DRIVERS & TRENDS

Support frames, deck structures and complex process and drilling modules are the essential parts of the offshore oil & gas production facilities. Reduction in plate thickness, compared to S355, can be 50% for S690 and 60% for S890 grades.

APPLICATION REQUIREMENTS

Reliability, due to nearly defect-free and high-toughness butt welds, determine a substantial part of the construction integrity. New covered electrodes, flux cored wires and wire/flux combinations have become available for the welding of (very) high strength steel components. They offer the required combination of strength and toughness in the as-welded and post-weld heat-treated condition, and very low weld metal hydrogen content. An important issue for end-users is the working range of a consumable that still delivers required properties. Restrictions in operability, heat input, welding position, or joint configuration, limit the application of a specific consumable and should be minimized.

ALLOYS & PROCESSES

High quality structural steel grades S355 up to S690 are used extensively. Main processes are SMAW, FCAW and SAW. Standard consumables for all arc welding processes are available for welding high strength steels up to S690MPa. Weld metal will meet the mechanical properties in the “as welded” as well as the “stress relieved” condition. Limitations for the welder, regarding heat input and welding technique can be minimized. Weld metal has proven to be fit for purpose. Welding procedures are available for all processes.

LINCOLN SOLUTION

Lincoln Electric offers optimized and customized solutions for offshore applications. As a customer, we will work with you to identify your specific needs and ensure that your requirements are met.

Lincoln Electric’s offering includes:

- Consumables manufactured according to an ISO 9001 qualified system
- Consumables for all processes in steel grades up to S690
- Consumables delivering weld metal that meet your requirements, also after PWHT when required
- Moisture Resistant (EMR) and hydrogen controlled Low Hydrogen consumables.
- Fit-for-purpose packaging
- Proven power source technology including Power Wave® AC-DC 1000® SD power sources with Wave Form Control Technology®
- Global resources and technical support

OFFSHORE INDUSTRY

EQUIPMENT

SPEEDTEC® 500S / LF45

Premium welding behaviour on CV MIG & Stick welding

- **Continues inductance control**
- **Synergic capability**
- **Job control with limits secured by a password**
- **Remote control on the gun (Job, WFS, Trim)**
- **Multi procedure**
- **Pre-setting**
- **Meet IEC974-1, ROHS and CE standards for safety and reliability**

CONSUMABLES

PROCESS	PRODUCT	AWS CLASSIFICATION	EN/ISO CLASSIFICATION	STEEL GRADES (OR EQUIVALENT)					
				S355	S420	S460	S500	S690	S890
SMAW	Conarc® 51	AWS A5.1 : E7016-1 H4R	ISO 2560-A : E 42 4 B 12 H5	✓	✓				
	Lincoln 7018-1	AWS A5.1 : E7018-1	ISO 2560-A : E 46 3 B 32 H5	✓	✓	✓			
	Conarc® 49C	AWS A5.1 : E7018-1 H4R	ISO 2560-A : E 46 4 B 32 H5	✓	✓	✓			
	Conarc® One	AWS A5.1 : E7018-1 H4R	ISO 2560-A : E 46 5 B 32 H5	✓	✓	✓			
	Kryo® 3	AWS A5.5 : E8018-C1-H4	ISO 2560-A : E 46 8 3Ni B 32 H5	✓	✓	✓			
	Kryo® 1	AWS A5.5 : E7018-G-H4R	ISO 2560-A : E 50 6 Mn1Ni B 32 H5		✓	✓	✓		
	Conarc® 60G	AWS A5.5 : E9018M-H4	EN 757 : E 55 4 Z B 32 H5		✓	✓	✓		
	Conarc® 70G	AWS A5.5 : E9018-G-H4R	EN 757 : E 55 4 1NiMo B 32 H5		✓	✓	✓		
	Kryo® 2	AWS A5.5 : E9018-G-H4R	EN 757 : E 55 6 Z B 32 H5		✓	✓	✓		
	Conarc® 80	AWS A5.5 : E11018M-H4	EN 757 : E 69 5 Z B 32 H5				✓	✓	
	Conarc® 85	AWS A5.5 : E12018-G-H4	EN 757 : E 69 5 Mn2NiCrMo B 32 H5				✓	✓	
FCAW	Outershield® T55-H	AWS A5.20 : E71T-5J H4 / E71T-5MJ H4	EN 758 : T 42 4 B C 2 H5 / T 42 4 B M 2 H5	✓	✓				
	Outershield® 71M-H	AWS A5.20 : E71T-1J-H4	EN 758 : T 46 2 P C 1 H5	✓	✓	✓			
	Outershield® 71E-H	AWS A5.20 : E71T-1C/MJ-H4	EN 758 : T 46 2 P C / 3 P M 1 H5	✓	✓	✓			
	Outershield® 81Ni1C-H	AWS A5.29 : E81T1-Ni1C JH4	EN 758 : T 50 4 1Ni P C 2 H5		✓	✓	✓		
	Outershield® 81Ni1-HSR	AWS A5.29 : E81T1-Ni1M JH4	EN 758 : T 50 5 1Ni P M 2 H5 T		✓	✓	✓		
	Outershield® 81K2-HSR	AWS A5.29 : E81T1-K2M JH4	EN 758 : T 50 6 1.5Ni P M 2 H5 T		✓	✓	✓		
	Outershield® 91Ni1-HSR	AWS A5.29 : E81T1-K2M JH4	ISO 18276-A - T 55 4 1NiMo P M 2 H5		✓	✓	✓		
	Outershield® 91K2-HSR	AWS A5.29 : E91T1-G H4	ISO 18276-A - T 55 4 1,5NiMo P M 2 H5		✓	✓	✓		
	Outershield® 690-HSR	AWS A5.29 : E111T1-K3M JH4	ISO 18276-A - T 69 4 Z P M 2 H5 T				✓	✓	
MCAW	Outershield® MC710-H	AWS A5.18/A5.18M : E70C-6M H4	EN 758 : T 46 3 M M 2 H5	✓	✓	✓			
	Outershield® MC710C-H	AWS A5.18/A5.18M : E70C-6C H4	EN 758 : T 46 3 M C 2 H5	✓	✓	✓			
	Outershield® MC715-H	AWS A5.18/A5.18M : E70C-6M H4	EN 758 : T 46 4 M M2 H5	✓	✓	✓			
FCAW-SS	Innershield® NR® 203Ni(1%)	AWS A5.29 : E71T8-Ni1		✓	✓				
	Innershield® NR® 203NiC+	AWS A5.29 : E71T8-K2		✓	✓				
GMAW/GTAW	LNM/LNT 25	AWS A5.18/A5.18M : ER70S-3	ISO 14341-A-G/W 42 2 M G2Si	✓	✓				
	SupraMIG® / Ultramag®	AWS A5.18/A5.18M : ER70S-6	ISO 14341-A-G 42 4 M G3Si1	✓	✓				
	SupraMIG® Ultra (SG3)	AWS A5.18/A5.18M : ER70S-6	ISO 14341-A-G 46 4 M G4Si1	✓	✓	✓			
	UltraMag® SG3	AWS A5.18/A5.18M : ER70S-6	ISO 14341-A-G 46 5 M G4Si1	✓	✓	✓			
	LNM/LNT Ni1	AWS A5.28 : ER80S-Ni1	ISO 14341-A-G/W 46 5 M G3Ni1	✓	✓	✓			
	LNM/LNT Ni2.5	AWS A5.28 : ER80S-Ni2	ISO 14341-A-G/W 46 6 M G2Ni2	✓	✓	✓			
	LNM MoNi	AWS A5.28 : ER100S-G	EN 12534 : G 62 4 M Mn3NiCrMo			✓	✓		
	LNM MoNiVa	AWS A5.28 : ER100S-G	EN 12534 : G 69 4 M Mn3Ni1CrMo				✓	✓	
	LNM MoNiCr	AWS A5.28 : ER120S-G	EN 12534 : G 89 4 Mn4Ni2CrMo				✓	✓	✓
SAW	L61 / P230	AWS A5.17 : F7A4/F6P5-EM12K	EN756 : S38 4 AB S2Si	✓					
	LNS 133U / P240 (8500, 888)	AWS A5.17 : F7A/P8-EH12K	EN756 : S42 6 FB 3Si	✓	✓				
	LNS 160 / P230	AWS A5.23 : F7A8/F7P8-ENi1-Ni1	EN756 : S46 4 AB S2Ni1	✓	✓	✓			
	LNS 162 / P240 (8500, 888)	AWS A5.23 : F7A/P10-ENi2-Ni2	EN756 : S46 6 FB S2Ni2	✓	✓	✓			
	LNS 165 / P240 (8500, 888)	AWS A5.23 : F8A/P8-ENi5-Ni5	EN756 : S50 6 FB SZ		✓	✓	✓		
	LNS 164 / 888	AWS A5.23 : F10A4/F9P6-EF3-F3	EN756 : S50 4 FB S3Ni1Mo		✓	✓	✓		
	LNS168 / MIL800-H (P240)	AWS A5.23 : F10A6/F10P2-EM2 M2	ISO 14295: S69 4 FB S3 Ni2,5 CrMo		✓	✓	✓	✓	