Objectives

After completing this learning unit you should be able to:

♦ Identify the different types of joints and welds
♦ Explain the terms and symbols used for groove and fillet welds
♦ Describe the different welding positions
♦ Recognize the factors involved in the selection of joints
♦ Identify and describe welding symbol and supplementary symbol elements
♦ Describe the use of multiple reference lines
♦ Recognize the factors involved in the selection of joints
Types of Joints

Joint: The junction of the workpiece(s) that are to be joined or have been joined.

Faying surface: The mating surface of a workpiece in contact with or in close proximity to another workpiece to which it is to be joined.

**FIG. 1** Definition of a joint.

**FIG. 2** The faying surfaces of these joints have been marked by a thick black line.
Basic Joint Types

Types of joints.

FIG. 3

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Basic Types of Welds

There are three basic types of welds:

1. Groove welds
2. Fillet welds
3. Plug and slot welds

Other types of welds include:

- Arc spot and seam welds
- Edge welds
- Flange welds
- Surfacing welds
- Seal welds

Groove Weld

A groove weld is a weld made in a weld groove on a workpiece surface, between workpiece edges, between workpiece surfaces, or between workpiece edges and surfaces. There are many different shapes of grooves. The figure shows one type of groove weld.

FIG. 4  A groove weld.
Fillet Weld

Reference
Download fillet welds in corner, T- and lap joints in 3D to your phone.

A fillet weld is a weld of approximately triangular cross section joining two surfaces approximately at right angles to each other in a lap joint, T-joint, or corner joint as shown.

FIG. 5 Fillet welds in corner, T- and lap joints.
A plug weld is a weld made in a circular hole in one member of a joint fusing that member to another member. A slot weld is similar to a plug weld except that the hole is elongated.

In preparation for plug and slot welds, holes or slots are made in the upper plate. On thinner material these welds can be made without holes or slots and are called arc spot and arc seam welds, in which the upper sheet is melted and fused to the lower sheet.
Arc Spot and Arc Seam Welds

Reference
Download arc spot and arc seam welds in 3D to your phone.

Arc spot and arc seam welds are used when attaching gauge metals such as roof deck to supporting steel using an electric arc welding process.
A surfacing weld is a weld applied to a surface, as opposed to making a joint, to obtain the desired properties or dimensions.
An edge weld is a weld in an edge joint, a flanged butt joint or a flanged corner joint, in which the full thickness of the members are fused. They are neither groove welds or fillet welds and they are not surfacing welds because these welds are forming a joint along two members.

**FIG. 9** Edge welds.
Classification of Groove Welds

Groove welds can be classified:

♦ In terms of efficiency:
  ♦ complete joint penetration groove welds (CJP)
  ♦ partial joint penetration groove welds (PJP)

♦ In terms of shape:
  ♦ Square
  ♦ Bevel
  ♦ “V”
  ♦ “J”
  ♦ “U”
  ♦ Flare-bevel
  ♦ Flare-V

The illustration shows the classification system.
Classification of Groove Welds

1. Groove welds

Shape | Single | Double | Efficiency
--- | --- | --- | ---
Square |  |  | 1. Complete joint penetration
Bevel |  |  | 2. Partial joint penetration
V- |  |  |  
J- |  |  |  
U- |  |  |  
Flare bevel |  |  |  
Flare V- |  |  |  

2. Fillet welds

3. Plug, slot welds

Plug | Slot

Classification of welds.
Single Groove Welds

Different types of single groove welds.

Single square-groove weld
Single bevel-groove weld
Single V-groove weld
Single V-groove weld (with backing)

Download different types of single groove welds in 3D to your phone.

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Single Groove Welds

Reference
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Single J-groove weld
Single U-groove weld
Single flare-bevel groove weld
Single flare-V-groove weld

FIG. 11

Different types of single groove welds - continued.
Double Groove Welds

Different types of double groove welds.

FIG. 12

Reference
Download different types of double groove welds in 3D to your phone.

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