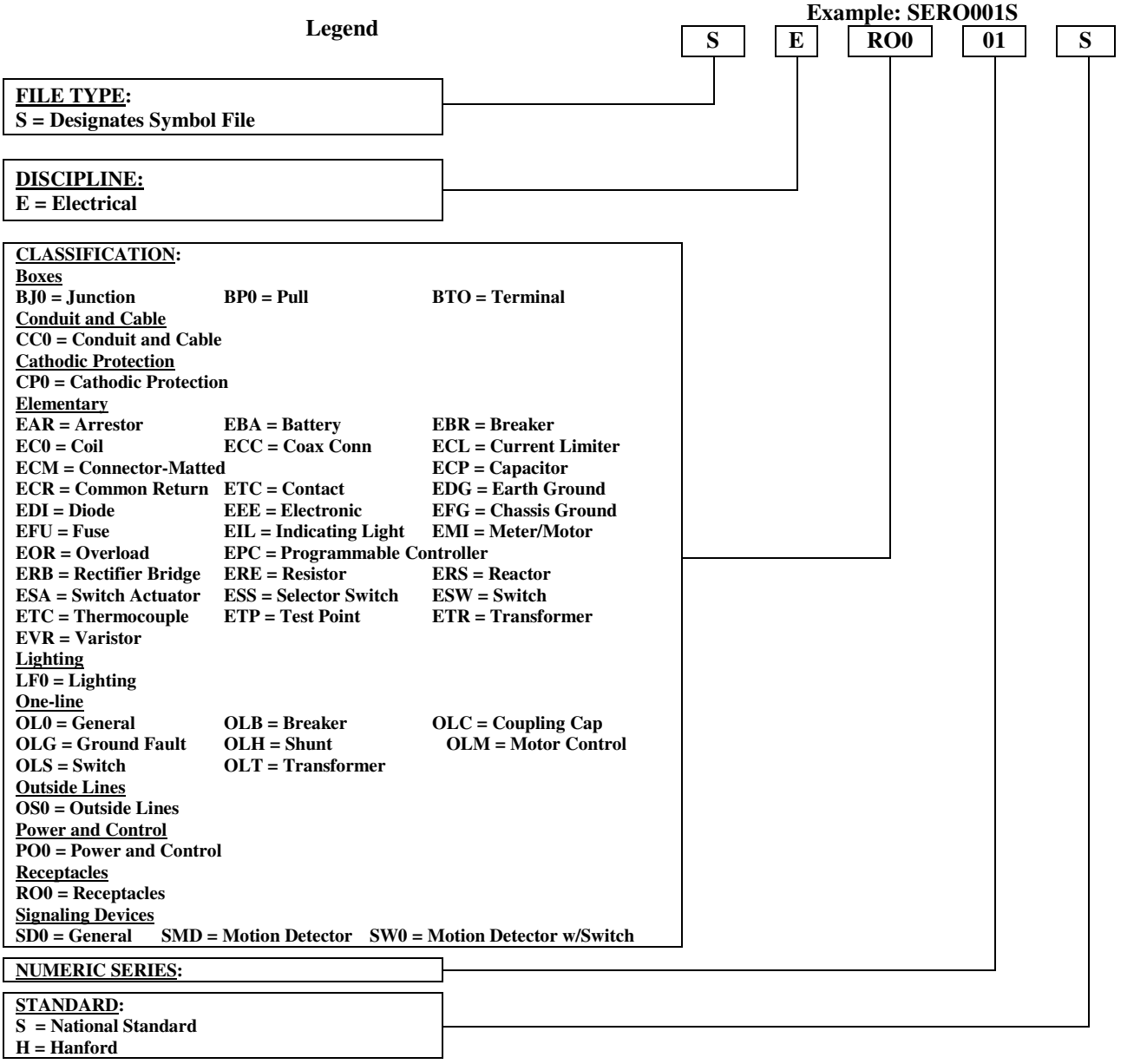
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-8. Control Systems Symbology Naming Standards.



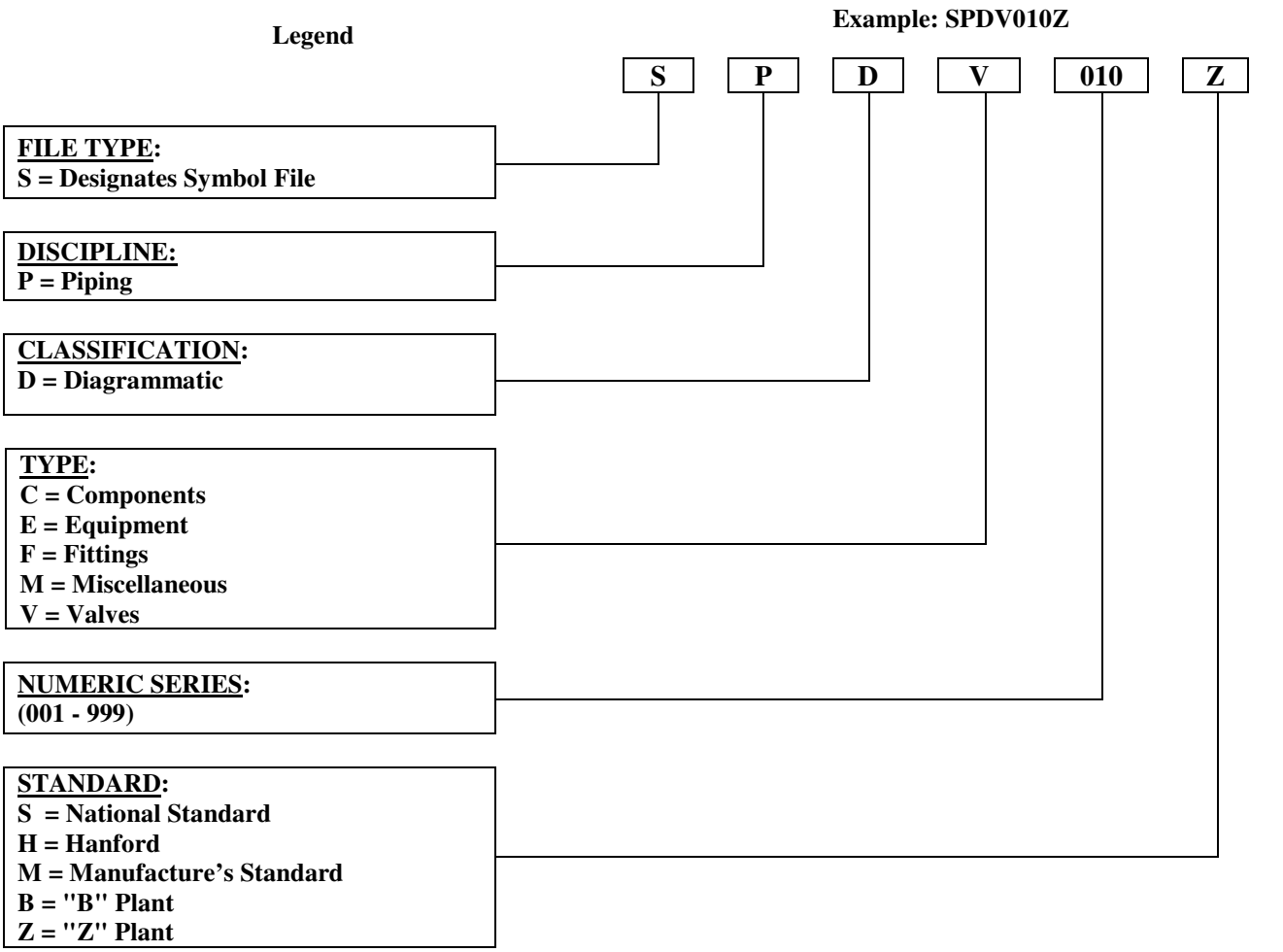
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-9. Electrical Symbology Naming Standards.



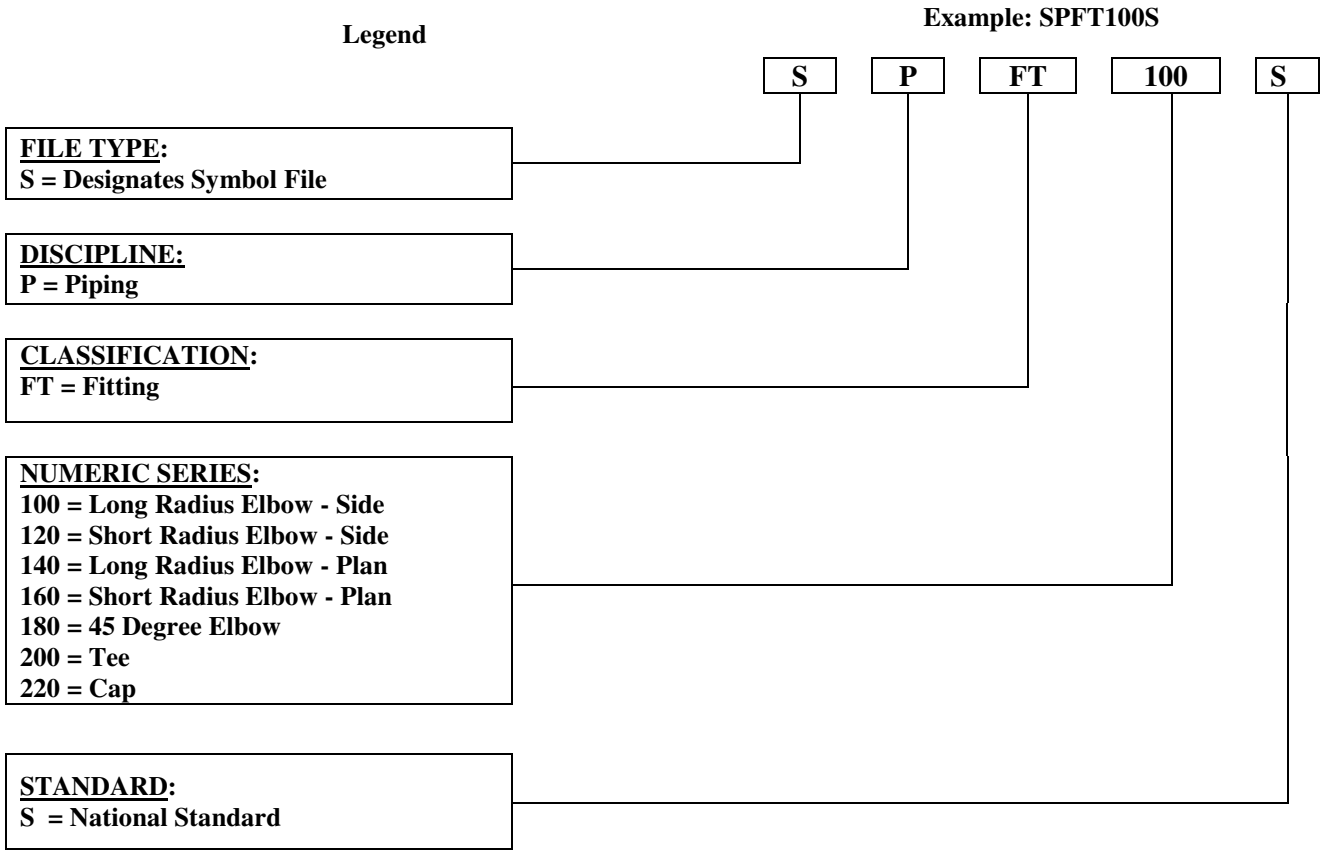
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-10. Piping - P&Id Symbology Naming Standards.



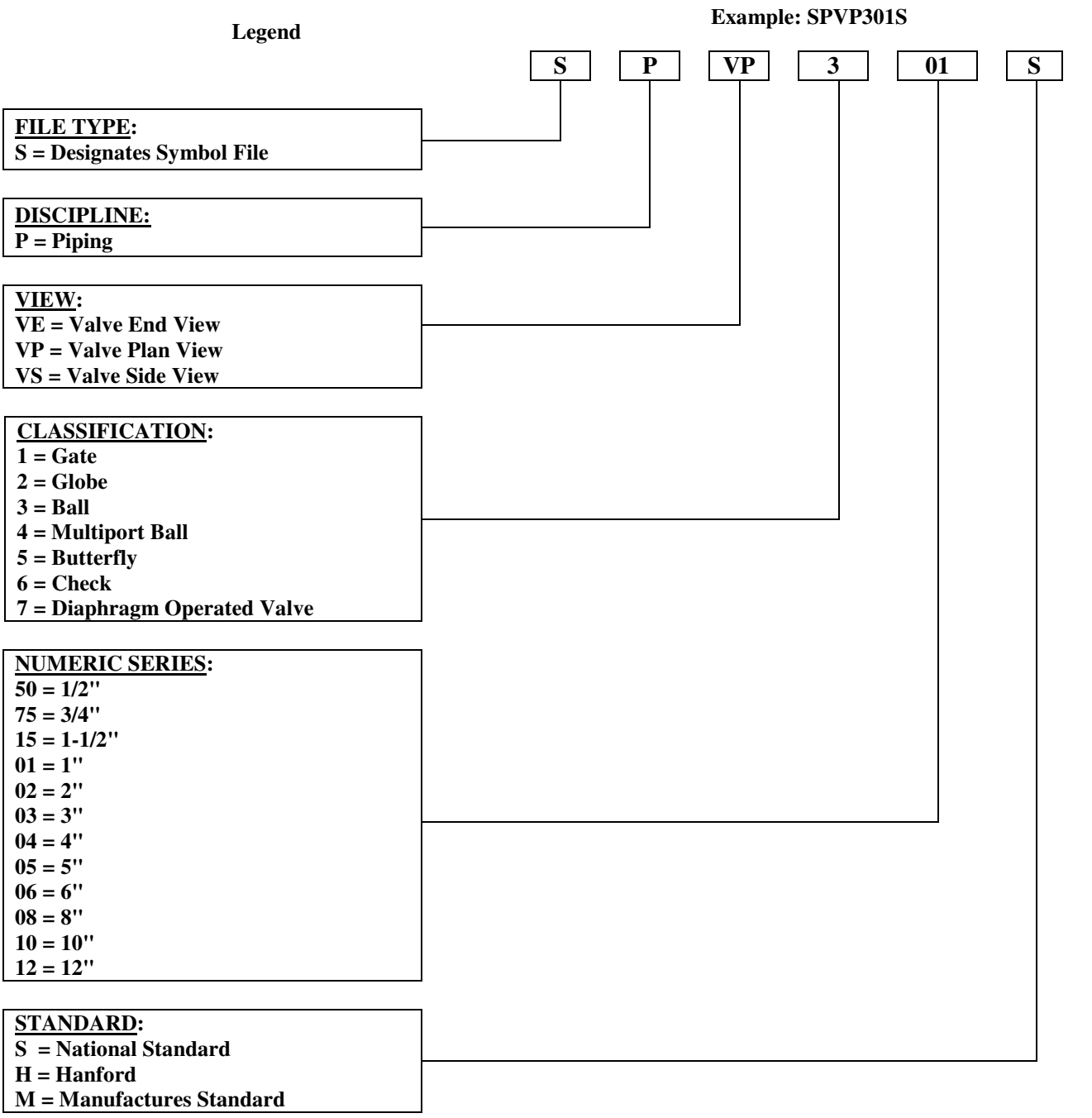
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-11. Piping - Fittings Symbology Naming Standards.



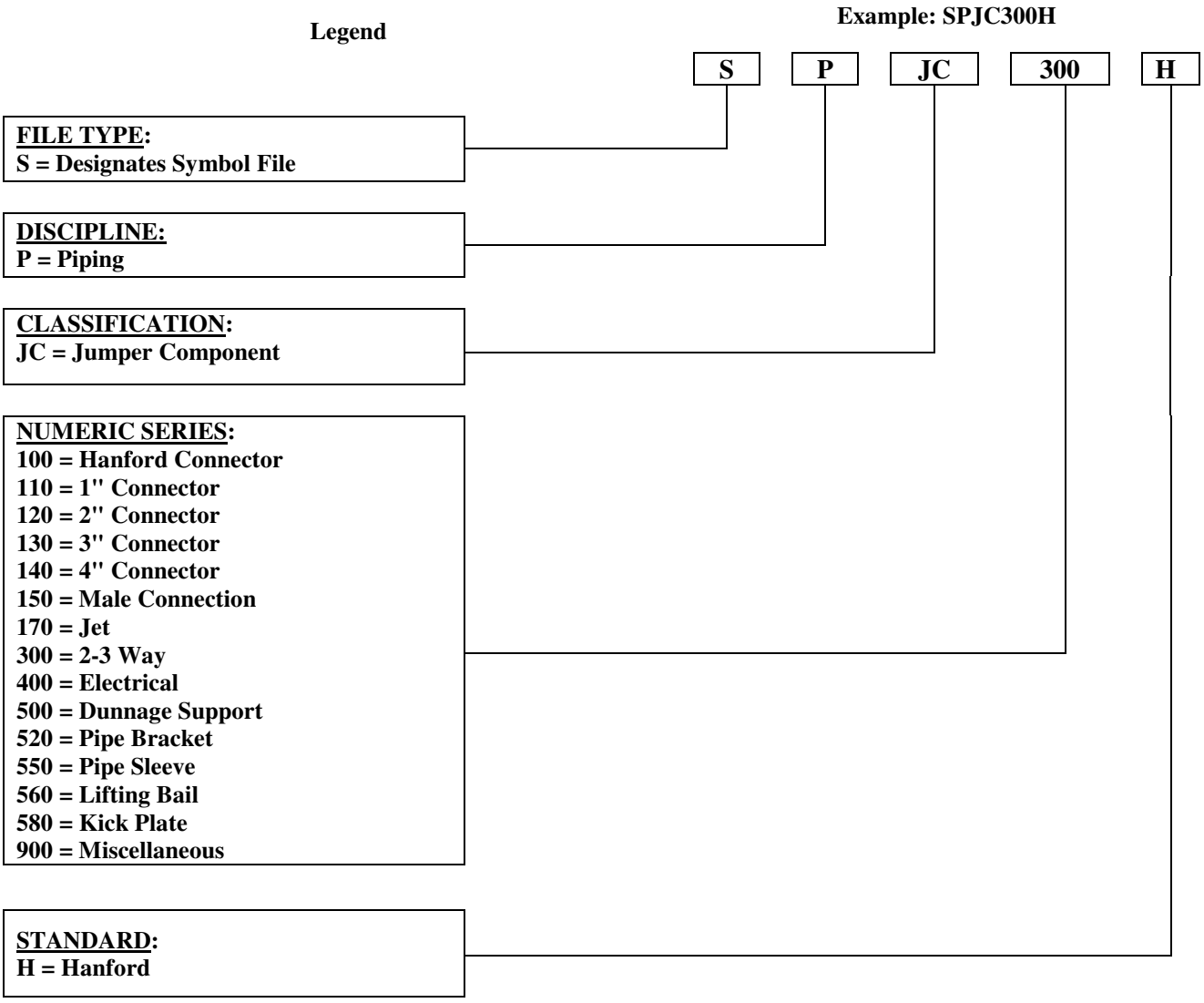
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-12. Piping - Valves Symbology Naming Standards.



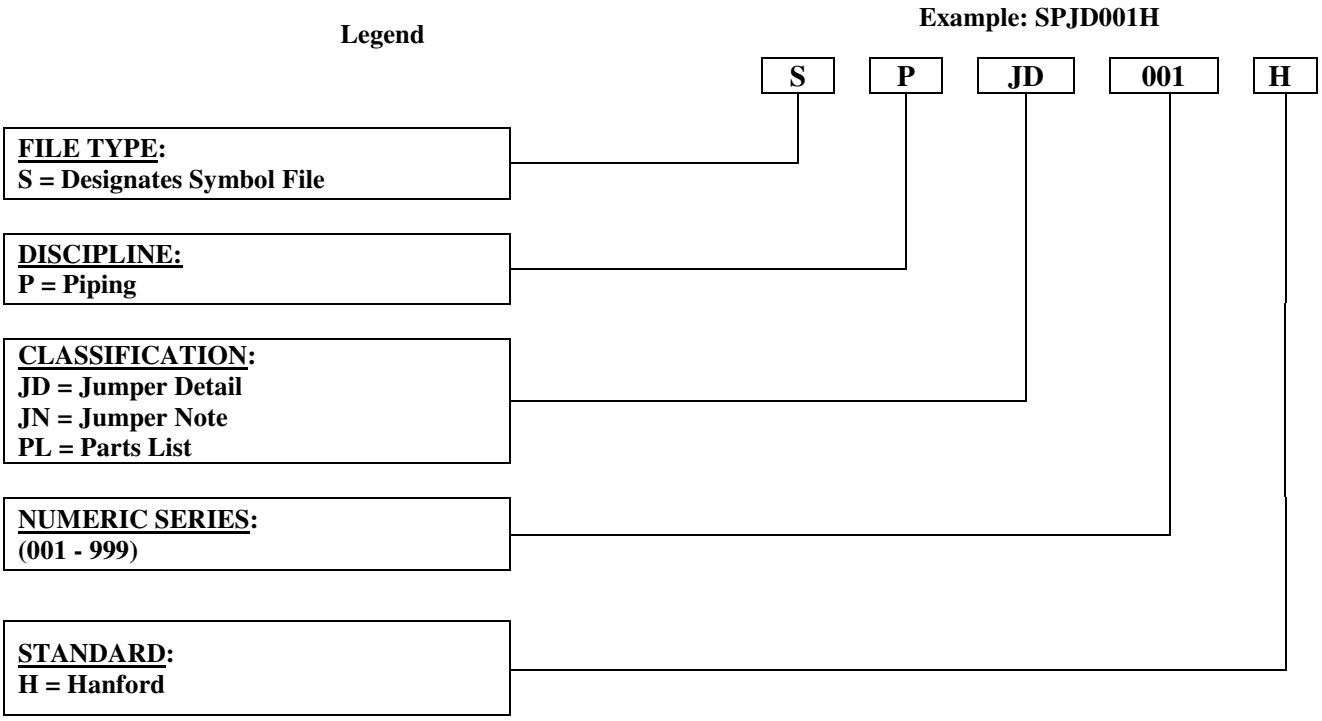
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-13. Piping - Jumper Components Symbology Naming Standards.



ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-14. Piping - Jumper Details And Notes Symbology Naming Standards.



ATTACHMENT F – PARTS/MATERIALS LIST

A. Recommended Practices

The following practices are industry proven and will assist in achieving the Parts/Materials List requirements listed in Section 3.21.

B. Arrangement

The Parts/Materials List should be arranged according to the following hierarchy:

1. Arrangement/installation or assembly
2. Subassemblies
3. Detailed items
4. Designed items
5. Commercial/catalog items
6. Hardware, e.g., bolts and nuts
7. Material items.

Three spaces should be provided between each category for future entries, see Example F-1. The sequence of items in the Parts/Materials List may be broken when items added by drawing development, progress, or revisions have used all reserved spaces.

C. Item Number/Find Number System

Items listed in the Parts/Materials List (assemblies, subassemblies, detailed items, commercial items, and material items) should be identified/located on the field of the drawing by item number as shown in Examples F-2 and F-3. Using this system allows the part number to be located in the Parts List and ensures that unique part numbering is maintained.

The item number is placed in a nominal 13 mm (.50") diameter circle with a radial leader pointing to the depicted item (see Figure F-1a).

Figure F-1. Part Call-Outs.

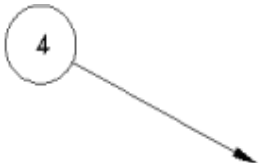


Figure F-1a.

Figure F-1b.

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Views detailing parts or assemblies should always have the item number centered below the primary view in a nominal 16 mm (.63") circle. The nomenclature/description shown in the Parts List should always be used. The lettering height should be 6 mm (.24") high and underlined (see Figure F-1b).

All associated items are to be located on the primary view where possible. Duplicate item number call-outs required for clarification may be used but held to a minimum and identified as reference call-outs by adding "REF" beside the circle.

D. Multiple Item Call-Outs

Where more than one item must be called out at one location, circled item numbers connected to one leader line may be stacked and quantities indicated as shown in Examples F-2 and F-3.

E. Items Not Requiring Pictorial Depiction

Items that do not require pictorial description for detail will be completely described, including dimensions, in the Parts/Materials List.

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

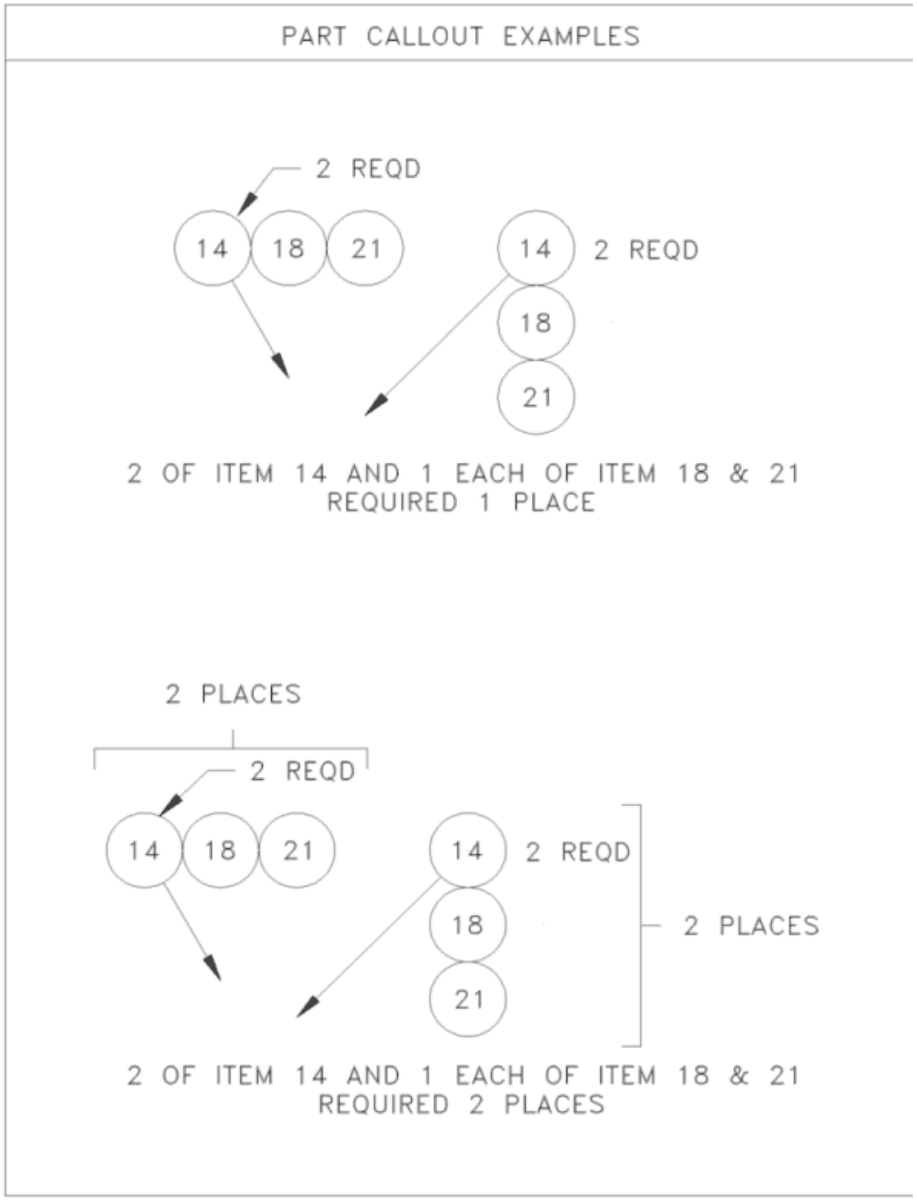
Example F-1. Parts/Materials List.

PARTS/MATERIAL LIST

QTY -020	REQD -010	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHT	ITEM NO
	X	-010	ASSEMBLY, GANTRY		1	1
X		-020	SUBASSY, GRANTRY TRI-ASJUSTABLE		2	2
						3
						4
						5
1	3	-001	STABILIZER ROD	ASTM A36	2	6
	8	-002	HOLD DOWN CLAMP	ASTM A36	2	7
	1	-003	INSTRUMENT RACK	ASTM A36	2	8
	6	-004	MOUNTING BRACKET	ASTM A36	3	9
						10
						11
						12
	3	H-1-48149-020	SCAFFOLD ASSEMBLY			13
						14
						15
						16
	1	FR211-73	DUPLEX PUMP	MILTON ROY CO		17
	2	(SSS60TF8)	VALVE, BALL, 12 mm FNPT, CL 150	ASTM A275 (WHITNEY)		18
						19
						20
						21
						22
	4		SCREW, SCHD CAP, HEX M6X1-4g6gX50 mm L	ASTM A574M		23
AR	AR		TUBING, TS, 101.6 mm X 101.6 mm X 6.35 mm (4"X4"X.25")	ASTM A500, GR B		24
AR	AR		PLATE, 6.35 mm (.25") THK	ASTM A36		25
2	1		CONTINUOUS HINGE, BLANK, W/PIN 1.52 mm (.060") THK X 38.1 mm (1.50") WIDE X 1828.8 mm (72") LONG	TP 304 SST		26

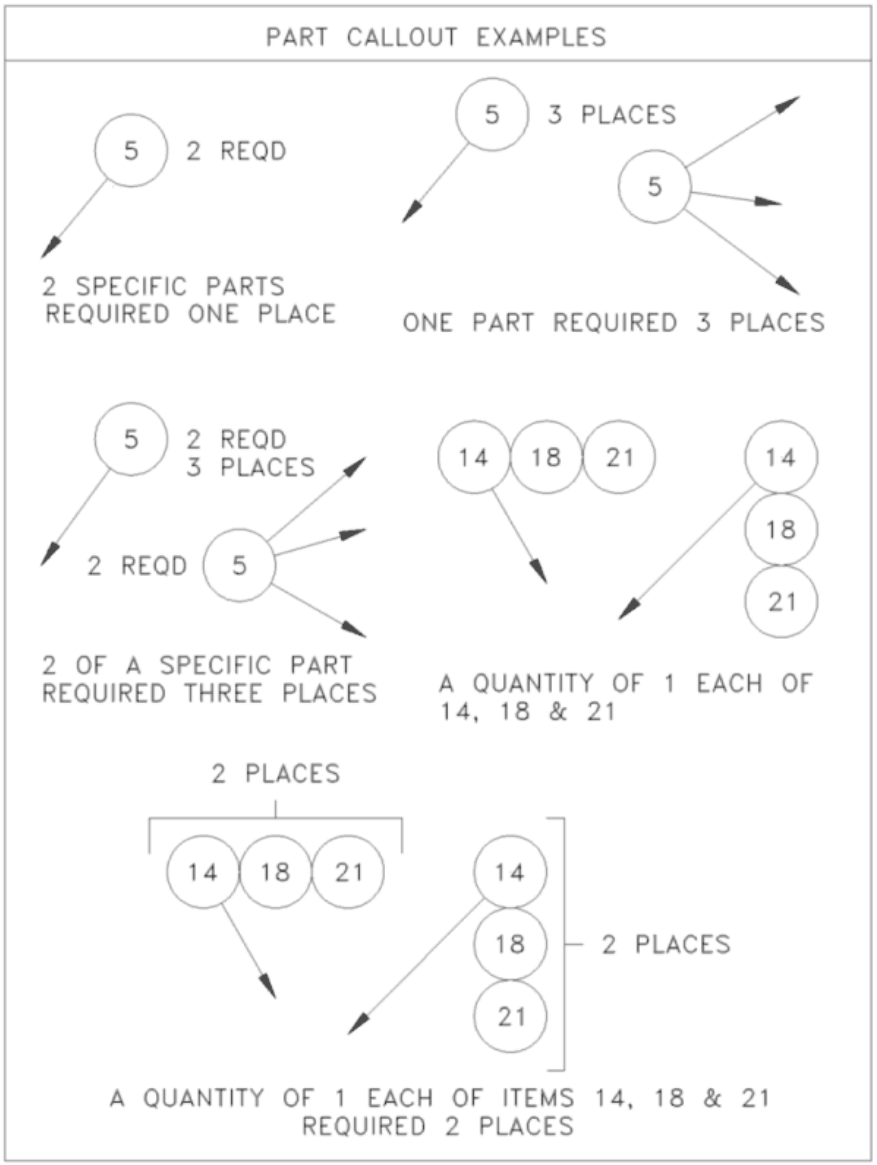
ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Example F-2. Single/Stacked Item Call-Outs.



ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Example F-3. Single/Stacked Item Call-Outs.



ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

F. Parts List Vertical Spacing

To describe the part adequately, the Parts/Materials List vertical spacing may vary as required. Minimum spacing should not be less than 10 mm (.38") as shown by Example F-1.

G. Applied Material

Applied material (see Section 4, Definitions), when required for fabrication, assembly, or installation, should be identified in the General Notes with any required application instructions, unless covered by a separate specification.

H. Optional/Alternate Parts/Materials

The words "or equal" are not to be used for parts or material substitution on drawings. Optional or alternate materials may be provided for on engineering drawings in the following ways:

By referencing multiple brands/materials in the Parts List and/or in the field of the drawing, as applicable.

By specific instructions for optional or alternate items placed in the General Notes.

I. Quantity - Quantity Required Column

The quantities (number of items required) are always for one arrangement, one installation, or one assembly only.

J. Counted Quantities

Counted quantities are to be accurate and described in customary trade units.

K. As Required (AR)

Use AR only when an exact quantity is not known or cannot be easily predetermined (e.g., piping, structural steel shapes, tubing, shims, gasket material).

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

L. Identifying Assemblies

For ease in identifying assemblies, place an X in the quantity (QTY) column where the assembly is placed. The X can be used to quickly identify the items required for the assembly and to indicate that all the quantities in that column are for that assembly.

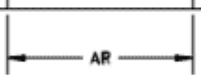
M. Reference Designation Column

This column should be used when unique identifiers are required. When used, the designator must correspond with the designator used in the field of the drawing. The width of the column is to be determined by the information required in the column (see Example F-4).

Example F-4. Parts/Materials List Example (Reference Designation).

PARTS/MATERIAL LIST

QTY -020	REQD -010	REF DES	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHT	ITEM NO
	X			INSTALLATION			1
							2
	1	SW-EV-CS-2	10250T1371	SWITCH, OPR, 3 POSN, SPR RTN FR RIGHT	CUTLER HAMMER		3
	3	SW-P-X37 SW-P-X36-1 SW-P-X36-3	10250T20KB	SWITCH, SELECTOR, 2 POSN MAINTAINED, 1 NO-1 NC CONTACT OIL TIGHT	CUTLER HAMMER		4
	7	DS-11,13,16,18, 19,20,21	10250T37R	INDICATING LIGHT, 120 VAC, XFMR TYPE WITH 6V LAMP & RED LENS, OIL TIGHT, PRESS TO TEST	CUTLER HAMMER		5
	2	DS-12,14	10250T37G	INDICATING LIGHT, 120 VAC XFMR TYPE WITH 6V LAMP & GREEN LENS, OIL TIGHT, PRESS TO TEST	CUTLER HAMMER		6
	1	BQ-C5	G0-405	TOTALIZER, DIGITAL, 110 VAC WITH EXTERNAL RECTIFIER	MOORE INDUSTRIES		7
	1	PS2	111-24-125	POWER SUPPLY, 115 VAC/24 VDC, 125 WATT	RONAN		8
	1	LELL-X37	4130-0X-601	PROBE, LEVEL ASSY WITH CABLE PROBE, WITH ENCLOSURE LENGTH: 145.5"	ENDRESS HAUSER		9



ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

N. Part/Dash Number Column

See Section 3.21.4.

O. Vendor Part Number

Vendor part numbers are the manufacturer's part numbers.

NOTE: The manufacturer's part number is to be used for commercial items. When only a distributor/vendor, e.g., McMaster Carr, Hanford Stores is known as a source, catalog numbers are noted as reference (in parentheses) in the Description Column or Material/Reference Column.

P. Nomenclature/Description Column

Enter the basic name (a noun name) first. The noun name is a noun or noun phrase that best establishes the basic concept of the item. It describes what the item is and what it is used for, not the material or method of fabrication. A compound noun or noun phrase is used only when a single noun is inadequate.

BASIC NAME EXAMPLE	
Bracket	(noun)
Piston	(noun)
Gear Box	(noun phrase)
Terminal Board	(noun phrase)

Use modifiers only when there is more than one type of the basic item used in the assembly (e.g., where two brackets are identified in an assembly, identified as bracket, mounting, and bracket, support).

Q. Description (Vendor [Supplier] Item)

Specify parts to obtain the most cost-effective item. Where possible, use generic descriptions rather than brand names. The description is to specify characteristics that are sufficient for intended end use, but still broad enough in definition to permit open purchasing.

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

R. Hardware and Material Items

List basic names with required modifiers for fasteners and materials (e.g., SCH CAP SCR, ¼-20-UNC-2A, etc.). As required, list material items by form and size description (e.g., TUBE STEEL, 4 X 4 X ¼; PLATE, 2 THK).

S. Material/Reference Column

List the controlling specification for the required material (e.g., ASTM, ACI) followed by the kind of material (e.g., SST, 6061-T6A, CS). Never use the word "COMMERCIAL" to indicate any acceptable grade. The words "ANY GRADE" may be used where the grade of material is not a design factor. Always identify the specific material grade when welding is required. List names of supplier for commercial items, other separate documents controlling material, general notes, etc.

T. Sheet Column

For improved readability, always use this column to note where assemblies, arrangements, or detailed items are depicted on a multi-sheet drawing.

U. Item Number Column

Enter consecutive numbers starting with the number 1. An item number should always be used for each vertical space, including spaces left blank for future use.