

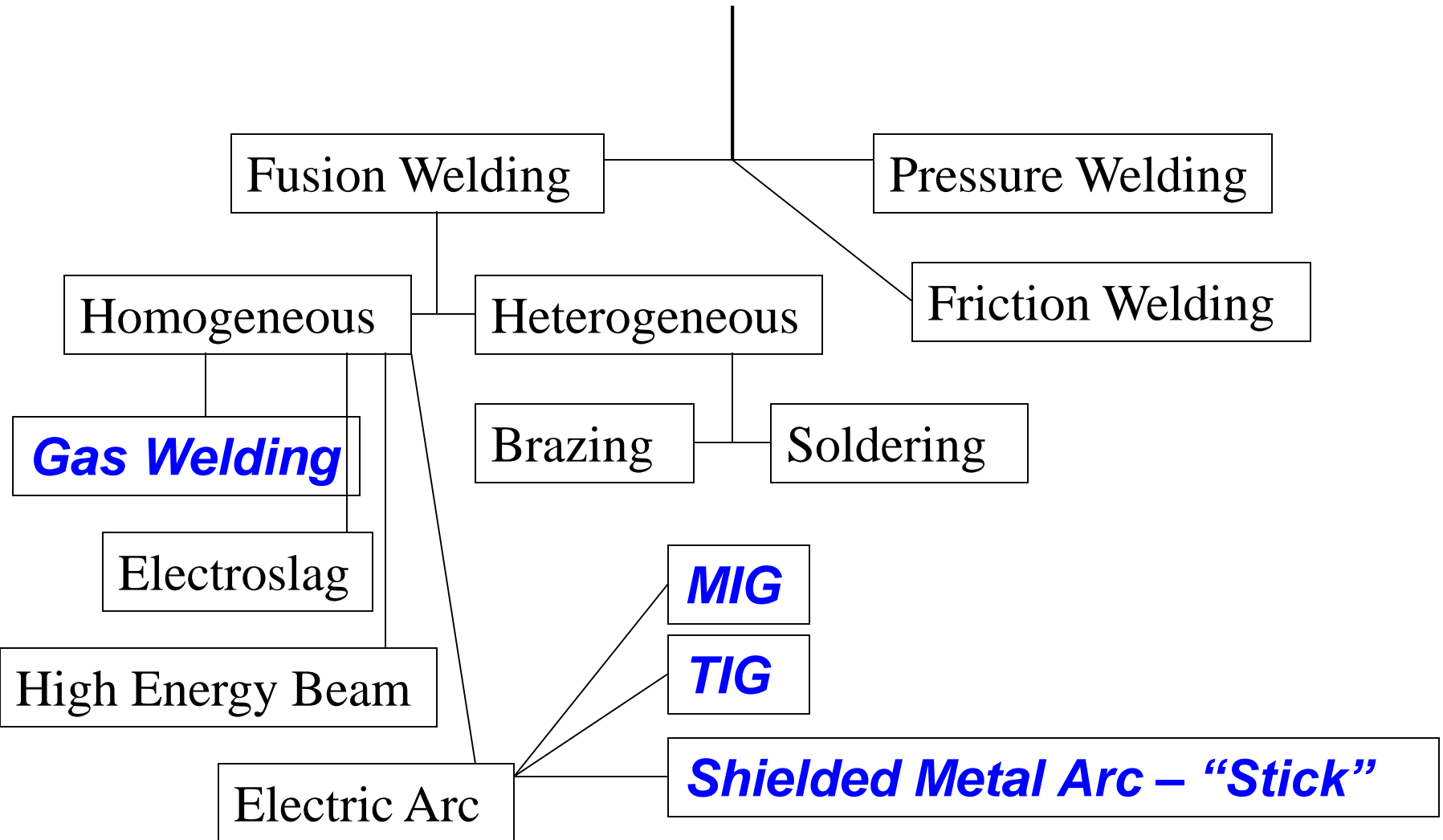


Testing. Inspection. Quality Assurance.

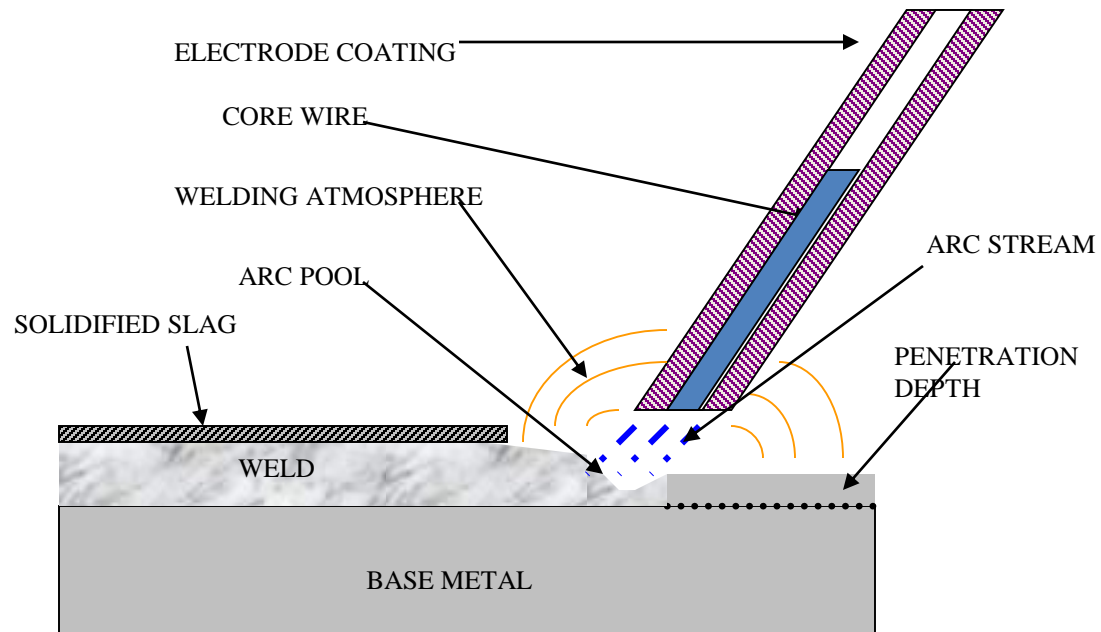


Welding Data

Types of Welding

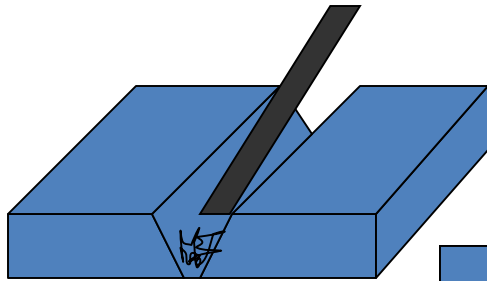


Fusion Welding

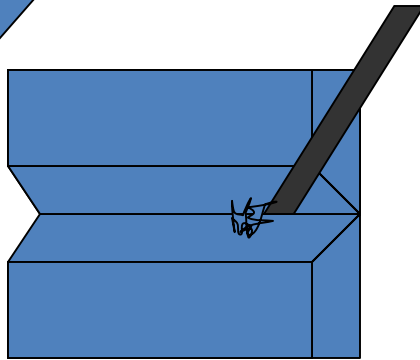


Welding Positions

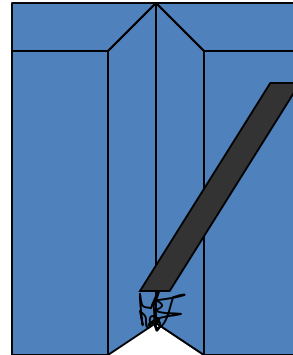
INCREASING DIFFICULTY



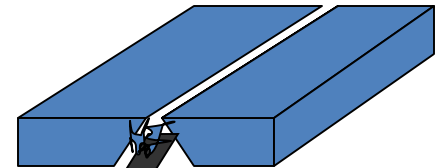
FLAT



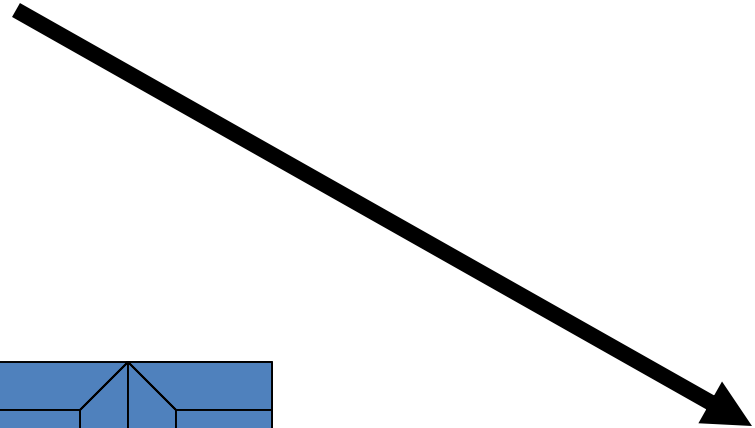
HORIZONTAL



VERTICAL



OVERHEAD



Weld Defects

- Undercuts/Overlaps



- Grain Growth
 - A wide ΔT will exist between base metal and HAZ. Preheating and cooling methods will affect the brittleness of the metal in this region
- Blowholes
 - Are cavities caused by gas entrapment during the solidification of the weld puddle. Prevented by proper weld technique (even temperature and speed)

Weld Defects

- Inclusions

- Impurities or foreign substances which are forced into the weld puddle during the welding process. Has the same effect as a crack. Prevented by proper technique/cleanliness.

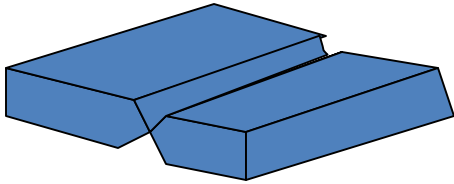
- Segregation

- Condition where some regions of the metal are enriched with an alloy ingredient and others aren't. Can be prevented by proper heat treatment and cooling.

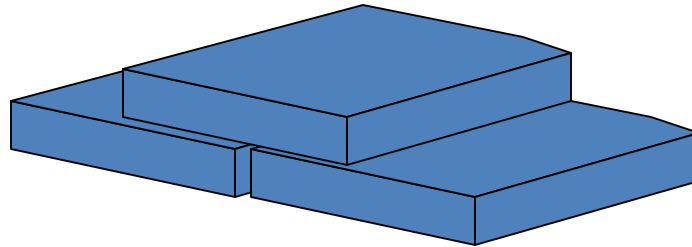
- Porosity

- The formation of tiny pinholes generated by atmospheric contamination. Prevented by keeping a protective shield over the molten weld puddle.

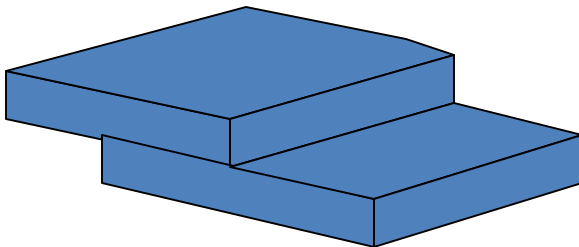
Joint Design



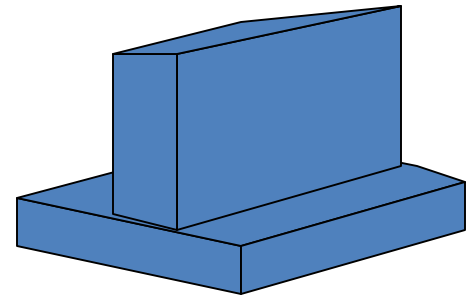
BUTT JOINT



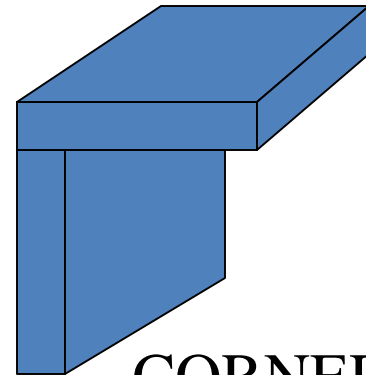
STRAP JOINT



LAP JOINT

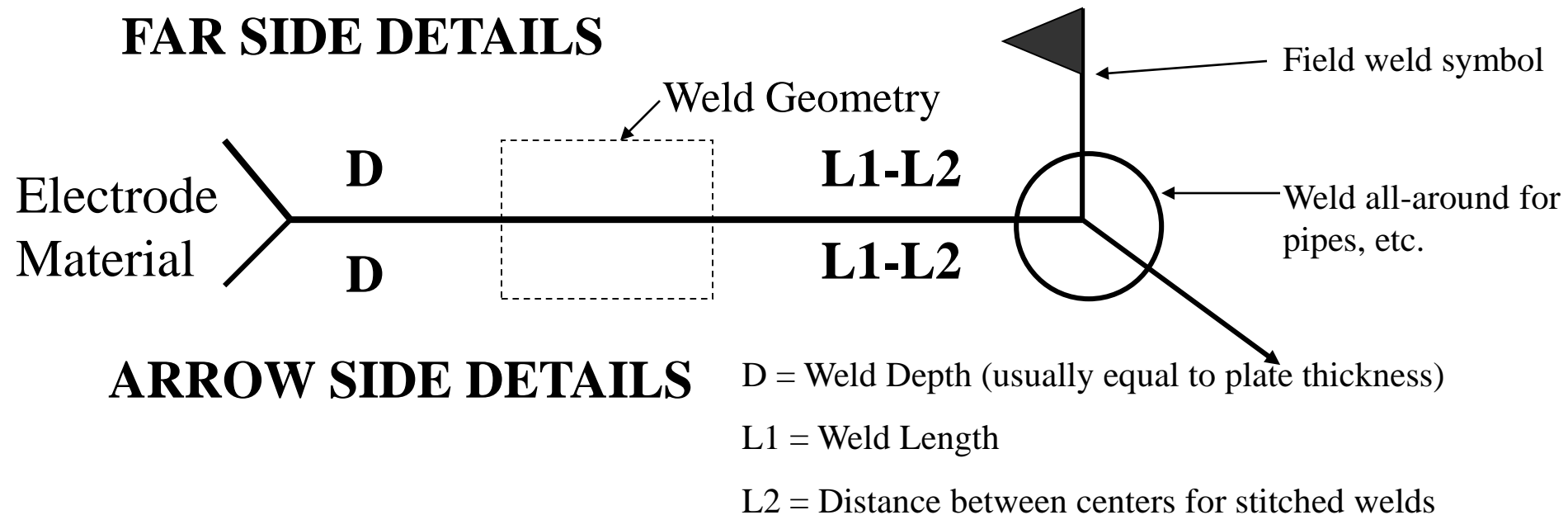


FILLET JOINT

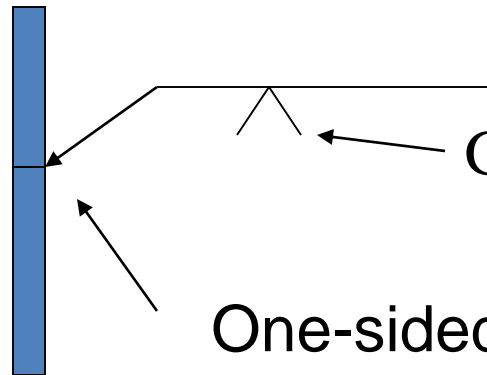
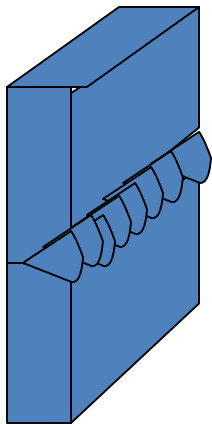


CORNER JOINT

Generalized Welding Symbol

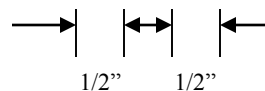
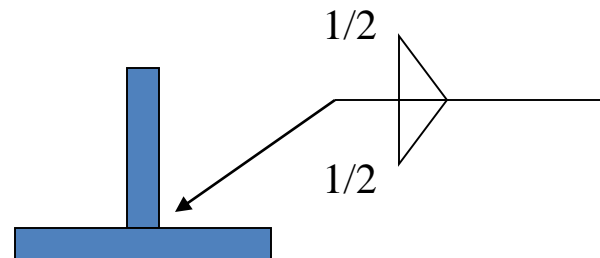
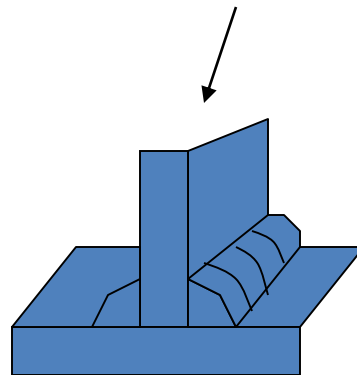


Example Welding Symbol

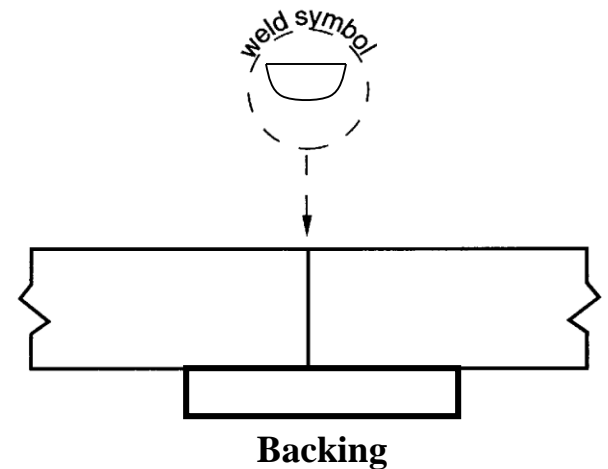
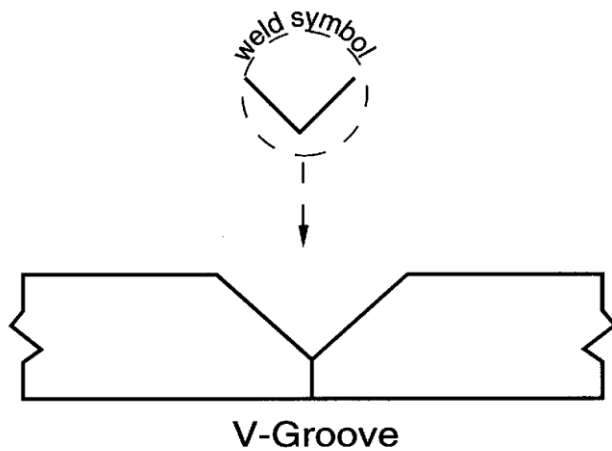
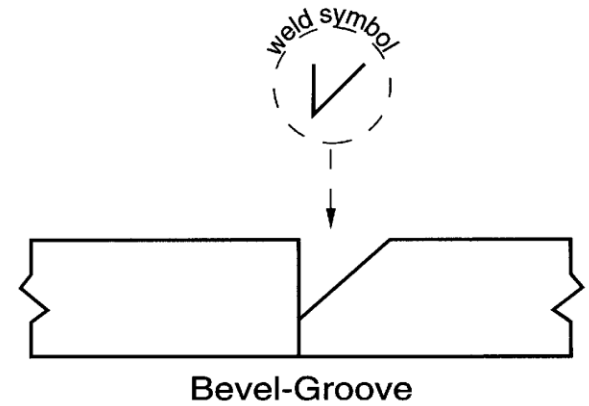
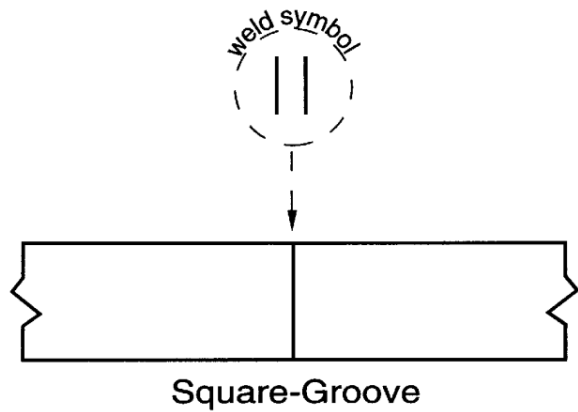


Geometry symbol for V-groove

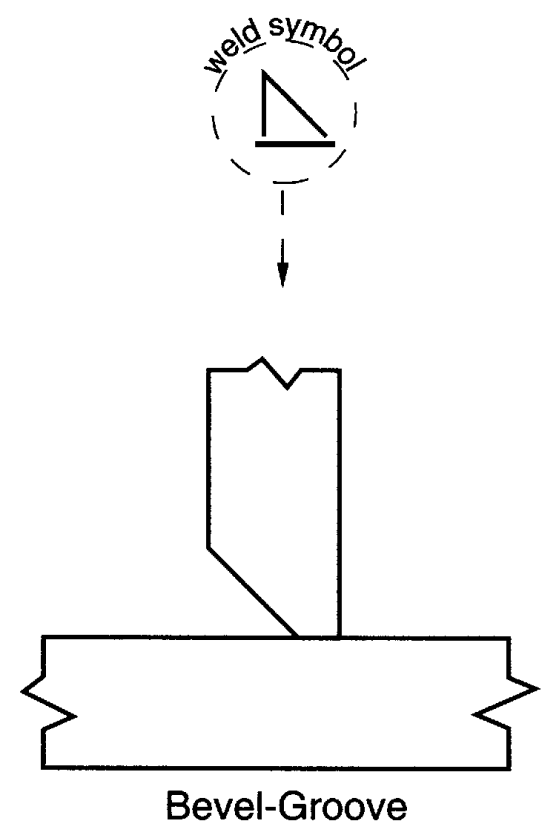
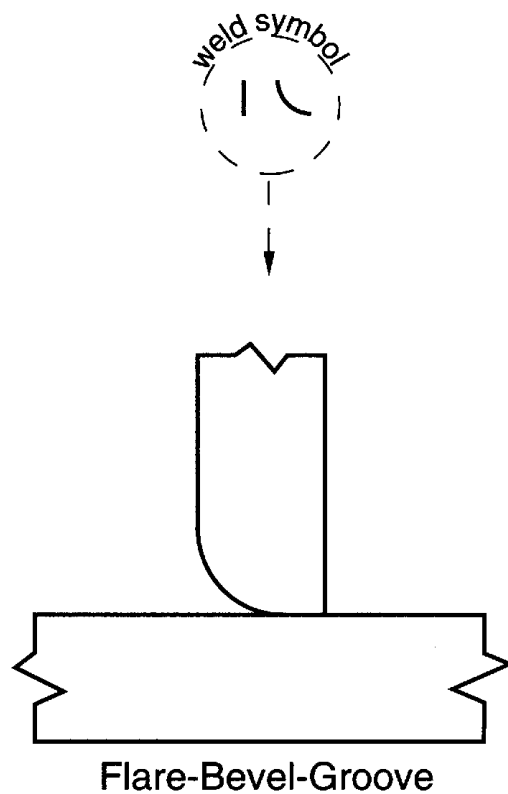
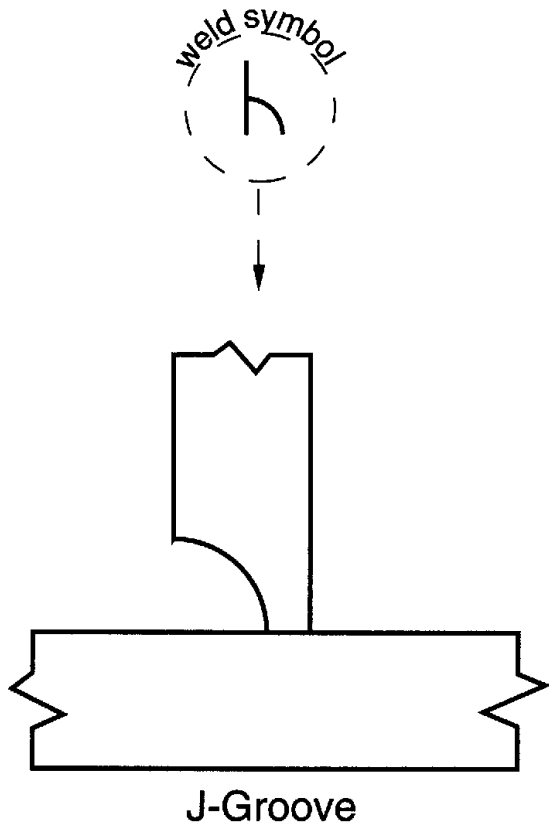
One-sided welds are max 80% efficient
Two sided are 100% efficient



Weld Symbols (Butt Joints)



Weld Symbol (Fillet Joints)



Weld Symbol (Corner Joints)

