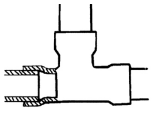
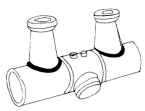
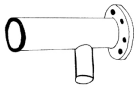
ARC WELDING CONSUMABLES AND APPLICATION GUIDE

AMERARC FERROUS ELECTRODES

FOR WELDING	TYPE	WT. (kg/PK)	DIA./LENGTH (mm X mm)	RECOMMENDED AMPERAGE	PCN	APPLICATION INFORMATION
MILD STEEL NORMAL CONDITIONS	**ER** GENERAL PURPOSE RUTILE	1.5 4.1 5.0 5.9	2.0 X 300 2.5 X 350 3.2 X 350 4.0 X 350	30 - 50 50 - 70 70 - 110 105 - 150 AC/DC (+/-)	0630047 0630054 0630062 0630070	**AMERARC ER** is a heavily coated rutile electrode used in all positions on AC or DC with positive or negative polarity. Arc action is particularly stable even when welding with low open circuit voltage transformers. Bead appearance is smooth and flat, and slag removal is easy. AMERARC ER electrodes have excellent wetting action and produce shallow penetration making it suitable for thin metal welding as well as butt, fillet and outside corner welds. **Tensile Strength: 490-600 N/mm^2**
	EO GENERAL PURPOSE ORGANIC	4.4 4.7 4.8	2.5 X 350 3.2 X 350 4.0 X 350	45 - 80 75 - 110 105 - 150 AC/DC (+/-)	0631060 0631078 0631086	**AMERARC EO** is a general purpose mild steel electrode that can be used in all positions. When used at lower current levels (shallow penetrations), it is superior for welding thin sections, joints with poor fit-up or for bridging gaps. The weld bead is smooth in appearance, wetting and fill are excellent. Slag is easily removed. AMERARC EO is especially easy to use for vertical down welding. Striking and restriking is easy, even on low voltage transformers. AMERARC EO is used for general mild steel fabrication in all positions, for tack welding most rusty or galvanized plates and for ordinary ship's plates of A-, D- and E-Quality. **Tensile Strength: 480-580 N/mm^2**
	PIPE DEEP PENETRATION ALL POSITION	4.3 4.6 4.5	2.5 X 350 3.25 X 350 4.0 X 350	45 - 80 75 - 110 105 - 150 DC (+)	0993015 0993023 0993031	**AMERARC PIPE** is an all-position cellulosic electrode producing an exceptionally smooth, evenly rippled weld bead with light slag and a high quality weld d eposit. The arc is stable over a wide range of current and is forceful, providing good control in all positions including vertical down applications. Penetration is deep, producing highly ductile, sound root welds free of defects. AMERARC PIPE electrodes are recommended for welding pipe, pressure vessels, tanks with plain or galvanized surfaces and general shipboard maintenance. **Tensile Strength: 520 - 535 N/mm^2**
	ECEL ALL POSITION	4.5 4.5 4.5	2.5 X 350 3.25 X 350 4.0 X 350	25 - 75 35 - 125 50 - 160 AC/DC (+)	0994013 0994021 0994039	**AMERARC ECEL** is an all-position cellulosic electrode, producing an exceptionally smooth, excellent quality weld deposit with very light slag. The forceful arc is easy to control, has good stability even at low current and freezes quickly. The penetration is deep, producing highly ductile, sound root welds, free from porosity and lack of fusion. The coating generates a large volume of shielding gas to eliminate porosity and problems associated with dirt and oil contamination. AMERARC ECEL electrodes are used for welding mild steels such as ASTM A-36,-283,-284,-285,-515,-516, and ABS Hull and Boiler steel. Typical applications include pressure vessels, fabricated structures, piping, tanks and general shipboard maintenance. **Tensile Strength: 520 - 535 N/mm^2**
	EOHP HIGH PERFORMANCE	5.0 5.0 5.0	4.0 X 350 5.0 X 350 6.3 X 350	180 - 240 250 - 290 320 - 400 AC/DC (+)	0994054 0994062 0994070	**AMERARC EOHP** is a heavily coated, iron powder electrode providing high deposition rates for flat (downhand) and horizontal welding with good weldability and superior mechanical properties. The electrode easily produces equal leg fillets with smooth bead appearance and self-cleaning slag. Features include increased penetration with minimal root porosity in the recommended welding positions. The electrode is easy to control. AMERARC EOHP is ideal for making high speed horizontal fillet, butt and lap welds on mild plate and structural steels such as decking, hatch covers, etc. **Tensile Strength: 480 - 570 N/mm^2**



Contact your Drew Marine representative for more information

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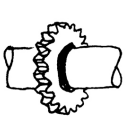
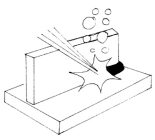
AMERARC FERROUS ELECTRODES

FOR WELDING	TYPE	WT. (kg/PK)	DIA./LENGTH (mm X mm)	RECOMMENDED AMPERAGE	PCN	APPLICATION INFORMATION
MILD STEEL UNDER HIGH STRESS	**LH** LOW HYDROGEN ELECTRODE	4.1 4 4.1	2.5 X 350 3.2 X 350 4.0 X 350	65 - 100 100 - 140 140 - 190 AC/DC (+/-)	0634049 0634056 0634064	**AMERARC LH** is a basic coated general purpose electrode with controlled low hydrogen well-suited for a broad range of general welding and repair applications. The superior mechanical properties of the weld metal make AMERARC LH a superior choice for applications with higher stress levels due to base metal chemistry or joint configuration. The coating produces a good weld bead appearance with a stable arc. The iron powder content of the coating produces a high deposition rate and metal recovery rate of 120%. Superior welding performance in the vertical up position. It is well-suited for welding ordinary and high strength ship's plates of A-, D- and E-Quality and also for galvanized plates. **Tensile Strength: 550 - 610 N/mm^2**
	LV LOW HYDROGEN VERTICAL DOWN	4.5 4.3	3.2 X 350 4.0 X 350	(Vertical Down) 120 - 160 150 - 210 AC/DC (+)	0638041 0638058	**AMERARC LV** is a basic-type, low hydrogen electrode with outstanding operating characteristics in the vertical down position. AMERARC LV can be used at relatively higher amperages providing high welding speeds with low heat input – the result – enhanced productivity and low residual stress and deformation. Excellent mechanical properties make AMERARC LV well suited for welding structures subjected to high stress conditions and/or low temperature impact loading. AMERARC LV is recommended for welding ordinary and high strength ship plates of A-D quality, including high strength, low alloy steels. **Tensile Strength: 500-640 N/mm^2**
HARD FACING	**HF38** MID-RANGE	4.3	3.25 X 350	90 - 110 AC/DC (+)	0817025	**AMERARC HF38** is an intermediate range hard-facing electrode with mechanical work-hardening properties well suited to applications combining high compressive loading and abrasion with excellent resistance to impact loading. The hardness of the weld deposit is Rc33-41/ HBN 310-380. The weld deposit is machinable and can be flame cut. AMERARC HF38 is well suited to repair hatch cover rails and rollers, sheaves and winches and components of bulk carrier unloading gear. It is also an excellent choice for build up of severely worn areas prior to the application of AMERARC HF60.
	HF60 HIGH HARDNESS	4.5 4.5	3.25 X 350 4.0 X 350	110 - 140 160 - 200 AC/DC (+)	0996019 0996027	**AMERARC HF60** is a high hardness range hard facing electrode based on a high chromium carbide composite with a rutile coating. It is ideally suited for rebuilding surfaces that have been worn due to moderate impact and/or severe abrasion. The very high chrome content produces a dense, smooth, easily polished, wear resistant surface. The as-welded surface has a minimum of ripple for this purpose. AMERARC HF60 is an excellent choice for resurfacing worn machine parts, hatch coam ings, grates, conveyor screws, shackles, buckets, rails and cat's pawls.
STAINLESS STEEL	**DP** DUPLEX STAINLESS STEEL	1.7 1.7	2.5 X 300 3.25 X 350	50 - 80 70 - 100 AC/DC (+/-)	0919011 0919029	**AMERARC DP** is a duplex stainless electrode for welding and cladding of austenitic/ferritic stainless steels. The nitrogen-based weld metal is resistant to chloride-containing medias.Also, the AMERARC DP has high stre ngth and good overall welding characteristics to combine with the excellent corrosion resistance. In the as-welded condition, the deposits have between 30%-50% ferrite and welding conditions should be used that will result in this same structure. **Tensile Strength: 800 N/mm^2**



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AMERARC FERROUS ELECTRODES

FOR WELDING	TYPE	WT. (kg/PK)	DIA./LENGTH (mm X mm)	RECOMMENDED AMPERAGE	PCN	APPLICATION INFORMATION
AUSTENITIC STAINLESS STEEL	**ST** STAINLESS STEEL	1.5 1.7	2.5 X 300 3.25 X 350	50 - 80 70 - 120 AC/DC (+)	0639023 0640020	**AMERARC ST** is a basic rutile type stainless steel electrode providing an 18 Cr, 12 Ni, 2 Mo weld deposit. It is suitable for welding austenitic steels of types AISI 316/316L Werkstoff 1.4404, 1.4401 and 1.4406 and similar standards. Operates well on both AC and DC positive polarity and has excellent out-of-position characteristics. Arc striking and restriking with AMERARC ST is easy and the electrode is free from short circuiting during welding. Slag removal is good and fillet welds have outstanding appearance. It is an extra low carbon type for highest corrosion resistance. **Tensile Strength: 580 N/mm^2 (Avg)**
	STV VERTICAL DOWN	2.2 2.2	2.5 X 300 3.25 X 300	60 - 80 90 - 110 AC/DC (+)	0997017 0997025	**AMERARC STV** is a specially formulated low carbon stainless steel electrode for joining titanium and niobium-stabilized 18/8 stainless steels. It is excellent for all positions of welding but excels in vertical down applications. The electrode produces a very smooth bead with good wetting resulting in a high quality weld deposit with a minimum of spatter and easily removable slag. AMERARC STV provides a smooth running arc, produces excellent welds in thin walled stainless steel piping and tanks in the vertical position. **Tensile Strength: 560 N/mm^2 (Avg)**
	SSMO MOLYBDENUM STAINLESS STEEL	1.7 2.2 2.2 2.2	1.6 X 300 2.5 X 300 3.25 X 350 4.0 X 350	25 - 45 40 - 80 65 - 120 90 - 150 AC/DC (+)	0816043 0816019 0816027 0816035	**AMERARC SSMO** is a highly alloyed rutile coated molybdenum stainless steel electrode suitable for welding in all positions with AC or DC. The slag is self-releasing, revealing a weld bead of exceptionally smooth contour without undercut or cold lap. The higher chromium and nickel content in combination with the molybdenum provides exceptional corrosion resistance of the weld deposit. AMERARC SSMO is especially well suited for welding or repairing stainless clad steel plates where corrosion resistance of the weld metal is critical. It is ideal for joining or repairing stainless steel piping, heating coils and fittings in stainless steel cargo tanks. **Tensile Strength: 650 N/mm2 (Avg)**
ALLOY STEELS	**CRMO** CHROME-MOLY LOW HYDROGEN	4.5 4.5	2.5 X 350 3.25 X 350	65 - 95 90 - 140 AC/DC (+/-)	0815011 0815029	**AMERARC CRMO** is a basic coated, extra low hydrogen electrode with major alloying elements of chromium and molybdenum. A limited carbon content reduces the possibility of cracking when welding the alloy steels for which this electrode is intended. These steels include 1/2% Cr - 1/2% Mo, 1% Cr - 1% Mo, 11/4% Cr - 1/2% Mo, which are typically used in high pressure boilers and power piping with a maximum service temperature of 550°C. AMERARC CRMO is ideally suited for welding creep and hydrogen resistant CrMo steels. The electrode provides high welding speed and deposition rate and easily removed slag. **Tensile Strength: 550 - 520 N/mm^2**
HARDENABLE STEELS	**TE** HIGH CHROME-NICKEL	1.7	3.25 X 350	65 - 120 AC/DC (+/-)	0641028	**AMERARC TE** is recommended for welding medium and high carbon hardenable steels, machine components, tools, springs and other steels of unknown composition. It is highly tolerant of base metal dilution and is generally free of hot cracking tendencies. AMERARC TE may also be used for welding dissimilar steels or under conditions where high temperature scaling resistance is important. The electrode operates well on both AC and DC positive polarity, has good slag removal and the finished weld bead may be polished to a hard high gloss surface with excellent wear characteristics. AMERARC TE is not recommended for welding cast irons or for repairing engine valves. **Tensile Strength: 830 N/mm2 (Avg)**
COBALT CHROMIUM HIGH TEMP. HIGH IMPACT	**COCR** COBALT CHROMIUM	2.2 2.2	3.25 X 350 4.0 X 350	80 - 110 100 - 150 AC/DC (+)	0814013 0814021	**AMERARC COCR** is a cobalt, chromium, tungsten alloy electrode with superior resistance to wear, erosion and impact at high temperatures. The metal core is fully alloyed assuring specified deposit composition if coating is chipped. AMERARC COCR is well suited for repairing/refacing engine valves and valve seats, pump rotors and corrosive fluid valve elements. **Tensile Strength: 890 N/mm^2 (Avg)**

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AMERARC FERROUS ELECTRODES

FOR WELDING	TYPE	WT. (kg/PK)	DIA./LENGTH (mm X mm)	RECOMMENDED AMPERAGE	PCN	APPLICATION INFORMATION
COPPER BASE ALLOYS and JOINING DISSIMILAR METALS SEE HANDBOOK	**NI99** HIGH NICKEL	1.7 2.1	2.5 X 300 3.25 X 350	30 - 70 55 - 110 AC/DC (-)	0642026 0643024	**AMERARC NI99** is a low slagging, high nickel electrode especially designed for cold welding of cast irons to produce crack-free, machinable welds in all positions. The unique coating produces a pulsed arc providing good penetration through surface skin and contaminants for a porosity-free weld without overheating and avoiding stress cracks. Preheating is not usually required. AMERARC NI99 can also be used for welding cast irons to other metals such as steel, stainless steel, clad steel and copper-based metal alloys. **Tensile Strength: 350 N/mm^2 (Avg)**
	NI60 NICKEL IRON	1.9 1.9	3.25 X 350 4.0 X 350	70 - 110 90 - 130 AC/DC (+)	0644022 0645020	**AMERARC NI60** is a lower nickel alloy than the AMERARC NI99 companion electrode. It has excellent operating characteristics with very low slagging and will operate on either DC positive or AC welding power. AMERARC NI60 is recommended for welding cast iron where color matching is important or where large cavities must be filled. Always use the lowest possible amperage and weld for short time periods intermittently in order to reduce heat-induced stresses and the possibility of cracking. For heavy sections, preheating to 300°C is advisable. Peening between passes to reduce residual stresses is recommended and the work should be covered or blanketed in order to produce a slow cooling rate. The electrode may also be used to weld malleable cast iron and for welding iron to steel. The deposit is machinable. **Tensile Strength: 520 N/mm^2 (Avg)**

AMERARC NON-FERROUS ELECTRODES

AUSTENITIC STAINLESS STEEL	**SN** TIN BRONZE	1.9	3.25 X 350	100 - 150 DC (+)	0648024	**AMERARC SN** is a tIn-bronze electrode recommended for joining copper base alloys to themselves or to steel or cast iron. It may also be used for welding cast iron without preheat where machining after welding is not required and for cladding of steels and other material and for filling cavities. AMERARC SN is used with DC positive polarity only. Avoid working temperature range of 400-600°C due to risk of hot shortness. **Tensile Strength: 420 N/mm^2**
	AB ALUMINUM BRONZE	1.8	3.25 X 350	90 - 125 DC (+)	0646028	**AMERARC AB** is an aluminum-bronze electrode intended for building up or joining copper base alloys or for welding copper base alloys to steel. May also be used for buildup of cast iron using normal precautions for this crack-sensitive material. AMERARC AB deposits exhibit high strength and are highly resistant to abrasion and wear. As on all copper welding, preheating is advisable. Best results obtained in flat or horizontal position with DC positive. **Tensile Strength: 690 N/mm^2**
ALLOY STEELS	**AL** ALUMINUM	0.8	3.25 X 350	80 - 130 DC (+)	0647026	**AMERARC AL** is an aluminum-silicon electrode suitable for welding cast or extruded aluminum alloys of relatively heavy thickness. Typical applications are repair of aluminum castings or architectural or decorative components. AMERARC AL is used with DC positive polarity only. The electrode exhibits high burn-off rates and high welding speeds and therefore for starts and on heavy sections preheating may be required. The residual slag is corrosive and should be completely removed following welding. **Tensile Strength: 235 N/mm^2**
HARDENABLE STEELS	**CH** CHAMFERING GOUGING	2.8	3.25 X 350	160 - 180 AC/DC (-)	0649022	**AMERARC CH** is specifically designed for gouging out cracks, or back gouging of welds and for joint preparation. Its thick, specially-developed coating produces a strong plasma and gas jet which removes the material melted by the arc. AMERARC CH may be used for gouging most engineering materials such as steel, stainless cast iron and many non-ferrous metals. The resulting grooves are smooth and even and welding may follow immediately after gouging except on stainless steel, which should be thoroughly cleaned prior to welding. Either AC or DC negative polarity may be used. The electrode should be struck perpendicular to the work and then pointed in the direction of travel at an angle of approximately 20 degrees to the perpendicular. Travel speed of l00-150 CM/Min should be maintained. It can also be used for cutting and piercing holes. Good ventilation in closed areas is recommended.

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Drew Marine maintains Safety Data Sheets on all of its products. These documents contain health and safety information for the development of appropriate product handling procedures to protect your employees. Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Drew Marine products.

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