Welding Solutions for

Construction & Mining



KISWEL

Construction & Mining

Ultra-High Current Robotic Welding Solutions for Extra-Large Industrial Machinery – 600A High-Current Capability & Welding Automation Performance Proven Globally

The global construction and mining equipment industry is facing a complex set of challenges—productivity, durability, and sustainability. As machinery grows in size and automated production becomes more widespread, the importance of high-speed, high-precision welding technologies continues to rise.

In particular, manufacturing sites for industrial machinery now regard robotic welding systems capable of handling ultra-high currents of 600A or more, along with welding consumables optimized for such conditions, as key technological elements. These technologies go beyond simple component joining, directly influencing the structural reliability, service life, and maintenance efficiency of heavy machinery.

To meet these market demands, KISWEL has developed specialized welding consumables for ultra-high current robotic welding systems. KISWEL's products deliver essential performance features for high-output automated processes, such as arc stability, deep penetration, low spatter, easy slag removal, and uniform bead shape. They ensure consistent quality and productivity, even in ultra-high current welding environments for large-scale structures.

Notably, KISWEL's SOLID wire and MCW solutions are already applied in robotic welding lines of global top-tier industrial machinery manufacturers, contributing to system optimization and operational efficiency. From the design phase to field application, KISWEL provides a premium total solution to help clients maximize productivity and secure reliable welding performance.

Center frame production at the KOMATSU factory using KISWEL MCW "KX-706K" in a 600A-class ultra-high-current robotic welding environment

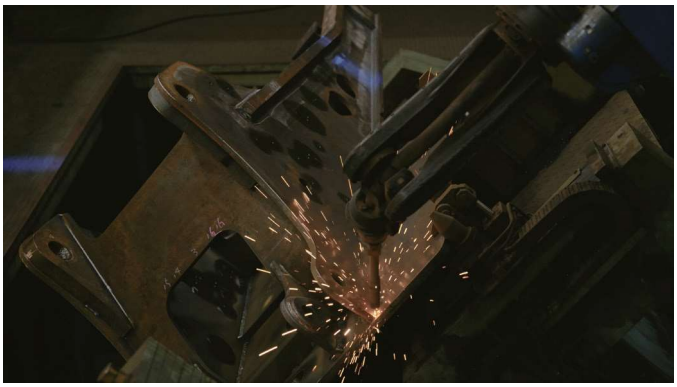


The Welding Solution Trusted by KOMATSU — Performance Proven in Ultra-High Current Robotic Welding

KISWEL's welding consumables deliver outstanding arc stability and consistent quality, even under the demanding high-productivity, high-output conditions of 600A robotic welding systems.

They are currently in use on KOMATSU's automated welding lines, demonstrating proven performance at some of the most advanced production sites in the world. By adopting KISWEL's solutions for ultra-high current robotic welding processes, KOMATSU has achieved reliable wire feeding, precise arc control, and consistent bead formation even under high-load conditions—ensuring the necessary structural strength for large equipment while significantly enhancing both productivity and operational efficiency.

KISWEL's robotic welding consumables are optimized for ultra-high-productivity, high-current automated environments, helping clients save time, maintain consistent quality, and maximize overall productivity and operational performance.









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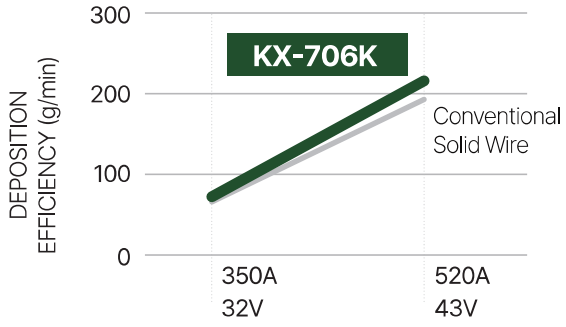
Key Products

MCW
KX-706K

• AWS A5.18	E70C-6M
• AWS A5.36	E70T15-M21A2 CS1 H4
• EN ISO 17632 A	T46 2 M M21 4 H5
• EN ISO 17632 B	T49 3 T15-0M21A H5
• JIS Z 3313	T49 3 T15-0MA H5

KX-706K — Metal-Cored Wire for Ultra-High-Current Robotic Welding

· The final 'K' in KX-706K stands for KOMATSU and indicates its co-development as a dedicated consumable for KOMATSU's robotic welding systems
· Flux Cored Wire wire engineered for ultra-high-current (600A-class) robotic welding
· Proven performance in KOMATSU's automated welding systems
· Ensures excellent arc stability and low spatter when using mixed shielding gas · Delivers consistent weld quality across varying currents and welding positions
· Suitable for mild steel and 490 MPa-grade high-tensile steel used in construction machinery, shipbuilding, bridges, and other structural applications



Welding Condition	Product Name	Deposition Efficiency (g/min)
350A 32V	**KX-706K**	**106.8**
	Conventional Solid Wire	96.8
520A 43V	**KX-706K**	**216.0**
	Conventional Solid Wire	194.3

	Conventional Solid Wire	KX-706K
Bead		
Spatter		
	★	★ ★ ★

★ Good / ★★ Better / ★★★ Best



Stable spray arc

Chemical Composition of Weld Metal (wt.%)

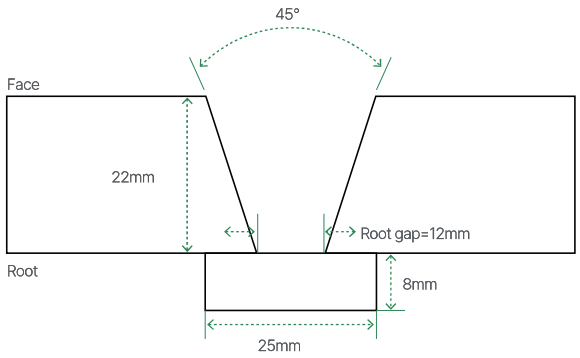
	C	Si	Mn	P	S
AWS A5.18 E70C-6M	≤0.12	≤0.90	≤1.75	≤0.03	≤0.03
KX-706K	**0.04**	**0.70**	**1.40**	**0.013**	**0.011**

Mechanical Properties of All Weld Metal

	Y.S (MPa)	T.S (MPa)	El.(%)	I.V (Joule @ Temp.)	Shielding Gas	PWHT
AWS E70C-6M	min. 400	min. 490	min. 22	≥27 @ -30°C	-	As-Welded
KX-706K(1G)	**510**	**570**	**31**	**85 @ -30°C**	**Ar+20%CO_2**	**As-Welded**

Welding Conditions for PQ test(Ultra-High Heat Input)

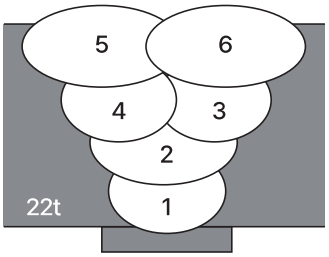
Product Name
KX-706K
Diameter : 1.4mm
Base Metal
SS-400
Welding Machine & Equipment
Phoenix 1002 RC Plus (EWM)
Auto-Carriage



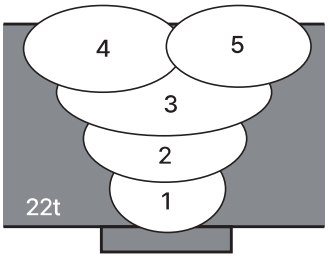
Schematic Diagram of Weld Fabrication

35 KJ/cm						50 KJ/cm					
Welding Pass	Current (A)	Voltage (V)	Welding Speed (cpm)	Interpass Temp. (°C)	Heat Input (KJ/cm)	Welding Pass	Current (A)	Voltage (V)	Welding Speed (cpm)	Interpass Temp. (°C)	Heat Input (KJ/cm)
1	550	43	38	16	37.3	1	550	43	28	20	50.7
2	550	43	38	113	37.3	2	550	44	28	170	50.7
3	550	43	43	180	33.0	3	550	43	29	190	50.1
4	550	43	43	170	33.0	4	550	43	28	180	50.7
5	550	42	39	200	35.5	5	550	43	28	230	50.7
6	550	43	43	210	33.0						

Multi-Pass Welding Sequence



Multi-Pass Welding Sequence



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Key Products

GMAW

ZO-27

- AWS A5.18 ER70S-G
- EN ISO 14341 A 14341-A : G 46 2 M21 Z
- EN ISO 14341 A 14341-B : G 49A 2 M S15
- JIS Z 3313 YGW15

ZO-27 — Solid Wire for Ultra-High-Current Robotic Welding

· Solid wire engineered for ultra-high-current (600A-class) robotic welding
· Proven performance in KOMATSU's automated systems
· Ensures excellent arc stability and low spatter with mixed shielding gas
· Delivers consistent weld quality across varying currents and welding positions
· Suitable for mild steel and 490 MPa-grade high-tensile steel used in construction machinery, shipbuilding, bridges, and structural applications

Consistent Bead Quality from Low to Ultra-High Current

Product Name		ZO-27
Low current	200A	
	300A	
	400A	
High current	500A	
	550A	

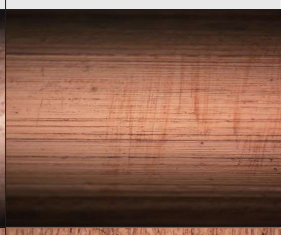
Chemical Composition of Wire (wt.%)

	C	Si	Mn	P	S	Ti	Cu
EN ISO S15	0.02-0.15	0.40-1.00	1.00-1.60	≤0.030	≤0.030	0.02-0.30	≤0.50
JIS YGW15	0.02-0.15	0.40-1.00	1.00-1.60	≤0.030	≤0.030	0.02-0.30	≤0.50
ZO-27	**0.07**	**0.62**	**1.18**	**0.014**	**0.010**	**0.09**	**0.10-0.35**

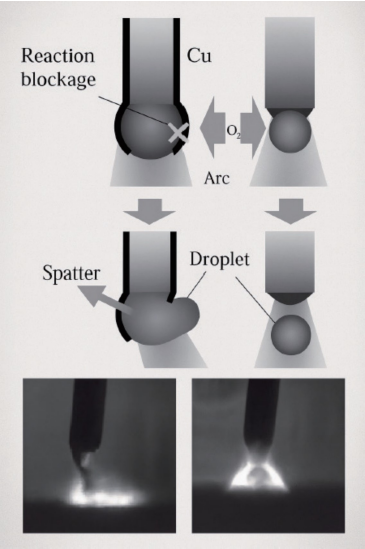
Mechanical Properties of All Weld Metal

	Y.S (MPa)	T.S (MPa)	El.(%)	I.V (Joule @ Temp.)	Shielding Gas	PWHT
AWS E70S-G	≥400	≥480	≥22	-	-	As-Welded
EN ISO S15	≥390	490-670	≥18	≥27 @ -20°C	Ar+15~25%CO_2	As-Welded
ZO-27	**490**	**560**	**31**	**160 @ -30°C**	**Ar+20%CO_2**	**As-Welded**

Wire Surface and Copper Coating Comparison

	KC-27CF	ZO-27(R2 type)	ZO-27
Wire Appearance			
Cu Adhesive	-		
	Cu Free Rough surface	Less Cu	Basic

Available in low-copper plating to reduce spatter and improve welding performance



Reduced copper coating allows stable droplet transfer, minimizing spatter and ensuring cleaner welds

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KISWEL Product Portfolio

Products by Base Metal in Manufacturing & Maintenance

Component Name	Base Material	Process	Product Name
Boom	SS400 + Casting	GMAW	ZO-26, ZO-27, KC-29(CF)
		SMAW	KK-50LF, K-7018
		FCAW	K-71T, KX-706K, K-81T
Arm	SS400	GMAW	ZO-26, ZO-27, KC-29(CF)
		SMAW	KK-50LF, K-7018
		FCAW	K-71T, KX-706K, K-81T
Bucket	Hardox450	SMAW	KM-700, KM-800
		FCAW	K-700HT, K-800HT
Main Beam	SS400	GMAW	ZO-26, ZO-27, KC-29(CF)
		SMAW	KK-50LF, K-7018
		FCAW	K-71T, KX-706K, K-81T
Center Frame	SS400	GMAW	ZO-26, ZO-27, KC-29(CF)
		SMAW	KK-50LF, K-7018
		FCAW	K-71T, KX-706K, K-81T

Products by Welding Process

Process	Product Name	AWS Specification	EN Specification
GMAW	ZO-26	A5.18 : E70S-G	EN 14341-B G 49A 2 C1(M21) S11
	ZO-27	A5.18 : E70S-G	EN 14341-B G 49A 2 M21 S15
	KC-29	A5.18 : E70S-6	EN 14341-B G 49A 4U C1(M21) S6
SMAW	KK-50LF	A5.1 : E7016	EN 2560-B : E 49 16 A U H10
	K-7018	A5.1 : E7018	EN 2560-B : E 49 18 A U H10
	KM-700	-	-
	KM-800	-	-
FCAW	K-71T	A5.20 : E71T-1C	EN 17632 B : T49 0 T1-1C1A-U H10
	K-81T	A5.29 : E81T1-Ni1C	EN 17632 B : T55 3 T1-1C1 A-N2 H5
	K-700HT	-	-
	K-800HT	-	-
	KX-706K	A5.18 : E70C-6M	T 49 3 T15-0M21A H5
	KX-706MU	A5.18 : E70C-6M	EN 17632-B T49 4 T15-0M21A-U

KISWEL Product Portfolio

Chemical Composition of Weld Metal (wt.%)

Process	Product Name	C	Si	Mn	P	S	Cr	Ni
GMAW	ZO-26	0.06	0.80	1.53	0.014	0.010	-	-
	ZO-27	0.07	0.62	1.18	0.014	0.010	-	-
	KC-29	0.08	0.99	1.63	0.015	0.007	-	-
SMAW	KK-50LF	0.07	0.53	0.93	0.013	0.012	0.03	0.02
	K-7018	0.07	0.61	0.87	0.015	0.011	0.03	0.02
	KM-700	0.48	1.42	1.36	0.015	0.012	3.65	0.03
	KM-800	0.47	1.45	1.51	0.017	0.012	4.10	0.03
FCAW	K-71T	0.04	0.55	1.25	0.015	0.011	-	-
	K-81T	0.02	0.51	1.28	0.014	0.011	-	0.95
	K-700HT	0.40	3.20	0.60	0.012	0.010	7.00	-
	K-800HT	0.44	3.40	0.55	0.013	0.011	7.50	-
	KX-706K	0.03	0.75	1.52	0.010	0.012	-	-
	KX-706MU	0.03	0.57	1.36	0.013	0.017	-	-

Mechanical Properties of All Weld Metal

Process	Product Name	Y.S (MPa)	T.S (MPa)	El.(%)	CVN Longitudinal	
					Test Temp. (°C)	Absorbed Energy(J)
GMAW	ZO-26	Min. 400	Min. 480	Min. 22	-20	120(Actual)
	ZO-27	Min. 400	Min. 480	Min. 22	-20	160(Actual)
	KC-29	Min. 400	Min. 480	Min. 22	-30	110(Actual)
SMAW	KK-50LF	Min. 400	Min. 490	Min. 22	-30	≥27
	K-7018	Min. 400	Min. 490	Min. 22	-30	≥27
	KM-700	-	-	Hv 600-700	-	-
	KM-800	-	-	Hv 700-800	-	-
FCAW	K-71T	Min. 390	490-670	Min. 22	-20	≥27
	K-81T	Min. 470	550-690	Min. 19	-30	≥27
	K-700HT	-	-	Hv 600-800	-	-
	K-800HT	-	-	Hv 700-800	-	-
	KX-706K	≥400	≥490	≥22	-30	≥27
	KX-706MU	≥400	≥490	≥22	-40	≥27

KISWEL

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