



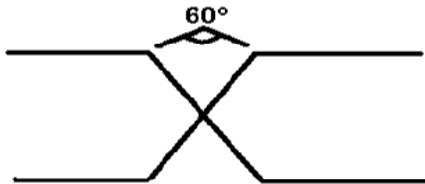
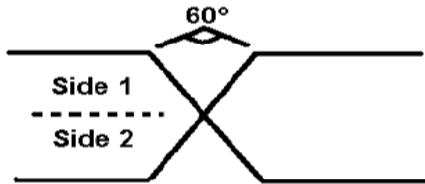
Major Tool and Machine, Inc.
1458 E. 19th St, Indianapolis, IN 46218
Procedure Qualification Record (PQR) - Details of Welding Test
Weldspec for Windows

PQR record number	PQR433	Revision 0	WPS record number	WPS433	Revision
Date	5/9/2005		Company name	Major Tool and Machine, Inc.	
			Welding standard	NCSX-CSPEC-141-03-05	

BASE METALS (QW-403)

	Product form	Specification (type or grade)	P no.	Grp-no.	Size	Sch.	Thick.	(in.)	Dia.	(in.)
Welded to:	Casting	CF8MNmMOD	U	U	n/a	n/a	1.313		n/a	
	Casting	CF8MNmMOD	U	U	n/a	n/a	1.313		n/a	
and tested:	Without PWHT, With impacts									
Notes										

JOINTS (QW-402)

Joint design	Double-V-groove		
Backing:	Back-gouged & welded		
Retainers	None		
Groove angle (deg.)	60 included		
Root opening (in.)	0.093		
Root face (in.)	0.0		

WELDING PROCESSES

Welding process	GTAW
Type	Manual

FILLER METALS (QW-404)

SFA specification	n/a
AWS classification	n/a
Filler metal F-number	U
Weld metal A-number	U
Filler metal nominal composition	-
Filler metal trade name	Metrode ER316MNNF
Filler metal size (in.)	0.093
Deposited thickness (in.)	1.5
Maximum pass thickness (in.)	0.125
Weld deposit chemistry	-

POSITION (QW-405)

Position of groove	1G
Weld progression	-

PREHEAT (QW-406)

Preheat temperature (°F)	70
Maximum interpass temperature (°F)	300

GAS (QW-408)

Shielding gas:	Type	Argon
	Flow rate (cfh)	25 - 45
Trailing gas:	Type	None
	Flow rate (cfh)	-
Backing gas:	Type	None
	Flow rate (cfh)	-

ELECTRICAL (QW-409)

Filler metal size (in.)	0.093
Amperes	197
Volts	16.4
Travel speed (in./min)	4.8
Maximum heat input (kJ/in.)	40.385
Tungsten size (in.)	0.093
Tungsten type	SFA 5.12 EWTh-2
Current/polarity	DCEN
DC pulsing current	Not used

TECHNIQUE (QW-410)

String or weave	Stringer
Orifice/gas cup size	0.450
Multi/Single pass per side	Multiple passes
Peening	Not used
Initial/interpass cleaning	Brushing and Grinding
Back gouging method	Grinding



Major Tool and Machine, Inc.
1458 E. 19th St, Indianapolis, IN 46218
Procedure Qualification Record (PQR) - Test Results (As Welded)
Weldspec for Windows

PQR record number	PQR433	Revision 0	WPS record number	WPS433	Revision
Date	5/9/2005		Company name	Major Tool and Machine, Inc.	
			Welding standard	NCSX-CSPEC-141-03-05	

TENSILE TESTS (QW-150)

Reduced section

Specimen number	Width (in.)	Thickness (in.)	Area (in ²)	Ultimate total load (lb)	Ultimate unit stress (psi)	Type of failure and location
T1 (68°F)	0.7466	1.2644	0.9440	86970	92100	Ductile-Base Metal
T2 (68°F)	0.7461	1.2765	0.9524	87440	91800	Ductile-Base Metal
T3 (-320°F)	0.2538	0.5374	0.1364	20290	148800	Ductile-Base Metal
T4 (-320°F)	0.2558	0.5806	0.1485	23940	161200	Ductile-Base Metal
T5 (-320°F)	0.5036	0.5818	0.2930	Not Available	Not Available	Not Available
T6 (-320°F)	0.2537	0.4866	0.1234	21870	177200	Ductile-Base Metal

Comments Transvers tensiles. T5 test was interrupted after yielding due to jaw failure

GUIDED BEND TESTS (QW-160)

Type of test	Acceptance criteria	Result	Comments

Comments

TOUGHNESS TESTS (QW-170)

Specimen number	Notch location	Notch type	Specimen size (in.) x (in.)	Test temperature (°F)	Impact values (ft lb) (% Shear)	(Mils)	Drop weight break
Base-1	Base Metal	Charpy V	Standard	68	109 (147.8J)	101	
Base-2	Base Metal	Charpy V	Standard	68	100 (135.6J)	109	
Base-3	Base Metal	Charpy V	Standard	68	119 (161.3J)	100	
Weld-1	Weld Metal	Charpy V	Standard	68	158 (214.2)	77	
Weld-2	Weld Metal	Charpy V	Standard	68	169 (229.1)	85	
Weld-3	Weld Metal	Charpy V	Standard	68	166 (225.1J)	78	
HAZ-1	HAZ	Charpy V	Standard	68	105 (142.4J)	64	
HAZ-2	HAZ	Charpy V	Standard	68	115 (155.9J)	77	
HAZ-3	HAZ	Charpy V	Standard	68	117 (158.6J)	66	
Base-4	Base Metal	Charpy V	Standard	-320	55 (74.6J)	30	
Base-5	Base Metal	Charpy V	Standard	-320	77 (104.4J)	59	
Base-6	Base Metal	Charpy V	Standard	-320	56 (75.9J)	50	
Weld-4	Weld Metal	Charpy V	Standard	-320	92 (124.7J)	61	
Weld-5	Weld Metal	Charpy V	Standard	-320	88 (119.3J)	34	
Weld-6	Weld Metal	Charpy V	Standard	-320	85 (115.2J)	42	
HAZ-4	HAZ	Charpy V	Standard	-320	70 (94.9J)	36	
HAZ-5	HAZ	Charpy V	Standard	-320	76 (103.0J)	32	
HAZ-6	HAZ	Charpy V	Standard	-320	67 (90.8J)	45	

Comments

OTHER TESTS

Type of test	Acceptance criteria	Result	Comments
Radiography	ASME IX:2004	Acceptable	MQS Report #13850040-4
Visual	ASME IX:2004	Acceptable	MTM NDT Report #11885
Magnetic Permeability with Severn Gage	μ shall not be > 1.02	Acceptable	MTM 65706/2.0/18/10 & 25

Comments

CERTIFICATION

Welder's name	ID Number	Stamp number	Mechanical testing by	Westmoreland Mechanical (WMT&R)
Bever, Jason	465		Laboratory test number	n/a
			Test file number	5-25009
			Tests conducted by	Richard G. Parks

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of the specified code.

Signature

Name	Signature
Josh Mayne	
Date	
5/9/2005	



Major Tool and Machine, Inc.
 1458 E. 19th St, Indianapolis, IN 46218
Procedure Qualification Record (PQR) - Additional information
 Weldspec for Windows

PQR record number	PQR433	Revision 0	WPS record number	WPS433	Revision
Date	5/9/2005		Company name	Major Tool and Machine, Inc.	
			Welding standard	NCSX-CSPEC-141-03-05	

*** WELD WIRE ***

Test Certificate: 193695

Name: Metrode ER316MNNF TIG 2.4mm

Specification: BS EN12072 W 20 16 3 Mn L

Batch No. W020132

Chemical AnalysisType: BS EN 10204: 2.2 / ASME SFA-5.01: Sch. H

Chemical Analysis: 0.015 C, 7.43 Mn, 0.42 Si, 0.006 S, 0.014 P, 19.9 Cr, 15.4 Ni, 2.62 Mo, 0.14 N, 0.20 Cu

*** BASE METAL ***

Metaltek Cast CF8MNMnMOD, Heat #133580 used for PQR433, Pour Date Dec. 19, 2004.

Example Chemical Anaysis from Heat #27731: 0.052 C, 17.96 Cr, 0.200 Cu, 2.620 Mn, 2.290 Mo, 0.250 N, 13.120 Ni, 0.010 P, 0.010 S, 0.300 Si

*** HEAT INPUT ***

Heat Input (J/in) = (V*A*60)/(travel speed in/min)

Pass	Side	Layer	in/min	V	A	Heat Input (J/in)	Pass	Side	Layer	in/min	V	A	Heat Input (J/in)
1	1	1	5.1	14.3	175	29196	19	1	6	5.6	17	214	39109
2	1	2	4	16	193	46063	20	1	6	4.8	17	217	46113
3	1	3	3.7	16.9	215	58439	21	1	7	4.4	16.1	189	41840
4	2	1	4.4	16	208	45483	22	1	7	4	16.1	192	45853
5	2	2	3.5	16.8	213	61131	23	1	7	5.7	16.4	199	34268
6	2	3	5	15.4	182	33634	24	1	7	5.7	16.4	202	35060
7	2	3	5	16.3	221	42927	25	2	6	5.7	16.6	195	34258
8	1	4	5.3	16	187	33660	26	2	6	6.4	16.1	198	30018
9	1	4	4.7	17.1	121	26381	27	2	6	5.3	15.4	185	32051
10	1	5	5.1	16.2	194	36928	28	2	6	5.2	16.8	205	39893
11	1	5	4.6	16.7	212	46320	29	1	8	9.1	15.8	192	19971
12	1	5	5	16.7	198	39679	30	1	8	10	15.9	200	19080
13	2	4	5.7	16.9	213	37797	31	1	8	9.5	16	206	20875
14	2	4	4.3	17.3	213	51896	32	1	8	9.6	15.7	200	19625
15	2	5	5.3	16.7	204	38894	33	2	7	8.7	15.7	186	20198
16	2	5	5.3	17.5	208	41253	34	2	7	9.1	16.1	198	20986
17	2	5	4.9	16.2	201	40160	35	2	7	10	15.7	200	18840
18	1	6	5	16	191	36927	36	2	7	8.6	16.3	205	23391
									Avg.	4.8	16.4	197	41487

*** Revision Information ***

Rev 0 - Created on 5/9/05 J.L.M.

- Qualified to NCSX-CSPEC-141-03-05 Sept. 23,2004 including addendum Letter No. 6-1 to Subcontract S005242-F's. 5/9/05 J.L.M.