UNITED STATES WELDING CORPORATION

USW ALLOY DESIGNATION AND DESCRIPTION	**TURBALOY® 91** **MC-GRADE** **GTAW SOLID BARE WELDING WIRE** **IRON BASE**	ISO 9001 AS 9100 Revision A	**DATA SHEET** 1677

CROSS-REFERENCE CONFORMANCE SPECIFICATIONS

USW 1677
Modified 9Cr 1Mo
AWS A5.28 ER90S-B9
9Cr 1Mo.V.Cb.N
ER505 Modified

Numerous company specifications with minor variations (see USW 1689 & USW 1866) Trace elements controlled (TEC) (Non-copper coated)
Available in HQ-GRADE

METALLURGICAL BACKGROUND INFORMATION

TURBALOY® 91 is produced by vacuum induction melting and remelting techniques. The final wire is manufactured by special lubricant-free, roller-die forming followed by surface abrasion and cleaning processes.
These manufacturing processes ensure consistent metallurgical integrity of the alloy with regard to control of trace elements and physical purity of the welding wire surface.

TURBALOY® 91 is a 9Cr 1Mo double stabilized, nitrogen strengthened filler metal having excellent creep properties and reproducible, sound X-ray quality welds in base materials of similar composition.
Original alloy development was done at Oak Ridge Laboratories for TVA and CE Corp.
Note the low manganese aim that is adopted.

MATERIALS TO BE WELDED AND APPLICATIONS

MC-GRADE TURBALOY® 91 is generally applied using GTAW. It is extensively used for steam turbine overhaul, repair and manufacture as well as for boiler tube and superheater tube fabrication and repair.
The alloy is now well established and is in extensive use worldwide for power station applications - both nuclear and fossil fueled.
Used on base alloys of 9Cr 1Mo and similar compositions.

WIRE CHEMISTRY WT%

Carbon	0.08	0.11 (aim 0.10)	Columbium	0.04	0.08	
Manganese	0.40	0.60 (aim 0.47)	Oxygen	-	0.008	(80ppm)
Silicon	0.15	0.30	Nitrogen	0.030	0.050	
Sulfur	-	0.008	Hydrogen	-	0.001	(10ppm)
Phosphorus	-	0.010	Boron	-	0.001	(10ppm)
Chromium	8.0	9.50	Aluminum	-	0.01	
Nickel	-	0.30	Copper	-	0.10	
Molybdenum	0.85	1.05	Iron		Balance	
Vanadium	0.18	0.25				

WELD PROPERTIES

after Normalized 1900°F
Temper 1340°F (air cool)

0.02% offset proof stress	66.41 ksi	
0.20% offset yield strength	76.46 ksi	RA 70%
Ultimate tensile strength	94.98 ksi	Elongation 25%

SIZES AND FORMS AVAILABLE

STRAIGHT LENGTHS

5 lb. (2.2kg) packs
36” (914mm) lengths
Flag tagged for traceability.
(Double tagging and other lengths on request)
Wide range of diameters.

SPOOLED WIRE

Precision layer wound, with controlled cast and helix
12” (300mm) diameter spools standard
8” (200mm), 4” (100mm) and proprietary spool sizes on request.
Wide range of diameters and spool weights.

PACKAGING

Sealed, air-evacuated, argon purged Vapor Barrier e nvelopes with desiccants ensure full protection from atmospheric contamination and prolonged shelf-life.

DFARS Compliant

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