Welding Solutions for

Wind Turbine Towers & Offshore Foundations



KISWEL

Wind Turbine Towers

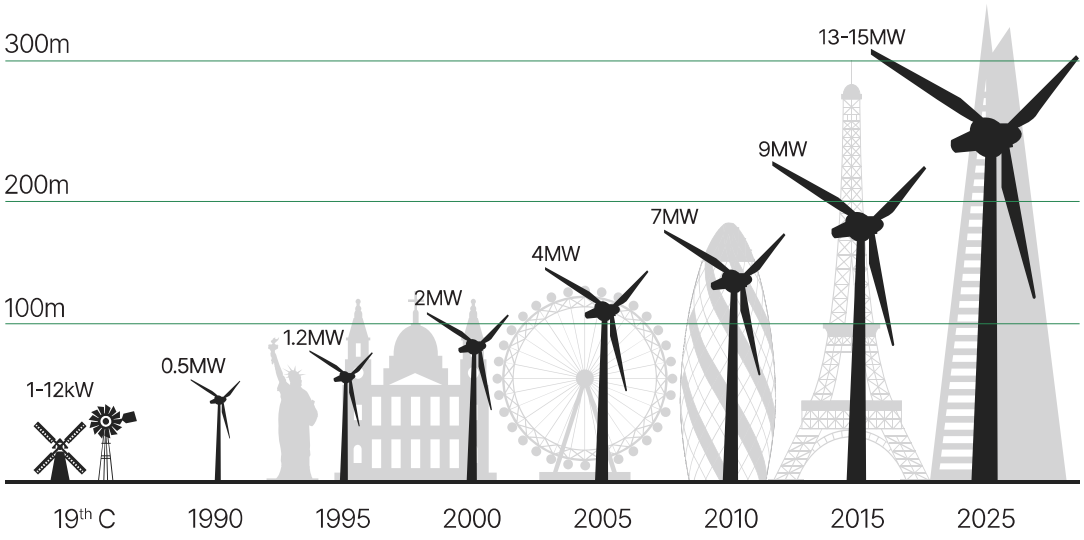
Proven Welding Solutions for Large Offshore Wind Towers – Proven Performance Even in Ultra-Low Temperatures of –60°C & Optimized for Automated Production

Amid global carbon reduction policies and the drive to strengthen energy security, wind power is playing a pivotal role as a sustainable energy source.
In particular, the offshore wind energy sector is rapidly expanding in line with Net Zero goals, and wind towers are increasingly becoming larger and more powerful.
Wind towers which are massive structures reaching tens of meters in height, are constantly exposed to strong winds, sea breezes, tides and temperature fluctuations for years. Therefore, welding consumables and technologies for thick structural steels are essential during the manufacturing process. Most factory manufacturing of offshore wind towers involves vertical, multi-pass welding, making attributes such as compatibility with automated processes, crack resistance and arc stability under high current crucial criteria for selecting welding consumables.

KISWEL's welding consumables for wind towers are a total solution that offers low-temperature impact toughness, crack resistance and high productivity which are all essential for the manufacturing of offshore structures.
They exhibit excellent CTOD performance even under ultra-low temperatures of –60°C and maintain stable joint performance even under combined stresses such as temperature variations, vibration, and stress concentration which arise in offshore environments.

Also, KISWEL's Submerged Arc Welding (SAW) solutions optimized for narrow groove welding, along with the K-PACK Bulk Packaging system, help enhance customer productivity, minimize material handling and offer an efficient welding environment for large structure manufacturing.

Evolution of wind turbine heights and output



Sources : Various, Bloomberg New Energy Finance

Offshore Foundations

As offshore wind farms expand into deeper seas and harsher environments, the demand for stable and robust tower foundations continues to grow. Three main support structures are used: **Monopile, Tripod, and Jacket**

Monopile

A single large steel column that is driven deep into the seabed.

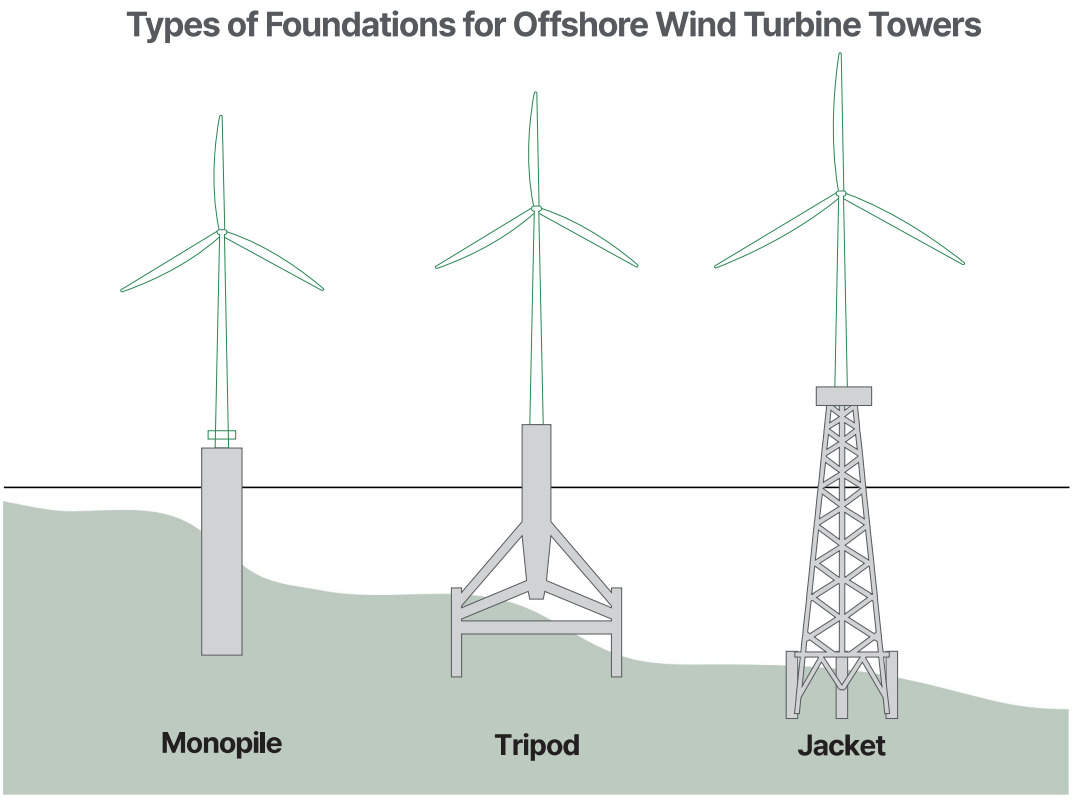
Tripod

A triangular structure with three legs, engineered to withstand waves and wind.

Jacket

A lattice framework anchored to the seabed to provide maximum stability.

Each foundation type is designed to ensure the safe, long-term operation of wind turbines in offshore conditions.



Wind Turbine Towers & Offshore Foundations

Key Products

EF-200LT X KD-50

SAW

AWS A5.17 F7A(P)8-EH14
EN 14171 S 46 6 CS S4

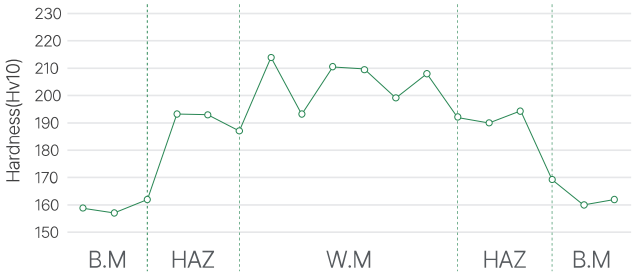
- Field-proven by global wind tower builders for over a decade
- Designed for high-strength steels in offshore structures
- CTOD-qualified at –60°C with low-hydrogen Contents
- SAW optimized for narrow grooves and high-efficiency deposition

Bead Appearance



Bead on plate (550A-30V-45CPM)

Hardness of Weld Metal



Mechanical Properties of All Weld Metal

	Y.S (MPa)	T.S (MPa)	El.(%)	IV(J) at. -62°C
AWS Spec.	≥400	480 ~660	≥22	≥27
EF-200LT+KD-50	546	585	29	100

Diffusible Hydrogen Content

(mL/100g Weld Metal)

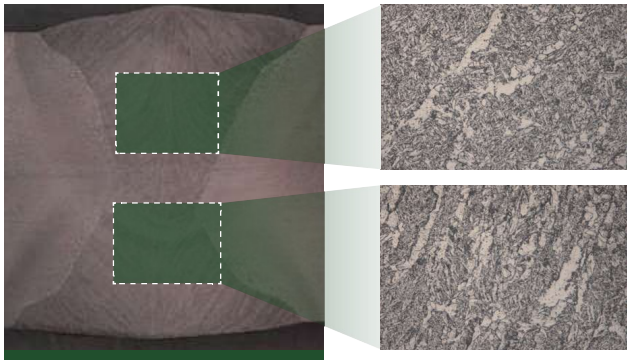
Test Information
-Test Method : Reference to AWS A4.3
-Test Equipment : G.C (Gas Chormatograph)

	1	2	3	4	Avg.
Result	3.62	3.18	3.62	3.96	3.59

Chemical Composition of Wire (wt.%)

	C	Si	Mn	P	S	Cu
AWS Spec. EH14	0.10 ~0.20	0.10	~2.20	Max. 0.030	Max. 0.030	Max. 0.35
Wire	0.12	0.03	1.85	0.010	0.007	0.14

Microstructure of Weld Metal



Two-Run Weld

Chemical Composition of Weld Metal

	C	Si	Mn	P	S	Cu
Weld Metal	0.08	0.17	1.55	0.016	0.011	0.12

KISWEL Product Portfolio

Products by Base Metal (EN 10025 standard)

Base Metal (EN 10025)	Y.S (MPa)	T.S (MPa)	CVN Longitudinal		Product Name
			Test Temp. (°C)	Absorbed Energy(J)	
S275J	Min. 275	410-560	20	≥27	EF-200V x KD-42 EF-200K x KD-42
S275J0			0	≥27	
S275J2			-20	≥27	
S275N		370-510	-20	≥40	EF-200LT x KD-50 EF-200UV x KD-EH12K
S275NL			-50	≥27	
S275M		370-530	-20	≥40	
S275ML			-50	≥27	
S355J	Min. 355	470-630	20	≥27	EH-200V x KD-EH12K EF-200K x KD-42
S355J0			0	≥27	
S355J2			-20	≥27	
S355K2			-20	≥40	EF-200LT x KD-50 EF-200UV x KD-EH12K
S355N			-20	≥40	
S355NL			-50	≥27	
S355M			-20	≥40	
S355ML			-50	≥27	
S420N	Min. 420	520-680	-20	≥40	EF-200V x KD-EA2
S420NL			-50	≥27	EF-200LT Plus x KD-50
S420M			-20	≥40	EF-200V x KD-EA2
S420ML			-50	≥27	EF-200LT x KD-50
S460N	Min. 460	540-720	-20	≥40	EH-200V x KD-EA2
S460NL			-50	≥27	EF-200LT Plus x KD-50
S460M			-20	≥40	EF-200V x KD-EA2
S460ML			-50	≥27	EF-200LT x KD-50



Wind Turbine Towers & Offshore Foundations

Characteristics of Welding Consumables

Product Name	AWS Specification	EN Specification	Applications
EF-200V x KD-42	A5.17 : F7A6-EM12K	EN 14171 : S 42 5 CS S2Si	Thick-section welding, 8-44mm. Tough weld metal CVN Tested at -50°C.
EF-200K x KD-42	A5.17 : F7A(P)6-EM12K	EN 14171 : S 46 5 CS S2Si	
EF-200LT x KD-50	A5.17 : F7A(P)8-EH14	EN 14171 : S 46 6 CS S4	Thick-section welding, 20–150 mm. Tough weld metal – CVN tested at –60°C, CTOD tested at –10°C High-productivity joint filling
EF-200UV x KD-EH12K	A5.17 : F7A(P)8-EH12K	EN 14171 : S 46 6 FB S3Si	
EF-200V x KD-EA2	A5.23 : F8A(P)6-EA2-A2	EN 14171 : S 46 5 CS S2Mo	Thick-section welding, 20-150mm. Tough weld metal CVN Tested at -50°C.

Chemical Composition of Weld Metal (wt.%)

Product Name	C	Si	Mn	P	S	Mo
EF-200V x KD-42	0.09	0.23	1.53	0.024	0.003	-
EF-200K x KD-42	0.09	0.28	1.63	0.027	0.001	-
EF-200LT x KD-50	0.08	0.30	1.70	0.025	0.003	-
EF-200UV x KD-EH12K	0.09	0.32	1.80	0.015	0.003	-
EF-200V x KD-EA2	0.09	0.14	1.10	0.022	0.008	0.41

Mechanical Properties of All Weld Metal (EN Standard)

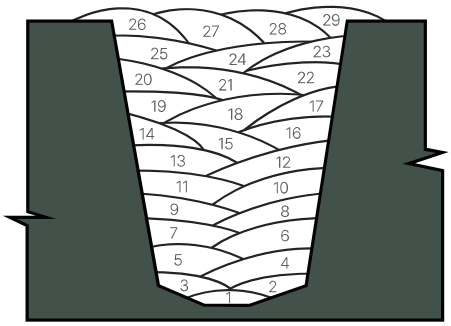
Product Name	Y.S (MPa)	T.S (MPa)	EL.(%)	CVN Longitudinal	
				Test Temp. (°C)	Absorbed Energy(J)
EF-200V x KD-42	Min.400	480/660	Min.22	-51	≥27
EF-200K x KD-42	Min.400	480/660	Min.22	-51	≥27
EF-200LT x KD-50	Min.400	480/660	Min.22	-62	≥27
EF-200UV x KD-EH12K	Min.400	480/660	Min.22	-62	≥27
EF-200V x KD-EA2	Min.470	550/700	Min.22	-51	≥27

Efficiency-Driven Welding Solutions

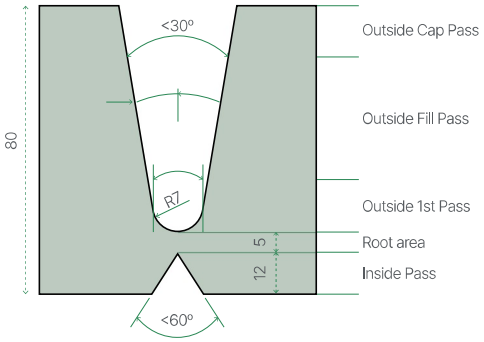
KISWEL's Narrow-Groove Welding

Fewer passes reduce time, material, and energy consumption

- Optimized for thick-section, high-strength steels used in offshore wind towers and jackets
- Reduces weld volume and pass count—cutting time, labor, and filler costs
- Minimizes heat input, improving weld quality and energy efficiency



Conventional SAW Welding:
29 passes @ 5kJ/mm



Narrow-Groove Solution:
<10 passes @ 6kJ/mm

KISWEL's K-PACK Bulk Packaging

Increased throughput, reduced handling

- 1-ton SAW Flux & Wire packaging engineered for high-efficiency and uninterrupted welding
- Reduces downtime from changeovers and preheating
- Fully recyclable packaging—supporting both productivity and sustainability



KD-50 4.0mm X 1000kg Coil
[size: 86cm x 1600cm]



EF-200LT X 1000kg Pack
[size: 90cm x 90cm x 1050cm]

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