

# Nickel-based welding consumables for joining and cladding

MMA ELECTRODES, MIG WIRES & TIG RODS, SAW FLUX/WIRE AND STRIP CLADDING COMBINATIONS.







## Best in class nickel-based welding consumables from a world leader in welding and cutting

As a world leading manufacturer of welding and cutting products, ESAB supplies state-of-the-art consumables for the welding of nickel-based materials, dissimilar welds, cast iron, cryogenic applications and for nickel alloy cladding. Equally important, fabricators can rely on technical support from a welding company with worldwide presence and a network of application and automation centres.

With the presentation of its nickel-based consumables under AWS alloy coded product names, ESAB has now simplified selection from the products brought together in this brochure for the various nickel alloys and their industrial welding applications. This range is available globally, so name, classifications, approvals and quality standard will be the same, wherever you order your ESAB nickel-based consumables.

ESAB produces its own nickel-based consumables with wire electrodes for MMA, MIG, TIG and SAW, building on its rich history of bringing leading products to the welding industry. All are produced against rigid quality standards utilizing advanced self-developed manufacturing techniques. ESAB nickel-based welding wires feature superior surface finish, column strength and controlled cast and helix for trouble-free wire feeding and X-ray quality welds in all applications. On demand, ESAB is able to supply nickel-based consumables according to ASME QSC standard.





Shield-Bright NiCrMo-3 is an all-positional cored wire for the welding and cladding of nickel-based steels providing excellent weldability on conventional non-pulsing power sources under Ar/CO2 mixed gas. The wire can also be used for the welding of dissimilar nickel-based alloys to each other, to alloyed steels or to stainless steels and for the joining of 6% molybdenum super austenitic steels or 9% nickel steel.

Quality, the environment and safety are three key areas of focus. ESAB is one of few international companies to have achieved the ISO 9001, ISO 14001 and OHSAS 18001 standards in Environmental, Health & Safety Management Systems across all our global manufacturing facilities. At ESAB, quality is an ongoing process that is at the heart of all our production processes and facilities worldwide.

ESAB offers a total solution partnership to its customers with a unique programme of welding consumables, equipment, automation and cutting. This comes with the rich heritage of ESAB application know-how. It is the ideal supplier for onestop-shopping wherever in the world you are located.

- Best in class nickel-based welding consumables
- Alloy coded product names for easy selection
- In house manufactured products
- Produced against rigid quality standards
- Total partnership solution with technical support



## Nickel-based consumables for all major arc welding processes



Electroslag strip cladding is a frequently applied and productive method for depositing a corrosion resistant lining to mostly carbon steel. ESAB supplies a full range of strips and fluxes.

ESAB supplies consumables and equipment for all major arc welding processes applied in the welding of nickel alloys, cast iron and 9% nickel steel. Processes covered are MMA [SMAW], MIG [GMAW], (hot wire) TIG [GTAW], PAW, SAW joining, SAW and ESW strip cladding.

One of the absolute highlights in the consumables range is OK 92.55 – the worlds number 1 MMA electrode for the welding of 9% Ni steel in LNG tank construction. It features extremely nice welder appeal and superior mechanical properties at cryogenic temperatures. It is part of a full program of consumables and equipment for the manual, mechanized and automated welding of tank floors, hulls, roofs and appliances. ESAB has been involved in an impressive list of LNG projects worldwide over many years.

Another outstanding product is OK Autrod NiCrMo-3 (formally OK Autrod 19.82) - ESAB's in-house produced MIG wire for welding high-alloyed heat resistant and corrosion resistant materials. It features superior surface finish, high column strength and controlled cast and helix and has earned a reputation for trouble-free wire feeding and perfectly positioned welds among the most critical of fabricators. ESAB is well known for its ability to supply complete solutions for submerged arc and electro-slag strip cladding. These include not only dedicated fluxes and strips for a variety of clad layer chemical compositions such as Alloy 625, but also column & booms, welding heads, power sources, control units, roller beds and flux handling equipment.

### **Smart consumables packaging**

At ESAB, it does not stop with best in class nickel-based welding consumables. Our innovation extends into the design of smart packaging that helps you save money on storage and handling. Examples are ESAB VacPac vacuum packaging for stick electrodes and ESAB Marathon Pac for wire products. VacPac keeps your nickel-based electrodes factory fresh until the moment of welding - effectively avoiding weld porosity, without the need of costly re-drying procedures. Marathon Pac bulk wire drums with a content of 100 or 250kg of nickel-based welding wire limits downtime for wire spool exchange to an absolute minimum. This, together with easy handling from goods-in to welding station, leads to a dramatic increase of welding productivity. Another major advantage is that straight wire delivery from Marathon Pac results in well-positioned welds and fewer rejects.



Marathon Pac bulk wire packaging saves dramatically on downtime for spool exchange. Can be folded flat and is fully environmentally friendly recyclable.



## A global range of welding nickelbased welding consumables.

MMA/SMAW	Classifications	Chemical composition, all weld metal (%)																
Stick electrodes		с	Mn	Si	Fe	Cr	Мо	Ni	Nb+ Ta	w	S	Р	AI	ті	Cu	Co	v	Other total
OK Ni-1 Formally OK 92.05	AWS/SFA A5.11/EN ISO 14172 ENi-1 / E Ni 2061 (NiTi3)	<0.05	<0.7	<1.0	<0.7			>92.0			<0.010	<0.020	<0.1	1.0- 4.0	<0.2			<0.5
OK NiCrFe-2 Formally OK 92.15	AWS/SFA A5.11/EN ISO 14172 ENiCrFe-2 / E Ni 6133 (NiCr16Fe12NbMo)	<0.10	1.0- 3.5	<0.75	6.0- 12.0	14.0- 17.0	0.5- 2.5	62- 78	1.0- 3.0		<0.015	<0.025			<0.5			<0.5
OK NiCrFe-3 Formally OK 92.26	AWS/SFA A5.11/EN ISO 14172 ENiCrFe-3 / E Ni 6182 (NiCr15Fe6Mo)	<0.10	5.0- 9.5	<1.0	2.0- 9.0	13.0- 17.0		61- 79	1.0- 2.5		<0.015	<0.025		<0.5	<0.5			<0.5
OK NiCrMo-5 Formally OK 92.35	AWS/SFA A5.11/ DIN 8555 ~ENiCrMo-5 / E 23-250 CKT	0.02- 0.10	0.4- 1.0	0.4- 1.0	4.0- 7.0	14.5- 16.5	15- 18	51.0- 64.0		3.0- 4.6	<0.02	<0.03						<0.5
OK NiCrMo-3 Formally OK 92.45	AWS/SFA A5.11/EN ISO 14172 ENiCrMo-3 / E Ni 6625 (NiCr22Mo9Nb)	<0.05	<0.50	0.30- 0.70	<5.0	20.5- 22.5	8.5- 10.0	60.0- 67.8	3.15- 4.00		<0.010	<0.020	<0.4		<0.3			<0.5
OK 92.55	AWS/SFA A5.11/EN ISO 14172 ENiCrMo-6 / E Ni 6620 (NiCr14Mo7Fe)	<0.080	2.6- 3.4	0.2- 0.6	<8.0	12.0- 14.0	5.5- 7.0	65.0- 75.0	1.2- 1.8	1.2- 1.8	<0.010	<0.020			<0.30			<0.5
OK NiCrMo-13 Formally OK 92.59	AWS/SFA A5.11/EN ISO 14172 ENiCrMo-13 / E Ni 6059 (NiCr23Mo16)	<0.020	<0.2	<0.20	<1.0	22.0- 24.0	15.0- 16.5	60.0- 64.0			<0.010	<0.010						<0.5
OK NiCu-7 Formally OK 92.86	AWS/SFA A5.11/EN ISO 14172 ENiCu-7 / E Ni 4060 (NiCr30Mn3Ti)	<0.10	1.0- 4.0	<1.0	0.5- 2.5			62.0- 69.0	<0.3		<0.015	<0.020	<0.5	<1.0	27.0- 34.0	<0.10	1.0- 4.0	<0.5
OK Ni-Cl Formally OK 92.18	AWS/SFA A5.15/EN ISO 1071 ENi-CI / E C Ni-CI 3	0.7- 1.1	<0.6	<0.9	2.0- 5.0			>92			<0.01	<0.01						
OK NiFe-CI-A Formally OK 92.58	AWS/SFA A5.15/EN ISO 1071 ENiFe-CI-A / E C NiFe-CI-A-1	1.4- 2.0	0.3- 1.2	0.4- 1.0	42- 48			47- 56			<0.010	<0.020	1.0- 3.0					
OK NiFe-CI Formally OK 92.60	AWS/SFA A5.15/EN ISO 1071 ENiFe-CI / E C NiFe-1 3	0.6- 1.2	0.5- 0.9	<0.8	38- 46			49- 59	0.1- 0.3		<0.01	<0.02	0.1- 0.5		0.6- 1.2			
OK NiCu-1 Formally OK 92.78	EN ISO 1071 / E C NiCu 1	0.2- 0.7	0.7- 1.1	<0.2	2- 4			60- 67			<0.02	<0.02			29- 35			
MIG/TIG/SAW Solid wires		Chem	nical c	omposi	ition, a	ill weld	l metal	(%)										
	AWS/SFA A5.14/EN ISO 18274 ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb)	<b>Chem</b> <0.10		<b>ompos</b> i ) <0.50	i <b>tion, a</b> <0.50	20.0	8.0- 10.0	<b>(%)</b> >60.0	3.15- 4.15		<0.015	<0.020	<0.40	<0.40	0 <0.50			<0.5
Solid wires OK Autrod NiCrMo-3 Formally OK Autrod	ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb)		<0.50			20.0-	8.0-	. ,		3.0- 4.5	<0.015 <0.015	<0.020 <0.020	<0.40	<0.40	<0.50 <0.50	<2.5	<0.3	<0.5 <0.5
Solid wires OK Autrod NiCrMo-3 Formally OK Autrod 19.82 OK Autrod NiCrMo-4 Formally OK Autrod	ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb) AWS/SFA A5.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276	<0.10	<0.50	) <0.50	<0.50	20.0- 23.0 14.5-	8.0- 10.0 15.0-	>60.0					<0.40	<0.40 <0.7		<2.5	<0.3	
Solid wires           OK Autrod NiCrMo-3           Formally OK Autrod           19.82           OK Autrod NiCrMo-4           Formally OK Autrod           19.83           OK Autrod NiCr-3           Formally OK Autrod	ERNICrMo-3 / S Ni 6625 (NiCr22Mo9Nb) AWS/SFA A5.14/EN ISO 18274 ERNICrMo-4 / S Ni 6276 (NiCr15Mo16Fe6W4) AWS/SFA A5.14/EN ISO 18274	<0.10 <0.02	<0.50 <1.0 2.5-	0 <0.50 <0.08	<0.50 4.0- 7.0	20.0- 23.0 14.5- 16.5 18.0-	8.0- 10.0 15.0-	>60.0 >50.0	4.15 2.0-		<0.015	<0.020	<0.40		<0.50	<2.5	<0.3	<0.5
Solid wires         OK Autrod NiCrMo-3         Formally OK Autrod         19.82         OK Autrod NiCrMo-4         Formally OK Autrod         19.83         OK Autrod NiCrA-3         Formally OK Autrod         19.85         OK Autrod NiCr-3         Formally OK Autrod         19.85         OK Autrod NiCr-3         Formally OK Autrod         19.85	ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb) AWS/SFA A5.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15Mo16Fe6W4) AWS/SFA A5.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA A5.14/EN ISO 1736 ERNi-1 / SG NiTi4 /	<0.10 <0.02 <0.10 <0.05	<0.50 <1.0 2.5- 3.5	) <0.50 <0.08 <0.50	<0.50 4.0- 7.0 <3.0	20.0- 23.0 14.5- 16.5 18.0-	8.0- 10.0 15.0-	>60.0 >50.0 >67.0	4.15 2.0-		<0.015 <0.015	<0.020 <0.020		<0.7	<0.50 <0.50	<2.5	<0.3	<0.5 <0.5
Solid wires       OK Autrod NiCrMo-3 Formally OK Autrod 19.82       OK Autrod NiCrMo-4 Formally OK Autrod 19.83       OK Autrod NiCr-3 Formally OK Autrod 19.85       OK Autrod NiCr-3 Formally OK Autrod 19.92       OK Autrod NiCu-7 Formally OK Autrod	ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb) AWS/SFA 45.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15Mo16Fe6W4) AWS/SFA 45.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA 45.14/EN ISO 1736 ERNi-1 / SG NiTi4 / (Werkstoff Nr. 2.4155) AWS/SFA 45.14/DIN 1736 ERNiCu-7 / SG NiCu30 MnTi / (Werkstoff	<0.10 <0.02 <0.10 <0.05	<0.50 <1.0 2.5- 3.5 <0.8 2.0-	<ul> <li>&lt;0.50</li> <li>&lt;0.08</li> <li>&lt;0.50</li> <li>&lt;0.7</li> </ul>	<0.50 4.0- 7.0 <3.0 <0.7 0.5- 2.5	20.0- 23.0 14.5- 16.5 18.0-	8.0- 10.0 15.0-	>60.0 >50.0 >67.0 >93.0 62.0-	4.15 2.0- 3.0		<0.015 <0.015 <0.01	<0.020 <0.020 <0.03	<1.0	<0.7 2.0- 3.5 1.5	<0.50	<2.5	<0.3	<0.5 <0.5 <0.5
Solid wires         OK Autrod NiCrMo-3         Formally OK Autrod 19.82         OK Autrod NiCrMo-4         Formally OK Autrod 19.83         OK Autrod NiCr-3         Formally OK Autrod 19.85         OK Autrod Ni-1         Formally OK Autrod 19.92         OK Autrod Ni-1         Formally OK Autrod 19.93	ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb) AWS/SFA 45.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15Mo16Fe6W4) AWS/SFA A5.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA A5.14/EN ISO 1736 ERNi-1 / SG NiTi4 / (Werkstoff Nr. 2.4155) AWS/SFA A5.14/DIN 1736 ERNiCu-7 / SG NiCu30 MnTi / (Werkstoff Nr 2.4377) AWS/SFA A5.14/EN ISO 18274 ERNiFeCr-1 / SNi 8065	<0.10 <0.02 <0.10 <0.05 <0.15 <0.05	<0.50 <1.0 2.5- 3.5 <0.8 2.0- 4.0 <1.0	<ul> <li>&lt;0.50</li> <li>&lt;0.08</li> <li>&lt;0.50</li> <li>&lt;0.50</li> <li>&lt;0.7</li> <li>&lt;1.0</li> </ul>	<0.50 4.0- 7.0 <3.0 <0.7 2.5 <28	20.0- 23.0 14.5- 16.5 18.0- 22.0 19.5- 23.5	8.0- 10.0 15.0- 17.0 2.5- 3.5	>60.0 >50.0 >67.0 >93.0 62.0- 69.0 >42	4.15 2.0- 3.0		<0.015 <0.015 <0.01 <0.015	<0.020	<1.0	<0.7 2.0- 3.5 1.5 3.0 0.5-	<0.50	<2.5	<0.3	<0.5
Solid wires OK Autrod NiCrMo-3 Formally OK Autrod 19.82 OK Autrod NiCrMo-4 Formally OK Autrod 19.83 OK Autrod NiCr-3 Formally OK Autrod 19.95 OK Autrod Ni-1 Formally OK Autrod 19.92 OK Autrod NiCu-7 Formally OK Autrod 19.93 OK Autrod NiFeCr-1	ERNiCrMo-3 / S Ni 6625 (NiCr22Mo9Nb) AWS/SFA 45.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15Mo16Fe6W4) AWS/SFA A5.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA A5.14/EN ISO 1736 ERNi-1 / SG NiTi4 / (Werkstoff Nr. 2.4155) AWS/SFA A5.14/DIN 1736 ERNiCu-7 / SG NiCu30 MnTi / (Werkstoff Nr 2.4377) AWS/SFA A5.14/EN ISO 18274 ERNiFeCr-1 / SNi 8065	<0.10 <0.02 <0.10 <0.05 <0.15 <0.05	<0.5( <1.0 2.5- 3.5 <0.8 2.0- 4.0 <1.0	<ul> <li>&lt;0.50</li> <li>&lt;0.08</li> <li>&lt;0.50</li> <li>&lt;0.7</li> <li>&lt;1.0</li> <li>&lt;0.50</li> </ul>	<0.50 4.0- 7.0 <3.0 <0.7 2.5 <28	20.0- 23.0 14.5- 16.5 18.0- 22.0 19.5- 23.5	8.0- 10.0 15.0- 17.0 2.5- 3.5	>60.0 >50.0 >67.0 >93.0 62.0- 69.0 >42	4.15 2.0- 3.0 <0.5		<0.015 <0.015 <0.01 <0.015	<0.020	<1.0	<0.7 2.0- 3.5 1.5 3.0 0.5- 1.2	<0.50	<2.5	<0.3	<0.5
Solid wires         OK Autrod NiCrMo-3         Formally OK Autrod         19.82         OK Autrod NiCrMo-4         Formally OK Autrod         19.83         OK Autrod NiCr-3         Formally OK Autrod         19.85         OK Autrod Ni-1         Formally OK Autrod         19.92         OK Autrod Ni-1         Formally OK Autrod         19.93         OK Autrod NiFeCr-1         FCAW         Flux Cored Wire         Shield-Bright	ERNiCrMo-3 / S Ni 6625 (NiCr22M09Nb) AWS/SFA A5.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15M016Fe6W4) AWS/SFA A5.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA A5.14/EN ISO 1736 ERNiL-1 / SG NITi4 / (Werkstoff Nr. 2.4155) AWS/SFA A5.14/DIN 1736 ERNiCu-7 / SG NiCu30 MnTi / (Werkstoff Nr 2.4377) AWS/SFA A5.14/EN ISO 18274 ERNiE-6Cr-1 / SNi 8065 (NiFe30Cr21Mo3)	<0.10 <0.02 <0.10 <0.05 <0.05 <0.05 Chem 0,10	<0.5( <1.0 2.5- 3.5 <0.8 2.0- 4.0 <1.0 0,50	<ul> <li>&lt;0.50</li> <li>&lt;0.08</li> <li>&lt;0.50</li> <li>&lt;0.70</li> <li>&lt;1.0</li> <li>&lt;0.50</li> <li>omposi</li> </ul>	<0.50 4.0- 7.0 <3.0 <0.7 0.5- 2.5 <28 ition, <i>z</i> 5,0	20.0- 23.0 14.5- 16.5 18.0- 22.0 19.5- 23.5 19.5- 23.5	8.0- 10.0 15.0- 17.0 2.5- 3.5 I metal 8.0 - 10.0	>60.0 >50.0 >67.0 >93.0 62.0- 69.0 >42 (%) >58.0	4.15 2.0- 3.0 <0.5 3.15 -		<0.015 <0.015 <0.01 <0.015 <0.03	<0.020<0.020	<1.0	<0.7 2.0- 3.5 1.5 3.0 0.5- 1.2	<0.50 <0.50 <0.2 28.0- 32.0 1.5- 3.0	<2.5	<0.3	<0.5
Solid wires         OK Autrod NiCrMo-3         Formally OK Autrod         19.82         OK Autrod NiCrMo-4         Formally OK Autrod         19.83         OK Autrod NiCr-3         Formally OK Autrod         19.83         OK Autrod NiCr-3         Formally OK Autrod         19.85         OK Autrod NiC-1         Formally OK Autrod         19.92         OK Autrod NiCu-7         Formally OK Autrod         19.93         OK Autrod NiFeCr-1         FCAW         Flux Cored Wire         Shield-Bright         NiCrMo-3         SAW/ESW	ERNiCrMo-3 / S Ni 6625 (NiCr22M09Nb) AWS/SFA A5.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15M016Fe6W4) AWS/SFA A5.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA A5.14/EN ISO 1736 ERNiL-1 / SG NITi4 / (Werkstoff Nr. 2.4155) AWS/SFA A5.14/DIN 1736 ERNiCu-7 / SG NiCu30 MnTi / (Werkstoff Nr 2.4377) AWS/SFA A5.14/EN ISO 18274 ERNiE-6Cr-1 / SNi 8065 (NiFe30Cr21Mo3)	<0.10 <0.02 <0.10 <0.05 <0.05 <0.05 Chem 0,10	<0.5( <1.0 2.5- 3.5 <0.8 2.0- 4.0 <1.0 0,50	<ul> <li>&lt;0.50</li> <li>&lt;0.08</li> <li>&lt;0.50</li> <li>&lt;0.7</li> <li>&lt;1.0</li> <li>&lt;0.50</li> <li>omposition (0,50)</li> </ul>	<0.50 4.0- 7.0 <3.0 <0.7 0.5- 2.5 <28 ition, <i>z</i> 5,0	20.0- 23.0 14.5- 16.5 18.0- 22.0 19.5- 23.5 19.5- 23.5	8.0- 10.0 15.0- 17.0 2.5- 3.5 I metal 8.0 - 10.0	>60.0 >50.0 >67.0 >93.0 62.0- 69.0 >42 (%) >58.0	4.15 2.0- 3.0 <0.5 3.15 - 4.15		<0.015 <0.015 <0.01 <0.015 <0.03	<0.020<0.020	<1.0	<0.7 2.0- 3.5 1.5 3.0 0.5- 1.2	<0.50 <0.50 <0.2 28.0- 32.0 1.5- 3.0	<2.5	<0.3	<0.5
Solid wires         OK Autrod NiCrMo-3         Formally OK Autrod 19.82         OK Autrod NiCrMo-4         Formally OK Autrod 19.83         OK Autrod NiCr-3         Formally OK Autrod 19.85         OK Autrod Ni-1         Formally OK Autrod 19.92         OK Autrod Ni-1         Formally OK Autrod 19.93         OK Autrod NiFeCr-1         FCAW         Flux Cored Wire         Shield-Bright         NiCrMo-3         SAW/ESW         Cladding Strips	ERNiCrMo-3 / S Ni 6625 (NiCr22M09Nb) AWS/SFA A5.14/EN ISO 18274 ERNiCrMo-4 / S Ni 6276 (NiCr15M016Fe6W4) AWS/SFA A5.14/EN ISO 18274 ERNiCr-3 / S Ni 6082 (NiCr20Mn3Nb) AWS/SFA A5.14/EN ISO 1736 ERNiL-1 / SG NITi4 / (Werkstoff Nr. 2.4155) AWS/SFA A5.14/ISO 1736 ERNiCu-7 / SG NiCu30 MnTi / (Werkstoff Nr 2.4377) AWS/SFA A5.14/EN ISO 18274 ERNiE-Cr-1 / SNi 8065 (NiFe30Cr21M03) AWS A5.34 / ENiCrMo3T1-4 AWS/SFA A5.14 / EN ISO 18274	<0.10 <0.02 <0.10 <0.05 <0.05 <0.05 Chem 0,10 Chem	<0.5( <1.0 2.5- 3.5 <0.8 2.0- 4.0 <1.0 <1.0 0,50	<ul> <li>&lt;0.50</li> <li>&lt;0.08</li> <li>&lt;0.50</li> <li>&lt;0.7</li> <li>&lt;1.0</li> <li>&lt;0.50</li> <li>omposition (0,50)</li> <li>omposition (0,50)</li> </ul>	<0.50 4.0- 7.0 <3.0 <0.7 0.5- 2.5 <28 ition, <i>z</i> 5,0	20.0- 23.0 14.5- 16.5 18.0- 22.0 19.5- 23.5 19.5- 23.5 20.0 - 23.0	8.0- 10.0 15.0- 17.0 2.5- 3.5 I metal 8.0 - 10.0 I metal	>60.0 >50.0 >67.0 >93.0 62.0- 69.0 >42 (%) >58.0 (%)	4.15 2.0- 3.0 <0.5 3.15- 4.15 4.0		<0.015	<0.020<0.020	<1.0 <1.0	<0.7 2.0- 3.5 1.5 3.0 0.5- 1.2 0,40	<0.50 <0.2 28.0- 32.0 1.5- 3.0 0,50	<2.5	<0.3	<0.5





#### **General alloy description**

OK Ni-1 is a stick electrode for joining commercial pure nickel in wrought and cast forms. It can also be used to join dissimilar metals such as nickel to steel, nickel to copper and copper to steel. Moreover, this electrode can be used for surfacing steel.

OK NiCrFe-2 is a nickel-based electrode for welding alloy 600 and similar alloys, cryogenic steels (e.g. 9%Ni and 5%Ni steels), martensitic to austenitic steels, dissimilar steels, heatresistant steel castings with limited weldability and so on. The weldability is good in all positions, even the overhead position.

OK NiCrFe-3 is a nickel-based electrode for welding nickel alloys such as Inconel 600 and similar Inconel alloys, cryogenic steels, martensitic to austenitic steels, dissimilar steels, heatresistant steels and castings with limited weldability.

OK NiCrMo-5 is a nickel-based, super-alloy electrode of the NiCrMoW type. Alloy 625 deposits an extremely tough, work-hardening weld metal, which is resistant to attacks by the most commonly used acids. The weld metal is also resistant to high temperatures.

OK NiCrMo-3 is a NiCrMoNb-based electrode for welding nickel alloys of the same or similar type, like Inconel 625, and for welding 5Ni and 9Ni steel. NiCrMo-5 is also suitable for welding UNS S31254 steel.

OK 92.55 is an all-positional, basic coated electrode which deposits a nickel-based alloy with additions of Mo, W and Nb. The electrode is specifically designed for welding 9%Ni steels for cryogenic applications down to -196°C.

OK NiCrMo-13 is designed for welding alloy 59, C-276 and 625 Ni-based materials. It is also suitable for welding super austenitic steels like AISI /ASTM S31254 and S32654.

A nickel-copper electrode for welding NiCu alloys to themselves and to steels and for corrosion-resistant surfacing. The weld metal of NiCu-7 is crack resistant and ductile and meets rigorous requirements relating to corrosion resistance in sea water and in reducing and oxidizing acids. NiCu-7 is used for welding corrosion-resistant monel alloys within the petroleum and ammonium sulphate industry and in power plants.

A nickel-cored electrode for joining normal grades of cast iron, such as grey-, ductile- and malleable irons. It is also suitable for rectification and repair of these grade and for joining them to steel. Deposition is done on cold or slightly preheated cast iron. Weld metal is well machinable.

A nickel-iron cored electrode for joining normal grades of cast iron, such as grey-, ductile- and malleable irons. It is also suitable for rectification and repair of these grades and for joining them to steel. Deposition is done on cold or slightly preheated cast iron. Weld metal is well machinable. The electrode produces a weld metal stronger and more resistant to solidification cracking than that of the nickel electrode type, also used for welding of cast iron. Because of this it is specially used for high duty welds in ductile irons and for welding grey irons with increased contents of sulfur and phosphorous.

A nickel-iron cored electrode for welding normal grades of cast iron and for joining them to steel. A special iron jacketed Ni core wire gives the electrode much improved current carrying capacity compared to electrodes with a homogeneous core wire. The electrode produces a weld metal stronger and more resistant to solidification cracking than the nickel electrode typed, also used for welding cast iron.

A nickel-copper cored electrode for welding normal grades of cast iron such as gray-, ductile- and malleable irons. Deposition is done on cold or slightly preheated material . The weld metal is well machinable and the color is very similar to that of cast iron.

A continuous, solid, corrosion- and heat resistant, Ni-Cr- Mo wire for welding high-alloyed heat-resistant and corrosion-resistant materials, 9% Ni steels and similar steels with high notch toughness at low temperature. It is also suitable for joining dissimilar metals of the types mentioned above. The weld metal has very good mechanical properties at high and low temperatures. Good resistance to pitting and stress corrosion. Most common use is corrosion protection weld overlay in the oil and gas sector.

OK Autrod NiCrMo-4 is a corrosion and heat resistant, nickel-chromium wire for submerged arc welding of high alloyed steel, heat resistant steel, corrosion resistant steel, 9% Ni steels and similar steels with high notch toughness at low temperatures. OK Autrod NiCrMo-4 can be combined with OK Flux 10.90 or OK Flux 10.16.

A nickel-based, corrosion- and heat-resistant, 20% Cr, 3% Mo, 2.5% Nb electrode for the GMAW of the high-alloyed steel, heat-resistant steel, corrosion-resistant steel, 9% Ni and similar steels with high notch toughness at low temperatures. It is suitable for joining dissimilar metals of the type mentioned above. OK Autrod NiCr-3 is usually welded with pure Argon as the shielding gas.

A nickel-based, electrode alloyed with 3% Ti for GMAW of high-purity nickel (min. 99.6% Ni), ordinary wrought nickel and nickel with reduced carbon content. OK Autrod Ni-1 is usually welded with pure Argon as the shielding gas.

A nickel-based electrode alloyed with about 30% Cu, 2% Ti and 1% Fe for GMAW of base materials of the same type. It can also be used for joining these alloys to steel. OK Autrod NiCu-7 is usually welded with pure Argon as the shielding gas.

Filler metal of this classification is used in the welding of nickel, iron, chromium, molybdenum, cooper bearing alloys such as UNS N08825 to itself with the GTAW and /or GMAW weld processes. This grade is also used to clad carbon and low alloy materials for use in the oil and gas markets

Shield-Bright NiCrMo-3 is an all position rutile wire for welding Ni-Cr-Mo alloys, 9% nickel steels and dissimiliar materials. An 80 % Argon / 20 % CO2 shielding gas should be used.

OK Band NiCrMo3 is a nickel-based strip for submerged arc strip cladding. Together with the proper ESAB OK flux such as OK Flux 10.17 it produces a weld overlay with good corrosion resistance and high temperature properties. Used extensively in the oil, gas and energy production sectors. OK Band NiCr3 is a nickel-based strip for submerged arc strip cladding. Together with proper flux ESAB flux, such as OK Flux 10.17, it produces a weld overlay with good corrosion

resistance and high temperature properties.

OK Band NiCu7 is a nickel-based strip for submerged arc strip cladding. Together with OK Flux 10.17 it produces a weld overlay with good corrosion resistance and high temperature properties. OK Flux 10.18 is specifically designed for use with NiCu7 strip to reach a NiCu composition on non-alloyed steel in three layers.



# Submerged arc and strip cladding fluxes

		Typical chemical co	mpositio	on, all v	weld m	etal (%	)				all weld		nical pro DC+	perties
OK Flux 10.9	0		С	Si	Mn	Cr	Ni	Мо	Fe	Other	ReL/ Reh	Rm	A4/ A5	CVN
											(Mpa)	(Mpa)	(%)	(J at °C)
Classification	EN 760: SA AF 2 CrNi DC	With OK NiCrMo-3	0.01	0.2	2.0	21.0	Bal.	8.5	2.0	Nb+Ta=3.0	440	720	33	90 at -196°
Basicity index	1.7	With OK NiCrMo-4	0.01	0.2	1.9	15.0	Bal.	14	7.0	W=3.5	480	700	35	75 at -196°
Density	-1.0kg/m3													
Grain size	0.25 – 1.6mm	OK Flux 10.90 is an agglo 9% nickel steels, other hig								iroo				
Slag type	Basic	It is primarily used for mul						ig nickei	-baseu w	1163.				
Polarity	DC+													
Alloy transfer	Cr compensating, Ni and Mn alloying										<b>-</b> .			
		Typical chemical	composi	tion, a	ll weld	metal	(%)					al mecr Id meta	•	roperties
OK Flux 10.9	3		с	Si	Mn	Cr	Ni	Мо	Fe	Other	ReL/ Reh	Rm	A4/ A5	CVN
											(Mpa)	(Mpa)	(%)	(J at °C)
Classification	EN 760: SA AF 2 DC	With OK NiCrMo-3	0.02	0.4	0.2	22	>60	9	5	Nb+Ta=3.0	340	570	45	60 at -196°
	1.7													
Basicity index														
Basicity index Density	-1.0kg/m3													
		OK Flux 10.93 is an agglo												
Density	-1.0kg/m3	stainless steels and Nicke thicknesses giving excelle	<ol> <li>It is used nt welding</li> </ol>	for sing characte	le run an eristics. I	d multi-ru can be c	n weldin	g of all p I with a v	late vide rang					
Density Grain size	-1.0kg/m3 0.25 – 1.6mm	stainless steels and Nicke	<ol> <li>It is used nt welding ommonly u</li> </ol>	for sing characte	le run an eristics. I	d multi-ru can be c	n weldin	g of all p I with a v	late vide rang					
Density Grain size Slag type	-1.0kg/m3 0.25 – 1.6mm Basic	stainless steels and Nicke thicknesses giving excelle of stainless wires and is co	<ol> <li>It is used nt welding ommonly u</li> </ol>	for sing characte	le run an eristics. I	d multi-ru can be c	n weldin	g of all p I with a v	late vide rang					
Density Grain size Slag type Polarity	-1.0kg/m3 0.25 – 1.6mm Basic DC+	stainless steels and Nicke thicknesses giving excelle of stainless wires and is co	I. It is used nt welding ommonly u ss steels.	for sing characte sed for b	le run an eristics. If outt and f	d multi-ru can be c illet weldi	n weldin ombined ng of all	g of all p I with a v	late vide rang					
Density Grain size Slag type Polarity	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None	stainless steels and Nicke thicknesses giving excelle of stainless wires and is co and higher alloyed stainles	I. It is used nt welding ommonly u ss steels.	for sing characte sed for b	le run an eristics. If outt and f	d multi-ru can be c illet weldi	n weldin ombined ng of all	g of all p I with a v	late vide rang					
Density Grain size Slag type Polarity Alloy transfer	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None	stainless steels and Nicke thicknesses giving excelle of stainless wires and is co and higher alloyed stainles	I. It is used nt welding ommonly u ss steels. mpositic	for sing characte sed for b n, all v	le run an eristics. If outt and f weld m	d multi-ru can be c illet weldi etal (%	n weldin ombined ng of all	g of all p I with a v standard	late vide rang I austenii	lic				
Density Grain size Slag type Polarity Alloy transfer OK Flux 10.1	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None	stainless steels and Nicke thicknesses giving excelle of stainless wires and is cr and higher alloyed stainles Typical chemical con	I. It is used nt welding ommonly u ss steels. mpositic	for sing characte sed for b n, all v	le run an eristics. If outt and f weld m	d multi-ru can be c illet weldi etal (%	n weldin ombined ng of all	g of all p I with a v standard	late vide rang I austenii	lic				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None 1 EN 760: SA AF 2 CrNi DC	stainless steels and Nicke thicknesses giving excelle of stainless wires and is co and higher alloyed stainles Typical chemical con With OK NiCrMo-3	I. It is used nt welding ommonly u ss steels. mpositic	for sing characte sed for b n, all v Si	le run an eristics. It butt and f weld m Mn	d multi-ru can be c illet weldi etal (% Cr	n weldin ombined ng of all ) Ni	g of all p I with a v standard	ilate vide rang I austenii Fe	iic Other				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification Basicity index	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None 1 EN 760: SA AF 2 CrNi DC 5.4	stainless steels and Nicke thicknesses giving excelle of stainless wires and is c and higher alloyed stainles Typical chemical con With OK NiCrMo-3 1st layer on mild steel 2nd layer on mild steel High basic. agglomerated	I. It is used nt welding ommonly u ss steels. mpositic c 0.03 0.02 flux design	for sing characterised for the m, all w Si 0.5 0.3 med for e	le run an eristics. I butt and f weld m 0.2 0.1 lectro-sla	d multi-ru can be c illet weldi etal (% Cr 19.5 21.0 ng strip cla	n weldin ombined ng of all ) Ni Bal. Bal. adding w	g of all p l with a v standard <b>Mo</b> 8.0 8.1 vith the	plate vide rang d austenin Fe 9.0 2.0	<b>Other</b> Nb+Ta=3.2				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification Basicity index Density	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None <b>1</b> EN 760: SA AF 2 CrNi DC 5.4 -1.0kg/m3	stainless steels and Nicke thicknesses giving excelle of stainless wires and is or and higher alloyed stainles Typical chemical con With OK NiCrMo-3 1st layer on mild steel 2nd layer on mild steel	I. It is used nt welding ommonly u ss steels. mpositic c 0.03 0.02 flux design nd nickel-i	for sing characterised for the m, all w Si 0.5 0.3 med for e	le run an eristics. I butt and f weld m 0.2 0.1 lectro-sla	d multi-ru can be c illet weldi etal (% Cr 19.5 21.0 ng strip cla	n weldin ombined ng of all ) Ni Bal. Bal. adding w	g of all p l with a v standard <b>Mo</b> 8.0 8.1 vith the	plate vide rang d austenin Fe 9.0 2.0	<b>Other</b> Nb+Ta=3.2				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification Basicity index Density Grain size	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None 1 EN 760: SA AF 2 CrNi DC 5.4 -1.0kg/m3 0.2 – 1.0mm	stainless steels and Nicke thicknesses giving excelle of stainless wires and is or and higher alloyed stainles Typical chemical con With OK NiCrMo-3 1st layer on mild steel 2nd layer on mild steel High basic. agglomerated stainless. fully austenitic a	I. It is used nt welding ommonly u ss steels. mpositic c 0.03 0.02 flux design nd nickel-i	for sing characterised for the m, all w Si 0.5 0.3 med for e	le run an eristics. I butt and f weld m 0.2 0.1 lectro-sla	d multi-ru can be c illet weldi etal (% Cr 19.5 21.0 ng strip cla	n weldin ombined ng of all ) Ni Bal. Bal. adding w	g of all p l with a v standard <b>Mo</b> 8.0 8.1 vith the	plate vide rang d austenin Fe 9.0 2.0	<b>Other</b> Nb+Ta=3.2				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification Basicity index Density Grain size Slag type	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None I EN 760: SA AF 2 CrNi DC 5.4 -1.0kg/m3 0.2 – 1.0mm Very high basic	stainless steels and Nicke thicknesses giving excelle of stainless wires and is or and higher alloyed stainles Typical chemical con With OK NiCrMo-3 1st layer on mild steel 2nd layer on mild steel High basic. agglomerated stainless. fully austenitic a	I. It is used nt welding ommonly u ss steels. mpositic c 0.03 0.02 flux design nd nickel-i	for sing characterised for the m, all w Si 0.5 0.3 med for e	le run an eristics. I butt and f weld m 0.2 0.1 lectro-sla	d multi-ru can be c illet weldi etal (% Cr 19.5 21.0 ng strip cla	n weldin ombined ng of all ) Ni Bal. Bal. adding w	g of all p l with a v standard <b>Mo</b> 8.0 8.1 vith the	plate vide rang d austenin Fe 9.0 2.0	<b>Other</b> Nb+Ta=3.2				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification Basicity index Density Grain size Slag type Polarity	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None <b>1</b> EN 760: SA AF 2 CrNi DC 5.4 -1.0kg/m3 0.2 – 1.0mm Very high basic DC+	stainless steels and Nicke thicknesses giving excelle of stainless wires and is or and higher alloyed stainles Typical chemical con With OK NiCrMo-3 1st layer on mild steel 2nd layer on mild steel High basic. agglomerated stainless. fully austenitic a	I. It is used th welding mmonly use ss steels. mpositic c 0.03 0.02 flux design nd nickel-1 ng speed.	for sing character sed for b on, all v 0.5 0.3 med for e pased str	le run an eristics. Il putt and f weld m 0.2 0.1 lectro-sla rips. Can	d multi-ru can be c illet weldi etal (% Cr 19.5 21.0 Ig strip cl. be used	n weldin ombined ng of all ) Ni Bal. Bal. adding w for single	g of all p l with a v standard <b>Mo</b> 8.0 8.1 vith the	plate vide rang d austenin Fe 9.0 2.0	<b>Other</b> Nb+Ta=3.2				
Density Grain size Slag type Polarity Alloy transfer <b>OK Flux 10.1</b> Classification Basicity index Density Grain size Slag type Polarity	-1.0kg/m3 0.25 – 1.6mm Basic DC+ None <b>1</b> EN 760: SA AF 2 CrNi DC 5.4 -1.0kg/m3 0.2 – 1.0mm Very high basic DC+ None	stainless steels and Nicke thicknesses giving excelle of stainless wires and is or and higher alloyed stainles Typical chemical con With OK NiCrMo-3 1st layer on mild steel 2nd layer on mild steel High basic. agglomerated stainless. fully austenitic a cladding with higher weldi	I. It is used th welding mmonly use ss steels. mpositic c 0.03 0.02 flux design nd nickel-1 ng speed.	for sing character sed for b on, all v 0.5 0.3 med for e pased str	le run an eristics. Il putt and f weld m 0.2 0.1 lectro-sla rips. Can	d multi-ru can be c illet weldi etal (% Cr 19.5 21.0 Ig strip cl. be used	n weldin ombined ng of all ) Ni Bal. Bal. adding w for single	g of all p l with a v standard <b>Mo</b> 8.0 8.1 vith the	plate vide rang d austenin Fe 9.0 2.0	<b>Other</b> Nb+Ta=3.2				
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OK Flux 10.17 is a high basic. agglomerated flux designed for submerged arc strip cladding with all grades of nicke-based strips. OK Flux 10.17 is new ESAB flux for internal overlay welding on mild or low alloyed steel. It has very good welding characteristics gives a smooth bead appearance and easy slag removal. For chemical and petrochemical plants. offshore constructions. marine equipments. pressure vessels. storage tanks. Etc



## **Packaging options**

MIG	Weight	Туре	ESAB	Description	A
	15kg	KS300	98-2	Layer-wound wire basket, plastic coated, which is used without adapter. Fitting to hub with diam. = 51 mm. Empty spool is recyclable.	
	12.5kg	D300	24-8	Plastic spool. Layer wound. EN 759: S 300	
	25kg	Euro Spool	31-1	Precision-wound octagonal wire basket. Can be fitted to ESAB's 0416 492 880 or 0153 872 880 coil adaptor. This spool is also suitable for coil holders with crossed arms. The empty basket is recyclable.	
	150kg	Wooden	34-4	Random-wound wooden bobbin. Decoiling stand required. The empty bobbin is recyclable.	
	250kg	OMP	93-2	Special coiling techniques that is used when packing the Marathon Pac ensures that the wire in never twisted or warped,	
	100kg	OMP	95-0	which would otherwise cause arc wander. The feeding from the Pac in automatic and requires no additional equipment or forces. This translates to less wear on the wire feeder systems. Marathon Pac comes in an octagonal cardboard drum that can be folded flat, to save on space and is fully recyclable.	ARATHON MARATHON B PAC P

B Description	ESAB	Туре	Length	TIG
5kg Tube		R15		<b>C N</b>

ММА	Diameter	Туре	ESAB	Description
	2.5mm	Vac Pac	L0	1/4 VP Approx. 1kg
	3.2mm	Vac Pac	L0	1/4 VP Approx. 1kg
	4.0mm	Vac Pac	G0	1/2 VP Approx. 2.5kg

The VacPac sizing options make it possible to match the number of electrodes to the expected production rate and are the electrodes are available as half and quarter packs, containing approximately 2.5 or 1 kg of electrodes.

SAW	Diameter	Туре	ESAB	Description
	1.6mm	Euro Spool	31-1	Precision-woun 880 or 0153 87
	2.0mm	Euro Spool	31-1	coil handler with
	2.4mm	Euro Spool	31-1	
	3.2mm	Euro Spool	31-1	

recision-wound wire basket. Can be fitted to ESAB's 0416 492 80 or 0153 872 880 coil handler. This spool is also suitable for oil handler with cross arms. The empty basket is recyclable.



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# World leader in welding and cutting technology and systems.



2 layer clad pipe section.

ESAB operates at the forefront of welding and cutting technology. Over one hundred years of continuous improvement in products and processes enables us to meet the challenges of technological advance in every sector in which we operate..

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