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METRODE WELDING CONSUMABLES

DATA SHEET **A-80**

RAILROD

Product description

MMA electrode for rail welding utilising basic low hydrogen flux coating with low moisture absorption characteristics. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

Specifications

None strictly applicable, nearest AWS E12016-G and nearest BS EN E69 Z Z B.

ASME IX Qualification

QW432 F-No -, QW442 A-No -.

Materials to be welded

Rail steels with up to 0.8% carbon and nominal tensile strength of > 700 MPa.

Applications

This electrode is especially designed for the butt welding of rails with square preparation. It can also be used for welding similar cross-sections such as bars, thick plates, flanges, etc. The electrode is specially designed to enable good fusion to the side walls to take place without excessive slag interference.
Weld metal has good resistance to collapse under compression by rolling loads.

Applications include **rails** for **rolling stock** and **crane rails** in **dockyards**, **mines**, **steelworks** and **petrochemical plants**.

Note that this technique has not been generally accepted as an alternative to the thermit process for in-situ welding of passenger track.

Microstructure

Mainly auto-tempered bainitic ferrite.

Welding guidelines

Preheat typically 200°C for >0.5%C rail steel, increasing to 300°C for >0.7%C rail steel. It is important to maintain these minimum temperatures during welding. Maximum suggested interpass temperature 400°C. Slow cool under insulation after welding.

This electrode is normally used in the downhand (flat) position with a slag-over-slag technique. Rail ends are square butt welded by setting 15-20mm apart with a prepared 4-6mm thick steel insert at the weld root, then copper shims are stacked to form an enclosure for the weld pool whilst allowing excess slag to run free.

Good surface profile underneath the weld root area will maximise fatigue resistance of the joint. Initial support for depositing the root can utilise a copper backing plate or wire-reinforced window glass. Before and during welding it is important to use a sufficient preheat-interpass range, and to retard cooling.

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo
min	0.06	0.7	0.2	--	--	2.0	--	--
max	0.12	1.5	0.8	0.020	0.025	2.6	0.5	0.5
typ	0.09	1	0.5	0.008	0.012	2.3	0.2	0.2

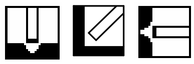
All-weld mechanical properties

As welded			typical
Tensile strength		MPa	900
0.2% Proof stress		MPa	700
Elongation on 4d		%	17
Impact energy *	+ 20°C	J	18-48
	0°C	J	14-43
Hardness		HV	280

* For comparison, typical thermit rail weld: 8J @ 20°C, 5J @ 0°C.

Parameters

DC +ve or AC (OCV: 70V min)



ø mm	3.2	5.0	6.0
min A	100	200	240
max A	160	280	360

Packaging data

ø mm	3.2 *	5.0	6.0 *	
length mm	380	450	450	
kg/carton	15.0	17.7	18.3	* supplied to order
pieces/carton	447	183	135	

Storage

3 hermetically sealed ring-pull metal tins per carton, with unlimited shelf life. Direct use from tin will give **hydrogen** <5ml/100g weld metal during 8h working shift.
For electrodes that have been exposed:
Redry 250-300°C/1-2h to ensure H_2 <10ml/100g, 300-350°C/1-2h to ensure H_2 <5ml/100g. Maximum 420°C, 3 cycles, 10h total.
Storage of redried electrodes at 100-200°C in holding oven or 50-150°C in heated quiver: no limit, but maximum 6 weeks recommended. Recommended ambient storage conditions for opened tins (using plastic lid): < 60% RH, >18°C.

Fume data

Fume composition, wt % typical:

Fe	Mn	Ni	Cr	Cu	Pb	F	OES (mg/m^3)
15	5	< 0.2	0.8	< 0.2	< 0.1	18	5