MEGADYNE® Est. 1985
The Electrosurgical Authority®

DOCUMENT NUMBER: ENG-RPT-340

DOCUMENT TITLE: Test Report - ULPA Replacement Filter & Carbon/Muffler

DOCUMENT NOTES:

Initial release into MasterControl

## Document Information

| | |
|---|---|
| Revision: 001 | Vault: MEG-Rel |
| Status: Release | Document Type: ENG-RPT |

## Date Information

| | |
|---|---|
| Effective Date: 07 Apr 2014 | Expiration Date: |
| Release Date: 07 Apr 2014 | Next Review Date: |

## Control Information

| | |
|---|---|
| Author: PBORGMEIER | Owner: ENG-APPR |
| Previous Number: 1150751-01 | Change Number: 14-056-01 |

| Megadyne Medical Products, Inc. | TEST REPORT<br>MASTER DOCUMENT | Document Number<br>1150751-01 |
|---|---|---|
| | ULPA REPLACEMENT FILTER & CARBON/MUFFLER | Revision: A |
| | | Effective Date:<br>2014 APR 0 7 |
| | | Page 1 of 30 |

4/4/14
Engineering Verification:

4-7-14
D.C. Verification:

Authored By: Shawn Horner

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## 1. ABSTRACT

### 1.1. ULPA Replacement Filter #2211 Testing

The ULPA Replacement Filter, Catalog # 2211, passed the verification testing outlined in 1150751-10. The 2211 Filter is equivalent to or better than the current 2210 following the testing outlined below:

Product tested:
2211 Lot # 61964
2210 Lot # 5260

| Test # | Description | Pass/Fail |
|---|---|---|
| A | 1st Article Feature Measurements | Complete |
| B | Force to insert Filter | Passed |
| C | Flow Test | Passed |
| D | Weld Joint Seal Pressure Test | Passed |
| E | Shear Force Test | Passed |
| 1150095-01 | Thermal Conditioning | Complete |
| F | Ship Test ASTM D4169-05 | Passed |

1.2. Carbon/Muffler (Vendor PN DF-0) Catalog #2220

The Carbon/Muffler (Vendor PN DF-0), Catalog #2220, passed the verification testing outlined in 1150751-10 (ship test). The DF-0 Filter is identical to the #2220 product.

| Test # | Description | Pass/Fail |
|---|---|---|
| 1150095-01 | Thermal Conditioning | Complete |
| A | Ship Test ASTM D4169-05 | Passed |

## 2. IEC SHIPPING/STORAGE CONDITIONING

All devices were conditioned per 1150095-10 starting on March 20, 2014.

## 3. ULPA FILTER INSPECTION AND TESTING

3.1. 1st Article Feature Measurements (Test A); See Appendix A for raw data.

3.1.1. Using Calipers and the ROI a dimensional comparison on the exhaust ports of the two designs were done by QA. See the first article inspection points report for required measurements

3.1.2. Using a threaded/barb connector and 22 mm port connector, the intake interfaces achieve their respective desired seals.

3.1.3. Results:

3.1.3.1. The 2211 parts passed 1st article inspection with one adjustment as an input to the drawing revision. The stem of the exhaust port has been consistently shorter than the currently defined length of 0.430 ± .005. As a result of this first article and inspection by the molder this dimension will be shifted to 0.425 ± .005.

The 2210 did not pass all the drawing dimensions at various points of the exhaust part inspection. No product drawings were provided for this part. The drawing dimensions were developed following review of various parts that fit into the LCD 10006 connection. Though the dimensions didn't match, the 2210 has a long history of use therefore it passes.

3.1.3.2. Intake connections connect to filters as intended, as evaluated by Marketing.

3.2. Force to insert Filter (Test B); See Appendix B for raw data.

3.2.1. Using the Instron and a feed rate of 7.8 in/min to a stroke length of 0.32 inchs, the #2211 and 2210 filters were inserted into the Colder PN LC10006 3/8 NPT non-valved coupling body (Filter Connector fitting for the MV & MVP) while measuring the force to insert.

3.2.2. Results:

| Sample # | 2210 (lbf) | 2211 (lbf) |
|---|---|---|
| 1 | 11.11 | 6.23 |
| 2 | 12.81 | 4.32 |
| 3 | 12.17 | 4.67 |
| 4 | 12.19 | 5.32 |
| 5 | 5.86 | 4.84 |
| 6 | 6.01 | 6.76 |
| 7 | 8.99 | 4.81 |
| 8 | 12.21 | 3.67 |
| 9 | 5.74 | 5.24 |
| 10 | 7.95 | 5.92 |
| 11 | 6.91 | 4.95 |
| Average | 9.268182 | 5.157273 |
| St Dev | 2.891438 | 0.880296 |

Force to insert filter

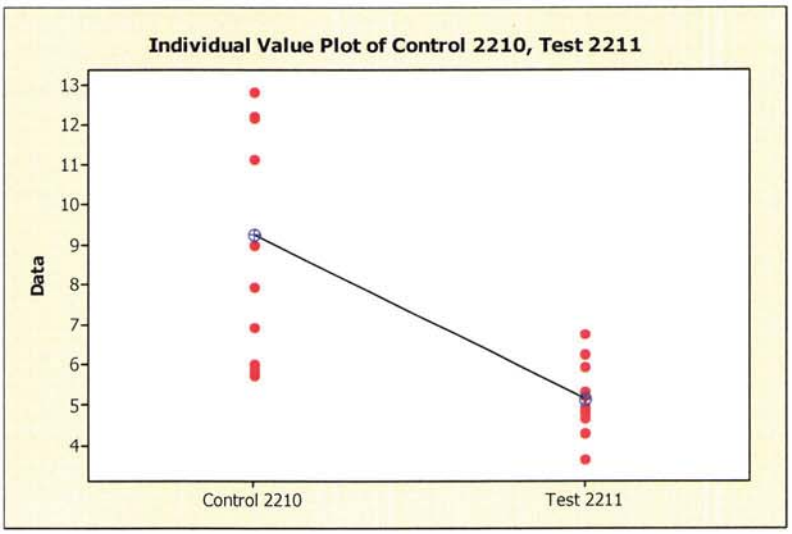
3.2.2.1. T-test resulted in the following:

**Two-Sample T-Test and CI: Control 2210, Test 2211 for insertion force of filter**

```
Two-sample T for Control 2210 vs Test 2211

              N   Mean  StDev  SE Mean
Control 2210  11   9.27   2.89     0.87
Test 2211     11  5.157  0.880     0.27


Difference = mu (Control 2210) - mu (Test 2211)
Estimate for difference:  4.111
95% lower bound for difference:  2.539
T-Test of difference = 0 (vs >): T-Value = 4.51  P-Value = 0.000  DF =
20
Both use Pooled StDev = 2.1372
```




The P-Value of 0 means that the insertion force for the two filters are different. The Control (2210) has a higher force for insertion than the Test (2211). Therefore, the 2211 passes insertion force test.

3.3. Flow Test (Test C); See Appendix C for raw data.

3.3.1. Using the MVP in an open mode and max flow condition, the air flow was measured at the filter face (filter only), between the filter and 2110-10 smoke pencil/tube set and 100 lpm box flow media evaluation .

3.3.2. Results:

| | Filter Only | | W/ 2210-09 | | @ 100 lpm Box Flow | |
|---|---|---|---|---|---|---|
| Sample # | 2210 (lpm) | 2211 (lpm) | 2210 (lpm) | 2211 (lpm) | 2210 (lpm) | 2211 (lpm) |
| 1 | 76.49 | 80.06 | 69.60 | 70.34 | 90.50 | 101.70 |
| 2 | 76.70 | 80.32 | 68.52 | 70.25 | 89.85 | 102.10 |
| 3 | 76.89 | 80.22 | 69.62 | 70.90 | 90.90 | 101.80 |
| 4 | 76.68 | 80.33 | 68.36 | 70.77 | 90.10 | 102.00 |
| 5 | 75.96 | 80.44 | 67.45 | 71.45 | 90.02 | 101.90 |
| 6 | 77.25 | 80.53 | 68.56 | 70.55 | 91.60 | 101.80 |
| 7 | 77.34 | 79.96 | 69.91 | 70.01 | 91.70 | 102.10 |
| 8 | 77.31 | 79.45 | 69.57 | 70.33 | 90.07 | 102.00 |
| 9 | 77.16 | 80.47 | 69.45 | 70.45 | 91.20 | 102.20 |
| 10 | 76.55 | 79.85 | 67.23 | 69.61 | 90.70 | 101.90 |
| 11 | 76.43 | 79.94 | 67.84 | 69.60 | 91.00 | 102.20 |
| Average | 76.80 | 80.14 | 68.74 | 70.39 | 90.69 | 101.97 |
| St Dev | 0.44 | 0.33 | 0.95 | 0.54 | 0.65 | 0.17 |

3.3.2.1. A T-test of the max flow rates resulted in the following:

**Two-Sample T-Test and CI: Control 2210, Test 2211 Filter Only**

```
Two-sample T for Control 2210 vs Test 2211

               N    Mean  StDev  SE Mean
Control 2210  11  76.796  0.438     0.13
Test 2211     11  80.143  0.326    0.098


Difference = mu (Control 2210) - mu (Test 2211)
Estimate for difference:  -3.346
95% upper bound for difference:  -3.062
T-Test of difference = 0 (vs <): T-Value = -20.32  P-Value = 0.000  DF = 20
Both use Pooled StDev = 0.3861
```

The P-Value of 0 means that the flow measure with filter only is different. The Control (2210) has lower flow than the Test (2211). Therefore, the 2211 passes the flow test.

### Two-Sample T-Test and CI: Control 2210, Test 2211 with 2110-09 Pencil

```
Two-sample T for Control 2210 vs Test 2211

                N     Mean  StDev  SE Mean
Control 2210   11   68.737  0.952     0.29
Test 2211      11   70.387  0.544     0.16


Difference = mu (Control 2210_1) - mu (Test 2211_1)
Estimate for difference:  -1.650
95% upper bound for difference:  -1.080
T-Test of difference = 0 (vs <): T-Value = -4.99  P-Value = 0.000  DF = 20
Both use Pooled StDev = 0.7751
```

The P-Value of 0 means that the flow measure between the filter and 2110-09 pencil is different. The Control (2210) has lower flow than the Test (2211). Therefore, the 2211 passes the flow test.

### Two-Sample T-Test and CI: Control 2210, Test 2211 using a MVP @ 100 lpm box flow

```
Two-sample T for Control 2210 vs Test 2211

                N     Mean  StDev  SE Mean
Control 2210   11   90.695  0.646     0.19
Test 2211      11  101.973  0.168    0.051

Difference = mu (Control 2210) - mu (Test 2211)
Estimate for difference:  -11.278
95% upper bound for difference:  -10.931
T-Test of difference = 0 (vs <): T-Value = -56.05  P-Value = 0.000  DF = 20
Both use Pooled StDev = 0.4719
```

The P-Value of 0 means that the flow measure using a modified MVP to reach 100 lpm is different. The Control (2210) has lower flow than the Test (2211). Therefore, the 2211 passes the flow test. The 100 lpm box flow test resulted in no visible separation under microscope of the filter media from the perimeter capture surface.

Therefore the 2211 filter passes the various aspects of the flow test defined.

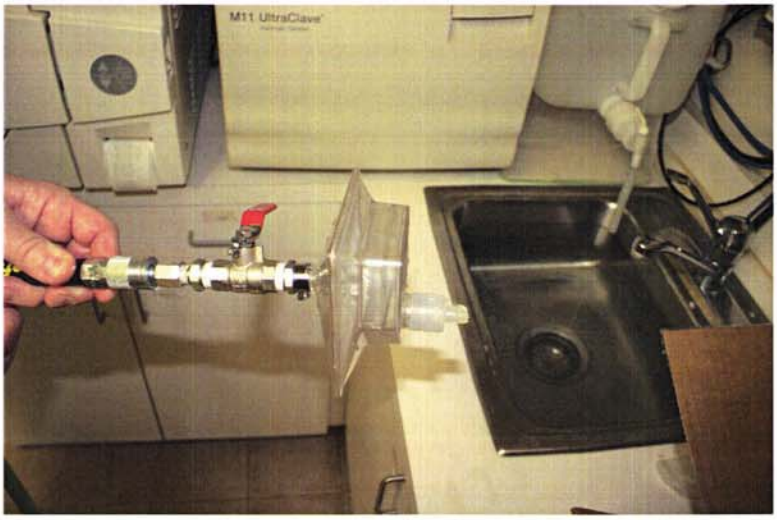
3.4. Weld Joint Seal Pressure Test (Test D) ; See Appendix D for raw data.

3.4.1. The filter inlets were sealed with a threaded connector with the ID sealed. The exhaust port was connected to a tube set. The system was pressurized to 7 psi and placed unit under water to check for weld joint seal leaks. The units passed, there was no leak/bubbles visible around the weld joint of the filter for a period of 30 seconds.

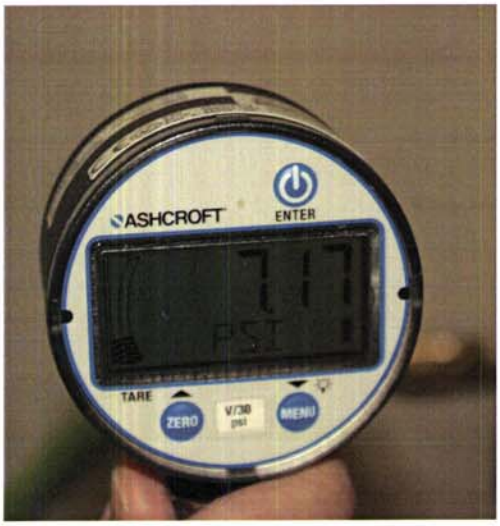
3.4.2. Results:

| Sample # | No Leak 2211 | Time / Pressure |
|---|---|---|
| 1 | Pass | 30s/7psi |
| 2 | Pass | 30s/7psi |
| 3 | Pass | 30s/7psi |
| 4 | Pass | 30s/7psi |
| 5 | Pass | 30s/7psi |
| 6 | Pass | 30s/7psi |
| 7 | Pass | 30s/7psi |
| 8 | Pass | 30s/7psi |
| 9 | Pass | 30s/7psi |
| 10 | Pass | 30s/7psi |
| 11 | Pass | 30s/7psi |
| 12 | Pass | 30s/7psi |
| 13 | Pass | 30s/7psi |
| 14 | Pass | 30s/7psi |
| 15 | Pass | 30s/7psi |
| 16 | Pass | 30s/7psi |

| Sample # | No Leak 2211 | Time / Pressure |
|---|---|---|
| 17 | Pass | 30s/7psi |
| 18 | Pass | 30s/7psi |
| 19 | Pass | 30s/7psi |
| 20 | Pass | 30s/7psi |
| 21 | Pass | 30s/7psi |
| 22 | Pass | 30s/7psi |
| 23 | Pass | 30s/7psi |
| 24 | Pass | 30s/7psi |
| 25 | Pass | 30s/7psi |
| 26 | Pass | 30s/7psi |
| 27 | Pass | 30s/7psi |
| 28 | Pass | 30s/7psi |
| 29 | Pass | 30s/7psi |
| 30 | Pass | 30s/7psi |
| 31 | Pass | 30s/7psi |
| 32 | Pass | 30s/7psi |




Picture of Leak Test setup




Pressure Gauge read-out

The 2211 filter showed no signs of weld joint leak. Therefore it passes the leak test.

3.5. Shear Force Test (Test E) ; See Appendix E for raw data.

3.5.1. Using the Instron with the 100 lb load cell, a feed rate of 1.6 in/sec and a stroke length of 1.5 inches, the #2211 and 2210 filters were attached to the Colder fitting #LC10006 in the secured vice on the base of the Instron.

3.5.2. Results:

| Sample # | 2210 (lbf) | 2211 (lbf) |
|---|---|---|
| 1 | 19.03 | 26.55 |
| 2 | 18.42 | 19.22 |
| 3 | 19.25 | 27.87 |
| 4 | 19.95 | 35.30 |
| 5 | 17.37 | 19.78 |
| 6 | 17.30 | 37.80 |
| 7 | 17.53 | 38.01 |
| 8 | 17.96 | 25.72 |
| 9 | 16.67 | 34.07 |
| 10 | 17.12 | 33.91 |
| 11 | 19.36 | 32.00 |
| Average | 18.18 | 30.02 |
| St Dev | 1.08 | 6.67 |

3.5.2.1. A T-test resulted in the following:

**Two-Sample T-Test and CI: Control 2210, Test 2211 for Shear Test**

```
Two-sample T for Control 2210 vs Test 2211

                N   Mean  StDev  SE Mean
Control 2210   11  18.18   1.08     0.33
Test 2211      11  30.02   6.67      2.0


Difference = mu (Control 2210-3) - mu (Test 2211-3)
Estimate for difference:  -11.84
95% upper bound for difference:  -8.33
T-Test of difference = 0 (vs <): T-Value = -5.82  P-Value = 0.000  DF = 20
Both use Pooled StDev = 4.7755
```

The P-Value of 0 means that the shear forces of the two filters are different. The Control (2210) has a lower shear force than the Test (2211). Therefore, the 2211 passes the shear test.

3.6. Ship Test (Test F) ; See Appendix F for raw data.

3.6.1. The worst case packaging, 10 units in a case box, passed the ASTM D4169-05 ship test. The box remained intact and the product showed no visual signs of damage.

## 4. CARBON/MUFFLER TESTING

4.1. Ship Test (Test A) ; See Appendix G for raw data.

4.1.1. The worst case packaging, 10 units in a case box, passed the ASTM D4169-05 ship test. The box remained intact and the product showed no visual signs of damage.

## 5. CONCLUSION

5.1. ULPA Filter

5.1.1. The 2211 Filter passed all requirements outlined per the protocol.

5.2. Carbon Muffler Testing

5.2.1. The 2220 Carbon/Muffler passed the ship testing outlined per the protocol.

## 6. REVISION HISTORY

| REVISION | DOCUMENT CHANGE ORDER NUMBER | DESCRIPTION OF CHANGE | EFFECTIVE DATE |
|---|---|---|---|
| A | 14-056-01 | Initial Release | 2014 APR 07 |

# APPENDIX A

# FIRST ARTICLE INSPECTION REPORT

PART NO.: 2211 ~~X5800119-01~~ REV.: 07 | P.O.# ____ | 2014 APR 07

PART NAME: INSPECTION POINT X5800119-01 REV 07 DETAIL L | Sheet 1 OF ___

INSPECTOR: M. Fisher DATE: 3/24/2014

SUPPLIER: ____ REASON: ____

**APPROVAL:**

| | | | | | | |
|---|---|---|---|---|---|---|
| INSPECTOR | M. Fisher | DATE: | 3/~~24~~/14 | ACCEPT: | ____ | REJECT: X |
| QUALITY ENG. | [signature] | DATE: | 2014 Mar 24 | ACCEPT: | ✓ | REJECT: ____ |
| PROD. ENG. | [signature] | DATE: | 3/24/14 | ACCEPT: | ✓ | REJECT: ____ |

| ITEM | SPECIFICATION | RESULTS 1 | 2 | 3 | PASS | FAIL |
|---|---|---|---|---|---|---|
| M40 | 0.360 ±.005 | .359 | .3603 | .359 | ✓ | |
| M32 | 0.063 ± .005 | .063 | .63 | .61 | ✓ | |
| M37 | 0.430± .005 | .4285 | .4265 | .427 | ✓ | |
| M36 | 0.328± .005 | .331 | .327 | .331 | ✓ | |
| M35 | 0.270± .005 | .270 | .273 | .273 | ✓ | |
| M34 | 0.077± .005 | ~~.076~~ .076 mf3 | .075 | .07665 | ✓ | |
| M33 | 0.430± .005 | .426 | .424 | .427 | | ✓ |
| M15-M14 | 1.427 ±.005 -0.933 ± .005 = 0.494 ± .010 | .493 | 494 | .497 | ✓ | |
| M15-M13 | 1.427 ±.005 -0.873 ± .005 = 0.554 ± .010 | .556 | .554 | .556 | ✓ | |
| | | | | | | |
| | | | | | | |

COMMENTS: Note: M33 is being adjusted to .425 ± .005

Form 1030028-01 Rev. C

# FIRST ARTICLE INSPECTION REPORT



| | | | |
|---|---|---|---|
| PART NO.: 2211 | REV.: | P.O.# | 2014 APR 07 |
| PART NAME: INSPECTION POINT X5800119-01 REV 07 DETAIL L | | | Sheet 1 OF |
| INSPECTOR: M Fisher | DATE: 3/25/2014 | | |
| SUPPLIER: | REASON: | | |

**APPROVAL:**

| | | | | | |
|---|---|---|---|---|---|
| INSPECTOR | M Fisher | DATE: 3/25/14 | ACCEPT: | REJECT: | X |
| QUALITY ENG. | | DATE: 2014 APR 01 | ACCEPT: V | REJECT: | |
| PROD. ENG. | | DATE: 3/28/14 | ACCEPT: X | REJECT: | |

| ITEM | SPECIFICATION | RESULTS 1 | 2 | 3 | PASS | FAIL |
|---|---|---|---|---|---|---|
| M40 | 0.360 ±.005 | 3.58 | .3611 | .358 | X | |
| M32 | 0.063 ± .005 | .0600 | .055 | .057 | | X |
| M37 | 0.430± .005 | .427 | .430 | .428 | X | |
| M36 | 0.328± .005 | .330 | .329 | .331 | X | |
| M35 | 0.270± .005 | .288 | .288 | .288 | | X |
| M34 | 0.077± .005 | .081 | .087 | .081 | | X |
| M33 | 0.430± .005 | .439 | .442 | .440 | | X |
| M15-M14 | 1.427 ±.005 -0.933 ± .005 = 0.494 ± .010 | .499 | .500 | .494 | X | |
| M15-M13 | 1.427 ±.005 -0.873 ± .005 = 0.554 ± .010 | .554 | .556 | .556 | X | |
| | | | | | | |
| | | | | | | |

COMMENTS:

We have purchased this part for many years. The dimension outlined did come from 2210 filter measurements. The purpose of these measurments are to assist in qualification of a new part per protocol # The intent is not to qualify the existing part 2210, but show compatibility to the new unit.

| REV. | ZONE | DESCRIPTION | DCO NO. | DCO BY | APPROVED DATE | APP'D BY |
|---|---|---|---|---|---|---|
| 01 | | INITIAL RELEASE. | | SH | | |
| 02 | | CHANGE IN ENERGY DIRECTOR | | SH | | |
| 03 | | CHANGE IN DRAFT | | SH | | |
| 04 | | ADDED DRAFT, MOLDING NOTES AND CHANGED WELD FEATURES | | SH | | |
| 05 | N/A | ADDED DRAFT | | CSF | | |
| 06 | N/A | ADD MATERIAL AND FINISH INFORMATION, CHANGED DRAFT AT MOLDER REQUEST. | | CSF | | |
| 07 | N/A | ADDED GATE LOCATION | N/A | CSF | | |

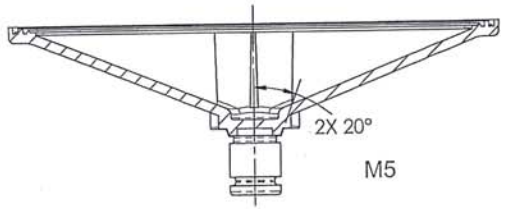
2014 APR 0 7

12/13/13

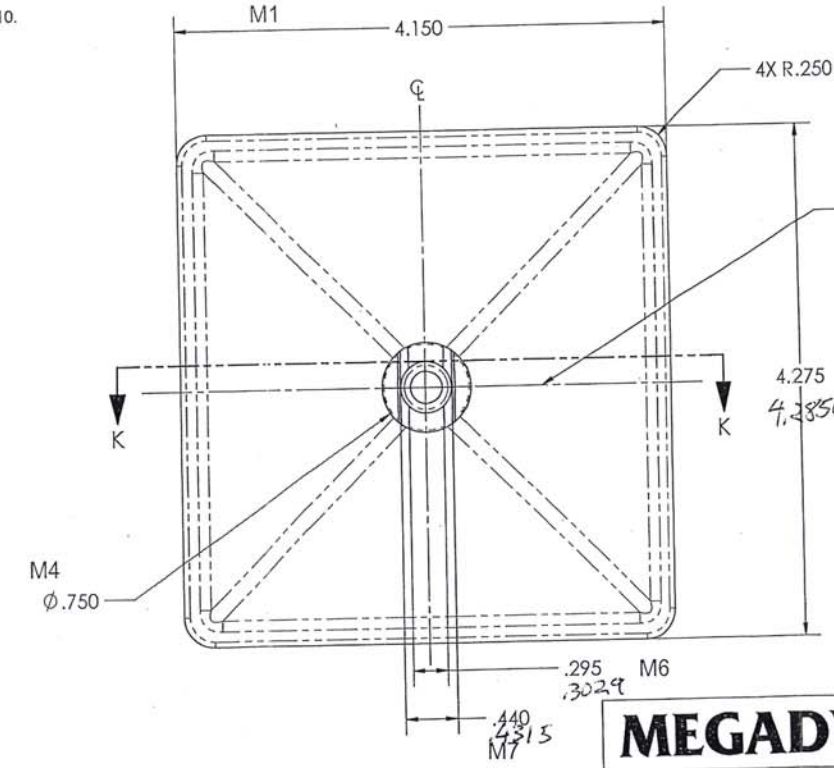
Mark Hewett 12/13/13

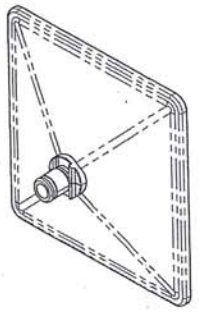
NOTES:

1. MATERIAL TO BE: TOYOLAC 920 555
2. SURFACE TEXTURE TO BE: SMOOTH
3. THIS PART IS CONTROLLED IN A SOLID WORKS MODEL, 5800119-01. THIS DRAWING ONLY SHOWS THOSE DIMENSIONS REQUIRED FOR INSPECTION AND GENERAL REFERENCE INFORMATION.
4. THIS PART MUST FIT WITH MEGADYNE P/N 5800118-01.
5. ALL INSIDE DRAFT ANGLES TO BE 0 - 1° PER SIDE, UNLESS OTHERWISE NOTED.
6. MEGADYNE TO APPROVE LOCATIONS OF GATE(S) & EJECTOR PINS.
7. EJECTOR PIN KNOCK-OUTS AND VENT PIN WITNESS MARKS TO BE FLUSH TO MINUS .01.
8. PART TO MEET REQUIREMENTS OF MEGADYNE WORK INSTRUCTION 1100007-10.
9. NO REGRIND ALLOWED.
10. MATERIAL TO BE COMPLIANT WITH EUROPEAN UNION ROHS DIRECTIVE.
11. NO SINKS ALLOWED ON ANY SURFACES.



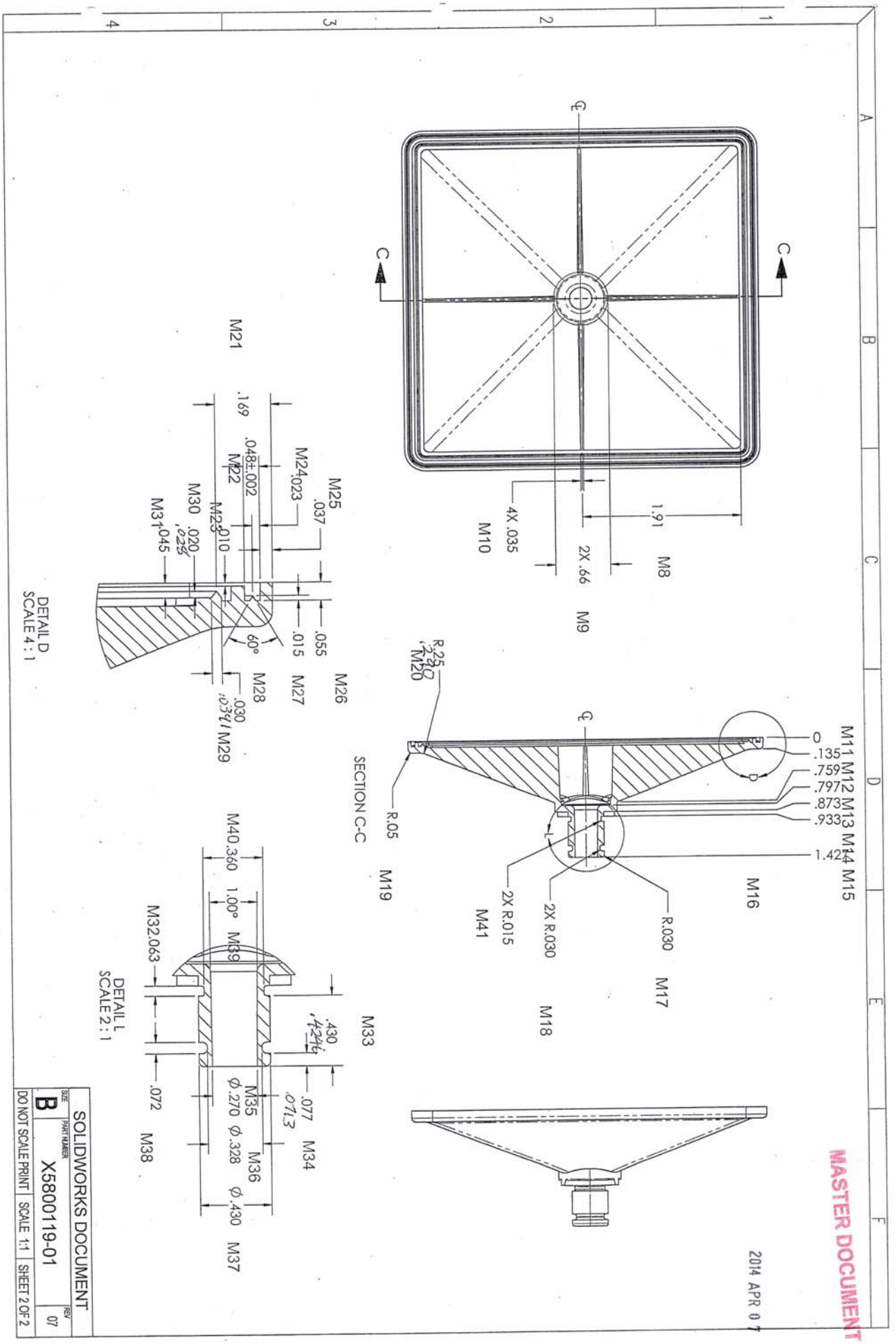

SECTION K-K



| | | | |
|---|---|---|---|
| MEGADYNE® | MEGADYNE MEDICAL PRODUCTS INC.<br>11506 SOUTH STATE STREET<br>DRAPER, UT 84020-9453<br>USA (801) 576-9669 | | |
| TOLERANCES UNLESS NOTED OTHERWISE<br>X = ±.1<br>.XX = ±.02<br>.XXX = ±.005<br>ANGLES = ± 1°<br>FRACTIONS = ± 1/16 | ENGINEER S.H. DATE 7/8/2013<br>DESIGNER S.H. DATE 7/8/2013<br>CHECKER DATE | TITLE: FILTER, ULPA REPLACEMENT EXHAUST | |
| DIMENSIONS INCH | ASME Y14.5M 1994 | SIZE B · PART NUMBER X5800119-01 · REV 07 | |
| | | DO NOT SCALE PRINT · SCALE 1:1 · SHEET 1 OF 2 | |

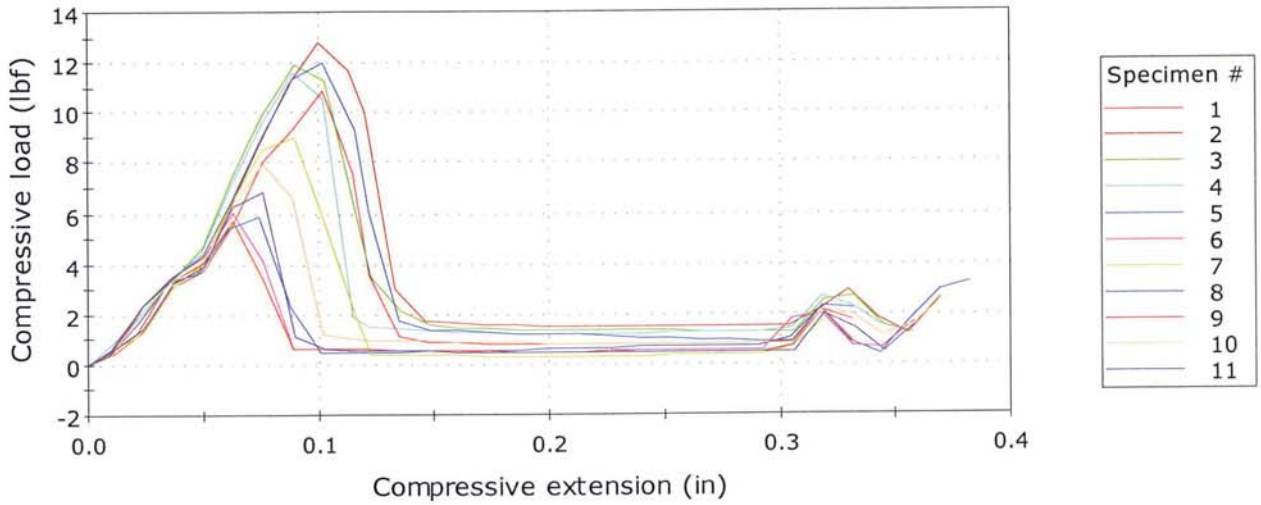
SOLIDWORKS DOCUMENT



# APPENDIX B

2014 APR 07

Specimen 1 to 11 C.## 2210




| | Load at Machine Peak Load (lbf) | Notes | Comments |
|---|---|---|---|
| 1 | -11.11000 | | |
| 2 | -12.81000 | | |
| 3 | -12.17000 | | |
| 4 | -12.19000 | | |
| 5 | -5.86600 | | |
| 6 | -6.01100 | | |
| 7 | -8.99300 | | |
| 8 | -12.21000 | | |
| 9 | -5.74200 | | |
| 10 | -7.95200 | | |
| 11 | -6.91800 | | |
| Maximum | -5.74200 | | |
| Minimum | -12.81000 | | |
| Mean | -9.27018 | | |
| Standard Deviation | 2.89 | | |

7.8 in/min
stroke .32 inches

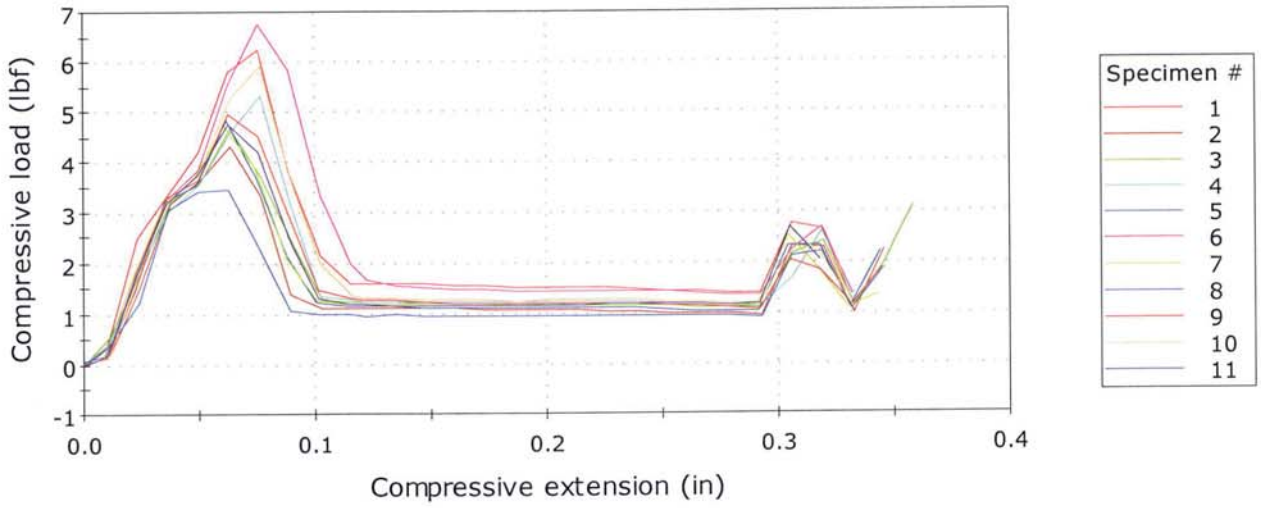
By Paul Valprede on 3-21-2014

Instron 4464
System id - 4464C2820
Calibrated on 5-3-2013
Due on 5-3-2014

2014 APR 07

Cat# 2211

# Specimen 1 to 11




| | Load at Machine Peak Load (lbf) | Notes | Comments |
|---|---|---|---|
| 1 | -6.23100 | | |
| 2 | -4.31700 | | |
| 3 | -4.67400 | | |
| 4 | -5.32100 | | |
| 5 | -4.84000 | | |
| 6 | -6.76200 | | |
| 7 | -4.81100 | | |
| 8 | -3.67200 | | |
| 9 | -5.23800 | | |
| 10 | -5.91700 | | |
| 11 | -4.95300 | | |
| Maximum | -3.67200 | | |
| Minimum | -6.76200 | | |
| Mean | -5.15782 | | |
| Standard Deviation | 0.88 | | |

7.8 in/min
stroke .32 inches

By Paul Valpreda 3-21-2014

Instron 4464
System id - 4464C2820
Calibrated on 5-3-~~2014~~ 2013
Due on 5-3-2014

# APPENDIX C

# Appendix 2

## Flow Testing Log Sheet

2110-05 Lot 5103

Enter the flow value and if dislodgement occurs.

| Sample | 2211 Filter | 2211 Panel | Dislodgement @ 100 lpm | 2210 Filter Lot 5260 | 2210 Panel | Dislodgement @ 100 lpm |
|---|---|---|---|---|---|---|
| 1 | 80.06 | 70.34 | 101.7 | 76.49 | 69.60 | 90.5 |
| 2 | 80.32 | 70.25 | 102.1 | 76.70 | 68.52 | 89.85 |
| 3 | 80.22 | 70.90 | 101.8 | 76.89 | 69.62 | 90.9 |
| 4 | 80.33 | 70.17 | 102.0 | 76.68 | 68.36 | 90.1 |
| 5 | 80.44 | 71.45 | 101.9 | 75.96 | 67.45 | 90.02 |
| 6 | 80.53 | 70.55 | 101.8 | 77.25 | 68.56 | 91.6 |
| 7 | 79.96 | 70.01 | 102.1 | 77.34 | 69.91 | 91.7 |
| 8 | 79.45 | 70.33 | 102.0 | 77.31 | 69.57 | 90.07 |
| 9 | 80.47 | 70.45 | 102.2 | 77.16 | 69.45 | 91.2 |
| 10 | 79.85 | 69.61 | 101.9 | 76.55 | 67.23 | 90.7 |
| 11 | 79.94 | 69.60 | 102.2 | 76.43 | 67.84 | 91.0 |

Comments: _____

_____

Paul Valpreda
Inspected by:

3-21-2014
Date completed

Flowmeter - Model 4040F

Serial number - 4040 0409 003

Megadyne number - 01272

Calibration date - April 2013

Recal Date - April 2014

# APPENDIX D

# Appendix 3

## Bubble Leak Test @ 7psi for 30 seconds Log Sheet

Catalog #_____

| Sample | Pass | Fail | Comment |
|---|---|---|---|
| 1 | ✓ | | |
| 2 | ✓ | | |
| 3 | ✓ | | |
| 4 | ✓ | | |
| 5 | ✓ | | |
| 6 | ✓ | | |
| 7 | ✓ | | |
| 8 | ✓ | | |
| 9 | ✓ | | |
| 10 | ✓ | | |
| 11 | ✓ | | |
| 12 | ✓ | | |
| 13 | ✓ | | |
| 14 | ✓ | | |
| 15 | ✓ | | |
| 16 | ✓ | | |

| Sample | Pass | Fail | Comment |
|---|---|---|---|
| 17 | ✓ | | |
| 18 | ✓ | | |
| 19 | ✓ | | |
| 20 | ✓ | | |
| 21 | ✓ | | |
| 22 | ✓ | | |
| 23 | ✓ | | |
| 24 | ✓ | | |
| 25 | ✓ | | |
| 26 | ✓ | | |
| 27 | ✓ | | |
| 28 | ✓ | | |
| 29 | ✓ | | |
| 30 | ✓ | | |
| 31 | ✓ | | |
| 32 | ✓ | | |

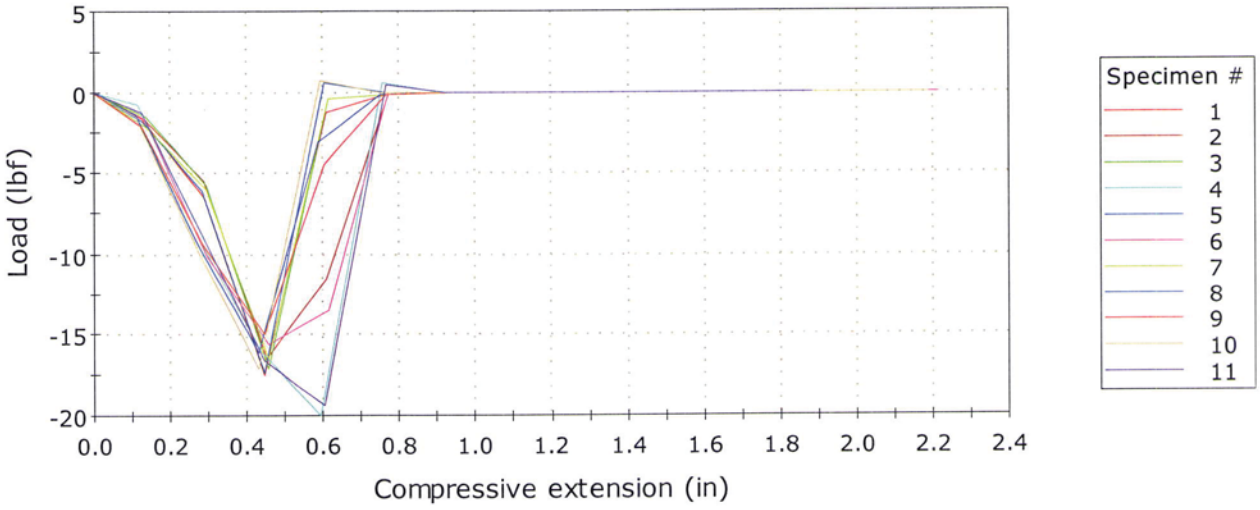
Signature: Paul Valpreda Date: 3-21-2014

Megadyne Pressure gauge: #01263 Calibration 01/31/14 Due 01/31/15

# APPENDIX E

Specimen 1 to 11  Lot# 2210





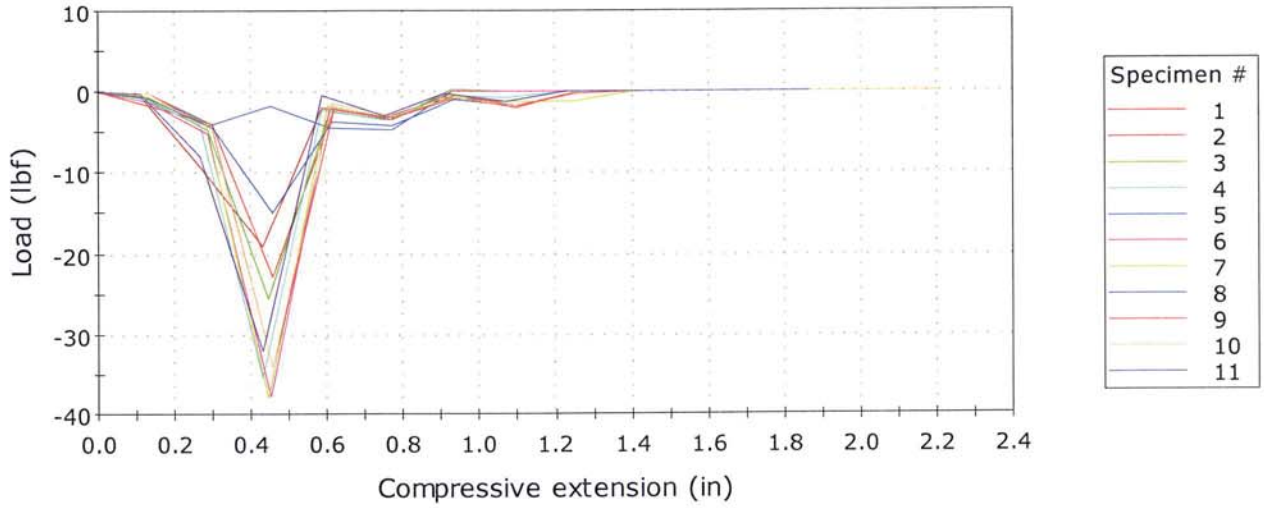

| | Load at Machine Peak Load (lbf) | Notes | Comments |
|---|---|---|---|
| 1 | -19.03000 | | |
| 2 | -18.42000 | | |
| 3 | -19.25000 | | |
| 4 | -19.95000 | | |
| 5 | -17.37000 | | |
| 6 | -17.30000 | | |
| 7 | -17.53000 | | |
| 8 | -17.96000 | | |
| 9 | -16.67000 | | |
| 10 | -17.12000 | | |
| 11 | -19.36000 | | |
| Maximum | -16.67000 | | |
| Minimum | -19.95000 | | |
| Mean | -18.17818 | | |
| Standard Deviation | 1.08 | | |

By Paul Valpreda on 3-21-2014

Instron 4464
System id - 4464C2820
Calibrated on 5-3-2013
Due on 5-3-2014

Specimen 1 to 11 Cat#2211

2014 APR 07




| | Load at Machine Peak Load (lbf) | Notes | Comments |
|---|---|---|---|
| 1 | -26.55000 | | New Filter |
| 2 | -19.22000 | | New Filter |
| 3 | -27.87000 | | New Filter |
| 4 | -35.30000 | | New Filter |
| 5 | -19.78000 | | New Filter |
| 6 | -37.80000 | | New Filter |
| 7 | -38.01000 | | New Filter |
| 8 | -25.72000 | | New Filter |
| 9 | -34.07000 | | New Filter |
| 10 | -33.91000 | | New Filter |
| 11 | -32.00000 | | New Filter |
| Maximum | -19.22000 | | |
| Minimum | -38.01000 | | |
| Mean | -30.02091 | | |
| Standard Deviation | 6.67 | | |

By Paul Valpreda on 3-21-2014

Instron 4464
System id - 4464C2820
Calibrated on 5-3-2013
Due on 5-3-2014

# APPENDIX F

# Appendix 5

## Shipping Test Log Sheet

Preconditioning: CARBON FILTER/MUFFLER

Start Date: 3-21-2014 Chamber Number: 01095

Completion Date: 3-24-2014 Last Calibration: 3-28-2013

Signature/Date: Paul Valpreda 3-24-2014 Calibration due: 3-31-2014

Drop Test:

Catalog _____ Weight 8.65 lbs. Drop Height: 15.5 inches

| Drop | Orientation | Specific face, edge or | Initials/Date |
|---|---|---|---|
| 1 | Top | Face 1 | PV - 3-25-2014 |
| 2 | Edge | Edge 5-3 | PV - 3-25-2014 |
| 3 | Edge | Edge 6-3 | PV - 3-25-2014 |
| 4 | Corner | Corner 2-3-5 | PV - 3-25-2014 |
| 5 | Corner | Corner 4-3-6 | PV - 3-25-2014 |
| 6 | Bottom | Face 3 | PV - 3-25-2014 |

Comments: _____

Signature: Paul Valpreda Date: 3-25-2014

Compression Test:

Catalog _____ Pounds Force 454 lbs.

Comments: _____

Signature: Paul Valpreda Date: 3-25-2014

# Appendix 5 Continued

## Shipping Test Log Sheet

Vibration:

Low Frequency, 40 minutes, Initials PV High frequency 10 minutes, Initials PV

Completion Date: 3-25-2014

Signature: Paul Valpreda Date: 3-27-2014

Second Drop Test:

Catalog _____ Weight 8.65 lbs. Drop Height: 15.5 & 30 inches.

| Drop | Orientation | Specific face, edge or | Initials/Date |
|---|---|---|---|
| 1 | Edge | Edge 4-6 | PV - 3-25-2014 |
| 2 | Face | Face 4 | PV - 3-25-2014 |
| 3 | Face | Face 6 | PV - 3-25-2014 |
| 4 | Corner | Corner 2-1-5 | PV - 3-25-2014 |
| 5 | Edge | Edge 2-1 | PV - 3-25-2014 |
| 6 | Bottom | Face 3, Increase height to 30 inches. | PV - 3-25-2014 |

Comments: _____

Signature: Paul Valpreda Date: 3-25-2014

# APPENDIX G

# Appendix 5

## Shipping Test Log Sheet

Preconditioning: ULPA FILTERS

Start Date: 3-21-2014 Chamber Number: 01095

Completion Date: 3-24-2014 Last Calibration: 3-28-2013

Signature/Date: Paul Valpreda 3-24-14 Calibration due: 3-31-2014

Drop Test:

Catalog _____ Weight 31bs. Drop Height: 15.5 inches

| Drop | Orientation | Specific face, edge or | Initials/Date |
|---|---|---|---|
| 1 | Top | Face 1 | PV - 3-25-2014 |
| 2 | Edge | Edge 5-3 | PV - 3-25-2014 |
| 3 | Edge | Edge 6-3 | PV - 3-25-2014 |
| 4 | Corner | Corner 2-3-5 | PV - 3-25-2014 |
| 5 | Corner | Corner 4-3-6 | PV - 3-25-2014 |
| 6 | Bottom | Face 3 | PV - 3-25-2014 |

Comments: _____

Signature: Paul Valpreda Date: 3-25-2014

Compression Test:

Catalog _____ Pounds Force 120

Comments: _____

Signature: Paul Valpreda Date: 3-25-2014

# Appendix 5 Continued

## Shipping Test Log Sheet

Vibration:

Low Frequency, 40 minutes, Initials PV High frequency 10 minutes, Initials PV

Completion Date: 3-25-2014

Signature: Paul Valpreda Date: 3-25-2014

Second Drop Test:

Catalog _____ Weight 31bs Drop Height: 15.5 + 30 inches

| Drop | Orientation | Specific face, edge or | Initials/Date |
|---|---|---|---|
| 1 | Edge | Edge 4-6 | PV 3-25-2014 |
| 2 | Face | Face 4 | PV 3-25-2014 |
| 3 | Face | Face 6 | PV 3-25-2014 |
| 4 | Corner | Corner 2-1-5 | PV 3-25-2014 |
| 5 | Edge | Edge 2-1 | PV 3-25-2014 |
| 6 | Bottom | Face 3, Increase height to 30 inches. | PV 3-25-2014 |

Comments: _____

Signature: Paul Valpreda Date: 3-25-2014