

Welding Consumables in Industry

Power Plant



TIENTAI

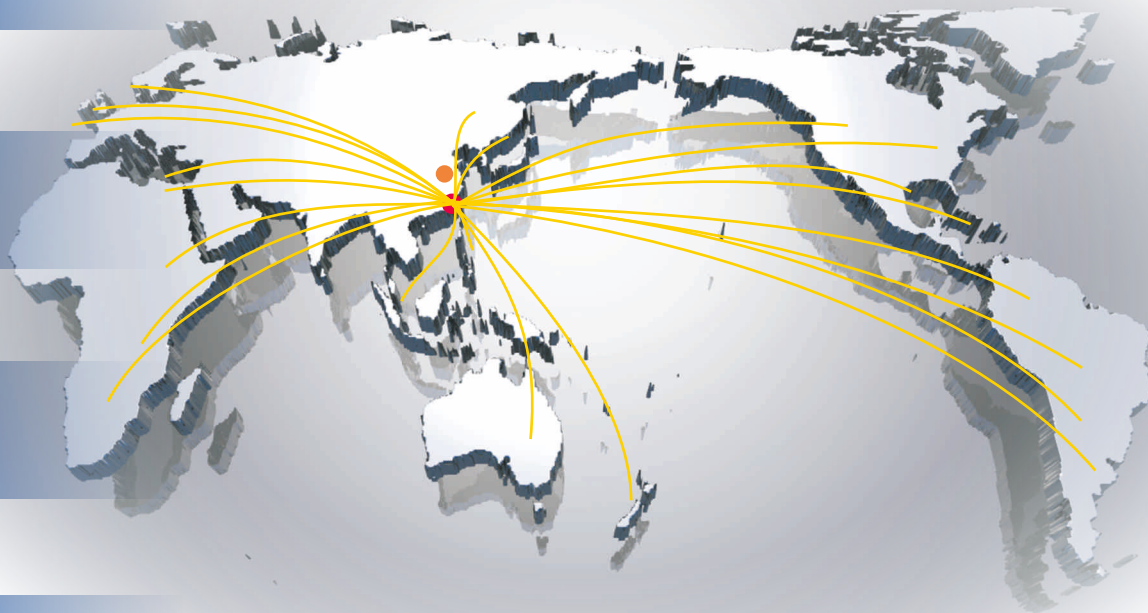
AN ILLINOIS TOOL WORKS COMPANY

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TIENTAI ELECTRODE CO., LTD.

ITW- Tradition of Excellence



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"During its more than 100 years of existence, ITW's recipe for success has been focused on creating "value-added products for key customers around the world. We do this by growing our business and making acquisitions which provide additional product solutions to our customers.

Many of our best product innovations come from simple observation coupled with a keen understanding of our customers' needs. Most companies design products specifically to increase sales volume. ITW's main goal is not to create a best seller, but to enhance customers. To attain that goal, our product design engineers develop value-added, proprietary products. Our unique approach begins at our customers' plants or worksites. By working closely with our customers. We determine how an ITW product or process could provide a better solution. Proof of our highly innovative culture is seen in our patent activities. In 2004, we had more than 16,000 unexpired patents and pending patent applications worldwide, including 2,900 U.S. Patents and 1,116 pending U.S. Applications. We typically rank in the top 100 of patent issuers in the U.S.

Power Plant



For global Power Plant equipments and construction, TienTai provide consumables with top quality and specialized welding services.



Welding consumables for thermal power plant & nuclear power plant

The consumables include heat-resistant steel, stainless steel, carbon steel, nickel alloy....etc, which are adopted for factory building, boiler, chimney, flue. F.G.D, high-pressure pipeline, general pipeline, and liner manufacture.

Your Perfect Welding Solutions

The limited page cannot afford whole specific contents of products and techniques. Please contact us if further information required.



Pressure vessel for nuclear power plant

Equipment name	Materials ASTM	Welding Processes				Remark
		SMAW	GTAW	GMAW	FCAW	
Pressure Vessel	A533B C1.1 A508 C1.2	TL-80	-	-	-	to adopt A533B C1.2 for PWR pressure vessel
Pressurizer & steam generator	Inside liner inside material	TS-308/308L TS-316/316L TNC-70B	TGA-82	MIG-82	-	-
RCCV	A36 A516 Gr.60 A516 Gr.70	TL-508	TGA-52	-	TWE-711	※ to adopt without the limitation of (ultra low carbon requirement) ULC (C≤0.02%)
	A516 Gr.70 and A240 Type 304L	TS-309/309L	TGA-309/309L TGFA-309L	MIG-309/309L	※TFW-309L	
	A240 Type 304L	TS-308/308L	TGA-308/308L TGFA-308L	MIG-308/308L	※TFW-308L	
BWR	A240 Type 304 or Type 304L	TS-308/308L	TGA-308/308L	MIG-308/ 308L	※TFW-308L	
Plumbing	A312 Type 304L or Type 316L (C≤0.02%)	TS-308/308L TS-316/316L	TGA-308/308L TGA-316/316L TGFA-308L TGFA-316L	MIG-308/308L MIG-316/316L	-	To adopt the ultra low carbon materials for SCC strategy

1、A533 B C1.2 is adopted for PEDESTAL, A572 Gr50 (TL-60) and A572 Gr65 (TL-80) are adopted for material of construction.

2、For pipe P1×P8, E309 (L) is adopted with the temperature below 150°C, ENiCrMo-3 or ENiCrFe-3 (TNM-10, TGS-61 or TNC-70C, TGS-82) is adopted with the temperature above 150°C.

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Product for Thermal Power Plant

Application	Steel	Weld method	TIENTAI Products	AWS SPEC.
Pipe outfitting accessories	SA213 TP304 TP304H SA312 TP304 TP304L	GTAW	TGA-308/308L TGFA-306L	A5.9ER-308/308L A5.22 R-308LT1-5
		SMAW	TS-308/308L	A5.4 E308/308L
		FCAW	TFW-308L	A5.22 E308LT1-1
	SA213 TP316/316L SA312 TP316/316L	GTAW	TGA-316/316L TGFA-316L	A5.9 ER-316/316L A5.22 R-316LT1-5
		SMAW	TS-316/316L	A5.4 E316/316L
		FCAW	TFW-316L	A5.22 E316LT1-1
	SA213 TP321 , 347 SA312 TP321 , 347	GTAW	TGA-347 TGFA-347	A5.9 ER-347 A5.22 R-347T1-5
		SMAW	TS-347	A5.4 E347
		FCAW	TFW-347L	A5.22 E347T1-1
Pipe outfitting accessories (different metals)	P1×P8 (≤315°C)	GTAW	TGA-309/309L TGFA-309L	A5.9 ER-309/309L A5.22 R-309LT1-5
		SMAW	TGA-309/309L TGFA-309L	A5.4 E309/309L A5.22 R-309LT1-5
		FCAW	TFW-309L	A5.22 E309LT1-1
	P1×P8 P3,4,5×P8 (>315°C)	GTAW	TGA-82	A5.14 ERNiCr-3
		SMAW	TNC-70C	A5.11 ENiCrFe-3
Clad Steel	Stainless cover layer	ML-305	TBD-308L TBD-309L TBD-316L TBD-347	EQ308L EQ309L EQ316L EQ347
	Nickel-base layer	ML-306	TBD-61 TBD-82	A5.14 EQ NiCrMo-3 EQ NiCr-3

SA312TP317/317L , TGA-317/317L-GTAW , TS-317/317L-SMAW , TFW-317/317L-FCAW are applied as well

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Application		Base Metal	Weld Method	TIENTAI Products	AWS SPEC.
Chimney	Outer	SA36	SMAW	TL-50	A5.1 E7016
			FCAW	TWE-711	A5.20 E71T-1C
			SAW	TF-565 xTSW12KM	A5.17 F7A2-EM12K
	Inner	SA588	SMAW	TAC-16	A5.5 E7018-W1C
			FCAW	TWE-81W2	A5.29 E81T1-W2C
Flux Duct F.G.D	SA36 SA516 Gr.70	SMAW	TL-50	A5.1 E7016	
		FCAW	TWE-711	A5.20 E71T-1C	
		SAW	TF-565xTSW-12KM	A5.17 F7A2-EM12K	
	C276	GTAW	TGA-17	A5.14 ERNiCrMo-4	
GMAW	MIG-17				
By pass	SA240 Type 321	SMAW	TS-347	A5.4 E347-16	
		FCAW	TFW-347	A5.22 E347T1-1	
Steel Fabrication	SA36, A572 Gr.50	SMAW	TL-50	A5.1 E7028	
		FCAW	TWE-711	A5.20 E71T-1C	
		SAW	TF-565 xTSW12KM	A5.17 F7A2-EM12K	
Pipeline	SA178C, SA106 B, C SA105 SA515Gr.70 SA234WPB, WPC SA210A-1,C SA672 B60, B70	GTAW	TGA-52	A5.18 E70S-2	
			TGA-50	A5.18 E70S-6	
		SMAW	TL-508	A5.1 E7018	
	SA209T1	SMAW	TL-78A1	A5.5 E7018-A1	
	SA213 T11, T2 SA182 F11 SA234 WP11 SA335 P11, 12	GTAW	TGA-80B2	A5.28 ER80S-G	
		SMAW	TLH-88B2 or TLH-88B2P	A5.5 E8018-B2 H4	
		FCAW	TWE-811B2	A5.29 E81T1-B2C	
High-pressure Steam Pipe	SA335 P22 SA182 F22 SA213 T22 SA336 F22a SA234 WP22	SMAW	TLH-98B3 or TLH-98B3P	A5.5 E9018-B3 H4	
		FCAW	TWE-911B3	A5.29 E91T1-B3	
	SA213 T91 A691 9Cr C1.2 SA335 P91	GTAW	TIG-9Cb	A5.28 ER90S-G	
		SMAW	TL-96B9	A5.5 E9016-B9	
Boiler	SA387 Gr. 11,12	SMAW	TLH-88B2 or TLH-88B2P	A5.5 E8018-B2 H4	
		FCAW	TWE-811B2	A5.29 E81T1-B2C	
	SA387 Gr. 22	SMAW	TLH-98B3 or TLH-98B3P	A5.5 E9018-B3 H4	
		FCAW	TWE-811B3	A5.29 E91T1-B3C	

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Typical chemical composition of weld metal (wt%)

Product Name		C	Si	Mn	Cr	Mo	P	S	Other
TL-50		0.08	0.50	1.1	-	-	0.020	0.006	-
TL-78A1		0.06	0.40	0.75	-	0.55	0.02	0.007	-
TLH-88B2		0.074	0.18	0.55	1.2	0.50	0.010	0.005	-
TLH-98B3		0.092	0.25	0.74	2.20	1.00	0.011	0.007	-
TLH-88B2P		0.085	0.17	0.61	1.22	0.53	0.009	0.005	-
TLH-98B3P		0.092	0.27	0.73	2.22	0.98	0.009	0.007	-
TL-96B9		0.085	0.25	0.7	9.0	1.00	0.01	0.009	Nb:0.4,V:0.20,N:0.05
TWE-711		0.05	0.55	1.45	-	-	0.015	0.008	-
TWE-811B2		0.06	0.42	0.85	1.17	0.55	0.014	0.008	-
TWE-911B3		0.06	0.45	0.78	2.27	1.10	0.016	0.011	-
TWE-81W2		0.03	0.57	1.15	0.60	-	0.015	0.007	Cu:0.45
TGA-50		0.085	0.85	1.50	-	-	0.015	0.005	Ti: Bal.
TGA-52		0.040	0.46	1.21	0.022	0.001	0.01	0.008	Ni:0.032,V:0.003, Al:0.083,Ti:0.101, Zr:0.039
Product Name	Wire	C	Si	Mn	Ni	Mo	P	S	Other
TF-385	TSW-12KM	0.06	0.6	1.4	-	-	<0.035	<0.02	-
	TSW-12KH	0.06	0.7	1.8	-	-	<0.03	<0.02	-
	TSW-E12	0.05	0.7	1.5	-	0.43	<0.03	<0.02	-
TF-565	TSW-12KM	0.06	0.4	1.7	-	-	0.03	<0.02	-
	TSW-12KH	0.05	0.4	2.0	-	-	<0.03	<0.02	-
	TSW-E12	0.06	0.29	1.6	-	0.45	<0.03	<0.02	-
TFS-340	TW-61	0.02	0.36	0.07	63.0	8.85	0.004	0.007	Co:0.03,Fe:2.9,Ti:0.11 Al:0.06,Nb:3.18,Cr:21.3
	TW-17	0.02	0.26	0.47	57.8	15.1	0.008	0.006	Co:0.07,Fe:7.23, W:3.78, Fe:7.23,Cr:15.0
Product Name		C	Si	Mn	Cr	Mo	P	S	Other
TGFA-308L		0.02	0.4	1.40	20.20	-	0.022	0.008	Ni:10.30
TGFA-309L		0.022	0.35	1.45	23.26	-	0.024	0.009	-
TGFA-316L		0.027	0.52	1.35	18.56	2.30	0.023	0.007	Ni:12.50
TGFA-347		0.024	0.5	1.53	20.00	-	0.024	0.006	Nb:0.63,Ni:10.22

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Typical mechanical properties of weld metal:

Product Name		Yield Stress (N/mm ²)	Tensile Strength (kgf/mm ²)	Elongation (%)	Charpy V-Notch (J)	Temperature (°C)	PWHT
TL-50		461	560	31	134	-30	-
TL-78A1		500	575	30	-	-	620°C * 1hr
TLH-88B2		520	610	26	100 70	-20 -30	690°C * 1hr
TLH-98B3		620	715	22	90	-30	690°C * 1hr
TLH-88B2P		530	620	26	110 80	-20 -30	690°C * 1hr
		520	610	28	160 140	-20 -30	690°C * 6hr
		490	570	30	170 120	-20 -30	690°C * 24hr
TLH-98B3P		630	720	23	94	-30	690°C * 1hr
TL-96B9		655	789	20	-	-	750°C * 1hr
TWE-711		530	580	29	100	-20	-
TWE-811B2		560	640	23	-	-	690°C * 1hr
TWE-911B3		645	730	20	-	-	690°C * 1hr
TWE-81W2		550	620	24	59	-	-
TGA-50		440	550	33	62	-30	-
TGA-52		470	530	33	200	-30	-
Product Name	Wire	Yield Stress (N/mm ²)	Tensile Strength (kgf/mm ²)	Elongation (%)	Charpy V-Notch (J)	Temperature (°C)	PWHT
TF-385	TSW-12KM	480	550	33	33	-20	-
	TSW-12KH	529	589	30	43	-29	-
	TSW-E12	617	656	29	-	-	-
TF-565	TSW-12KM	460	530	33	40	-40	-
					65	-30	
	TSW-12KH	508	600	31	32	-50	AW
	TSW-E12	546	614	26	60	-30	AW
TFS-340	TW-61	503	754	46	67	-196	AW
	TW-17	490	706	32	57	-196	AW

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TIENTAI ELECTRODE CO., LTD.

The Portfolio of Brands





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