



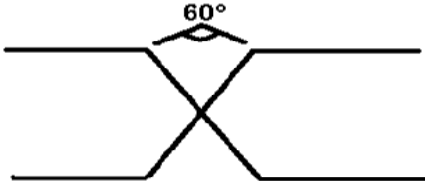
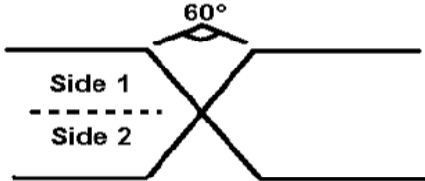
Major Tool and Machine, Inc.
1458 E. 19th Street, Indianapolis, Indiana, 46218
Procedure Qualification Record (PQR) - Details of Welding Test
WeldOffice WPS

| | | | | | |
|-------------------|-----------|------------|-------------------|------------------------------|----------|
| PQR record number | PQR437 | Revision 0 | WPS record number | WPS433 | Revision |
| Date | 8/15/2005 | | Company name | Major Tool and Machine, Inc. | |
| | | | Welding standard | ASME Section IX | |

BASE METALS (QW-403)

| | Product form | Specification (type or grade) | P no. | Grp-no. | Size | Sch. | Thick. | (in.) | Dia. | (in.) |
|-------------|--------------|-------------------------------|-------|---------|------|------|--------|-------|------|-------|
| Welded to: | Casting | CF8MNMnMOD | U | U | n/a | n/a | 1.5 | | n/a | |
| | Casting | CF8MNMnMOD | U | U | n/a | n/a | 1.5 | | n/a | |
| and tested: | Without PWHT | | | | | | | | | |
| 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 Street, Indianapolis, Indiana, 46218
Procedure Qualification Record (PQR) - Test Results (As Welded)
WeldOffice WPS

| | | | | | |
|-------------------|-----------|------------|-------------------|------------------------------|----------|
| PQR record number | PQR437 | Revision 0 | WPS record number | WPS433 | Revision |
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| | | | Welding standard | ASME Section IX | |

TENSILE TESTS (QW-150)

Turned

| Specimen number | Diameter (in.) | Area (in ²) | Ultimate total load (lb) | Ultimate unit stress (psi) | Type of failure and location |
|-----------------|-------------------------------------|----------------------------|-----------------------------|-------------------------------|---------------------------------|
| Trans.-Top-1 | 0.3497 | 0.0960 | 15330 | 159600 | Ductile-Base Metal |
| Trans.-Top-2 | 0.3498 | 0.0961 | 14620 | 152100 | Ductile-Base Metal |
| Trans.-Bottom-1 | 0.3498 | 0.0961 | 11140 | 115900 | Ductile-Weld |
| Trans.-Bottom-2 | 0.3498 | 0.0961 | 14020 | 145900 | Ductile-Base Metal |
| Comments | 4 tension tests performed at -320°F | | | | |

GUIDED BEND TESTS (QW-160)

| Type of test | Acceptance criteria | Result | Comments |
|---|---------------------|------------|--------------------------|
| 4 transverse side bends per QW-161.1 and QW-462.2 | QW-163 | Acceptable | see - ASME IX - QW-451.1 |
| Comments | | | |

OTHER TESTS

| Type of test | Acceptance criteria | Result | Comments |
|--|-----------------------|------------|------------------------------|
| Visual | ASME IX | Acceptable | MTM NDT Report #13218 |
| Magnetic Permeability with Severn Gage | μ shall not be > 1.02 | Acceptable | 65706/2.0 Sub:28 Seq:10 & 30 |
| Radiographic inspection | ASME IX | Acceptable | MQS Report #13850291 |
| Comments | | | |

CERTIFICATION

| Welder's name | ID Number | Stamp number | Mechanical testing by | Westmoreland Mechanical |
|---------------|-----------|--------------|------------------------|-------------------------|
| Bever, Jason | 465 | | Laboratory test number | |
| Spencer, John | 352 | | Test file number | 5-32326 |
| | | | Tests conducted by | Matt Wojton |

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 | |
| 8/15/2005 | |



Major Tool and Machine, Inc.
1458 E. 19th Street, Indianapolis, Indiana, 46218
Procedure Qualification Record (PQR) - Additional information
WeldOffice WPS

| | | | | | |
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*** WELD WIRE ***

Test Certificate: 193695 & 194277

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

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

*** Revision Information ***

Rev 0 - Created on 6/20/05 from PQR433 J.L.M.