

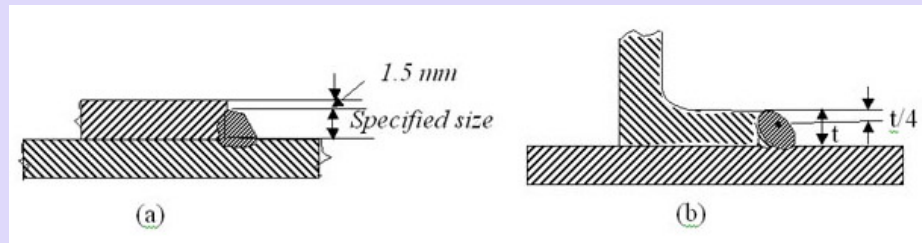
**Fig. 3.18 Typical fillet weld**

The root of the weld is the point where the faces of the metallic members meet. The theoretical throat of a weld is the shortest distance from the root to the hypotenuse of the triangle. The throat area equals the theoretical throat distance times the length of the weld.

The concave shape of free surface provides a smoother transition between the connected parts and hence causes less stress concentration than a convex surface. But it is more vulnerable to shrinkage and cracking than the convex surface and has a much reduced throat area to transfer stresses. On the other hand, convex shapes provide extra weld metal or reinforcement for the throat. For statically loaded structures, a slightly convex shape is preferable, while for fatigue – prone structures, concave surface is desirable.

Large welds are invariably made up of a number of layers or passes. For reasons of economy, it is desirable to choose weld sizes that can be made in a single pass. Large welds can be made in a single pass by an automatic machine, though manually, 8 mm fillet is the largest single-pass layer.

thickness [Fig. 3.26 (a)]. For the rounded toe of a rolled section, the weld size should not exceed  $3/4$  thickness of the section at the toe [Fig. 3.26 (b)] (Cl.10.5.8.1).



**Fig.3.26 (a) Fillet welds on square edge of plate, (b) Fillet Welds on round toe of rolled section**

**Table 3.5. Value of K for different angles between fusion faces**

Angle between fusion faces	60° - 90°	91°-100°	101°-106°	107°-113°	114°-120°
Constant K	0.70	0.65	0.60	0.55	0.50

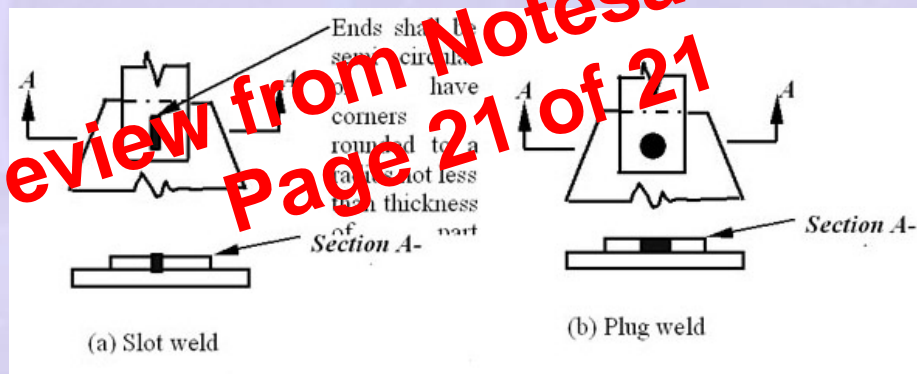
Intermittent fillet welds may be provided where the strength required is less than that can be developed by a continuous fillet weld of the smallest allowable size for the parts joined. The length of intermediate welds should not be less than 4 times the weld size with a minimum of 40 mm. The clear spacing between the effective lengths of the intermittent welds should be less than or equal to 12 times the thickness of the thinner member in compression and 16 times in tension; in no case the length should exceed 20 cm. Chain intermittent welding is better than staggered intermittent welding. Intermittent fillet welds are not used in main members exposed to weather. For lap joints, the overlap should not be less than five times the thickness of the thinner part. For fillet welds to be used in slots and holes, the dimension of the slot or hole should comply with the following limits:

- a) The width or diameter should not be less than three times the thickness or 25 mm whichever is greater
- b) Corners at the enclosed ends or slots should be rounded with a radius not less than 1.5 times the thickness or 12 mm whichever is greater, and

column connections. However, their strength may not be considered in the overall strength of the joint.

The limitations given in specifications for the maximum sizes of plug and slot welds are necessary to avoid large shrinkage, which might be caused around these welds when they exceed the specified sizes. The strength of a plug or slot weld is calculated by considering the allowable stress and its nominal area in the shearing plane. This area is usually referred to as the faying surface and is equal to the area of contact at the base of the slot or plug. The length of the slot weld can be obtained from the following relationship:

$$L = \frac{\text{Load}}{(\text{Width}) \text{ allowable stress}} \quad (3.15)$$



**Fig. 3.28 Slot and plug welds**