

Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

REVISION #	DATE	Creator Name	Approval Name(s)
A	04/28/2024	David Sgro	Daniel Jewell
В	4/30/2024	Daniel Jewell	

# This Document was Prepared for SKB Cases

CORPORATE / MFG HEADQUARTERS

434 W. Levers Place Orange, CA 92867 Phone (714) 637-1252 Fax (714) 637-0491 http://www.skbcases.com



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### **Table of Contents**

1.	Testing Summary	
2.	Applicable Documents	2
3.	Abbreviations	2
4.	Qualification Summary	5
5.	iSeries Qualification Test Details	
5.1.	Low Temperature Storage	
5.2.	Temperature Shock	8
5.3.	Humidity	9
5.4.	Fungus	10
5.5.	Salt Fog / Corrosive Environments	11
5.6.	Contamination by Fluids	13
5.7.	Loose Cargo Vibration	14
5.8.	Transit Drop	15
5.9.	High Temperature Storage	17
5.10	Altitude	19
5.11	. Vibration	20
5.12	Solar Radiation	22
5.13	Blowing Rain	22
5.14	Blowing Sand	23
5.15	Blowing Dust	23
5.16	. Immersion	24
6.	Conclusion	24



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### **List of Tables**

Table 1: Applicable Documents	4
Table 2: Abbreviations	4
Table 3: iSeries Qualification Summary Matrix	6
List of Figures	
Figure 1: SKB iSeries Case in Low Temperature Test Chamber	
Figure 2: Low Temperature Test Data	
Figure 3: Temperature Shock Test Setup Chamber Example	8
Figure 4: Temperature Shock Test Data	8
Figure 5: Humidity Test Setup Chamber Example	9
Figure 6: Humidity Chamber Test Data	9
Figure 7: Fungus Testing Pre and Post Cleaning of Handle	10
Figure 8: Fungus Testing Interior Photo Pre-Cleaning	10
Figure 9: Salt Fog Controlled Drying in Chamber	11
Figure 10: Salt Fog Test Setup	11
Figure 11: Salt Fog Post Test Exterior – Prior to Cleaning	12
Figure 12: Salt Fog Post Test Interior – Prior to Cleaning	12
Figure 13: Contamination by Fluids Pre Test with Grid	13
Figure 14: Contamination by Fluids Post Test Cleaning	13
Figure 15: Loose Cargo Pre Test with Weight Inside Case	14
Figure 16: Loose Cargo Axis One	14
Figure 17: Loose Cargo Axis Two	14
Figure 18: Loose Cargo Post Test	14
Figure 19: Transit Drop Setup	15
Figure 20: Transit Drop Height Verification	15
Figure 21: Transit Drop Corner Example	16
Figure 22: Transit Drop Edge Example	16
Figure 23: Transit Drop Post Test Exterior	16
Figure 24: Transit Drop Post Test Interior	16
Figure 25: SKB Internal Test Memorandum	
Figure 26: Composite Wheeled Vehicle Vibration Comparison Graph - Vertical	
Figure 27: Composite Wheeled Vehicle Vibration Comparison Graph - Longitudinal	
Figure 28: Composite Wheeled Vehicle Vibration Comparison Graph - Transverse	21



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 1. Testing Summary

This document details the qualification testing performed on SKB iSeries injection molded shipping cases. The testing performed and listed within this test report qualifies the case including all size variants to climatic and dynamic environments IAW MIL-STD-810H with Change Notice 1.

### 2. Applicable Documents

Document	Title		
MIL-STD-810H with	Department of Defense Test Method Standard		
Change Notice 1 Environmental Engineering Considerations and Labora			
SKB-202301	iSeries Test Plan for SKB Cases		
TR-PH00009403, Revision 1	NTS Technical Systems Test Report:		
	Environmental and Dynamics Testing of the iSeries SKB Case and		
	rSeries SKB Case		
Memorandum	Addendum to MIL-STD testing on SKB 3i series case dated October		
	20, 2005		
OC17522-0812513	Environment Associates Inc Test Report:		
	Environmental Test Report for the Transit Case Part Number		
	3i-2011-7B		
20643	CRT Laboratories, Inc Test Report		

Table 1: Applicable Documents

#### 3. Abbreviations

IAW	In Accordance With
PSD	Power Spectral Density
QBS	Qualification by Similarity
UUT	Unit Under Test

Table 2: Abbreviations



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 4. Qualification Summary

Test	Test Method	Test Details	Qualification Method	Result	Section Number
Low Temperature Storage	MIL-STD-810H w/ CN 1 Method 502.7, Procedure I	<u>Temperature:</u> -56°C <u>Dwell Duration:</u> +72 Hours	Test	Pass	5.1
Temperature Shock	MIL-STD-810H w/ CN 1 Method 503.7, Procedure I-C	Maximum Temperature: +52°C  Minimum Temperature: -39°C  Number of Cycles: 5  Transition Time: 1 minute or less	Test	Pass	5.2
Humidity (Aggravated)	MIL-STD-810H w/ CN 1 Method 507.6, Procedure II	Temp Range: +30°C to +60°C <u>Humidity:</u> 95% R.H. <u>Number of Cycles:</u> 10	Test	Pass	5.3
Fungus	MIL-STD-810H w/ CN 1 Method 508.8	<u>Test Duration:</u> 28 Days <u>Fungi:</u> As Listed in Table 508.8-I	Test	Pass	5.4
Salt Fog / Corrosive Environments	MIL-STD-810H w/ CN 1 Method 509.8, Procedure I	Salt Concentration: 5%  Cycle Exposure: 24hr followed by  24hr air dry  Number of cycles: 2	Test	Pass	5.5
Contamination by Fluids	MIL-STD-810H w/ CN 1 Method 504.3, Procedure I	Fluids: See List in Section Temperature: Lab Ambient Fluid Exposure Duration: Occasional (10 minutes)	Test	Pass	5.6
Loose Cargo Vibration	MIL-STD-810H w/ CN 1 Method 514.8, Procedure II, Category 5	Frequency: 5Hz <u>Duration per axis:</u> 40 minutes <u>Number of axes:</u> 2	Test	Pass	5.7
Transit Drop	MIL-STD-810H w/ CN 1 Method 516.8, Procedure IV	<u>Drop height:</u> 48" <u>Number of Drops:</u> 26 <u>Surface:</u> Steel backed by concrete	Test	Pass	5.8
High	MIL-STD-810H w/ CN1 Method 501.7, Procedure I	Max Temperature: +71°C Number of 24 Diurnal Cycles: 7	QBS	Pass	
Temperature Storage	MIL-STD-810H w/ CN1 Method 501.7, Procedure I, Tailored	Max Temperature: +98.8°C (+210°F) Constant Exposure Time: 4 Hours	Test	Pass	5.9
Altitude	MIL-STD-810H w/ CN1 Method 500.6, Procedure I	Max Altitude: 40,000 ft.  Dwell Time at Altitude: 2 Hours  Ramp Rate: 10 m/s	QBS	Pass	5.10
Vibration	MIL-STD-810H w/ CN1 Method 514.8, Procedure I, Category 4	Composite Wheeled Vehicle Secured Cargo: 2 Hours per Axis Number of Axes: 3	QBS	Pass	5.11



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

Solar Radiation	MIL-STD-810H w/ CN1 Method 505.7, Procedure II	Temperature: +49°C Solar Radiation: 1120 W/m² Exposure: 20-hour lights on / 4-hour lights off Number of Cycles: 7	QBS	Pass	5.12
Blowing Rain	MIL-STD-810H w/ CN1 Method 506.6, Procedure I	Pre-Conditioning Temperature: +10°C above water Rainfall Rate: 4 in/hr Wind Speed: 40 MPH Exposure Duration: 30 minutes per side Total number of sides: 6	QBS	Pass	5.13
Blowing Sand	MIL-STD-810H w/ CN1 Method 510.7, Procedure II	Maximum Temperature: +52°C Sand Concentration: 2.2 g/m³ Duration: 90 minutes per side Number of Sides: 6	QBS	Pass	5.14
Blowing Dust	MIL-STD-810H w/ CN1 Method 510.7, Procedure I	Maximum Temperature: +52°C  Lab Ambient Temperature: +25°C  Duration: 6 hours at +25°C followed by 6 hours at +52°C; 1.5 hours per side for each temperature range	QBS	Pass	5.15
Immersion	MIL-STD-810H w/ CN1 Method 512.6, Procedure I	Depth: 1 Meter Duration: 30 Minutes Pre-Conditioning Temperature: +10°C above water temperature	QBS	Pass	5.16

 Table 3: iSeries Qualification Summary Matrix



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5. iSeries Qualification Test Details

The following sections provide details pertaining to the qualification of the iSeries hard shell injection molded cases.

### 5.1. Low Temperature Storage

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.1

Page(s): 9 through 15

Date(s) of Test: 12/21/2023 to 12/28/2023

Low Temperature storage was conducted at the NTS facility located in Fullerton, CA. The shipping case was instrumented with two thermocouples which were adhered to the inside of the top cover using aluminum tape. The iSeries case was then placed into the climatic chamber and the instrumentation run though a local porthole into a data acquisition system. The chamber was programmed to remain at +25°C for 10 minutes before ramping to the specified max cold temperature at a rate no greater than 3°C per minute. The case was subjected to a constant temperature of -56°C for a total duration of 74 hours. Once the dwell was completed, the chamber was programmed to +25°C at a rate of no greater than 3°C per minute. Upon removing the case from the chamber, it was inspected for warping, ensuring it will open and close and seal properly, and latches will close and lock in place as designed. There was no observed issues with the test conduct and the case. Testing is considered a pass.



**Figure 1:** SKB iSeries Case in Low Temperature Test Chamber

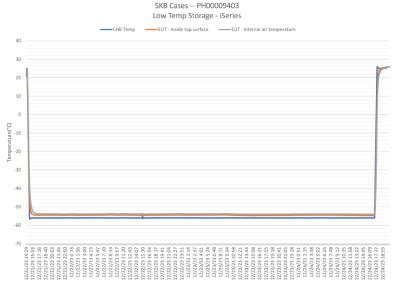


Figure 2: Low Temperature Test Data



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.2. Temperature Shock

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.6

Page(s): 56 through 63

Date(s) of Test: 01/02/2024 to 01/05/2024

Temperature shock was conducted at the NTS facility located in Fullerton, CA. The shipping case was instrumented with two thermocouples: one located on the outside top cover and the other adhered to the inside of the top cover using aluminum tape. Two chambers were used to conduct this test. One chamber was set to  $-39^{\circ}$ C and the other set to  $+52^{\circ}$ C. The iSeries case was then placed into the "cold" climatic chamber and the instrumentation run though a local porthole into a data acquisition system. The chamber was programmed to ramp to max cold temperature and allowed to dwell for a minimum of 3 hours. Once the minimum dwell time was achieved, the case and instrumentation were moved to the hot chamber. The time of the swap was recorded for each swap from hot to cold and cold to hot chambers which required to be no greater than 1 minute. The case was subjected to a total of 5 cycles. Once the dwell was completed, the chamber was programmed to  $+25^{\circ}$ C. Upon removing the case from the chamber, it was inspected for warping or other visual anomalies, ensuring it will open and close and seal properly, and latches will close and lock in place as designed. There were no observed issues with the test conduct and the case. Testing is considered a pass.

Note: SKB rSeries and iSeries cases were tested together.



**Figure 3:** Temperature Shock Test Setup Chamber Example *Note: iSeries Case is on the right* 

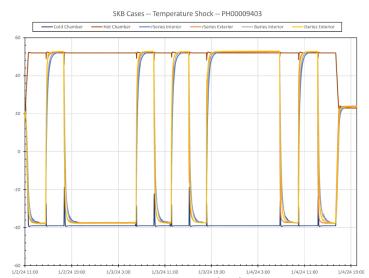


Figure 4: Temperature Shock Test Data



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.3. Humidity

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.8

Page(s): 80 through 93

Date(s) of Test: 01/05/2024 to 01/17/2024

Humidity testing was conducted at the NTS facility located in Fullerton, CA. A portable data acquisition system was placed inside the case to measure temperature, pressure, and humidity. The data collected from the portable data logger was for information purposes only and was calibrated to NIST standards. The case was then placed into the humidity chamber and subjected to ten 24-hour aggravated humidity cycles including a pre and post conditioning period as defined in MIL-STD-810. Upon removing the case from the chamber, it was inspected for warping or other visual anomalies, ensuring it will open and close and seal properly, and latches will close and lock in place as designed. The case functioned as designed as the top cover closes and was not warped, the latches closed and sealed properly. The NTS technician noted a minor amount of moisture observed within the case. The moisture was unable to be captured for a volume measurement as there was very little found. It is always recommended to have the end user secure their product for long term storage which may consist of the system wrapped in plastic, vacuum sealed vapor bag with desiccant or other means. Testing is considered a pass.

Note: *SKB rSeries and iSeries cases were tested together*.



Figure 5: Humidity Test Setup Chamber Example Note: iSeries Case is on the right

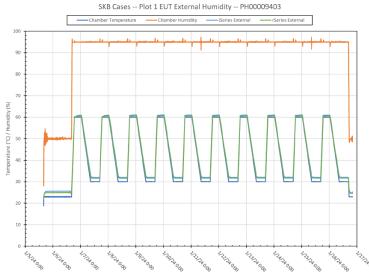


Figure 6: Humidity Chamber Test Data



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.4. Fungus

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.11

Page(s): 124 through 136

Date(s) of Test: 01/23/2024 to 02/21/2024

Fungus testing was conducted at The MicroStar Lab located in Crystal Lake, IL. The iSeries case was placed in a chamber capable of fungal growth and exposed to 5 varieties of fungi per MIL-STD-810 Table 508.8-I. The shipping case was exposed to the environment for a total of 28 days. Upon completion, the case was examined for any signs of fungal growth. Two species of fungi were observed on the exterior handle of the case only. The fungi located on the handle was easily cleaned up via basic antibacterial wipe. Once the area was cleaned there was no visible signs of damage to the handle. All other exterior and interior areas of the case did not have any signs of fungal growth. Per MIL-STD-810, Table 508.8-II, the rating of 1 was granted to this test result. Testing is considered a pass.





Figure 7: Fungus Testing Pre and Post Cleaning of Handle



Figure 8: Fungus Testing Interior Photo Pre-Cleaning



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 5.5. Salt Fog / Corrosive Environments

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.12

Page(s): 137 through 149

Date(s) of Test: 01/23/2024 to 01/27/2024

Salt fog testing was conducted at the NTS facility located in Fullerton, CA. The iSeries case was subjected to two full cycles consisting of a 24-hour constant salt fog exposure followed by a 24-hour constant controlled humidity air dry in a chamber. Upon completion of the 4-day test, the case was inspected for any observable signs of damage, then rinsed off using deionized water and inspected again. There were no signs of corrosion damage, testing is considered a pass.

Note: SKB rSeries and iSeries cases were tested together.



Figure 9: Salt Fog Controlled Drying in Chamber Note: iSeries Case is on the bottom



**Figure 10:** Salt Fog Test Setup *Note: iSeries Case is on the right* 



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 







Figure 12: Salt Fog Post Test Interior – Prior to Cleaning



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 5.6. Contamination by Fluids

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.13

Page(s): 150 through 156 Date(s) of Test: 01/30/2024

Contamination by Fluids testing was conducted at the NTS facility located in Fullerton, CA. The iSeries case was exposed to 12 fluids consisting of gasoline, oils, lubricants, insect repellent, face paint, cleaning agents, and others. The test was conducted by generating a grid on the top cover exterior and exposing that location to that specific fluid type. Each fluid was applied by either spraying or brushing in that grid location. Per MIL-STD-810 guidelines for "occasional exposure", each fluid was exposed for 10 minutes followed by an air dry period of 8 hours. Upon satisfying the 8 hour dry period the case was inspected for any structural damage to which there was none. Testing is considered a pass.

Note: SKB rSeries and iSeries cases were tested together.



Figure 13: Contamination by Fluids Pre Test with Grid



Figure 14: Contamination by Fluids Post Test Cleaning



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 5.7. Loose Cargo Vibration

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.2

Page(s): 16 through 31 Date(s) of Test: 12/28/2024

Loose Cargo Vibration testing was conducted at the NTS facility located in Fullerton, CA. The iSeries case was tested with a 5lb weight placed inside the case which was lined with foam. The case was subjected to 40 minutes of loose cargo vibration in two axes, for a total of 80 minutes. After each axis, the case was inspected for any structural damage, hinge & and latches issues, or misalignment. The case remained intact, hinges and latches remained locked, and the case opened and closed without any misalignment. Testing is considered a pass.



Figure 15: Loose Cargo Pre Test with Weight Inside Case



Figure 17: Loose Cargo Axis Two



Figure 16: Loose Cargo Axis One



Figure 18: Loose Cargo Post Test



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 5.8. Transit Drop

Reference Report: NTS Test Report TR-PH00009403, Revision 1

Section: 5.3

Page(s): 32 through 42 Date(s) of Test: 01/28/2024

Transit Drop testing was conducted at the NTS facility located in Fullerton, CA. The iSeries case was tested with a 5lb weight placed inside the case which was lined with foam. Note, this is the same case used for loose cargo testing in the prior section. The iSeries case was closed up and subjected to 26 drops on all faces, sides, edges, and corners from a height of 4 feet onto a steel surface backed by concrete. Only one case was used to conduct this test. During all 26 drops the case structure remained intact, the latches remained locked, and there were no visual signs of cracks. Upon completion of the test, the case was opened up and inspected as well as opened and closed where there were no observed issues noted. Testing is considered a pass.



Figure 19: Transit Drop Setup



Figure 20: Transit Drop Height Verification



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 



Figure 21: Transit Drop Corner Example



Figure 23: Transit Drop Post Test Exterior



Figure 22: Transit Drop Edge Example



Figure 24: Transit Drop Post Test Interior



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

### 5.9. High Temperature Storage

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 2.0

Page(s): 10 through 11

Date(s) of Test: 08-12-2005 to 08-19-2005

High temperature storage testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to seven 24-hour diurnal cycles up to a maximum temperature of +71°C. This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the same "hot dry" (A1) high temperature profile listed in Table 501.7-III for "Induced (Storage and Transit) Conditions". Additionally, the number of diurnal cycles performed in the 2005 test meet the same recommended number of diurnal cycles listed in method 501.7. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.



**Test Report Number:** iSeries-MIL-STD-810H-2024

**Revision Number: B** 

Reference Report: SKB Memorandum

Date(s) of Test: 10-20-2005

Testing of the iSeries case was conducted at SKB Headquarters utilizing one of their large ovens. The case was placed into the oven and allowed to stabilize at +21.1°C (+70°F) for 4 hours. It was then removed and opened and closed a total of 5 times to validate proper alignment of latches and mechanisms. During that time, the oven was programmed to ramp to +98.9°C (210°F). The case was closed up, placed back into the oven, and allowed to thermally stabilize for 4 hours. It was then removed from the oven and allowed to thermally stabilize back to ambient temperature for 1 hour. The case was then opened and closed a total of 5 times to validate proper alignment of latches and mechanisms. The case structural integrity, latches, and alignments remained within specification. This tailored method of MIL-STD-810, applies to the latest revision of MIL-STD-810. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.



- CORPORATE/ MFG HEADOUARTERS 434 W. Levers Place Orange, CA 92867 Phone (714) 637-1252 Fax (714) 637-0491
- SALES and SHIPPING 1607 N. O'Donnell Way Orange, CA 92867 Phone (800) 783-0087 Fax (714) 283-0425

http://www.skbcases.com

Re: Addendum to "MIL-STD testing on SKB 3i series case" dated October 20, 2005

The following US Military Specification was used in the design of our SKB 3i series case, and as such the cases will satisfy this specification.

Storage Temperature - High +71°C (+160°F) MIL-STD-810E Method 501.3, procedure I, storage

In addition, I completed a modified Method 501.3, procedure 1 test on one of our COTS 3i-1813-5 cases today at a temperature of 210°F. The following is the test protocol that I followed:

- Normalize the COTS case for a period of 4 hours at 70°F
- 2. Heated test oven to a temperature of 210°F.
- Open and close sample case 5 times to confirm operability.
- 4. Placed sample case in test oven for a period of 4 hours while monitoring temperature inside the over using both digital and analog thermometers.
- Removed sample case from test oven and allowed to normalize back to room temperature of 70°F for a period of 1 hour.
- Opened and closed the sample case 5 times to confirm operability after exposure to 210°F temperature for a period of 4 hours.

We certify that after following the test procedure outlined above we still had an operational case.

If you have any additional questions, please feel free to contact me at your convenience.

Regards,

Robert Wilkes Vice President

Figure 25: SKB Internal Test Memorandum



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.10. Altitude

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 5.0

<u>Page(s):</u> 16 through 18 <u>Date(s) of Test:</u> 08-12-2005

Altitude testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to one cycle of altitude storage to a maximum elevation of 40,000 feet (12,192 meters) with ramp rates not to exceed 32.8 ft/sec (10 m/sec). This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the same number of cycles, altitude ramp rates, and minimum dwell for method 500, procedure I. Additionally, the test conducted in 2005 utilized a 2 hour dwell which is longer than the recommended 1 hour minimum as noted in 4.5.2 Procedure I, Step 4 of method 500.6. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.11. Vibration

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 7.0

Page(s): 19 through 22 Date(s) of Test: 09-08-2005

Vibration testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to three axes of "Composite Wheeled Vehicle" vibration for a duration of 2 hours per axis. Over the years additional vehicles were added to the "Composite Wheeled Vehicle" profile which changed the profile spectra and vibration duration. A comparison of vibration profiles between the MIL-STD-810E and MIL-STD-810H with Change Notice 1 are listed below in Figure 26 through Figure 28. Both profiles have very similar overall grms levels and the low frequency input is generally higher than the newer standard. MIL-STD-810H w/ Change Notice 1 recommends a time duration of 40 minutes per axis whereas MIL-STD-810E recommended a time duration of 2 hours per axis. The time duration the iSeries was subjected to was 3 times longer. Combined with the longer time duration the rev "E" test was harsher in overall fatigue damage as well. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.

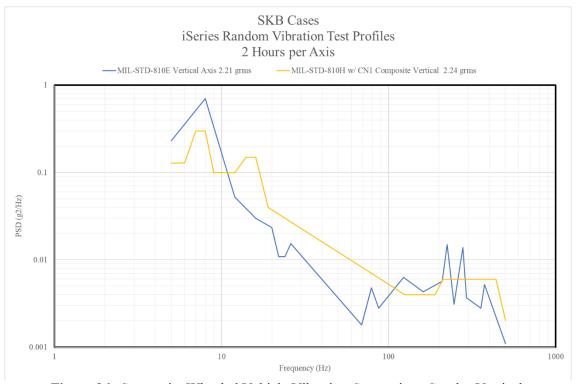


Figure 26: Composite Wheeled Vehicle Vibration Comparison Graph - Vertical



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

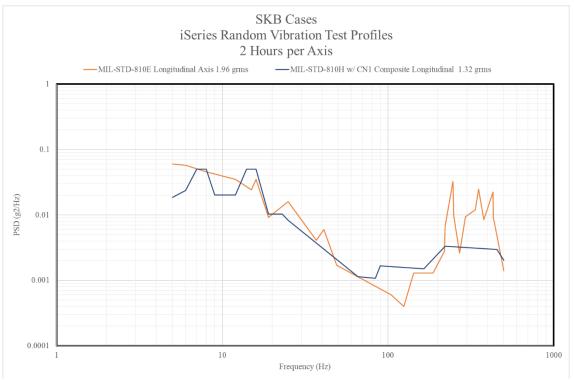


Figure 27: Composite Wheeled Vehicle Vibration Comparison Graph - Longitudinal

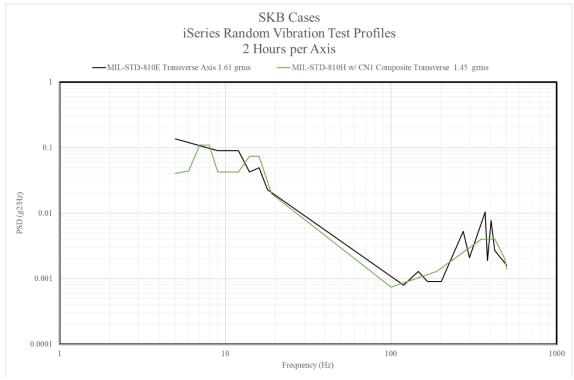


Figure 28: Composite Wheeled Vehicle Vibration Comparison Graph - Transverse



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.12. Solar Radiation

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 15.0

Page(s): 37 through 38

Date(s) of Test: 09-15-2005 to 09-22-2005

Solar radiation testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to seven 24-hour cycles consisting of 24-hour constant exposure to +49°C temperature and 20-hour constant exposure to max solar load of 1120 W/m². This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the profile as listed in Figure 505.7-2 using the "A1" temperature and "W" solar load profiles. Additionally, this test as described in the standard under section 2.3.2, subsection b, "Procedure II produces an acceleration factor of approximately 2.5 as far as the total energy received by the test item is concerned...". This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.

#### 5.13. Blowing Rain

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 13.0

<u>Page(s):</u> 32 through 34 <u>Date(s) of Test:</u> 09-14-2005

Blowing rain testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to a rainfall rate of 4 inches per hour with a wind velocity of 40 MPH and a temperature preconditioning of +10°C above measured water temperature. A total of 6 sides were exposed to the blowing rain test. Each exposure side was subjected to 30 minutes of blowing rain for a total of 3 hours for all 6 sides. Upon completion of the test, the case was opened up and carefully inspected. There was no evidence of water intrusion. This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the same wind velocity, temperature preconditioning, rainfall rate, and exposure time duration. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.14. Blowing Sand

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 14.0

Page(s): 35 through 36

Date(s) of Test: 09-12-2005 to 9-13-2005

Blowing sand testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to a sand concentration of 2.2 g/m³, at a constant temperature of +52°C, for 90 minutes per side for a total of 9 hours. Upon completion of the test, the exterior case was cleaned and then opened up for careful inspection. There was no evidence of sand inside the case. This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the same wind velocity, temperature, sand concentration rate, and exposure time duration per side. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.

### 5.15. Blowing Dust

Reference Report: Environmental Associates Test Report OC17522-0812513

Section: 11.0

Page(s): 28 through 29

Date(s) of Test: 09-12-2005 to 9-13-2005

Blowing dust testing was originally tested against MIL-STD-810E using an iSeries case that uses the same injection molding manufacturing methods and chemical composition as today. The case was subjected to a dust concentration of 10.6 g/m³, at twos constant temperatures of +23°C & +52°C, for 6 hours per each temperature. In all, the case was exposed to 12 hours of dust exposure. Upon completion of the test, the exterior case was cleaned and then opened up for careful inspection. There was no evidence of sand inside the case. This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the same wind velocity, room temperature, maximum temperature, dust concentration rate, and exposure time duration per temperature. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.



Test Report Number: iSeries-MIL-STD-810H-2024

**Revision Number: B** 

#### 5.16. Immersion

Reference Report: CRT Laboratories, Inc Report Number 20643

Section: N/A

Page(s): 1 through 2

Date(s) of Test: 04-24-2018

Immersion testing was originally tested against MIL-STD-810G using multiple sized iSeries cases that uses the same injection molding manufacturing methods and chemical composition as today. The cases were subjected to an immersion depth of 1 meter (3.28 ft.) and a temperature preconditioning of +10°C above measured water temperature. The cases were immersed for a total of 30 minutes at maximum depth. Upon completion of the test, the cases were opened up for careful inspected for water ingress. There was no evidence of water inside any of the cases. This test continues to satisfy the testing processes and procedures noted in the latest MIL-STD-810 method. MIL-STD-810H with Change Notice 1 recommends the same immersion depth, temperature preconditioning prior to performing immersion testing, and immersion time duration. This test is considered a pass and qualified by similarity to meet MIL-STD-810H, with Change Notice 1.

#### 6. Conclusion

The SKB iSeries shipping case has proven, through rigorous testing, that it can withstand harsh extreme climatic and dynamic environments around the globe. The iSeries cases are qualified to MIL-STD-810H with Change Notice 1 to all environments listed within this document.