

Mechanical Drawing I

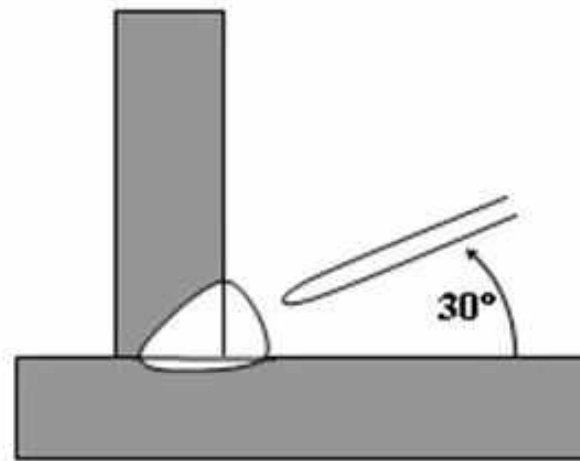
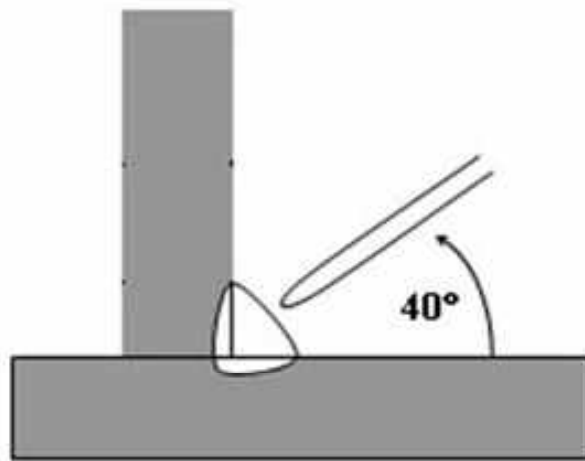
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Welding

Welding:

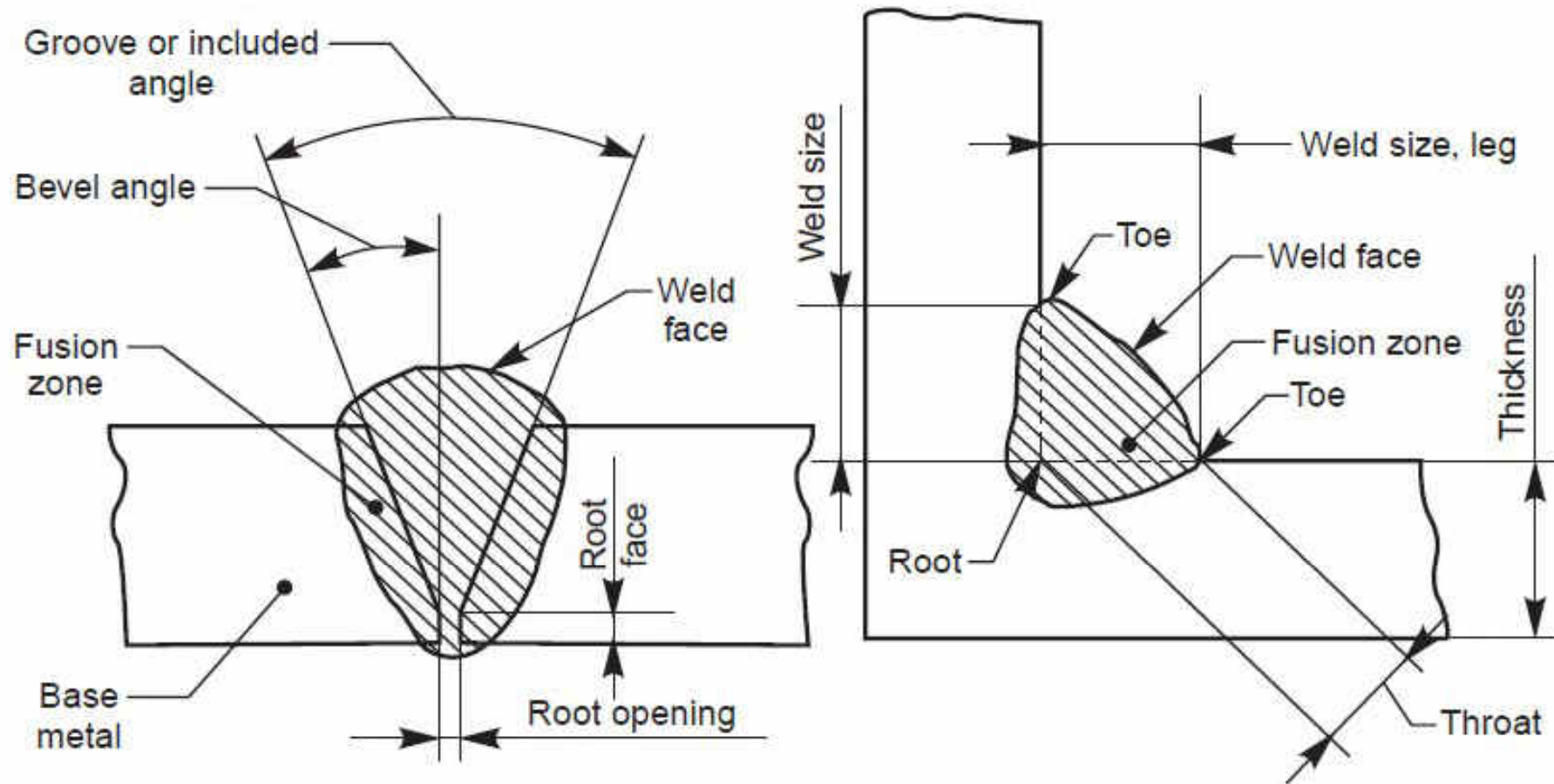
Welding is an effective method of making permanent joints between two or more metal parts.

Welding is considered as fast, permanent and low cost process.



Welded joints and symbols:

Basic terms of a welded joint are:

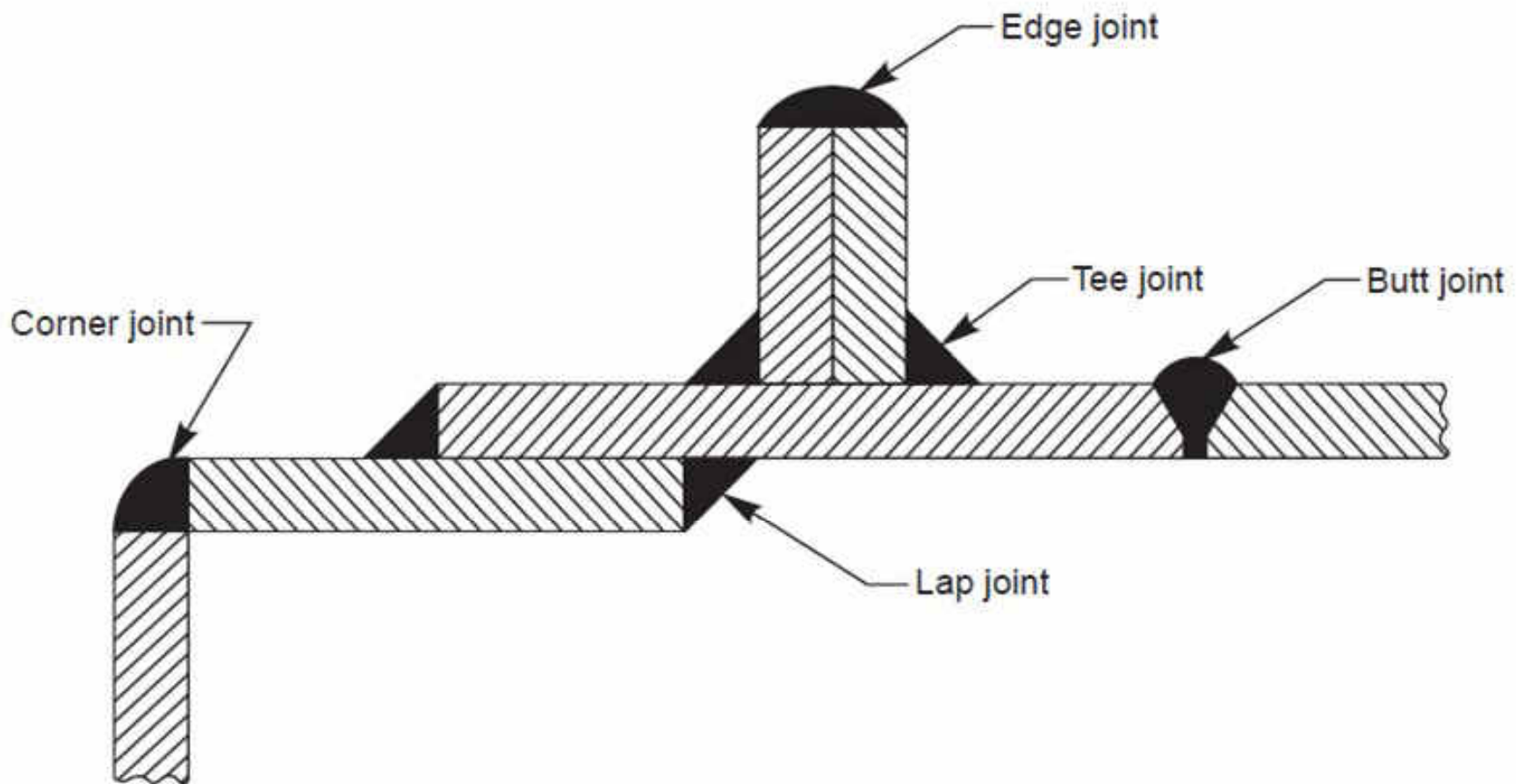


Butt weld

Fillet weld

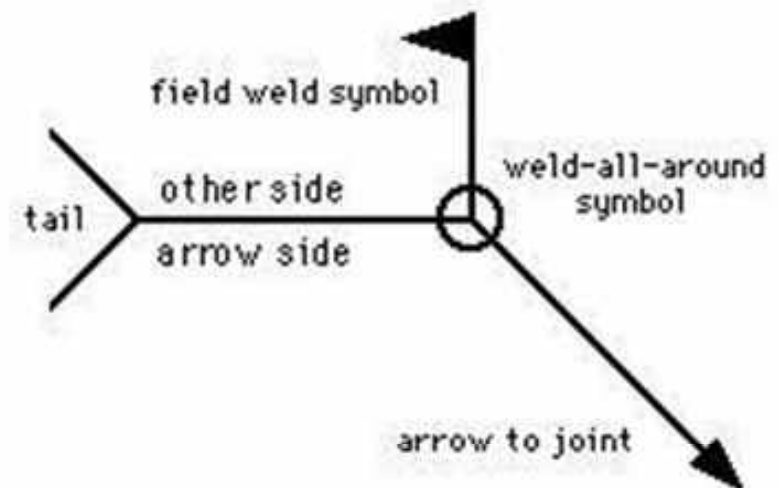
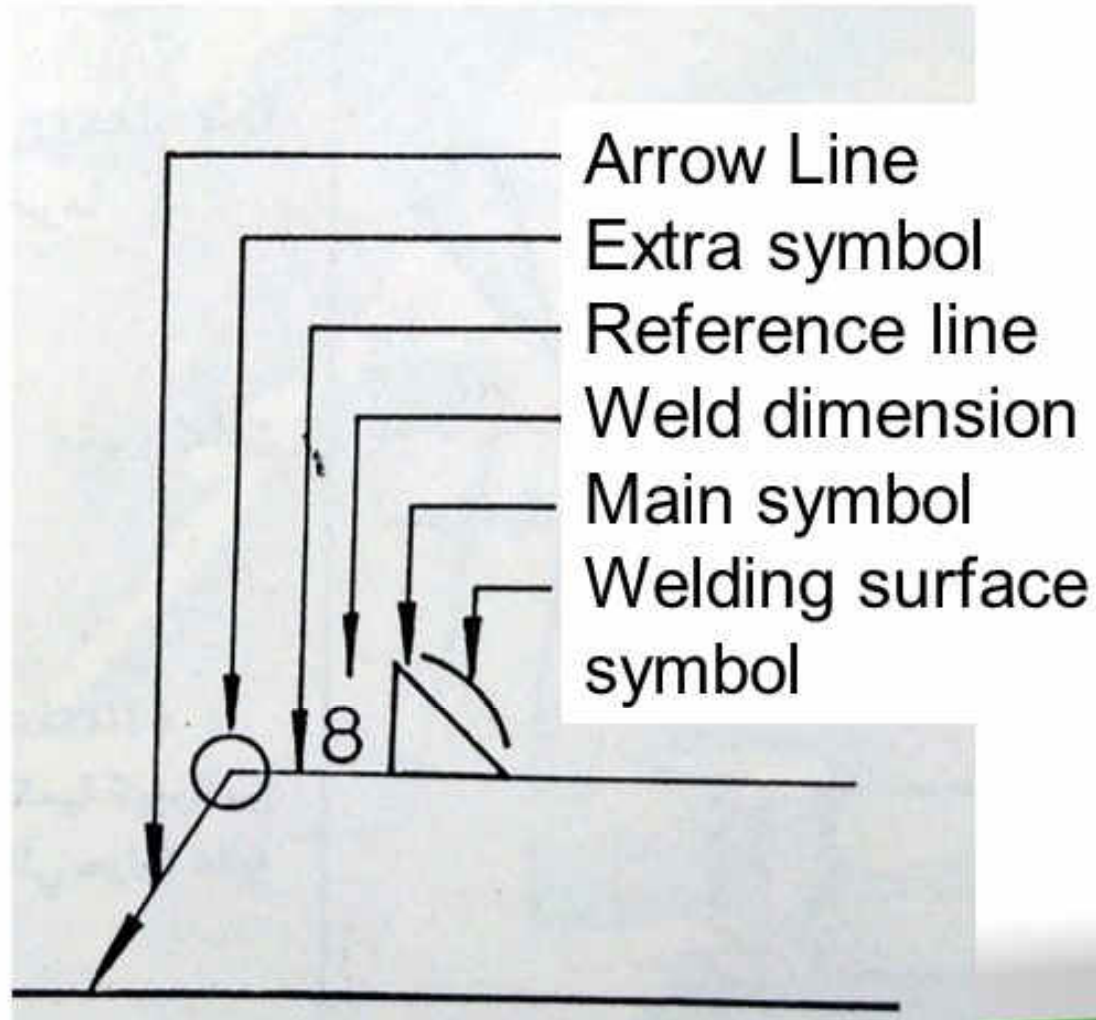
Welded joints and symbols:

Types of joints are:



Welded joints and symbols:

Types of joints are:

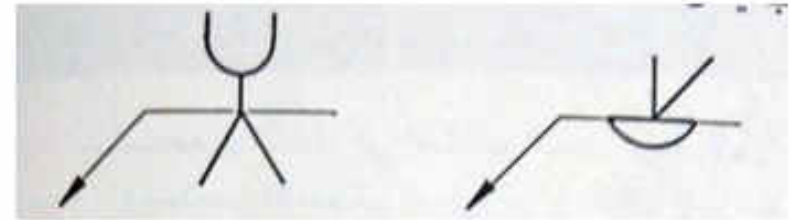


Welded joints and symbols:

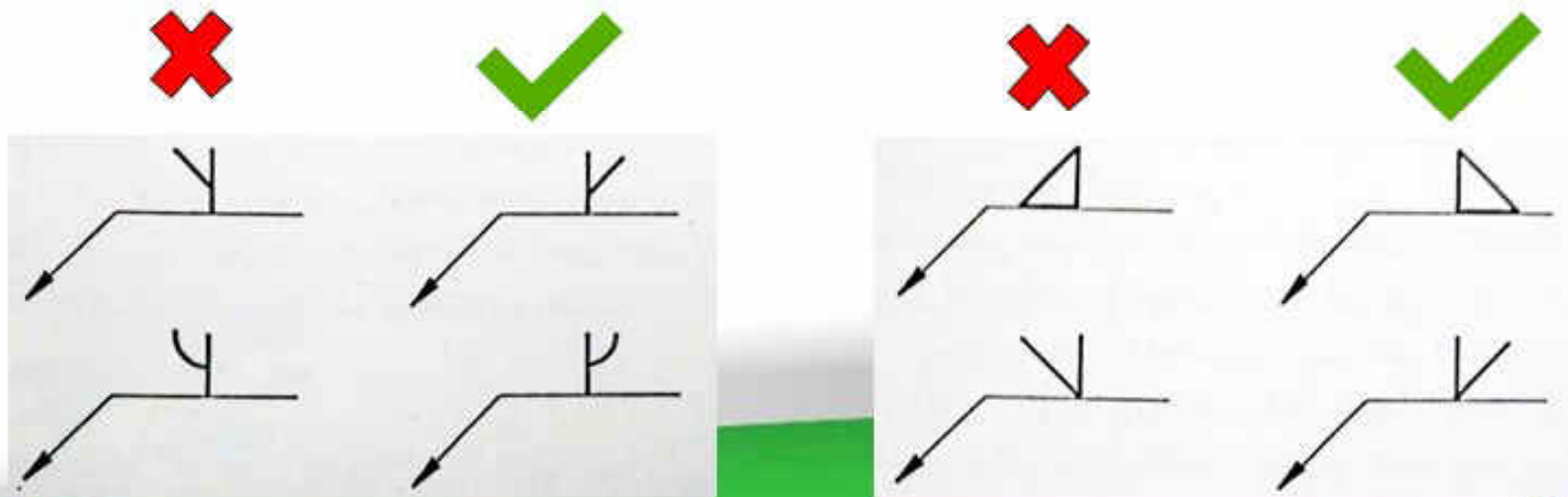
Main symbol:

Its indicate to the class or the type of the used welding.

In general the main symbol is similar to the weld type.











* The vertical line of the main symbol always located on the left side of the symbol.








Welded joints and symbols:

Elementary welding symbols (Main symbol):

<i>No.</i>	<i>Designation</i>	<i>Illustration</i>	<i>Symbol</i>
1.	Butt weld between plates with raised edges (the raised edges being melted down completely)		
2.	Square butt weld		
3.	Single-V butt weld		
4.	Single-bevel butt weld		

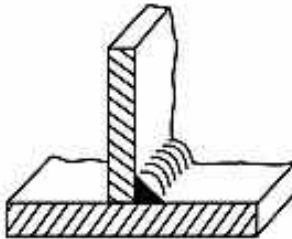



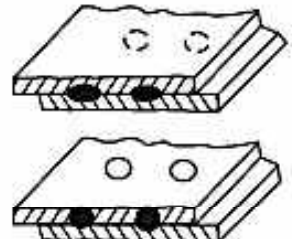

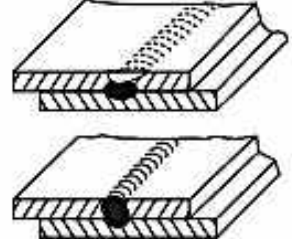

Welded joints and symbols:

Elementary welding symbols (Main symbol):

5.	Single-V butt weld with broad root face		Y
6.	Single-bevel butt weld with broad root face		Y
7.	Single-U butt weld (parallel or sloping sides)		U
8.	Single-U butt weld		U
9.	Backing run; back or backing weld		U




Welded joints and symbols:

Elementary welding symbols (Main symbol):

10.	Fillet weld		
11.	Plug weld; plug or slot weld		
12.	Spot weld		
13.	Seam weld		









Welded joints and symbols:

Supplementary symbols (Welding surface symbol):

<i>Shape of weld surface</i>	<i>Symbol</i>
(a) Flat (usually finished flush)	
(b) Convex	
(c) Concave	


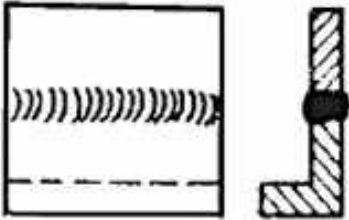
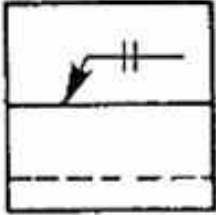
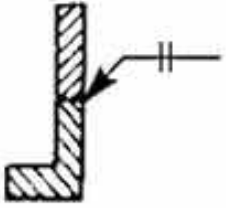
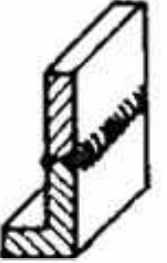
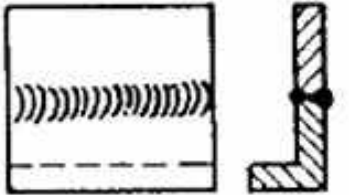

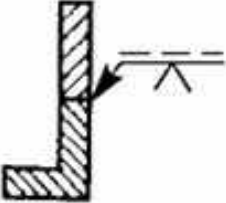
Welded joints and symbols:

Combination of elementary and supplementary symbols:

<i>Designation</i>	<i>Illustration</i>	<i>Symbol</i>
Flat (flush) single-V butt weld		
Convex double-V butt weld		
Concave fillet weld		
Flat (flush) single-V butt weld with flat (flush) backing run		

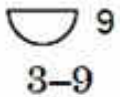
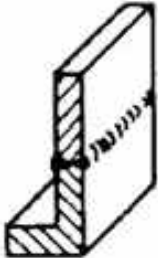
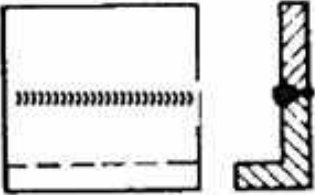
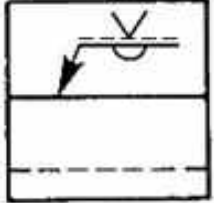
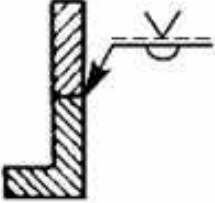
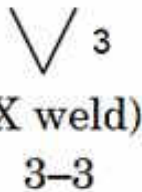

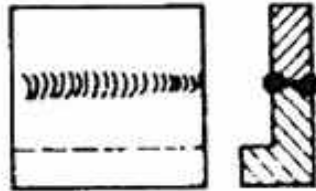
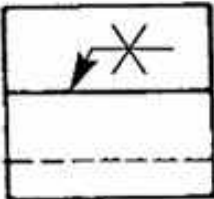
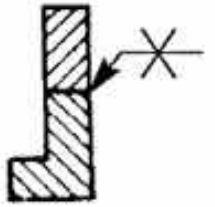


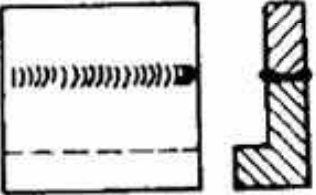
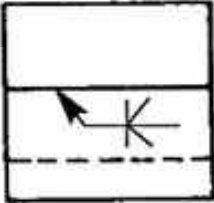
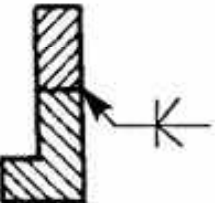
Welded joints and symbols:

Combination of elementary symbols:

<p>1.</p>	<p>Square butt weld $\parallel \parallel$ 2 welded from both sides 2-2</p>				
<p>2.</p>	<p>Single-V butt weld ∇ 3</p>				

Welded joints and symbols:

Combination of elementary symbols:

<p>3.</p>	<p>and backing run</p> 				
<p>4.</p>	<p>Double-V butt weld</p> 				
<p>5.</p>	<p>Double bevel butt weld</p> 				

Welded joints and symbols:

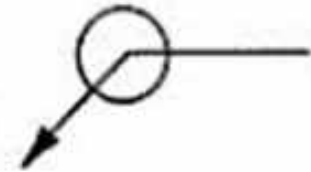
Combination of elementary symbols:

6.	(K weld) 4-4				
7.	Double-U butt weld 7-7				
8.	Fillet weld and fillet weld				
9	10-10				

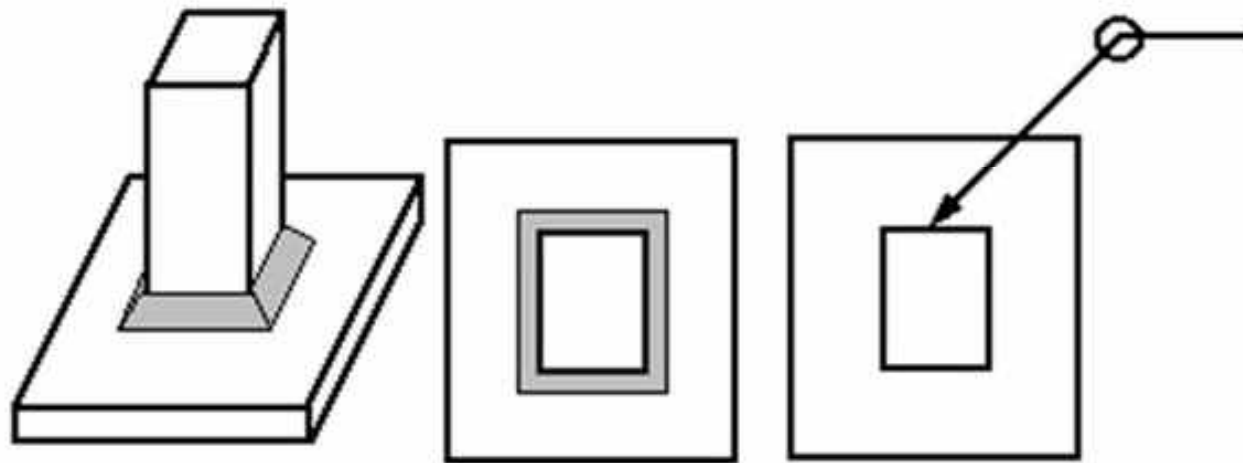
Welded joints and symbols:

Extra symbols:

- A circle at the elbow, connecting the arrow and the reference line to indicate welding all around.



Weld All Around



Welded joints and symbols:

Extra symbols:

- Filled-in circle at the elbow to indicate welding on site (field weld).
Or filled-in flag indicates welding on site (field weld)

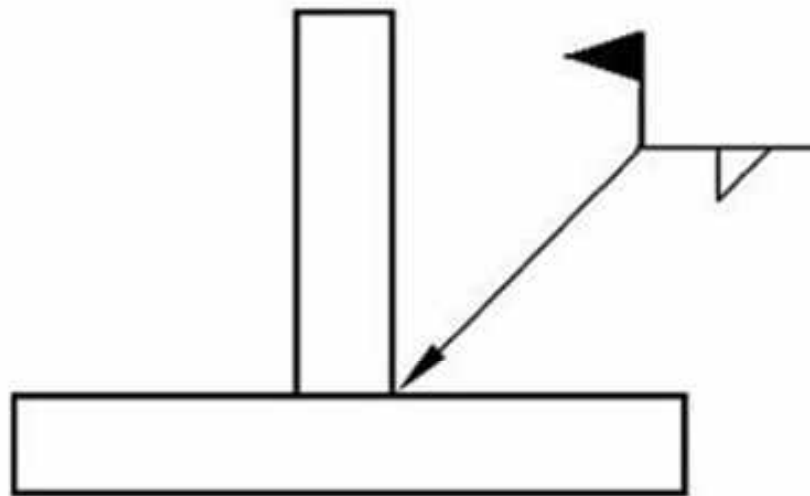
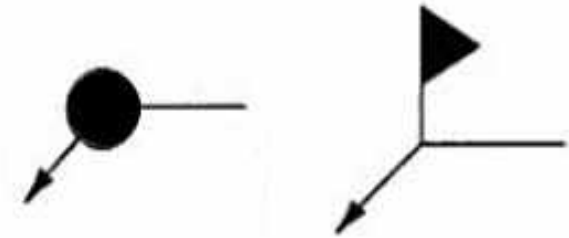
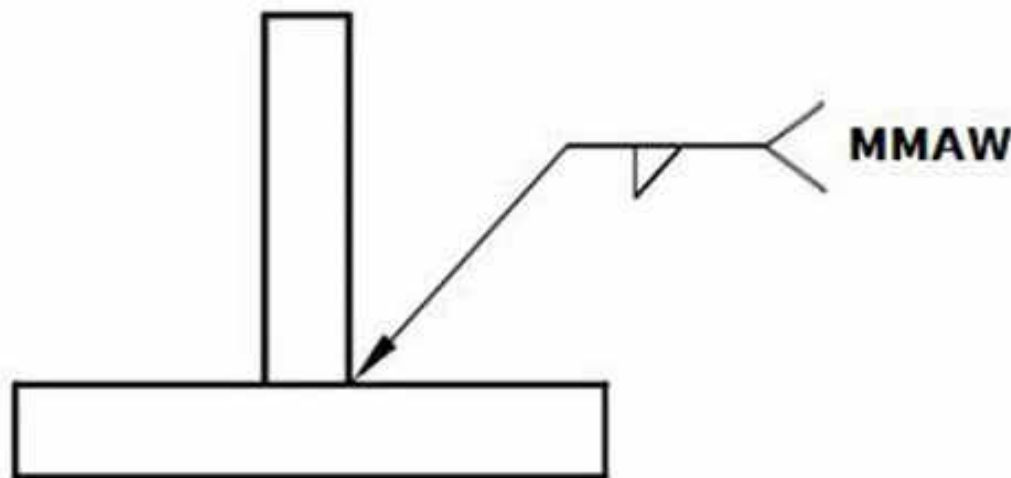


Figure: Site weld symbol

Welded joints and symbols:

Extra symbols:

- The welding process is written as a note at the tail end of the arrow, forming a 90°V.



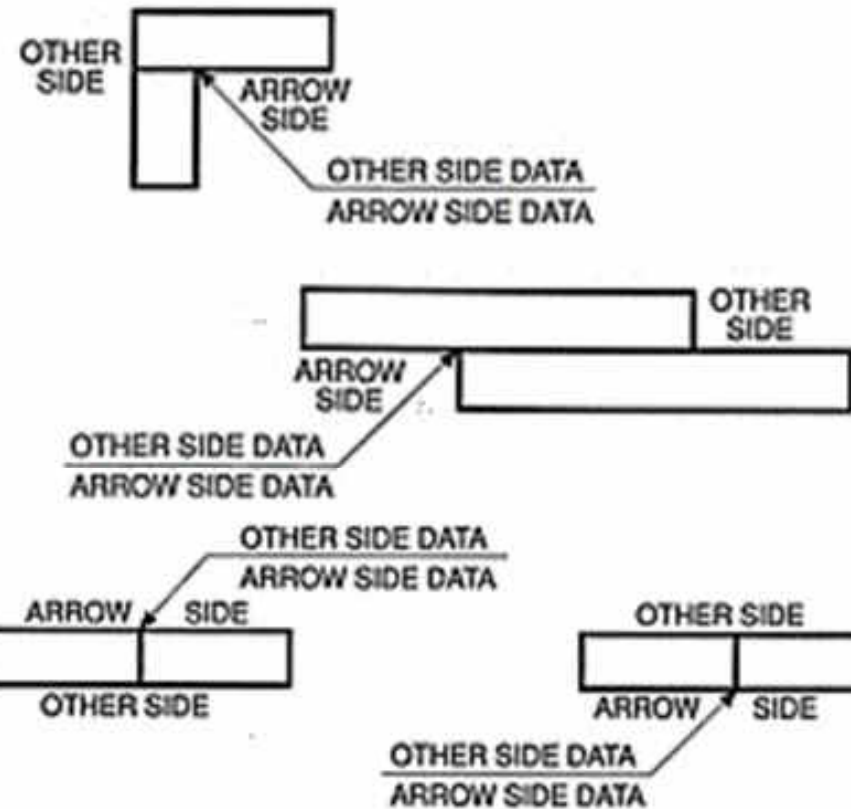
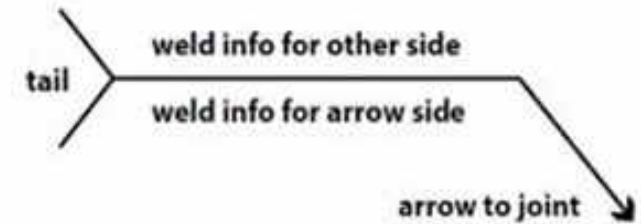
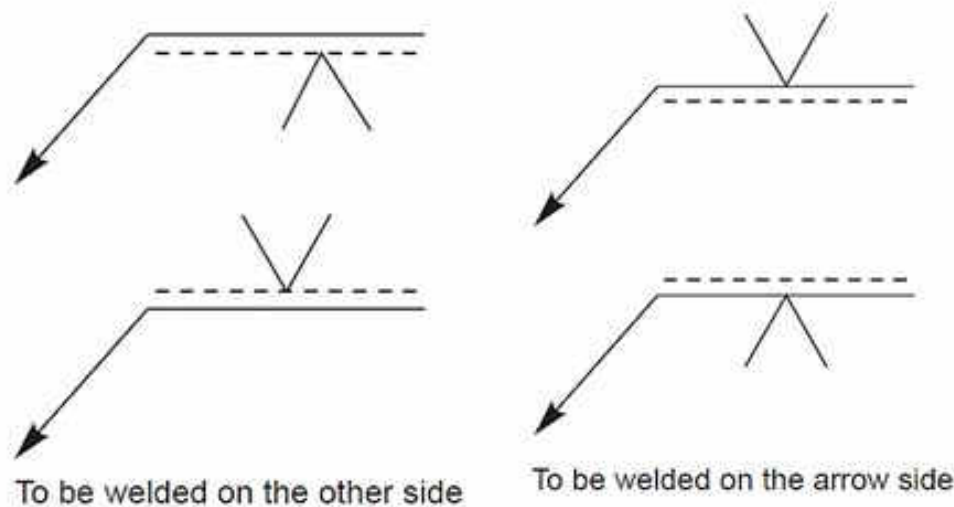
- Abbreviation.
- number
- See detail

MMAW: manual metal arc welding

Welded joints and symbols:

Location of welds:

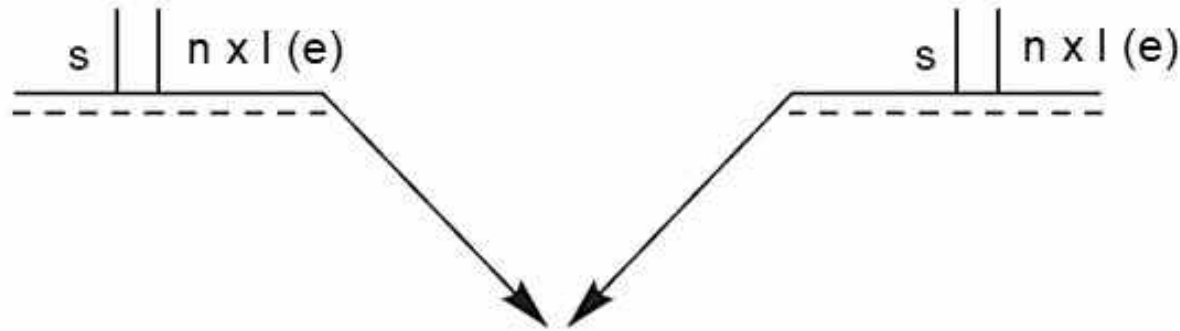
Symbol below the reference line = weld on the arrow side.
 Symbol above the reference line = weld on the other side.
 The dashed line = weld on the other side.



Dimensions of Weld:

Butt weld:

- i. The main dimensions relative to the cross-section, written on the left hand side of (before) the symbol.
- ii. longitudinal dimension written on the right hand side of (after) the symbol.

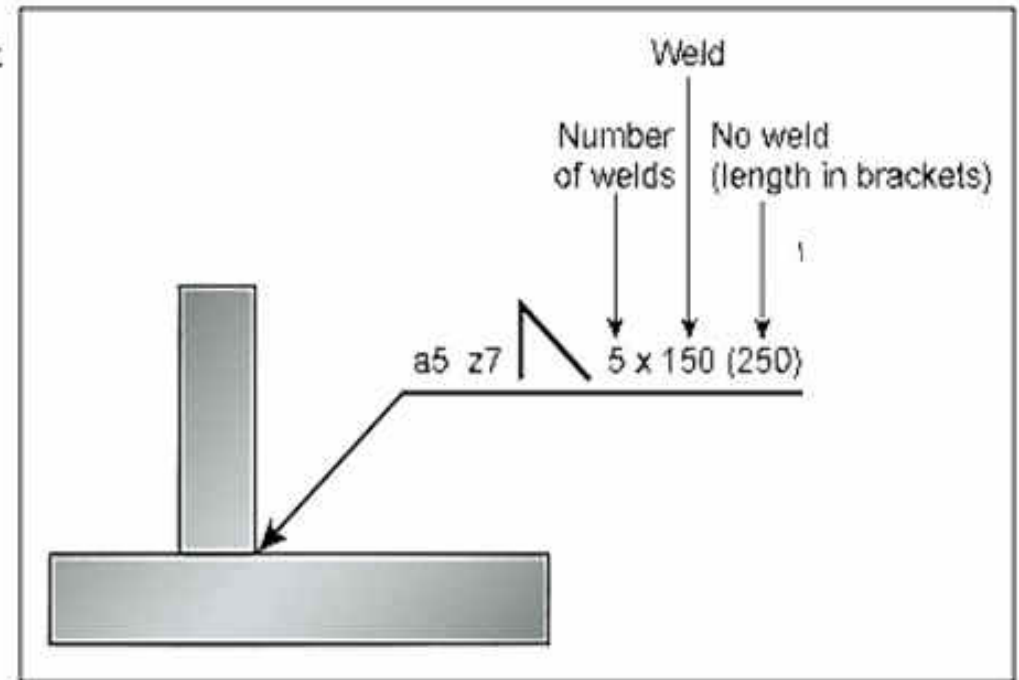
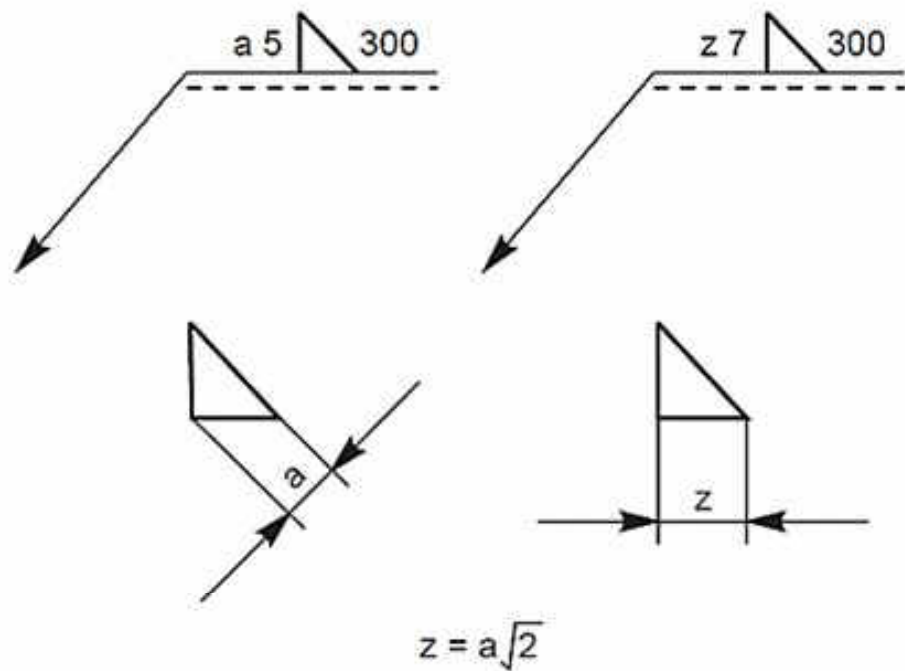


s: cross-section dimensions
n: number of times
l: longitudinal dimension
e: rest or stop distance

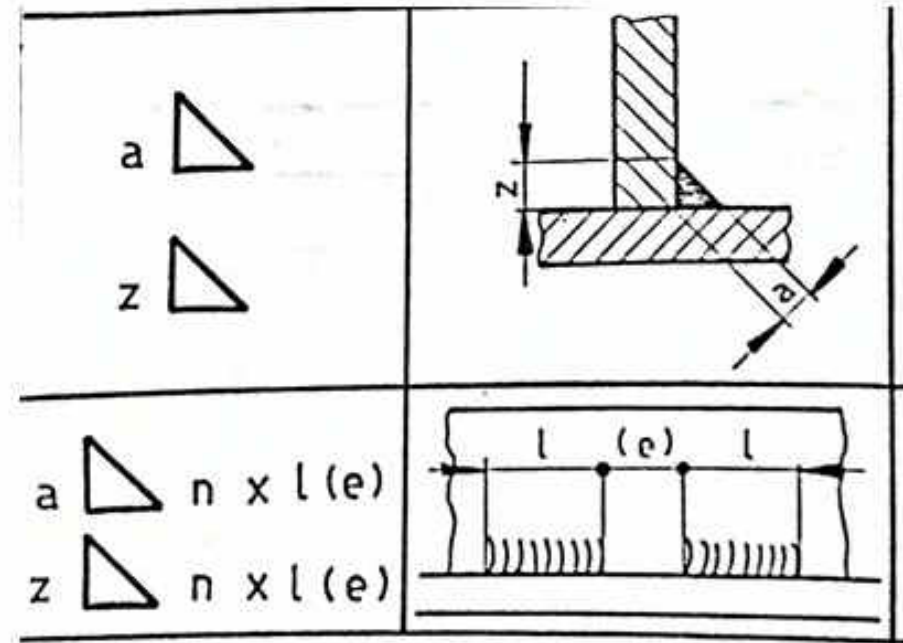
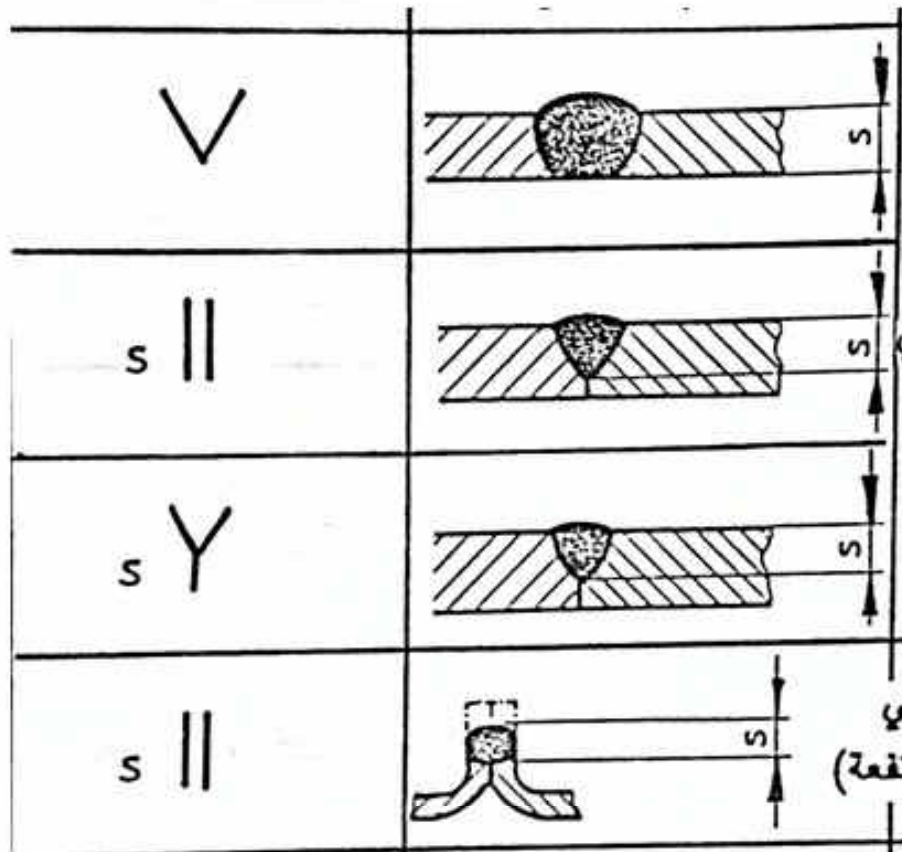
Dimensions of Weld:

Fillet weld:

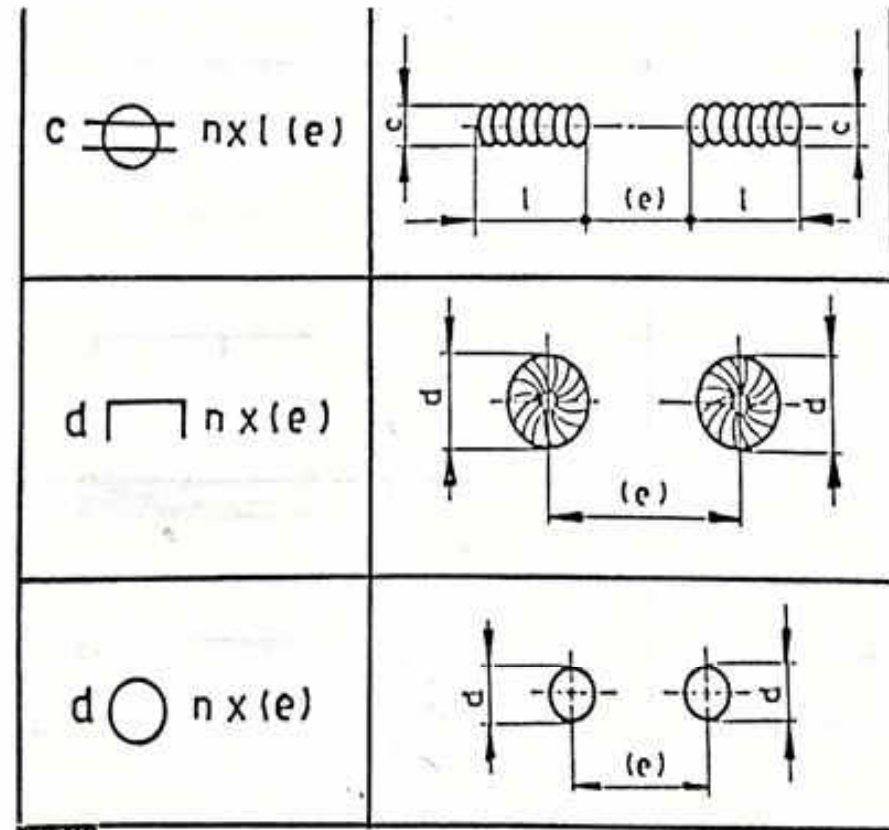
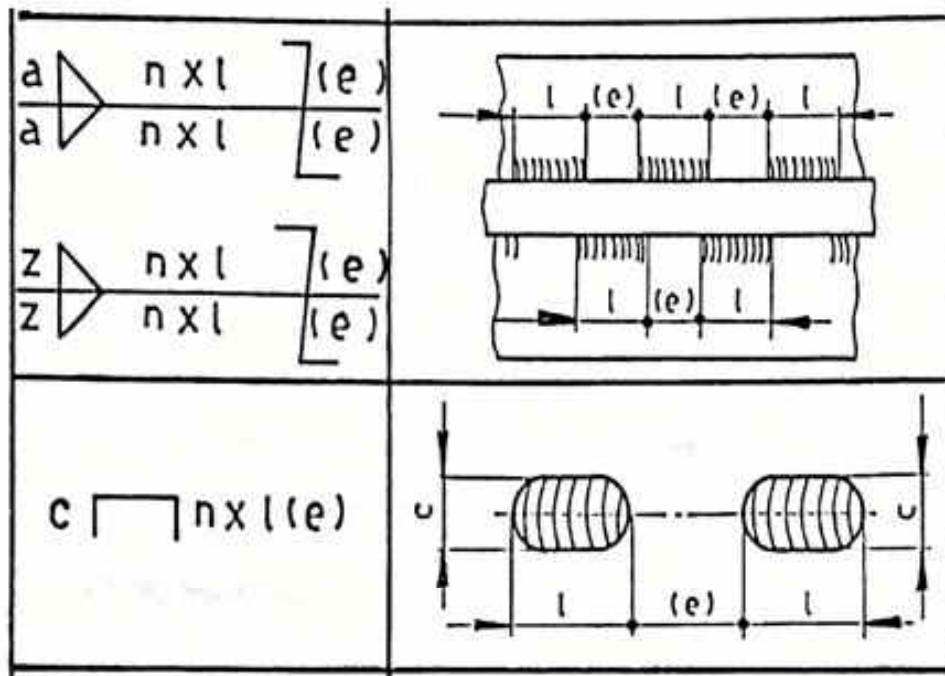
There are two methods to indicate the dimensions of fillet welds:
a (throat thickness), or *z* (leg length)



Dimensions of Weld:



Dimensions of Weld:

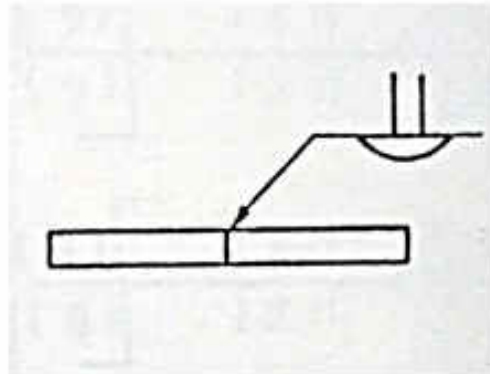


Dimensions of Weld:

Example:

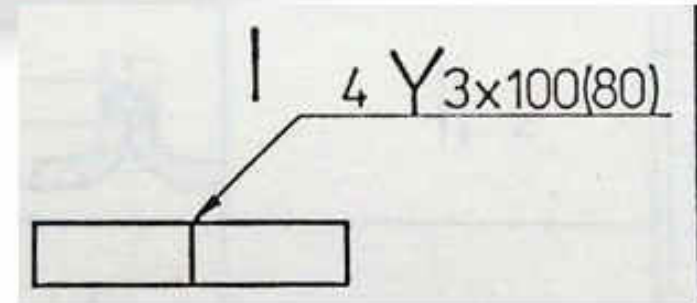
Explain the meaning of weld symbol.

On the other side:
Square butt weld.



On the arrow side:
Backing run weld.

Due to weld section dimension and weld length didn't give, so:
Weld section dimension equal plate thickness
Weld length equal plate length.



On the other side:

Single – V butt weld with broad root face.

Weld cross-section dimension (s) = 4mm

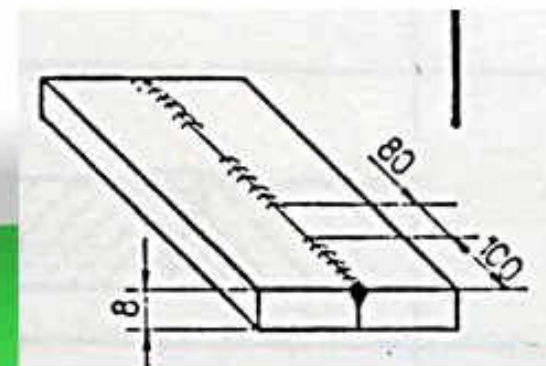
Number of weld times (n) = 3

Weld length (l) = 100mm

Distance between weld (e) = 80mm

On the arrow side:

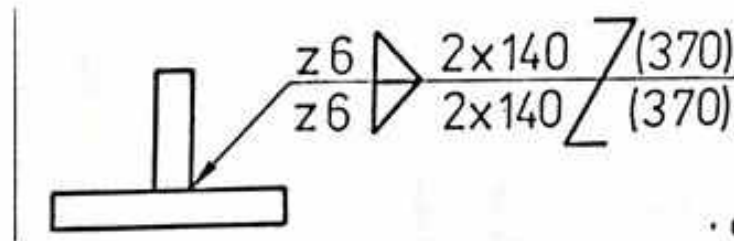
There is no weld



Dimensions of Weld:

Example:

Explain the meaning of weld symbol.



Zigzag fillet weld (on both sides)
 leg length (z) = 6mm.
 Number of weld times (n) = 2
 Weld length (l) = 140mm
 Distance between weld (e) = 370mm

