Low Alloy Steels

DATA SHEET **A-22**

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T24 CONSUMABLES

Alloy type

2¼%Cr steel alloyed with Mo, V, Nb, and B for high temperature creep resistance.

Materials to be welded

BS EN 10216-2 X7CrMoVTiB10-10
ASTM A213 T24

Applications

These consumables are designed to weld equivalent 'type 24' 2¼%Cr steels modified with molybdenum, vanadium, niobium, and a small boron addition to give improved long term creep properties.

The consumables are intended for high integrity service at elevated temperature so the minor alloy additions responsible for creep strength are kept close to the parent material range. One exception is Ti/Nb; the T24 base material is alloyed with Ti but because of the difficulties in achieving consistent transfer of Ti in weld metals this is replaced with Nb.

The rupture strength of T24 can be up to twice that of T22 and interest in its use is growing as a candidate for components such as **waterwalls in ultra-super-critical boilers**, in fossil fuelled **power generating plants**.

Microstructure

In the PWHT condition the microstructure consists of bainite.

Welding guidelines

In many situations it is claimed that thin wall tube can be welded without preheat; if preferred, and for thicker wall sections, a preheat of 150-200°C can be applied. Maximum interpass temperature should be kept to 350°C.

For many current applications T24 tube is put into service in the as-welded condition. During production of the tube the typical tempering cycle applied is 750°C/30 minutes; the ASTM standard specifies a minimum tempering temperature of 730°C for base material.

Additional information

J Arndt, K Haarmann, G Kottmann, J C Vaillant: "The T23/T24 Book" Vallourec & Mannesmann Tubes, 1998.

Products available

Process	Product	Specification
TIG	**24CrMoV**	--
SAW	**24CrMoV (wire)**	--
	LA424 (flux)	BS EN 760: S A AR

24CrMoV

Solid T24 low alloyed wire for TIG and SAW

Product description

Solid copper coated wire for TIG and SAW.

Specifications

None applicable

ASME IX Qualification

QW432 F-No -, **QW442** A-No -

Composition (wire wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Nb	V	Cu
min	0.05	--	--	--	--	2.20	--	0.80	0.02	0.20	--
max	0.11	1.0	0.5	0.015	0.020	2.60	0.40	1.10	0.08	0.30	0.25
typ	0.09	0.6	0.2	0.005	0.01	2.4	0.2	1.0	0.06	0.25	0.1

All-weld mechanical properties

Typical values PWHT 760°C/2h			TIG
Tensile strength		MPa	670
0.2% Proof stress		MPa	575
Elongation on 4d		%	27
Elongation on 5d		%	23
Reduction of area		%	75
Impact energy	+20°C	J	250
Impact energy	-20°C	J	200
Hardness cap/mid		HV	220/215

Typical operating parameters

	TIG	SAW
Shielding	Argon	LA424
Current	DC-	DC+
Diameter	2.0mm	2.0mm
Parameters	120A, 14V	*

* Main application would be for high speed fillet welds on waterwall, contact Technical Department for information.

Packaging data

ø mm	TIG	SAW
2.0	5kg tube	25kg/300kg

Fume data

MIG fume composition (wt %) (TIG & SAW fume negligible)

Fe	Mn	Cr^3	Ni	Mo	Cu	OES (mg/m^3)
55	10	<0.1	<0.1	<0.5	1.2	5

LA424 and L2N

Sub-arc flux for high speed fillet welding

Product description

LA424 is an agglomerated submerged arc welding flux. It is optimised for high speed single pass welding and produces a good bead shape and wetting at high travel speeds. LA424 is suitable for AC/DC welding with maximum current of 800A.

Specifications

BS EN 760 (flux) S A AB1 76 AC H5 1-16
S A AR1 76 AC H5 1-16

Composition (flux wt %)

SiO_2 + Ti O_2	CaO + Mg O	AlO_3 + MnO	CaF_2
35%	5%	55%	5%

Basicity index (Boniszewski) ~0.4

Packaging data

Metrode **LA424** flux is supplied in sealed moisture resistant 25kg metal drums. Preferred storage conditions for opened drums: < 60%RH, > 18°C. If the flux has become damp or has been stored for a long period, it should be redried in the range 300-350°C/1-2h.