Supplemental Information

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SOREX®
The Professional Quality

Recommended drying condition for covered electrodes and SAW flux

Steel	Type of coating	Product Name	Drying Temp (℃)	Drying period(min)
Mild steel	High cellulose type	SC-10、SC-11	70~80	30~60
	High titanium oxide type	SM-13	80~100	30~60
High tensile steel	Low hydrogen type	SL-50、SL-60、SL-80、SL-110、SL-120	300~350	60
	Iron powder Low hydrogen type	SL-50D、SL-56、SL-58、SL-58M、SLH-58、SL-108M、SL-118M		
Heat Resistant Steel	High cellulose type	SC-70A1	70~80	30~60
	Low hydrogen type	SR-76A1、SR-86B2、SR-96B3、SR-86B6、SR-86B8	350~400	60
	Iron powder Low hydrogen type	SR-78A1、SR-88B2、SR-98B3、		
Low Temperature Service Steel	Low hydrogen type	SN-86C1、SN-86C2、SN-86C3	350~400	60
	Iron powder Low hydrogen type	SN-88C1、SN-88C2、SN-88C3、SN-88G、SN-98G		
Atmospheric Corrosion Resistant Steel	Iron powder Low hydrogen type	SW-78W1、SW-88W2	350~400	60
Stainless steel	Low hydrogen titanium oxide type	SS-307、SS-307HM、SS-308、SS-308H、SS-308L、SS-309、SS-309L、SS-309MoL、SS-310、SS-312、SS-316、SS-316L、SS-317L、SS-318、SS-347、SS-385、SS-410、SS-410NM、SS-2209	250~300	60
Cast iron	Graphite type	SN-55、SN-99	70~100	30~60
Nickel alloy	Low hydrogen type	SNF-1、SNF-2、SNF-3、SNM-3、SNM-4	350~400	60
Hardfacing	Ilmenite type	SH-26R、SH-35R、SH-45R	80~120	30~60
	Low hydrogen type	SH-45、SH-50、SH-60、SH-80、SH-80W、SH-90、SH-90HS、SH-95HC、SH-95HN、SH-W、SH-WM、SH-MN	300~350	30~60
	Low hydrogen titanium oxide type	SH-50N4	150~200	30~60
SAW flux	Agglomerated type	SF-30、SF-33、SF-38、SF-65、SF-68、SF-80、SFB-S300、SFB-E300	350	60

Type	Brand Name	Shield Gas	Inspection Institute			Inspection Institute						
			ABS	BV	CCS	CE	CR	DB	DNV	GL	LR	NK
Carbon & Low-alloy Stick Electrode	SL-50	--	AWS A5.1 E7016									
	SR-86B2	--	AWS A5.5 E8016-B2									
	SR-96B3	--	AWS A5.5 E9016-B3									
Stainless Stick Electrode	SS-308L	--				EN 1600 E 19 9 L R 1 2					304L m	
	SS-309L	--				EN 1600 E 23 12 L R 1 2					SS/CMn m	
	SS-316L	--				EN 1600 E 19 12 3 L R 1 2					316L m	
	SS-2209	--				EN 1600 E 22 9 3 N L R 1 2						
Carbon Flux Cored Wire	SFC-71	C	3YSA H10	3YSMH10	3YS H10	EN ISO 17632-A T42 2 P C 1 H10	3YSH10		IIIYMS(H10)	3YH10S	3YSH10	KSW53G(C)H10
	SFC-71	M	3YSA H10	S3YSMH10		EN ISO 17632-A T42 2 P M 1 H10				3YH10S	3YSH10	
	SFC-71J	C	4YSA H5								4YSH5	
	SFC-71J	M	4YSA H5								4YSH5	
	SFC-71M	M	3YSA H10			EN ISO 17632-A T42 2 M M 3 H10						
	SFC-75	C								3YH10S	3YSH10	
Stainless Flux Cored Wire	SFC-308L	C	AWS A5.22 E308LT1-1	308L	304L	EN ISO 17633-A T 19 9 L P M 2			308L	4306	304L S	
	SFC-309L	C	AWS A5.22 E309LT1-1	309L	309L	EN ISO 17633-A T 23 12 L P M 2		EN ISO 17633-A T 23 12 L P C 2	309L	4332	SS/CMn S	
	SFC-309MoL	C	AWS A5.22 E309LMoT1-1									
	SFC-316L	C	AWS A5.22 E316LT1-1	316L	316L	EN ISO 17633-A T 19 12 3 L P M 2			316L	4435	316L S	
	SFC-317L	C	AWS A5.22 E317LT1-1									
	SFC-347L	C	AWS A5.22 E347T1-1									
	SFC-2209	C	AWS A5.22 E2209T0-1	2205	2205	EN ISO 17633-A T 22 9 3 N L P M 2			Duplex Steel			
Carbon TIG Solid Wires	STG-50	A	AWS A5.18 ER70S-G									
	STG-56	A	AWS A5.18 ER70S-G									

Remark：

ABS： American Bureau of Shipping
BV： Bureau Veritas
CCS： China Classification Society
CE ： European Community (CE) Product
CR： China Corporation Register of Shipping
DB： German Railway Authority
DNV： Det Norske Veritas
GL： Germanischer Lloyd
LR： Lloyd's Register Asia
NK：Nippon Kaiji Kyokai
C ： CO2
M ： 75-80%Ar/bal CO2
A ： Ar Gas

Vickers Hardness (DPH)	Brinell Hardness 10mm Ball 3000kg Load		Rockwell Hardness		Shore Hardness	Tensile Strength kgf/mm2 Approx.(1)
	Standard Ball	Tungsten Carbide Ball	B Scale 100kg Load 1/16" Ball	C Scale 150kg Load Brale Ball		
940	--	--	--	68.0	97	--
920	--	--	--	67.5	96	--
900	--	--	--	67.0	95	--
880	--	767	--	66.4	93	--
860	--	757	--	65.9	92	--
840	--	745	--	65.3	91	--
820	--	733	--	64.7	90	--
800	--	722	--	64.0	88	--
780	--	710	--	63.3	87	--
760	--	698	--	62.5	86	--
740	--	684	--	61.8	84	--
720	--	670	--	61.0	83	--
700	--	656	--	60.1	81	--
690	--	647	--	59.7	--	--
680	--	638	--	59.2	80	--
670	--	630	--	58.8	--	--
660	--	620	--	58.3	79	--
650	--	611	--	57.8	--	--
640	--	601	--	57.3	77	--
630	--	591	--	56.8	--	--
620	--	582	--	56.3	75	--
610	--	573	--	55.7	--	--
600	--	564	--	55.2	74	--
590	--	554	--	54.7	--	210
580	--	545	--	54.1	72	206
570	--	535	--	53.6	--	202
560	--	525	--	53.0	71	199
550	505	517	--	52.3	--	195
540	496	507	--	51.7	69	190
530	488	497	--	51.1	--	186
520	480	488	--	50.5	67	183
510	473	479	--	49.8	--	179
500	465	471	--	49.1	66	174
490	456	460	--	48.4	--	169
480	448	452	--	41.7	64	165
470	441	442	--	46.9	--	160
460	433	433	--	46.1	62	156
450	425	425	--	45.3	--	153
440	415	415	--	44.5	59	149
430	405	405	--	43.6	--	144
420	397	397	--	42.7	57	140
410	388	388	--	41.8	--	136
400	379	379	--	40.8	55	131
390	369	369	--	39.8	--	127
380	360	360	(110.0)	38.8	52	123

Remarks : (1) Approximate values are from JIS Z 8413 conversion table
(2) Values in the parentheses are rarely referred

Vickers Hardness (DPH)	Brinell Hardness 10mm Ball 3000kg Load		Rockwell Hardness		Shore Hardness	Tensile Strength kgf/mm2 Approx.(1)
	Standard Ball	Tungsten Carbide Ball	B Scale 100kg Load 1/16" Ball	C Scale 150kg Load Brale Ball		
370	350	350	--	37.7	--	120
360	341	341	(109.0)	36.6	50	115
350	331	331	--	35.5	--	112
340	322	322	(108.0)	34.4	47	109
330	313	313	--	33.3	--	105
320	303	303	(107.0)	32.2	45	103
310	294	294	--	31.0	--	100
300	284	284	(105.5)	29.8	42	97
295	280	280	--	29.2	--	96
290	275	275	(104.4)	28.5	41	94
285	270	270	--	27.8	--	92
280	265	265	(103.5)	27.1	40	91
275	261	261	--	26.4	--	89
270	256	256	(102.0)	25.6	38	87
265	252	252	--	24.8	--	86
260	247	247	(101.0)	25.0	37	84
255	243	243	--	23.1	--	82
250	238	238	99.5	22.2	36	81
245	233	233	--	21.3	--	79
240	228	228	98.1	20.3	34	78
230	219	219	96.7	(18.0)	33	75
220	209	209	95.0	(15.7)	32	71
210	200	200	93.4	(13.4)	30	68
200	190	190	92.5	(11.0)	29	65
190	181	181	89.5	(8.5)	28	62
180	171	171	87.1	(6.0)	26	59
170	162	162	85.0	(3.0)	25	56
160	152	152	81.7	(0.0)	24	53
150	143	143	78.7	--	22	50
140	133	133	75.0	--	21	46
130	124	124	71.2	--	20	44
120	114	114	66.7	--	--	40
110	105	105	62.3	--	--	--
100	95	95	56.2	--	--	--
95	90	90	52.0	--	--	--
90	86	86	48.0	--	--	--
85	81	81	41.0	--	--	--

Remarks : (1) Approximate values are from JIS Z 8413 conversion table
(2) Values in the parentheses are rarely referred

Fig. 1 Schaeffler's diagram

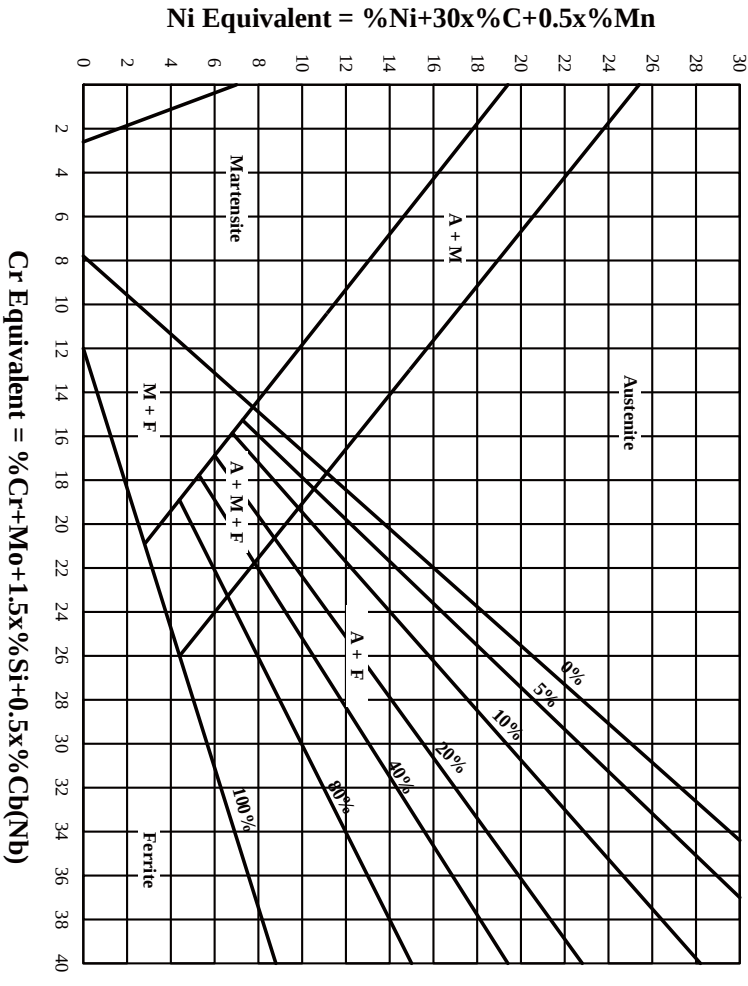
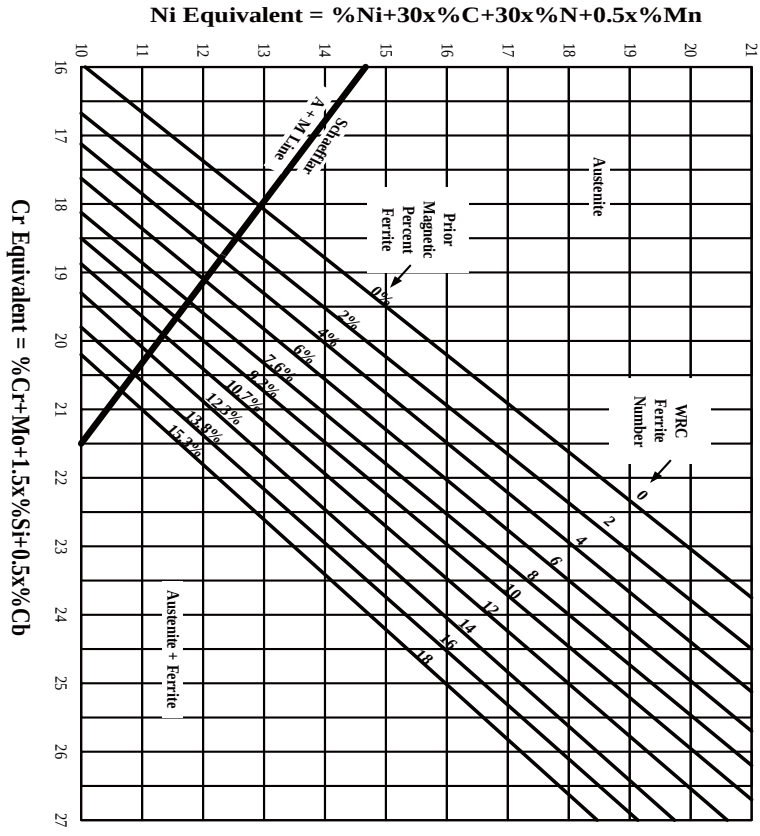


Fig. 2 DeLong's diagram

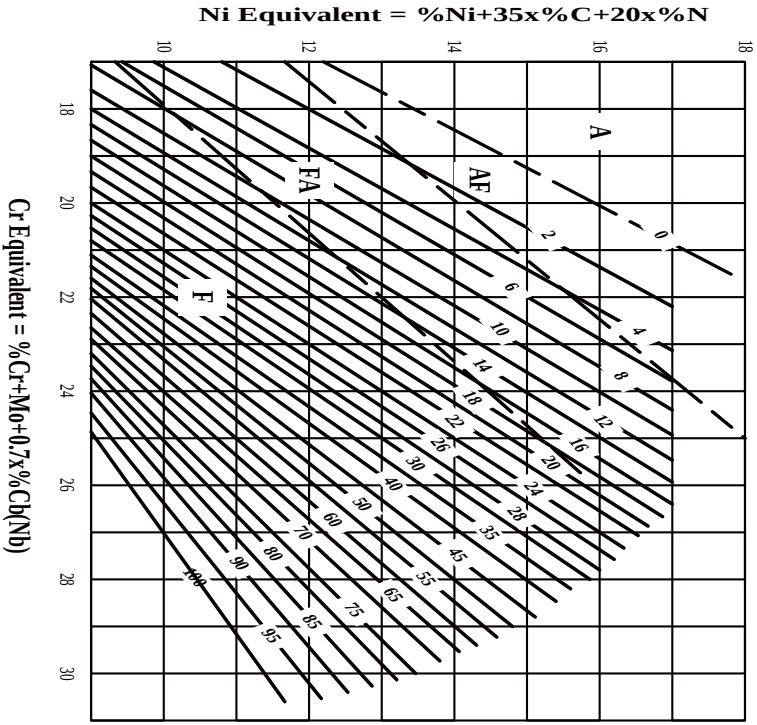
Nitrogen is included in Ni-equivalent. A ferrite content is given in FN (Ferrite Number) related to the ferrite percentage.



When use this diagram, it is desirable to use a nitrogen percentage by chemical analysis. If analysed value is not available, apply 0.03% for nitrogen content .

Fig. 3 WRC diagram (1992)

This diagram can be used for a high-ferrite stainless weld metal such as duplex stainless. The solidification mode is useful to estimate the hot-crack sensibility.



A, AF, FA, F stand for solidification modes
A : Austenitic single phase (r)
AF : Primary phase (r)+ Eutectic Ferrite (δ)
FA : Primary phase (δ)+ Peritectic / Eutectic phase (r)
F : δ Single phase Solidification

Stainless flux cored wire, “SFC” stainless wire can weld stainless steel with high efficiency and this is gas-shielding arc welding wire with excellent usability.

Features :

(1) Economical welding wire, because deposition rate is much higher than stick electrode (2-4 times), and deposition efficiency is quite high (about 90%).

(2) Wide range of proper current and voltage makes condition setting easier than solid wire, which enables semi-automatic welding and automatic welding.

(3) Spatter generation is very low, slag removability is excellent and bead is bright and beautiful. Arc stability is excellent and X-ray property is also good.

Notes on usage :

(1) Welding power source :

Use DC power source with constant voltage characteristics. Polarity is DC-EP. Inverter type welding power source can also be used. When spatter generation increases by use of pulse power source, use with turning off pulse switch.

(2) Shielding gas :

Usually, use CO_2 gas for welding. Ar+20-50%CO_2 can be also used, but compared with CO_2 gas, porosity such as pit or blowhole is apt to occur. The flow rate of shielding gas should be 20-50l/min.

(3) Wire stick-out :

Keep the distance between tip and base metal at about 15mm for 0.9mm diameter, and at 15-20mm for 1.2mm diameter, and 1.6mm diameter. When wire stick-out is shorter than above mentioned length, porosity such as pit and gas hole is apt to occur. When use Ar+CO_2 gas, wire stick-out should be 5mm longer than in use of CO_2 gas

(4) Protection against wind :

When wind velocity near an arc is more than 1m/sec, blowhole is apt to occur and the ferrite content of weld metal reduces on account of N from the air. As this result, there is a danger of occurring hot crack. Therefore protect a weld free from wind.

(5) Weld fumes :

As the amount of generated fumes is more than that of covered electrodes, wear a protection mask and make sufficient ventilation.

(6) Storage of wire

Once SFC stainless wire picked up moisture, it can not be dried with high temperature such as stick electrode. When wire is exposed at high humidity atmosphere or wet environment for a long time, pit or blowhole is apt to occur. Once package is opened, the wire should be stored at low humidity place with care in order not the wire to catch water or dust.