

9.44 DO'S AND DON'TS OF DIMENSIONING

The following checklist summarizes briefly most of the situations in which a beginning designer is likely to make a mistake in dimensioning. Students should check the drawing by this list before submitting it to the instructor.

1. Each dimension should be given clearly so that it can be interpreted in only one way.
2. Dimensions should not be duplicated, nor should the same information be given in two different ways—except for dual dimensioning—and no dimensions should be given except those needed to produce or inspect the part.
3. Dimensions should be given between points or surfaces that have a functional relation to each other or that control the location of mating parts.
4. Dimensions should be given to finished surfaces or important centerlines, in preference to rough surfaces, wherever possible.
5. Dimensions should be given so that it will not be necessary for the machinist to calculate, scale, or assume any dimension.
6. Dimension features should be attached to the view where the feature's shape is best shown.
7. Dimensions should be placed in the views where the features dimensioned are shown true shape.
8. Dimensioning to hidden lines should be avoided wherever possible.
9. Dimensions should not be placed on a view unless clarity is promoted and long extension lines are avoided.
10. Dimensions applying to two adjacent views should be placed between views, unless clarity is promoted by placing some of them outside.
11. The longer dimensions should be placed outside all intermediate dimensions so that dimension lines will not cross extension lines.
12. In machine drawing, all unit marks should be omitted, except when necessary for clarity; for example, 1" VALVE or 1 mm DRILL.
13. Don't expect production personnel to assume that a feature is centered (as a hole on a plate), but give a location dimension from one side. However, if a hole is to be centered on a symmetrical rough casting, mark the centerline and omit the locating dimension from the centerline.
14. A dimension should be attached to only one view, not to extension lines connecting two views.
15. Detail dimensions should line up in chain fashion.
16. A complete chain of detail dimensions should be avoided; it is better to omit one. Otherwise add a reference to the overall dimension by enclosing it within parentheses.
17. A dimension line should never be drawn through a dimension figure. A figure should never be lettered over any line of the drawing. The line can be broken if necessary.
18. Dimension lines should be spaced uniformly throughout the drawing. They should be at least 10 mm (.38 in.) from the object outline and 6 mm (.25 in.) apart.
19. No line of the drawing should be used as a dimension line or coincide with a dimension line.
20. A dimension line should never be joined end to end with any line of the drawing.
21. Dimension lines should not cross, if avoidable.
22. Dimension lines and extension lines should not cross, if avoidable. (Extension lines may cross each other.)
23. When extension lines cross extension lines or visible lines, no break in either line should be made.
24. A centerline may be extended and used as an extension line, in which case it is still drawn like a centerline.
25. Centerlines should not extend from view to view.
26. Leaders for notes should be straight, not curved, and point to the center of circular views of holes wherever possible.
27. Leaders should slope at 45°, 30°, or 60° with horizontal, but may be made at any convenient angle except vertical or horizontal.
28. Leaders should extend from the beginning or the end of a note, with the horizontal "shoulder" extending from mid-height of the lettering.
29. Dimension figures should be approximately centered between the arrowheads, except in a stack of dimensions, where they should be staggered.
30. Dimension figures should be about 3 mm (.13 in.) high for whole numbers and 6 mm (.25 in.) high for fractions.
31. Dimension figures should never be crowded or in any way made difficult to read.
32. Dimension figures should not be lettered over lines or sectioned areas unless necessary, in which case a clear space should be reserved for the dimension figures.
33. Dimension figures for angles should generally be lettered horizontally.
34. Fraction bars should never be inclined except in confined areas, such as in tables.
35. The numerator and denominator of a fraction should never touch the fraction bar.
36. Notes should always be lettered horizontally on the sheet.
37. Notes should be brief and clear, and the wording should be standard in form.
38. Finish marks should be placed on the edge views of all finished surfaces, including hidden edges and the contour and circular views of cylindrical surfaces.
39. Finish marks should be omitted on holes or other features where a note specifies a machining operation.
40. Finish marks should be omitted on parts made from rolled stock.

41. If a part is finished all over, all finish marks should be omitted and the general note FINISH ALL OVER or FAO should be used.
42. A cylinder is dimensioned by giving both its diameter and length in the rectangular view, except when notes are used for holes. A diagonal diameter in the circular view may be used in cases where it increases clarity.
43. Manufacturing processes are generally determined by the tolerances specified, rather than specifically noted in the drawing. When the manufacturing process must be noted for some reason—such as for dimension holes to be bored, drilled, and reamed—use leaders that preferably point toward the center of the circular views of the holes. Give the manufacturing processes in the order they would be performed.
44. Drill sizes should be expressed in decimals, giving the diameter. For drills designated by number or letter, the decimal size must also be given.
45. In general, a circle is dimensioned by its diameter, an arc by its radius.
46. Diagonal diameters should be avoided, except for very large holes and for circles of centers. They may be used on positive cylinders for clarity.
47. A diameter dimension value should always be preceded by the symbol \varnothing .
48. A radius dimension should always be preceded by the letter R. The radial dimension line should have only one arrowhead, and it should pass through or point through the arc center and touch the arc.
49. Cylinders should be located by their centerlines.
50. Cylinders should be located in the circular views, if possible.
51. Cylinders should be located by coordinate dimensions in preference to angular dimensions where accuracy is important.
52. When there are several rough, noncritical features obviously the same size (fillets, rounds, ribs, etc.), it is necessary to give only typical (abbreviation TYP) dimensions or to use a note.
53. When a dimension is not to scale, it should be underscored with a heavy straight line or marked NTS or NOT TO SCALE.
54. Mating dimensions should be given correspondingly on both drawings of mating parts.
55. Pattern dimensions should be given in two-place decimals or in common whole numbers and fractions to the nearest 1/16 in.
56. Decimal dimensions should be used for all machining dimensions.
57. Cumulative tolerances should be avoided where they affect the fit of mating parts.