

Welding Consumables for Shipbuilding

Advanced Welding Consumables for NSGP Crude Oil Tankers

NSGP-1: Highly Corrosion-resistant Steel for Bottom Plate Sections

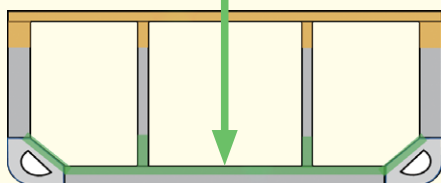
NSGP-2: Highly Corrosion-resistant Steel for Underside of Deck Plate Sections

NSGP-1

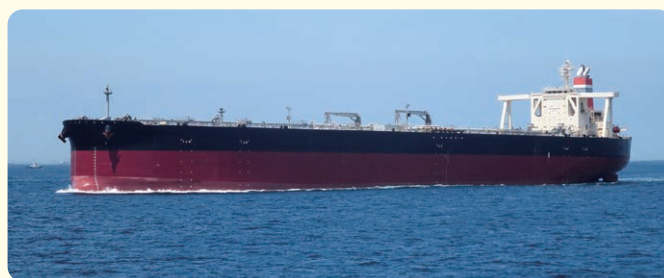
Pitting corrosion in crude oil tanker bottom plates has long been a critical issue. NSGP-1, jointly developed by NIPPON YUSEN KAISHA and NIPPON STEEL CORPORATION, provides excellent resistance to pitting corrosion. First applied in 2004, NSGP-1 demonstrated outstanding performance, with no pitting corrosion observed after 2.5 years, even without coating.

NSGP-2

The upper internal surfaces of crude oil cargo tanks are highly susceptible to corrosion. NSGP-2, developed with NIPPON STEEL CORPORATION's proprietary technology, provides outstanding corrosion resistance. Commercialized in 2014, NSGP-2 helps reduce maintenance requirements, repair time, and downtime for complex underdeck structures.



Cross-sectional View of a Crude Oil Tanker



Product Lineup for NSGP

Welding Process	Brand Name	Size mm	Shielding Gas	Welding Position	Approval Ship Class (As of Sep. 2026)	
					NK	Others
FCAW	SF-1 • GP	1.2, 1.4, 1.6	CO ₂	All Positions	KSW52Y40G(C)H5	ABS, LR, DNV
	SM-1F • GP	1.2, 1.4, 1.6	CO ₂	Horizontal Fillet	KSW52Y40G(C)H5	ABS, LR, DNV
	SM-1F • GP for tandem welding	1.6	CO ₂	Horizontal Fillet	KAW52Y40G(C)	ABS, LR, DNV
SMAW	L-55 • GP	2.6, 3.2, 4.0, 5.0	—	All Positions	KMW53Y40H10	ABS, LR, DNV

Typical Mechanical properties of all-weld metal

Welding Process	Brand Name	Shielding Gas	Tensile test			Impact test		Specification
			YS MPa	TS MPa	El %	Temp. °C	vE J	
FCAW	SF-1 • GP	CO ₂	520	582	27	0	112	AWS A5.20 E71T-1C-H4
	SM-1F • GP	CO ₂	524	598	24	0	66	AWS A5.20 E70T-1C-H4
	SM-1F • GP for tandem welding	CO ₂	516	602	25	0	85	AWS A5.20 E70T-1C-H4
SMAW	L-55 • GP	—	463	547	29	-20	157	AWS A5.1 E7016

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9% and 7% Ni steel welding consumables for LNG Cryogenic storage tanks



Line up of welding consumable for 9% and 7% Ni steel

Welding method	Brand name	Size mm	Polarity	Welding position
FCAW	FC-9NI (Shielding gas: CO ₂)	1.2	DCEP	Flat, Horizontal Vertical up
SMAW	NI9	2.6 × 350, 3.2 × 350 4.0 × 350, 5.0 × 350	AC	Flat, Horizontal Vertical up
	YAWATA™ WELD B(M)	3.2 × 350, 4.0 × 350 5.0 × 350	AC DCEP	Flat, Horizontal Vertical up, Over head
	NITTETSU™ WELD 196	2.6 × 300, 3.2 × 300 4.0 × 350, 5.0 × 350	AC DCEP	Flat, Horizontal Vertical up, Over head
SAW	NITTETSU FLUX 10H (flux) × NITTETSU FILLER 196 (wire)	Spool: 1.2, 1.6, 2.4 Coil: 2.4	DCEP	Flat, Horizontal Horizontal fillet
	BF-276 (flux) × Y-276 (wire)	Coil: 2.4	DCEP	Flat, Horizontal Horizontal fillet
GTAW (TIG)	NITTETSU FILLER 196	Spool: 1.2 Rod: 2.0 × 1000 2.4 × 1000, 3.2 × 1000	DCEN	Flat, Horizontal Vertical up, Over head

Typical Mechanical Properties of All-Weld Metal

Welding method	Brand name	AWS specification	Mechanical properties			
			0.2%P.S. MPa	T.S. MPa	El. %	vE-196°C J
FCAW	FC-9NI	—	445	699	47	88
SMAW	NI9	A5.11 ENiCrMo-6	450	720	51	84
	YAWATA WELD B(M)	A5.11 ENiCrFe-4	443	709	39	68
	NITTETSU WELD 196	A5.11 ENiMo-9	449	743	46	101
SAW	NITTETSU FLUX 10H (flux) × NITTETSU FILLER 196 (wire)	A5.14 ERNiMo-9 Modify	415	708	43	60
	BF-276 (flux) × Y-276 (wire)	A5.14 ERNiCrMo-4	470	715	46	103
GTAW (TIG)	NITTETSU FILLER 196	A5.14 ERNiMo-9	468	746	44	173

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Product Lineup for Ammonia Carriers

Welding Process	Brand Name	Shielding gas	Approval Ship Class	
			NK	Others
SMAW	L-55SN	—	KMWL3H10	ABS, LR, DNV
FCAW	SF-36E	CO ₂	KSWL3G (C) H5+Mfr's	ABS, LR, DNV, BV
	SF-36F	CO ₂	KSWL3G (C) H5	ABS, LR, DNV
SAW	NF-310 × Y-E (flux) × (wire)	—	KAWL3TM-TS540M	ABS, LR, DNV, BV
	NB-55L × Y-D (flux) × (wire)	—	KAWL3M	ABS, LR, DNV, BV
GTAW	YT-28	Ar	KSWL3G (I)	ABS

Typical Mechanical properties of all-weld metal

Welding Process	Brand Name / Shielding gas	Heat Treatment	Tensile test		Impact test		Specification
			YS MPa	TS MPa	Temp. °C	vE J	
SMAW	L-55SN	As-Welded	517	573	-50	154	AWS A5.5 E7016-G
		620°C × 1hr	484	543	-50	162	
FCAW	SF-36E / CO ₂	As-Welded	561	625	-60	72	A5.29 E81T1 K2C-H4
	SF-36F / CO ₂	As-Welded	511	589	-60	77	A5.29 E70T1-GC-H4
SAW	NF-310 × Y-E (flux) × (wire)	As-Welded	521	588	-60	138	A5.23 F8A8-EG-G
		630°C × 1hr	498	573	-60	125	F8P4-EG-G
	NB-55L × Y-D (flux) × (wire)	As-Welded	515	612	-60	143	A5.23 F7A8-EG-G
		600°C × 1hr	503	599	-60	125	F7P8-EG-G
GTAW	YT-28 / Ar	As-Welded	419	563	-20	145	A5.18 ER70S-6
		620°C × 1hr	421	550	-20	258	

Typical Mechanical properties of welding joint metal - SF-36E -

Welding Process	Brand Name	Welding Position	Heat input kJ/cm	Heat Treatment	Tensile test			Impact test	HV10
					YS MPa	TS MPa	El %	vE-60°C J	
FCAW	SF-36E / CO ₂	Flat	22	As-Welded	561	625	31	72	212
		Vertical-up	41	As-Welded	511	589	33	77	211



Cross section of welding joints

(The weld reinforcement and backing strip were ground flush for RT inspection.)

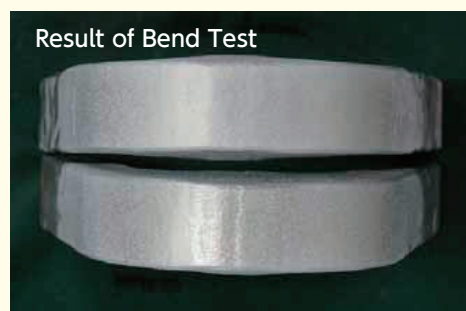
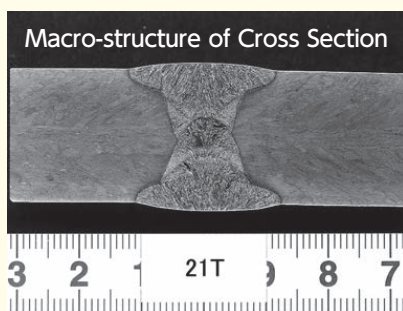
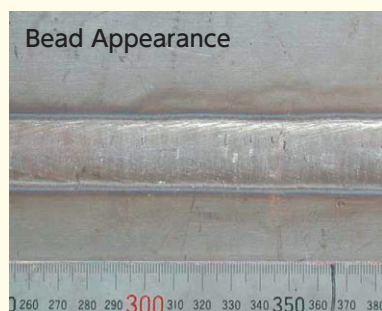
Product Lineup

Steel Grade Applications	FCAW	SMAW	SAW (flux) × (wire)	GTAW
SUS304L	SF-308L	S-308L · R	BF-300M × Y-308L	YT-308L
SUS304 for Cryogenic or High-Strength Tanks	FC-308LK	—	BF-308LK × Y-308L	—
SUS316L	SF-316L	S-316L · R	—	YT-316L
Lean Duplex Stainless Steel (SUS821L1)	SF-2120	S-2120 · R	—	—
Duplex Stainless Steels (SUS821L1, SUS329J1, and SUS329J3L)	SF-DP8 FC-DP8	S-DP8	BF-30 × Y-DP8	YT-DP8
SUS304L to Carbon Steel and Clad Steel	SF-309L	S-309 · R	—	—
SUS316L/SUS316LN to Carbon Steel and Clad Steel	SF-309MOL	S-309ML · R	—	YT-309MOL

Typical Mechanical properties of welding joint metal - BF-30 × Y-DP8 for Duplex Stainless - Steels

Applicable to a wide range of duplex stainless steels, from low-alloy duplex grades attracting attention as alternatives to SUS304 and SUS316 (KSUS821L1, KSUS323L) to general-purpose duplex stainless steels (KSUS329J1, KSUS329J3L).

Welding Process	Brand Name (flux) × (wire)	Welding Position	Welding Test	Tensile test				Impact test
				YS MPa	TS MPa	El %	Fracture Location	vE-20°C J
SAW	BF-30 × Y-DP8	Flat	Welded Joint Test	—	841	—	Base metal	92
		Flat	All Weld metal	585	782	35	—	94



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Fumes and gas may be hazardous to your health. Please take appropriate preventive measures such as the implementation of ventilation as well as wearing a protector for breathing. Arc light is harmful to the eyes and skin. Please use appropriate shielding measures. Please do not touch anything where electricity is activated. It may cause death.

Request to Customers

- 1 Various data of distinctive features such as welding consumables, all-weld metal, weld metal, etc. shown in this catalog are provided for general information only and represent typical values. They do not constitute any representation or guarantee of performance, quality, or suitability for any specific application unless expressly agreed as specifications.
- 2 The properties and performance of welded structures, which cannot be determined by welding consumables alone, may vary depending on various factors such as structural design, chemical composition of base materials, fabrication method, welding conditions, environment, and operator skill. Users are solely responsible for evaluating and determining the suitability of the products for their intended applications, and appropriate verification and testing are recommended prior to use.
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