

WELDREAM™ Premium

WELDREAM Premium is positioned in the visionary product category that transcends customers' conventional perceptions of welding. Below, we introduce the innovative technologies and product characteristics of WELDREAM Premium.

1 "CF Wire": An extremely low hydrogen seamless flux-cored wire



Product name: **CF Wire**

*Meaning of the name: Curb Fracture

In recent years, with a focus on redevelopment projects, the demand for large high-rise buildings has been steadily increasing. Apart from its application in high-rise buildings, construction and industrial machinery ("construction/industrial machinery") play a crucial role in national land resiliency plans and restoration projects for major disasters both in Japan and overseas, contributing significantly to building social infrastructure.

High-tensile steel is widely utilized in these sectors, with efforts being made to promote its application for weight reduction through thinning and utilization in critical components. However, welding high-tensile steel often leads to the occurrence of cold cracking (delayed cracking) in the welded area. Consequently, preventing cold cracking through "preheating" is widely adopted to facilitate the release of diffusible hydrogen before welding. Consequently, there has been a perceived issue where the growing demand for high-tensile steel coincided with an increase in welding workload. To address this issue, we have introduced "CF wire," an ultra-low hydrogen seamless flux-cored wire designed to mitigate cold cracking and streamline welding processes.

2 Features of CF wire

The most remarkable feature of CF wire is its exceptional resistance to cold cracking, surpassing that of conventional welding wires. Through our seamless technology and optimization of flux composition, CF wire has achieved an extremely low diffusible hydrogen content in the weld metal (refer to Fig. 1 [Target value: 1 mL/100 g]). The adoption of CF wire aids customers in their efforts to reduce preheat temperature and energy *costs during welding operations.

*Example: Gas, electricity, etc. for preheating

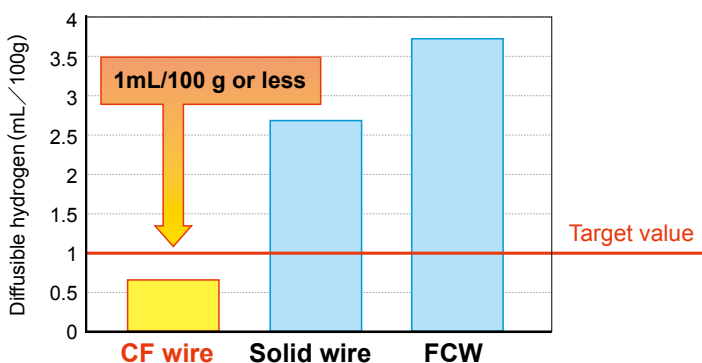


Fig. 1: Diffusible hydrogen content in CF wire

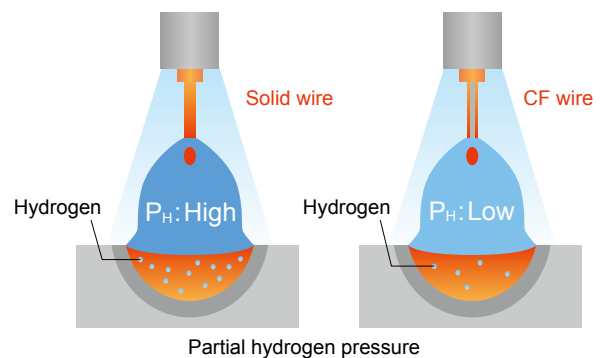


Fig. 2: Image of hydrogen reduction in CF wire

Negative Aspects of Preheating Operations

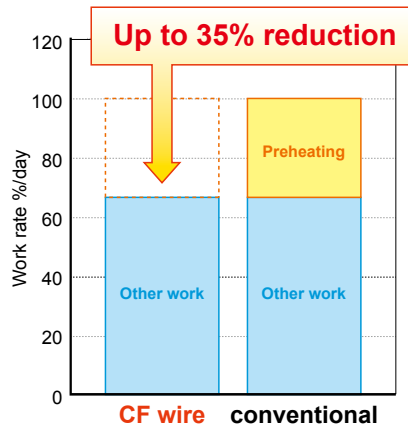
•Large workload

- Difficult to install equipment
- Preheating in a hot environment is harsh
- Time-consuming if parts are large

•Large management burden

- Strict construction management is required
- Cost of necessary materials is high
- Labor costs are high

Customer benefits from CF wire application



Preheating work can be reduced by applying CF wire.

- Faster welding
- Safe welding
- Low cost welding

3 CF wire line-up

The CF wire line-up is presented below. Please refer to the properties described for each variant and select the one that best suits your preheat reduction requirements, irrespective of the field of application.

Table1 CF wire list and product specifications


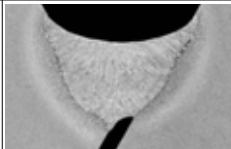



grade	Brand	Standard	Shielding gas	Applicable position	Size mm	Example of application
780 MPa	SF-80CF	JIS Z3313 T780T1-1CA-N4M2-UH5 AWS A5.29 E111T1-GC-H2	CO ₂	All positions	1.2	Horizontal welding of column joints Vertical welding of beam web
	SX-80CF	JIS Z3313 T782T15-0CA-N4C1M2-UH5 AWS A5.28 E110C-G H2		Flat Horizontal	1.2	Joint section of beam flange Corner welding part of BOX columns
490 MPa	SF-1CF	JIS Z3313 T49J0T1-1CA-UH5 AWS A5.29 E71T1-GC-H2	CO ₂	All positions	1.2 1.4	Lap fillet welding of wear resistant steel and repair welding
	SM-1A.CF	JISZ3313 T492T5-0MA-UH5 AWS A5.29 E70T5-GM-H2			1.2 1.4	
780 MPa	SX-80A.CF	JIS Z3313 T784T15-0MAG-UH5 AWS A5.28 E110C-G H2	Ar+CO ₂	Flat Horizontal	1.2	Welding of crane jibs and earth-moving machine buckets
980 MPa	SX-100A.CF	—			1.2	



4 Cold cracking resistance and weld metal properties of CF wire

The Cold cracking resistance of CF wire has been confirmed through tests specified by JIS, all of which have yielded positive results with no instances of cold cracking.

Table2 Example of the evaluation of cold cracking resistance for CF wire

There was no cold cracking when welded in low temperature condition. *					
Wire	SX-80CF	SF-80CF	SF-1CF	SX-80A.CF	SX-100A.CF
Base metal	BT-HT™630C-ES	BT-HT™630C-ES	ABREX™ 500	WEL-TEN™ 780E	WEL-TEN™ 980E
Welding condition (temperature)	0°C	5°C	5°C	0°C	0°C
Preheat	none	none	none	none	none
Sheet thickness	100mm	100mm	40mm	22mm	16mm
Cross section Photo					

* Based on JIS Z3158 y-type weld cracking test (cross-sectional cracking rate and root cracking rate are all 0%)
 ABREX and WEL-TEN are the trademarks of NIPPON STEEL CORPORATION.
 BT-HT is a product name of NIPPON STEEL CORPORATION's thick plate

Table3 Mechanical properties of deposited metal and diffusible hydrogen content of CF wire

Brand name	Mechanical properties of deposited metal (Typical)*				Diffusible hydrogen content** (ml/100g) (Typical)
	Yield point/0.2% proof stress (MPa)	Tensile strength (MPa)	Elongation (%)	Impact value (J)	
SF-80CF	741	824	20	0°C : 89	0.62
SX-80CF	771	823	21	-20°C : 80	0.33
SF-1CF	513	566	25	0°C : 110	0.55
SM-1A.CF	487	563	27	-20°C : 158	0.15
SX-80A.CF	797	889	20	-40°C : 82	0.32
SX-100A.CF	981	1082	16	-40°C : 40	0.52

* Based on JIS Z3133 **Based on JIS Z3118
 Diffusible hydrogen content in the table does not guarantee actual operation (factory or field work).