

Welding symbols

Basic Welding Symbols
and
Their Location Significance

Objectives

After completing this chapter, the student should be able to:

- Understand the basics of welding symbols
- List the major parts of a welding symbol
- Interpret weld locations
- Interprets welding symbol information

Welding Symbols

- Enable a designer to indicate detailed information
 - Shorthand language
 - Standardized by AWS
 - Tail is added to the basic symbol for placement of specific information

• Reference Line

Reference Line (Required element)



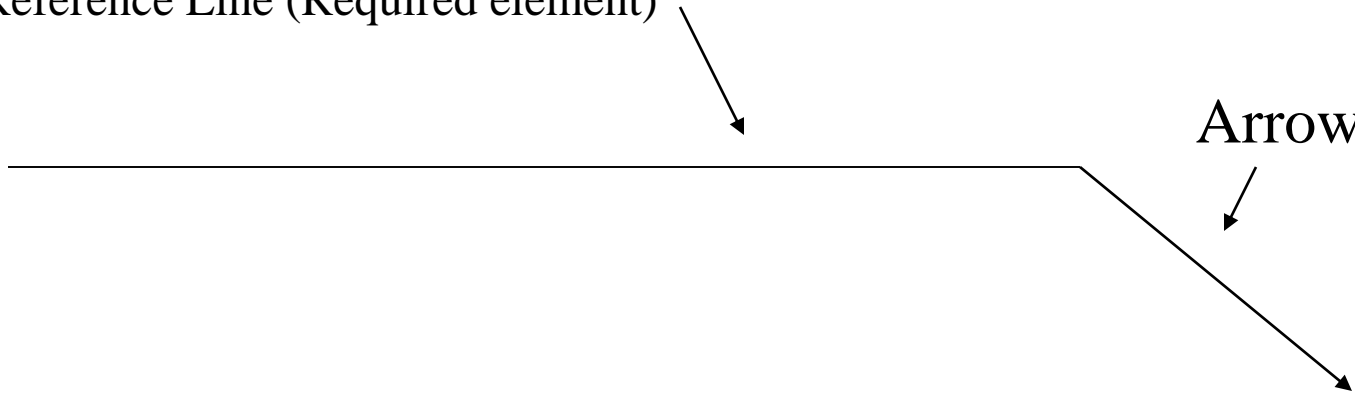
Always Horizontal



Arrow Line

Reference Line (Required element)

Arrow

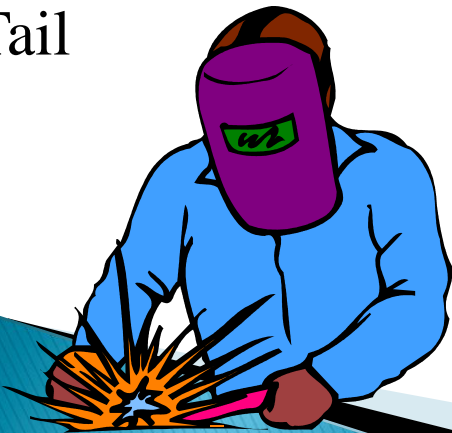


Tail

Reference Line (Required element)

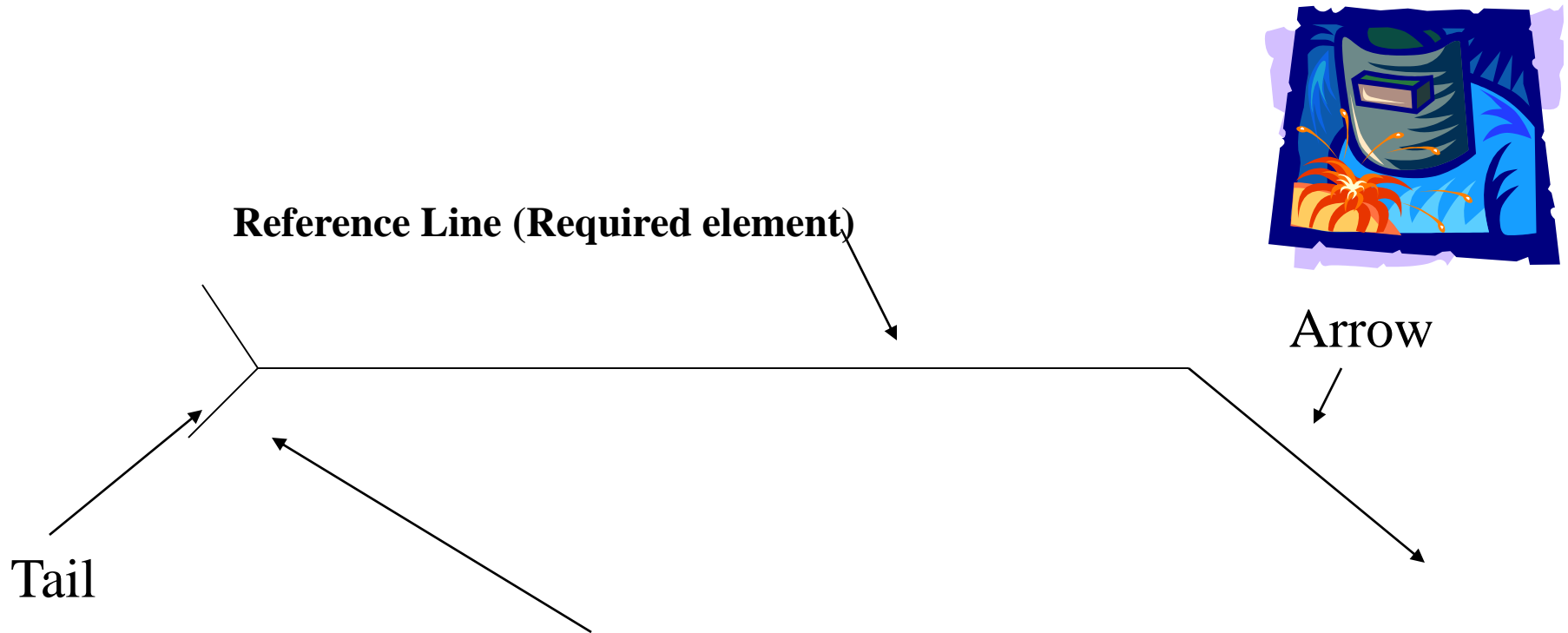
Arrow

Tail



Reference Line must always be horizontal,

Arrow points to the line or lines on drawing which clearly identify the proposed joint or weld area.



The tail of the welding symbol is used to indicate the welding or cutting processes, as well as the welding specification, procedures, or the supplementary information to be used in making the weld.

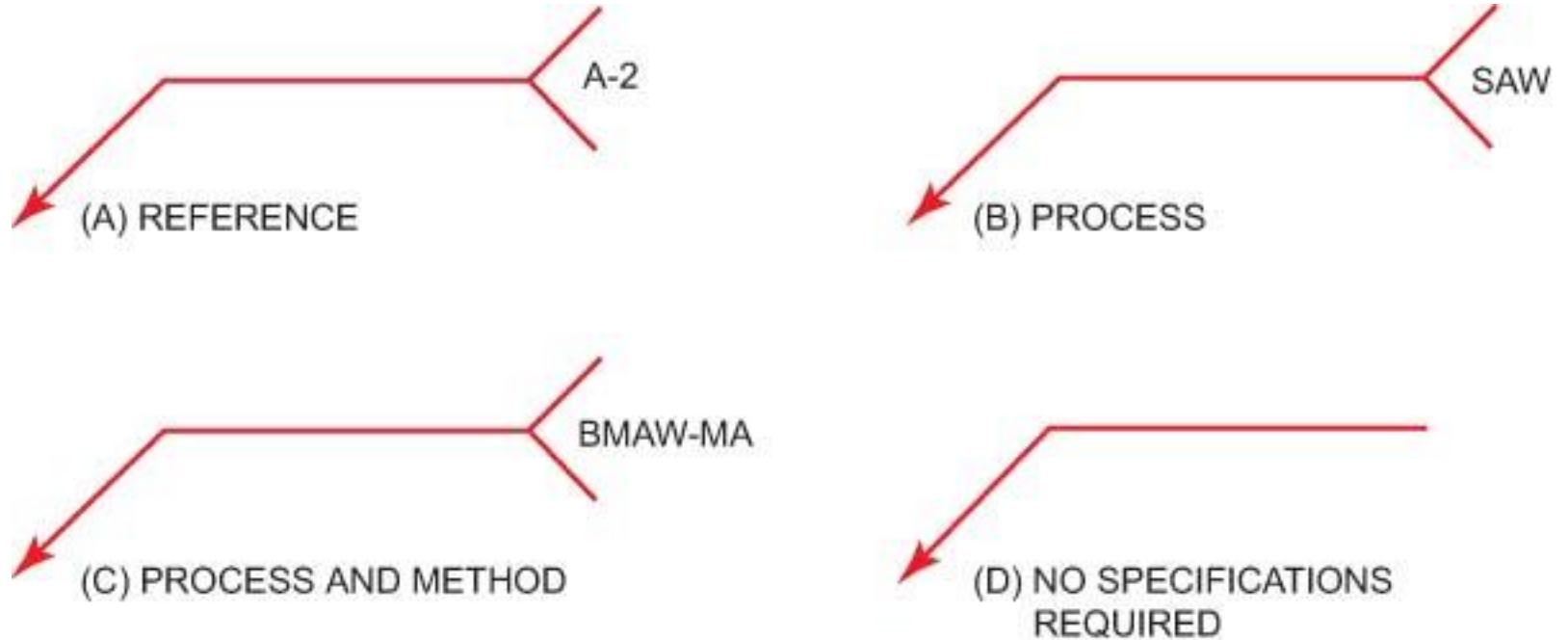


FIGURE 20-19 Locations of specifications, processes, and other references on weld symbols.

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Location Significance of Arrow

- Fillet and groove welding symbols
 - Arrow connects welding symbol reference line to one side of the joint
- Joint illustrated as a single line
 - Arrow of a symbol is directed to the line
 - Arrow side of joint is the near side of the joint
- Plug, slot, spot, seam, resistance, flash, upset, or projection symbols
 - Arrow connects reference line to outer surface

Indicating Types of Welds

- Weld type classifications
 - Fillets
 - Grooves
 - Flange
 - Plug
 - Slot
 - Spot or projection
 - Seam
 - Back or backing
 - Surfacing

Weld Location

- Arrow side, other side, and both sides
 - Used to indicate the weld location
- Weld deposited on arrow side
 - Symbol placed below the reference line
- Weld deposited on the other side of the joint
 - Symbol is placed above
- Tail is added to designate welding specifications

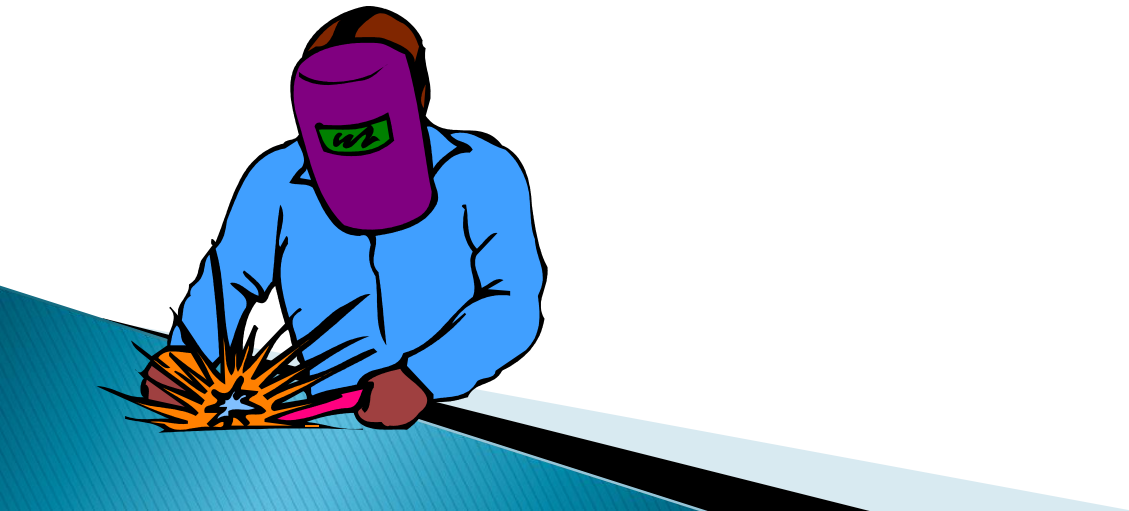
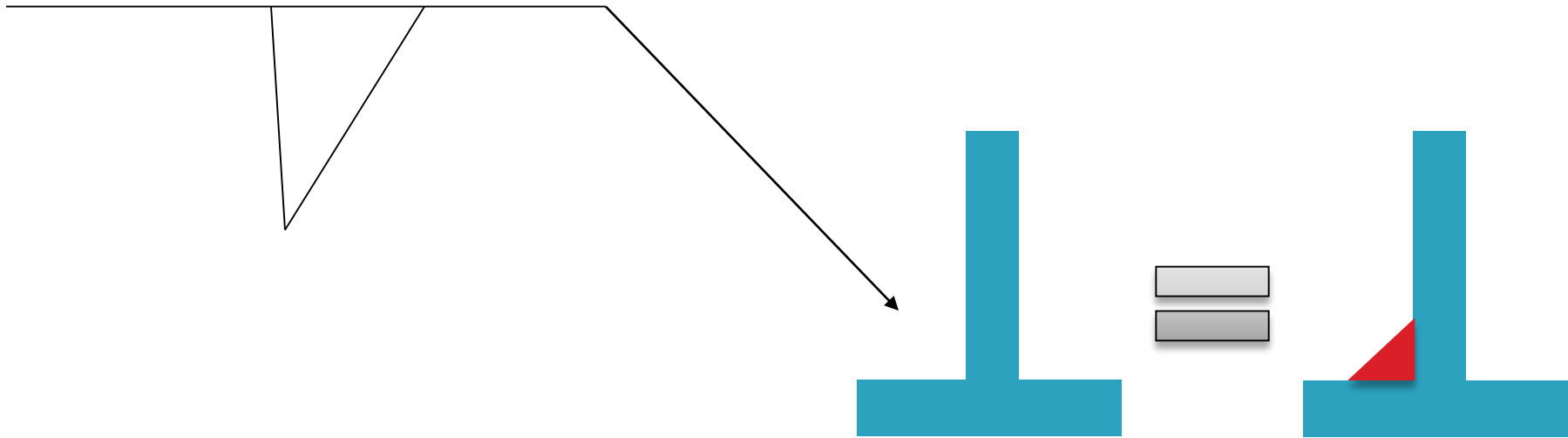
Weld Symbol Terminology

OTHER SIDE

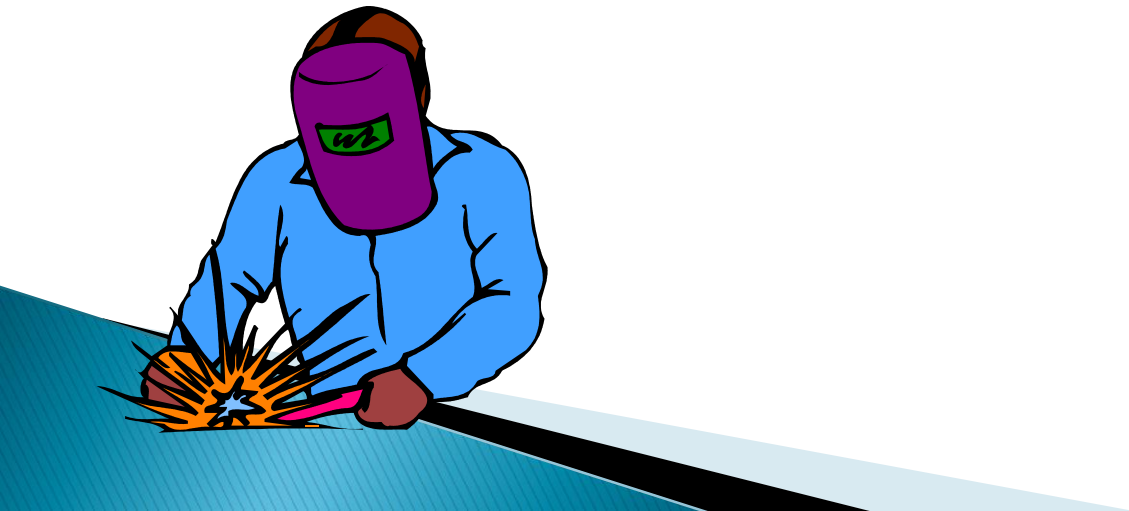
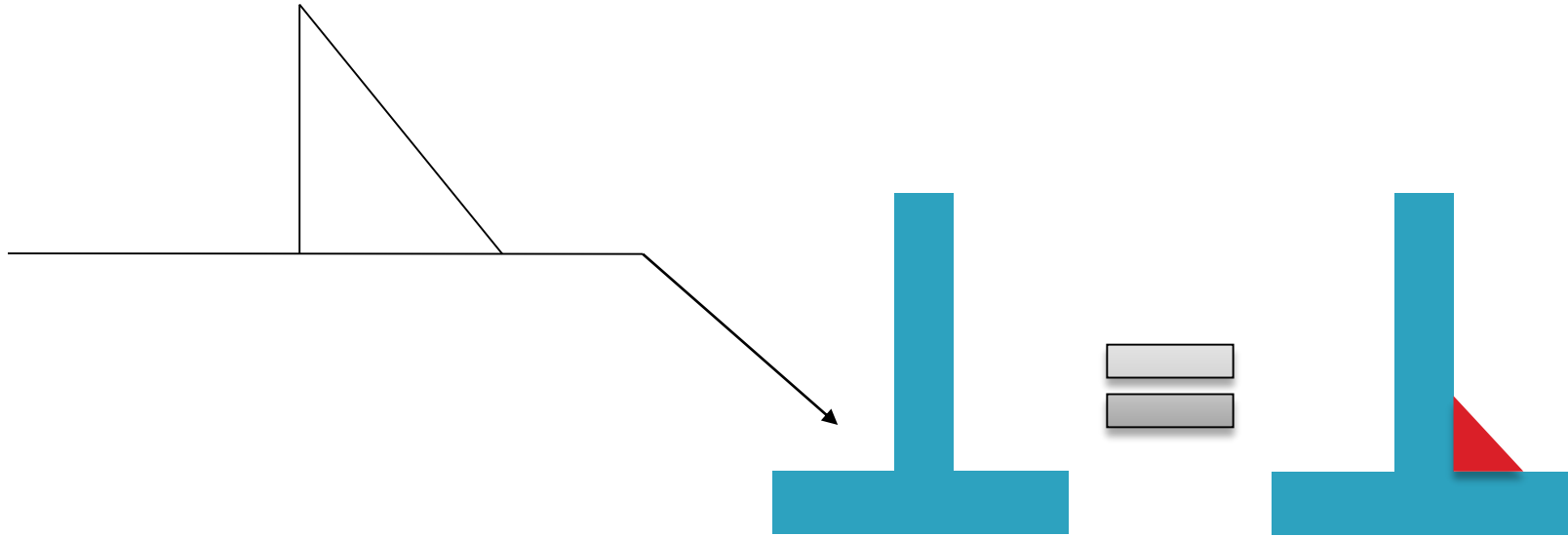
ARROW SIDE



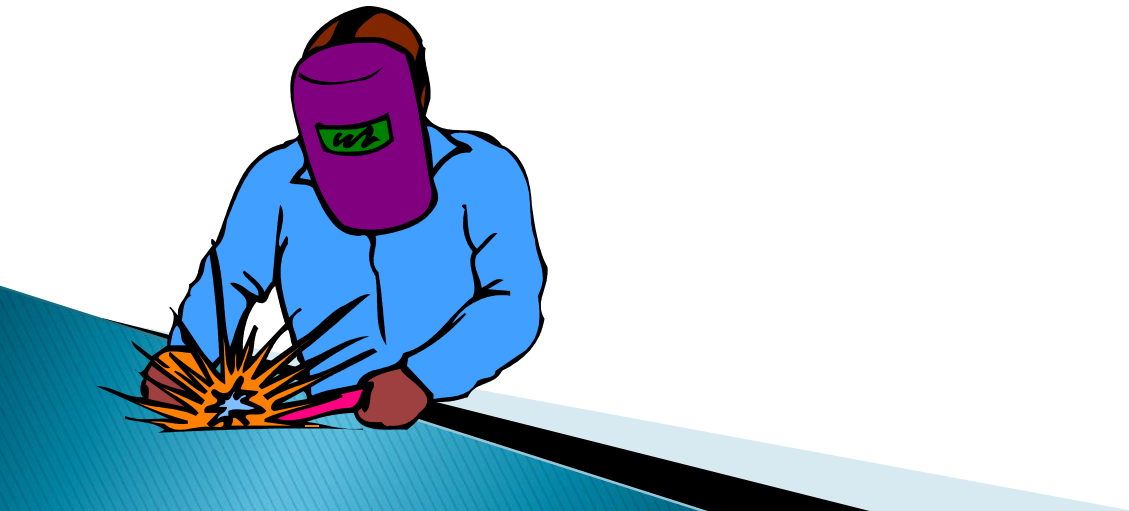
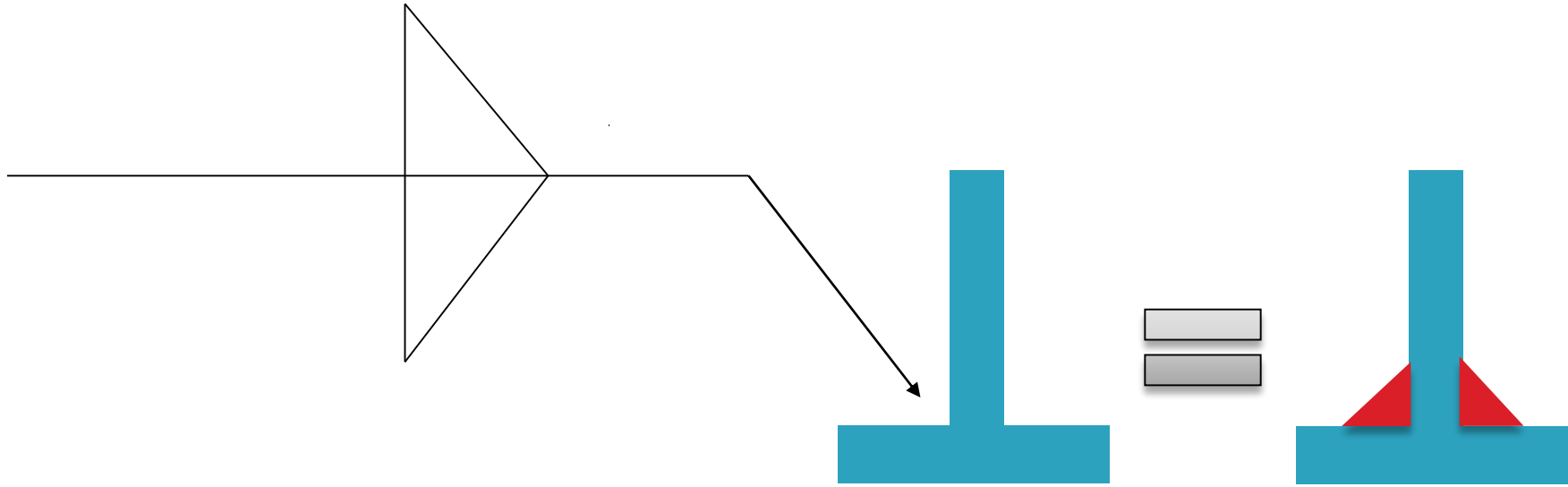
Fillet Weld (Arrow Side of Joint Only)



Fillet Weld (Other Side of Joint Only)



Fillet Weld (Both Sides of Joint)



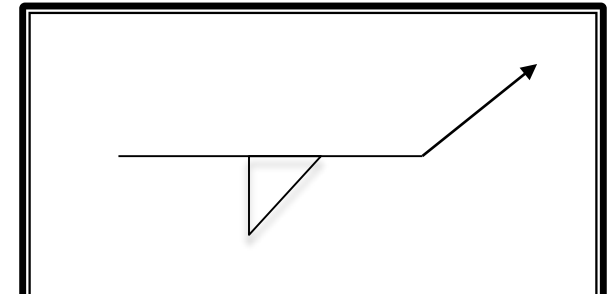
Basic Welding Symbols and Their Location

- » Significance

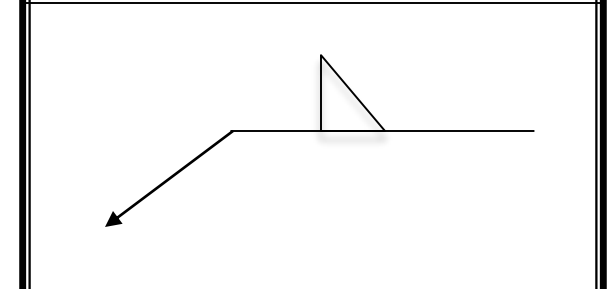
Fillet Weld Symbol

- Notice the Vertical line
Is always
located on the Left!
- And the angled line it leans
towards the reference line.

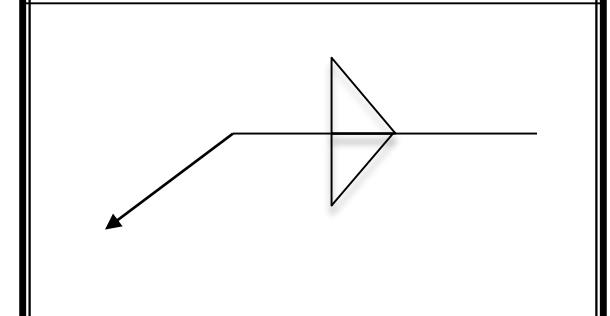
Arrow Side



Other Side

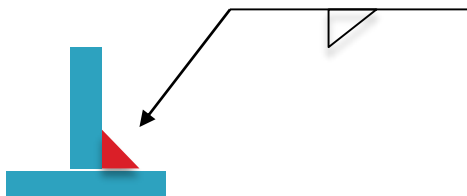


Both Sides



No Arrow side or
Other side Significance

Not Used

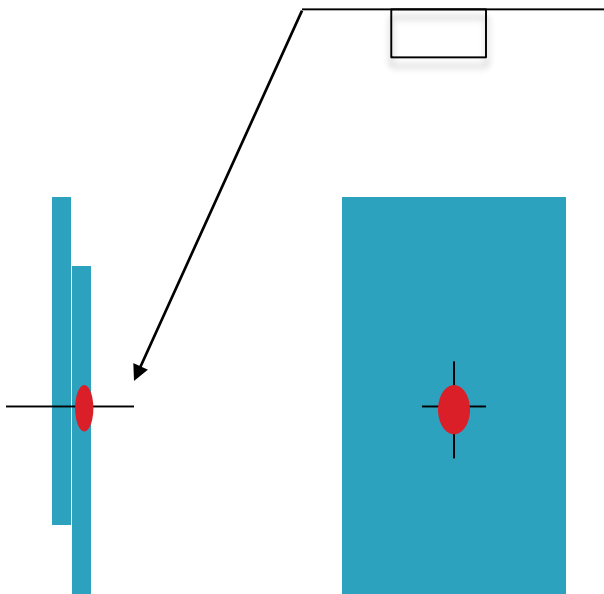


Fillet Welds

- Dimensions of fillet welds
 - Shown on same side of reference line as weld symbol
- Size of a fillet weld with unequal legs
 - Shown in parentheses to left of symbol
- Intermittent fillet welds
 - Length and pitch increments are placed to the right
 - Used to reduce amount of welding, possible weld distortion, and to prevent a crack from spreading

Plug or Slot

- Rectangle shape

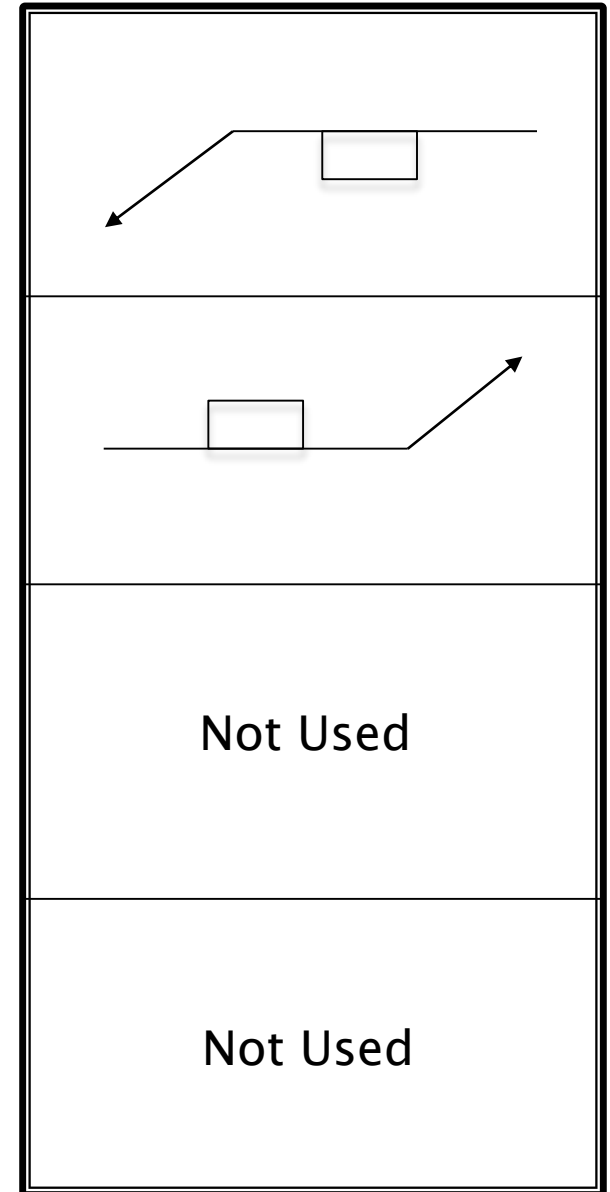


Arrow Side

Other Side

Both Sides

No Arrow side or
Other side Significance



Plug Welds

- Holes in arrow side member of a joint for plug welding
 - Indicated by placing weld symbol below the reference line
- Holes in the other side member
 - Indicated by placing weld symbol above the line
- Diameter or size
 - Located to the left of the symbol

Spot or Projection

- Resistance welder

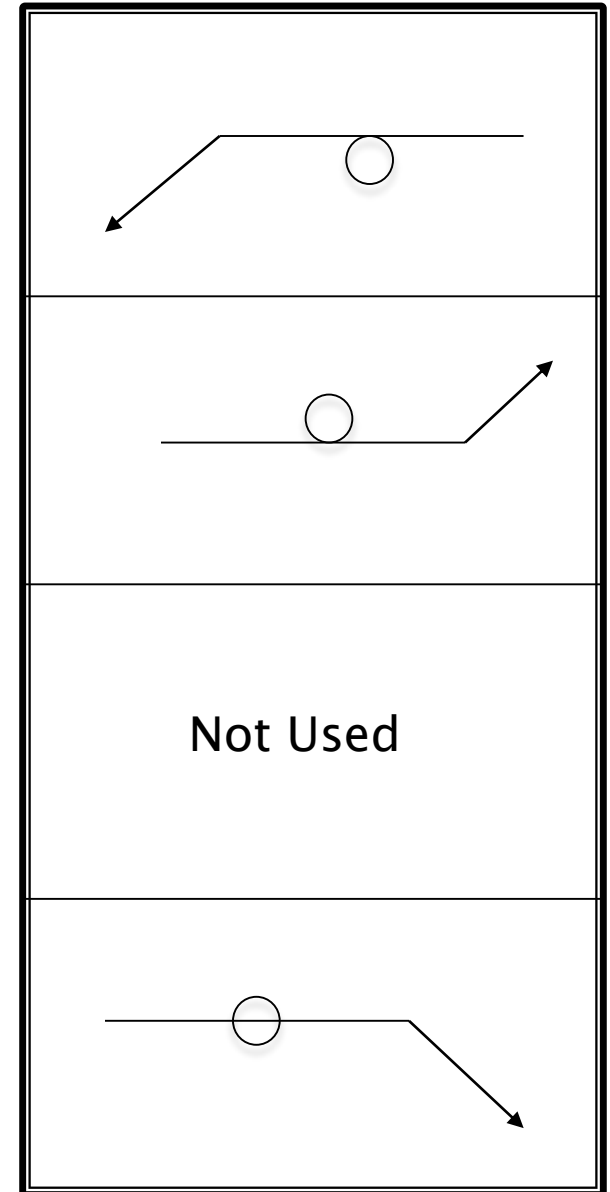


Arrow Side

Other Side

Both Sides

No Arrow side or
Other side Significance

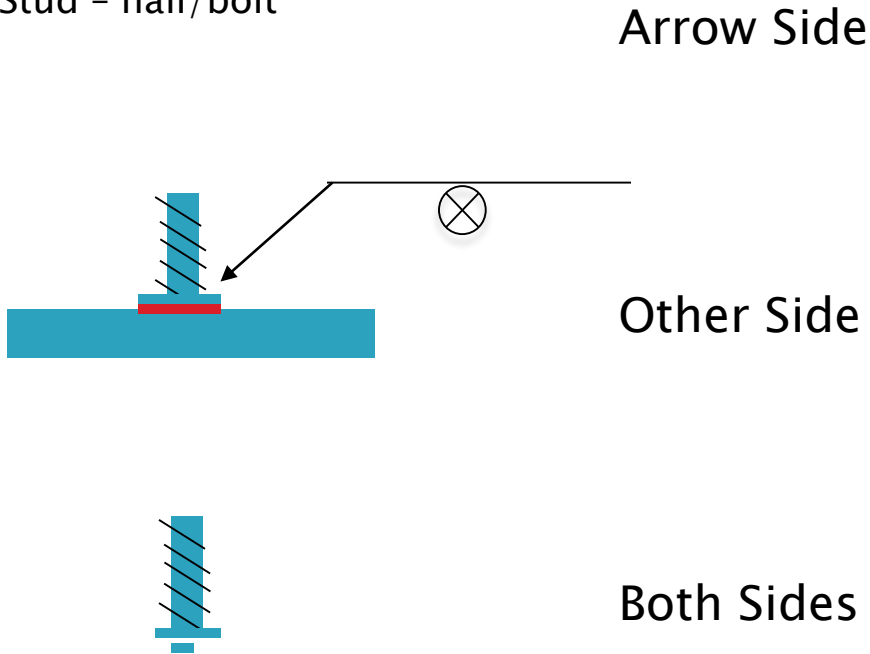


Spot Welds

- Dimensions of resistance spot welds
 - Indicated on same side of reference line as the weld symbol
 - Dimensioned by size or strength
 - Size: designated as weld diameter
 - Strength: shown as minimum shear strength in pounds per spot and is shown to the left of the symbol

Stud

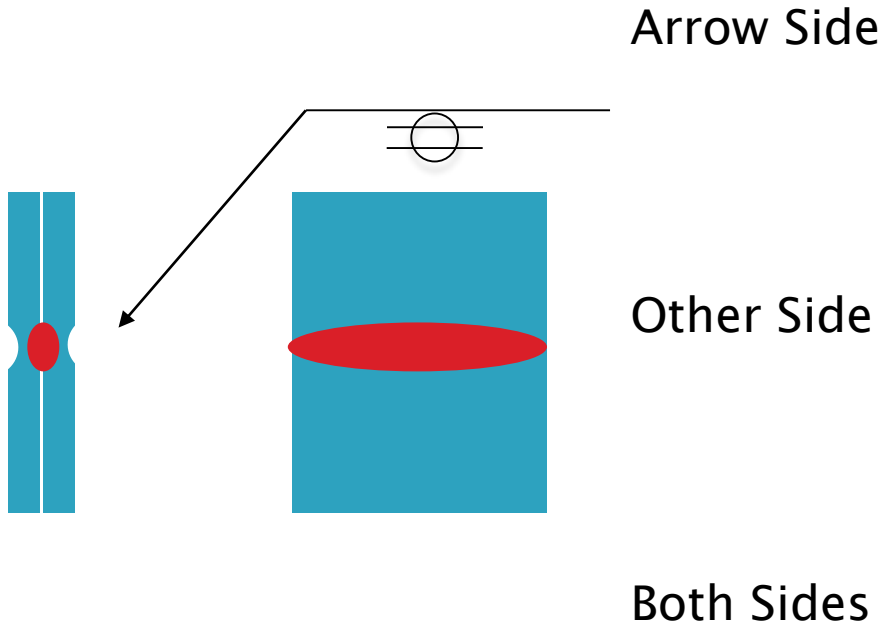
- Stud – nail/bolt



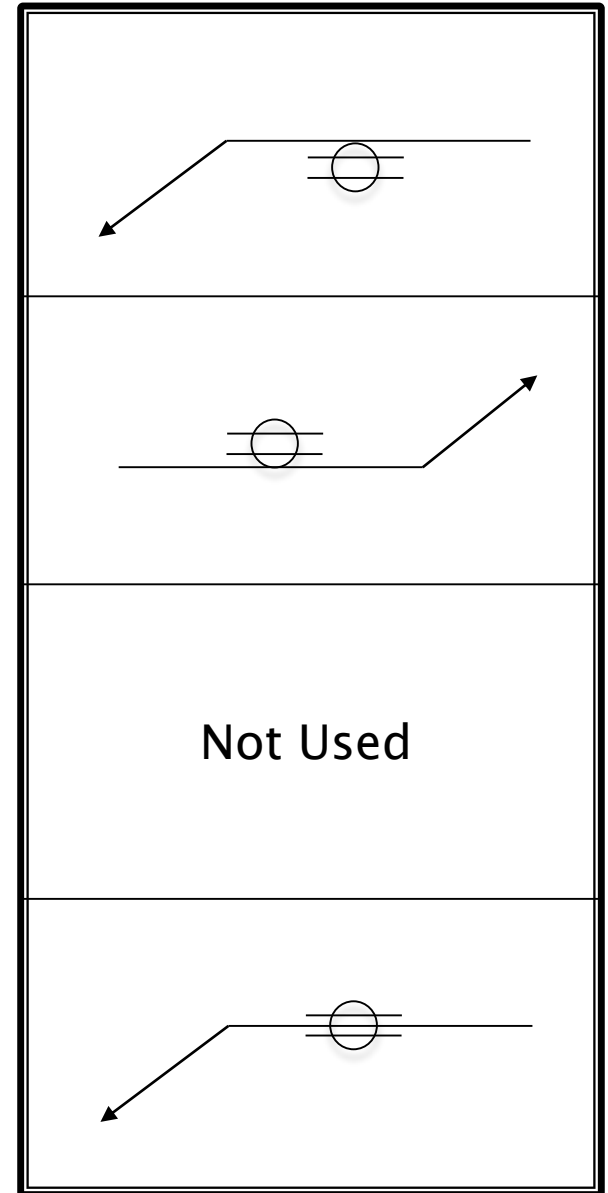
No Arrow side or
Other side Significance

Not Used
Not Used
Not Used

Seam



No Arrow side or
Other side Significance



Seam Welds

- Dimensions of seam welds
 - Shown on same side of reference line as the weld symbol
 - Size is shown with or without the inch marks to the left of the weld symbol
 - Strength is designated as minimum acceptable shear strength in pounds per linear inch

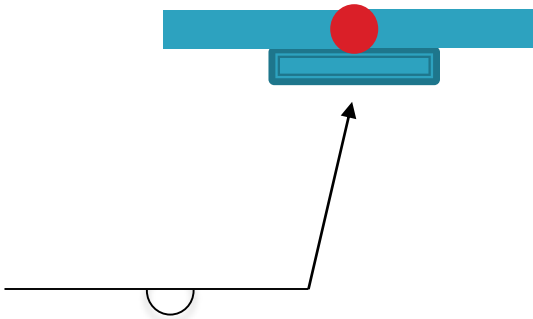
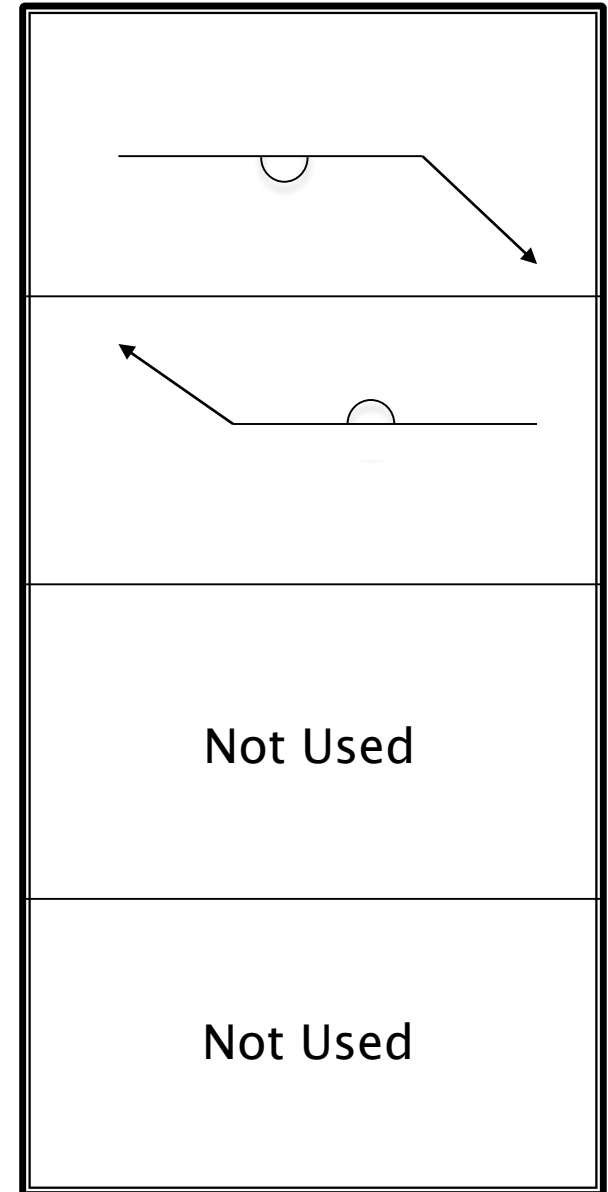
Back or Backing

Arrow Side

Other Side

Both Sides

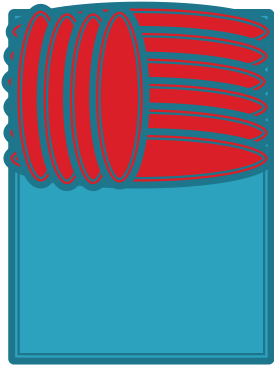
No Arrow side or
Other side Significance



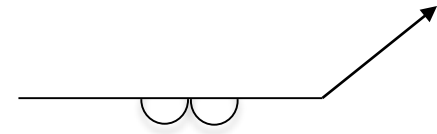
Backing

- Piece of metal placed on back side of a weld joint
 - Must be thick enough to withstand the heat of the root pass
 - May be used on butt joints, tee joints, and outside corner joints
 - May be left on the finished weld or removed

Surfacing



Arrow Side



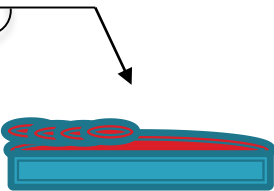
Other Side

Not Used

Both Sides

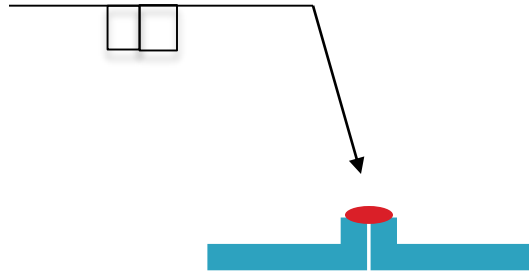
Not Used

No Arrow side or
Other side Significance

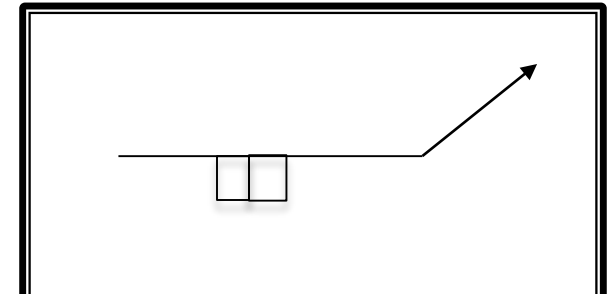


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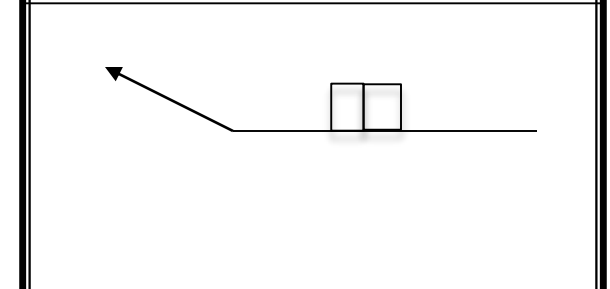
Edge



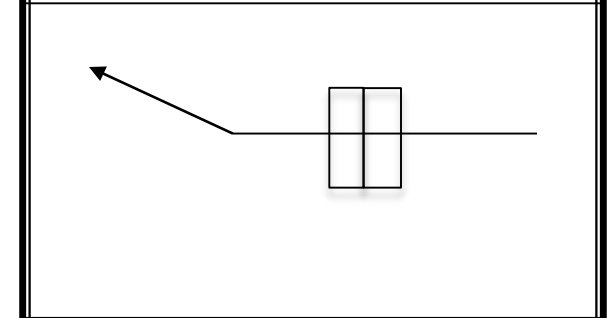
Arrow Side



Other Side



Both Sides



No Arrow side or
Other side Significance

Not Used

Flanged Welds

- Weld symbols used where edges joined are bent to form a flange
 - Edge flange: shown by edge flange weld symbol
 - Corner flange welds: indicated by corner flange weld symbol
 - Dimensions: shown on same side of reference line as weld symbol
 - Size of flange weld: shown by a dimension placed outward from flanged dimensions

» Groove
Welding Symbols
and Their Location
Significance

Groove Welds

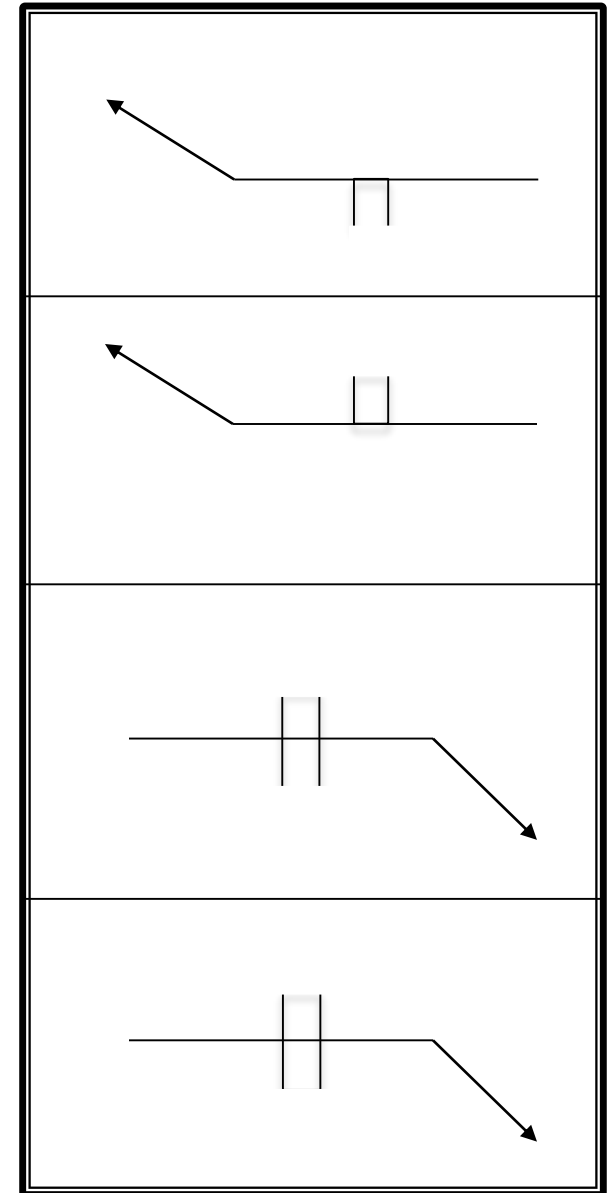
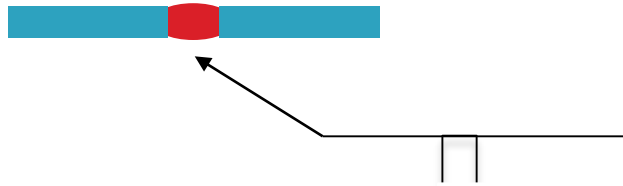
- Joint strength
 - Can be improved by making some type of groove preparation
 - Seven types of grooves
 - Can be made in one or both plates or on one or both sides
 - Cutting the groove: weld can penetrate deeper
 - Can be cut in base metals in a number of ways

Square

Arrow Side

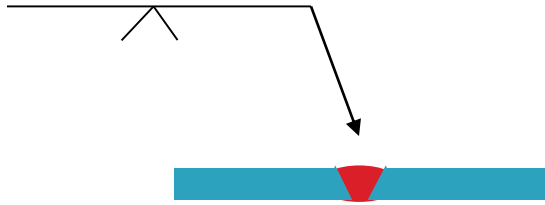
Other Side

Both Sides

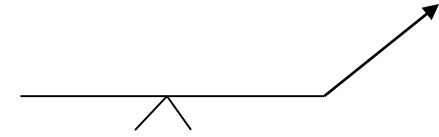


No Arrow side or
Other side Significance

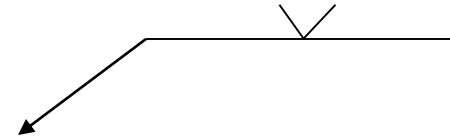
V



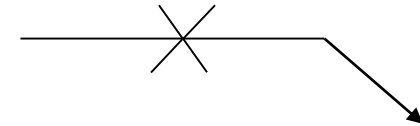
Arrow Side



Other Side



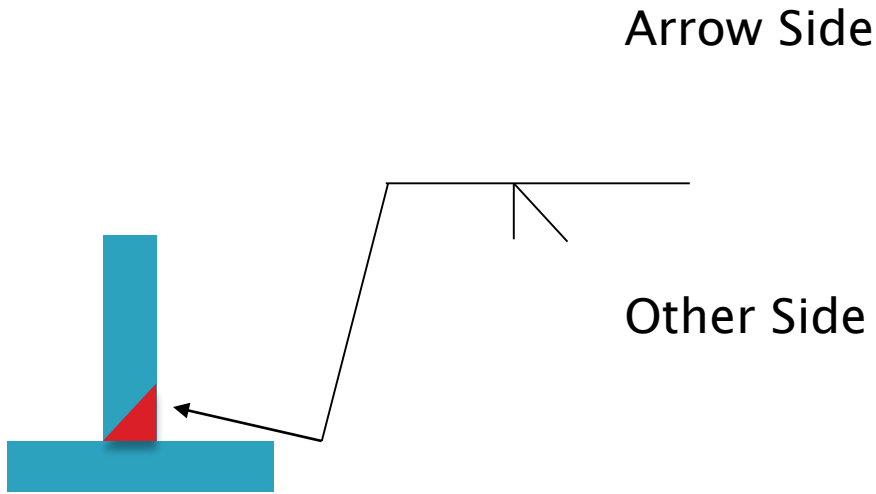
Both Sides



No Arrow side or
Other side Significance

Not Used

Bevel



Arrow Side

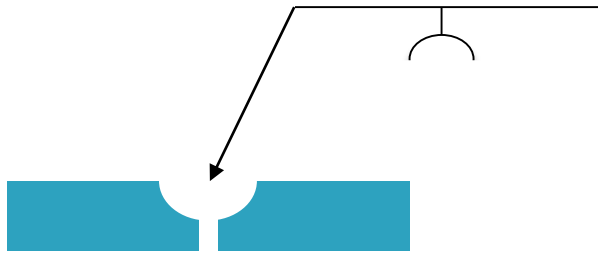
Other Side

Both Sides

No Arrow side or
Other side Significance

Not Used

U

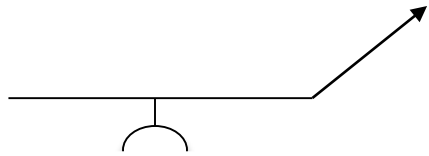
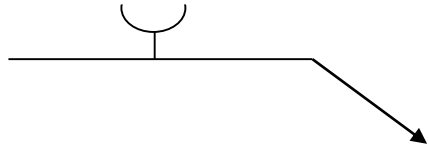
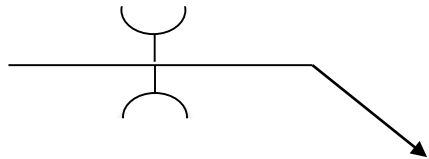


Arrow Side

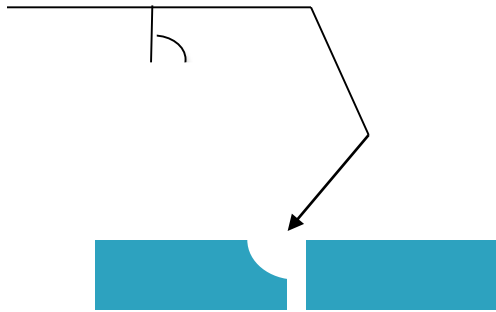
Other Side

Both Sides

No Arrow side or
Other side Significance




Not Used

J

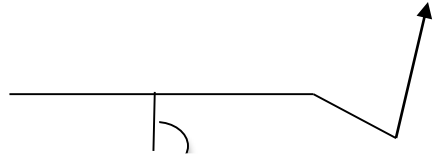
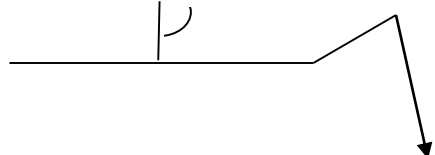
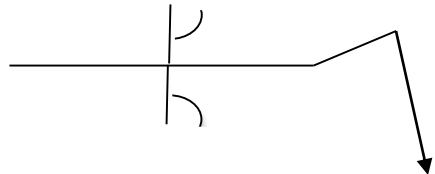


Arrow Side

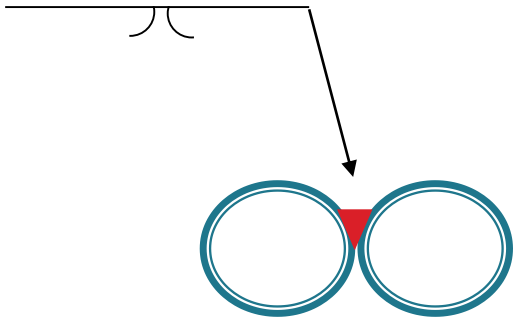
Other Side

Both Sides

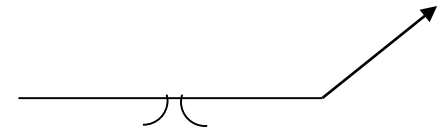
No Arrow side or
Other side Significance




Not Used

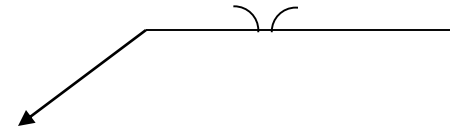
Flare-V



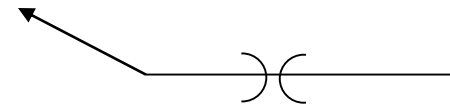
Arrow Side



Other Side



Both Sides

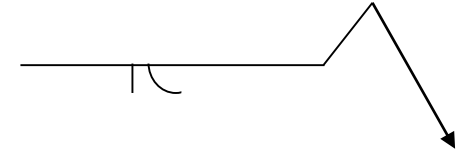


No Arrow side or
Other side Significance

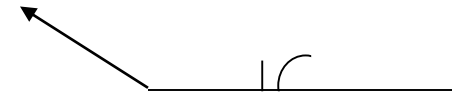
Not Used

Flare-Bevel

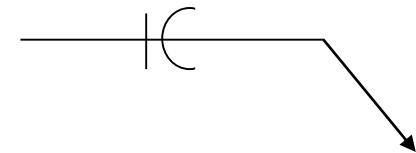
Arrow Side



Other Side

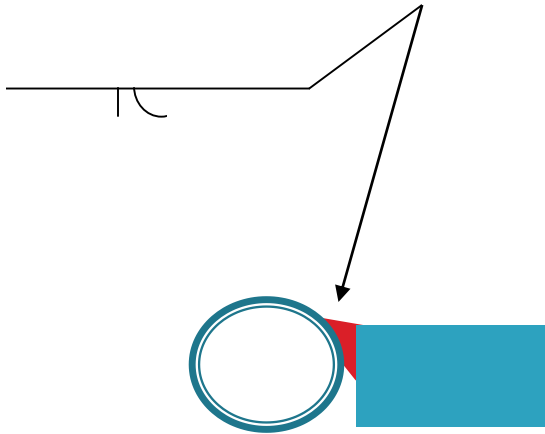


Both Sides



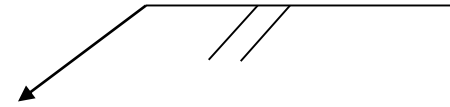
Not Used

No Arrow side or
Other side Significance

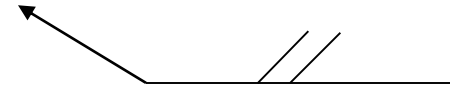


Scarf for Brazed Joint

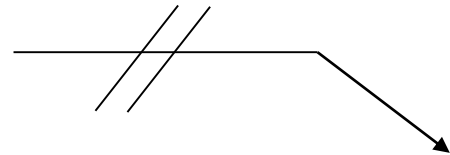
Arrow Side



Other Side

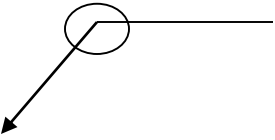
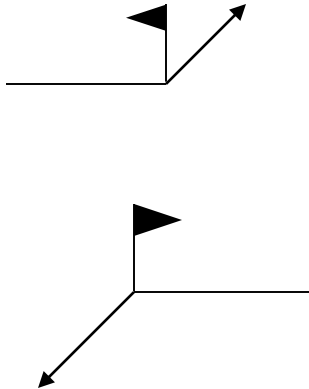
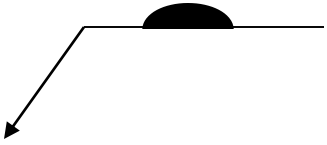
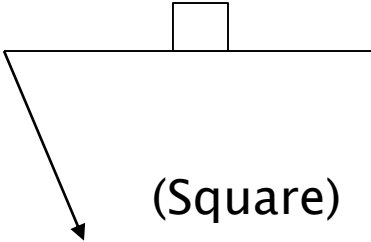


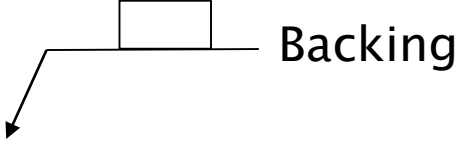
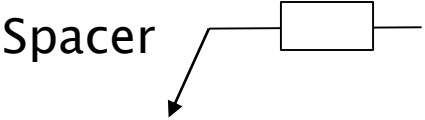
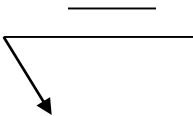
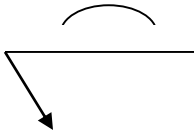
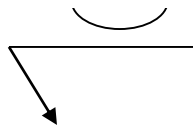
Both Sides



No Arrow side or
Other side Significance

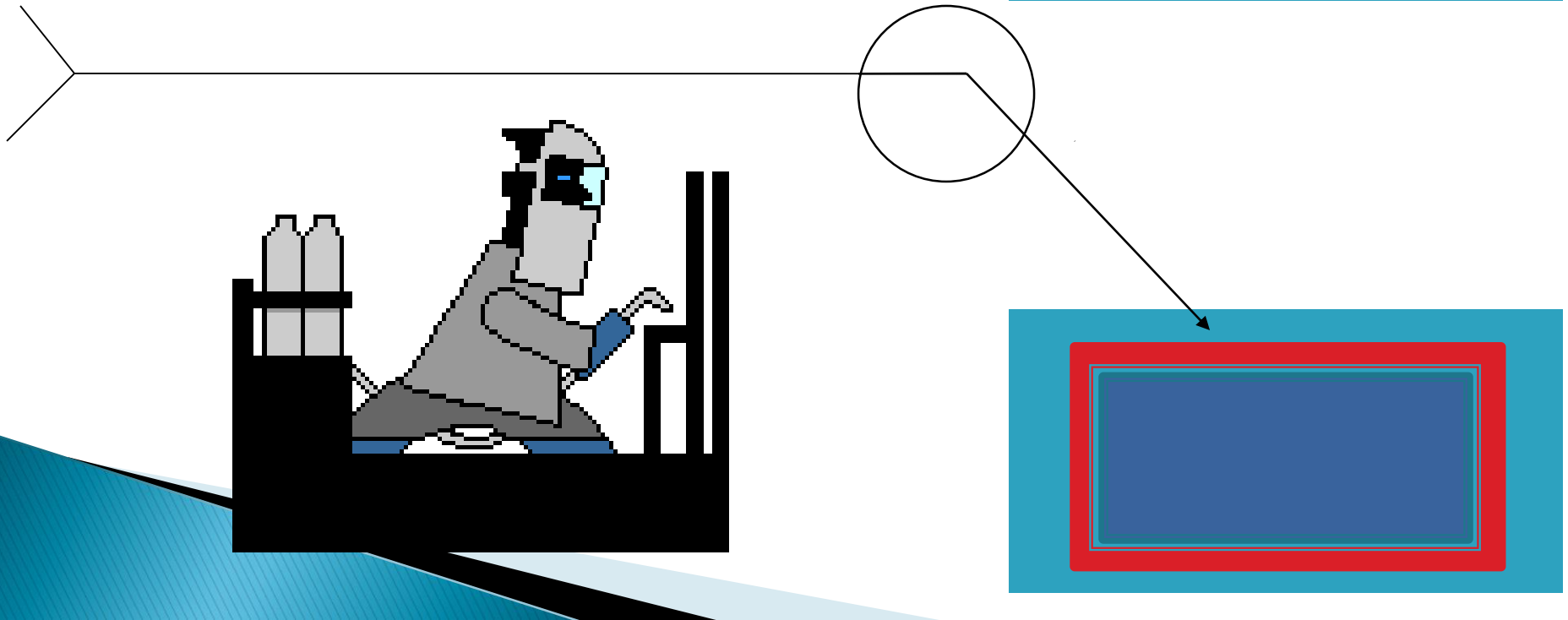
Not Used

Weld all Around	Field weld	Melt thru	Consumable Insert
			 <p>(Square)</p>

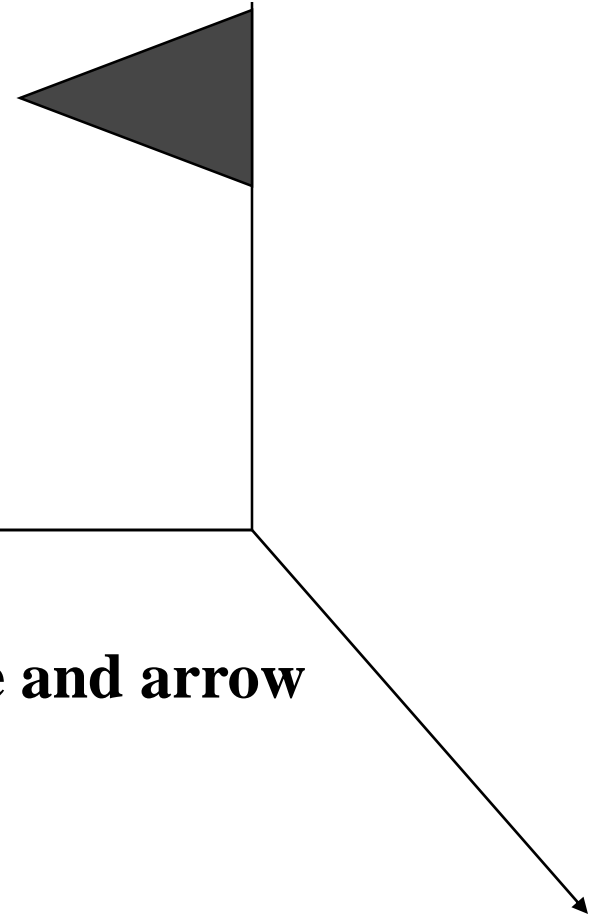
Backing/Spacer (Rectangular)	Contour		
 	Flush or Flat	Convex	Concave
			

All the way Around

A circle at the tangent of the arrow and the reference line means welding to be all around.



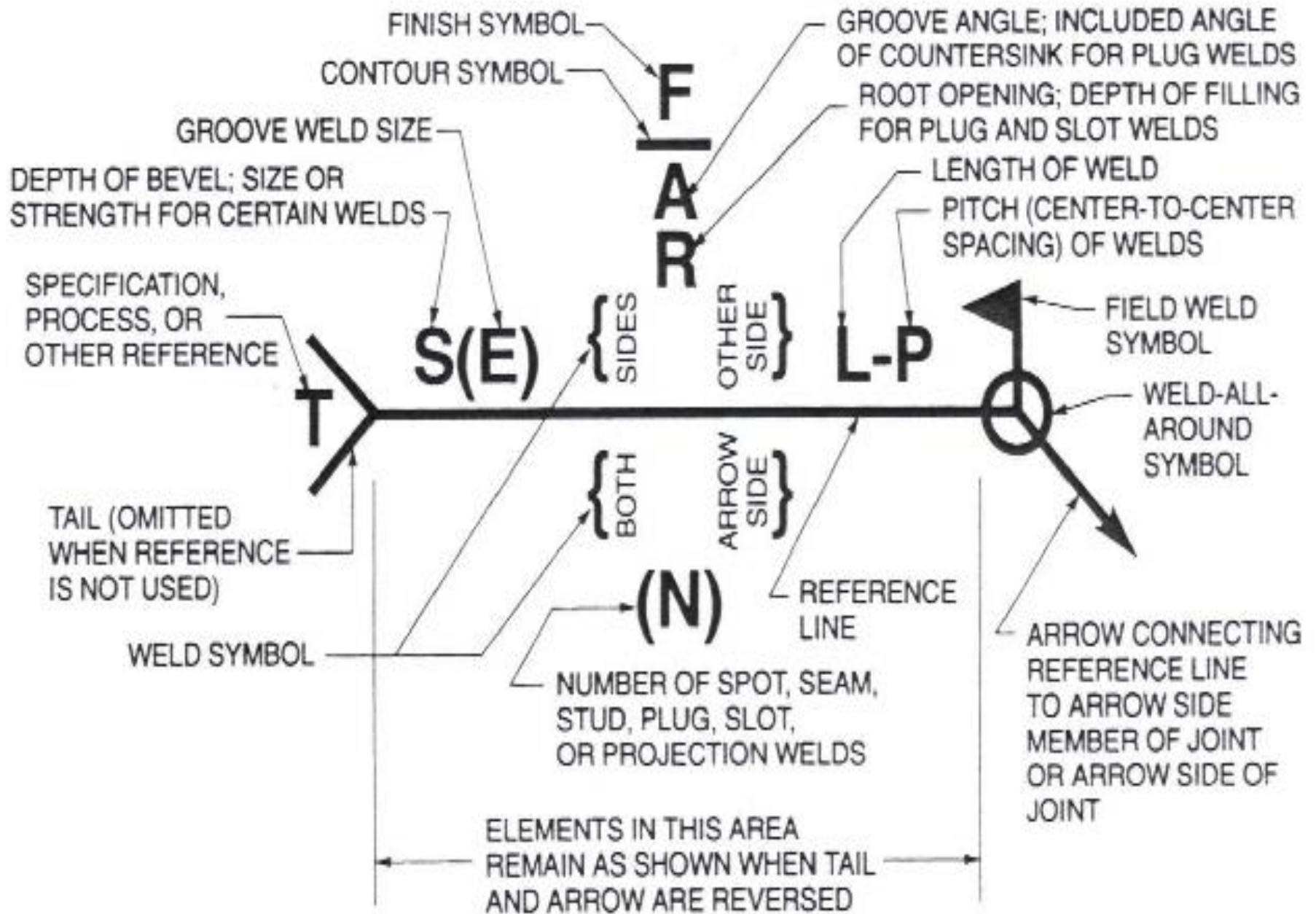
Field Weld Symbol



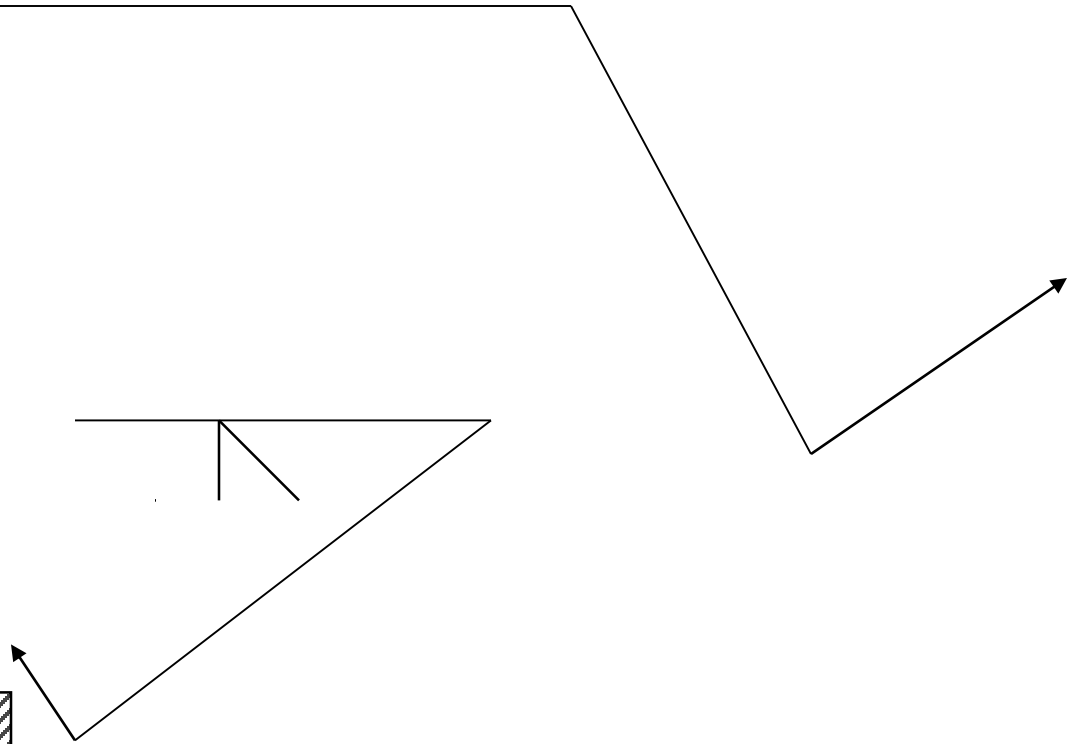
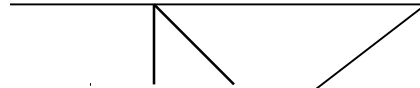
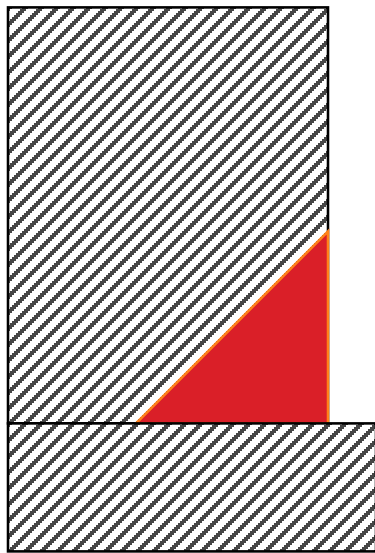
A flag at the tangent of the reference line and arrow means Field Weld.



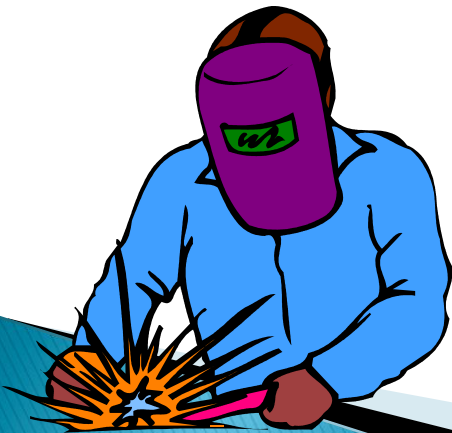
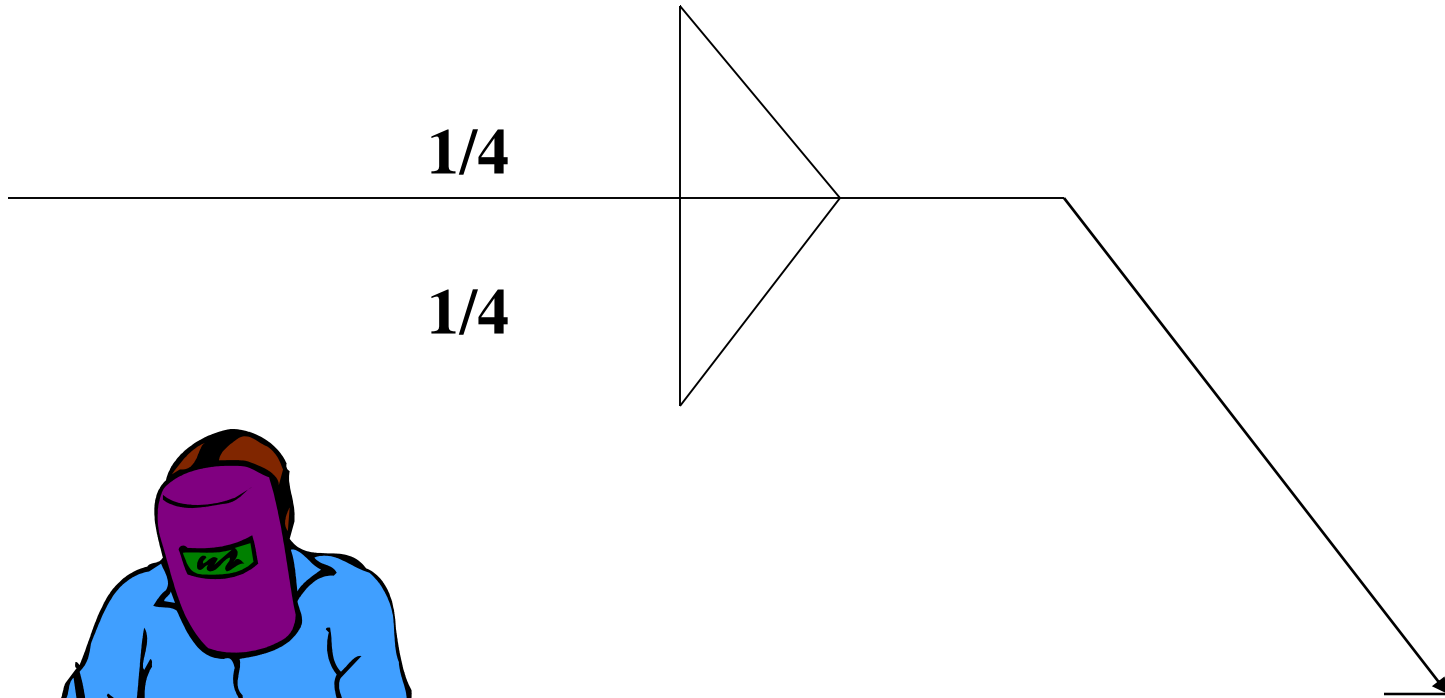
Location of Elements of a Welding Symbol



Break in arrow means arrow side must be side that beveling or other preparation required.



Size of Fillet Weld Noted



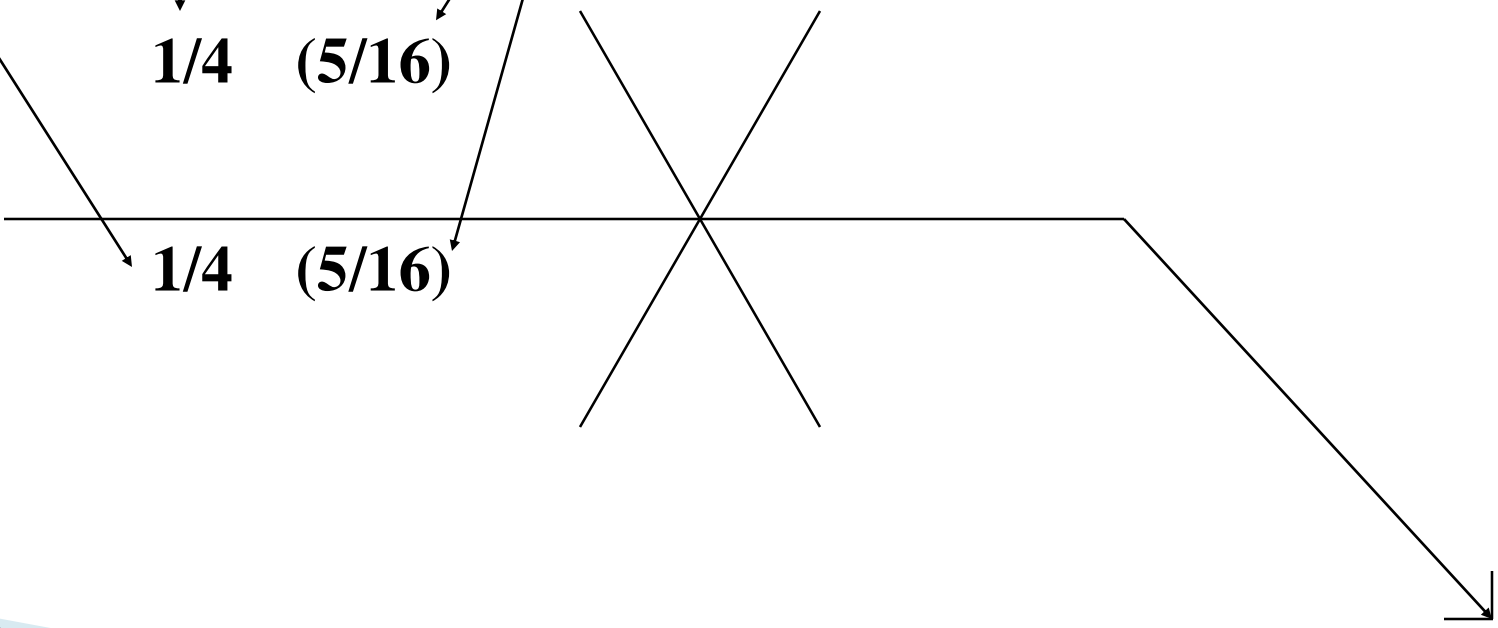
Example of Double Bevel Groove weld

Depth of preparation or groove

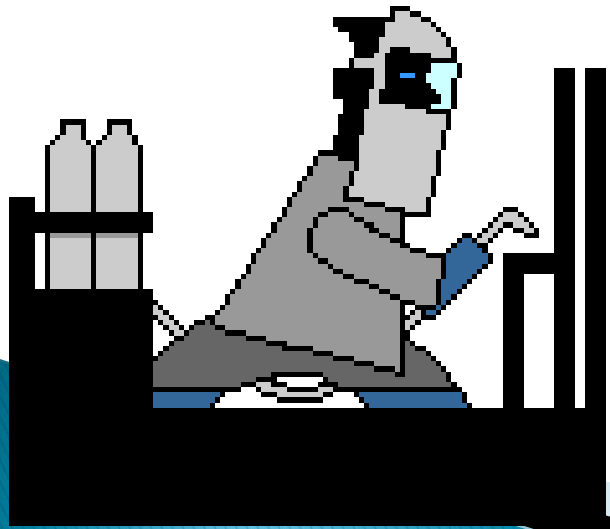
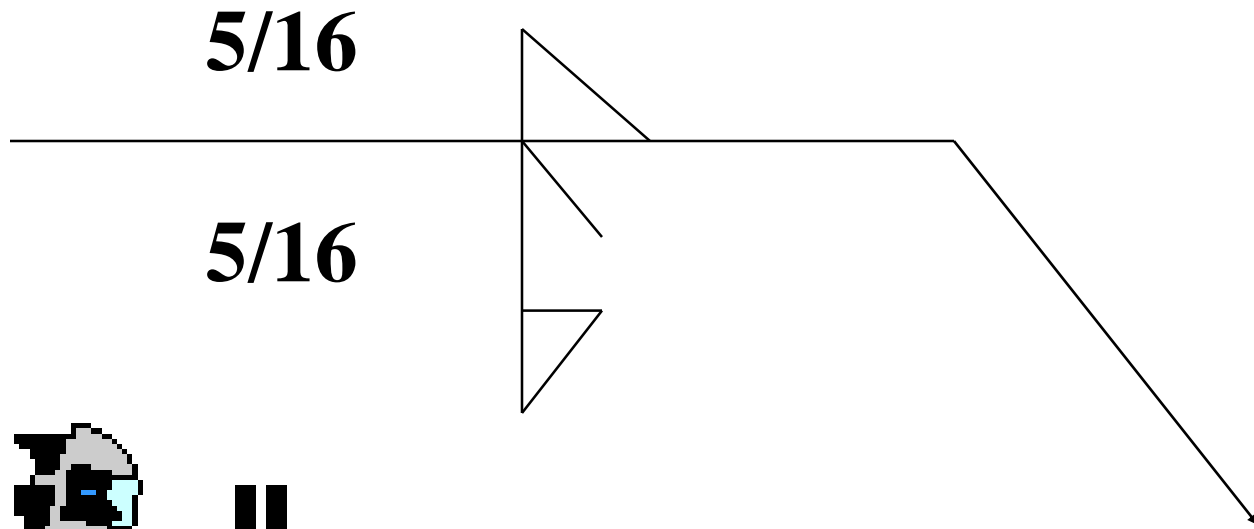
Depth of penetration

1/4 (5/16)

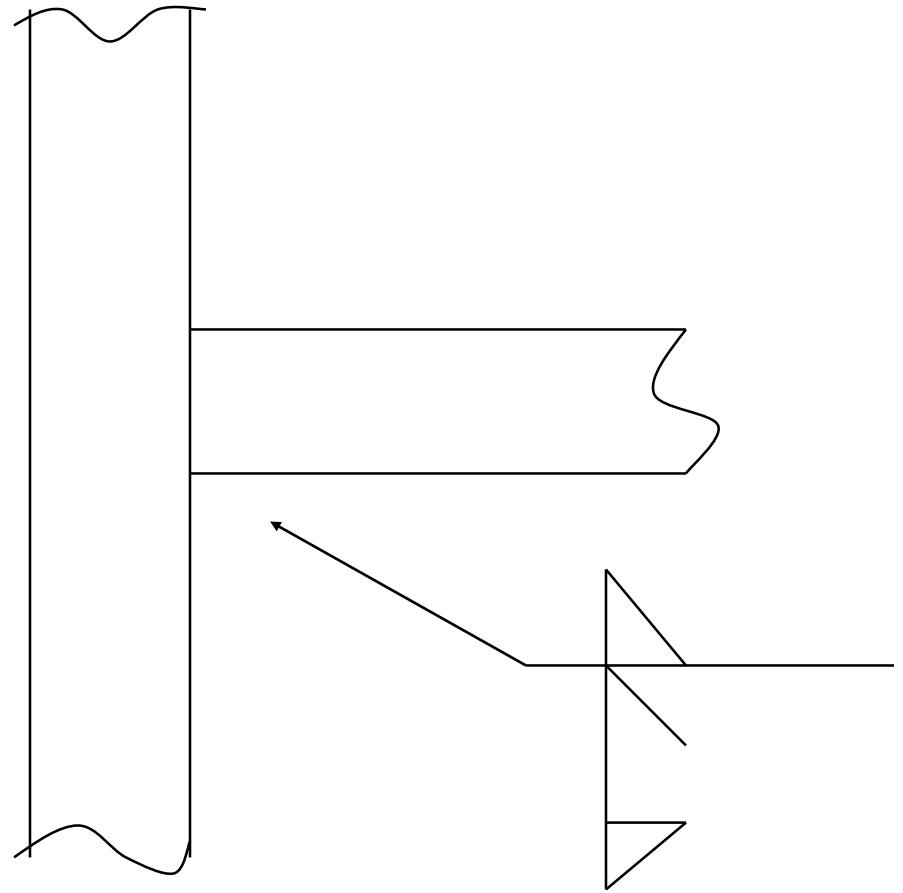
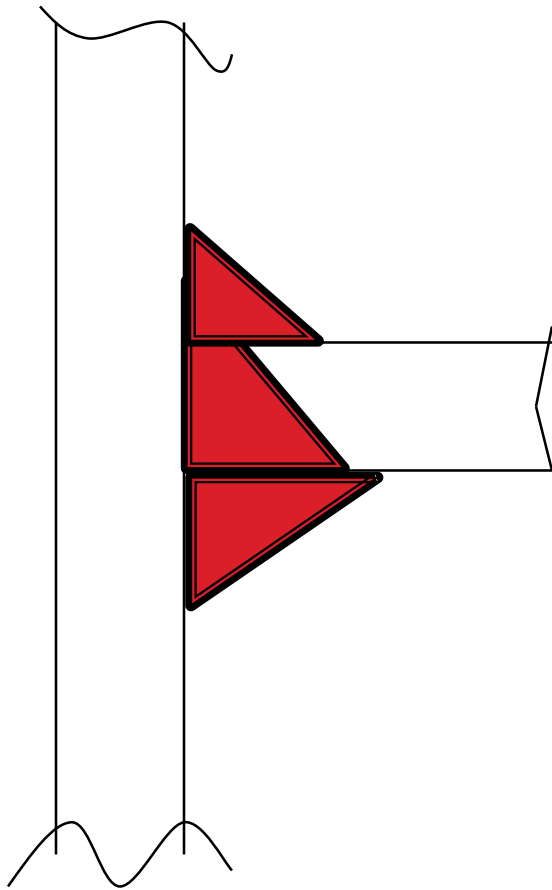
1/4 (5/16)



Single-Bevel-Groove and Double Fillet Weld Symbol

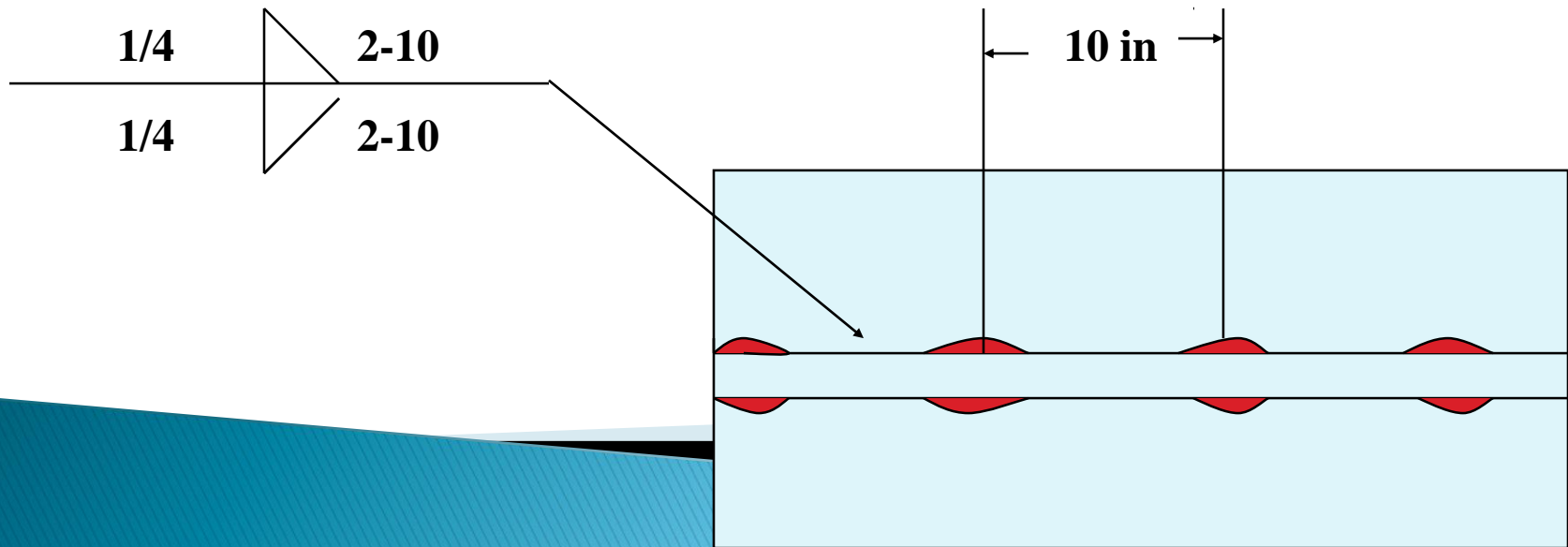


Single-Bevel-Groove and Double Fillet weld Symbols



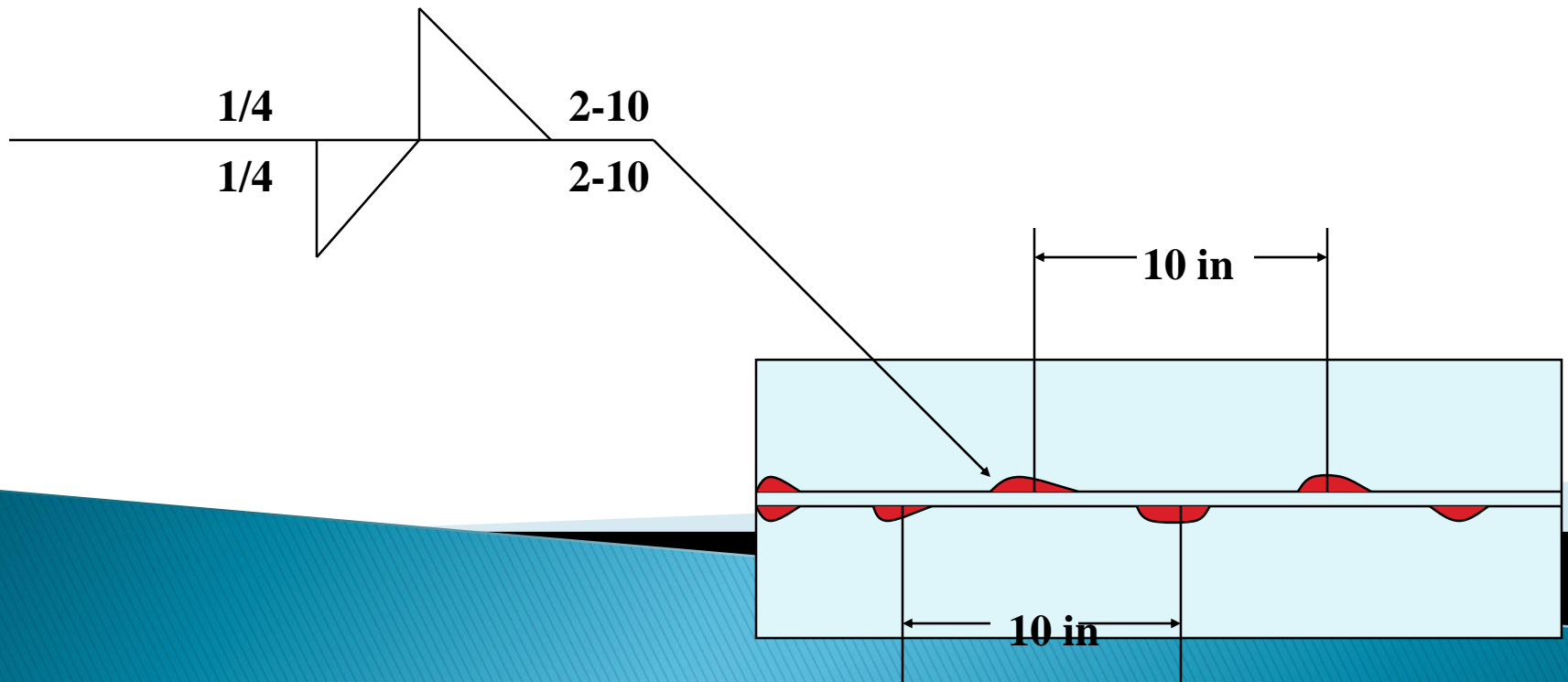
Chain Intermittent Fillet Weld

Weld both sides each end and 10 inches center to center in between



Staggered Intermittent Fillet Weld

Weld ends than 10 inch centers staggered each side



Code or Standards Requirements

- Type, depth angle, and location of the groove
 - determined by a code or standard
- Welder skill
 - Can be a limiting factor in joint design
- Acceptable cost
 - Joint design: one major way to control welding cost

Summary

- Welding symbols
 - Meanings must be interpreted
 - Understanding prevents over-welding
 - Weldments must be flexible within limits