



Engineering Drafting Document (Draft)

This Engineering Drafting Document establishes a uniform drafting practice to be applied when stating design intent and other related requirements on engineering drawings.

Requirements:

1. Adherence to the ASME Y14.5-2009 Standard is mandatory on all mechanical drawings except as noted.
2. Functional Datums: Datum features must be chosen to reflect the functional mating features of the part with its higher level mating features.
 - a. Primary datum features, when applicable, must be chosen based on which feature(s) constrain the majority of Rotational and Translational degrees of freedom.
 - b. Secondary datum features (when applicable) must be chosen based on which feature(s) constrain the next level of Rotational and/or Translational degrees of freedom.
 - c. Tertiary datum features (when applicable) will be chosen when and if remaining Rotational and/or Translational degrees of freedom are required to be constrained.
3. The only Geometric Tolerances to be used are:
 - a. Φ (**Position**) – primarily used for locating the center axis, center plane or center point of a Feature of Size (i.e. internal threads, press-fit pins, etc.)
 - b. \frown (**Profile of a Surface**) – used for controlling all 3D surface geometries
 - c. \smile (**Profile of a Line**) – used for controlling all 2D surface elements such as cross-sections on flexible components (i.e. tubes, wires, etc.)
4. Features of size must only be defined as equal-bilateral which means the CAD model must always represent the mid-geometry
 - a. NO unilateral, unequal-bilateral, etc.
5. Only use Φ when specifying location of axis for splines, external/internal threads, gear teeth, and press fit pins. Ideally, everything else should use \frown or \smile .
 - a. Clearance Holes: Used for locating the axis within the actual mating envelop within its allowable tolerance. In most case the modifier should be \textcircled{M} to enable “bonus tolerance”.

Example: $\Phi \phi 0.X \textcircled{M} A$

- b. Internal Threads: Used for locating the pitch axis within the projected tolerance zone. In most case the modifier should be \textcircled{M} to enable “bonus tolerance”. The projected tolerance zone represents the maximum thickness of the part being bolted-up relative to the associated datum feature. RFS \textcircled{S} should be used for all self-tapping threads as no mobility would be allowed.

Example: $\Phi \phi 0.X \textcircled{M} \textcircled{S} X.X A$

11. Metric drawings:

- a. Drawings must not be dual dimensioned (Metric and English units).
- b. Must have a “0” in front of the decimal point if the value is less than one. Example: 0.1
- c. Trailing zeros: Must be dropped to the right of the last significant digit. Example: 0.1 not 0.10, except that the nominal size and tolerance should match.

12. Multiple features associated with individual callouts must be specified as 2X, 3X, etc and not as “TYP” (typical)

13. Holes, threads and other features must not be specified as “THRU” as it is obvious when there is not a depth or thickness associated with the callout.

14. Legacy drawings that utilize Concentricity and Symmetry must be interpreted as



15. Default Note to be added to drawings

Unless Otherwise Specified:

a. All Dimensions (specified and unspecified) are BASIC and controlled by the CAD model

b. All features have the following tolerances applied

i. Diametral Features = $\boxed{\text{Ø} \mid \text{Ø}0.X \text{ (M)} \mid \text{A}}$

ii. Other Features = $\boxed{\text{ () } \mid \text{X X} \mid \text{A}}$

c. All applications using Position and Profile where no datums are specified in the Feature Control Frames, all callouts must still be considered simultaneous due to all applicable dimensioning being BASIC.

i. Simultaneity will apply the same as FCF's having datums specified (same datums, same sequence with the same datum feature modifiers)

ii. Simultaneity applies to all applicable single-segment FCF's and upper portions of Composite FCF's

16. Types of mechanical drawings not requiring compliance to ASME Y14.5-2009 include but not be limited to:

- Labels and nameplates
- Purchased electronic panels and components
- Wiring harnesses and wiring diagrams
- Purchased items such as fasteners and hoses

Related Documents:

1. ASME Y14.8-2009, Castings, Forgings and Moldings
2. ASME Y14.41-2003, Digital Product Definition Data Practices
3. ASME B46.1-2002, Surface Texture
4. IEEE/ASTM SI 10-2002, Metric Practice