



19.1 SCOPE.

19.1.1. Purpose. This Tooling Drawing section provides standardized regulations for the preparation and interpretation of Company tooling drawings. This section is concerned primarily with format and procedures peculiar to tooling drawings.

19.2 APPLICABLE DOCUMENTS. *(none)*

19.3 DEFINITIONS.

19.3.1 Tooling Drawings. Drawings of special equipment for testing, handling, checking, or the fabrication of parts, subassemblies, and assisting in the process of manufacturing these items. They may include drawings of jigs, dies, fixtures, molds, patterns, tapes, gages, or other special equipment or manufacturing aids.

19.3.2 Tool Number. A part or identifying number assigned to a tool.

19.4 RESPONSIBILITIES OF THE TOOL DESIGNER.

19.4.1 Tool Design Responsibility. The Tool Designer is responsible for the preparation of tool designs that will adequately meet the requirements of the tool order. The tool drawing must present a true picture of the tool design, be clear, concise, complete, accurate, and subject to only one interpretation.

19.4.2 Function Of Tool. The tool drawing should indicate the function of the tool and the part number for which the tool was designed.

19.4.3 Tool Design Package. The designer shall present layouts, dimensional calculations, catalogs, design memoranda, part prints and reference prints to the tool drawing checker.

19.4.4 Tool Drawing Corrections. Final correction of the drawing, after checking, should be made by the original tool designer so that he may avoid making the same or similar errors in the future. Final correction of the drawing shall normally take precedence over other work.

19.4.5 Tool Drawing Approval. A drawing changed after it has been submitted to check, or prior to release, shall be resubmitted to the checker for approval.

19.5 RESPONSIBILITIES OF THE TOOL DESIGN CHECKER.

19.5.1 Tool Design Checker Responsibility. The checker is responsible for verifying the functional feasibility of the tool, dimensional accuracy of tool design drawings, and assuring conformance to the standard drafting procedures. The checker is the last person to sign off the drawing except when the Supervisor of the Tool Design Group is required to sign off prior to release. The checking procedure is as stated in SECTION 2.



19.6 DRAWING NUMBERING SYSTEM.

19.6.1 Tool Number Assignment. Once assigned, a tool number is peculiar to that application. Do not reassign it.

19.6.1.1 Multiple Sheet Tool Number Assignment. The tool number identifies one tooling drawing with one title, regardless of the number of sheets on which it is drawn.

19.6.1.2 Tool Number Identification. The tool number also identifies the physical tooling manufactured in accordance with the tooling drawing.

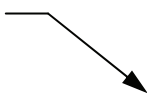
19.7 ASSIGNMENT OF DETAIL NUMBERS.

19.7.1 Detail Number Assignment. Assign or cite a part number for each part of a tool, including commercial parts. The detail number can identify.

- a. An individual part of a tool or assembly.
- b. An assembly of parts which is a portion of the tool.
- c. An assembly of parts which is a portion of another assembly.
- d. Shown and opposite parts and assemblies (See PARAGRAPH 19.7.3.)
- e. Through tabulations each of a series of similar parts of a tool.
- f. Other tools with other tool numbers, if these tools become components of the tool shown on the drawing.

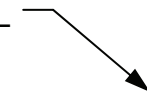
19.7.2 Reference Part Identification. When a tool or other item is shown on a drawing for reference purposes (not a part of the tool), draw it with a phantom outline, and identify it appropriately.

Example:

XXXXXXXX SPINNING FIXTURE 

Standard construction balls, pins, and rolls that are required for fabrication and inspection of the tool shall be drawn in phantom and appropriately identified.

Example:

500 DIA CONSTRUCTION BALL 

Construction balls, rolls, and pins are assigned detail numbers as tool parts only if they are used in the function of the tool.



19.7.3 Shown And Opposite Detail Number Assignment. Shown and opposite parts shall be assigned detail numbers that run in sequence whenever practical. The opposite shall be understood to be a mirror opposite of the shown component. Differences must be clearly indicated by views or notes.

19.7.4 Detail Of Tool Appears Elsewhere Than Callout. When a tool component is detailed in a place other than where called out, the title should consist of a detail number and the word “DETAIL” or “ASSY” as applicable.

19.7.5 Detail Number Changes

19.7.5.1 Change Control. Changes to a tool component after formal drawing release shall be as follows:

- a. When it is practical to rework the original component, the original detail number is retained.
- b. When it is not practical to rework the original component, the original detail number is made obsolete, except when the change is minor, as when a bolt size, type, or length is changed.

19.7.5.2 Parts Deleted. Obsolete details or assemblies are deleted in the Parts List and “lined-out” on the field of the drawing. Once a detail number has been deleted, it is not used again on the same drawing.

19.8 DRAWING FORMAT.

19.8.1 Drawing Arrangement. The title block, general notes, drawing numbers, etc. are located on the drawing as shown in Section 6.

19.8.2 Classification And Espionage Act Stamps. These notes shall not be added to drawings unless required by the cognizant requestor or the security department. When required, the appropriate security classification shall be added to the drawing as directed by the security representative. The security classification must be added prior to any reproduction or duplication of the drawing.

19.8.3 Margins. The margins are made as shown in Section 6. The “J” size drawing has a 4-inch protective flap at the right hand end of the drawing along with a 1-inch margin on top, bottom, and left end of the drawing.

19.8.4 Data Blocks.

19.8.4.1 Block Location. Blocks are located as shown in Section 6. Blocks within the title block which do not pertain to individual designs are to be crossed out. Parts list format may be varied to suit specific requirements.



19.9 DRAWING TITLES.

19.9.1 Title Assignment.

19.9.1.1 Title Construction. Titles on all tool design drawings shall consist of a basic name, a modifier, and a modifying phrase.

19.9.1.2 Title Description. The basic name (noun or noun phrase) shall describe the tool or usage of the tool.

Example:

FIXTURE
JIG
DIE

19.9.1.3 Title Restriction. The method of manufacture of the tool shall not be used in the basic name.

Example:

WELDED, MACHINED, or CAST

19.9.1.4 Singular Form Of Basic Name. The singular form of the noun or noun phrase is used as the basic name except where the only form of the noun is plural;

Example:

BELLOWS, TONGS, SCISSORS

or, where the drawing contains multiple single items or tabulations.

Example:

SPACERS, BOLTS, WASHERS

19.9.1.5 Modifier As A Single Word. The modifier may be a single word or a qualifying phrase. The modifier shall serve to narrow the area of concept established by the basic name.

Example:

FIXTURE, ALIGNMENT

19.9.1.6 Modifier As A Phrase. The modifying phrase shall be separated from the preceding modifier by a comma. This phrase further identifies the function, application (what it is used for), or location (where it is used) of the item.

Example:

FIXTURE, WELD, SUB-ASSY TEMPLATE, CONTOUR FORWARD NOSE



19.10 DRAWING NOTES.

19.10.1 Composition Of Local And General Notes. Local and general note composition and methods of placing this data on drawings shall be as shown in SECTION 9.

19.11 PARTS LIST. (See SECTION 6)

19.11.1 General Requirements. The Parts List shall list all components and assemblies that are assigned detail numbers on the field of the drawing. Standard tool drawing lettering of .156 inch in height shall be used in the Parts List.

19.11.2 Assembly Number Column. The detail number on each assembly as defined here shall appear in the Part or Identifying Number Column of the Parts List.

19.11.3 Part Or Identifying Number Column. The detail number of each tool component shall appear in the Part or Identifying Number Column of the Parts List.

19.11.4 Quantity Required Column. Entries are made here to indicate the total number of each detail required to fabricate one tool as described by the tool drawing.

19.11.4.1 Assembly. An assembly is composed of two or more details joined as a unit:

- a. that is intended by the designer to be fabricated independently from the rest of the tool.
- b. that will be attached, removed, or handled separately from the rest of the tool in the normal process of use.

19.11.5 Nomenclature/Description Column. A complete description of each detail number shall be listed in this column for ordering purposes.

19.11.5.1 Supplier's Part Number Location. Any reference to supplier's part number shall appear in the "Part or Identifying Column" with the supplier's Commercial and Government Entity (CAGE) listed in the adjacent column.

19.11.5.2 Supplier's Address When CAGE Code Not Assigned. When a supplier does not have a CAGE Code, use a flagnote "  " referring to a general note listing the manufacturer's name and address.

19.12 WELDING PROCEDURES. (See SECTION 14)

19.13 THREADS. (See SECTION 12)



19.14 DRAWING CHANGE PROCEDURE.

19.14.1 General Procedures. The change procedures and standard forms described in SECTION 23 will be used for initiating changes to tooling and recording changes to tooling drawings.

19.14.1.2 Interchangeable Revision. When changes do not affect interchangeability of the tool, and it is capable of performing the function as before, the change shall be incorporated on the drawing as a letter revision.

19.14.1.3 Non-Interchangeable Revision. When modifications are made to the extent that the original capabilities of a tool are destroyed, the modified tool should be reidentified with a new tool number, and an appropriate drawing prepared.

19.14.1.4 Multiple Identical Tooling Modifications. When identical tooling is in use simultaneously at more than one facility, and modifications are necessary to fit conditions peculiar to one facility that are not applicable or desirable at the other, a reidentification with new tool numbers is necessary.