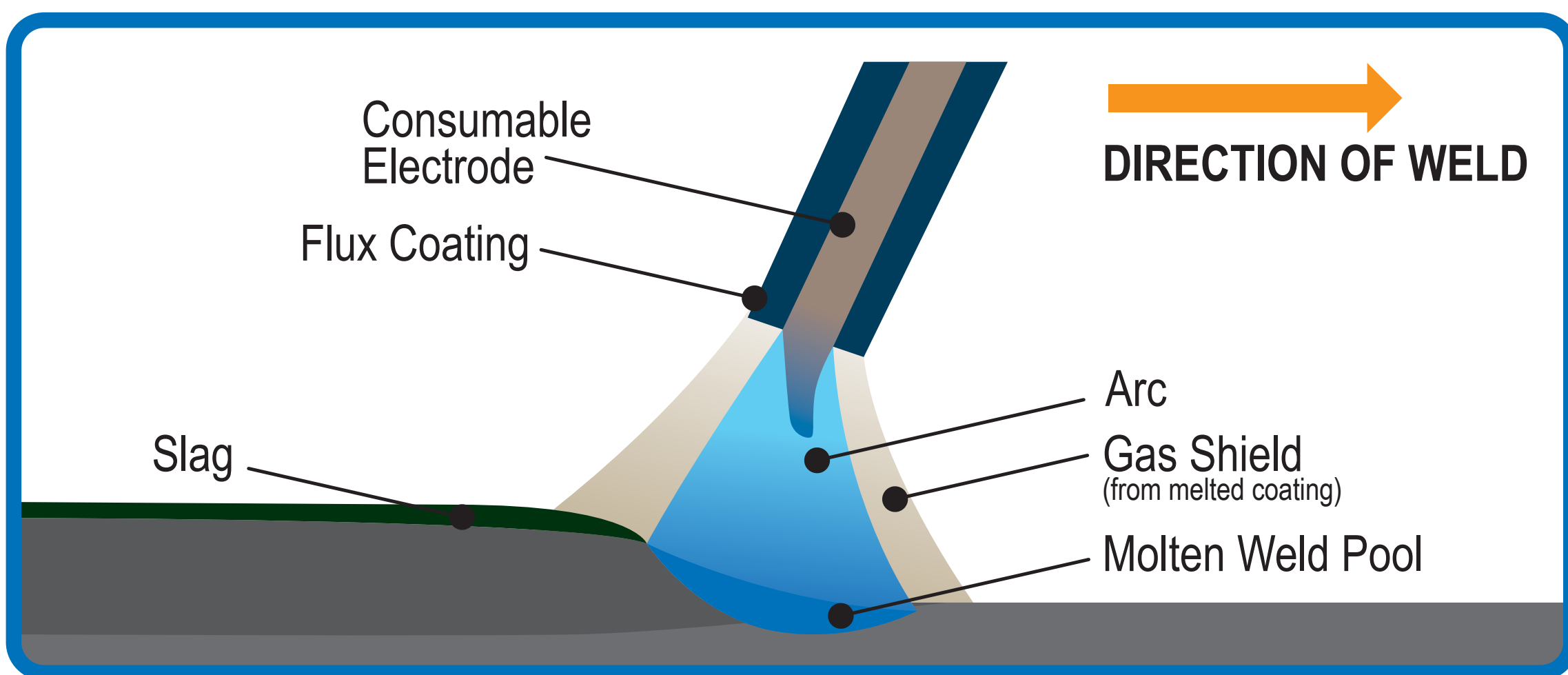


## ENJOY THE ADVANTAGE OF SMAW IN KOBELCO

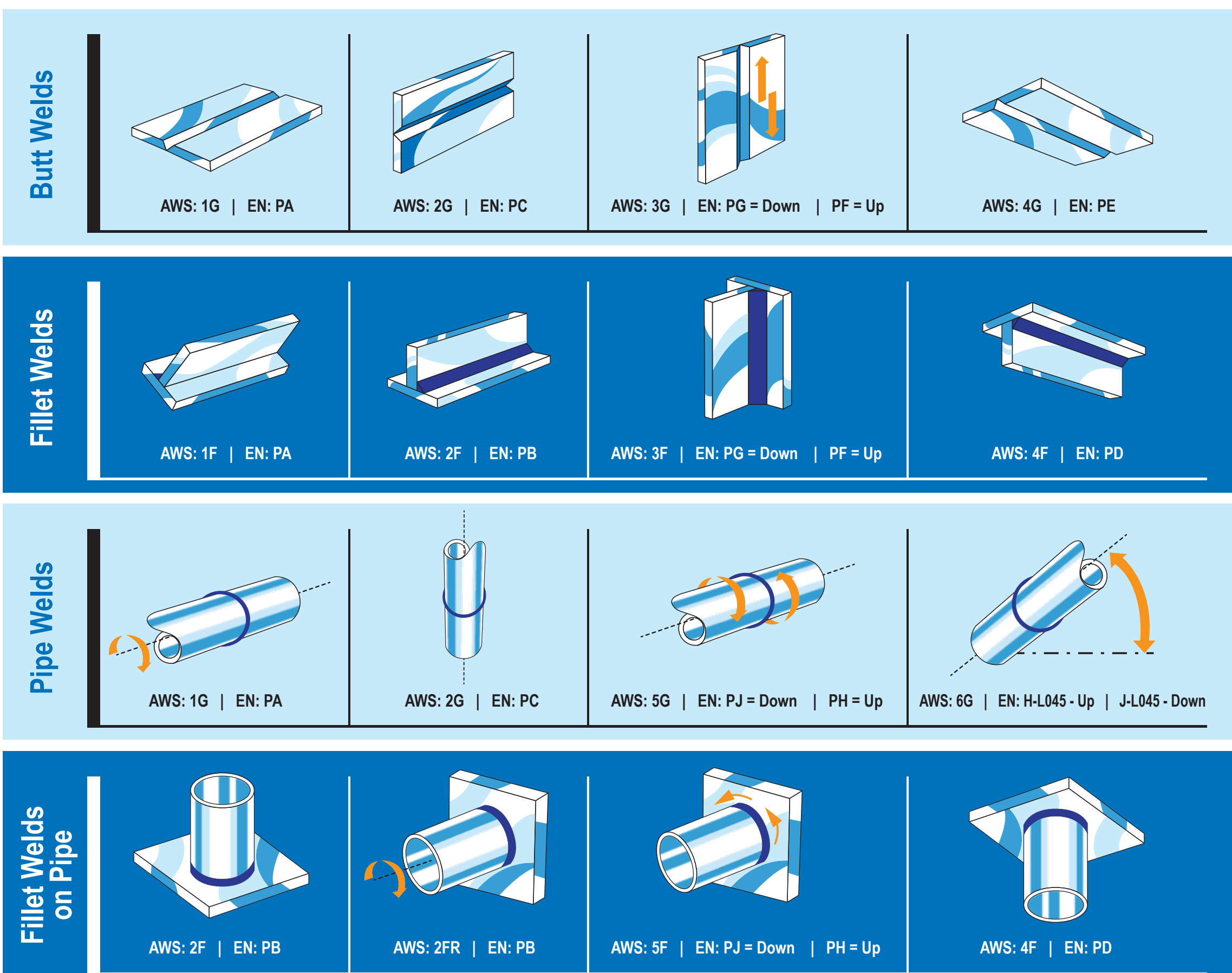


**SMAW** stands for “Shielded Metal Arc Welding”, is one of the most reliable welding processes ever invented in any welding industry. After the discovery of electric arc in 1800 by Humphry Davy, there was little development in electrical welding until Auguste De Meritens developed a carbon arc torch, patented in 1881. Nikolay Benardos developed carbon arc welding, obtaining patents from 1887 showing a rudimentary electrode holder. A year after, Nickolay Slavyanov developed consumable metal electrode in 1888 where popularity of SMAW being spread widely across the globe.

**SMAW** process is widely and commonly used in any welding industry, in fact welding in modern times has gained public acceptance and trust largely on the strength of **SMAW**. It is highly tolerant of adverse condition like wind, moisture and light amount of mill scale. Investment for SMAW welding equipment was affordable and economical which attributes a great reliability of the process, have made it one of the most widely used welding process in the world.

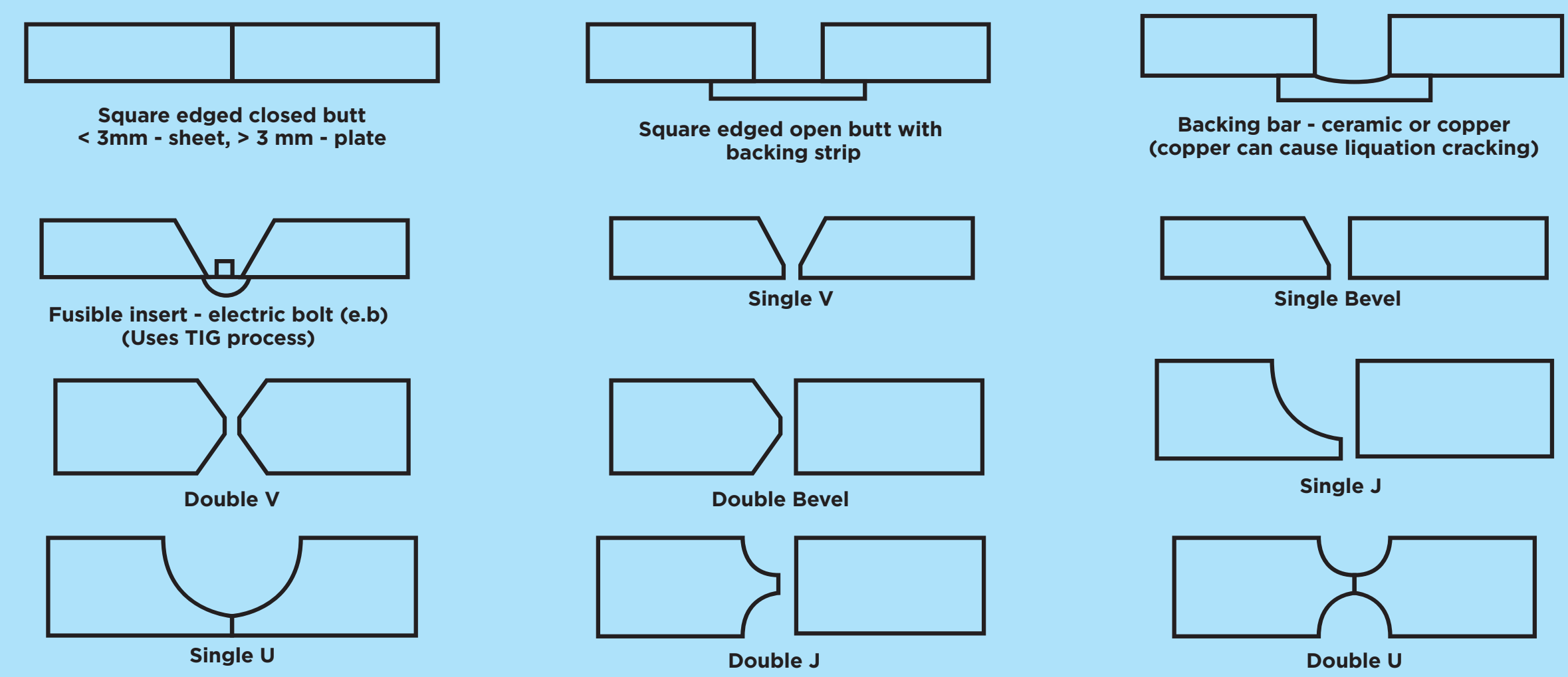
The actual welding technique utilized depends on the electrode, the composition of workpiece, and the position of the joint being welded. The selection of electrode and welding position is depending on several vital factors such as; material grade, joint configuration & design of structure. Flat welds require the least operator skill and can be carried out with electrode that melts quickly. Regardless of any welding process, there is advantage and disadvantage of utilizing it.

### WELDING POSITION



### PLATE EDGE PREPARATION FOR BUTT WELDS

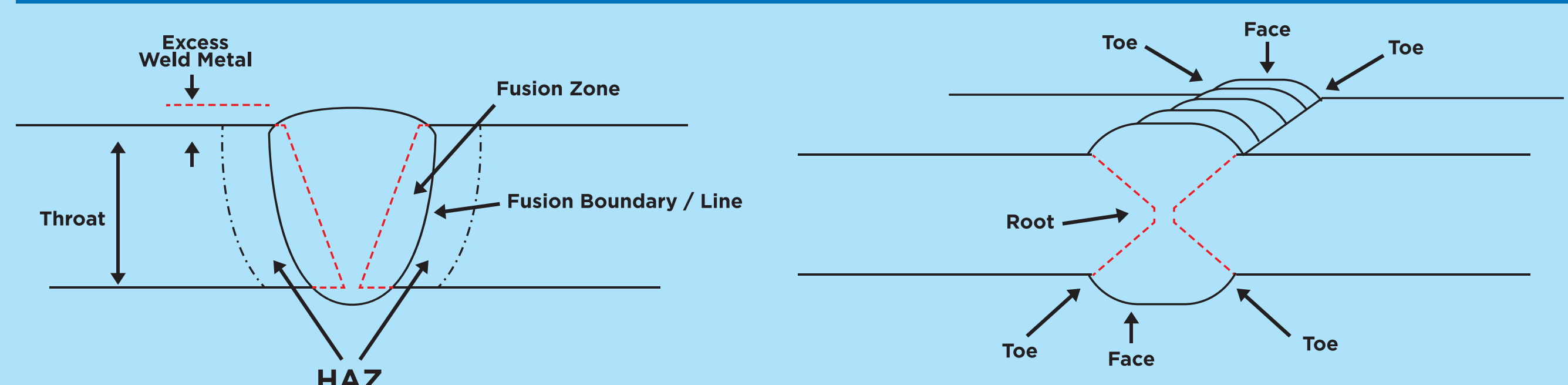
Each joint configuration shows standard terminology for the various features of plate edge preparations.



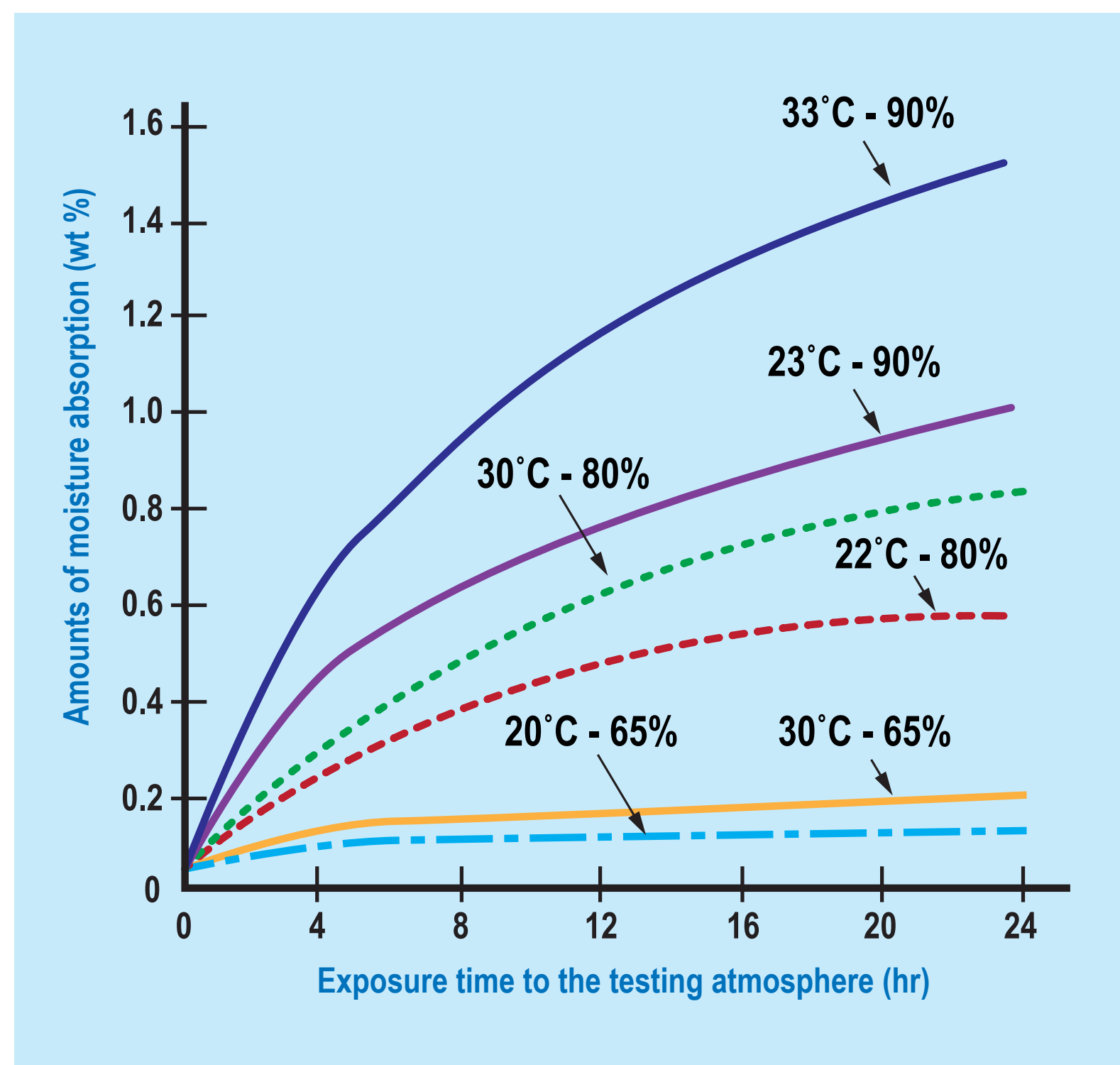
### RE-DRY CONDITION

Applicable Steel	AWS Class	Product Name	Re-drying Temperature (°c)	Re-drying Time (hour)	Holding Temperature (°c)
Mild	E6013 E6019	RB-26 B-14	70-100	0.5-1	—
High Tensile or Low Temperature	E7016 E7016 E7018	LB-52U LB-52 LB-52-18	300-350	0.5-1	100-150
	E7018-1 E7016-G E8016-G E8018-G E8016-C1 E9016-G E9018-G E10016-G E11016-G E11018-G E7016-C2L	KOBE-7018-1 LB-52NS LB-55U, LB-55NS LB-8018 LB-62L LB-67L LB-62D LB-106 LB-116 LB-80L NB-3J	300-400	1	100-150
	E8016-B2 E8018-B2 E8015-B3L E9016-B3 E9018-B3 E9015-B91 E9016-G E10016-G	CM-A96 CM-B98 CM-B105 CM-A106 CM-B108 CM-95B91 CM-A106H BL-106	325-375	1	100-150
	Stainless Steel	NC-38L, NC-39L, NC36L, NC-37 NC-2209, NC-2594	150-200 250-350	0.5-1 1-2	100-150
	Hardfacing	KOBE-350R, KOBE-600R	70-100	0.5-1	—
		HF-12, HF-13, HF-30, HF-260, HF-350, HF-450, HF-500, HF-600, HF-650, HF-700, HF800K HF-11, HF-16, HF-950	300-350 150-200	0.5-1 0.5-1	100-150 100-150
	Cast iron	CI-A3	300-350	0.5-1	100-150
		CI-A1, CI-A2	70-100	0.5-1	100-150

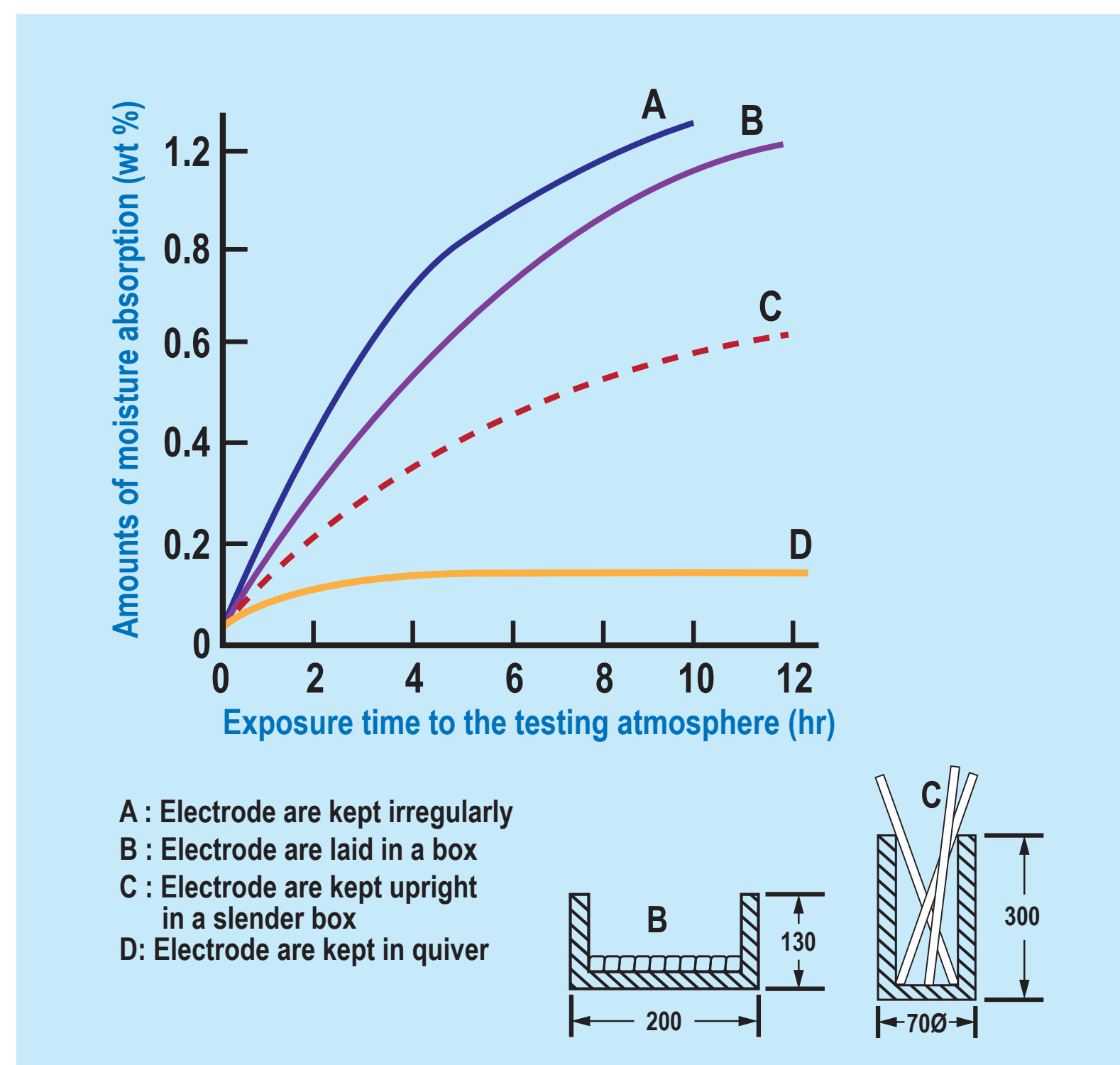
### FEATURES OF COMPLETED WELD JOINT



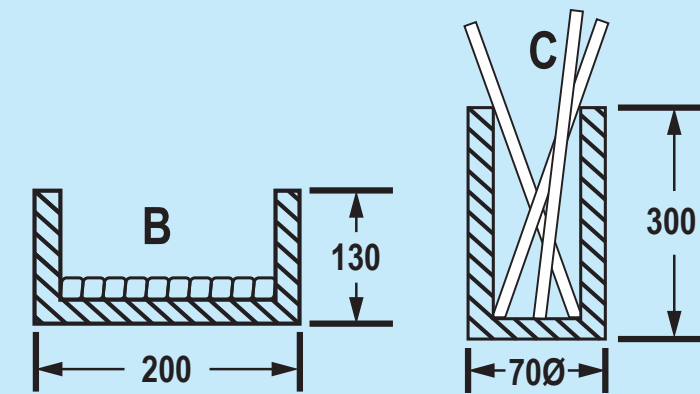
## ENJOY THE ADVANTAGE OF SMAW IN KOBELCO



The moisture pick up vs several temperatures and levels of humidity of the controlled testing atmosphere.

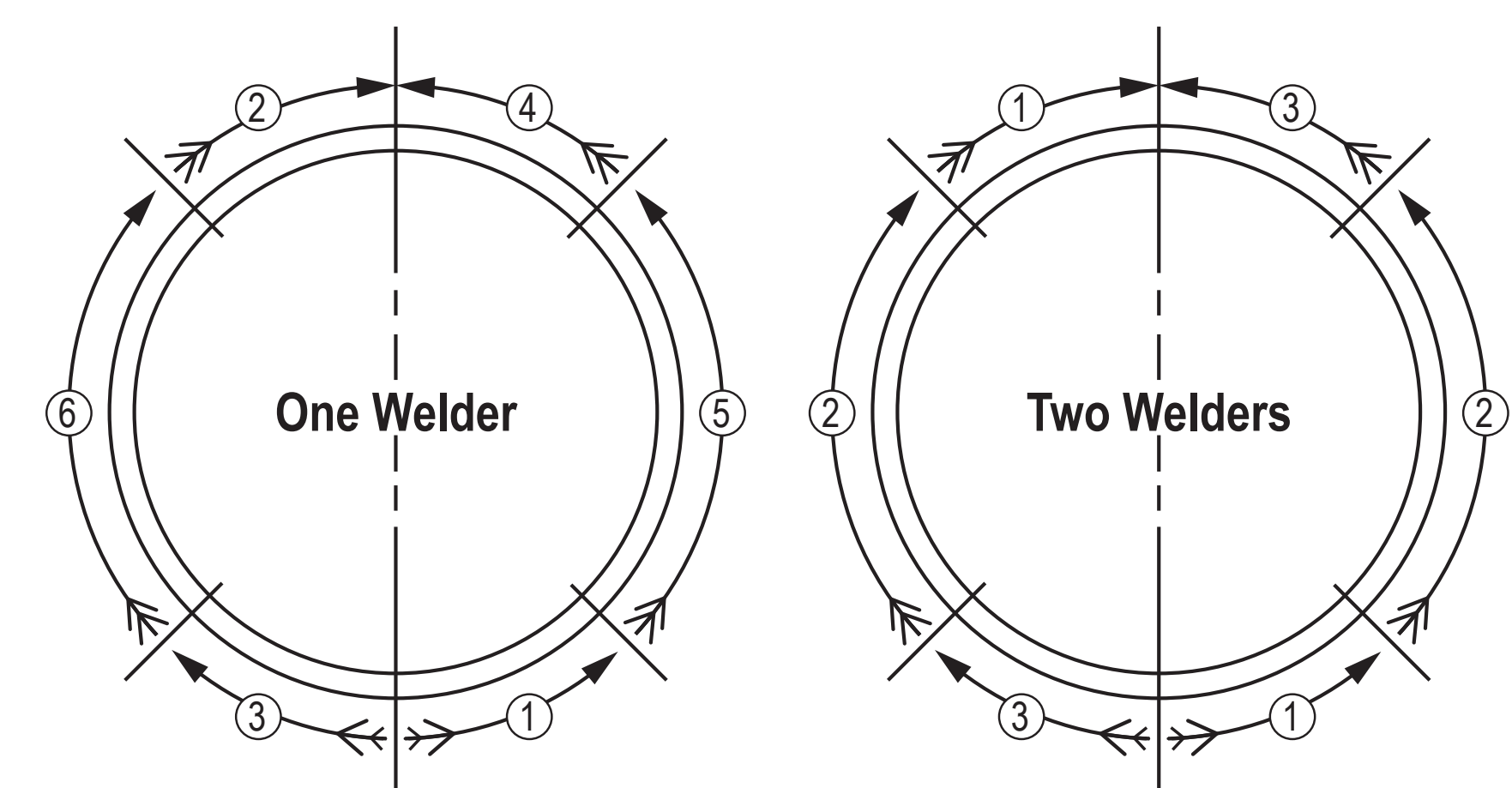


- A: Electrode are kept irregularly
- B: Electrode are laid in a box
- C: Electrode are kept upright in a slender box
- D: Electrode are kept in quiver



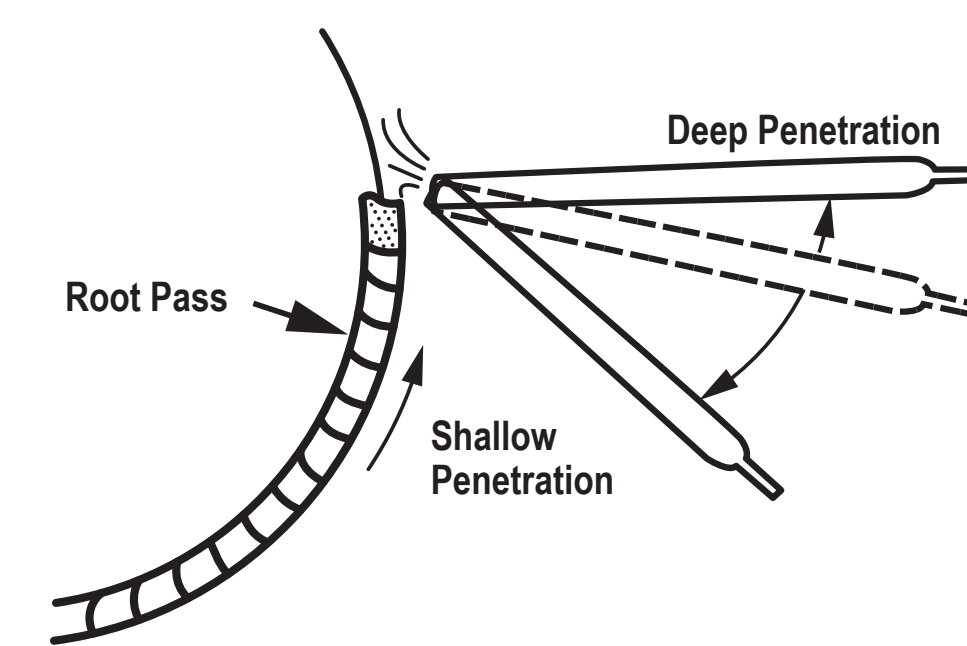
A comparison between three different storage ways for E7016 electrodes on the moisture absorption rates in the constant atmospheric condition (25°C x 90% RH)

### PIPE WELDING SEQUENCE TO MINIMIZE DISTORTION



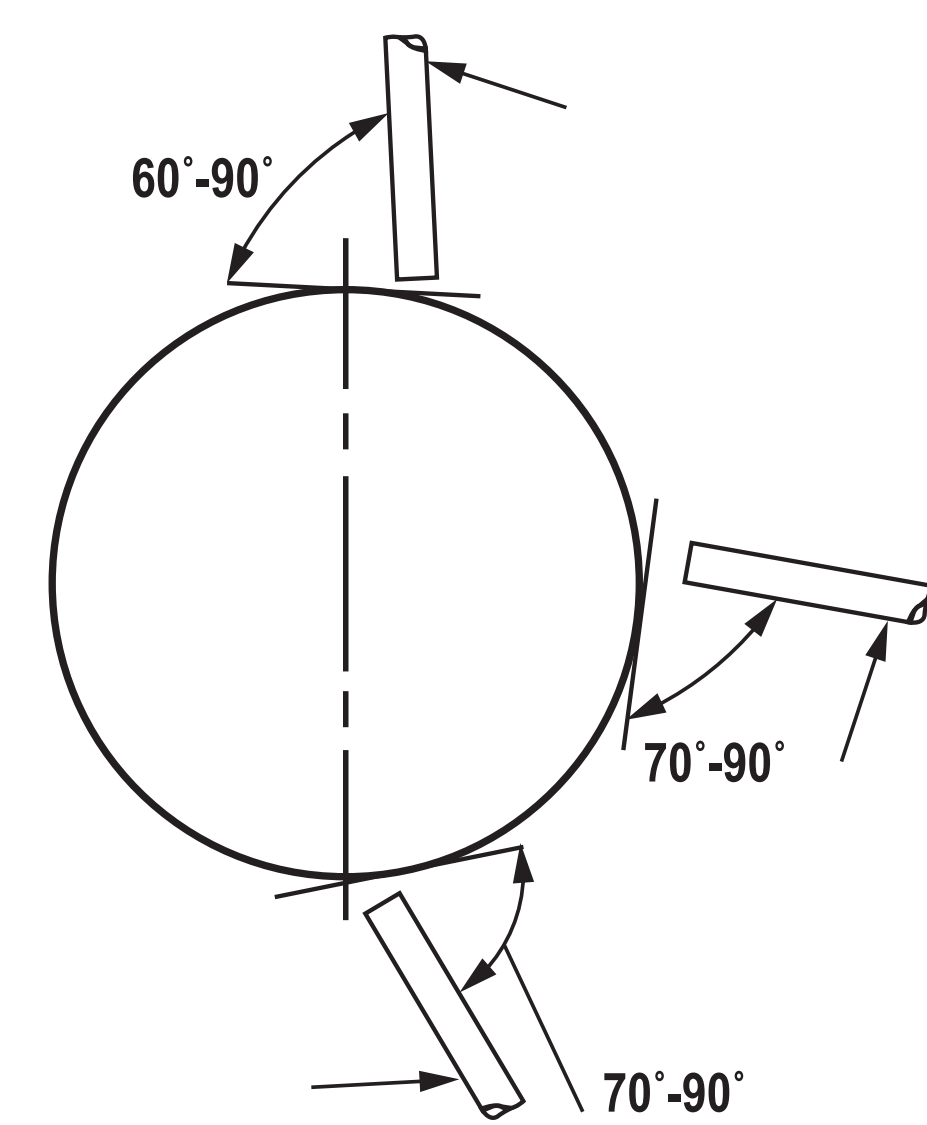
Pipes equivalent to or more than 24in. (600mm) in outer diameter.

### ELECTRODE MANIPULATION FOR PIPE WELDING (5G)



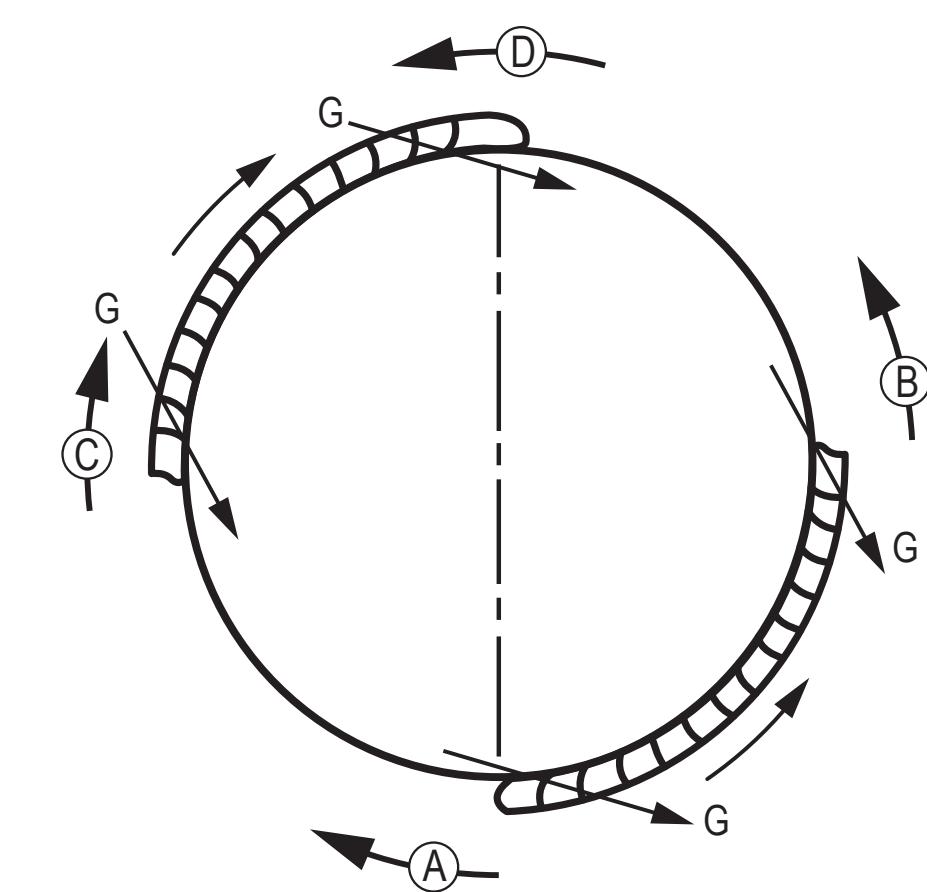
#### ELECTRODE ANGLE:

- Lower angle - Shallow Penetration
- Higher angle - Deeper Penetration



#### HOLDING ANGLE OF ELECTRODE:

- Electrode should be maintained at 70° - 90° angle from 6 o'clock - 3 o'clock direction
- Electrode should be maintained at 60° - 90° angle at 12 o'clock direction



#### METHOD OF GRINDING:

- G stands for "Grinding"
- A, B, C, D indicates welding direction
- Before joining the bead, the end of previous bead should be ground off

### MANIPULATION OF ELECTRODE

FLAT - Front View		Side View	
HORIZONTAL - Front View		Side View	
VERTICAL UP - Top View		Side View	
OVERHEAD - Front View		Side View	



## ENJOY THE ADVANTAGE OF SMAW IN KOBELCO



### URANAMI (ROOT PASS)

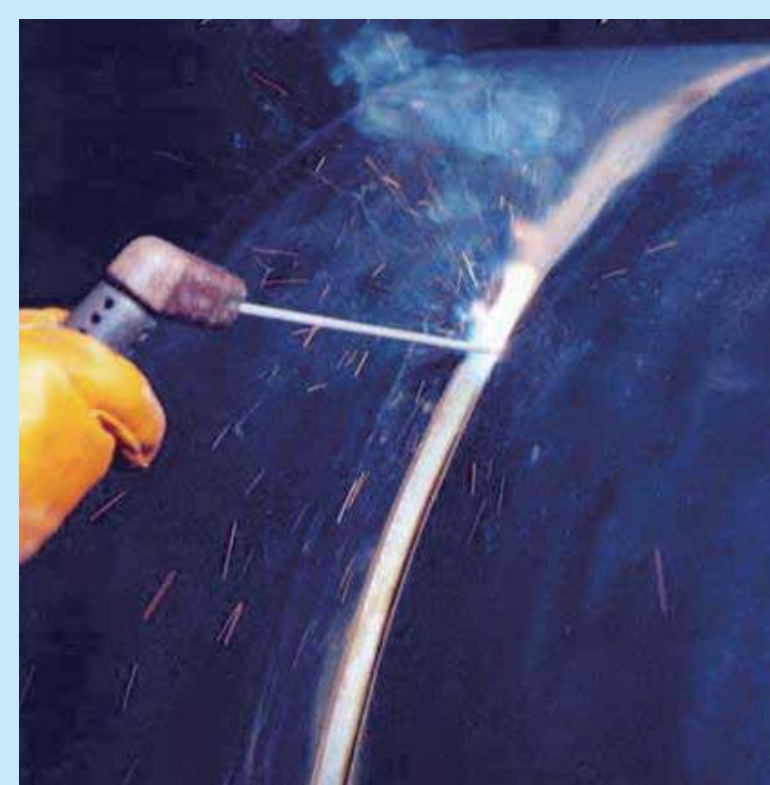
“URANAMI” is a Japanese industrial terms which defined as “URA” means “back” and “NAMI” means wave, is a definition of reverse bead on a butt joint, in another common terms which is called root pass welding. KOBELCO being the pioneer in welding industry to develop “URANAMI” electrode specially for root pass welding without backing. Over the past decades, KOBELCO SMAW product which ends with a “U” is specially designed for root pass welding and gained immense popularity in welding business.

### FAMILIARC™ LB-52U

AWS A5.1 E7016

Typical mechanical properties of all-weld metal				
	0.2% OS (MPa)	TS (MPa)	EI (%)	IV (J)
Example	441	545	31	-40°C : 91
Guaranty	≥400	≥450	≥22	-40°C : ≥27J
Diffusible hydrogen content (ml/100g)				
N=1	N=2	N=3	N=4	AVG
3.6	3.7	4.0	3.7	3.8

According to AWS A4.3 (Gas chromatography method)



a) Face Side

### FAMILIARC™ LB-55U

AWS A5.5 E8016-G

Typical mechanical properties of all-weld metal				
	0.2% OS (MPa)	TS (MPa)	EI (%)	IV (J)
Example	573	621	31	-40°C : 87
Guaranty	≥460	≥570	≥20	-40°C : ≥32J
Diffusible hydrogen content (ml/100g)				
N=1	N=2	N=3	N=4	AVG
4.0	3.5	3.9	3.7	3.8

According to AWS A4.3 (Gas chromatography method)



b) "Uranami Bead"

### KOBELCO PRODUCTS



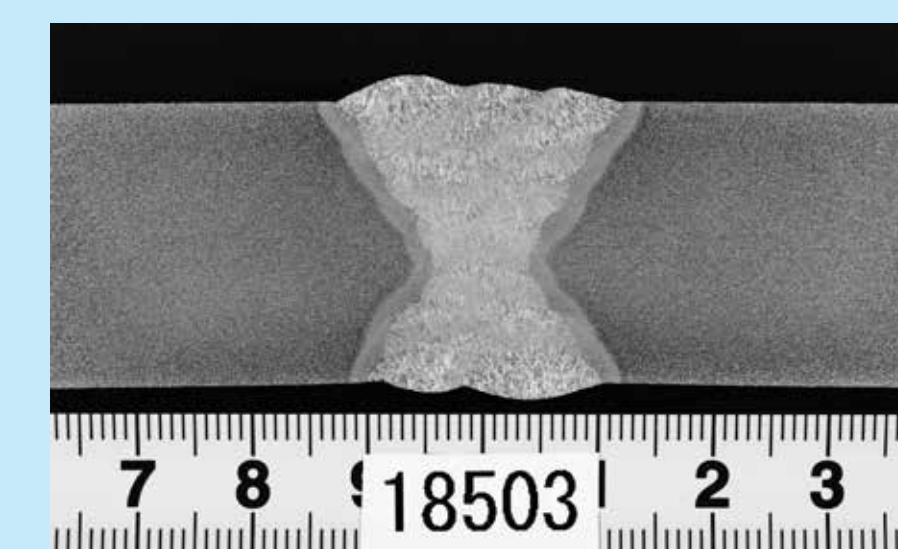
## FAMILIARC™ LB-52-18

AWS A5.1 E7018

- Suitable for butt and fillet welding of heavy structure
- Contains iron powder which gives high welding efficiency

#### Mechanical Properties of All Weld Metal

	Yield Point (ksi)	Tensile Strength (ksi)	Elongation (%)	I.V - 29C	PWHT
Example	500 (72)	560 (81)	31	110	A.W.
	410 (60)	510 (74)	33	140	620°C X 1hr
Guaranty	≥400 (≥58)	≥480 (≥70)	≥22	≥27	A.W.
	≥350 (≥50)	≥460 (≥67)	≥25	≥27	620°C X 1hr



Macro Image of LB-52-18, 3.2mm  
Position: Vertical Up  
Polarity: DC-EP  
Ampere: 110A



## FAMILIARC™ LB-52U

AWS A5.1 E7016

- Suitable for one side welding for pipe
- Good arc stability in one side welding at low current



### FAMILIARC™ RB-26

AWS A5.1 E6013



### FAMILIARC™ LB-52

AWS A5.1 E7016



### TRUSTARC™ LB-52NS

AWS A5.5 E7016-G



### TRUSTARC™ KOBE-7018-1

AWS A5.1 E7018-1



#### Disclaimer

Information in this poster such as chemical compositions and mechanical properties is typical or example for explaining the features and performance of our products, and it does not guarantee otherwise specified.

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