SAW FLUX: LOW ALLOY STEEL

WF-211

Specification	EN760	AWS A5.17/A5.23
Classification	SA FB 1 67 AC H5	F6A4-EL8 F7A4-EM12K F7A4-EH14 F8A2-EA2-A2

Application and Properties:

WF-211 can be used for welding ship, pressure vessels, boiler, tank, construction, longitudinal and spiral seam pipeline etc. WF-211 is suitable for submerged-arc twin-wire, tandem, and multi-wire welding as well as welding with two-run technique such as in the production of large pipes. It can be fillet welded with a large throat thickness in steel constructions.

WF-211 assures excellent weldability, beautiful bead appearance, and extremely easy removable slag. Good toughness at the low temperature with extremely high crack resistance. When impact properties at temperature down to -20℃ are required, heat input should be less than 30KJ/cm or should be used wire containing Mo.

Metallurgical Behavior	Slight Si pick-up. Mn is neutral
Basicity	1.8 (BIIW)
Grain Size	10-60 mesh
Current	DC+/AC
Redried	300-350℃ × 2hrs

Mechanical Properties of Deposited Metal

Wire	PWHT	Yield strength（MPa）	Tensile strength（MPa）	Elongation（%）	Charpy V notch impact strength（J）		
					-20℃	-40℃	-50℃
WW-20	AW	≥330	415-550	≥22	≥50	≥34	-
WW-31	AW	≥400	500-600	≥22	≥50	≥34	-
WW-44	AW	≥400	500-650	≥22	≥80	≥60	-
WW-30Mo	AW	≥460	550-690	≥22	≥50	≥50	-

Chemical Composition of Deposited Metal (%)

Wire	C	Si	Mn	Mo	Others
WW-20	0.05-0.10	0.20-0.30	0.55-0.80	-	-
WW-31	0.05-0.10	0.25-0.35	0.90-1.10	-	-
WW-44	0.05-0.10	0.20-0.30	1.40-1.60	-	-
WW-30Mo	0.05-0.10	0.25-0.35	1.50-1.80	0.20-0.40	-

SAW FLUX: LOW ALLOY STEEL

WF-231

Specification	EN760	AWS A5.17/A5.23
Classification	SA FB 1 55 AC H5	F7A6-EM12K F7A8-EH14 F8A2-EA2-A2

Application and Properties:

WF-231 is designed for joint welding on high-tensile and fine-grain steels that the steels are tough enough at low temperature. It is suited to narrow gap welding on thick plates with tandem and multi-wire processes.

Slag is extremely easy to remove and bead appearance is beautiful in multi-layer narrow gap welding of thick plates.

Metallurgical Behavior	Slight Si and Mn are neutral
Basicity	3.1 (BIIW)
Grain Size	10-60 mesh
Current	DC+; AC
Redried	300-350℃ × 2hrs

Mechanical Properties of Deposited Metal

Wire	PWHT	Yield strength（MPa）	Tensile strength（MPa）	Elongation（%）	Charpy V notch impact strength（J）			
					-30℃	-40℃	-51℃	-62℃
WW-31	AW	≥400	490-650	≥22	≥80	≥50	≥34	-
WW-44	AW	≥420	490-650	≥22	≥100	≥80	≥70	≥50
WW-30Mo	AW	≥470	550-650	≥22	≥80	≥60	≥34	-

Chemical Composition of Deposited Metal (%)

Wire	C	Si	Mn	Mo	Others
WW-31	0.05-0.10	0.25-0.35	0.90-1.20	-	-
WW-44	0.05-0.10	0.15-0.30	1.40-1.60	-	-
WW-30Mo	0.05-0.10	0.15-0.25	1.20-1.50	0.30-0.50	-

SAW FLUX: LOW ALLOY STEEL

WF-215

Specification	EN760	AWS A5.17/A5.23
Classification	SA AB 1 67 AC H5	F7A2-EM12K F8A2-EA2-A2

Application and Properties:

WF-215 can be used for welding shape of H, box structure, boiler, pressure vessel, pipeline, and shipbuilding. It is suitable for submerged-arc single-wire, twin-wire, tandem, and multi-wire welding, as well as using the two-run technique.

WF-215 has smooth surface of weld, fine ripple, good slag detachability, excellent toughness at the low temperature, low moisture pick up, and granular stability that shows excellent welding technology properties.

Metallurgical Behavior	Low Si pick up; Slight Mn pick up
Basicity	1.3 (BIIW)
Grain Size	10-60 mesh
Current	DC+/AC
Redried	300-350℃ × 2hrs

Mechanical Properties of Deposited Metal

Wire	Yield strength（MPa）	Tensile strength（MPa）	Elongation（%）	Charpy V notch impact strength（J）		
				-20℃	-30℃	-40℃
WW-31	≥400	500-600	≥22	-	≥80	-
WW-30Mo	≥480	560-690	≥22	≥34	-	-

Chemical Composition of Deposited Metal (%)

Wire	C	Si	Mn	Mo
WW-31	0.05-0.10	0.30-0.40	0.95-1.25	-
WW-30Mo	0.05-0.10	0.20-0.35	1.00-1.30	0.20-0.40

SAW FLUX: LOW ALLOY STEEL

WF-203

Specification	EN760	AWS A5.17/A5.23
Classification	SA AR 1 88 AC H5	F7A2-EM12K

Application and Properties:

WF-203 is suited to twin-wire, tandem and multi-wire at high speed welding for construction, small pressure vessel (such as small LPG store cylinder), and thin wall thickness pipeline. The welding speed can exceed 100cm/min. WF-231 is useful for welding steel plate of less than 20mm in single pass and limited pass.

WF-203 has excellent slag removal especially in flat and horizontal fillet welding. Bead appearance is beautiful, welding defects such as pits and porosity scarcely occur. It can be combined using with electrode containing low Mn content. Slag detachability is good for butt and fillet (horizontal fillet) welding at high speed.

Metallurgical Behavior	Low Si pick up; High Mn pick up
Basicity	0.8 (BIIW)
Grain Size	10-60 mesh
Current	DC+/AC
Redried	300-350℃ × 2hrs

Mechanical Properties of Deposited Metal

Wire	PWHT	Yield strength（MPa）	Tensile strength（MPa）	Elongation（%）	Charpy V notch impact strength（J）
					-30℃
WW-31	AW	⩾420	530-640	⩾22	⩾40

Chemical Composition of Deposited Metal (%)

Wire	C	Si	Mn
WW-31	0.05-0.10	0.35-0.50	1.40-1.60

SAW FLUX: LOW ALLOY STEEL

WF-232

Specification	EN760	AWS A5.17/A5.23
Classification	SA FB 1 55 AC H5	F8P2-EB2R-B2 F8P2-EB3R-B3

Application and Properties:

WF-232 is mainly used for multi-layer welding of 1-1.25%Cr-0.5Mo and 2.25%Cr-1Mo heat resisting steel for boiler drums' main steam tubes, superheated steam tubes, and chemical engineering apparatus. It is suitable for single or multi-layer welding with 200-300℃ preheat and inter-pass temperature. Heat input should be less than 20KJ/cm.

Uniform mechanical properties with low temperature toughness are obtained. Slag is extremely easy to remove and bead appearance is beautiful in multi-layer narrow gap welding of thick plates.

Metallurgical Behavior	Si and Mn are neutral
Basicity	2.8 (BIIW)
Grain Size	12-60 mesh
Current	DC+
Redried	300-350℃ × 2hrs

Mechanical Properties of Deposited Metal

Wire	Yield strength（MPa）	Tensile strength（MPa）	Elongation（%）	Charpy V notch impact strength（J）		Heat treatment
				-20℃	-30℃	
WW-30CrMo1	≥470	550-700	≥22	≥100	≥80	690℃×2h
WW-20CrMo2	≥500	600-750	≥22	-	≥80	690℃×2h

Chemical Composition of Deposited Metal (%)

Wire	C	Si	Mn	P	S	Cr	Mo
WW-30CrMo1	0.05-0.08	0.15-0.30	0.70-1.00	0.01	0.004	1.00-1.35	0.50
WW-20CrMo2	0.05-0.08	0.15-0.30	0.50-0.80	0.01	0.004	2.00-2.50	1.00