



Major Tool and Machine, Inc.
1458 E. 19th St, Indianapolis, IN 46218
Welding Procedure Specification - Page 1
WeldOffice WPS

WPS record number	WPS433-PPPL	Revision 1	Qualified to	NCSX-CSPEC-141-03-05
Date	8/18/2005		Company name	Major Tool and Machine, Inc.
Supporting PQR(s)	PQR433 - Rev 0, PQR434 - Rev 0, PQR437 - Rev 0			
Reference docs.	NCSX-CSPEC-141-03-05 Sept. 23,2004 including addendum Letter No. 6-1 to Subcontract S005242-F's			

Scope	Full or partial penetration groove welds and fillet welds. PPPL Modular Coil Winding Forms. Groove, fillet, no PWHT (As-welded), impact testing
Joint	Joint details for this welding procedure specification in: Production drawings

BASE METALS (QW-403)

Type	CF8MNMnMOD	P-no. U	Grp-no. U
Welded to	CF8MNMnMOD	P-no. U	Grp-no. U
Backing:	Back-gouged & welded	P-no. U	Grp-no. U
Retainers	None		
Notes			

THICKNESS RANGE QUALIFIED (in.)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Complete pen.	0.188	3.0	-	-
Impact tested	0.188	3.0	-	-
Partial pen.	0.188	3.0	-	-
Fillet welds	no min.	no max.	-	-

DIAMETER RANGE QUALIFIED (in.)

	As-welded		With PWHT	
	Min.	Max.	Min.	Max.
Nominal pipe size	no min.	no max.	-	-

FILLER METALS (QW-404)

THICKNESS RANGE QUALIFIED (in.)

	SFA	Classification	F-no.	A-no.	Chemical analysis or Trade name	As-welded		With PWHT	
						Min.	Max.	Min.	Max.
GTAW	n/a	ER316MNNF	U	U	Metrotec ER316MNNF	no min.	no max.	-	-
Cons. insert	-	-	-	-	-	- None -			
Flux	-	-	-	-	-	- None -			

WELDING PROCEDURE

Welding process	GTAW
Type	Manual
Preheat temperature (°F)	70
Maximum interpass temperature (°F)	400
Tungsten size (in.)	0.093
Tungsten type	SFA 5.12 EWTh-2
Filler metal size (in.)	0.093
Layer number	All
Position of groove	All
Weld progression	Uphill
Current/polarity	DCEN
Amperes	See Page 3
Volts	See Page 3
Travel speed (in./min)	See Page 3
Maximum heat input (kJ/in.)	41.487
DC pulsing current	Not used
Shielding: Gas type	Argon
Flow rate (cfh)	25 - 45
Trailing: Gas type	None
Flow rate (cfh)	-
Backing: Gas type	None
Flow rate (cfh)	-
String or weave	Stringer
Orifice/gas cup size	0.450 - 0.625
Multi/Single pass per side	Multiple passes
Weld deposit chemistry	
Notes	



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TECHNIQUE (QW-410)

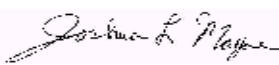
Peening	Not used
Surface preparation	See Notes
Initial/interpass cleaning	See Notes
Back gouging method	Grinding

NOTES

* Initial cleaning requirements: Grind a minimum of 1.0" clean on each side of the weld joint. Wire brush as needed using SST wire brush. Wipe as needed using isopropyl alcohol or acetone.

* Interpass cleaning requirements: Brushing and grinding as required. Wipe as needed using isopropyl alcohol or acetone. Use SST wire brush only.

Signature

Name	Signature
Josh Mayne	
Date	
8/18/2005	



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Welding Procedure Specification - Additional Information
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Heat Input (J/in) = $(V \cdot A \cdot 60) / (\text{travel speed in/min})$

in/min	V	A	Max Heat Input 41487 (J/in)
4.8	16.4	197	40385
4.8	16	207	41400
4.8	17.7	187	41374
4.8	16.9	196	41405
4.8	15.9	208	41340
3.8	15.4	170	41337
3.8	17.4	151	41485
3.8	12.3	212	41173
3.8	14.4	182	41381
5.8	15.4	260	41421
5.8	17.4	230	41400
5.8	17.5	229	41457
6.0	15.4	269	41426
6.0	17.4	238	41412
6.0	14.9	278	41422
6.0	17.9	231	41349

*** Revision Information ***

Rev 0 - Created on 5/10/05 J.L.M.

- Qualified to NCSX-CSPEC-141-03-05 Sept. 23,2004 including addendum Letter No. 6-1 to Subcontract S005242-F's. 5/10/05 J.L.M.

Rev 1 - Created on 8/18/05 J.L.M.

- Supporting PQR437 added.