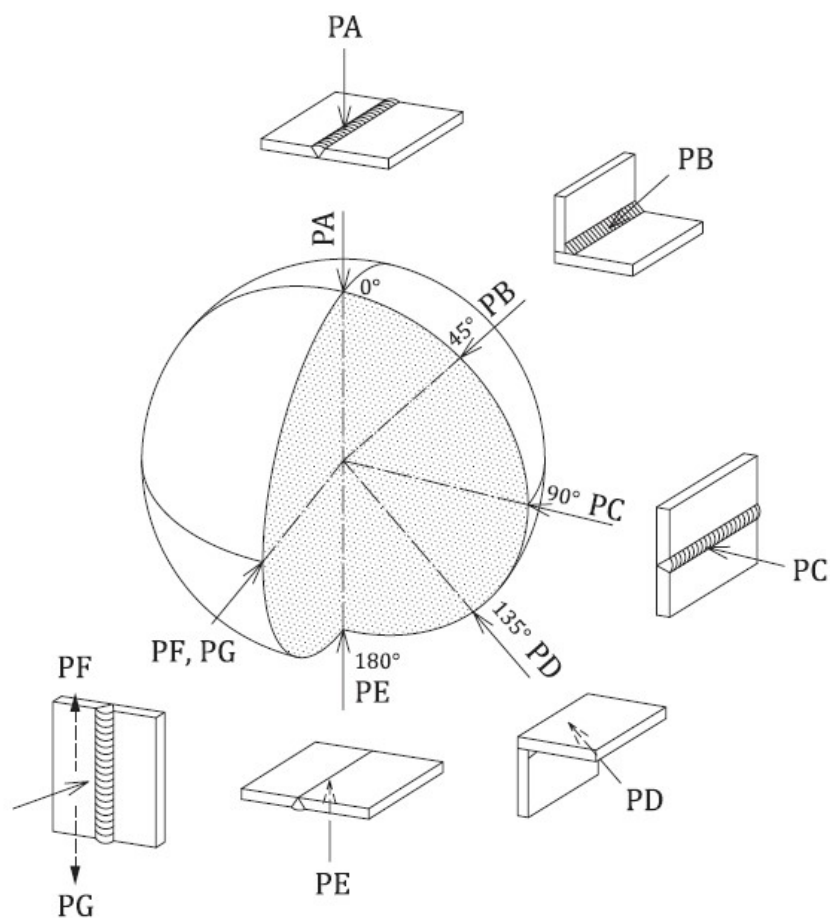


WELDING POSITIONS



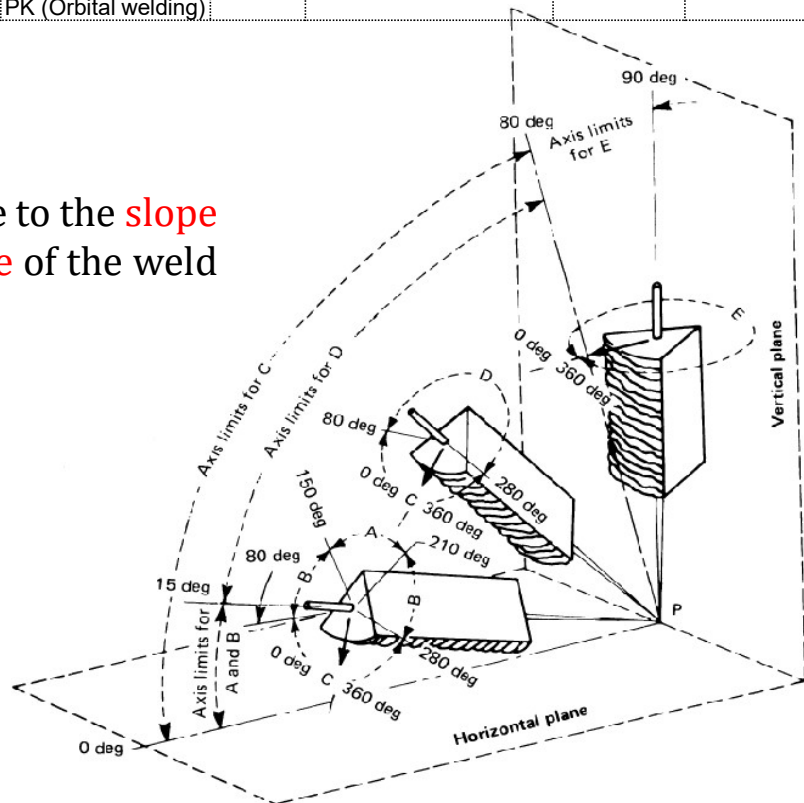
HOW WELDING POSITIONS ARE DEFINED & WHAT ARE THERE ?

- SLOPE
- ROTATION
- DIRECTION (UP/ DOWN WARD)
- JOB INCLINED ANGLE

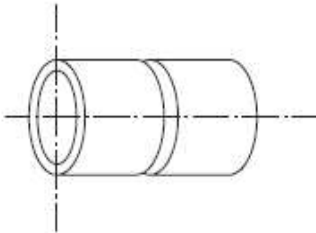
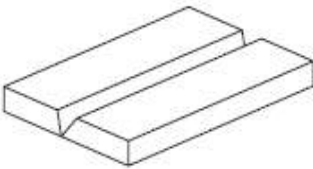
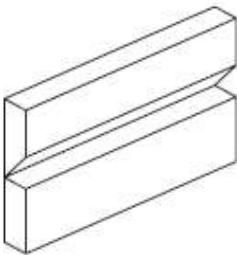
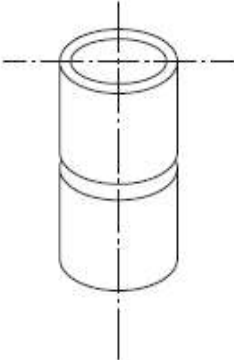
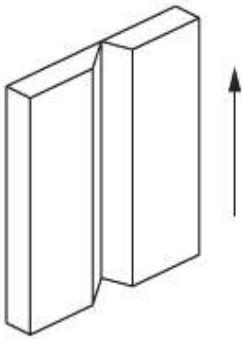
Main Welding Positions							
ISO 6947				ASME SEC IX			
Plate		Pipe		Plate		Pipe	
Butt	Fillet	Butt	Fillet	Butt	Fillet	Butt	Fillet
PA	PA (Job Inclined at 45°)	PA	PA (job Rotated)	1G	1F (Job Inclined at 45°)	1GR	1FR (Job Rotated)
XXX	PB	XXX	PB		2F		2F & 2FR (Job Rotated)
PC	PC (Job Inclined at 45°)	PC	XXX	2G	2F	2G	
XXX	PD	XXX	PD		4F		4F
PE	PE (Axial at 0°)	PE	XXX	4G	4F	4G	
PF (UP)	PF (UP)	PH (UP)	PH (UP)	3G (UP)	3F (UP)	5G (UP)	5F (UP)
PG (DOWN)	PG (DOWN)	PJ (DOWN)	PJ (DOWN)	3G (DOWN)	3F (DOWN)	5G (DOWN)	5F (DOWN)
		H-LO45 (UP)	XXX			6G (UP)	XXX
		J-LO45 (DOWN)	XXX			6G (DOWN)	XXX
		PK (Orbital welding)	PK (Orbital welding)				

Welding position

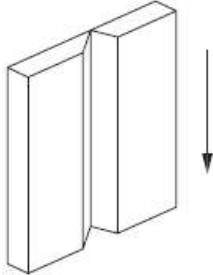
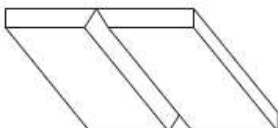
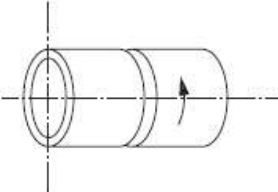
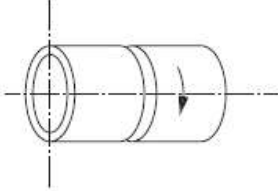
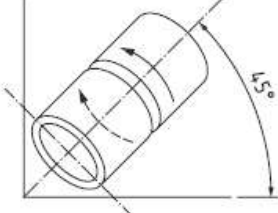
Position of a weld defined relative to the **slope of the axis** and **rotation of the face** of the weld relative to the **horizontal plane**



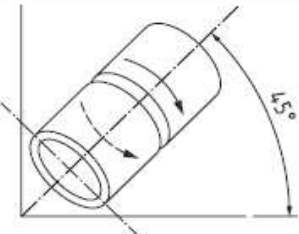
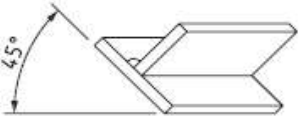
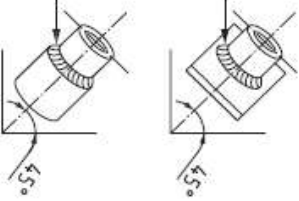
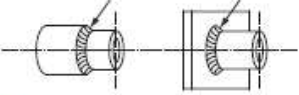
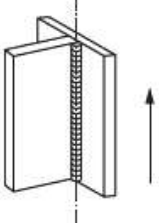
MAIN WELDING POSITIONS

Illustration		Welding position in accordance with AWS A3.0M/ A3.0 and ASME Section IX	Welding position in accordance with ISO 6947
		1G	PA
		2G	PC
		3G uphill	PF
^a The inclined angle is an example only.			

MAIN WELDING POSITIONS

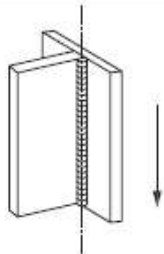
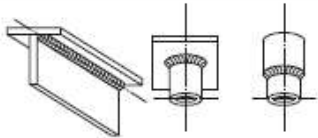
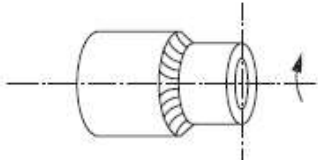
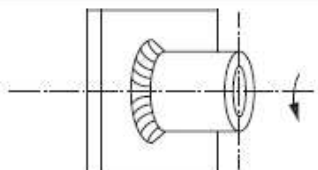
Illustration	Welding position in accordance with AWS A3.0M/ A3.0 and ASME Section IX	Welding position in accordance with ISO 6947
 vertical down position	3G downhill	PG
 overhead position	4G	PE
 vertical up position (pipe fixed)	5G uphill	PH
 vertical down position (pipe fixed)	5G downhill	PJ
 inclined position (pipe fixed) welding upwards	6G uphill	PH-L045 ^a
^a The inclined angle is an example only.		

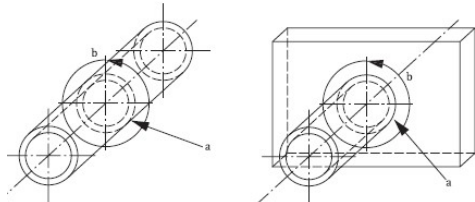
MAIN WELDING POSITIONS

Illustration	Welding position in accordance with AWS A3.0M/A3.0 and ASME Section IX	Welding position in accordance with ISO 6947
 inclined position (pipe fixed) welding downwards	6G downhill	PJ-L045 ^a
 flat position	1F	PA
 flat position (pipe rotating)	1FR	PA
 horizontal vertical position	2F	PB
 horizontal vertical position (pipe rotated)	2FR	PB
 vertical up position	3F uphill	PF

^a The inclined angle is an example only.

MAIN WELDING POSITIONS

Illustration	Welding position in accordance with AWS A3.0M/ A3.0 and ASME Section IX	Welding posi- tion in accord- ance with ISO 6947
 vertical down position	3F downhill	PG
 horizontal overhead position	4F	PD
 vertical up position (pipe fixed)	5F uphill	PH
 vertical down position (pipe fixed)	5F downhill	PJ
^a The inclined angle is an example only.		

		PK For Orbital Welding *NEW
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RANGES FOR WELDING POSITIONS

Ranges for Welding Positions in Production (Butt welds)					
ISO 6947 :2019			ASME SEC IX 2019		
Test Welding Position	Slope	Rotation	Test Welding Position	Slope	Rotation
PA	±15°	±30°	1G	0° to 15°	150° to 210°
PC	±15°	+60° -10°	2G	0° to 15°	80° to 150° 210° to 280°
PE	±80°	±80°	4G	0° to 80°	0° to 80° 280° to 360°
PF	+10° to +75°	±100°	3G (UP)	15° to 80°	80° to 280°
PG	±10°	±180°	3G (DOWN)	80° to 90°	0° to 360°

Ranges for Welding Positions in Production (Fillet Welds)					
ISO 6947 :2019			ASME SEC IX 2019		
Test Welding Position	Slope	Rotation	Test Welding Position	Slope	Rotation
PA	±15°	±30°	1F	0° to 15°	150° to 210°
PB	±15°	+15° -10°	2F	0° to 15°	125° to 150° 210° to 235°
PC	±15°	+35° -10°	2F		
PD	±80°	+35° -10°	4F	0° to 80°	0° to 125° 235° to 360°
PE	±80°	±35°	4F		
PF	+10° to +75°	±100°	3F(UP)	15° to 80°	125° to 235°
PG	±10°	±180°	3G (DOWN)	80° to 90°	0° to 360°

1. Welding positions and allowable deviations for testing shall not exceed ±5° in slope and ±10° in rotation from the main welding position.
2. For Special Position The allowable range in production shall be ±15° in slope and in rotation.

RANGES OF QUALIFICATIONS FOR WELDING POSITIONS

As Per ISO 9606-1			As Per ASME SEC IX		
Testing Positions	Range of Qualification		Testing Positions	Range of Qualification*	
	BUTT	FILLET		BUTT	FILLET
PA	PA	PA	1G (Plate & Pipe)	F	F
PB		PB & PA	2G (Plate & Pipe)	F & H	F & H
PC	PC & PA	PA, PB & PC	3G (Plate)	F & V	F, H & V
PD		PE, PD, PC, PB & PA	4G (Plate)	F & O	F, H & O
PE (Plate)	PE, PC & PA	PE, PD, PC, PB & PA	3G & 4G (Plate)	F, V, O	All
PF (Plate)	PF & PA	PF, PA & PB	2G, 3G & 4G (plate)	All	All
PH (Pipe)	PA, PE & PF	PA, PB, PC, PD, PE & PF	Special Position (Plate)	SP, F	SP, F
PG (Plate)	PG	PG	5G (Pipe)	F, V & O	All
PJ (Pipe)	PG, PE, PA	PA, PB, PD, PE & PG	6G (Pipe)	All	All
H-L045 (Pipe)	PA,PC,PE & PF		2G & 5G (pipe)	All	All
J-L045 (Pipe)	PA,PC,PE & PG		Special Position (Pipe)	SP, F	SP, F
			1F (Plate & Pipe)		F
			2F (Plate & Pipe) & 2FR (Pipe)		F & H
			3F (Plate)		F, H & V
			4F (Plate & Pipe)		F, H & O
			3F & 4F (Plate)		All
			5F (Pipe)		All
			Special Position (Pipe)		SP, F
ISO 9606-1 cl 5.3 1. Pipe OD > 25 mm (1 inch) covers plate. 2. Plate covers pipes OD ≥ 500 mm. 3. Plate cover rotating pipes OD ≥ 75 mm in welding position PA, PB, PC and PD.			1. For pipe range of qualified position are shown only for Over 610mm dia for less than 610mm dia See Table QW 461.9 2. Butt welds qualify fillet welds or but not vice versa (QW 303.1 & 2) 3. F- Flat; H – Horizontal, V- Vertical & O- Over head (*) 4. G- Groove & F- Fillet (Testing Positions)		
ISO 9606-1 cl 5.4 1. Butt weld (BW) qualifies any type of butt welds (BW) except for branch joints with an angle ≤ 60°. 2. For branch connections of < 60°, a specific test piece should be used to qualify the welder. 3. Butt welds do not qualify fillet welds or vice versa.					
ISO 9606-1 cl 5.8 1. Welding in two positions in two pipes, PH+PC / PJ+PC with the same diameter covers the same range as a pipe welded in H-L045 / J-L045. 2. If a pipe diameter ≥ 150 mm in one test piece. Welded in two welding positions. PH or PJ 2/3 Portion and PC 1/3 portion of circumference. Then the range of qualification is? (for Butt) PH + PC = PA,PC,PE & PF or PJ + PC = PA,PC,PE & PG					