

## Temperature & Vibration Testing on Zafety Lug Lock

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3 Pages, 1 Appendix

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## **1.0 INTRODUCTION**

This report contains the results from the Temperature & Vibration tests performed on three (3) Zafety Lug Lock Units for TAFCAN Consulting Ltd.

The received samples were identified with BTG Sample Number as 08-03-C0185-1 to 3.

## **2.0 TEST EQUIPMENT**

- Data Physics 550 Vibration Controller – MII No. A13756, calibrated
- Thermotron Vibration Shaker with Chamber DS640 – Asset No. 20041, calibrated
- PCB Accelerometer – MII No. B04867, calibrated
- Kistler Power Supply – MII No. B04882, calibrated

## **3.0 PROCEDURES**

A representative from TAFCAN was present to install the Zafety Lug Lock onto the lug nuts of the wheel prior to attachment onto the vibration platform.

The vibration tests were performed on the vertical table of the Thermotron DS640 vibration test system. The wheel was attached to the vibration platform with its vertical axis parallel to the vibration platform's thrust direction for vibration testing in the vertical direction (Z) as shown in Appendix A, Figure 1A and 2A.

One accelerometer which provided the control signal was attached to the vibration platform in thrust direction.

We were instructed to perform the vibration test as a sinusoidal vibration dwell at 30 Hz and 3 g acceleration amplitude at ambient temperature of 25 °C (77 °F), 50 °C (122 °F) and -40 °C (-40 °F) for 2 hours at each temperature level. A 15-minute dwell at each temperature level was employed prior to the vibration test.

## **4.0 RESULTS**

The vibration test was performed in sequence listed in Table 1. On completion of the vibration testing at 25 °C, a posttest visual inspection indicated that the Zafety Lug Lock did not sustain any external damages or physical degradation and no evidence of any looseness.

Prior to the vibration test conducted at +50 °C and -40 °C, the representative installed two lug nuts with hand tight onto the top position wheel studs then inserted a Zefety Lug Lock onto them, as shown in Appendix A, Figure 3A.

Again, upon completion of the vibration testing at each temperature level of +55 °C and -40 °C, a posttest visual inspection indicated that the Zafety Lug Lock did not sustain any external damages or physical degradation and no evidence of any looseness of the lug nuts.

**Table 1: Test Results**

Test Type	Temperature (C)	Comments	Figure # in Appendix A
Sine dwell 3g, 30 Hz	25	No issue	1A, 2A
	+50	No issue	3A, 4A
	-40	No issue	3A, 5A

The vibration controller generated plots for the vibration tests are shown in Appendix B, Figures 1B to 3B.

Reported by:



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*This report refers only to the particular samples, units, material, instrument, or other subject used and referred to in it, and is limited by the tests and/or analyses performed. Similar articles may not be of like quality, and other testing and/or analysis programs might be desirable and might give different results.*

## **APPENDIX A**

Photographs

(3 Pages)



Figure 1A: Vertical vibration test set-up at 25 °C



Figure 2A: Photos of Zafety Lug Lock prior to vibration test at 25 °C

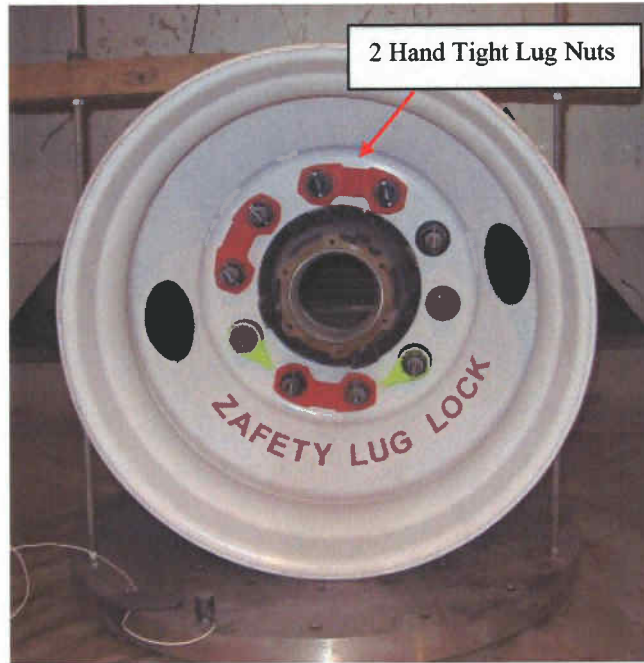


Figure 3A: Vertical vibration test set-up for 55 °C and -40 °C



Figure 4A: Photos of Zafety Lug lock prior to vibration test at 55 °C



Figure 5A: Photos of Zafety Lug lock after vibration test at -40 °C

## **APPENDIX B**

Vibration Test Plots

(3 Pages)



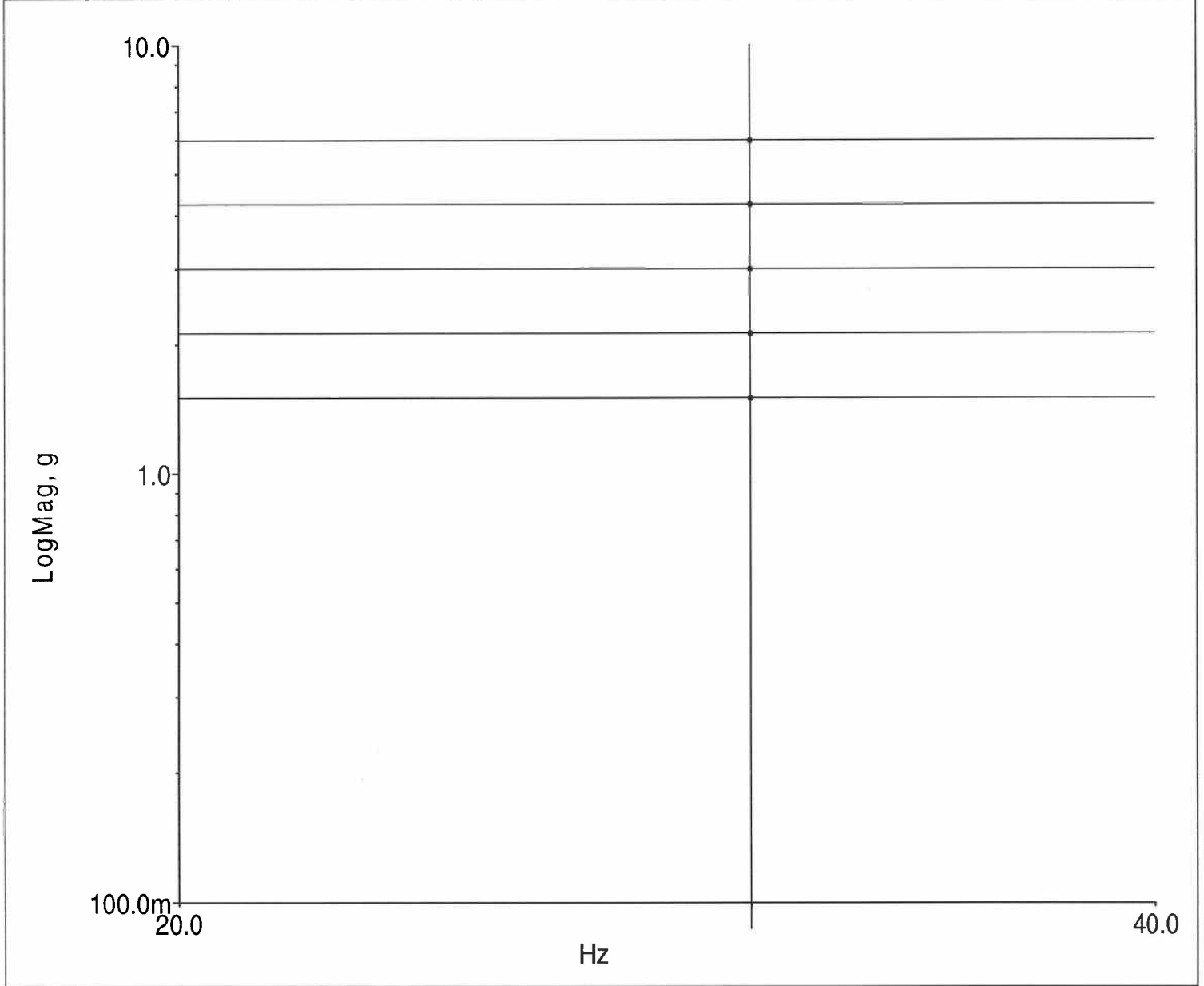
**Bodycote Testing Group**  
**Vibration Testing for TAFCAN**  
**Dwell at 30 Hz and 3 g's for 2 hrs at 25 C**  
**BTG Sample No. 08-03-C0185-1**

Accel: 3.0059 g  
Displ: 0.06532 in p-p  
Freq: 30.00 Hz

Drive: 0.1696 V-pk  
Total Time: 02:00:19  
Status: Ready

Run State: Auto  
Loop: Closed  
Checks: Enabled

Reference;Control;AlarmLow;AlarmHigh;Ab



Test started: 10:17:54 AM 7/4/2008  
Test stopped: 12:18:17 PM 7/4/2008  
Safety Lug Lock

FIGURE 1B

SH

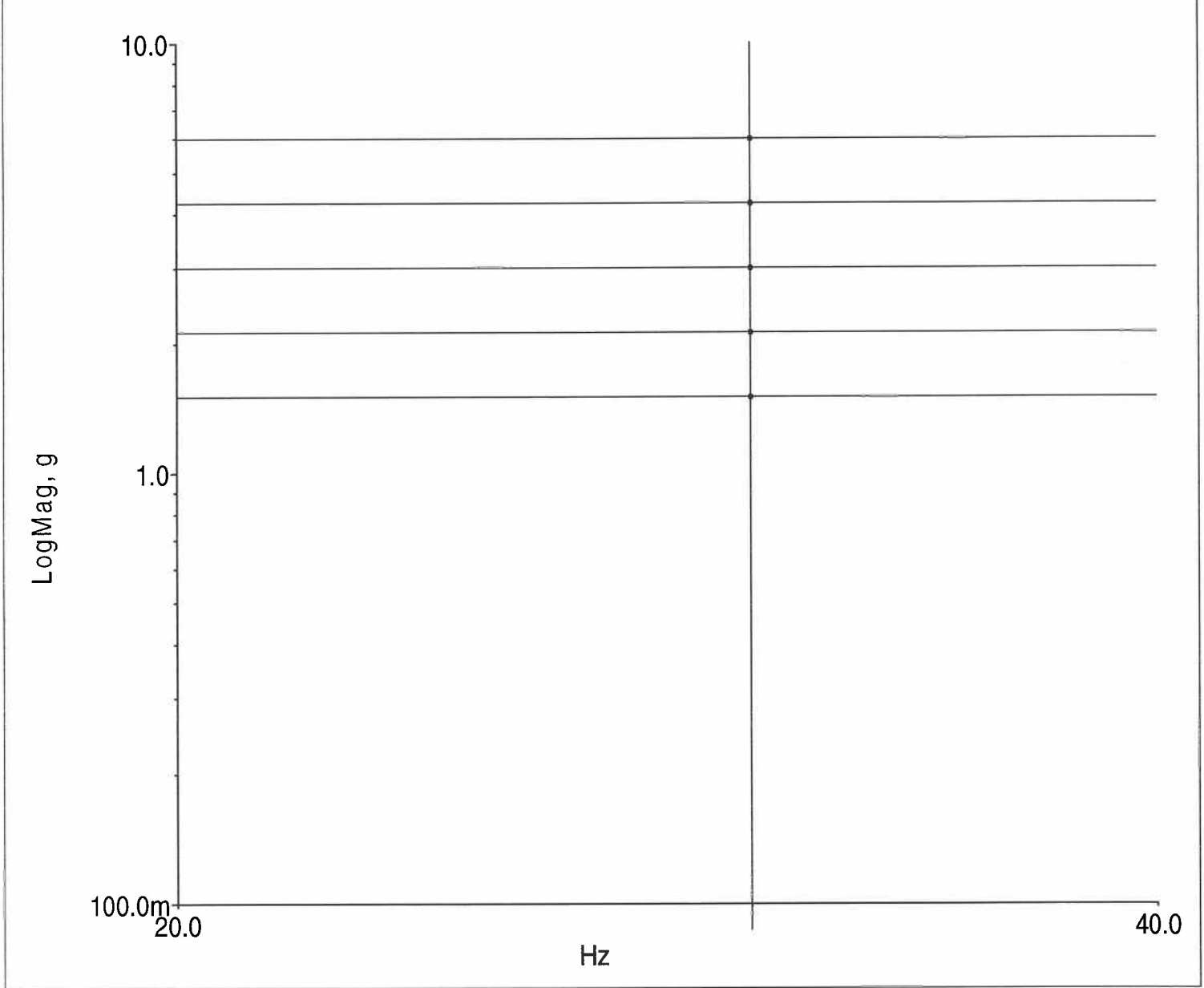
**Bodycote Testing Group**  
**Vibration Testing for TAFCAN**  
**Dwell at 30 Hz and 3 g's for 2 hrs at +50 C (+122 F)**  
**BTG Sample No. 08-03-C0185-1**

Accel: 2.9985 g  
Displ: 0.06516 in p-p  
Freq: 30.00 Hz

Drive: 0.1735 V-pk  
Total Time: 02:00:19  
Status: Ready

Run State: Auto  
Loop: Closed  
Checks: Enabled

Reference;Control;AlarmLow;AlarmHigh;Ab



Test started: 12:47:32 PM 7/4/2008  
Test stopped: 2:47:54 PM 7/4/2008  
Safety Lug Lock

FIGURE 2B

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