Welding Inspector

Welding Symbols
Section 9

Welding Symbols

- Standards for symbolic representation of welded joints on drawings
- Elementary welding symbols
- Combination of elementary symbols
- Supplementary symbols
- Position of symbols on drawings
- Relationship between the arrow and joint lines
- Position of the reference line and weld symbol
- Positions of the continuous and dashed lines
- Dimensioning of welds
- Complimentary indications
- Indication of the welding process
- Weld symbols in accordance with AWS 2.4

Weld symbols on drawings

Advantages of symbolic representation:

- simple and quick plotting on the drawing
- does not over-burden the drawing
- no need for additional view
- gives all necessary indications regarding the specific joint to be obtained

Disadvantages of symbolic representation:

- used only for usual joints
- requires training for properly understanding of symbols

Weld symbols on drawings

The symbolic representation includes:

- an arrow line
- a reference line
- an elementary symbol

The elementary symbol may be completed by:

- a supplementary symbol
- a means of showing dimensions
- some complementary indications

Dimensions

Convention of dimensions

In most standards the cross sectional dimensions are given to the left side of the symbol, and all linear dimensions are give on the right side

BS EN ISO 22553

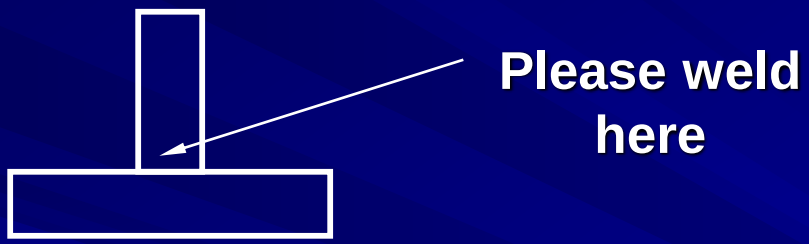
a = Design throat thickness
s = Depth of Penetration, Throat thickness
z = Leg length (min material thickness)

AWS A2.4

- In a fillet weld, the size of the weld is the leg length
- In a butt weld, the size of the weld is based on the depth of the joint preparation

Weld symbols on drawings

A method of transferring information from the design office to the workshop is:



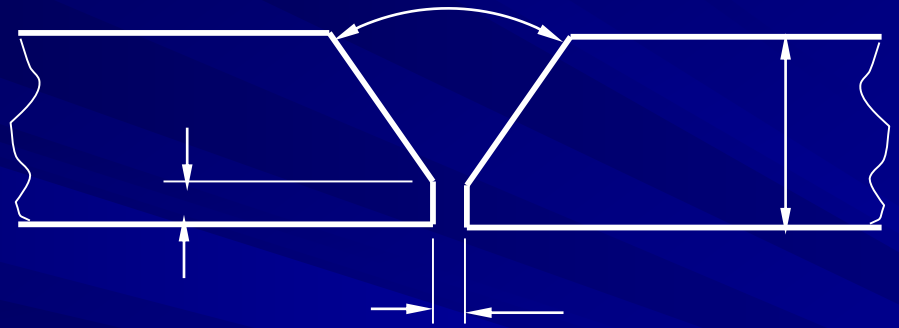
The above information does not tell us much about the wishes of the designer. We obviously need some sort of code which would be understood by everyone.

Most countries have their own standards for symbols. Some of them are AWS A2.4 & BS EN 22553 (ISO 2553)

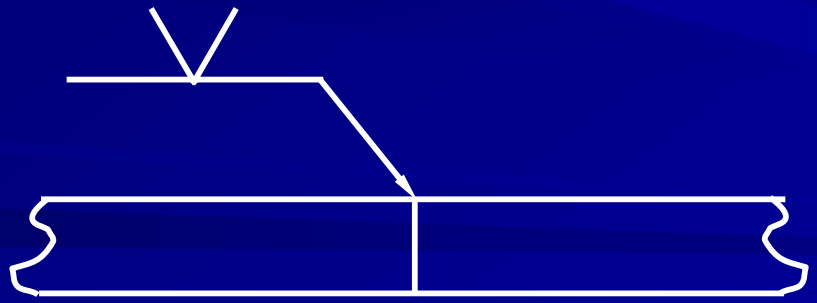
Weld symbols on drawings

Joints in drawings may be indicated:

- **by detailed sketches, showing every dimension**



- **by symbolic representation**



Elementary Welding Symbols

(BS EN ISO 22553 & AWS A2.4)

Convention of the elementary symbols:

Various categories of joints are characterised by an elementary symbol.

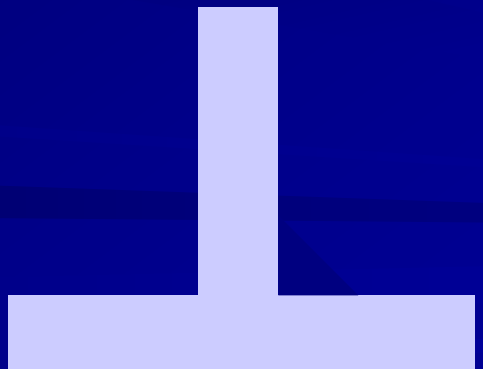
The vertical line in the symbols for a fillet weld, single/double bevel butts and a J-butt welds must always be on the left side.

Weld type	Sketch	Symbol
Square edge butt weld		
Single-v butt weld		

Elementary Welding Symbols

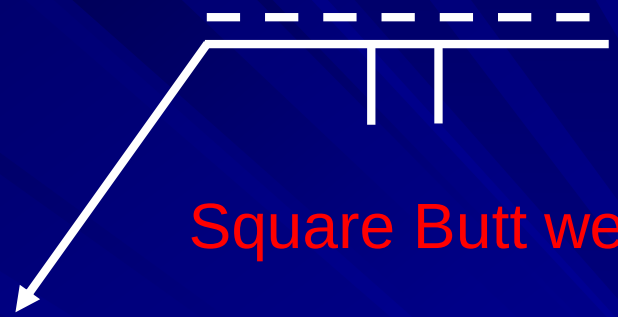
Weld type	Sketch	Symbol
Single-V butt weld with broad root face		
Single bevel butt weld		
Single bevel butt weld with broad root face		
Backing run		

Elementary Welding Symbols

Weld type	Sketch	Symbol
Single-U butt weld		
Single-J butt weld		
Surfacing		
Fillet weld		

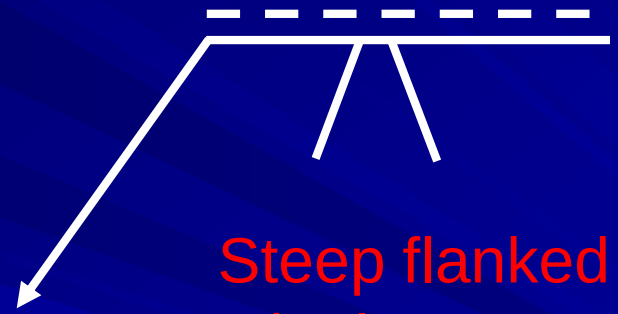
ISO 2553 / BS EN 22553

Plug weld

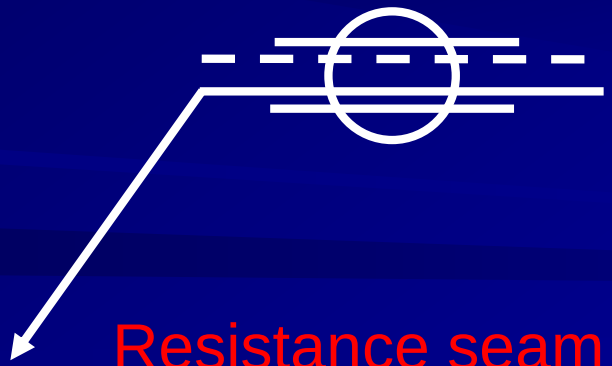


Square Butt weld

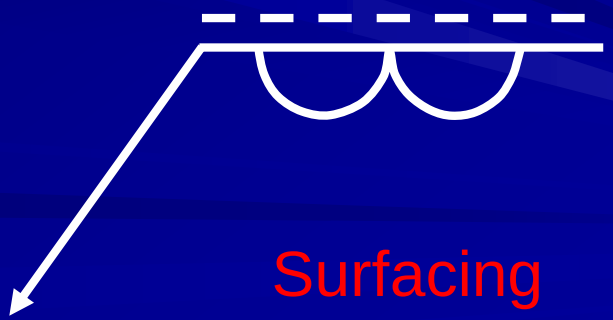
Resistance spot weld



Steep flanked Single-V Butt



Resistance seam weld



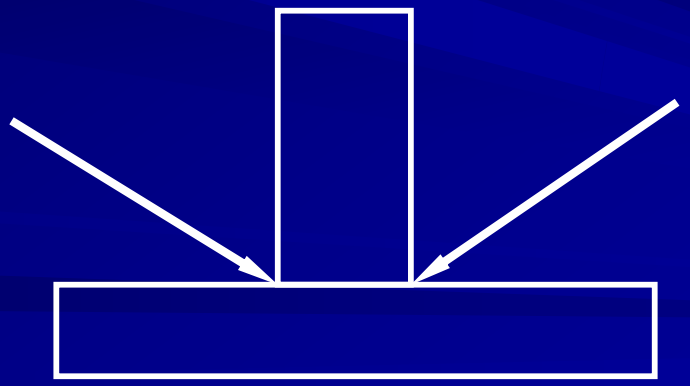
Surfacing

Arrow Line

(BS EN ISO 22553 & AWS A2.4):

Convention of the arrow line:

- **Shall touch the joint intersection**
- **Shall not be parallel to the drawing**
- **Shall point towards a single plate preparation (when only one plate has preparation)**



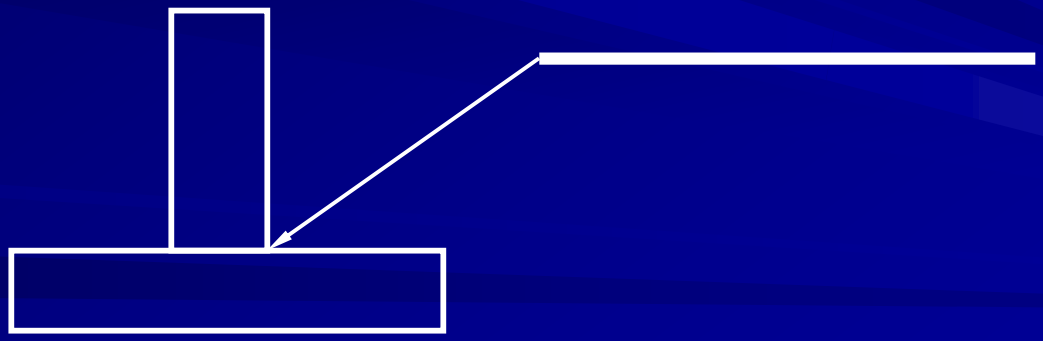
Reference Line

(AWS A2.4)

Convention of the reference line:

Shall touch the arrow line

Shall be parallel to the bottom of the drawing

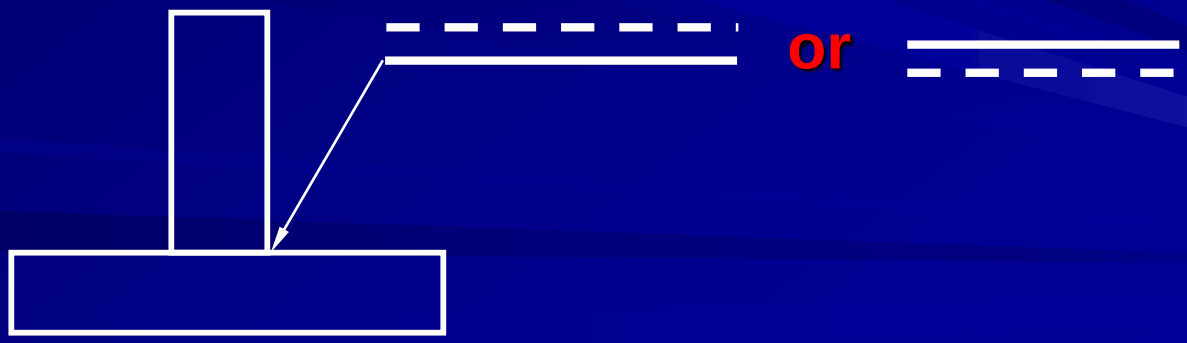


Reference Line

(BS EN ISO 22553)

Convention of the reference line:

- **Shall touch the arrow line**
- **Shall be parallel to the bottom of the drawing**
- **There shall be a further broken identification line above or beneath the reference line (Not necessary where the weld is symmetrical!)**

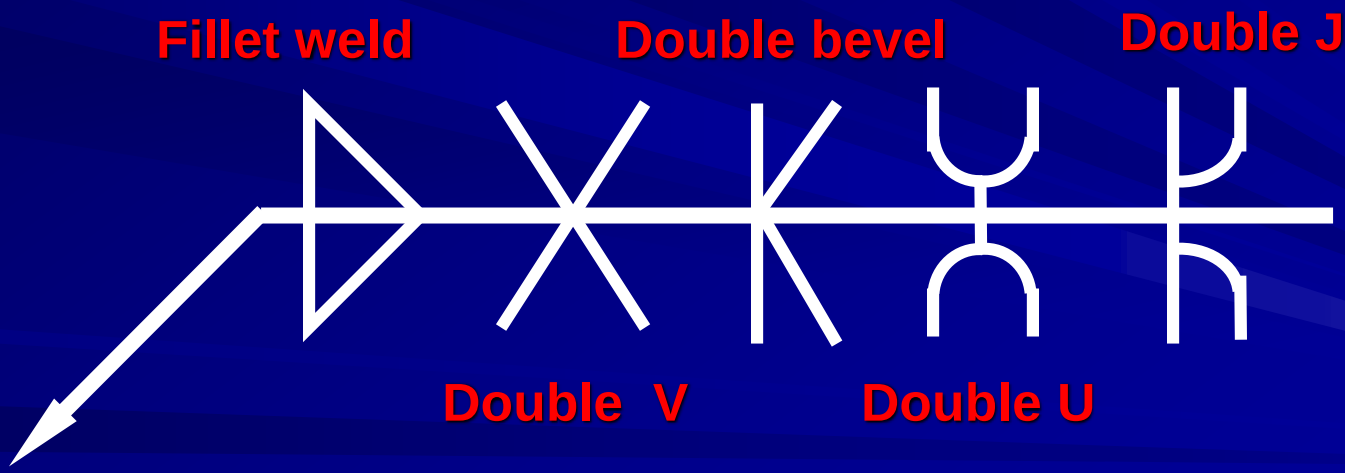


Double side weld symbols

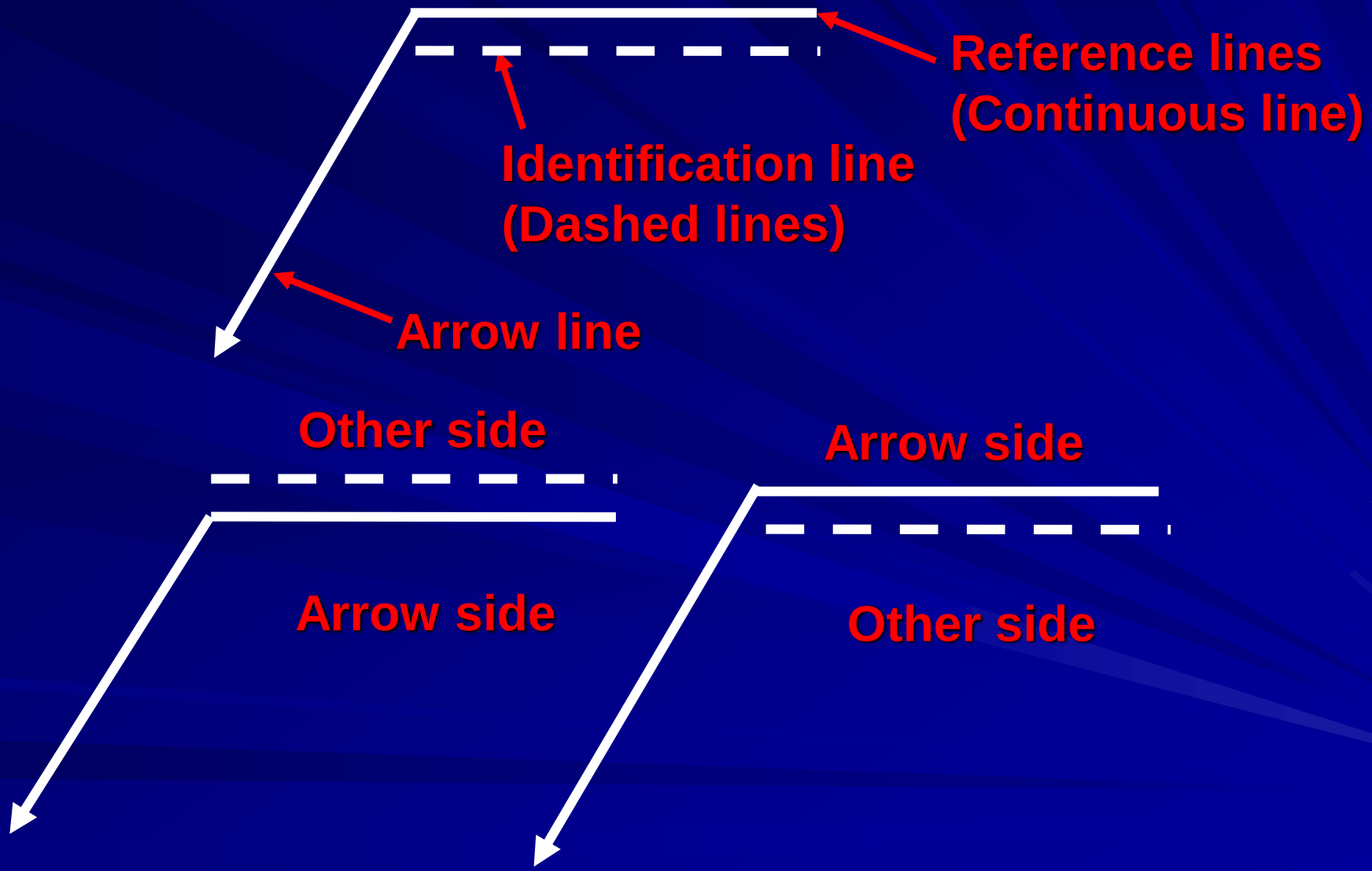
(BS EN ISO 22553 & AWS A2.4)

Convention of the double side weld symbols:

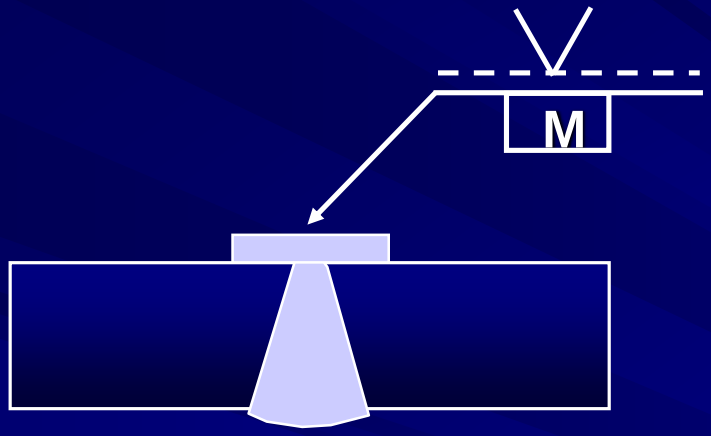
Representation of welds done from *both sides* of the joint intersection, touched by the arrow head



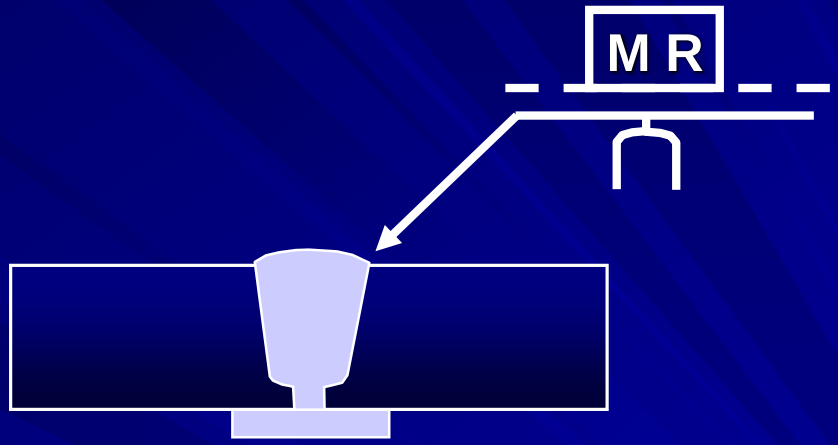
ISO 2553 / BS EN 22553



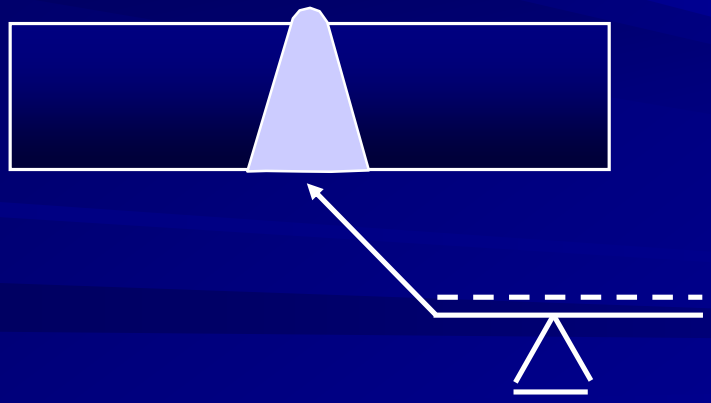
ISO 2553 / BS EN 22553



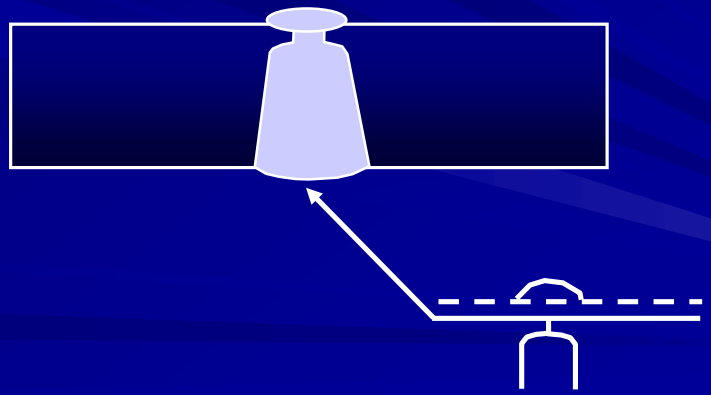
Single-V Butt with permanent backing strip



Single-U Butt with removable backing strip

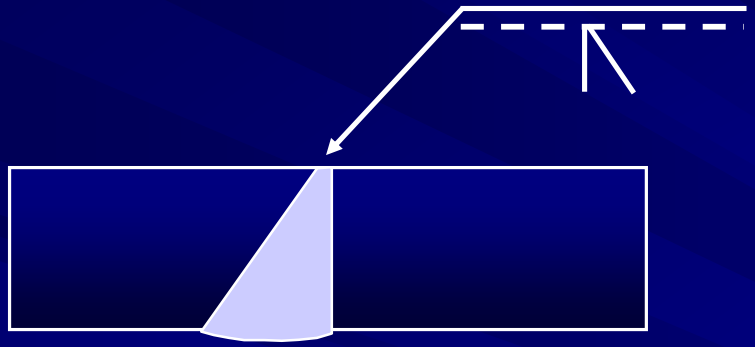


Single-V Butt flush cap

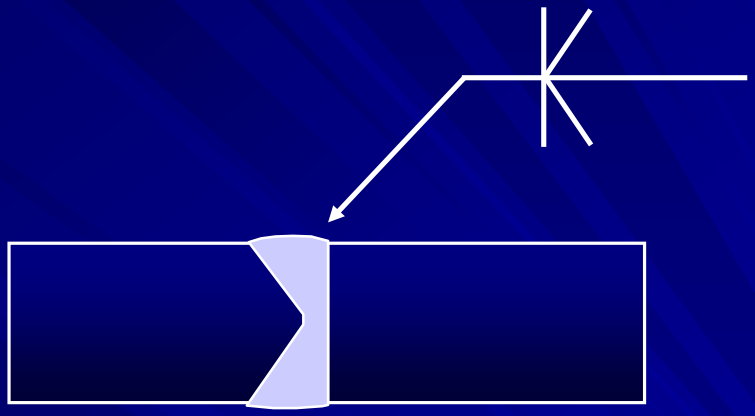


Single-U Butt with sealing run

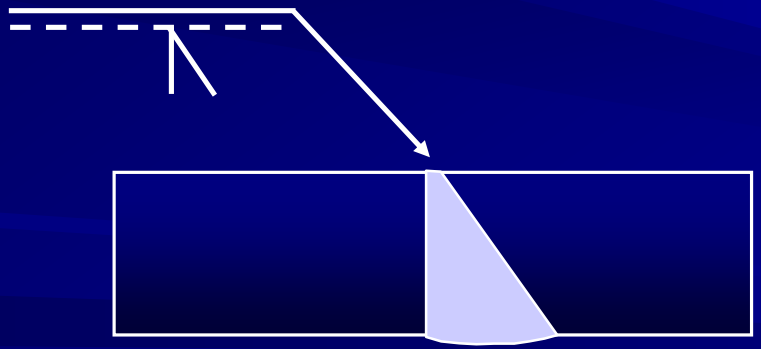
ISO 2553 / BS EN 22553



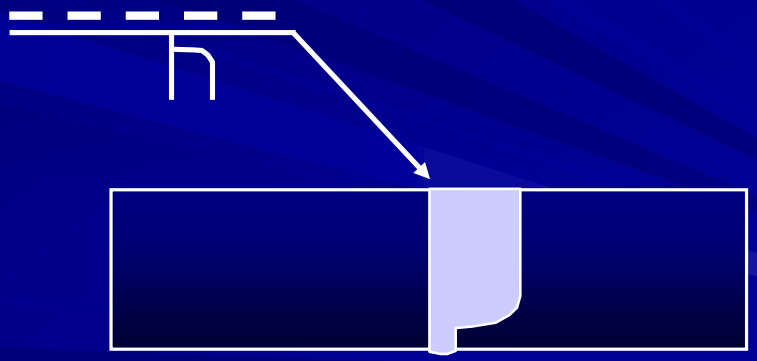
Single-bevel butt



Double-bevel butt



Single-bevel butt



Single-J butt

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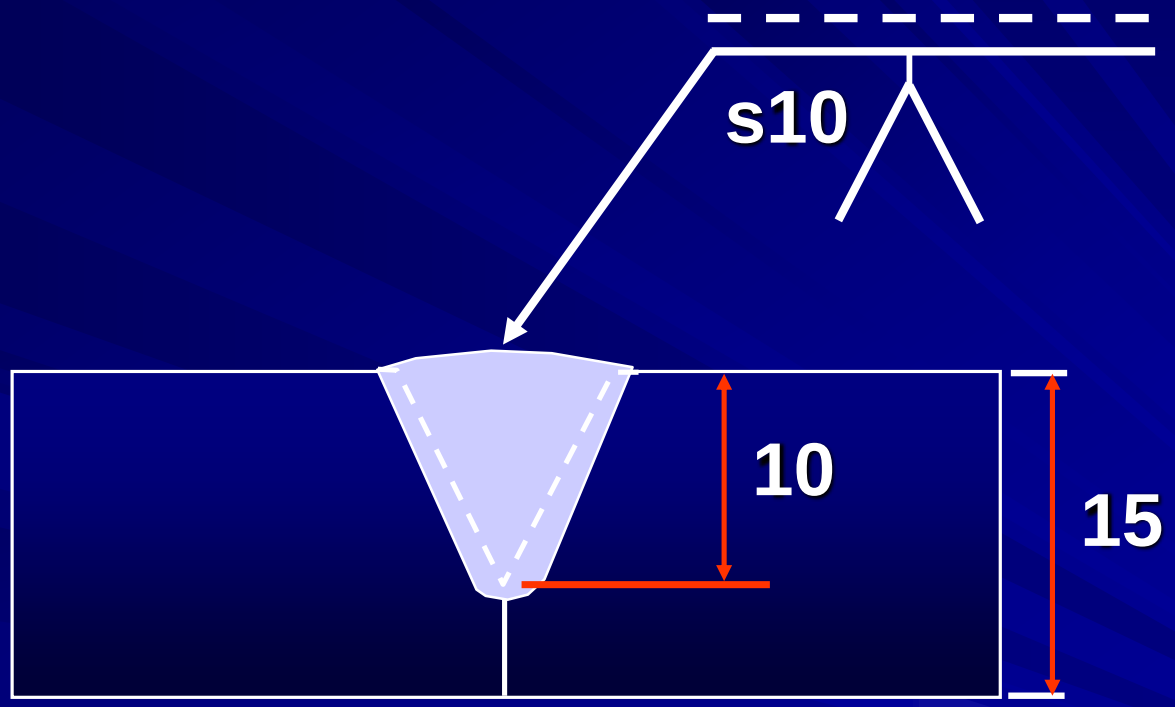


Partial penetration single-V butt
‘S’ indicates the depth of penetration

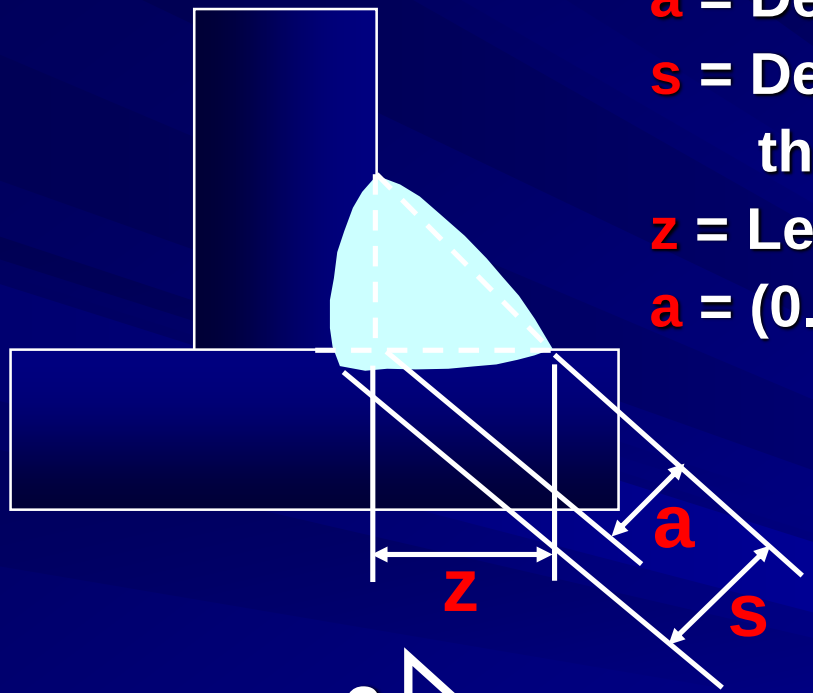
ISO 2553 / BS EN 22553

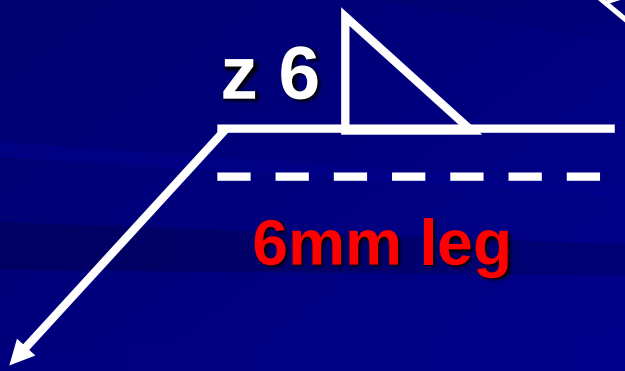
a = Design throat thickness

s = Depth of Penetration, Throat thickness

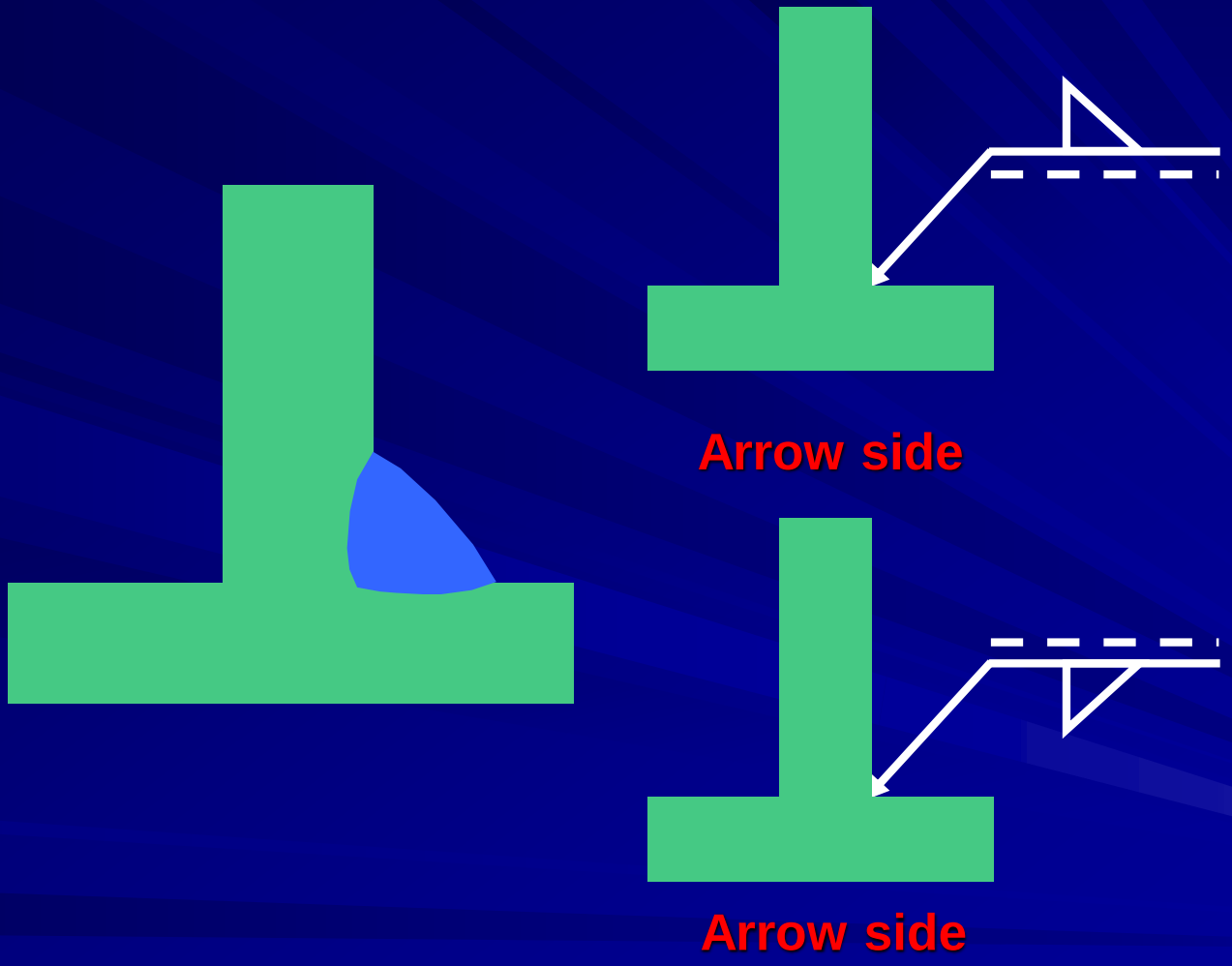
z = Leg length(min material thickness)

a = (0.7 x z)

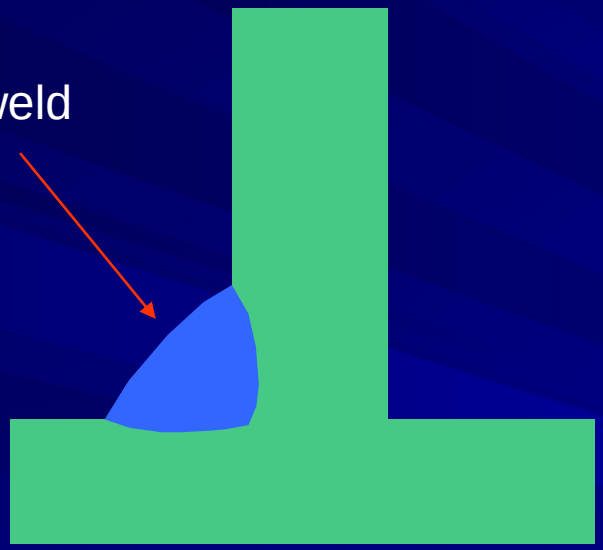




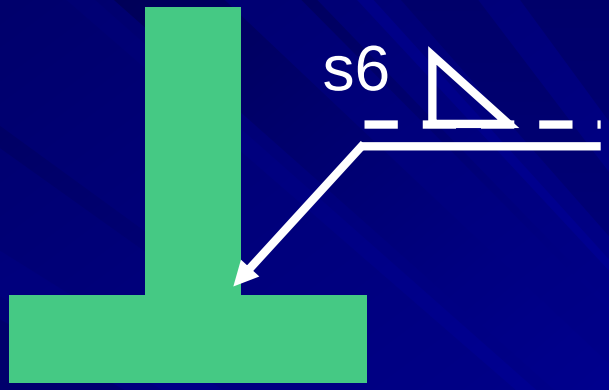
ISO 2553 / BS EN 22553



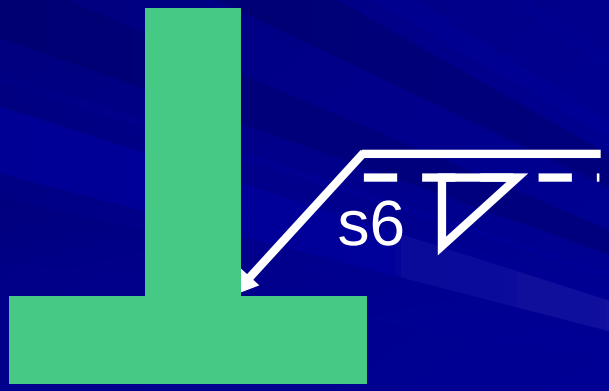
ISO 2553 / BS EN 22553



6mm fillet weld



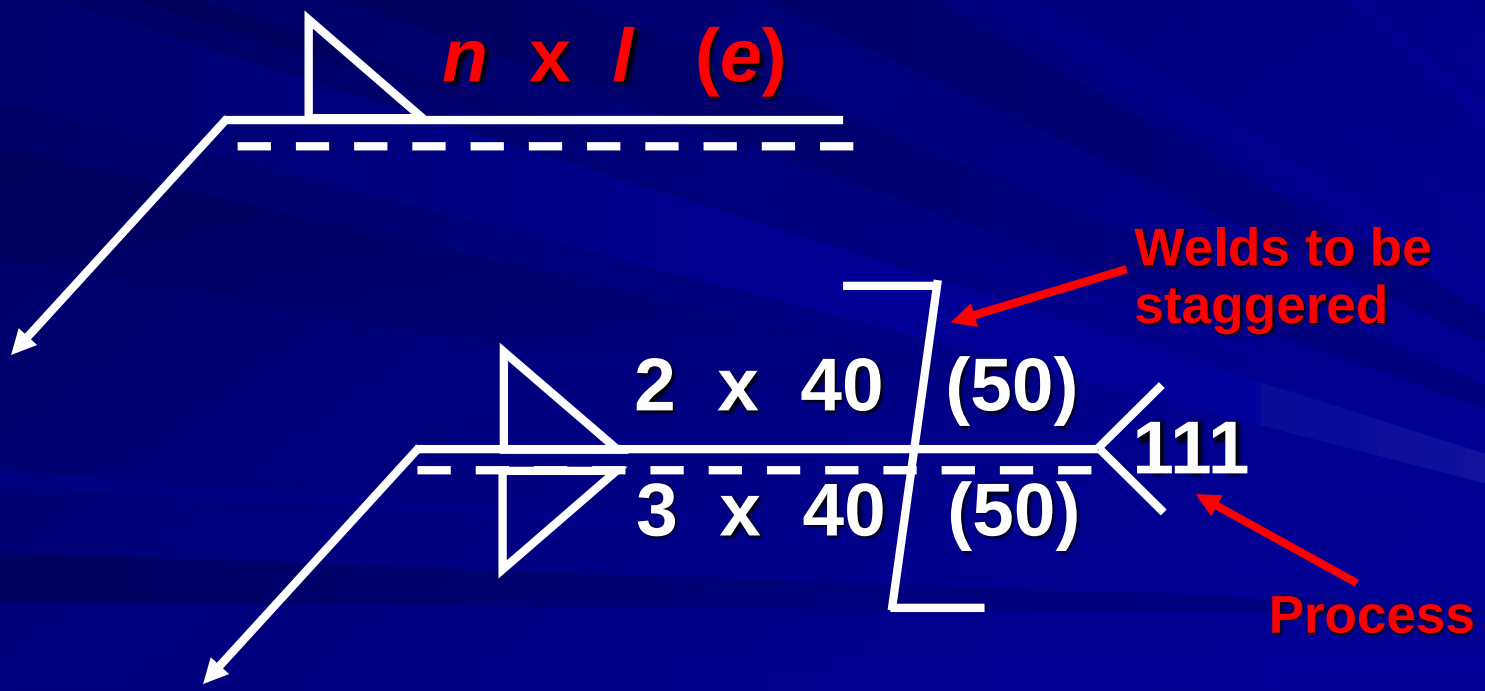
Other side



Other side

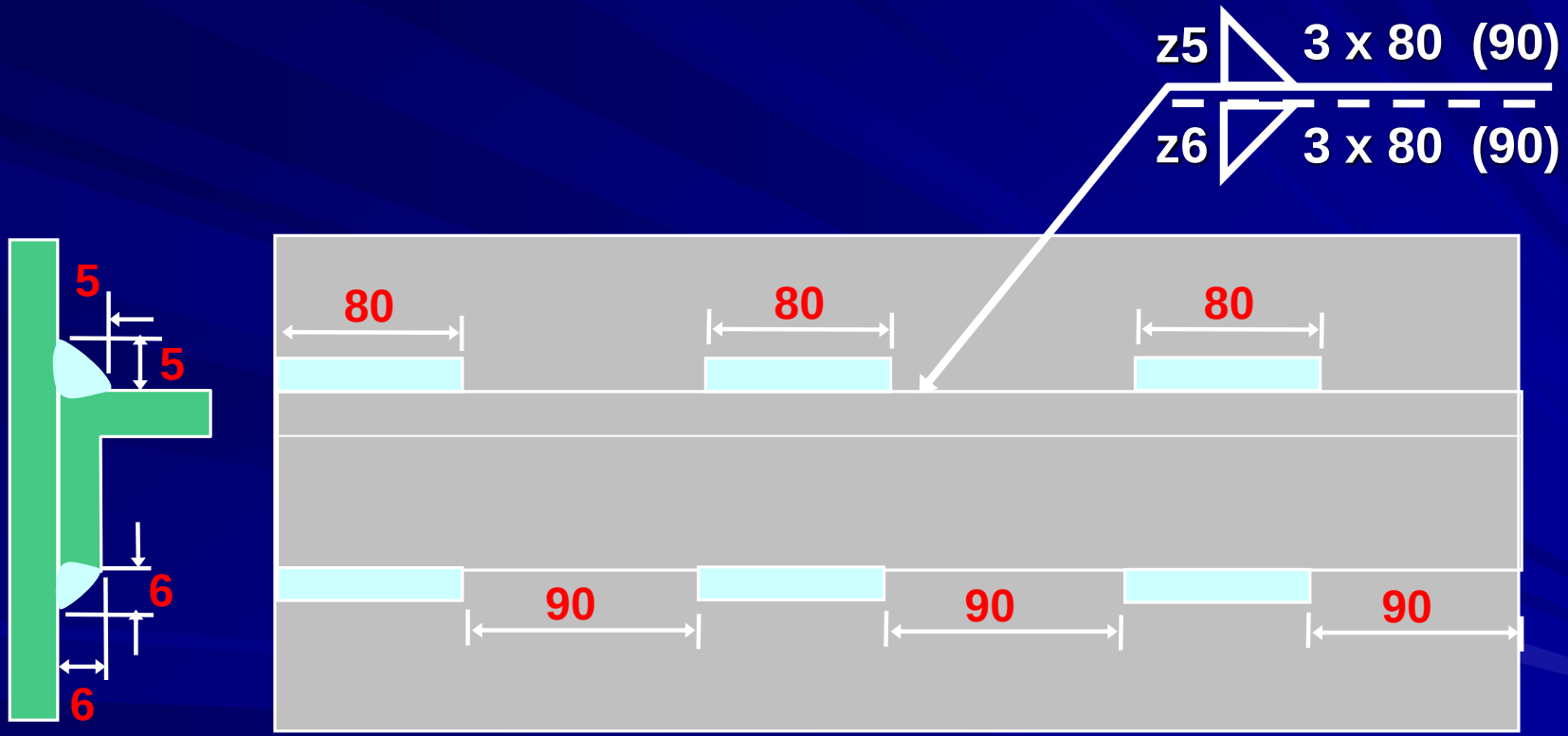
ISO 2553 / BS EN 22553

n = number of weld elements
***l* = length of each weld element**
(*e*) = distance between each weld element



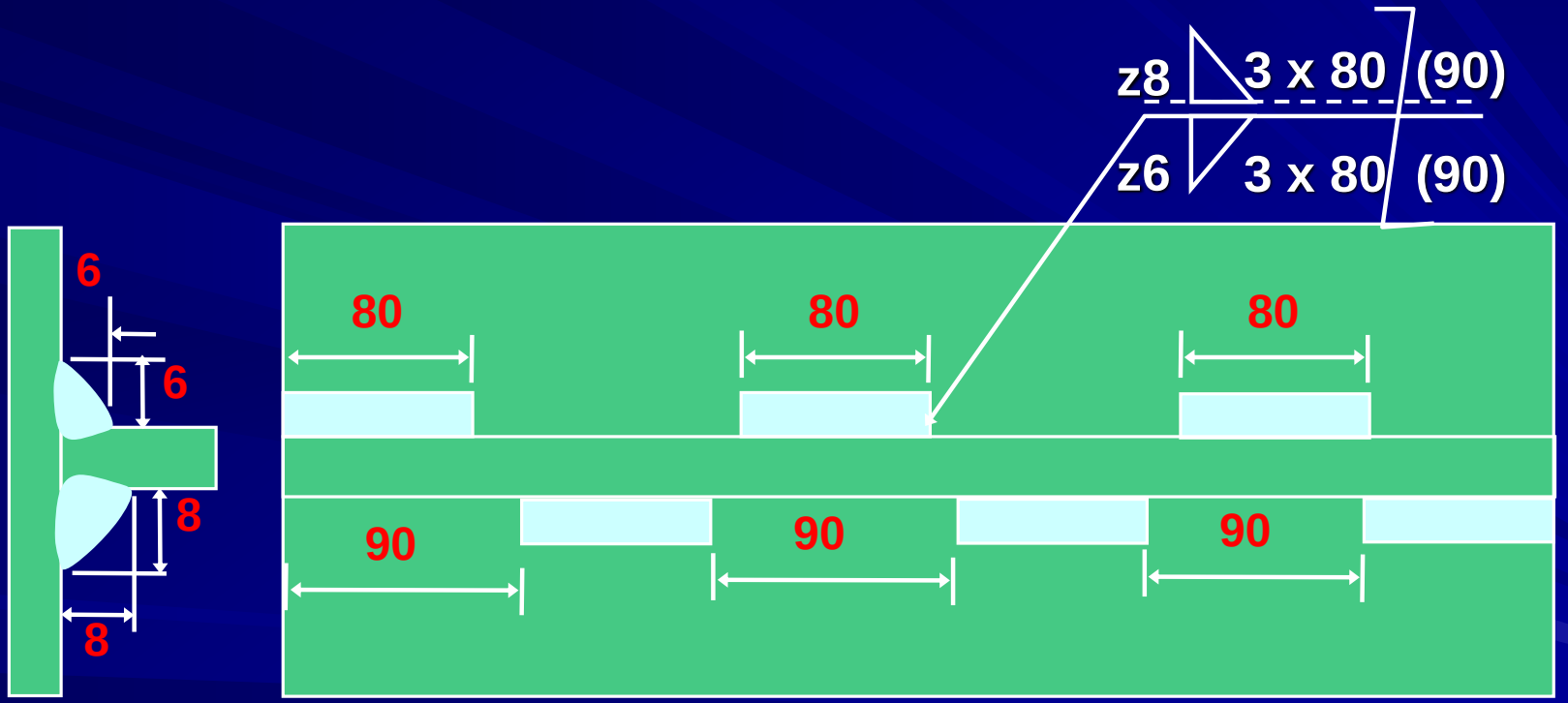
ISO 2553 / BS EN 22553

All dimensions in mm



ISO 2553 / BS EN 22553

All dimensions in mm

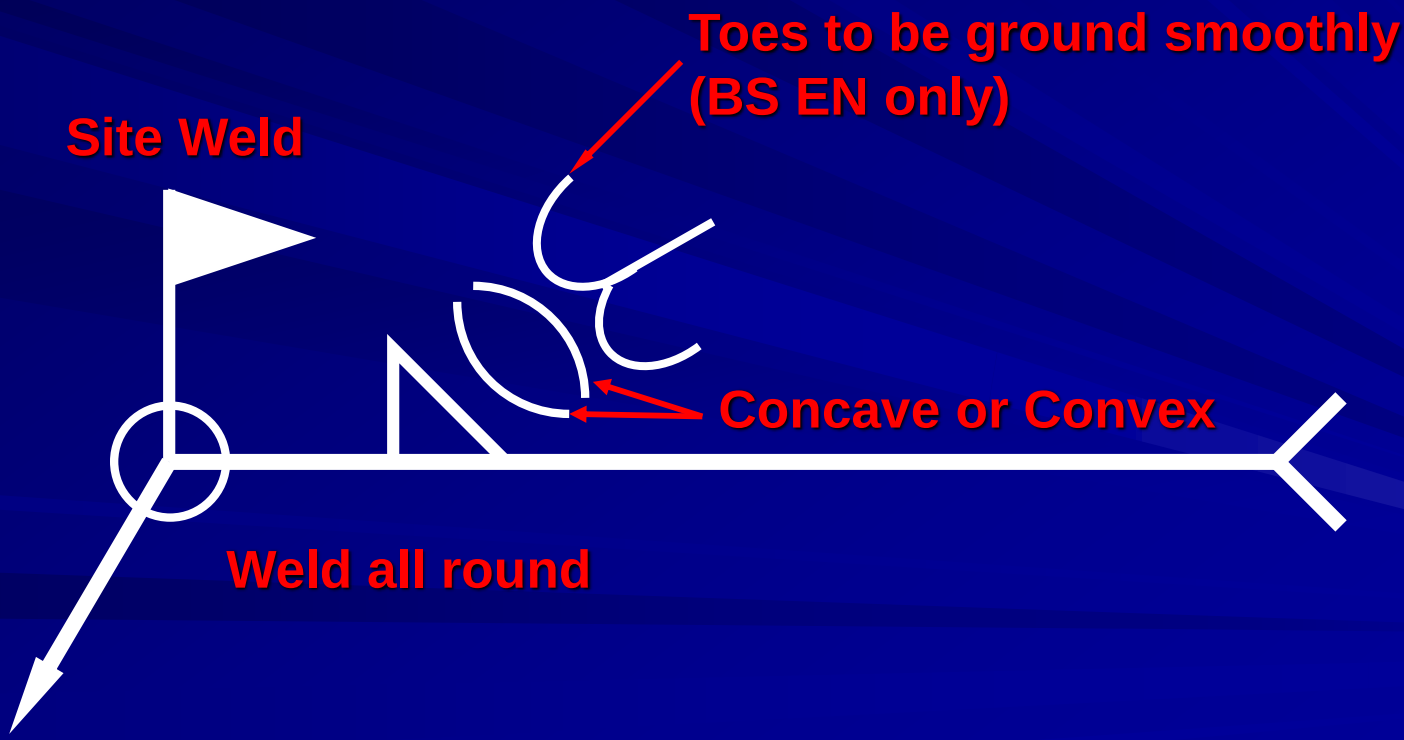


Supplementary symbols

(BS EN ISO 22553 & AWS A2.4)

Convention of supplementary symbols

Supplementary information such as welding process, weld profile, NDT and any special instructions



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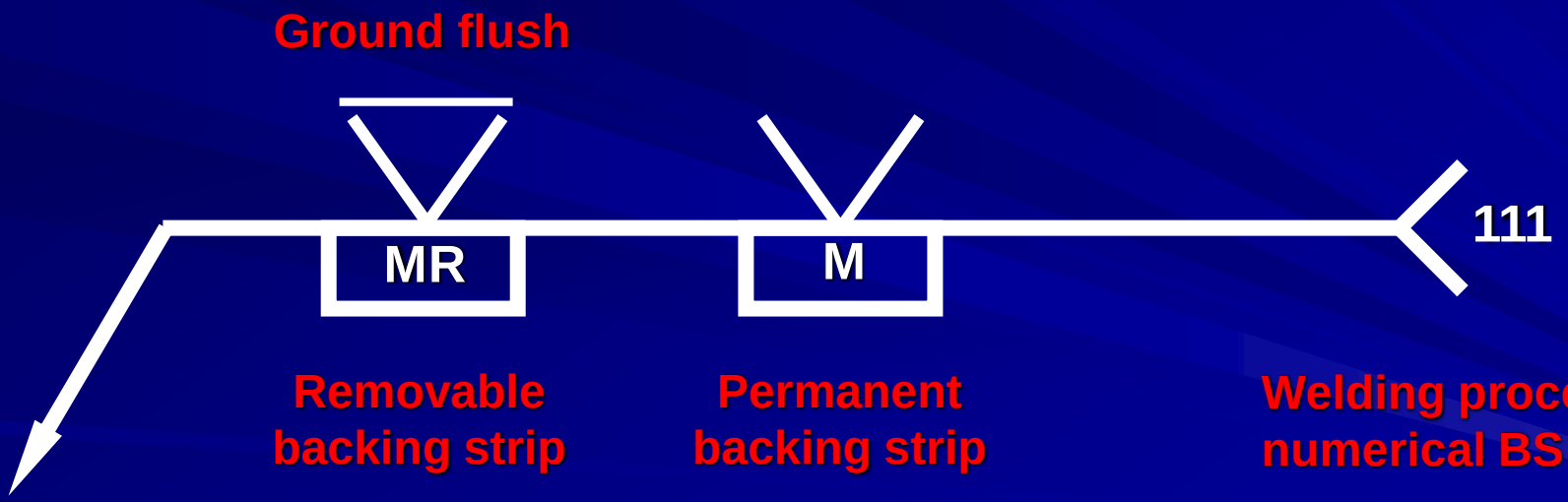
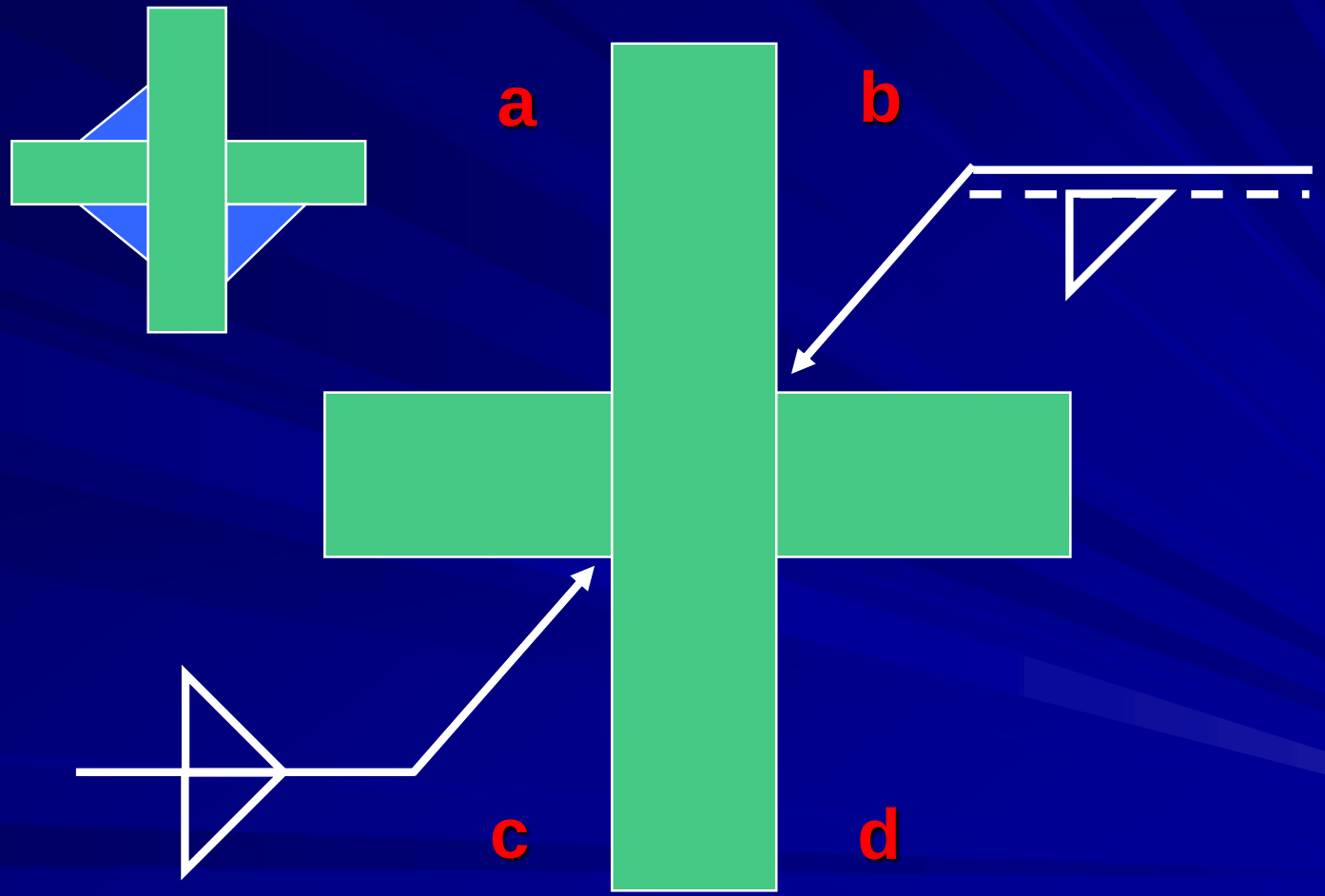
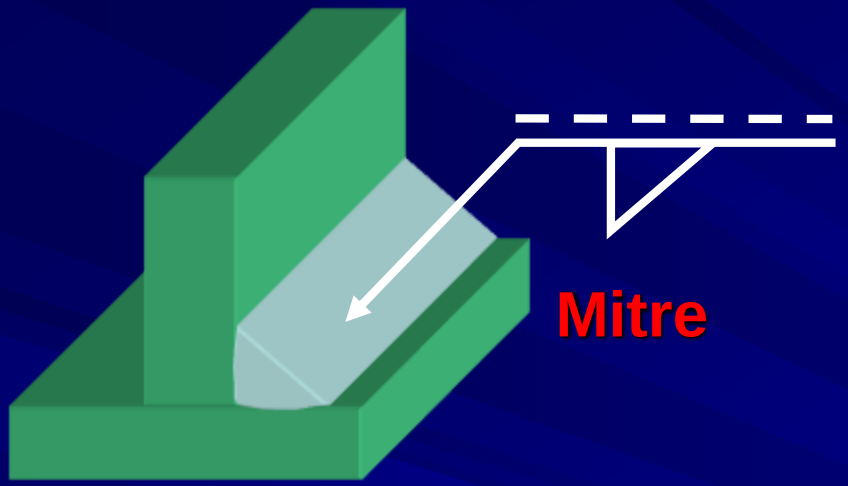


Further supplementary information, such as WPS number, or NDT may be placed in the fish tail

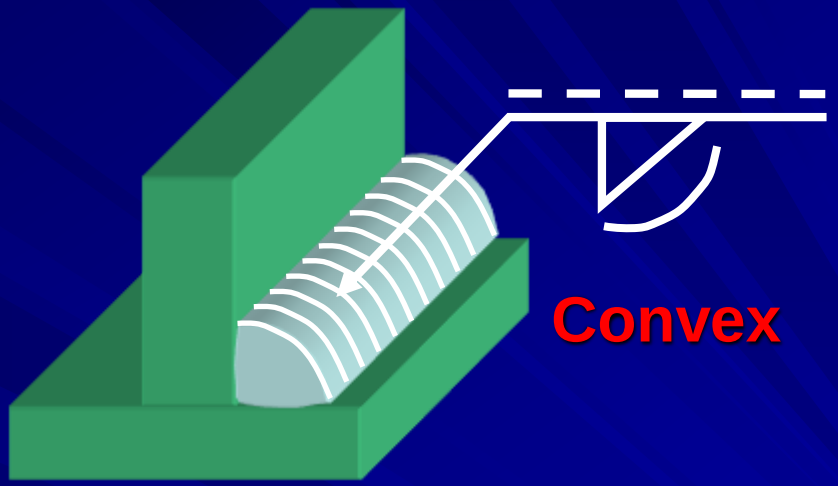
ISO 2553 / BS EN 22553



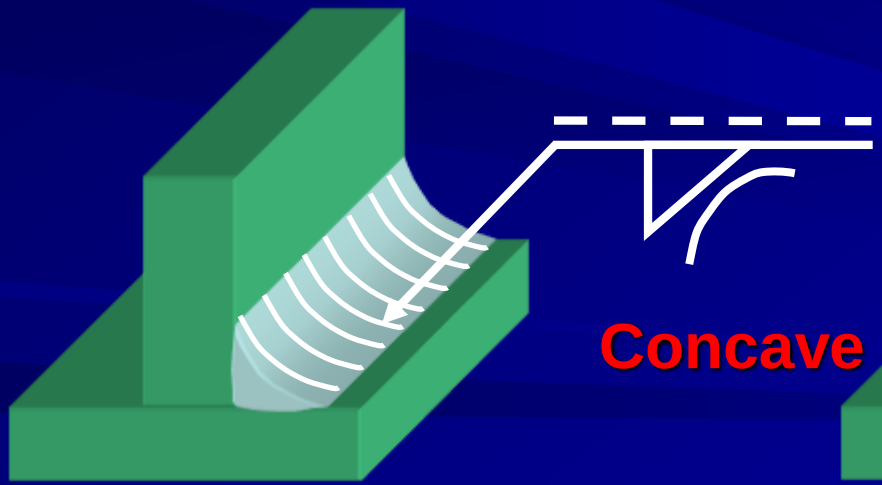
ISO 2553 / BS EN 22553



Mitre



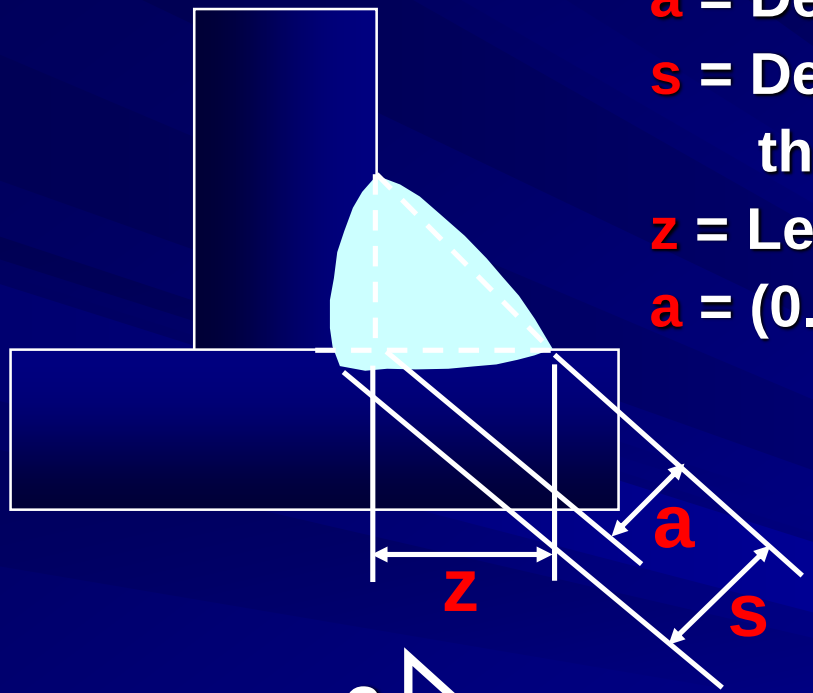
Convex



Concave

Toes shall be blended

ISO 2553 / BS EN 22553



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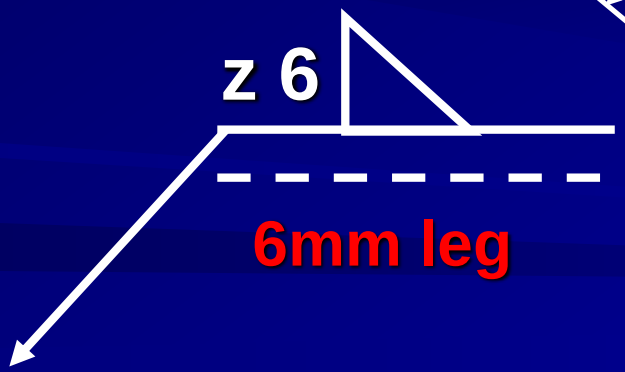
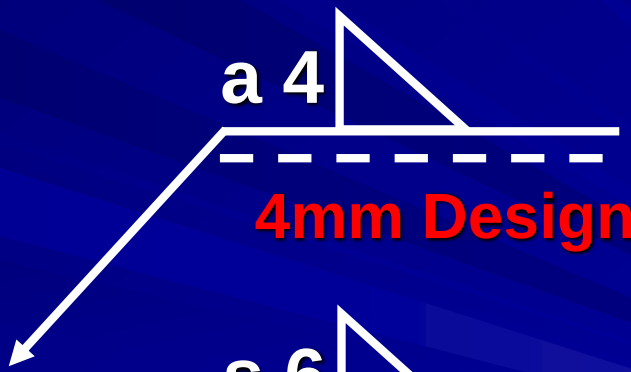
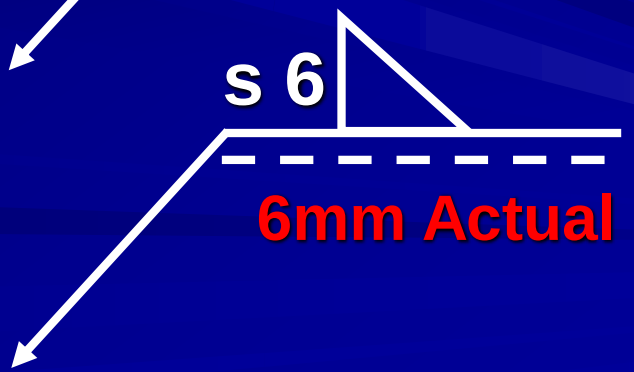
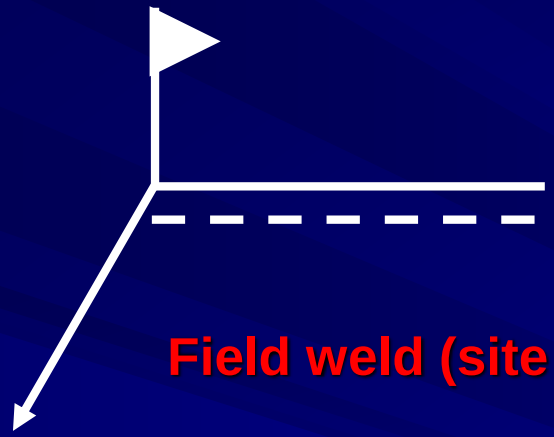






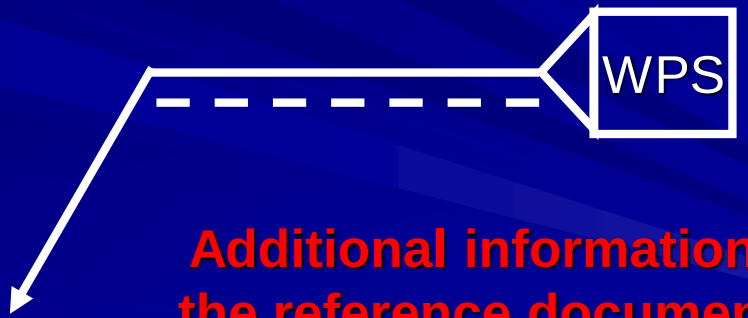
ISO 2553 / BS EN 22553
Complimentary Symbols



Field weld (site weld)

Welding to be carried out all round component (peripheral weld)

The component requires NDT inspection



Additional information, the reference document is included in the box

ISO 2553 / BS EN 22553

Numerical Values for Welding Processes:

111: MMA welding with covered electrode

121: Sub-arc welding with wire electrode

131: MIG welding with inert gas shield

135: MAG welding with non-inert gas shield

136: Flux core arc welding

141: TIG welding

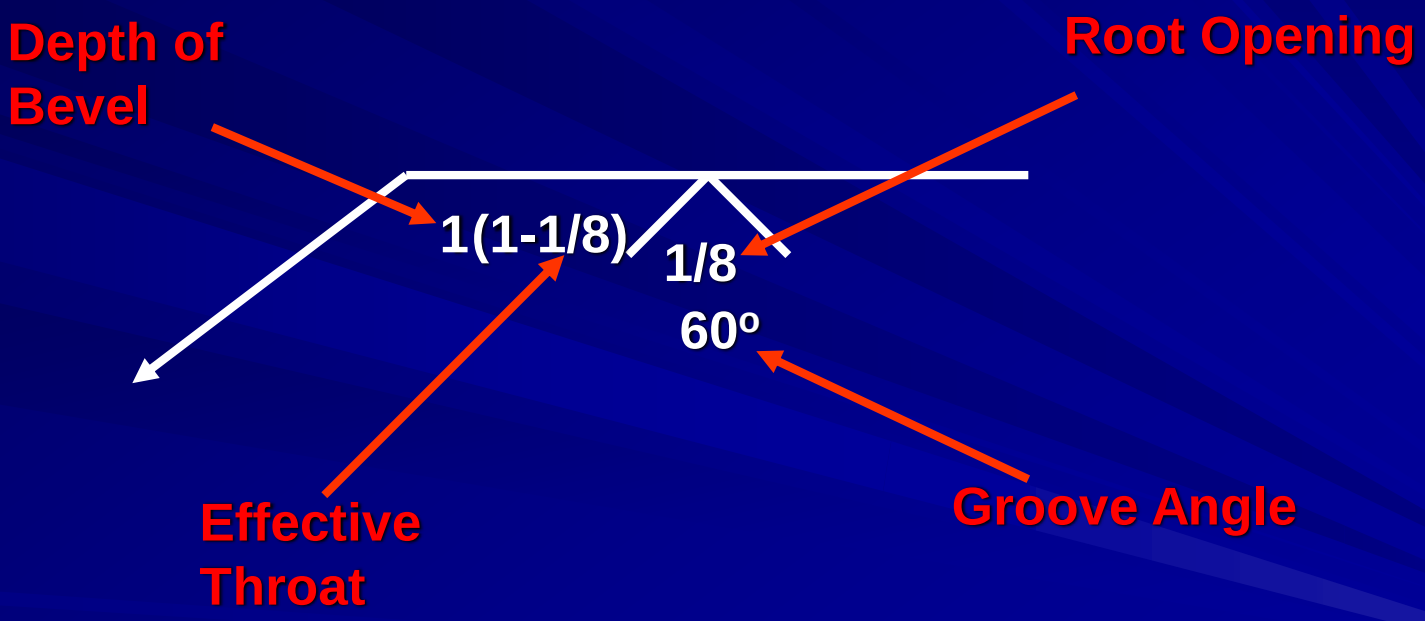
311: Oxy-acetylene welding

72: Electro-slag welding

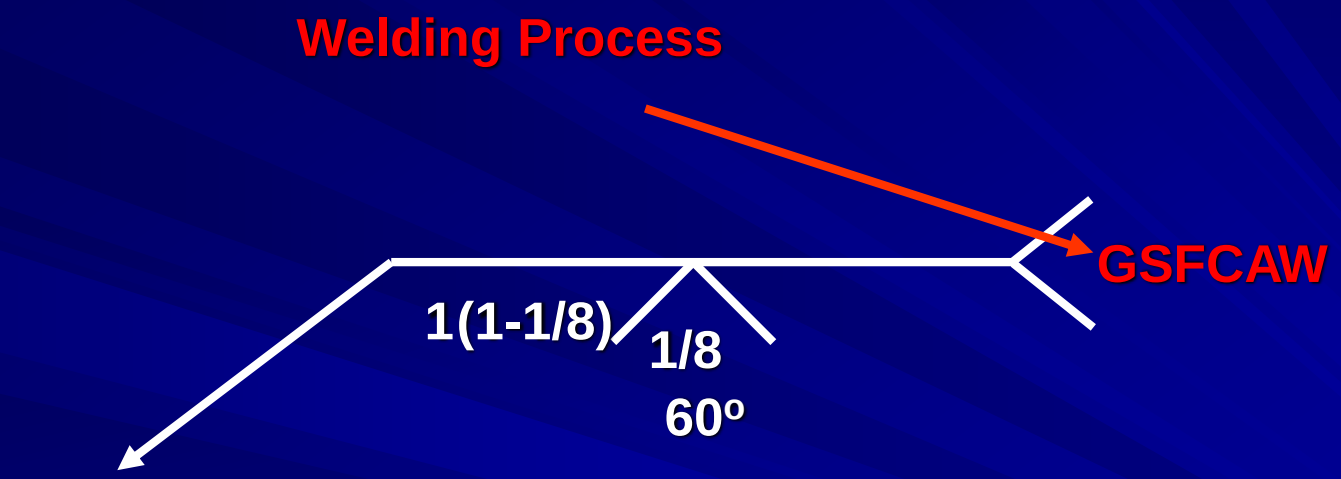
15: Plasma arc welding

AWS A2.4 Welding Symbols

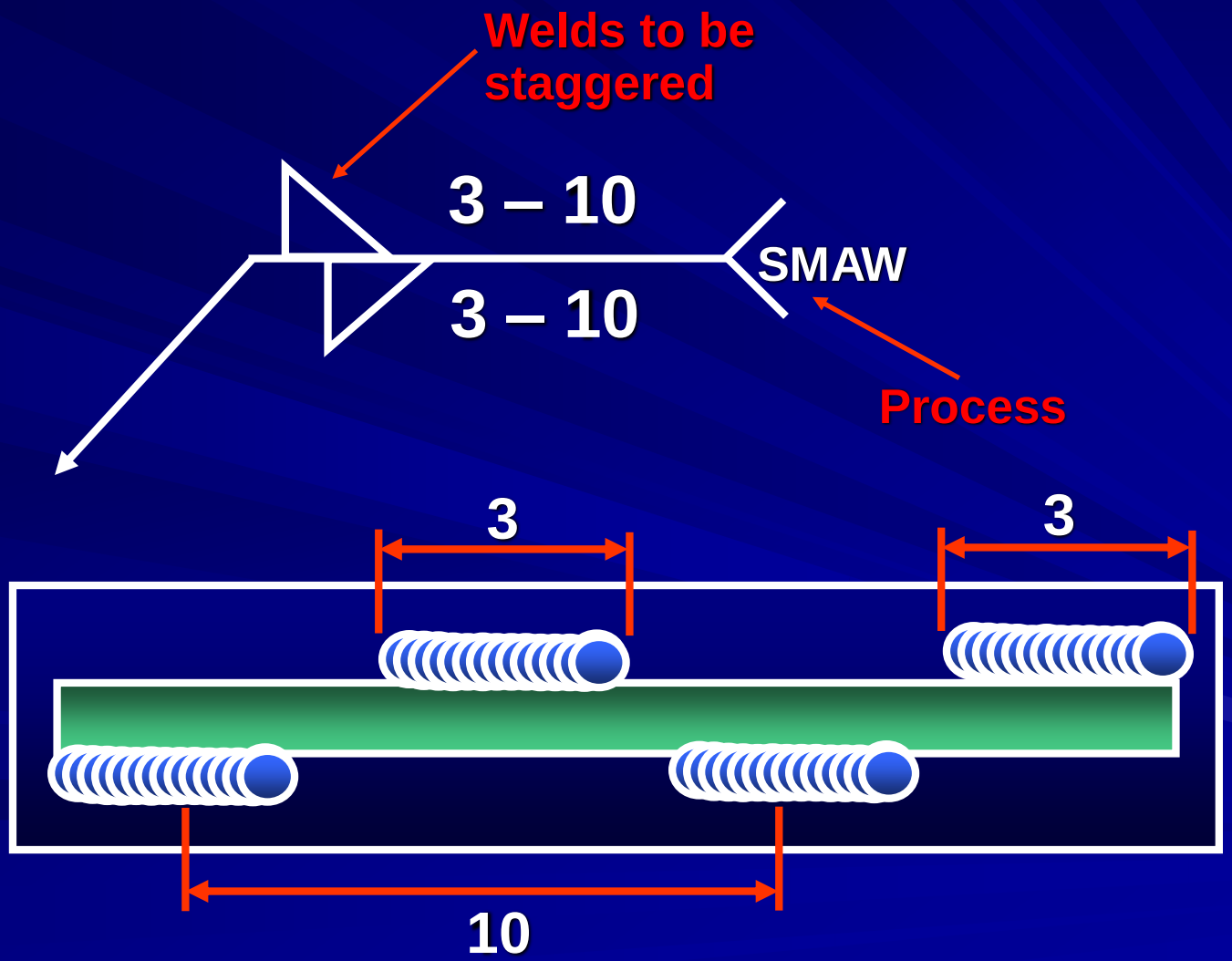
AWS Welding Symbols



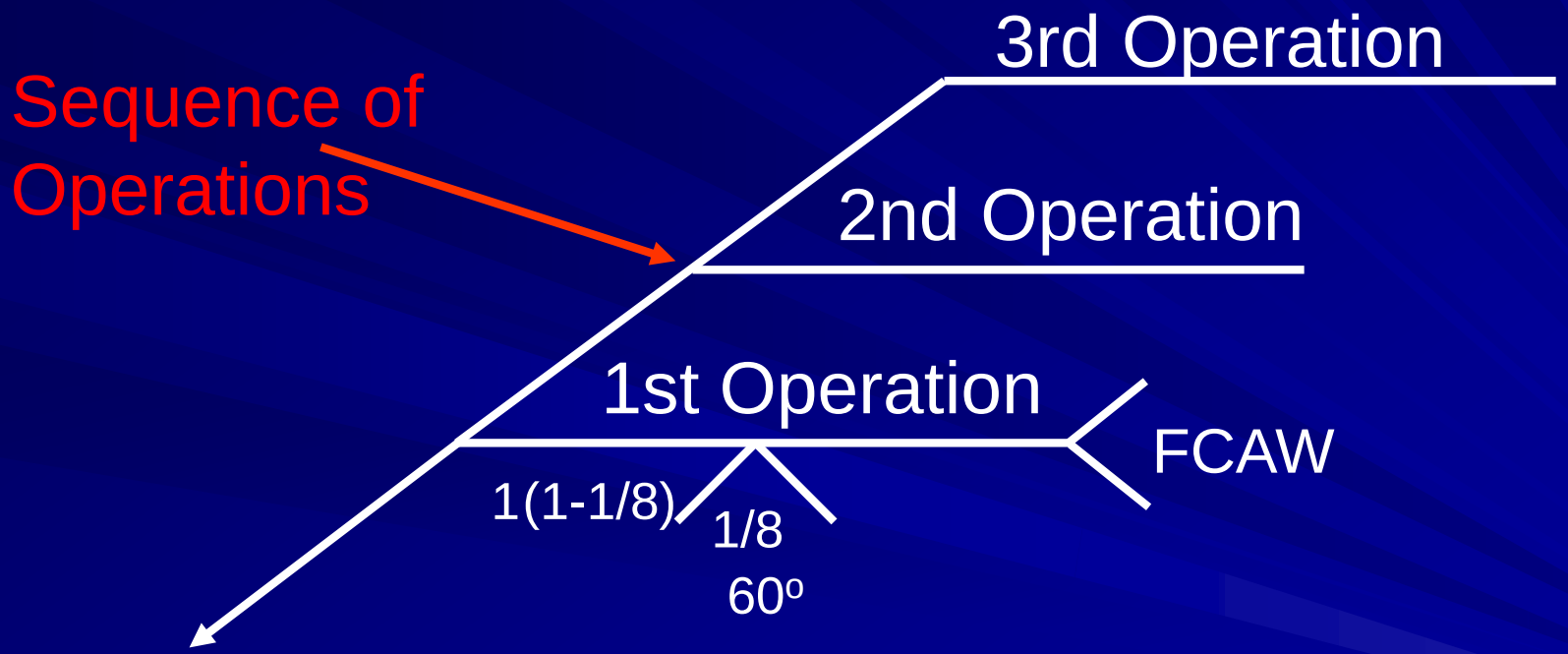
AWS Welding Symbols



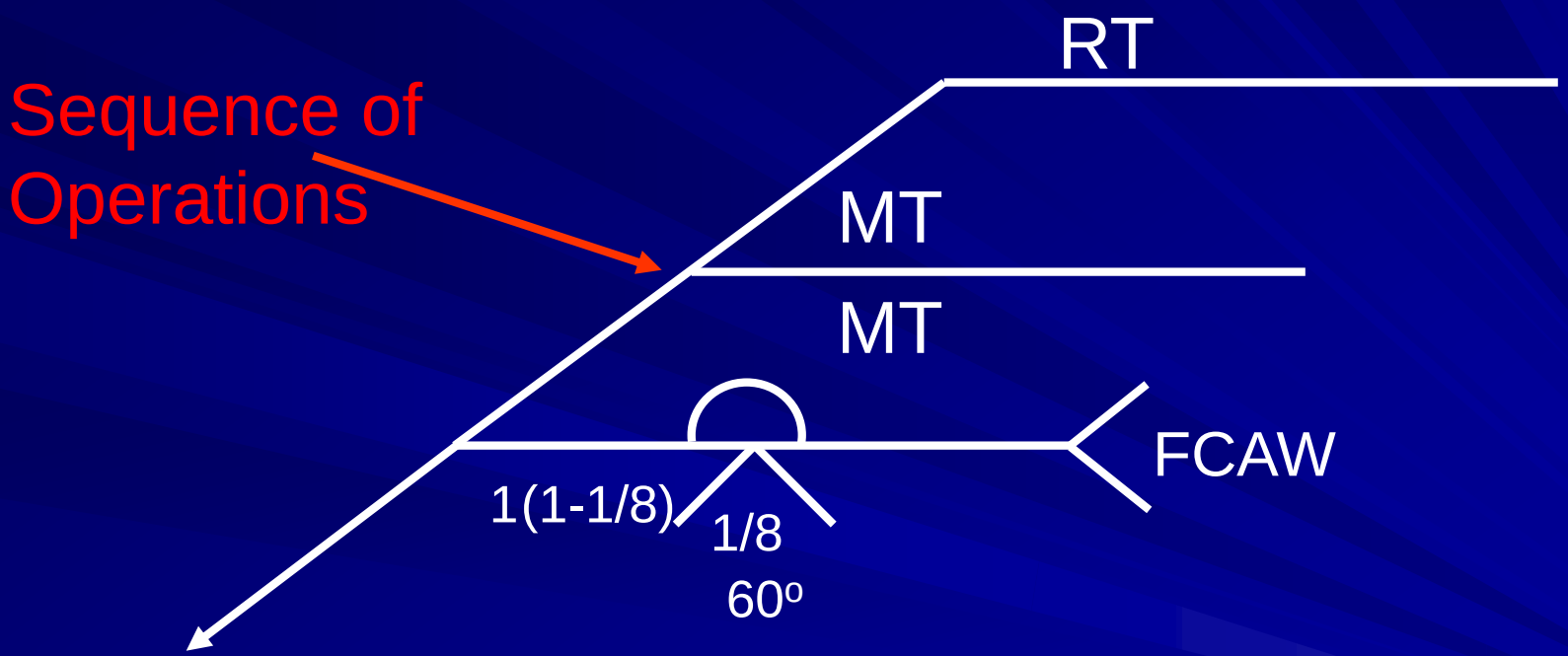
AWS Welding Symbols



AWS Welding Symbols



AWS Welding Symbols



AWS Welding Symbols

Dimensions- Leg Length