High Temperature Alloys

DATA SHEET **C-31**

METRODE PRODUCTS LTD
HANWORTH LANE, CHERTSEY
SURREY, KT16 9LL
Tel: +44(0)1932 566721
Fax: +44(0)1932 565168 Sales
Fax: +44(0)1932 569449 Technical
Fax: +44(0)1932 566199 Export
Email: info@metrode.com
Internet: http//www.metrode.com

310H ELECTRODE TO MATCH HK40

Alloy type

0.4%C-25%Cr-20%Ni (3 10H) austenitic cast alloy for heat resisting service.

Materials to be welded

ASTM	A351, A608 Grade HK40
DIN	1.4846 (X40CrNi 25 21) 1.4848 (G-X40CrNiSi 25 20)
BS	3100 Grade 310C40 1504 Grade 310C40
Proprietary	H20 (Doncasters Paralloy) Thermalloy 47 (Duraloy) Lloyds T47 (LBA) HR6 (Cronite)

Applications

Thermet 3 10H is designed to weld HK40 which is one of the standard materials for centrifugally cast tubes operating at around 1000°C.

These alloys are used in **reformer** and **steam cracker coils** in **chemical** and **petrochemical plants**. Also for components such as **billet skids**, **calinating tubes**, **kiln nose segments**, **conveyor rolls**, and **furnace structural items** in the **cement**, **ceramic** and **steel industries.**

Microstructure

In the as-welded condition the weld metal microstructure consists of austenite with eutectic and secondary carbides.

Welding guidelines

Generally no preheat or PWHT are required.

Related alloy groups

There are two other 310 alloy groups: the 3 10L (data sheet B-45) which is used for corrosion resistant applications not high temperature service, and the standard 310 alloys (data sheet C-30) which are used for the standard (0.1 %C) base materials.

Products available

Process	Product	Specification
MMA	**Thermet 310H**	AWS E310H-15

THERMET 310H

Basic all-positional MMA electrode for HK40 type castings

Product description

MMA electrode with basic flux coating made on 310 core wire to give low residual levels. The electrode is optimised for DC+ welding in all positions including fixed pipework in ASME 5G/6G positions. Moisture resistant coating giving sound porosity free deposits.

Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

Specifications

AWS A5.4	E310H-15
BS EN 1600	E 25 20 H B 42
BS 2926	25.20.H.B

ASME IX Qualification

QW432 F-No 5

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
min	0.35	1.0	--	--	--	25.0	20.0	--	--
max	0.45	2.0	0.70	0.025	0.030	28.0	22.0	0.50	0.50
typ	0.41	1.7	0.5	0.01	0.02	26	21	0.1	0.03

All-weld mechanical properties

As welded		min	typical
Tensile strength	MPa	620	760
0.2% Proof stress	MPa	350	550
Elongation on 4d	%	10	20
Elongation on 5d	%	10	17
Reduction of area	%	--	25
Hardness	HV	--	230

These alloys are designed for operation at elevated temperatures and modest ambient temperature elongations in the range 10-20% are normal.

Operating parameters

DC +ve

ø mm	2.5	3.2	4.0
min A	60	75	100
max A	90	120	155

Packaging data

ø mm	2.5	3.2	4.0
length mm	300	350	350
kg/carton	11.4	13.5	14.4
pieces/carton	546	384	258

Storage

3 hermetically sealed ring-pull metal tins per carton, with unlimited shelf life. Direct use from tin is satisfactory for longer than a working shift of 8h. Excessive exposure of electrodes to humid conditions will cause some moisture pick-up and increase the risk of porosity.
For electrodes that have been exposed:
Redry 200 – 250°C/1-2h to restore to as-packed condition. Maximum 350° C, 3 cycles, 10h total.
Storage of redried electrodes at 50 – 200°C in holding oven or 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	Mo	Cu	F	OES (mg/m^3)
12	6	2	8.5	<0.2	<0.2	16	0.6