



16.1 SCOPE.

16.1.1 Purpose. This section establishes the procedures to be followed in the preparation of casting drawings. Data on design practices is incidental to subject presentation and is intended only as a guide.

16.2 APPLICABLE DOCUMENTS. Note: DoD Policy Memo 05-3 “Elimination of Waivers to Cite Military Specifications and Standards in Solicitation and Contracts” has eliminated the need for waivers to use MIL-SPECS and MIL-STDS on DoD contracts. (See PREFACE 1, Section 2)

ASME Y14.5M-1994	Dimensioning and Tolerancing
ASME Y14.8M	Castings and Forgings
ASME Y14.36M	Surface Texture Symbols
ASME B46.1	Surface Texture, Surface Roughness, Waviness and Lay
ASME Y14.100	Engineering Drawing Practices

16.3 DEFINITIONS. (Alphabetically Listed)

16.3.1 Casting. A part produced by a process in which a molten material (plastic, liquid, etc.), is introduced by gravity or under pressure into a mold, allowing it to solidify therein.

16.3.2 Core. A loose part of the mold used to form a cavity, opening or hole in the casting.

16.3.3 Corner Radius. A convex radius on the surface of a part connecting intersecting surfaces. Also referred to as “edge radius”.

16.3.4 Datum Target. Sometimes considered as representing a tooling point, line or area. See SECTION 5.

16.3.5 Die Closure. Permissible part thickness variation caused by inconsistent mating of opposing segments of a mold or die.

16.3.6 Draft. The angle or taper given to a pattern or die to facilitate removal of either the pattern or casting from the mold. Draft also describes the angle or taper defined on a drawing or model, and to the angle or taper on the as-produced part, which is a result of the die or pattern geometry described above.

16.3.7 Dress Out. A localized depression on the surface of a part that results when abrasive tools are used to remove surface discontinuities.

16.3.8 Fillet Radius. A concave radius on the surface of a part connecting intersecting surfaces.

16.3.9 Flash. A thin projection on a casting, formed by mold sections not making intimate contact at the parting line. It may also be known as “fin”.



16.3.10 Gate. An opening into the mold cavity that is used for filling the mold. When the casting is removed from the mold, a sprue formed by the gate remains attached, but is subsequently removed.

16.3.11 Grain Direction. The predominant orientation of the fibrous crystalline structural units of wrought metals.

16.3.12 Hold-Down Lugs. Projections or pads, not functionally required, added to a casting to provide clamping surfaces to restrain a part during machining.

16.3.13 Match Draft. Additional draft allowance permitted on matching surfaces at parting lines when the normal draft allowance would result in an offset of the surfaces at the parting line.

16.3.14 Mismatch. Offset of features on a part caused by misalignment of opposing segments of a mold or die.

16.3.15 Mold. A matrix of sand, metal, etc., into which molten material is poured or injected to form the cast piece.

16.3.16 Mold Line. A line generated by the theoretical intersection of projected surfaces.

16.3.17 Movable Targets. Two or more targets with a controlled simultaneous motion used for centering parts.

16.3.18 Parting Line. The surface(s) along which a mold is split to facilitate the removal of the pattern or the casting from the mold.

16.3.19 Pattern. A form that is used to shape the mold. It may be made from wood, metal, plastic, etc., and reflects the size and shape of casting with necessary allowances for shrinkage.

16.3.20 Riser. A reservoir of molten metal connected to the casting to provide additional metal to the casting during solidification.

16.3.21 Tie-Bar. A rib or reinforcement, not functionally required, added to casting to prevent warping or distortion of casting.



16.4 DESIGN PRACTICE.

16.4.1 Casting Design And Foundry Practice. General information pertaining to casting design and foundry practice can be found in reference books from publishers of technical books. There is no “rule of thumb” which applies to all casting designs and processes (see FIGURE 16-1); therefore, each design must be considered separately.

FOUNDRY PROCESS	PROCESS DESCRIPTION	METALS CAST	PATTERN TYPE	AVERAGE CASTING SIZE & COMPLEXITY	SURFACE FINISH (ROUGHNESS HEIGHT RATING)
SAND CASTING (GREEN SAND OR DRY SAND)	SAND CASTINGS ARE MADE BY POURING MOLTEN METAL INTO AN EXPENDABLE MOLD, THAT WAS PREPARED BY PACKING A MIXTURE OF LOOSE SAND AND CLAY AROUND A PATTERN.	ALL FERROUS AND NON-FERROUS CASTING ALLOYS	WOOD OR METAL	OUNCES TO TONS, DEPENDING ON THE ALLOY. COMPLEXITY VARIES FROM SIMPLE TO VERY DIFFICULT	ALUMINUM AND MAGNESIUM 250 TO 500. SOMETIMES 125. STEEL 500 TO 1000.
SHELL MOLD CASTING	SHELL MOLD CASTINGS ARE MADE BY POURING MOLTEN METAL INTO AN EXPENDABLE MOLD, THAT WAS PREPARED BY CURING A LAYER OF A REFRACTORY MATERIAL AND THERMOSETTING RESIN MIXTURE ON A HEATED METAL PATTERN	MOST CASTING ALLOYS EXCEPT LOW CARBON STEELS	METAL PATTERNS WITH EJECTOR PINS AND HEATING ELEMENTS	OUNCES TO 100 POUNDS. COMPLEX SHAPES CAN BE CAST.	125 TO 500
PERMANENT MOLD CASTING	PERMANENT MOLD CASTINGS ARE MADE BY POURING MOLTEN METAL INTO A SEPARABLE REUSABLE MOLD, THAT WAS PREPARED BY MACHING A CAVITY IN METAL BLOCKS.	ALUMINUM, MAGNESIUM, AND COPPER-BASE ALLOYS-CAST IRON	NO PATTERN IRON, STEEL, OR ALUMINUM REUSABLE MOLD	OUNCES TO SEVERAL POUNDS. COMPLEXITY IS LIMITED BUT MAY BE INCREASED BY SAND CORES OR COLLAPSABLE METAL CORES.	125 TO 250
PLASTER MOLD CASTING	PLASTER MOLD CASTINGS ARE MADE BY POURING MOLTEN METAL INTO AN EXPENDABLE MOLD, THAT WAS PREPARED BY POURING A PLASTER MIXTURE INTO A PATTERN AND ALLOWING IT TO HARDEN.	ALUMINUM, MAGNESIUM, COPPER-BASE, AND OTHER LOW-MELTING ALLOYS	WOOD OR METAL	OUNCES TO SEVERAL POUNDS. COMPLEX SHAPES CAN BE CAST.	125 TO 250. SOMETIMES 63
DIE CASTING	DIE CASTINGS ARE MADE BY INJECTING MOLTEN METAL, UNDER HIGH PRESSURE, INTO A SEPARABLE, REUSABLE MOLD, THAT WAS PREPARED BY MACHINING A CAVITY IN METAL DIE BLOCKS.	ALUMINUM, MAGNESIUM, COPPER-BASE, AND OTHER LOW-MELTING ALLOYS	NO PATTERN ALLOY STEEL DIE MOLD	OUNCES TO SEVERAL POUNDS. COMPLEXITY LIMITED ONLY BY THE FACT THAT THE CASTING MUST BE WITHDRAWN FROM THE DIE.	63 TO 125. SURFACES CAN BUFFED OR POLISHED SMOOTH.
INVESTMENT CASTING	INVESTMENT CASTINGS ARE MADE BY POURING MOLTEN METAL INTO AN EXPENDABLE MOLD, THAT WAS PREPARED BY SURROUNDING AN EXPENDABLE PATTERN (WAX, PLASTIC, FROZEN MERCURY, ETC.) WITH A REFRACTORY MIXTURE AND HEATING THE MOLD TO REMOVE THE PATTERN.	MOST CASTING ALLOYS	METAL DIE USED TO MAKE AN EXPENDABLE WAX, PLASTIC OR FROZEN MERCURY PATTERN	OUNCES TO SEVERAL POUNDS. COMPLEX SHAPES CAN BE CAST BY USE OF APPROPRIATE DIES.	63 TO 250
CERAMIC MOLD CASTING	CERAMIC MOLD CASTINGS ARE MADE BY POURING MOLTEN METAL INTO AN EXPENDABLE MOLD, THAT WAS PREPARED BY POURING A LAYER OF REFRACTORY OVER A PATTERN AND FUSING THE MOLD AT A HIGH TEMPERATURE.	STEELS	WOOD OR METAL	OUNCES TO SEVERAL POUNDS. COMPLEXITY LIMITED SINCE MOLDS AND CORES ARE FRAGILE.	125 TO 250

GENERAL CASTING INFORMATION


FIGURE 16-1

16.5 MARKINGS.

16.5.1 Location Of Cast Symbols. All cast symbols and markings should be located on a flat, or nearly flat, surface parallel to the parting line whenever possible and preferably on a surface that will not be machined. (See SECTION 11.)


16.5.2 Preferred Location Of Cast Part Number. The preferred location for the casting part number is adjacent to the foundry trademark.

16.5.3 Cast Part Number Located On Surface Left Un-Machined. When the drawing locates the markings on a surface that will not be machined, the part number shall be preceded by the word CASTING or CSTG as follows:


 MARK PER (applicable standard) .25 CHARACTERS WITH CSTG (drawing number and applicable suffix identifier (dash) number).



16.5.4 Foundry Trademark Location. The foundry trademark location is indicated and called out as follows:

 MARK PER (applicable standard) WITH FOUNDRY SYMBOL

16.5.5 Raised Pad Suitable For Stamping. All quality control and other markings, not specified above, are located on a raised pad suitable for stamping and called out as follows:

 MARK PER (applicable standard) WITH QUALITY ACCEPTANCE STAMPS AND ASSIGNED SERIAL NO.

16.5.6 Machined All Over Casting Marking Controls. When all surfaces of a casting are machined, the method of marking the machined part must be compatible with the designed use of the part. Cast part identification may be specified in addition to other markings.

16.5.7 Castings Too Small To Apply Markings. When the physical size of a casting prevents the application of legible markings, the markings are applied to a tag or to the container.

16.6 MATERIAL REQUIREMENTS.

16.6.1 Casting Part Callout In Parts List. The parts list of the casting drawing shall provide a complete description of the material and its specification. (See FIGURE 16-2 & 16-4.)

16.6.1.1 Material Specification Column. Provide as applicable the material heat treat specification, the lot/melt number, date, code for traceability.

16.6.2 Identical Castings Of Different Materials. Each casting of the same configuration but of different material shall have separate identification, i.e., different suffix identifier (dash) numbers or separate drawings identified with different drawing numbers.

16.6.3 Method Of Casting Is Not Identified. Unless specific design requirements exist, the method of casting (sand, shell-mold, investment, etc.) is not called out. The casting should be designed with a particular process in mind; however, in most cases, more than one process will satisfactorily produce the part.

16.7 DRAWING TITLE. (See SECTION 8)

16.8 DRAWING NOTES. The most commonly used General Notes that are used on casting drawings are as follows. Other notes for consideration, refer to ASME Y14.8M.



16.8.1 Machined Surfaces.

16.8.1.1 Identification Of Casting Surfaces For Machining. Those surfaces which are to be subsequently machined may be indicated on the drawing by a flagnote, cross-referenced to the following general note:

 SURFACE INDICATED TO BE SUBSEQUENTLY MACHINED.

16.8.1.2 Casting Machined All Over. A part to be machined all over may be indicated by the following general note:

X. THIS CASTING TO BE SUBSEQUENTLY MACHINED ALL OVER.

16.8.2 Cast Surfaces.

16.8.2.1 Casting Left As Cast. Those surfaces which are to be left as cast or require minimal cleanup operations may be covered by a general note as follows:

X. REMOVE BURRS, GATES, FINS, ETC., FLUSH WITH CONTOUR + .XX - .XX.

16.8.2.2 Cast Fillets And Corner Radii. Fillets and corner radii which are not dimensioned on the drawing are covered by a general note as follows:

X. UNLESS OTHERWISE SPECIFIED CAST FILLETS R .XX AND CORNER RADII R .XX.

16.8.2.3 Surface Roughness Acceptable As-Cast. Surface roughness acceptable by casting the part may be listed by a general note as follows:


X. CAST SURFACES .

16.8.3 Acceptance Requirement Notes.

16.8.3.1 Heat Treatment. May be listed by a general note as follows:

X. FLUORESCENT PENETRANT INSPECT PER (applicable specification) AFTER HEAT TREATMENT AND BEFORE RADIOGRAPHIC INSPECTION. INTERPRET PER (applicable specification or note acceptance standards).

16.8.3.2 Radiographic Inspection. May be indicated on the drawing by a flagnote cross-referenced to the following general note:

 THIS AREA SHALL CONFORM TO (applicable class, level, etc.).
RADIOGRAPHIC QUALITY LEVEL PER (applicable specification).

(If applicable, the casting is zoned into different quality level areas to denote the critically stressed sections by using phantom lines.)



16.8.3.3 Discontinuities Inspection. May be listed by a general note as follows:

- X. DYE (or FLUORESCENT PENETRANT or MAGNETIC PARTICLE)
INSPECT PER (applicable specification and type, class, condition, etc.).
INTERPRET PER (applicable specification or note acceptance standards).

16.8.3.4 Classification. May be listed by a general note as follows:

- X. CASTING SHALL CONFORM TO (applicable specification, grade, type, class, etc.).

16.8.3.5 Straightening. May be listed by a general note as follows:

- X. CASTING TO BE STRAIGHTENED PRIOR TO FLAW INSPECTION.

6.8.3.6 Sandblasting Or Shot Peening. May be listed by a general note as follows:

- X. NO SANDBLASTING OR SHOT PEENING PRIOR TO FLAW INSPECTION.

16.8.3.7 Casting Material Scheduled For Removal. May be listed by a general note as follows:

- X. EXCEPT FOR DIMENSIONS MARKED "CSTG" THE CONTOUR OF THE CASTING IS NOT RESTRICTED BY THE ENVELOPE SHOWN IN PHANTOM.

16.8.3.8 Casting Requiring Pressure Testing. May be listed by a general note as follows:

- X. MACHINED CASTINGS SHALL WITHSTAND $XXX \pm XX$ PSI. HOLD FOR X MINUTES MINIMUM.
NO PERMANENT SET IN EXCESS OF 0.2% PERMITTED.



CASTING DRAWINGS

DESCRIPTION:

A casting drawing shows the molded condition and requirements for a part made of a specific material. See FIGURE 16-2.

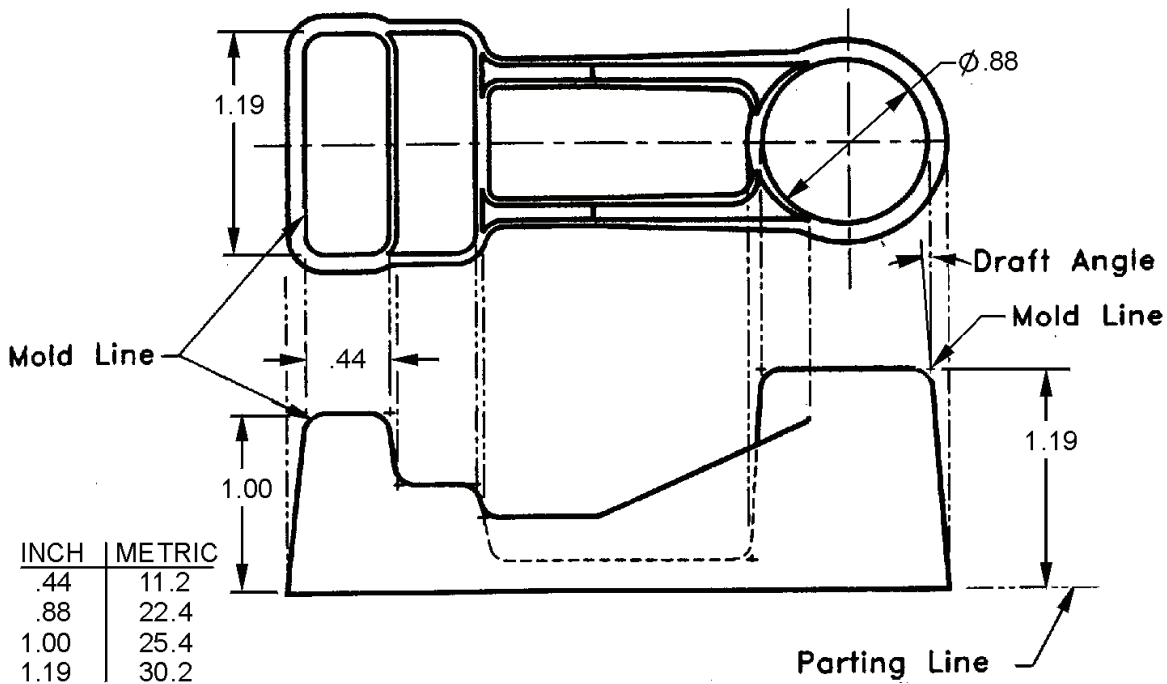
USE:

This type of drawing is normally used when a part, due to material features and physical shape, can be fabricated by a molded method to a related size of the desired finished part at less cost than machining it from bulk or stock material.

DRAWING REQUIREMENTS:

1. Separate drawings may be required for the casting and the item made from the casting (e.g. casting, machined casting).
2. Drawing shows sufficient number of principal, auxiliary, sectional and detail views with adequate dimensions and notes for every feature of the casting.
3. Features of a casting are defined by dimensions to surfaces, mold lines of features (intersecting planes), etc., rather than to centerline of a corner radius or fillet.

For Example:



4. As-cast surfaces on drawings shall specify whether machining as-cast surfaces is permitted or prohibited (other than removing gates, risers, flash, etc.). Where machining is permitted, the surface texture value shall be specified.
5. Corner radii size and tolerance shall be specified on the drawing.
6. Fillet radii size and tolerance shall be specified on the drawing.



7. The use of temporary datum features should be avoided. Use surfaces for datum features that will not be subsequently machined (see SECTION 5).
8. Die closure tolerance is applied to the appropriate dimensions.

For Example:

THIS ON THE DRAWING	MEANS THIS
<p>DIE CLOSURE NOT SPECIFIED DIMENSIONAL TOLERANCE: $\pm .03$ EXCEPT AS NOTED.</p> <p>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE RELATED TO DATUM A (PRIMARY), DATUM B (SECONDARY), AND DATUM C (TERTIARY).</p>	<p>Die closure tolerance is included in dimensions shown.</p>
<p>DIE CLOSURE NOT SPECIFIED AND PARTING LINE INDICATED DIMENSIONAL TOLERANCE: $\pm .03$ EXCEPT AS NOTED. DIE CLOSURE TOLERANCE: $+.09$ $-.05$</p> <p>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE RELATED TO DATUM A (PRIMARY), DATUM B (SECONDARY), AND DATUM C (TERTIARY).</p>	<p>Die closure tolerance applies to dimensions that cross the parting line.</p>
<p>DIE CLOSURE NOT SPECIFIED AND PARTING LINE NOT INDICATED DIMENSIONAL TOLERANCE: $\pm .03$ EXCEPT AS NOTED. DIE CLOSURE TOLERANCE: $+.09$ $-.05$</p> <p>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE RELATED TO DATUM A (PRIMARY), DATUM B (SECONDARY), AND DATUM C (TERTIARY).</p>	<p>Die closure tolerance applies to dimensions that cross the parting line.</p>

INCH	METRIC
.03	0.8
.05	1.3
.09	2.3
1.05	26.7
1.07	27.2
1.10	27.9
1.13	28.7
1.19	30.8
1.25	31.8
1.27	32.3
1.30	33.0
1.33	33.8
1.39	35.3
5.95	151.1
5.97	151.6
6.00	152.4
6.03	153.2
6.09	154.7



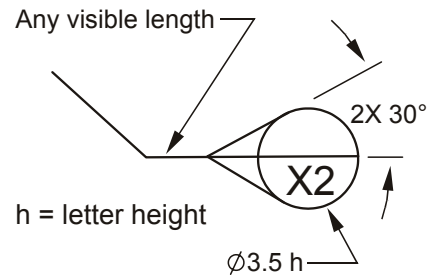
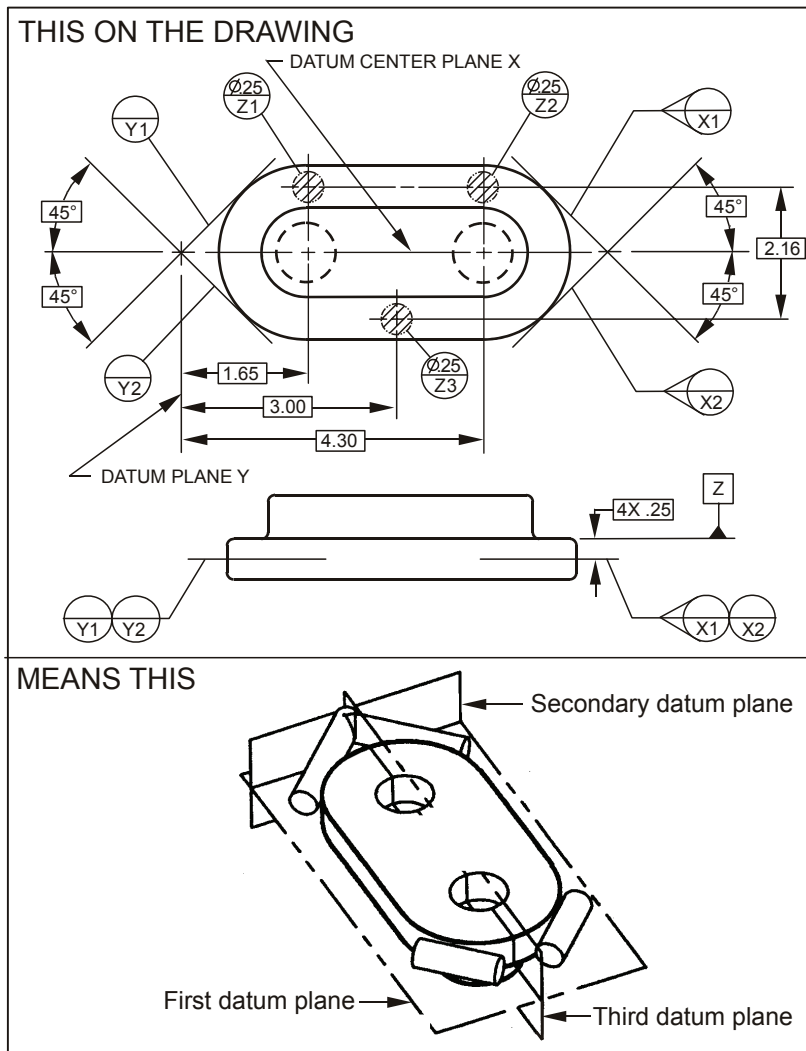
9. Use correlated datums between casting and machine drawings. Indicate by a general note:

X. CORRELATED DATUMS INDICATED BY  ,  AND  .

10. Because of the inherent irregularity of cast surfaces, it may be a good idea to use datum targets to define a datum reference frame on an as-cast part. See SECTION 5 herein, ASME Y14.8M, and ASME Y14.5M-1994 for more information about datum targets.

11. Datum Targets may be used when it is necessary to coordinate measurements for fabrication (See SECTION 5 herein.)

12. Equalizing datums should be considered to center a casting. The associated datum plane (or axis) may be identified by note. The example illustrates the application of an equalizing datum established by two fixed datum targets, Y1 and Y2 and two simultaneous movable targets, X1 and X2. The movable target symbol was added in the revised 1996 publication of ASME Y14.8M. It is presented here until it is added to ASME Y14.5M together with other target symbol applications.

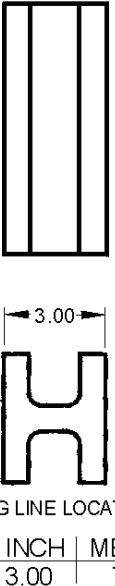
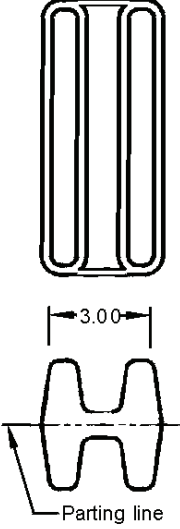
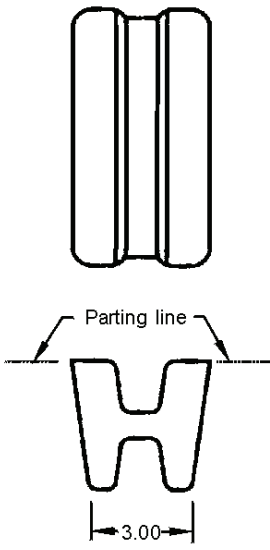
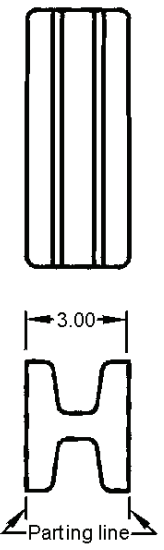


MOVABLE DATUM TARGET SYMBOL FORM AND PROPORTION

INCH	METRIC
.25	6.4
.50	12.7
1.65	42.0
2.16	54.9
3.00	76.2
4.30	109.2

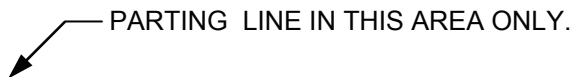
MOVABLE DATUM TARGETS ESTABLISHING A DATUM CENTER PLANE

13. Parting lines are generally not shown; but when required by design, they shall be shown as a phantom line (or lines or curves, as applicable) extending beyond the part in applicable views and identified. A local note is used to indicate their location:

THIS ON THE DRAWING	MAY MEAN ANY OF THESE						
 <p>PARTING LINE LOCATION OPTIONAL</p> <table border="1"> <tr> <td>INCH</td> <td>METRIC</td> </tr> <tr> <td>3.00</td> <td>76.2</td> </tr> </table>	INCH	METRIC	3.00	76.2	 <p>Parting line</p>	 <p>Parting line</p>	 <p>Parting line</p>
INCH	METRIC						
3.00	76.2						
<p>Dimensions and tolerances exclude draft. Draft adds mass.</p>							

PARTING LINE LOCATIONS

A local note may also be used when design is a requirement.



14. Including draft on a model or on features depicted on a drawing is optional, but it is a good design practice to do so. If desired, the requirements may be indicated by a General Note:

- X. UNLESS OTHERWISE SPECIFIED, DRAFT ANGLE X° MAX MAY BE APPLIED TO INCREASE STOCK. MATCH DRAFT WHERE NECESSARY.

Draft may be shown for clarity. When shown, draft angle and tolerance shall be specified. Show draft pictorially on cast surfaces that remain on the finished part when the external draft exceeds 2 degrees and internal draft exceeds 3 degrees. Draft may exceed perfect form boundary at MMC unless otherwise specified. Drafted surfaces may also be defined with basic dimensions and their variation defined using profile of a surface. Remember, profile of a surface applies normal to the true profile, which in this case is the drafted surface. This method offers the most robust and best way to define the surface and its allowable variation, and presents the clearest requirements for verification.

Note: Including draft on the drawing or in a 3D solid model also allows for more accurate calculation of mass, center of gravity or mass (for balance), stress or strength using finite element analysis (FEA), and it presents a much more accurate picture of the final part geometry than would be obtained if draft was not shown. As shown above, the difference in allowable part geometry where the parting line and resulting draft has not been specified (or modeled) can be severe.

15. Match Draft shall be specified where applicable.

THIS ON THE DRAWING	MAY MEAN EITHER OF THESE					
<p>4X .56</p> <p>PARTING LINE</p> <p>DRAFT ANGLE: 3° MATCH DRAFT AS REQUIRED</p> <table border="1"> <tr> <th>INCH</th> <th>METRIC</th> </tr> <tr> <td>.56</td> <td>14.2</td> </tr> </table>	INCH	METRIC	.56	14.2	<p>.56</p> <p>3°</p> <p>PARTING LINE</p> <p>match draft</p> <p>3°</p> <p>.56</p>	<p>.56</p> <p>3°</p> <p>PARTING LINE</p> <p>.56</p> <p>3°</p>
INCH	METRIC					
.56	14.2					

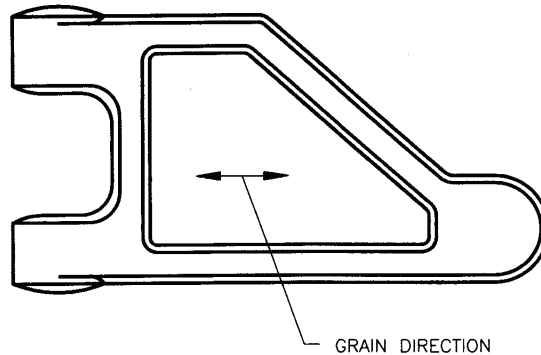
MATCH DRAFT

16. Mismatch where applicable, shall be specified as a maximum value. Mismatch may exceed perfect form boundary at MMC, unless otherwise specified.

THIS ON THE DRAWING	MEANS THIS																
<p>A</p> <p>A1</p> <p>PARTING LINE</p> <p>2X 3.00</p> <p>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE RELATED TO DATUM A (PRIMARY), DATUM B (SECONDARY), AND DATUM C (TERTIARY) DIMENSIONAL TOLERANCE: ± .08 MISMATCH: .12 MAX</p>	<p>A</p> <p>A1</p> <p>PARTING LINE</p> <p>3.08</p> <p>2.92</p> <p>3.20</p> <p>2.80</p> <table border="1"> <tr> <th>INCH</th> <th>METRIC</th> </tr> <tr> <td>.08</td> <td>2.0</td> </tr> <tr> <td>.12</td> <td>3.0</td> </tr> <tr> <td>2.80</td> <td>71.1</td> </tr> <tr> <td>2.92</td> <td>74.2</td> </tr> <tr> <td>3.00</td> <td>76.2</td> </tr> <tr> <td>3.08</td> <td>78.2</td> </tr> <tr> <td>3.20</td> <td>81.3</td> </tr> </table>	INCH	METRIC	.08	2.0	.12	3.0	2.80	71.1	2.92	74.2	3.00	76.2	3.08	78.2	3.20	81.3
INCH	METRIC																
.08	2.0																
.12	3.0																
2.80	71.1																
2.92	74.2																
3.00	76.2																
3.08	78.2																
3.20	81.3																

MISMATCH TOLERANCE

17. Grain Direction when required by design is specified on the drawing and shown in an appropriate view.



GRAIN DIRECTION SPECIFIED

18. Flash Extension limits shall be specified on the drawing. Flash extension may exceed perfect form boundary at MMC unless otherwise specified.

THIS ON THE DRAWING

FLASH EXTENSION: .12 MAX

MEANS THIS

Flash extension

Flash extension

INCH	METRIC
.08	2.0
.12	3.0

FLASH EXTENSION

THIS ON THE DRAWING

FLASH EXTENSION: .12 MAX
MISMATCH: .08 MAX

MEANS THIS

Flash extension

Flash extension

Mismatch

FLASH EXTENSION AND MISMATCH



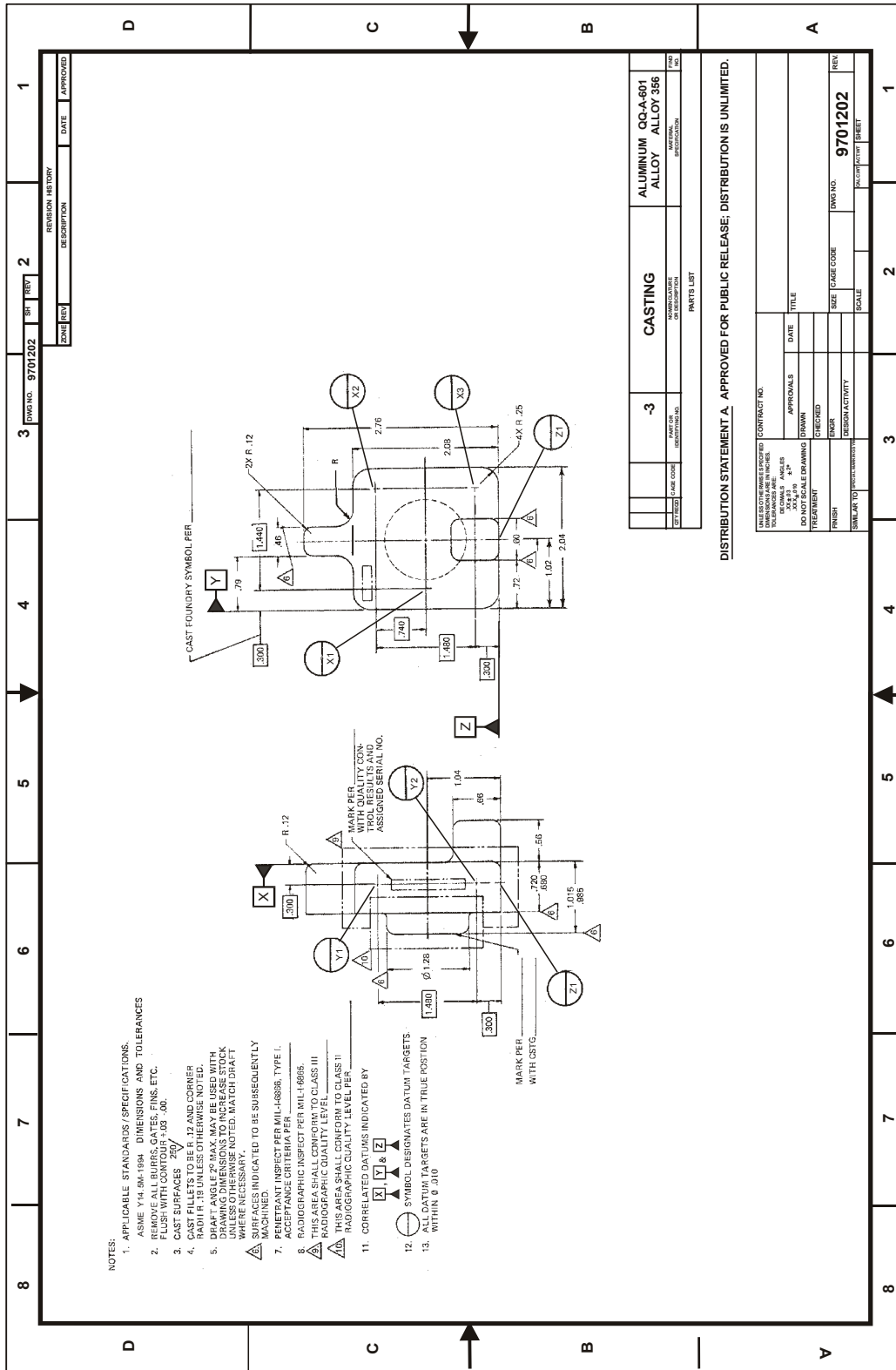
19. Geometric Dimensioning and Tolerancing (GD&T) should be used to define cast surfaces on casting drawings and annotated models to ensure complete and unambiguous definition. Profile of a surface is often a good choice for cast and forged parts, as castings and forgings often include complex-shaped surfaces. Such surfaces can only be adequately defined using basic dimensions and unambiguously toleranced using profile of a surface. From the standpoint of doing a complete and thorough job, profile of a surface is often the only choice available.

20. All cast symbols and markings should be located on a flat or nearly flat surface parallel to the parting line whenever possible and preferably on a surface that will not be machined (See PARAGRAPH 16.5 and SECTION 11 herein.)

21. Each casting of the same configuration but of different material is to have separate identification, i.e., different suffix identifier (dash) numbers or separate drawings.

22. Unless specific design requirements exist, the method of casting (sand, shellmold, etc.) is not called out.

23. Castings are preferably modeled and drawn full size.



THIS SAMPLE DRAWING IS INFORMATIONAL ONLY AND COMPLETE TO THE DEGREE NECESSARY TO ILLUSTRATE THE TYPE OF DRAWING BEING DESCRIBED
DRAWING FORMAT SIZE PROPORTIONS HAVE BEEN EXAGGERATED FOR CLARITY



CASTING MACHINE DRAWING

DEFINITION:

A drawing that defines the machining and other requirements of part made from a casting. See FIGURE 16-3.




USE:

The purpose of a casting machine drawing is the same as a detail drawing of an item to be made from raw stock.

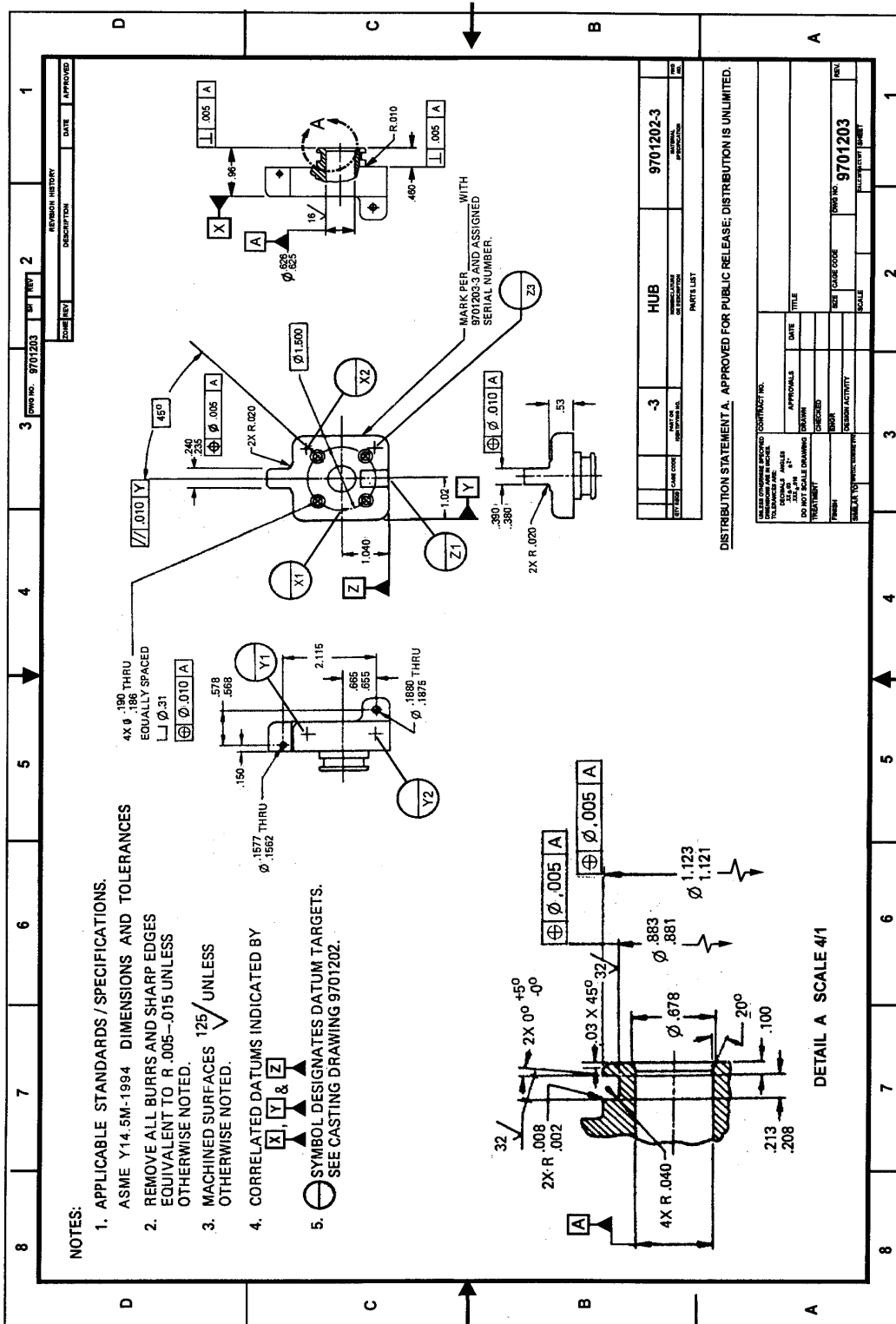
DRAWING REQUIREMENTS:

1. Sufficient views, dimensions and notes are given to adequately define the part to be machined from the casting.
2. The casting part number is entered in the material column of the parts list (See SECTIONS 7 and 10.)
3. Markings to identify part after machining.
4. Cast and machine drawing general notes per PARAGRAPH 16.8.
5. Designations of datum features and/or datum targets to be carried over from the casting drawing are shown and noted (See SECTION 5.)

6. Correlation of datums is indicated by a general note:

X. CORRELATED DATUMS INDICATED BY  ,  AND .

7. If a separate datum reference frame is to be established on the machined casting drawing from machined datum features, the appropriate machined datum features should be related to the cast/correlated datum reference frame.
8. All other machined features should be related to this or other datum reference frames derived from machined features.



THIS SAMPLE DRAWING IS INFORMATIONAL ONLY AND COMPLETE TO THE DEGREE NECESSARY TO ILLUSTRATE THE TYPE OF DRAWING BEING DESCRIBED
 DRAWING FORMAT SIZE PROPORTIONS HAVE BEEN EXAGGERATED FOR CLARITY

MACHINING DRAWING OF A CAST PART

FIGURE 16-3



COMBINATION CAST AND MACHINE DRAWING

DESCRIPTION:

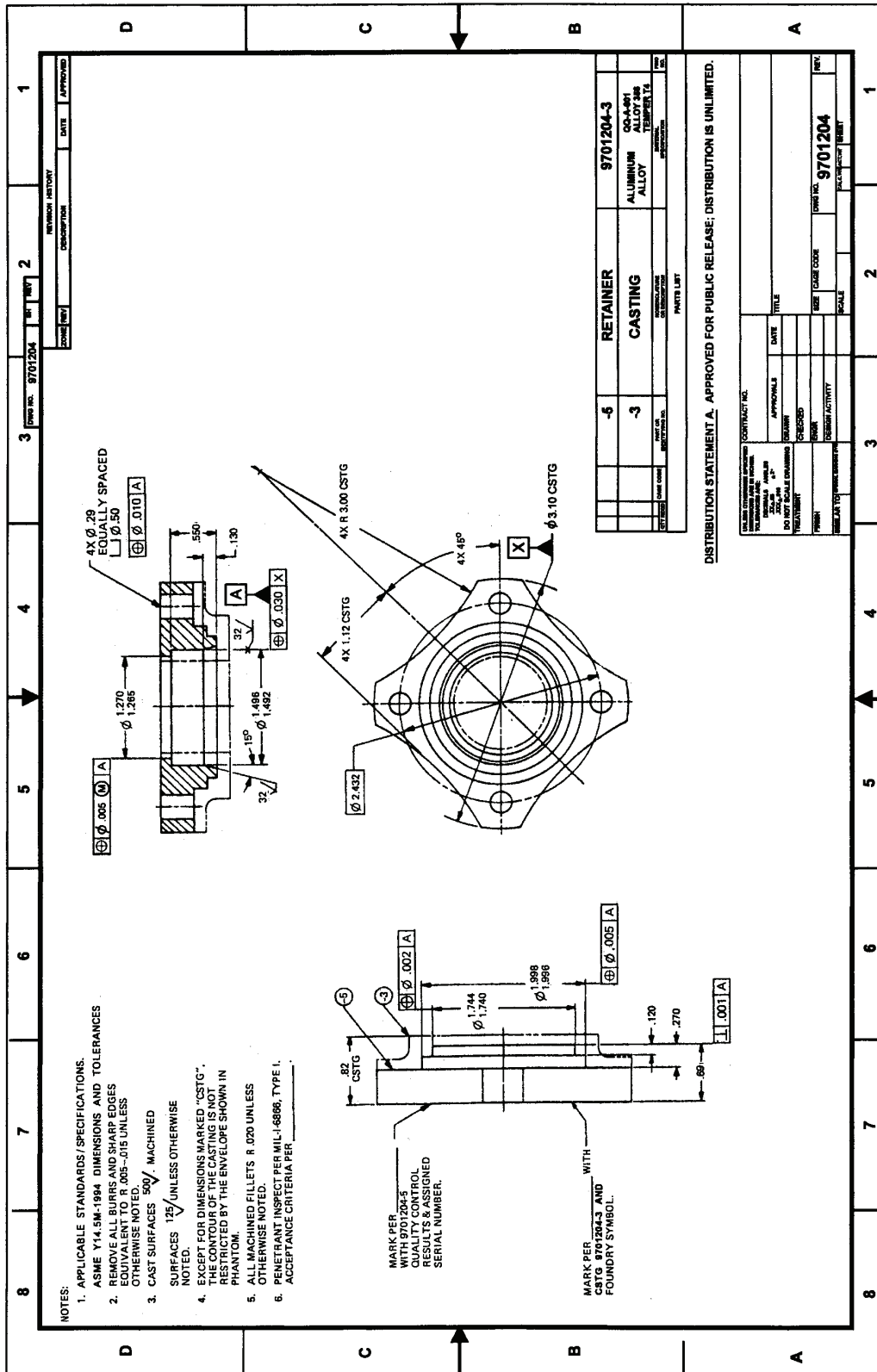
A drawing that shows the cast and machined features of a part on the same drawing. See FIGURE 16-4.

USE:

This type of drawing may be used where essential controls of the cast part can adequately be shown in conjunction with the machined part and on the same drawing.

DRAWING REQUIREMENTS:

1. The part is drawn as a “machined” item and the outlines of cast surfaces to be machined is shown on the machined detail drawing by phantom lines with limiting dimensions.
2. All cast dimensions are indicated as CSTG.
3. The casting and machined parts are identified with different suffix identifier (dash) numbers, e.g., -3 and -5.
4. Sufficient views, dimensions and notes are given to adequately define and differentiate between the casting and the part machined from the casting.
5. An alternate method would be to show the casting and the machine part in separate views on the same drawing.



COMBINATION CAST PART AND MACHINING DRAWING

FIGURE 16-4

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DRAWING FORMAT SIZE PROPORTIONS HAVE BEEN EXAGGERATED FOR CLARITY