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## **COMPLIANCE TESTING FOR FMVSS No. 218 MOTORCYCLE HELMETS**

Jiangmen Pengcheng Helmets Ltd (MHR) LS2

Model – OF569

Size – M (58 cm)

Prepared by:

**Southwest Research Institute®**

6220 Culebra Road

San Antonio, Texas 78238-5166

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Prepared for:

**Jiangmen Pengcheng Helmets Ltd.**

Industrial Park East, Gonghe Town, Heshan Jiangmen City

Guangdong, P.R. China 529728



DETROIT, MICHIGAN (248) 353-2550 • HOUSTON, TEXAS (713) 977-1377 • WASHINGTON, DC (301) 881-0289

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Technician: Manuel R. Gonzalez  
Manuel R. Gonzalez

Project Manager: Daniel J. Pomeroy  
Daniel J. Pomeroy

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# TABLE OF CONTENTS

|  | <b><u>Page</u></b> |
|--|--------------------|
| 1. PURPOSE OF COMPLIANCE TEST.....                             | 5                  |
| 2. HELMET DATA .....   | 5                  |
| 3. SUMMARY OF TEST RESULTS.....                                | 6                  |
| 4. SELECTION OF APPROPRIATE HEADFORM (S6.1) .....              | 7                  |
| 5. REFERENCE MARKING (S6.2) AND HELMET POSITIONING (S6.3)..... | 7                  |
| 6. CONFIGURATION (S5.4).....                                   | 7                  |
| 7. PERIPHERAL VISION AND BROW OPENING (S5.4) .....             | 8                  |
| 8. PROJECTIONS (S5.5) .....                                    | 8                  |
| 9. LABELING (S5.6) .....                                       | 9                  |
| 10. CONDITIONING FOR TESTING (S6.4).....                       | 10                 |
| 11. IMPACT TESTING (S5.1 & S7.1) .....                         | 11                 |
| 12. PENETRATION (S5.2 & S7.2).....                             | 13                 |
| 13. RETENTION SYSTEM TESTING (S5.3 & S7.3).....                | 14                 |
| 14. TEST FAILURE DETAILS .....                                 | 15                 |
| 15. INTERPRETATION OF DEVIATIONS FROM FMVSS NO. 218 .....      | 15                 |
| 16. CONDITIONING ENVIRONMENTS .....                            | 16                 |
| 17. IMPACT TIME HISTORIES .....                                | 17                 |
| 18. RETENTION TIME HISTORIES .....                             | 22                 |
| 19. PHOTOGRAPHS .....  | 24                 |
| 20. TEST EQUIPMENT LIST AND CALIBRATION INFORMATION.....       | 28                 |

## LIST OF PHOTOGRAPHS

|  | <u>Page</u> |
|--|-------------|
| Photograph 1. Front View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm).....     | 24          |
| Photograph 2. Side View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm).....      | 24          |
| Photograph 3. Rear View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm) .....     | 25          |
| Photograph 4. Top View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm).....       | 25          |
| Photograph 5. Interior View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm) ..... | 26          |
| Photograph 6. Labeling 1 Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm) .....    | 26          |
| Photograph 7. Labeling 2 Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm) .....    | 27          |

## LIST OF TABLES

|   | <u>Page</u> |
|---|-------------|
| Table 1. Instrumentation List for SwRI Protective Headgear Testing.....   | 28          |
| Table 2. Test Apparatus List for SwRI Protective Headgear Testing Requiring One-Time<br>Dimensions Checks or No Calibration ..... | 29          |

## 1. PURPOSE OF COMPLIANCE TEST

The purpose of the test was to determine if the OF569 production helmets supplied by Jiangmen Pengcheng Helmets Ltd (MHR) satisfy the requirements of Federal Motor Vehicle Safety Standard Number 218 - Motorcycle Helmets (FMVSS No. 218). This specification is a performance standard, and is not intended to restrict design.

## 2. HELMET DATA

Helmet data given is based on information provided with the helmets, information provided by the manufacturer/distributor, and measured data.

Helmet Brand Name: LS2

Helmet Model Designation: OF569

Helmet Manufacturer: Jiangmen Pengcheng Helmets Ltd (MHR)

Month and Year of Manufacture: 01/2011

Helmet Size Designation: M (58 cm)

Coverage: Full

Helmet Position Index (HPI) (mm): 62.0 mm

Shell Material: Fiberglass

Liner Material: Polystyrene

Type of Retention System: Quick Release

| Helmet                         | A<br>Ambient | B<br>Low Temp | C<br>High Temp | D<br>Water<br>Immersed | E<br>Spare |
|--------------------------------|--------------|---------------|----------------|------------------------|------------|
| Shell<br>Color/Pattern         | Silver       | Silver        | Silver         | Silver                 | Silver     |
| Weight (grams)                 | 1203         | 1217          | 1230           | 1213                   | 1231       |
| Month & Year<br>of Manufacture | 01/2011      | 01/2011       | 01/2011        | 01/2011                | 01/2011    |

### Comments:

- The HPI is based on information supplied by the manufacturer.
- Weight is with all auxiliary equipment removed including face shield and support hardware - ready for testing.
- Photographs of the helmets are given in Photographs (Section 19).

### 3. SUMMARY OF TEST RESULTS

| TEST                                  | HELMET | A    | B    | C    | D    |
|---------------------------------------|--------|------|------|------|------|
| IMPACT (S5.1, S7.1)                   |        | PASS | PASS | PASS | PASS |
| PENETRATION (S5.2, S7.2)              |        | PASS | PASS | PASS | PASS |
| RETENTION (S5.3, S7.3)                |        | PASS | PASS | PASS | PASS |
| CONFIGURATION (S5.4)                  |        | PASS | NA   | NA   | NA   |
| PERIPHERAL VISION/BROW OPENING (S5.4) |        | PASS | NA   | NA   | NA   |
| PROJECTIONS (S5.5)                    |        | PASS | NA   | NA   | NA   |
| LABELING (S5.6)                       |        | PASS | NA   | NA   | NA   |

Comments:

- The helmet passed all testing.

#### 4. SELECTION OF APPROPRIATE HEADFORM (S6.1)

Selection of the headform used during testing was based on the helmet size designation, as identified in the following table. If the size range is not specified by hat size, the selection is based on best fit of the helmet on the headform. As identified in FMVSS No. 218, if the helmet size designation falls into more than one of the size ranges, it shall be tested on each appropriate headform. When multiple headforms are appropriate, the selection shall be based on best fit and discussion with the supplier of the helmets.

| HELMET SIZE DESIGNATION   | HEADFORM SIZE | WEIGHT  |
|---|---------------|---|
| ≤ European size 54<br>≤ 6 3/4                                   | Small         | 3.5, +0.00, -0.063 kg<br>7.8, +0.00, -0.14 lbs  |
| >European Size 54 but ≤ European Size 60<br>> 6 3/4 but ≤ 7 1/2 | Medium        | 5.0, +0.00, -0.090 kg<br>11.0, +0.00, -0.20 lbs |
| > European size 60<br>> 7 1/2                                   | Large         | 6.1, +0.00, -0.108 kg<br>13.4, +0.00, -0.24 lbs |

Comments:

- A medium headform was used based on information provided by the manufacturer. The total weight of the drop assembly was 4.98 kg. The helmet was a good fit on the headform.

#### 5. REFERENCE MARKING (S6.2) AND HELMET POSITIONING (S6.3)

The test line was drawn on the helmet, as identified by Figure 2 in FMVSS No. 218, following the procedures of S6.2 of FMVSS No. 218. The centers of impact sites were selected at points on the helmet on or above the test line. Before each test, the helmet was fixed on the test headform in the position that conformed to the helmet position index, in accordance with the requirements of S6.3 of FMVSS No. 218.

Comments:

- None.

#### 6. CONFIGURATION (S5.4)

The configuration of this helmet is such that it has a protective surface of continuous contour at all points above the test line.

Comments:

- This helmet satisfies the configuration requirements of S5.4 of FMVSS No. 218. See helmet photographs in Photographs (Section 19).

## 7. PERIPHERAL VISION AND BROW OPENING (S5.4)

The peripheral vision shall be at least 105° each side of the mid-sagittal plane through the basic plane. The brow opening shall be at least 2.54 cm (1-inch) above all points in the basic plane that is within the angles of peripheral vision. The peripheral vision and brow opening were measured with the helmet positioned on the headform in accordance with S6.2.1 and S6.2.2 of FMVSS No. 218.

|                          | REQUIREMENTS | TEST RESULTS |
|--------------------------|--------------|--------------|
| <b>Peripheral Vision</b> | > 105°       | > 105°       |
| <b>Brow Opening</b>      | > 2.54 cm    | > 2.54 cm    |

Comments:

- This helmet satisfies the peripheral vision and brow opening requirements of S5.4 of FMVSS No. 218.

## 8. PROJECTIONS (S5.5)

A helmet shall not have any internal rigid projections. External rigid projections shall be limited to those required for operation of essential accessories, and shall not protrude more than 5 mm (0.20 inches).

| Projection Type       | REQUIREMENTS |             | TEST RESULTS                 |             |
|-----------------------|--------------|-------------|------------------------------|-------------|
|                       | Availability | Height (mm) | Availability                 | Height (mm) |
| <b>Internal Rigid</b> | None         | 0.00        | None                         | N/A         |
| <b>External Rigid</b> | Operational  | < 5 mm      | Front Vent, Rear Vent Covers | 2.54, 10.16 |

Comments:

- This helmet satisfies the projection requirements of S5.5 of FMVSS No. 218.



## 9. LABELING (S5.6)

Each helmet shall be permanently and legibly labeled, in a manner such that the label(s) can be easily read, without removing padding or any other permanent part. The following information shall be included:

| REQUIRED INFORMATION   | PASS | FAIL |
|--|------|------|
| (1) Manufacturer's name or identification.   | PASS |      |
| (2) Precise model designation.   | PASS |      |
| (3) Size.  | PASS |      |
| (4) Month and year of manufacture.   | PASS |      |
| (5) The DOT symbol, constituting the manufacturer's certification that the helmet conforms to the applicable Federal Motor Vehicle Safety Standards. This symbol shall appear on the outer surface, in a color that contrasts with the background, in letters at least 1 cm (0.375 inch) high centered laterally with the horizontal centerline on the symbol located a minimum of 2.9 cm (1.125 inches) and a maximum of 3.5 cm (1.375 inches) from the bottom edge of the posterior portion of the helmet. | PASS |      |
| (6) Instruction to the Purchaser as follows:   |      |      |
| Shell and liner constructed of (identify type(s) of materials)   | PASS |      |
| The helmet can be seriously damaged by some common substances without the damage being visible to the user.  | PASS |      |
| Apply only the following: (Recommended cleaning agents, paints, adhesives, etc. as appropriate).   | PASS |      |
| Make no modifications.   | PASS |      |
| Fasten helmet securely.  | PASS |      |
| If the helmet experiences a severe blow, return it to the manufacturer for inspection or destroy and replace it.   | PASS |      |

### Comments:

- This helmet satisfies all the labeling requirements of S5.6 of FMVSS No. 218. See labeling photographs (Section 19). The DOT symbol is 1.22 cm in height. The specified height is greater than 1.2 cm. It is 4.0 cm above the rear of the helmet based on the edge of the black molding. The specified height greater than 3.5 cm.

## 10. CONDITIONING FOR TESTING (S6.4)

The helmets were conditioned for 12 to 24 hours in the specified environmental condition shown below, prior to testing. One helmet was conditioned in each environment. Each test was begun within two minutes after removal of the helmet from conditioning. The maximum time during which the helmets were out of the conditioning environment was less than four minutes. Records of the conditioning are given in Conditioning Environments (Section 16).

| IDENTIFICATION     | CONDITIONS   | HELMET |
|--------------------|--|--------|
| Ambient Conditions | 21°C ± 6°C, 40% to 60% RH, Site Pressure<br>59°F to 81°F | A      |
| Low Temperature    | -10°C +8°C, -0°C<br>14°F to 28°F                         | B      |
| High Temperature   | 50°C +0°C, -4°C<br>115°F to 122°F                        | C      |
| Water Immersion    | 25°C ± 6°C<br>66°F to 88°F                               | D      |

### Comments:

- None.

## 11. IMPACT TESTING (S5.1 & S7.1)

The helmets were subjected to the impact attenuation test in accordance with S7.1 of FMVSS No. 218. The construction materials and resonant frequencies of the headforms satisfy the requirements of S7.1.5 of FMVSS No. 218. The testing was performed using a monorail drop test system, as required by S7.1.6 of FMVSS No. 218. The drop assembly satisfies the requirements of S7.1.7, S7.1.8, and S7.1.12 of FMVSS No. 218. The response accelerometer and instrumentation satisfy the requirements of S7.1.9 of FMVSS No. 218. The anvils and mounting satisfy the requirements of S7.1.10 and S7.1.11 of FMVSS No. 218.

The Impact Attenuation Instrument System was checked before and after testing by dropping the bare headform, for impact on the top, onto a MEP pad. The pre-test drop height was set to achieve a nominal peak acceleration of 400 g's  $\pm$  10 g's. Post-test drops were made from the same drop height. Three drops were made for the pre-test and post-test conditions, and the peak deceleration averaged. Summary data is provided in the following table and time histories for the system check impacts are given in Impact Time Histories (Section 17). The difference between pre-test average and the post-test average shall not exceed 40 g's.

MHR, LS2 OF569, M (58 cm)  
Impact Testing

| Anvil         | Impact Velocity    |
|---------------|--------------------|
| Hemispherical | 5.07 to 5.33 m/sec |
| Flat          | 5.85 to 6.15 m/sec |

| Temperature C | Relative Humidity % |
|---------------|---------------------|
| 21            | 47                  |

Headform Size = Medium  
Impact Position on Crown

Drop Assembly Weight = 4.98 kg

| System Check                                       | Drop No | Drop Height (cm) | Vel (m/sec) | Peak Acceleration (g) | Dwell Time (msec)               |            |
|--|---------|------------------|-------------|-----------------------|---------------------------------|------------|
|  |         |                  |             |                       | at 150 g's                      | at 200 g's |
| Pre Test   | 1A      | 84               | 3.97        | 401                   | 1.8                             | 1.6        |
|  | 2A      | 84               | 4.03        | 398                   | 1.8                             | 1.6        |
|  | 3A      | 84               | 4.02        | 400                   | 1.8                             | 1.6        |
| Pre Test Average                                   |         | ---              | ---         | 400                   | ---                             | ---        |
| Post Test  | 1B      | 84               | 4.07        | 402                   | 1.8                             | 1.5        |
|  | 2B      | 84               | 4.02        | 399                   | 1.8                             | 1.5        |
|  | 3B      | 84               | 4.02        | 399                   | 1.8                             | 1.5        |
| Post Test Average                                  |         | ---              | ---         | 400                   | ---                             | ---        |
| Difference Between Pre Test and Post Test Averages |         |                  |             | 0                     | Difference Not to Exceed 40 g's |            |

Each helmet (A, B, C, and D) was impacted at four sites with the center of impact points on or above the test line, and at least one-fifth of the maximum circumference of the helmet from any prior impact center. Two impacts on each helmet were with the hemispherical anvil and two were with the flat anvil. Acceptable velocities were: (a) Flat Anvil – 5.85 to 6.15 m/sec (19.19 to 20.18 ft/sec) and (b) Hemispherical Anvil – 5.07 to 5.33 m/sec (16.64 to 17.49 ft/sec). Summary data is provided in the following table and time histories for the impacts are given in Impact Time Histories (Section 17). Given on these plots are the conditioning environment, impact location, anvil type, peak acceleration, dwells at 150 g's and 200 g's, and impact velocity.

MHR, LS2 OF569, M (58 cm)  
Impact Testing

| Helmet Designation | Helmet Condition | Helmet Type     | Impact Location (+/- 45 degrees) |      |            |      |             |      |           |      |
|--------------------|------------------|-----------------|----------------------------------|------|------------|------|-------------|------|-----------|------|
|                    |                  | Partial/Full    | Forehead                         |      | Left Side  |      | Right Side  |      | Rear      |      |
|                    |                  | Complete        | Left Front                       |      | Right Rear |      | Right Front |      | Left Rear |      |
|                    |                  | Impact No.      | 1                                | 2    | 1          | 2    | 1           | 2    | 1         | 2    |
| A                  | Ambient          | Anvil           | Hemi                             |      | Hemi       |      | Flat        |      | Flat      |      |
|                    |                  | Test Record No. | 3                                | 4    | 11         | 12   | 19          | 20   | 27        | 28   |
|                    |                  | Peak g          | 88                               | 163  | 85         | 104  | 168         | 203  | 148       | 157  |
|                    |                  | ms @ 150 g      | 0.0                              | 0.7  | 0.0        | 0.0  | 2.3         | 2.8  | 0.0       | 0.5  |
|                    |                  | ms @ 200 g      | 0.0                              | 0.0  | 0.0        | 0.0  | 0.0         | 0.2  | 0.0       | 0.0  |
|                    |                  | Velocity m/sec  | 5.19                             | 5.19 | 5.27       | 5.20 | 5.93        | 5.93 | 5.93      | 5.93 |
| B                  | Low Temperature  | Anvil           | Hemi                             |      | Hemi       |      | Flat        |      | Flat      |      |
|                    |                  | Test Record No. | 5                                | 6    | 13         | 14   | 21          | 22   | 29        | 30   |
|                    |                  | Peak g          | 82                               | 110  | 86         | 112  | 158         | 193  | 152       | 161  |
|                    |                  | ms @ 150 g      | 0.0                              | 0.0  | 0.0        | 0.0  | 1.7         | 2.9  | 0.0       | 0.8  |
|                    |                  | ms @ 200 g      | 0.0                              | 0.0  | 0.0        | 0.0  | 0.0         | 0.0  | 0.0       | 0.0  |
|                    |                  | Velocity m/sec  | 5.19                             | 5.20 | 5.28       | 5.19 | 6.03        | 5.93 | 5.93      | 5.94 |
| C                  | High Temperature | Anvil           | Hemi                             |      | Hemi       |      | Flat        |      | Flat      |      |
|                    |                  | Test Record No. | 7                                | 8    | 15         | 16   | 23          | 24   | 31        | 32   |
|                    |                  | Peak g          | 96                               | 160  | 81         | 108  | 161         | 175  | 138       | 144  |
|                    |                  | ms @ 150 g      | 0.0                              | 0.6  | 0.0        | 0.0  | 1.6         | 1.9  | 0.0       | 0.0  |
|                    |                  | ms @ 200 g      | 0.0                              | 0.0  | 0.0        | 0.0  | 0.0         | 0.0  | 0.0       | 0.0  |
|                    |                  | Velocity m/sec  | 5.11                             | 5.20 | 5.20       | 5.20 | 6.04        | 5.93 | 5.93      | 5.94 |
| D                  | Water Immersed   | Anvil           | Hemi                             |      | Hemi       |      | Flat        |      | Flat      |      |
|                    |                  | Test Record No. | 9                                | 10   | 17         | 18   | 25          | 26   | 33        | 34   |
|                    |                  | Peak g          | 103                              | 305  | 88         | 128  | 167         | 214  | 141       | 144  |
|                    |                  | ms @ 150 g      | 0.0                              | 1.4  | 0.0        | 0.0  | 2.0         | 2.9  | 0.0       | 0.0  |
|                    |                  | ms @ 200 g      | 0.0                              | 1.0  | 0.0        | 0.0  | 0.0         | 1.0  | 0.0       | 0.0  |
|                    |                  | Velocity m/sec  | 5.19                             | 5.20 | 5.20       | 5.19 | 5.93        | 6.04 | 5.93      | 6.03 |

Comments:

- The helmet passed the impact testing. This helmet satisfies the requirements of S5.1 of FMVSS No. 218.

## 12. PENETRATION (S5.2 & S7.2)

One sample of each of the helmets was subjected to the penetration test in accordance with S7.2 of FMVSS No. 218. The penetration striker satisfies the requirements of S7.2.6 and S7.2.7 of FMVSS No. 218. The height of the free fall drop was a normal 300 cm (116.9 to 118.1 inches), as measured from the striker point to the impact point on the outer surface of the test helmet. Two penetration blows were applied to each helmet at least 7.6 cm (3 inches) apart, and at least 7.6 cm (3 inches) from the centers of any impacts applied during the impact attenuation test.

| TEST | HELMET | CONDITION        | PASS | FAIL |
|------|--------|------------------|------|------|
| 1    | A      | Ambient          | PASS |      |
| 2    | A      | Ambient          | PASS |      |
| 3    | B      | Low Temperature  | PASS |      |
| 4    | B      | Low Temperature  | PASS |      |
| 5    | C      | High Temperature | PASS |      |
| 6    | C      | High Temperature | PASS |      |
| 7    | D      | Water Immersed   | PASS |      |
| 8    | D      | Water Immersed   | PASS |      |

### Comments:

- This helmet satisfies the penetration requirements of S5.2 of FMVSS No. 218.

### 13. RETENTION SYSTEM TESTING (S5.3 & S7.3)

The helmets were subjected to the retention system testing in accordance with the procedures given in S7.3 of FMVSS No. 218. The helmet was placed on the headform, which was mounted on a stationary support. Load was applied to the retention system through a simulated jaw structure that satisfies the requirements of S7.3.2. The elongation of the retention system was measured between the extremity of the adjustable portion of the retention system and the apex of the helmet. Elongation was defined as the difference between the position with an initial 22.7 kg (50-lb.) load and the final position with a 136 kg (300-lb.) load. The acceptance criteria were that the retention system remained intact without elongating more than 2.54 cm (1 inch).

| HELMET | CONDITIONS       | INITIAL READING (cm) | FINAL READING (cm) | ELONGATION (cm) |
|--------|------------------|----------------------|--------------------|-----------------|
| A      | Ambient          | 3.98                 | 5.56               | 1.58            |
| B      | Low Temperature  | 4.02                 | 5.71               | 1.69            |
| C      | High Temperature | 4.34                 | 5.97               | 1.62            |
| D      | Water Immersed   | 4.30                 | 5.92               | 1.62            |

Time histories for the retention system testing are given in Retention Time Histories (Section 18). Given on these plots are the conditioning environment, load, and elongation.

Comments:

- None.

#### **14. TEST FAILURE DETAILS**

Comments:

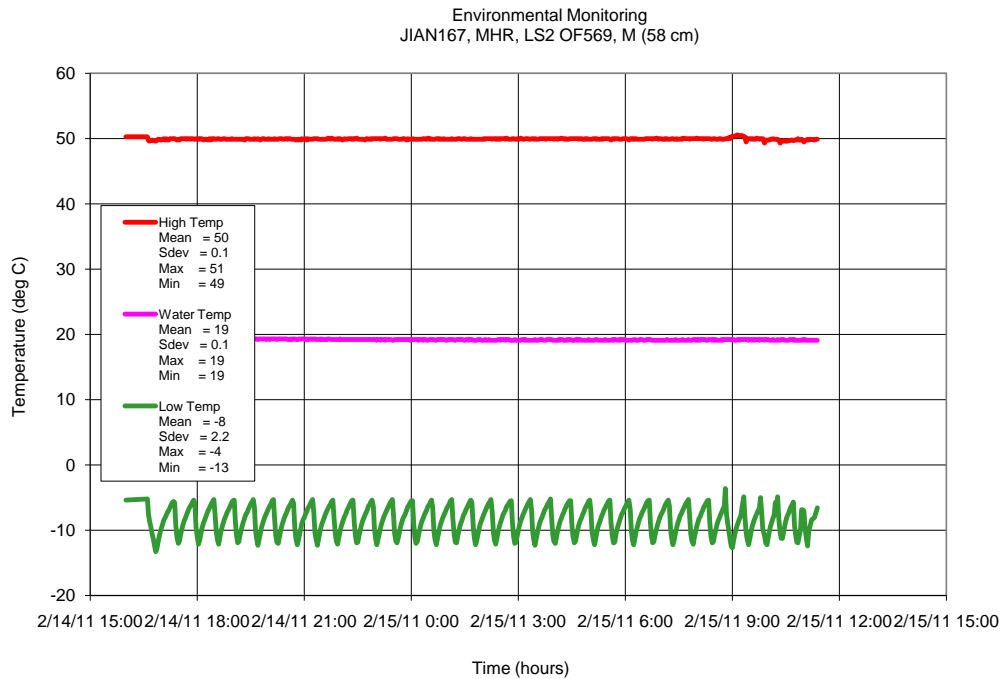
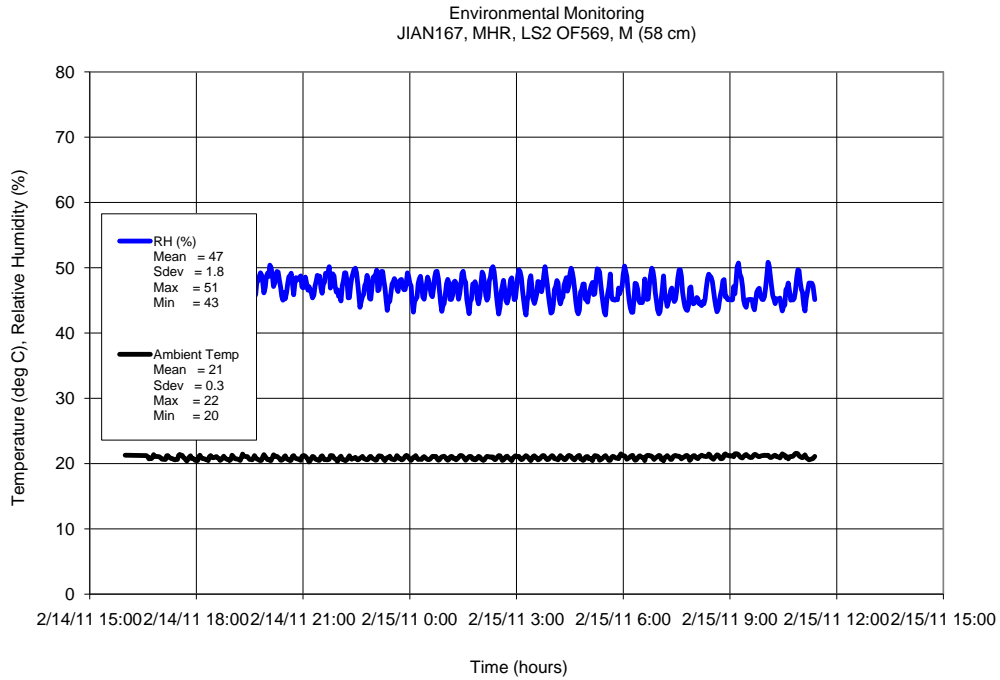
- None.

#### **15. INTERPRETATION OF DEVIATIONS FROM FMVSS NO. 218**

Comments:

- All testing was performed in accordance with the requirements of FMVSS NO. 218.

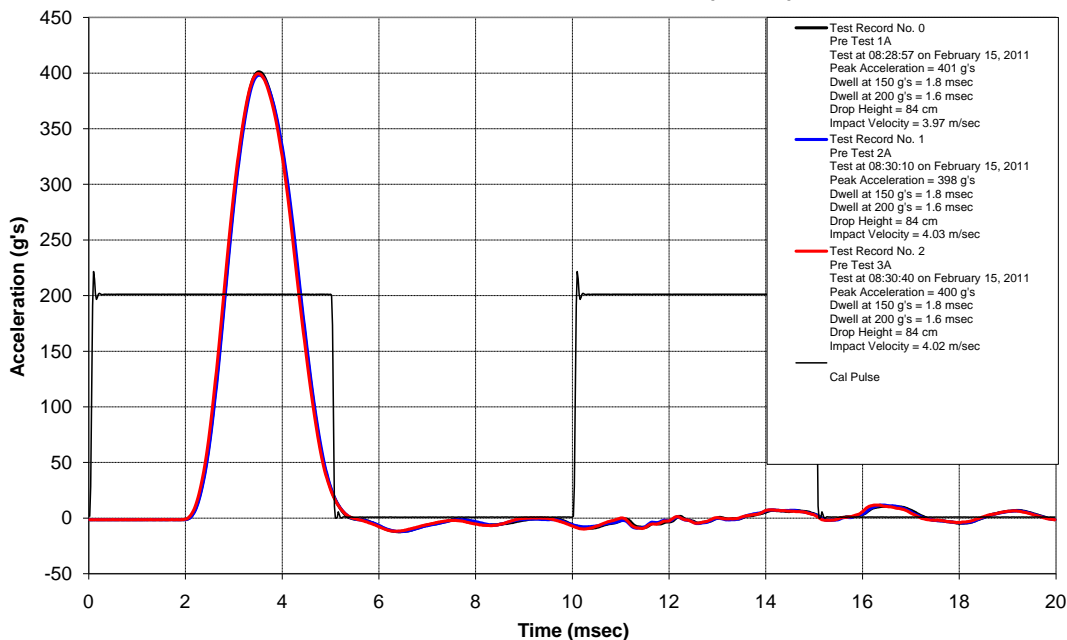
## 16. CONDITIONING ENVIRONMENTS



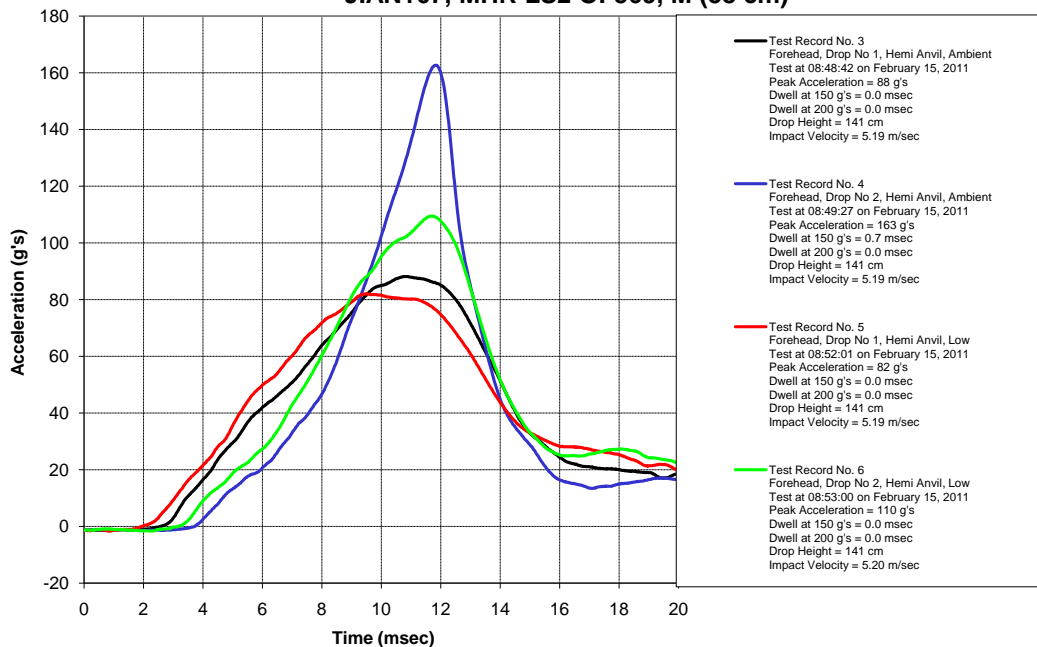


## 17. IMPACT TIME HISTORIES

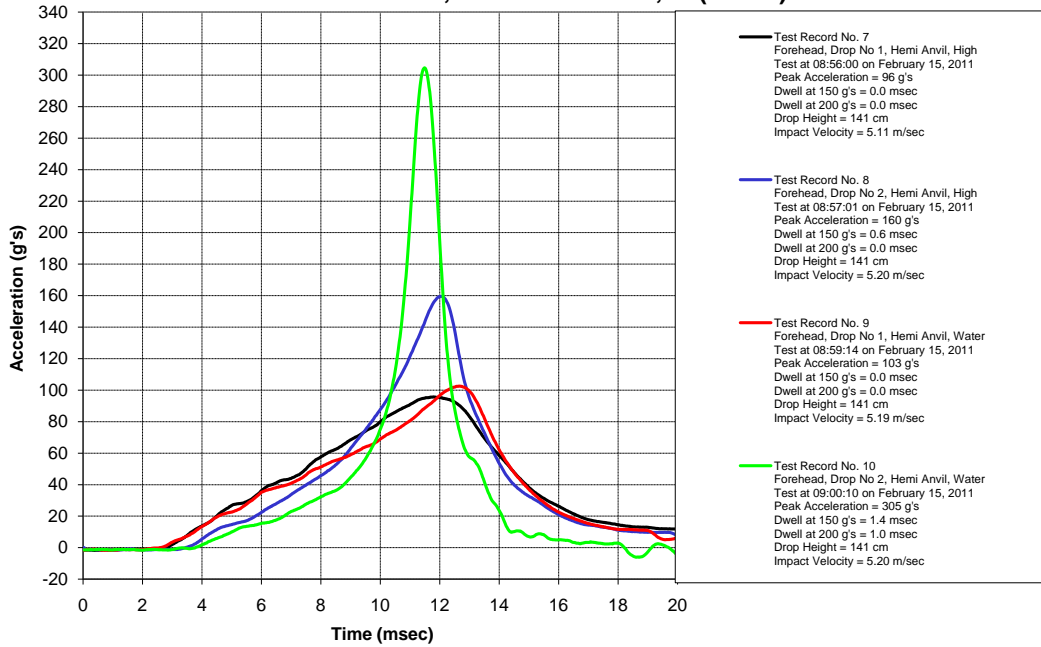
### Impact Testing JIAN167, MHR LS2 OF569, M (58 cm)



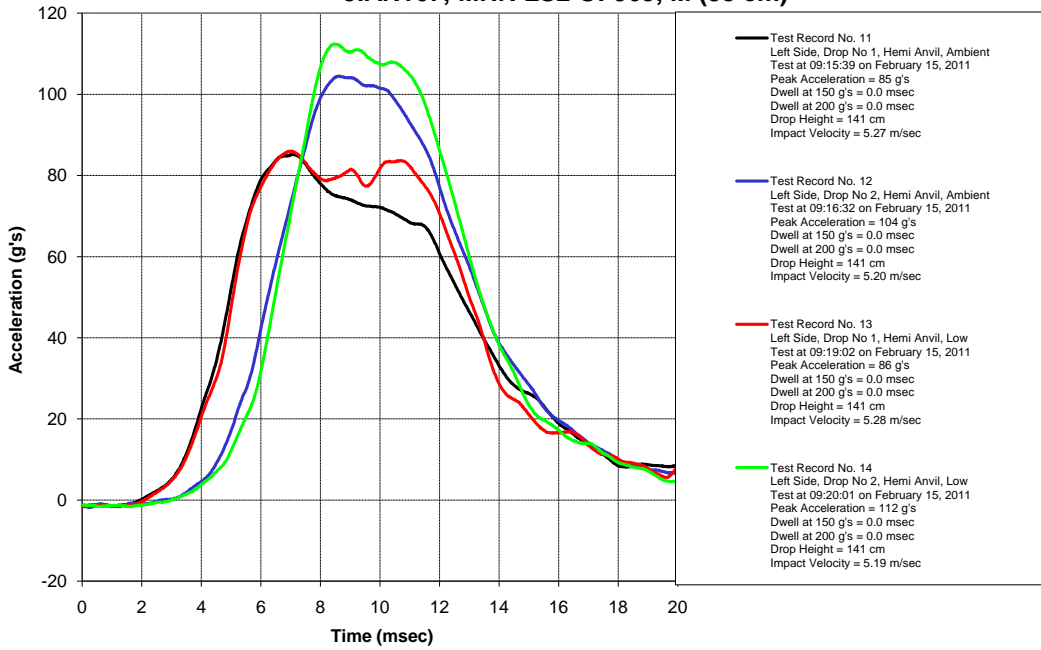
### Impact Testing JIAN167, MHR LS2 OF569, M (58 cm)



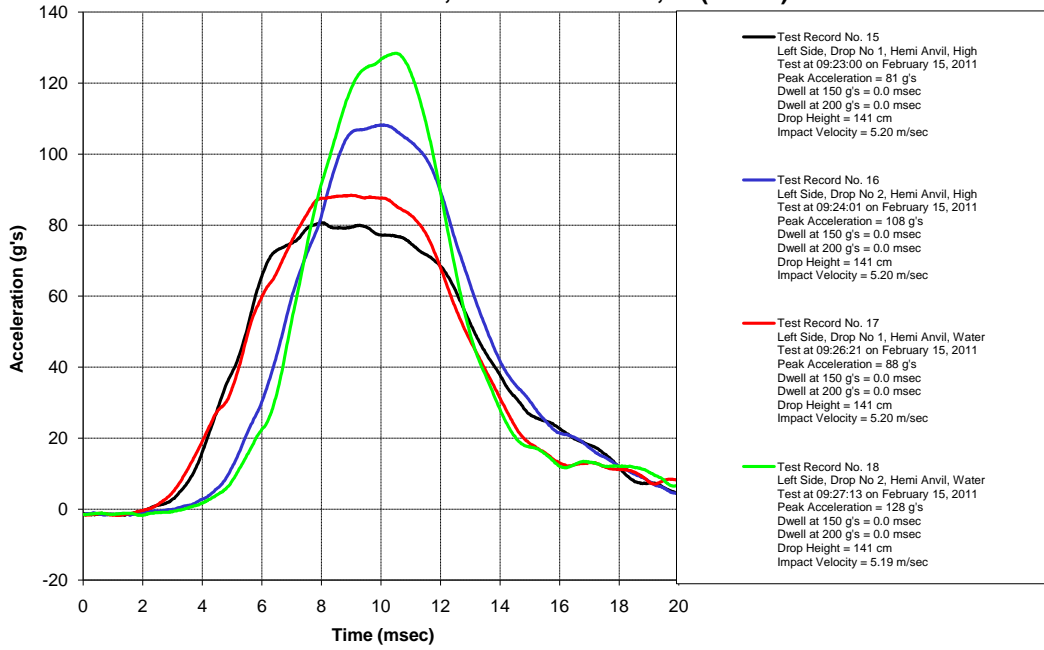
### Impact Testing JIAN167, MHR LS2 OF569, M (58 cm)



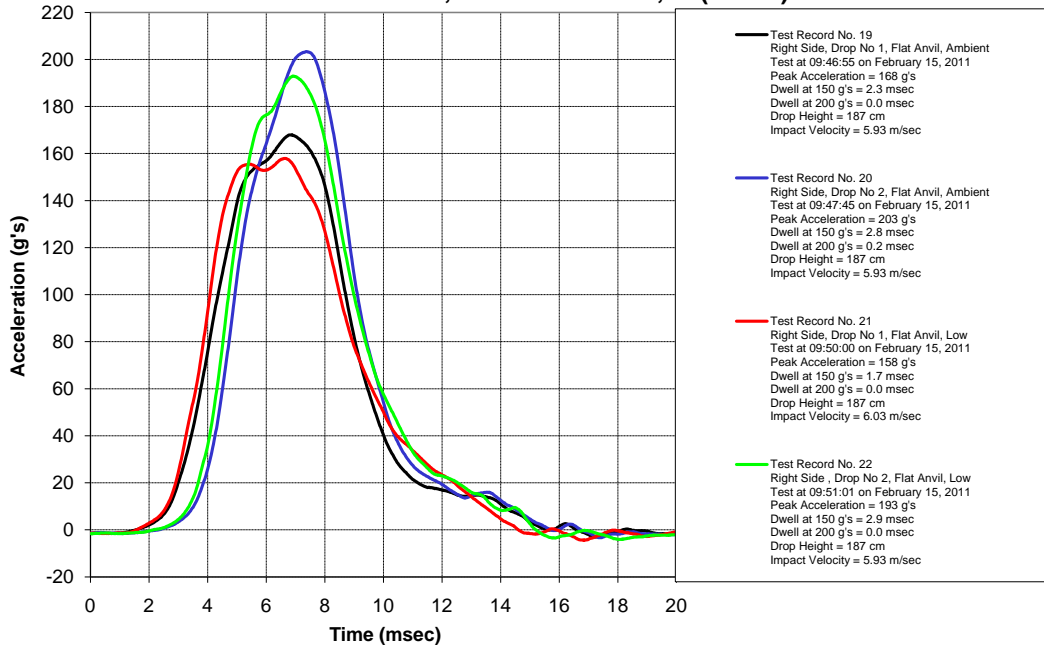
### Impact Testing JIAN167, MHR LS2 OF569, M (58 cm)



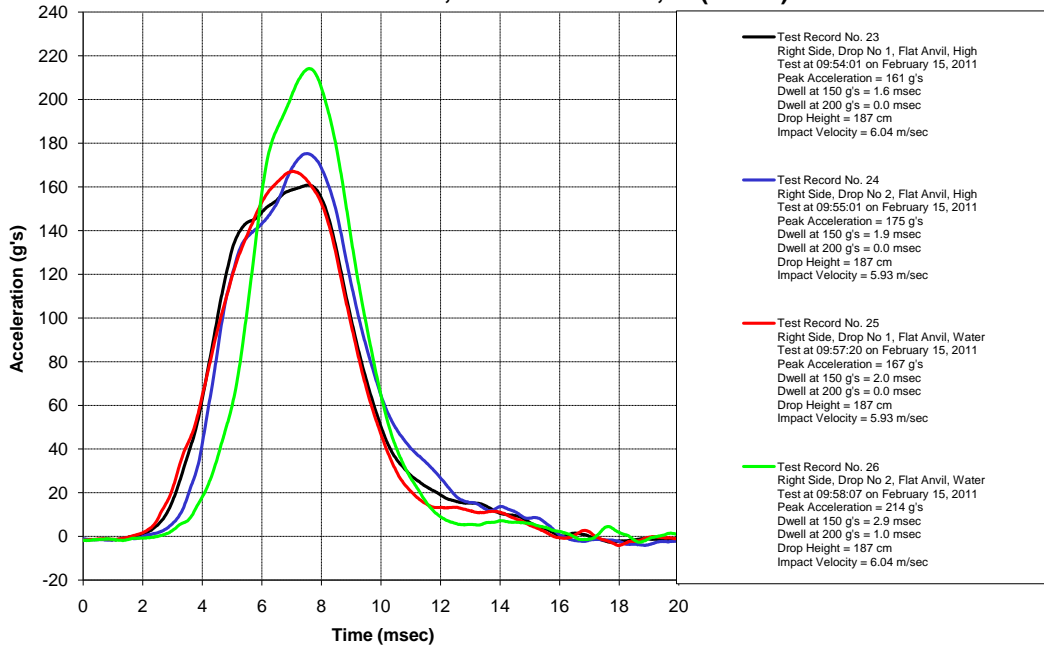
**Impact Testing  
JIAN167, MHR LS2 OF569, M (58 cm)**



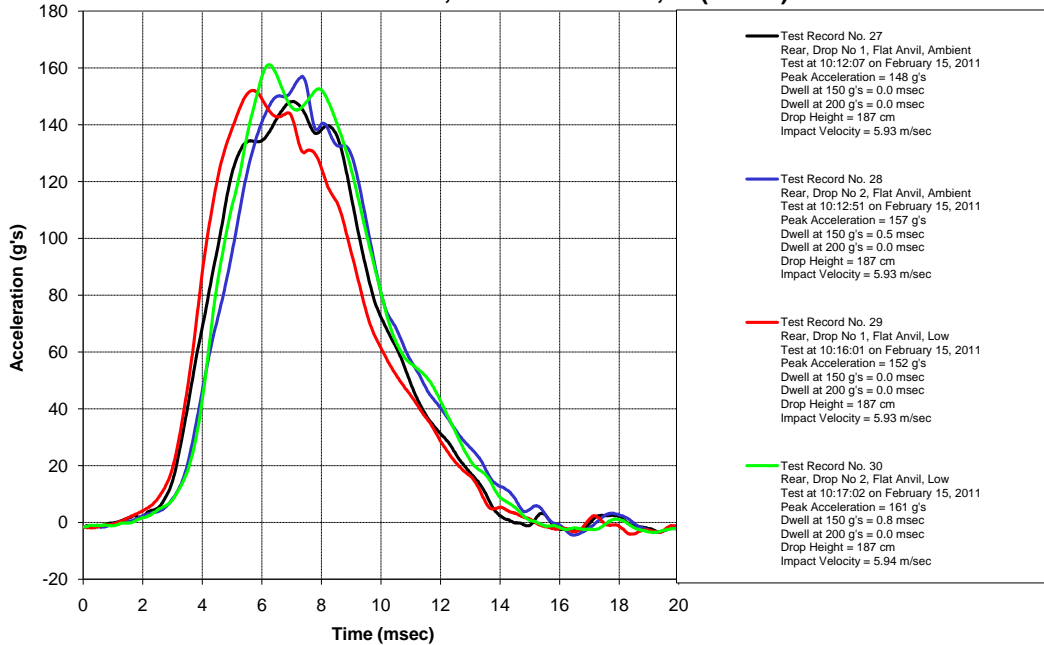
**Impact Testing  
JIAN167, MHR LS2 OF569, M (58 cm)**



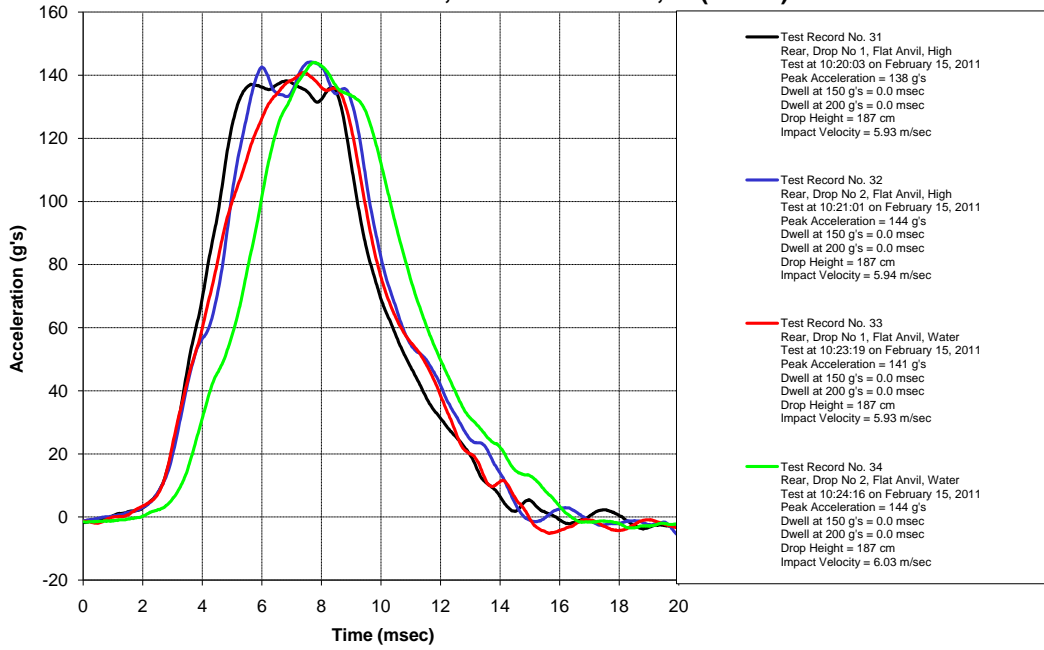
**Impact Testing  
JIAN167, MHR LS2 OF569, M (58 cm)**



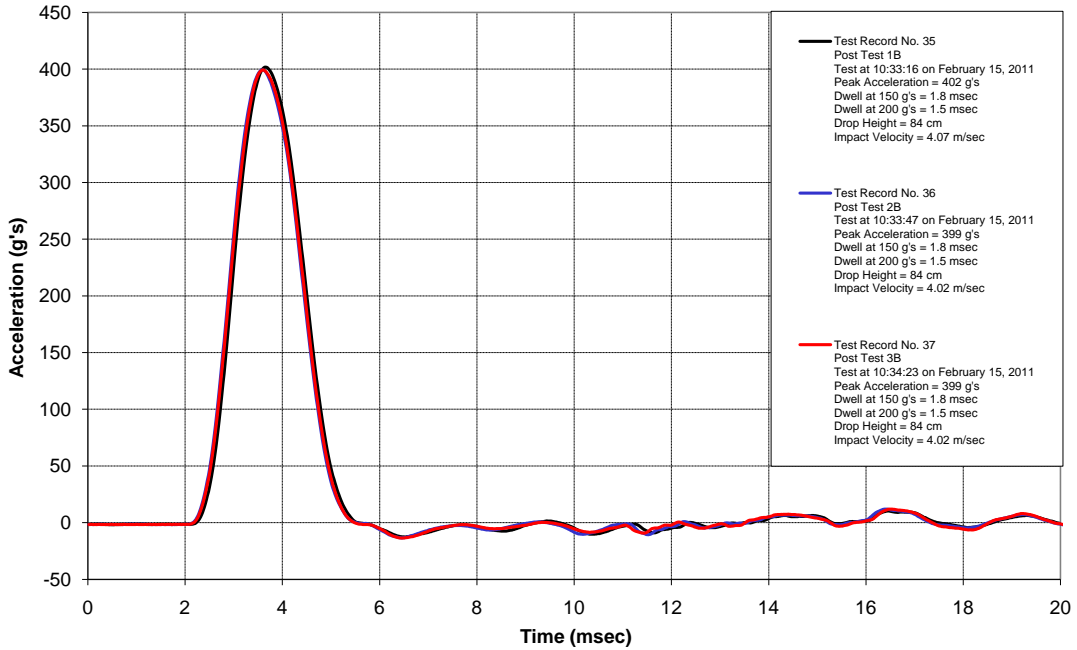
**Impact Testing  
JIAN167, MHR LS2 OF569, M (58 cm)**



**Impact Testing  
JIAN167, MHR LS2 OF569, M (58 cm)**

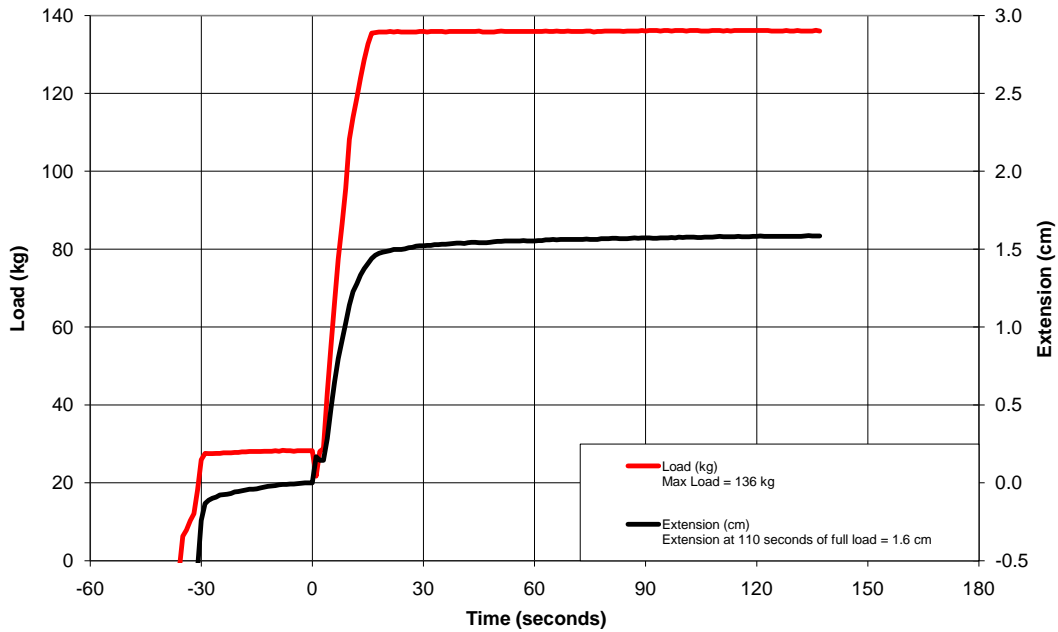


**Impact Testing  
JIAN167, MHR LS2 OF569, M (58 cm)**

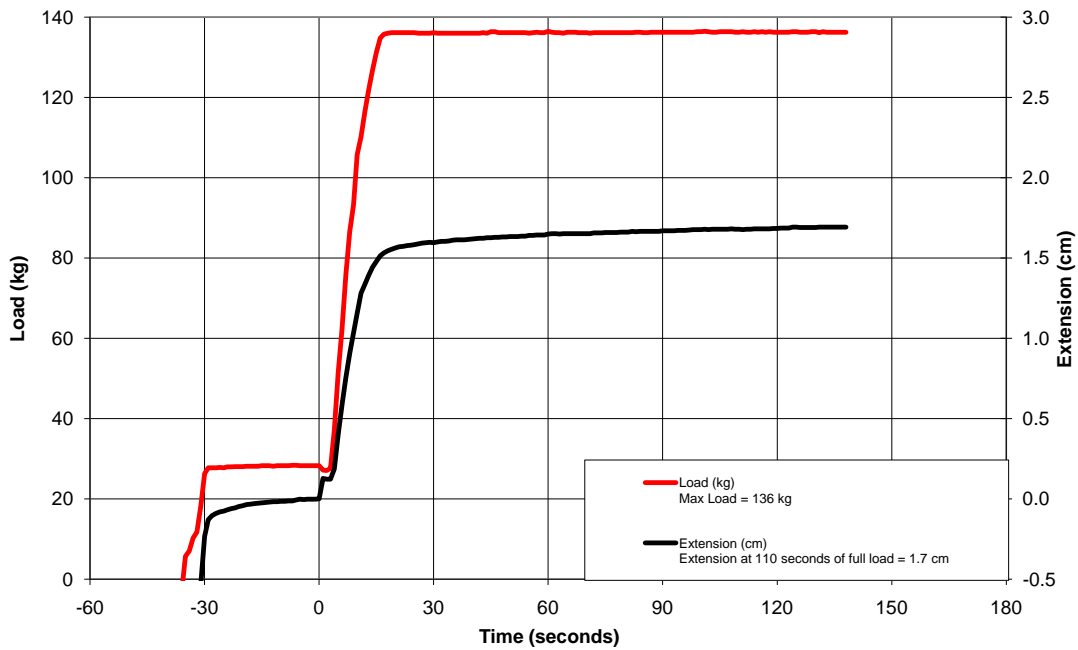


## 18. RETENTION TIME HISTORIES

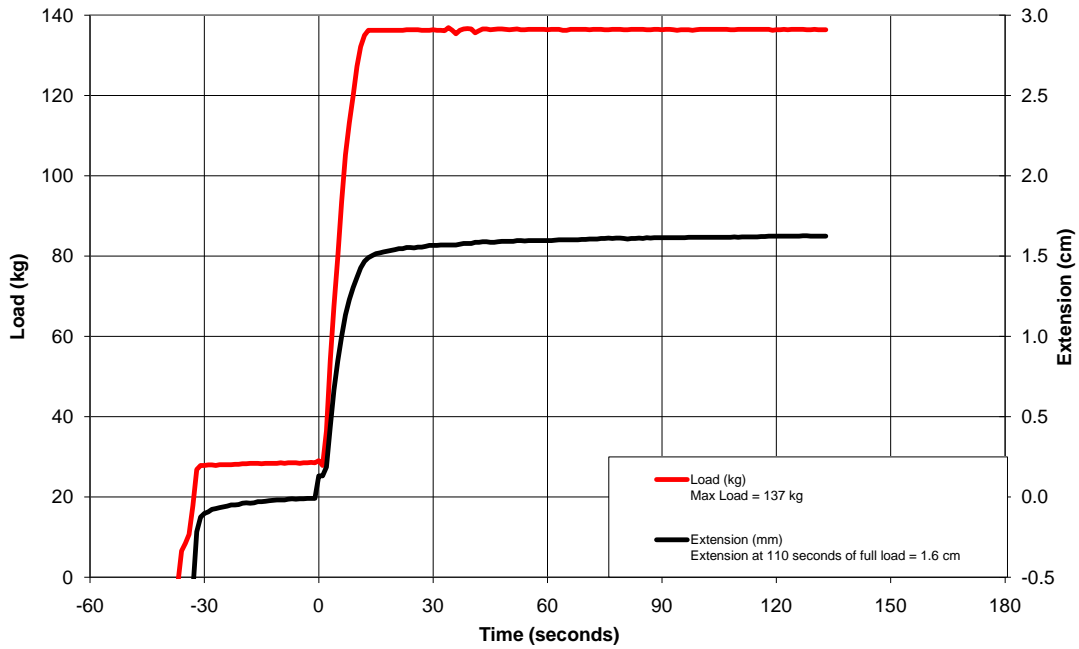
Ambient Temperature Retention Testing 02/15/11  
JIAN167, MHR, LS2 OF569, M (58 cm)



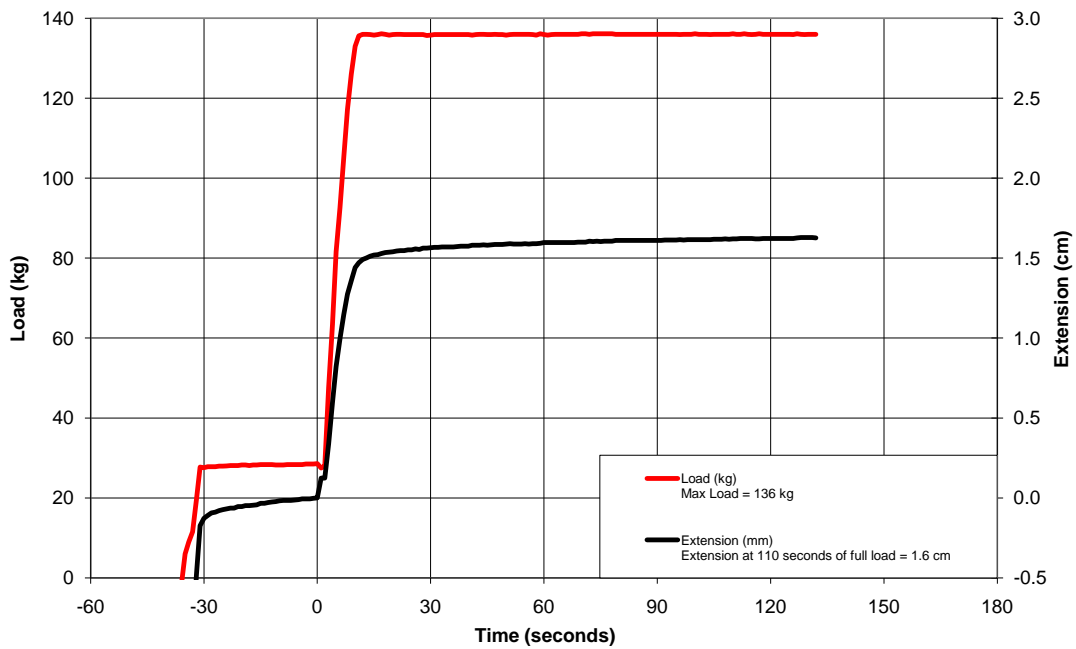
Low Temperature Retention Testing 02/15/11  
JIAN167, MHR, LS2 OF569, M (58 cm)



**High Temperature Retention Testing 02/15/11  
JIAN167, MHR, LS2 OF569, M (58 cm)**



**Water Immersed Retention Testing 02/15/11  
JIAN167, MHR, LS2 OF569, M (58 cm)**



## 19. PHOTOGRAPHS



**Photograph 1. Front View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)**

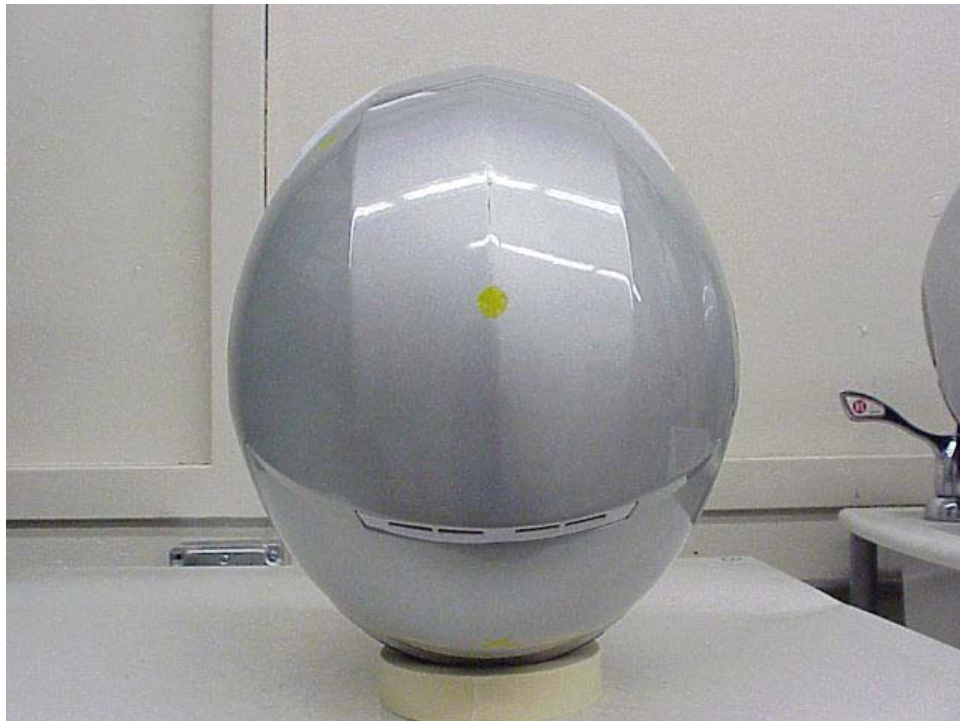


**Photograph 2. Side View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)**





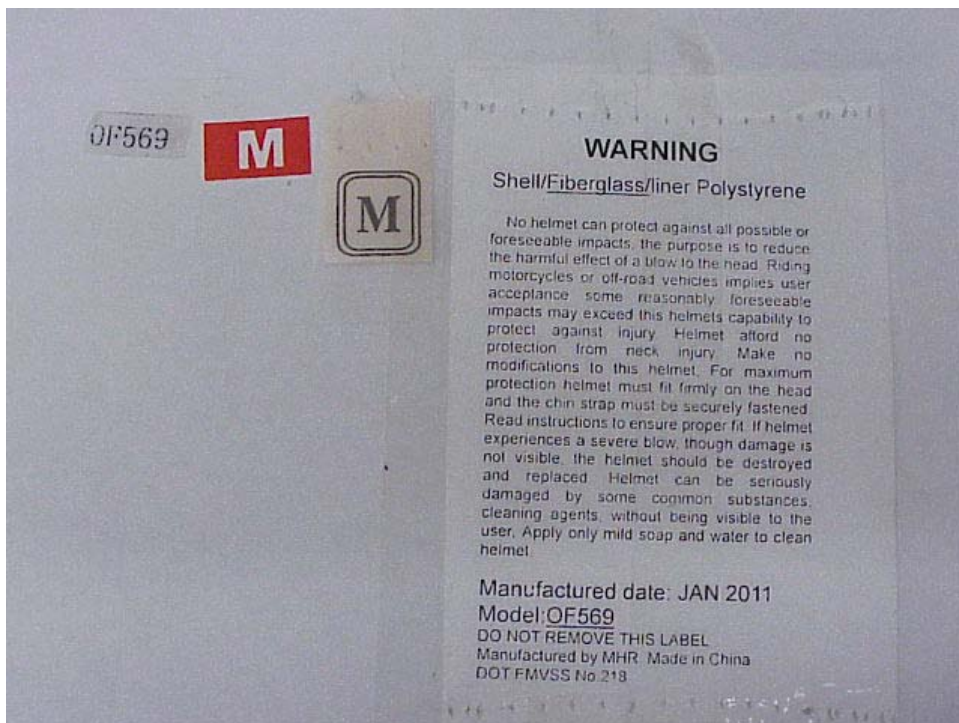
**Photograph 3. Rear View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)**



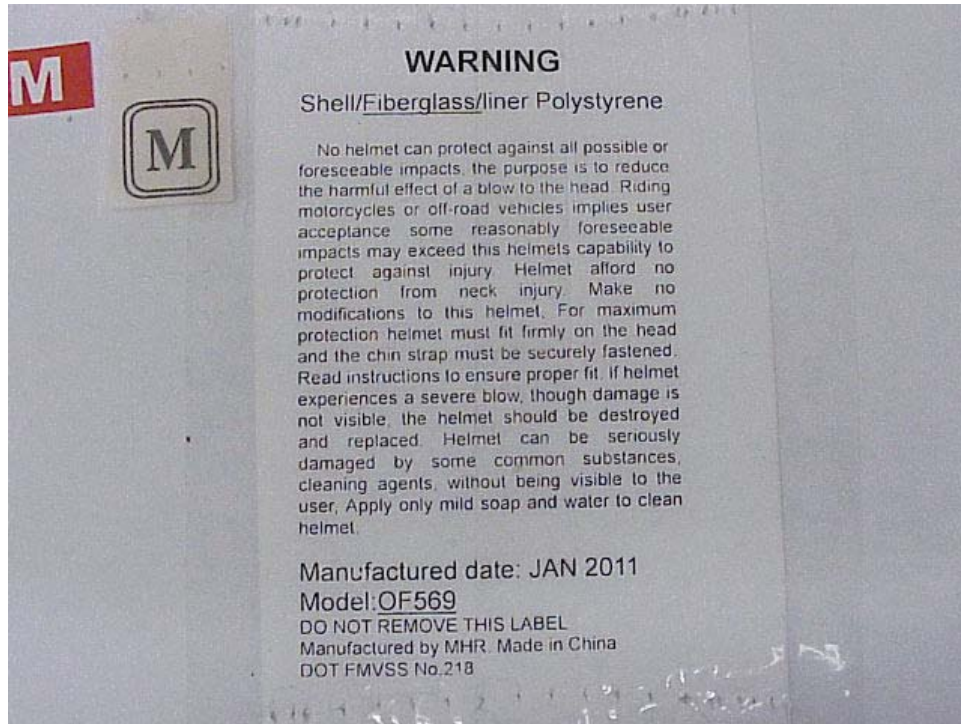
**Photograph 4. Top View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)**



Photograph 5. Interior View Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)



Photograph 6. Labeling 1 Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)



**Photograph 7. Labeling 2 Jiangmen Pengcheng Helmets Ltd (MHR), OF569, M (58 cm)**

## 20. TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

**Table 1. Instrumentation List for SwRI Protective Headgear Testing**

| ITEM NO. | DESCRIPTION                                     | MANUFACTURER AND MODEL   | SERIAL NO               | ACCURACY  | DATE OF LAST CALIB. | DATE OF NEXT CALIB. |
|----------|---|--|-------------------------|---|---------------------|---------------------|
| 1        | Data Acquisition Card                           | National Instruments PCIMIO-16E-4                                | None                    | System Software Validation Procedure                                    | NA                  | NA                  |
|          | Data Acquisition Software                       | National Instruments / Labview for Windows                       | Ver 6                   |   |                     |                     |
|          | Data Acquisition Computer                       | Dell Computer Optiplex GX280                                     | BVRV261                 |   |                     |                     |
| 2        | Humidity and Temperature Transmitter            | Omega / HX41   | 0599-6004               | Manufacturer's Specification and System Software Verification Procedure | 07/14/10            | 07/14/11            |
|          | Isolated Voltage Output                         | Omega / OM5-II-4-20  | 9213-15<br>9149-08      |   |                     |                     |
| 3        | Thermocouple Wire and Thermocouple Input Module | Omega / OM5-LTC-J2-C   | 21266<br>21261<br>21253 | System Software Verification Procedure                                  | 06/14/10            | 06/14/11            |
| 4        | Optical Velocity Transducer                     | Biokinetic and Associates Velocity Gate / 048-004-9411           | 9505-007                | System Software Verification Procedure                                  | 06/14/10            | 06/14/11            |
| 5        | Test Accelerometer                              | Endevco / 2262-1000  | NL05                    | System Software Verification Procedure                                  | 06/14/10            | 06/14/11            |
|          | Strain Gage Conditioner                         | Measurement Group Inc. / 2120A                                   | 102130                  |   |                     |                     |
|          | Strain Gage Power Supply                        | Measurements Group Inc. / 2110A                                  | 102034                  |   |                     |                     |
|          | Filter  | Frequency Devices, Inc. / 5BAF-LPBU4 4 Pole Butterworth 1.75 KHz | None                    |   |                     |                     |
| 6        | Load Cell                                       | Western / 51   | 830-7X                  | System Software Verification Procedure                                  | 06/14/10            | 06/14/11            |
|          | Strain Gage Conditioner                         | Measurement Group Inc. / 2120A                                   | 102130                  |   |                     |                     |
|          | Strain Gage Power Supply                        | Measurements Group Inc. / 2110A                                  | 102034                  |   |                     |                     |
|          | Isolated Voltage Output                         | Intelligent Measurement / PCI-5B41-02                            | None                    |   |                     |                     |
| 7        | Potentiometer                                   | Humphrey / RP14-0601-1   | 87                      | System Software Verification Procedure                                  | 06/14/10            | 06/14/11            |
|          | Isolated Voltage Output                         | Intelligent Measurement / PCI-5B41-02                            | None                    |   |                     |                     |
| 8        | Scale   | Ohaus Scale Corp / EB-15   | 8029436776              | Manufacturer's Specification  | 01/13/10            | 01/13/11            |
| 9        | Function Generator                              | Agilent / 33220A   | MY44029640              | Manufacturer's Specification  | 03/01/10            | 03/01/11            |

**Table 2. Test Apparatus List for SwRI Protective Headgear Testing Requiring One-Time Dimensions Checks or No Calibration**

| ITEM NO. | DESCRIPTION                               | MANUFACTURER             | MODEL                    | SERIAL NO.             | ACCURACY     | DATE OF DIMENSIONAL CHECK |
|----------|---|--------------------------|--------------------------|------------------------|--------------|---------------------------|
| 1        | DOT Headforms                             | Controlled Casting       | Small, Medium, and Large | None                   | +0.31 inches | 6/89                      |
|          |   | CADEX                    | Large                    | 4914                   | +0.31 inches | 2/08                      |
| 2        | ISO Impact Headforms                      |                          | A, E, J, M, and O        |                        |              |                           |
| 3        | ISO Full Headforms                        |                          | A, E, J, M, and O        |                        |              |                           |
| 4        | Drop Assembly                             | SwRI                     | Small, Medium, and Large | None                   | TP-218-06    | 6/89                      |
| 5        | Modular Elastomeric Programmer (MEP)      | MTS Systems Corp.        | None                     | None                   | N/A          | N/A                       |
| 6        | Spherical Impactor with MEP               |                          |                          |                        |              |                           |
| 7        | Static Retention Test System              | SwRI                     |                          |                        |              |                           |
| 8        | Chin Strap Fixture                        | SwRI                     | 1                        | 1                      | TP-218-06    | 1/80                      |
| 9        | Static Weights (Steel)                    | SwRI                     | 1                        | 1                      | ±0.1 lbs.    | 2/94                      |
| 10       | Hydraulic Cylinder                        | Enerpac                  | RD46                     | 1                      | N/A          | N/A                       |
| 11       | Hydraulic Pump                            | Enerpac                  | P-18                     | CC 4511                | N/A          | N/A                       |
| 12       | Dynamic Retention Test System             |                          |                          |                        |              |                           |
| 13       | Chin Strap Fixture                        | SwRI                     | 1                        | 1                      | TP-218-06    | 1/80                      |
| 14       | Dynamic Weights (Steel)                   |                          |                          |                        | ±0.1 lbs.    |                           |
| 15       | Roll-off Test System                      |                          |                          |                        |              |                           |
| 16       | Penetration Striker                       | SwRI                     | 1                        | 1                      | TP-218-06    | 1/80                      |
| 17       | Environmental Conditioner                 | EDPAC                    | Mini Tech 90             | None                   | N/A          | N/A                       |
| 18       | Oven with Digitronic Control              | Despatch Industries Inc. | LDB1-69                  | 128710                 | N/A          | N/A                       |
| 19       | Freezer with Omega Temperature Controller | Sears                    | 9105010 CN100TC          | S10204102<br>6 4011302 | N/A          | N/A                       |
| 20       | Peripheral Vision Template                | SwRI                     | 1                        | 1                      | ±15 min      | 1/80                      |