Dimensioning

ASME Y14.5M-1994 Dimensioning Standards

- Process of adding size information to a drawing
- A well dimensioned part will communicate the size and location requirements for each feature
- Parts are dimensioned based on two criteria:
  - Basic sizes and locations of the features
  - Details of construction for manufacturing
Units of Measure

- **English System**
  - inches
  - feet (if length is over 72”)
  - assume drawings are in English units

- **SI System**
  - millimeter (mm)
  - Metric drawings should clearly state that the drawing is in metric units

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Terminology

- Dimension
- Dimension line
- Arrows
- Extension line
- Leader line
- Plus and minus dimension
- Diameter Symbol
- Radius Symbol
- Text (1/8” height)
Terminology (continued)

- Dimension
- Dimension line
- Arrows
- Extension line
- Visible gap (1/16”)
- Limits of size
- Text (1/8” height)

Angular Units

- degrees minutes seconds (DMS)
- decimal degrees (DD)
Basics of Dimensioning

Dimensions of width, height and depth are shown in the front, right side and top views. The location and size of all features such as, holes, slots etc. must be shown in the proper view. Dimensions must be shown properly to allow fabrication of the part.

Group Dimensioning

Group dimensions as shown in figure A below. As a general rule, do not use object lines as part of the dimension as shown in figure B. In other words, dimensions should be placed outside of the object whenever possible. Extension lines should not cross dimension lines.
Stagger Dimension Text

The general practice is to stagger the dimension text on parallel dimensions. Holes are dimensioned via diameter. Rounds or fillets are dimensioned via radius.

Locating holes

The center mark of a hole is used to locate the hole within the object. The center mark must be located in both the horizontal and vertical directions.
**Unidirectional and Aligned Methods**

The Unidirectional Method is required for all mechanical engineering drawings. The Aligned Method is used on Architectural and Civil Engineering Drawings. Many Civil Engineering drawings require text to be placed along, above or below an object on a drawing.

The Unidirectional and Aligned Method applies to the placement of text on an engineering drawing.

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**Placement of Dimensions**

Dimensions are kept off of the view, unless necessary for clarity. Figure A is very confusing to the reader. Figure B illustrates the good practice of keeping dimensions outside the view.
Dimensioning Arcs

Arcs of less than half a circle are dimensioned as radii, with the R symbol preceding the dimension value.

The center mark of arcs must also be located in the horizontal and vertical direction unless the location of the center mark is obvious to the reader.

Repetitive Features

Repetitive Features such as the 0.375 diameter circular holes in the flange shown to the right are dimensioned using the symbol X.
Counterbored, Countersunk and Spotfaced Holes

Symbols for Drilling Operations:

Treatment of Blind Holes
Proper Dimensioning

- Each feature of an object is dimensioned once and only once.
- Dimensions should be selected to suit the function of the object.
- Dimensions should be placed in the most descriptive view of the feature being dimensioned.
- Dimensions should specify only the size of a feature. The manufacturing method should only be specified if it is a mandatory design requirement.
- Angles shown on drawings as right angles are assumed to be 90 degrees unless otherwise specified, and they need not be dimensioned.
- Dimensions should be located outside the boundaries of the object whenever possible.
- Dimension lines should be aligned and grouped where possible to promote clarity and uniform appearance.
- Crossed dimension lines should be avoided whenever possible. When dimension lines must cross, they should be unbroken.
- The space between the first dimension line and the object should be at least ¾ inch (10 mm). The space between dimension lines should be at least ¼ inch (6 mm).

Principles of Good Dimensioning
Principles of Good Dimensioning

- There should be a visible gap between the object and the origin of an extension line.
- Extension lines should extend 1/8 inch (3mm) beyond the last dimension line.
- Extension lines should be broken if they cross or are close to arrowheads.
- Leader lines used to dimension circles or arcs should be radial.
- Dimensions should be oriented to be read from the bottom of the drawing.
- Diameters are dimensioned with a numerical value preceded by the diameter symbol.
- Concentric circles should be dimensioned in a longitudinal view whenever possible.
- Radii are dimensioned with a numerical value preceded by the radius symbol.
- When a dimension is given to the center of an arc or radius, a small cross is shown in the center.
- The depth of a blind hole may be specified in a note. The depth is measured from the surface of the object to the deepest point where the hole still measures a full diameter in width.
- Counterbored, spotfaced, or countersunk holes should be specified in a note.