



U.S. Department  
of Transportation

**Pipeline and Hazardous  
Materials Safety  
Administration**

1200 New Jersey Avenue, SE  
Washington, D.C. 20590

**APR 25 2012**

Mr. Fred A. Nachman  
President  
Thunderbird Cylinder, Inc.  
4209 E. University Drive  
Phoenix, AZ 85034-7315

Ref. No. 10-0156

Dear Mr. Nachman:

This responds to your letter requesting written clarification of the cylinder requalification requirements prescribed in § 180.205 of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Specifically, you request confirmation from this Office that the linear calibration procedure your company uses and its corresponding calibration charts are in compliance with the expansion measurement procedures prescribed in § 180.205(g)(3) of the HMR. I apologize for the delay in responding and any inconvenience it may have caused.

The answer is yes. It is the opinion of this Office that the calibration charts you provided and the methodology used in determining the expansion values and corresponding ranges indicated therein is in full compliance with § 180.205(g)(3) of the HMR. Please note this response represents current application of the HMR regarding the specific facts as presented by you in your request for clarification in accordance with 49 CFR 105.20.

I trust this satisfies your inquiry. Please contact us if we can be of further assistance.

Sincerely,

T. Glenn Foster  
Chief, Regulatory Review and Reinvention Branch  
Standards and Rulemaking Division

# Thunderbird Cylinder, Inc.

Stevens  
§180.205(g)  
Cylinders  
10-0156

Original July 25, 2006  
Revised July 19, 2009, April 6, 2010 and July 19, 2010

Mr. Mark Toughiry [mark.toughiry@dot.gov](mailto:mark.toughiry@dot.gov)  
Mr. Duane Cassidy [duane.cassidy@dot.gov](mailto:duane.cassidy@dot.gov)  
Mr. Edward Mazzullo [edward.mazzullo@dot.gov](mailto:edward.mazzullo@dot.gov)  
Mr. Ryan Posten [ryan.posten@dot.gov](mailto:ryan.posten@dot.gov)

PHMSA Department of Transportation  
1200 New Jersey Avenue S.E.  
Washington, D. C., 20590-0081

Dear Mr. Toughiry, Cassidy, Mazzullo and Posten,

On Wednesday, May 5, 2010, I met with Ms. Hattie Mitchell, Chief of Regulatory Review, and Mr. Mark Toughiry, Mechanical Engineer, at DOT concerning Thunderbird Cylinder's request for clarification of its linear calibration procedure for hydrostatic testing as specified in **49CFR180.205(g) Pressure test** and resolution of issues described below. At that meeting, they agreed with our position and promised to send written approval; however, after multiple follow-up calls to Ms. Mitchell, she subsequently retired without having issued the promised letter.

The May 5, 2010 meeting was to discuss letters for clarification previously submitted on this subject. While we had been verbally advised that our procedure was compliant with the regulations and that no letter needed to be written, the issue remained that one of our major clients is requiring that each of our daily calibration points be performed within single digits of base calibration points shown on most calibration cylinders, specifically, 3000 (3000-3009), 4000 (4000-4009), etc. It should be noted that most hydrotest calibrated cylinders have these single points documented. It is also our understanding that enforcement is not consistent in their compliance audits and may only accept a single point within a single digit, e.g., 3000, 4000, etc.. Thunderbird's calibration charts (attached) show primary and subsequent incremental points with corresponding acceptable ranges. It is our position that requirement by our customer and some DOT enforcement officers is over and above the regulations as promulgated in the CFRs. While they do not dispute our position after clarification and discussion, we request that DOT confirms in writing approval of our request to prevent future misunderstandings.

Since all calibration cylinder's expansions in CC's vs. actual pressure in PSI are linear by definition, Thunderbird utilizes the attached Calibration Charts for the Norris Cylinder Serial No. 1846081Y (Galiso No. LCC0610-0348A) and Norris Cylinder Serial No. 4130773Y (Galiso Serial No. SCC1006-1128). Thunderbird's calibration charts and linear points are based on tables provided and signed off by Galiso, Inc.

While Thunderbird requalification personnel are trained and will endeavor to have their machines maintained and tuned to hit as close to (i.e., 10psi) the Target test pressure (e.g., 3000, etc.) as possible on their automated Galiso Recordtest IV test apparatus, they are not always able to do so. Since the corresponding expansions of each test pressure are linear, the enclosed Charts show the overshoots in 10 psi increments to a max of 1% or 50 psi and the corresponding (linearly adjusted) Target CC's along with their respective Acceptable "Low" and "High" Ranges. Please review the attached Charts which we utilize to assure conservative tolerances when verifying calibration.

As there are no regulations on how a calibration cylinder is to be made, we request DOT to confirm that our procedure is compliant with the 49CFR180 et.al. regulations for calibration.

Respectfully submitted,

A handwritten signature in cursive script that reads "Fred".

Fred A. Nachman  
President

Encl:

Galiso Calib SCC1006-1128.pdf

Galiso Calib LCC0610-0348A 31509.pdf

(DOT Clarification on Calibration Expansions Rev71910.doc)

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Thunderbird Cylinder, Inc.  
Standard Operating Procedure

|   |                             |                |              |
|---|-----------------------------|----------------|--------------|
| SOP No.:  | Procedure:                  | Revised:       | Program Mgr: |
| 5. SOP- Cal HP Cyl 348A Ranges @ PSI Increments | Calibration Cyl Ranges 348A | March 20, 2009 | Fred Nachman |

## HP 348A Cylinder Calibration Ranges

Cyl Mfr: Norris Cylinder  
Mfg. Serial No.: 1846081Y  
Galiso Serial No.: LCC0610-0348A

Temperatures:  
Jkt: 70F Cylinder: 70F Air: 70F

Calibrated by: *Tim Coughlin*  
Date Calibrated: 3/19/2009

| Expansion Range in CCs vs. Pressure in psi: 348A |             |                               |                  |       |
|--|-------------|-------------------------------|------------------|-------|
| Actual PSI                                       | Target CC's | Expansion Range +/-1.0% in CC | Acceptable Range |       |
|  |             |                               | Low              | High  |
| 3000   | 58.8        | 0.5                           | 58.3             | 59.3  |
| 3010   | 59.0        | 0.5                           | 58.5             | 59.5  |
| 3020   | 59.2        | 0.5                           | 58.7             | 59.7  |
| 3030   | 59.4        | 0.5                           | 58.9             | 59.9  |
| 4000   | 78.7        | 0.7                           | 78.0             | 79.4  |
| 4010   | 78.9        | 0.7                           | 78.2             | 79.6  |
| 4020   | 79.1        | 0.7                           | 78.4             | 79.8  |
| 4030   | 79.3        | 0.7                           | 78.6             | 80.0  |
| 4040   | 79.5        | 0.7                           | 78.8             | 80.2  |
| 5000   | 98.7        | 0.9                           | 97.8             | 99.6  |
| 5010   | 98.9        | 0.9                           | 98.0             | 99.8  |
| 5020   | 99.1        | 0.9                           | 98.2             | 100.0 |
| 5030   | 99.3        | 0.9                           | 98.4             | 100.2 |
| 5040   | 99.5        | 0.9                           | 98.6             | 100.4 |
| 5050   | 99.7        | 0.9                           | 98.8             | 100.6 |
| 6000   | 118.4       | 1.1                           | 117.3            | 119.5 |
| 6010   | 118.6       | 1.1                           | 117.5            | 119.7 |
| 6020   | 118.8       | 1.1                           | 117.7            | 119.9 |
| 6030   | 119.0       | 1.1                           | 117.9            | 120.1 |
| 6040   | 119.2       | 1.1                           | 118.1            | 120.3 |
| 6050   | 119.4       | 1.1                           | 118.3            | 120.5 |
| 7000   | 138.3       | 1.3                           | 137.0            | 139.6 |
| 7010   | 138.5       | 1.3                           | 137.2            | 139.8 |
| 7020   | 138.7       | 1.3                           | 137.4            | 140.0 |
| 7030   | 138.9       | 1.3                           | 137.6            | 140.2 |
| 7040   | 139.1       | 1.3                           | 137.8            | 140.4 |
| 7050   | 139.3       | 1.3                           | 138.0            | 140.6 |
| 8000   | 158.4       | 1.5                           | 156.9            | 159.9 |
| 8010   | 158.6       | 1.5                           | 157.1            | 160.1 |
| 8020   | 158.8       | 1.5                           | 157.3            | 160.3 |
| 8030   | 159.0       | 1.5                           | 157.5            | 160.5 |
| 8040   | 159.2       | 1.5                           | 157.7            | 160.7 |
| 8050   | 159.4       | 1.5                           | 157.9            | 160.9 |
| 9000   | 178.4       | 1.7                           | 176.7            | 180.1 |
| 9010   | 178.6       | 1.7                           | 176.9            | 180.3 |
| 9020   | 178.8       | 1.7                           | 177.1            | 180.5 |
| 9030   | 179.0       | 1.7                           | 177.3            | 180.7 |
| 9040   | 179.2       | 1.7                           | 177.5            | 180.9 |
| 9050   | 179.4       | 1.7                           | 177.7            | 181.1 |
| 10000  | 198.6       | 1.9                           | 196.7            | 200.5 |
| 10010  | 198.8       | 1.9                           | 196.9            | 200.7 |
| 10020  | 199.0       | 1.9                           | 197.1            | 200.9 |
| 10030  | 199.2       | 1.9                           | 197.3            | 201.1 |
| 10040  | 199.4       | 1.9                           | 197.5            | 201.3 |
| 10050  | 199.6       | 1.9                           | 197.7            | 201.5 |

**Note:**

When actual PSI is between the expansion pressures above, use the "Low" of the "Acceptable Range" at the next higher pressure and the "High" of the next lower pressure to keep a conservative tolerance.

To ensure accuracy, water & air temperatures must be within 2°F. Ref Std: Heise Model DXD Pressure Indicator S/N 5489.

This Galiso Certification Report complies with 49CFR180.205(g)(3)(ii).

**Thunderbird Cylinder, Inc.**  
**Standard Operating Procedure**

|   |                              |              |              |
|---|------------------------------|--------------|--------------|
| SOP No.:  | Procedure:                   | Revised:     | Program Mgr: |
| 5 SOP- Cal HP Cyl SCC1006-1128 Ranges @ PSI Incrs | Calibration Cyl SCC1006-1128 | July 1, 2010 | Fred Nachman |

**HP 1128 Cylinder Calibration Ranges**

Cyl Mfr: Norris  
Mfg. Serial No.: 4130773Y  
Galiso Serial No.: SCC1006-1128

Temperatures:  
Jkt: 72F Cylinder: 72F Air: 73F

Calibrated by: *Tim Coughlin*  
Date Calibrated: 6/10/2010 See Cert

| Expansion Range in CCs vs. Pressure in psi: 1128 |             |                               |                  |       |
|--|-------------|-------------------------------|------------------|-------|
| Actual PSI                                       | Target CC's | Expansion Range +/-1.0% in CC | Acceptable Range |       |
|  |             |                               | Low              | High  |
| 2700   | 29.3        | 0.2                           | 29.1             | 29.5  |
| 2705   | 29.3        | 0.2                           | 29.1             | 29.5  |
| 2710   | 29.4        | 0.2                           | 29.2             | 29.6  |
| 2715   | 29.4        | 0.2                           | 29.2             | 29.6  |
| 2720   | 29.5        | 0.2                           | 29.3             | 29.7  |
| 2725   | 29.5        | 0.2                           | 29.3             | 29.7  |
| 3000   | 32.5        | 0.3                           | 32.2             | 32.8  |
| 3010   | 32.6        | 0.3                           | 32.3             | 32.9  |
| 3020   | 32.7        | 0.3                           | 32.4             | 33.0  |
| 3030   | 32.8        | 0.3                           | 32.5             | 33.1  |
| 3500   | 38.0        | 0.3                           | 37.7             | 38.3  |
| 3510   | 38.1        | 0.3                           | 37.8             | 38.4  |
| 3520   | 38.2        | 0.3                           | 37.9             | 38.5  |
| 3530   | 38.3        | 0.3                           | 38.0             | 38.6  |
| 4000   | 43.4        | 0.4                           | 43.0             | 43.8  |
| 4010   | 43.5        | 0.4                           | 43.1             | 43.9  |
| 4020   | 43.6        | 0.4                           | 43.2             | 44.0  |
| 4030   | 43.7        | 0.4                           | 43.3             | 44.1  |
| 4040   | 43.8        | 0.4                           | 43.4             | 44.2  |
| 5000   | 54.4        | 0.5                           | 53.9             | 54.9  |
| 5010   | 54.5        | 0.5                           | 54.0             | 55.0  |
| 5020   | 54.6        | 0.5                           | 54.1             | 55.1  |
| 5030   | 54.7        | 0.5                           | 54.2             | 55.2  |
| 5040   | 54.8        | 0.5                           | 54.3             | 55.3  |
| 5050   | 54.9        | 0.5                           | 54.4             | 55.4  |
| 6000   | 65.4        | 0.6                           | 64.8             | 66.0  |
| 6010   | 65.5        | 0.6                           | 64.9             | 66.1  |
| 6020   | 65.6        | 0.6                           | 65.0             | 66.2  |
| 6030   | 65.7        | 0.6                           | 65.1             | 66.3  |
| 6040   | 65.8        | 0.6                           | 65.2             | 66.4  |
| 6050   | 65.9        | 0.6                           | 65.3             | 66.5  |
| 7000   | 76.5        | 0.7                           | 75.8             | 77.2  |
| 7010   | 76.6        | 0.7                           | 75.9             | 77.3  |
| 7020   | 76.7        | 0.7                           | 76.0             | 77.4  |
| 7030   | 76.8        | 0.7                           | 76.1             | 77.5  |
| 7040   | 76.9        | 0.7                           | 76.2             | 77.6  |
| 7050   | 77.0        | 0.7                           | 76.3             | 77.7  |
| 8000   | 87.6        | 0.8                           | 86.8             | 88.4  |
| 8010   | 87.7        | 0.8                           | 86.9             | 88.5  |
| 8020   | 87.8        | 0.8                           | 87.0             | 88.6  |
| 8030   | 87.9        | 0.8                           | 87.1             | 88.7  |
| 8040   | 88.0        | 0.8                           | 87.2             | 88.8  |
| 8050   | 88.1        | 0.8                           | 87.3             | 88.9  |
| 9000   | 98.8        | 0.9                           | 97.9             | 99.7  |
| 9010   | 98.9        | 0.9                           | 98.0             | 99.8  |
| 9020   | 99.0        | 0.9                           | 98.1             | 99.9  |
| 9030   | 99.1        | 0.9                           | 98.2             | 100.0 |
| 9040   | 99.2        | 0.9                           | 98.3             | 100.1 |
| 9050   | 99.3        | 0.9                           | 98.4             | 100.2 |
| 10000  | 110.0       | 1.1                           | 108.9            | 111.1 |
| 10010  | 110.1       | 1.1                           | 109.0            | 111.2 |
| 10020  | 110.2       | 1.1                           | 109.1            | 111.3 |
| 10030  | 110.3       | 1.1                           | 109.2            | 111.4 |
| 10040  | 110.4       | 1.1                           | 109.3            | 111.5 |
| 10050  | 110.6       | 1.1                           | 109.5            | 111.7 |

Note:

When actual PSI is between the expansion pressures above, use the "Low" of the "Acceptable Range" at the next higher pressure and the "High" of the next lower pressure to keep a conservative tolerance.

To ensure accuracy, water & air temperatures must be within 2°F. Ref Std: Heise Model DXD Pressure Indicator S/N 5489. This Galiso Certification Report complies with 49CFR180.205(g)(3)(ii).