

No.: H202312204372-04EN

SINORA HARD SHELL
Test report
(Environment Test)

total of 26 pages

GRG METROLOGY & TEST GROUP CO.,LTD.

February 2024



SINORA HARD SHELL

Test report

(Environment Test)

Customer : ProTech Co.Ltd

Manufacturer : ProTech Co.Ltd

Sample Model : SIN-05542-20BK-E

Sample Name : SINORA HARD SHELL

Test Date : January 19,2024~January 27,2024

SINORA HARD SHELL

Test report

(Environment Test)

Signed page

Write: *Chen Nanji* February 19, 2024

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Conclusion

From January 19, 2024 to January 27, 2024, Shenzhen Laboratory of Reliability and Environmental Engineering Division of GRG METROLOGY & TEST GROUP CO.,LTD. (hereinafter referred to as "laboratory") in accordance with MIL-STD-810H-2019 《ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS》 The temperature shock test, vibration test and drop test of SIN-05542-20BK-E SINORA HARD SHELL (number: H202312204372-0004) were completed according to the test conditions and test methods. During the test, the appearance inspection results of the tested products were in line with the requirements of the prescribed conformity criteria.

GRG METROLOGY & TEST GROUP CO.,LTD



February 22, 2024

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1 Trial overview

1. 1 Task source and basis for compilation

1. 1. 1 Task Sources

H202312204372 Service order for temperature shock test, vibration test and drop test commissioned by ProTech Co.Ltd

1. 1. 2 Basis of preparation

MIL-STD-810H-2019 ENVIRONMENTAL ENGINEERING CONSIDERATIONS
AND LABORATORY TESTS

H202312204372 Test record

1. 2 Nature and purpose of the test

1. 2. 1 Nature of the trial

Omitted。

1. 2. 2 Purpose of trial

Omitted。

1. 3 Subject

1. 3. 1 General picture of the subject

See Fig.1-1 for the full picture of the subjects in this experiment。



Figure 1-1 Full picture of subjects ((Test No. : H202312204372-0004)

1. 3. 2 Subject name, code, quantity, batch number (No.) and contractor

The subject of this test is a SINORA HARD SHELL, the research and production unit is ProTech Co.Ltd, the quantity is 1 piece, the subject model is SIN-05542-20BK-E, the test number is H202312204372-0004.

The test product was delivered to the test unit on January 19, 2024.

1. 3. 3 Subject function

Omitted.

1. 3. 4 Subject composition

Omitted.

1. 3. 5 Description of the subject's technical status

Not provided by client.

1. 4 Test companion

There are no companions for this environmental test.

1. 5 The start and end time and test place of the test

1. 5. 1 Test time

From January 19, 2024 to January 27, 2024。

1. 5. 2 Trial Site

Location: Shenzhen Laboratory of GRG METROLOGY & TEST GROUP CO.,LTD.。

Test address: No. 10, Dafu Industrial Zone, Guanlan Street, Longhua District, Shenzhen, Guangdong Province。

Table 1-2 shows the assignment of specific test sites and description of subjects。

Table 1-2 Test items, test time, place and description of the tested equipment

Serial Number	Trial items	Trial time	Trial location	Test number
1	Temperature shock test	2024.01.20~2024.01.21	Shenzhen Laboratory	H202312204372-0004
2	Vibration test	2024.01.21~2024.01.26	Shenzhen Laboratory	H202312204372-0004
3	Drop test	2024.01.25~2024.01.27	Shenzhen Laboratory	H202312204372-0004

1. 6 Test environment and conditions

During the test, the actual atmospheric conditions are:

- a) Temperature:24℃~30℃。
- b) Relative humidity: 25%~45%。
- c) Air pressure: 100kPa~101kPa。

1. 7 Test the completion of the project

In this environmental test, the subjects have completed the specified temperature shock test, vibration test and drop test。

1. 8 The units and personnel participating in the test

Table 1-3 Information of participating units and personnel

Serial Number	Units	Name	Remarks
1	GRG METROLOGY & TEST GROUP CO.,LTD.	Zhang Zesen	Participants
2	GRG METROLOGY & TEST GROUP CO.,LTD.	ChenNanji	Participants

1.9 Any other questions that need to be addressed

1.9.1 Test equipment

The test equipment used in the test is shown in Table 1-4.

Table 1-4 Test equipment

Serial Number	Name	Model number	Number	Calibration expiration range	Test items	Remarks
1	Walk-in temperature and humidity test chamber	UC13-70150-R	181197	2023.02.27~2024.02.27	Temperature shock test	/
2	Rapid temperature change test chamber	HQTH-1012-10-70W	HGX02023 0605A-GDJL	2023.11.18~2024.11.17		/
3	Digital electric vibration test system	ES-50-445	D1604138	2023.02.02~2024.02.01	Vibration test	/
4	General-purpose Class acceleration sensor	U1S502	2011001	2023.02.25~2024.02.24		
5	General-purpose Class acceleration sensor	U1S502	2011003	2023.04.23~2024.04.22		
6	Single wing drop tester	TG-6301-AS1	201704007	2023.08.15~2024.08.14	Drop test	/

1.9.2 Instrumentation

None.

2 Trial contents and results

2.1 Temperature shock test test

2.1.1 Purpose of the test

Omitted.

2.1.2 Trial conditions

Temperature shock test The test conditions are as follows:

- a) High temperature: 70℃;
- b) Low temperature: -10℃;
- c) Holding time: the high temperature section and the low temperature section are held for 2h respectively;
- d) Conversion time: no more than 1min;
- e) Number of cycles: 3.

2. 1. 3 Test method

The test was conducted according to the test method specified in “MIL-STD-810H-2019”。

a) Pre-test detection

Before the test, the test subject shall be inspected in accordance with the requirements of Annex 1 under the standard atmospheric conditions of the test。

b) Installation of the subject

Place the test subject flat on the shelf of the temperature impact test box, and in the effective volume of the test box, the air in the box can flow freely. See Attachment 2 for the actual placement status of the subject。

c) Test run

The temperature shock test is carried out on the subject according to the test conditions specified in 2.1.2. The test started from the low temperature stage. During the test, the high temperature was 70℃, the low temperature was -10℃, the holding time of high and low temperature was 2h, and the conversion time of high and low temperature was about 60s. A total of 3 cycles were carried out。

d) Recovery treatment

At the end of the experiment, the subject was in the low temperature zone of -10℃, and when the temperature in the box naturally returned to the laboratory temperature, the door of the box was opened to restore the subject under the standard atmospheric conditions of the test for 2h。

e) Post-test detection

After the test, the appearance inspection of the subject is carried out in accordance with the requirements of Annex 1 under the standard atmospheric conditions of the test. The results are shown in Table 4-1。

During the test, the test equipment ran normally and met the test conditions stipulated in Article 2.1.2. See Annex 2 for the interface diagram of the test temperature。

2. 1. 4 Test results

Temperature shock test results are as follows:

The appearance inspection results of the test subjects are shown in Table 4-1。

2. 1. 5 Project conclusion

During the experiment, the appearance inspection results of the tested products meet the requirements of conformity criteria.

2. 2 Vibration test

2. 2. 1 Purpose of test

Omitted.

2. 2. 2 Trial conditions

The vibration test conditions are as follows:

a) Test axis: X axis (transverse), Y axis (longitudinal), Z axis (vertical), axis definition is shown in Figure 2-1, vibration test magnitude is shown in Table 2-1 and Table 2-2.

b) Test time: The vibration test time is 1h per axial direction.

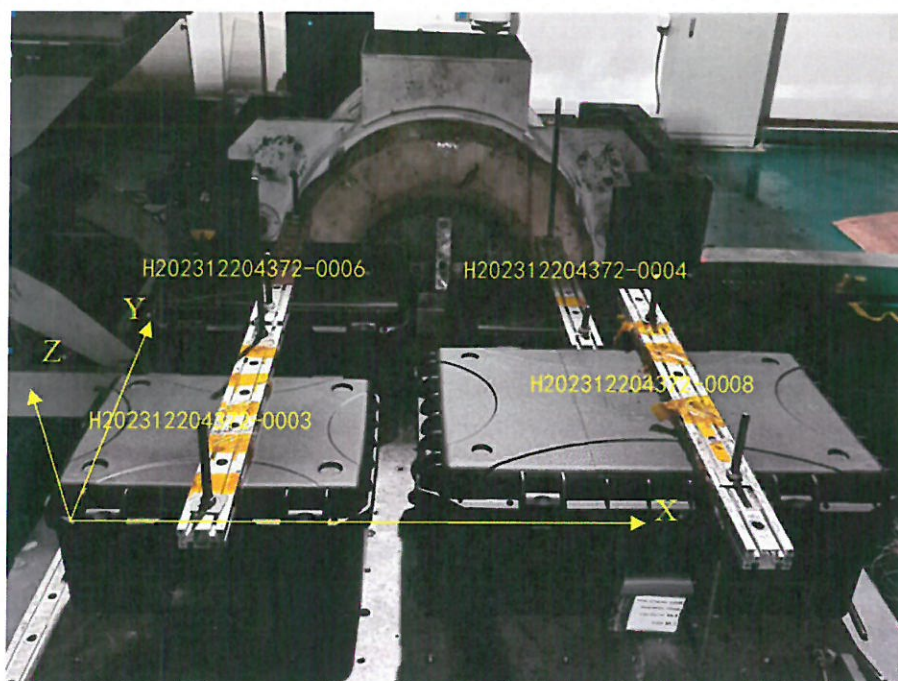


Figure 2-1 Axial definition of the subject

Table 2-1 vibration test magnitude- Road Transportation

Z axis Vertical		X axis Landscape		Y axis Portrait		Test axis and time
Frequenc y (Hz)	Acceleratio n ((g)2/Hz)	Frequenc y (Hz)	Acceleratio n ((g)2/Hz)	Frequenc y (Hz)	Acceleratio n ((g)2/Hz)	X axis: 1h Y axis: 1h Z axis: 1h
5	0.015	5	0.00013	5	0.0065	
40	0.015	10	0.00013	20	0.0065	
500	0.00015	20	0.00065	120	0.0002	
/	/	30	0.00065	121	0.003	
/	/	78	0.00002	200	0.003	
/	/	79	0.00019	240	0.0015	
/	/	120	0.00019	340	0.00003	
/	/	500	0.00001	500	0.00015	
Root-mean-square value: 1.08g		Root-mean-square value: 0.21g		Root-mean-square value: 0.76g		

Table 2-2 vibration test magnitude- Jet C-5

Frequency (Hz)	Acceleration n ((g)2/Hz)	Left slope (dB/Oct)	Right slope (dB/Oct)	Test axis and time
15	0.003	0	0	X axis: 1h X axis: 1h X axis: 1h
1000	0.003	0	-6	
2000	0.0007	-6	0	
Root-mean-square value: 2.11g				

2.2.3 Test method

The test was conducted according to the test methods specified in MIL-STD7 810H-2019 Method 514 for Road Transport and Jet C-5.

a) Pre-test detection

The test result after the temperature shock test of the subject is taken as the test result before the test.

b) Installation of the subject

The subject is rigorously fixed on the shaking table surface through the aluminum bar and screw, and the control sensor is installed near the connection position of the subject. The two-point average control method is adopted. First, the Y-axis of the subject is examined. See attachment 2 for the actual installation status of the subject.

c) Test run

Step 1: According to the experimental conditions stipulated by 2.2.2 table 2-1, the test of 1h" road transport "was first tested for the trial product z axis. During the test period of the vibration, the test is not effective.

Step 2: Change the axial direction of the subject, and conduct the vibration test of the subject in X axis and Z axis for 1h respectively. See Attachment 2 for the actual installation status of the subject.

Step 3: After the experiment, the test condition of the test product y axis was tested by 2.2.2 table 2-2. During the test period of the vibration, the test is not effective.

Step 4: Change the axial direction of the subject, and conduct 1h vibration test on the Y axis and X axis of the subject in turn. See Attachment 2 for the actual installation status of the subject.

d) Post-test detection

After the test, the appearance inspection of the subject is carried out in accordance with the requirements of Annex 1 under the standard atmospheric conditions of the test. The results are shown in Table 4-2.

During the test, the test equipment ran normally and met the test conditions stipulated in Article 2.2.2. See Annex 2 for the test control spectrum diagram.

2. 2. 4 Test results

The vibration test results are as follows:

The appearance inspection results of the test subjects are shown in Table 4-2.

2. 2. 5 Project conclusion

During the experiment, the appearance inspection results of the tested products meet the requirements of conformity criteria.

2. 3 Drop test

2. 3. 1 Purpose of test

Omitted.

2. 3. 2 Test condition

The test conditions of the subjects are shown in Table 2-3.

Table 2-3 Drop test conditions

Drop surface	Drop height (cm)	Number of falls	Trial number
12 edges	122	Every edge one times, twelve times	H202312204372-0004
8 Angles	122	Every Angle one times, eight times	
6 faces	122	Every face one times, six times	

2.3.3 Test methods

The test was conducted in accordance with the test method specified in MIL-STD-810H-2019 Method 516.8。

a) Pre-test detection

The test result after the vibration test is taken as the test result before the test。

b) Installation of the subject

The subjects are placed on the test table, and the sample is installed in attachment 2。

c) Test run

Step 1: Press 2.3.2 table 2-3 test conditions to place the subjects on the drop shelf, in height 122cm, to fall on the 12 edges of the subjects。

Step 2: the transformation is tested in order to drop the eight angles and six faces. The actual installation status of the test is shown in attachment 2。

d) Post-test detection

After the test, the appearance inspection of the subject is carried out in the standard atmospheric conditions of the test according to the requirements of Annex 1, and the results are shown in Table 4-3。

2.3.4 Test results

Drop test results are as follows:

The appearance inspection results of the subjects are shown in Table 4-3。

2.3.5 Project conclusion

During the experiment, the appearance inspection results of the tested products meet the requirements of conformity criteria。

3 The main problems in the test and their treatment

In the test, no failure occurred in the subject。

4 Conclusion

4.1 Environmental test standards

From January 19, 2024 to January 27, 2024, Shenzhen Laboratory of Reliability and Environmental Engineering Division of GRG METROLOGY & TEST GROUP

CO.,LTD.in accordance with MIL-STD-810H-2019 《 ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS 》 The temperature shock test, vibration test and drop test of SIN-05542-20BK-E SINORA HARD SHELL (number: H202312204372-0004) were completed according to the test conditions and test methods.During the test, the appearance inspection results of the tested products were in line with the requirements of the prescribed conformity criteria。

In summary, SINORA HARD SHELL passed the environmental test.。

Table 4-1 Summary table of test results of temperature shock test

Serial number	Trial items	Test items	Test number	Test requirements and conformity criteria	Test results
1	Check before temperature shock test	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
2	Check after temperature shock test	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance

Table 4-2 Summary of vibration test results

Serial number	Trial items	Test items	Test number	Test requirements and conformity criteria	Test results
1	Check before the "road transport" vibration test	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
2	Check in "road transport" vibration test (after Y axis test)	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
	Check in "road haulage" vibration test (after X-axis test)	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
	Check in "road transport" vibration test (after Z-axis test)	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
3	"Road haulage" after vibration test check	Visual inspection	H202312204372-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance

Table 4-2 Summary of vibration test results (Continuation of table 4-2)

Serial number	Trial items	Test items	Test number	Test requirements and conformity criteria	Test results
4	Check before the "Jet C-5" vibration test check	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
5	Check in "Jet C-5" vibration test (after Z-axis test)	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
	Check in "Jet C-5" vibration test (after Y-axis test)	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
	Check in "Jet C-5" vibration test (after X-axis test)	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
6	"Jet C-5" after vibration test check	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance

Table 4-3 Summary of drop test results

Serial number	Trial items	Test items	Test number	Test requirements and conformity criteria	Test results
1	Check before drop test	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance
2	Check after drop test	Visual inspection	H20231220437 2-0004	The appearance of the subject should not be cracked, unglued or damaged	Good appearance

5 Existential Questions and Suggestions

None.

6 List of attachments

This report includes 2 annexes as follows:

- a) Attachment 1: Test items and requirements.
- b) Attachment 2: Typical test pictures.

Attachment 1 Test items and requirements

Schedule 1.1 Test Items and Requirements-Before/After test

Serial number	Test items	Test requirements/criteria of conformity
1	Visual inspection	The appearance of the subject should not be cracked, unglued or damaged

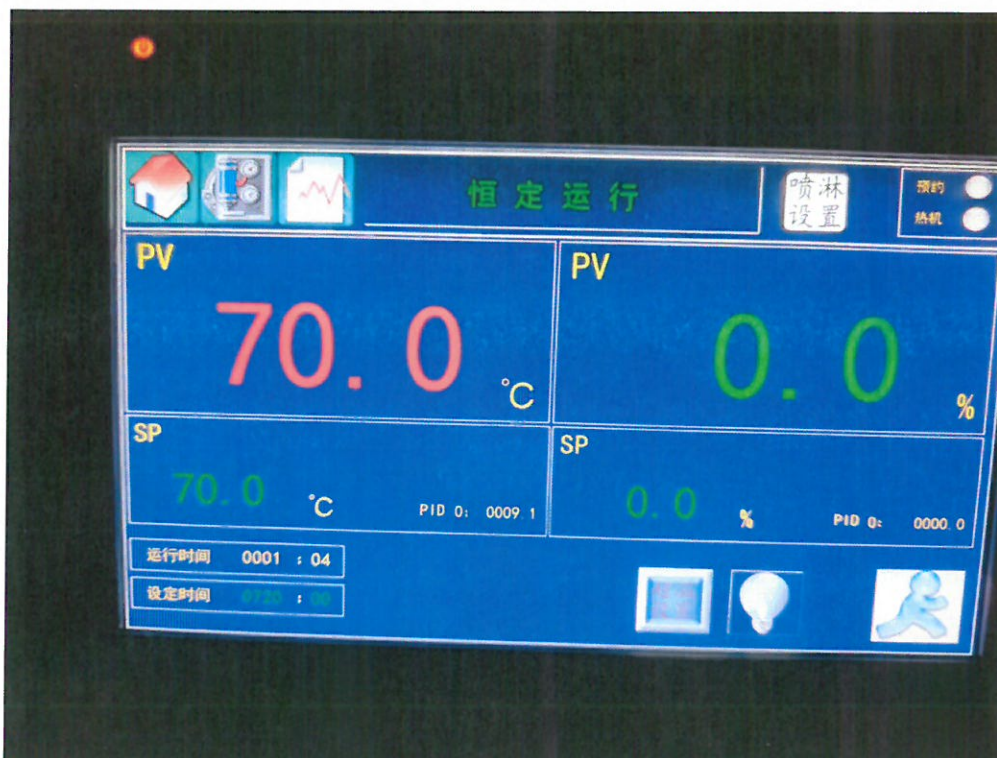
Schedule 1.2 Test items and requirements-Under test

Serial number	Test items	Test requirements/criteria of conformity
1	Visual inspection	The appearance of the subject should not be cracked, unglued or damaged

Attachment 2 Typical test pictures



Attached figure 2.1 Temperature shock test subject placement diagram (H202312204372-0004)



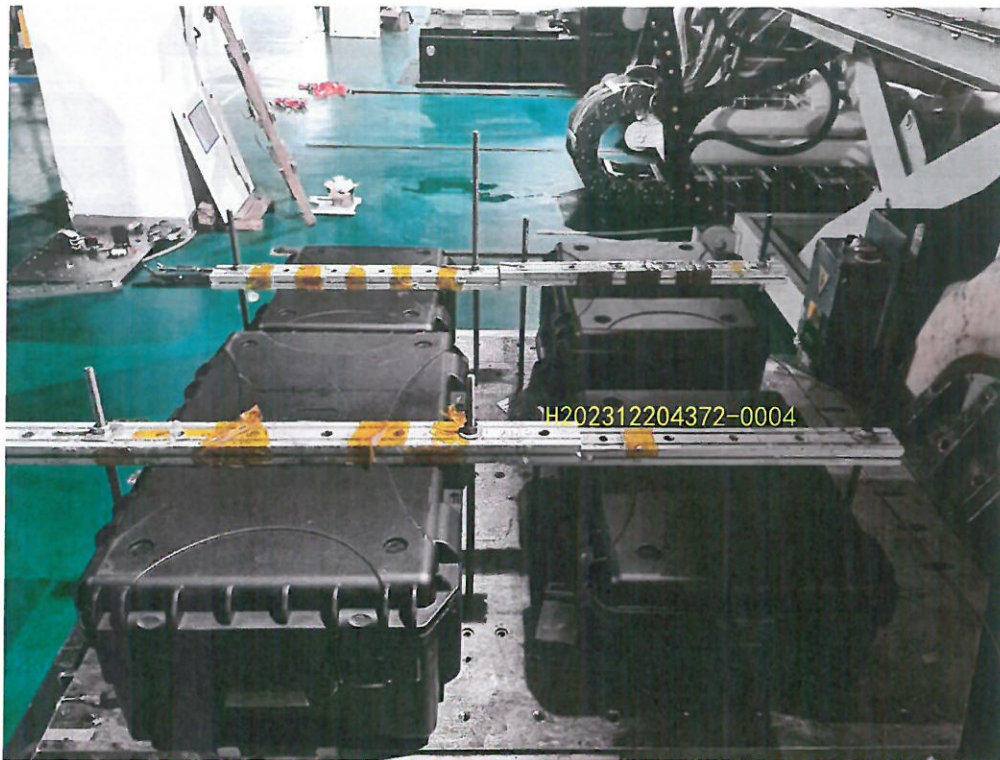
Attached figure 2.2 Temperature shock test equipment running interface - high temperature box (H202312204372-0004)



Attached figure 2.3 Temperature impact test subject placement diagram (H202312204372-0004)



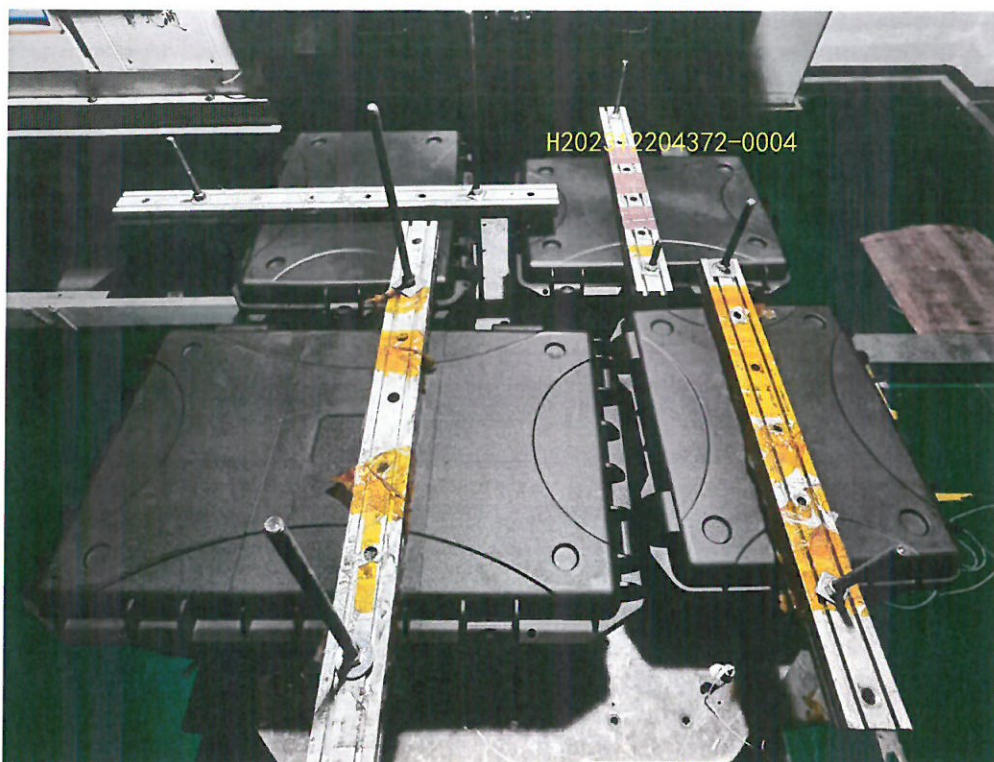
Attached figure 2.4 Temperature shock test equipment running interface-cryogenic box (H202312204372-0004)



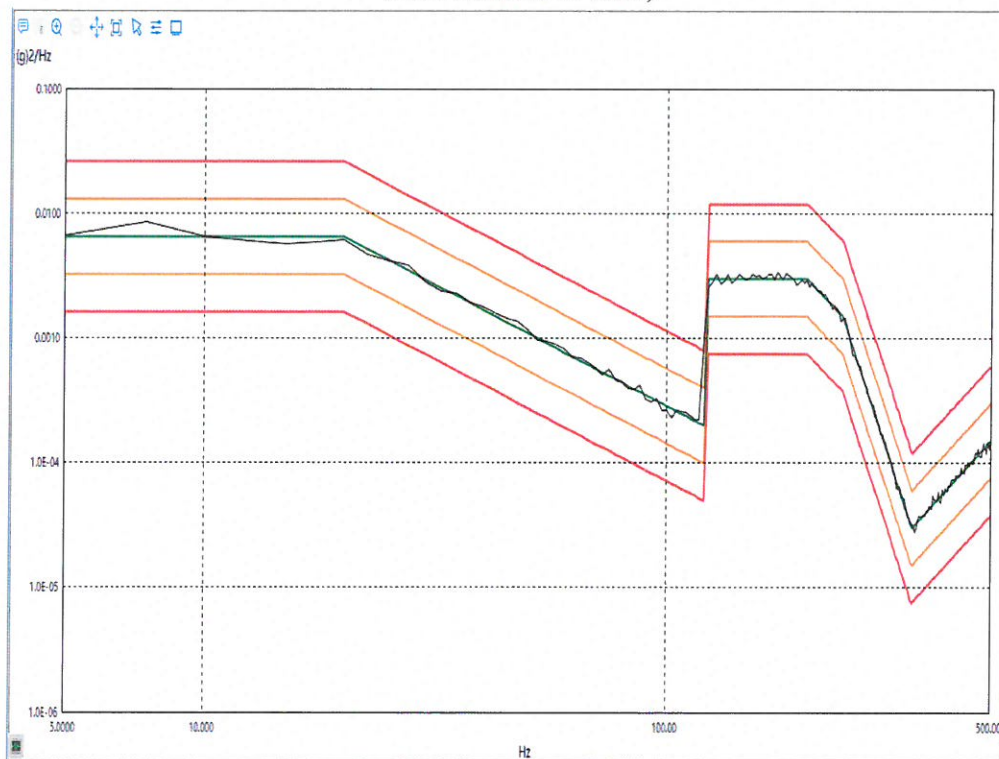
Attached figure 2.5 The vibration test is typically set up by the sample-Y axis
(H202312204372-0004)



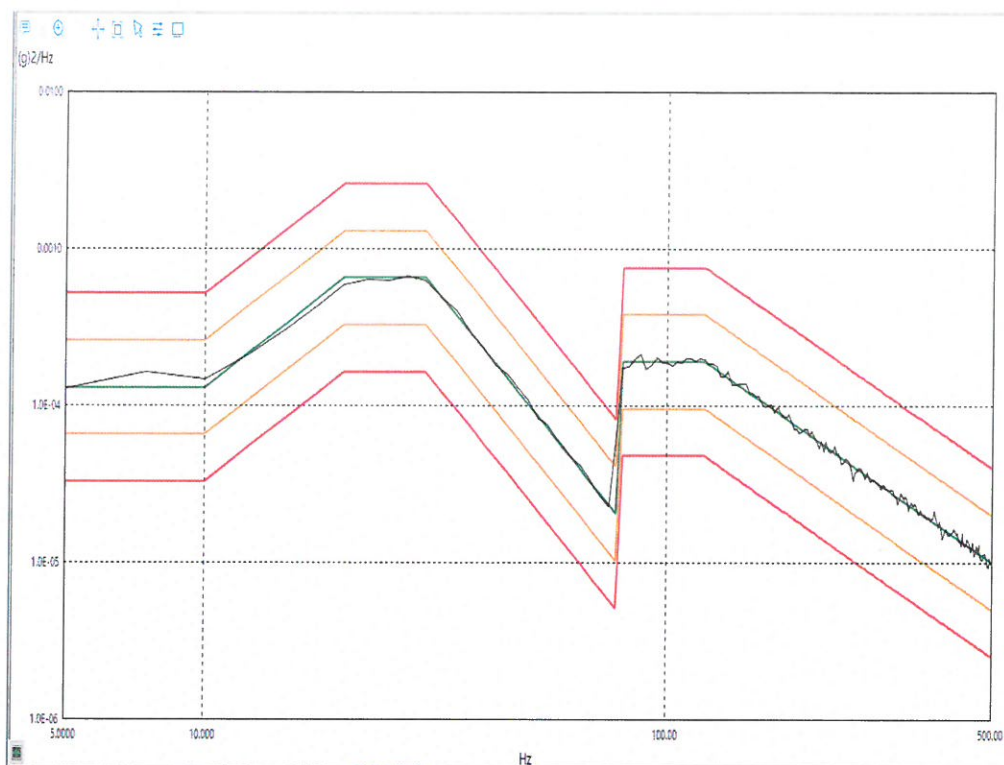
Attached figure 2.6 The vibration test is typically set up by the sample-X axis
(H202312204372-0004)



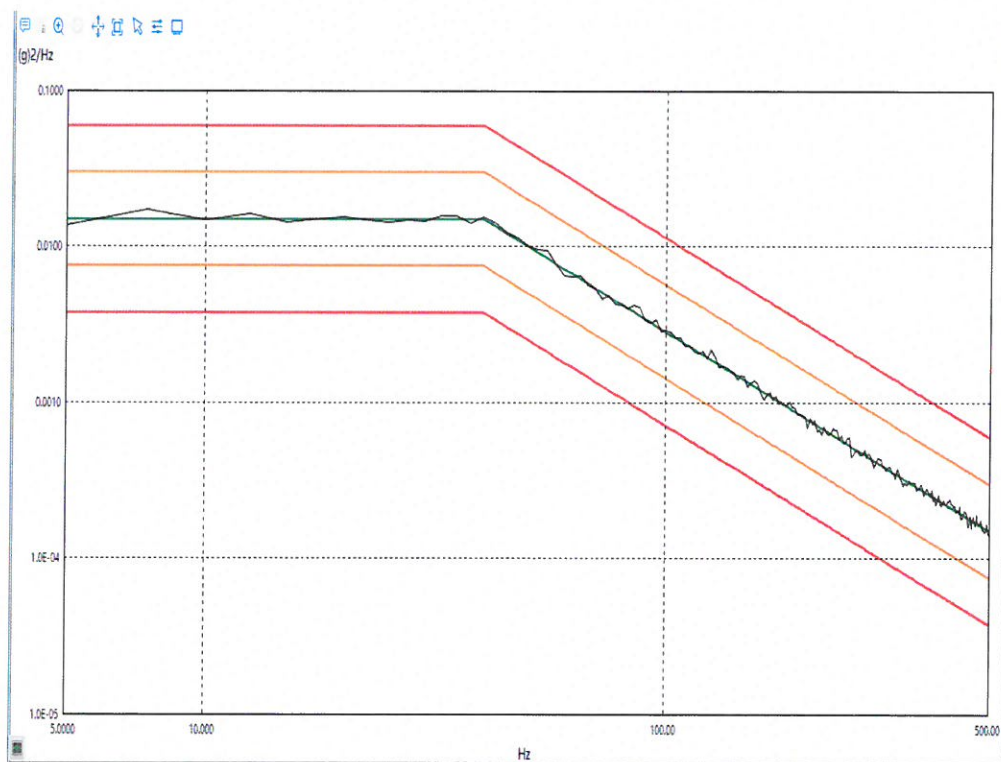
Attached figure 2.7 The vibration test is typically set up by the sample-Z axis
(H202312204372-0004)



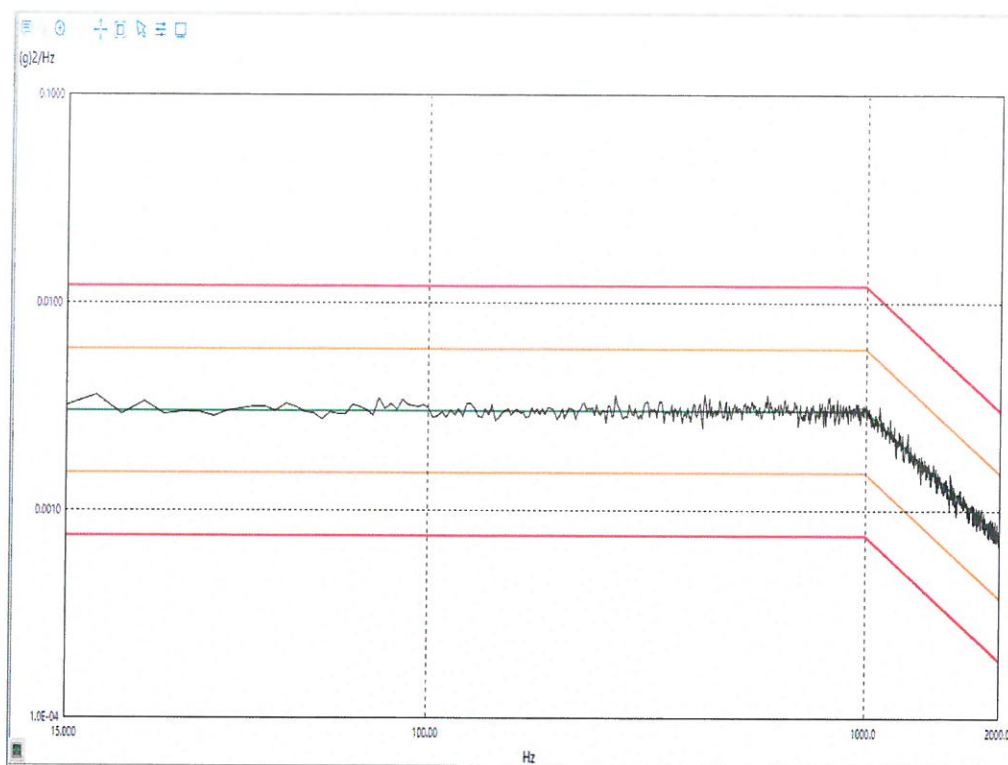
Attached figure 2.8 Y-axis of "Road Transportation" vibration test Control diagram



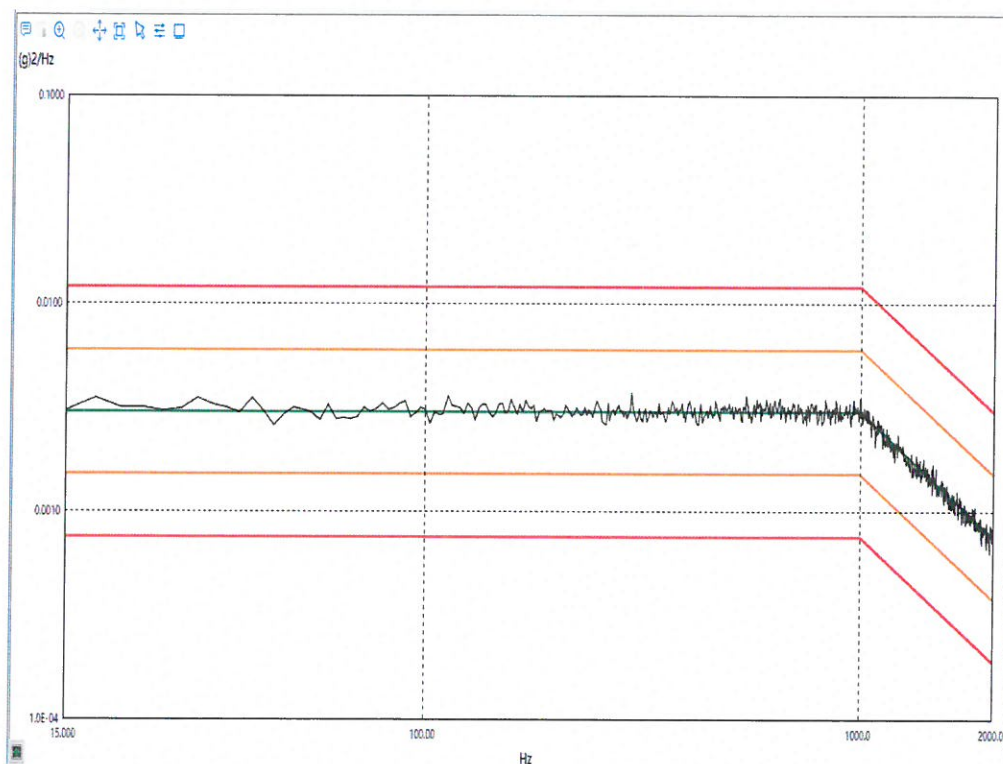
Attached figure 2.9 X-axis of "Road Transportation" vibration test Control diagram



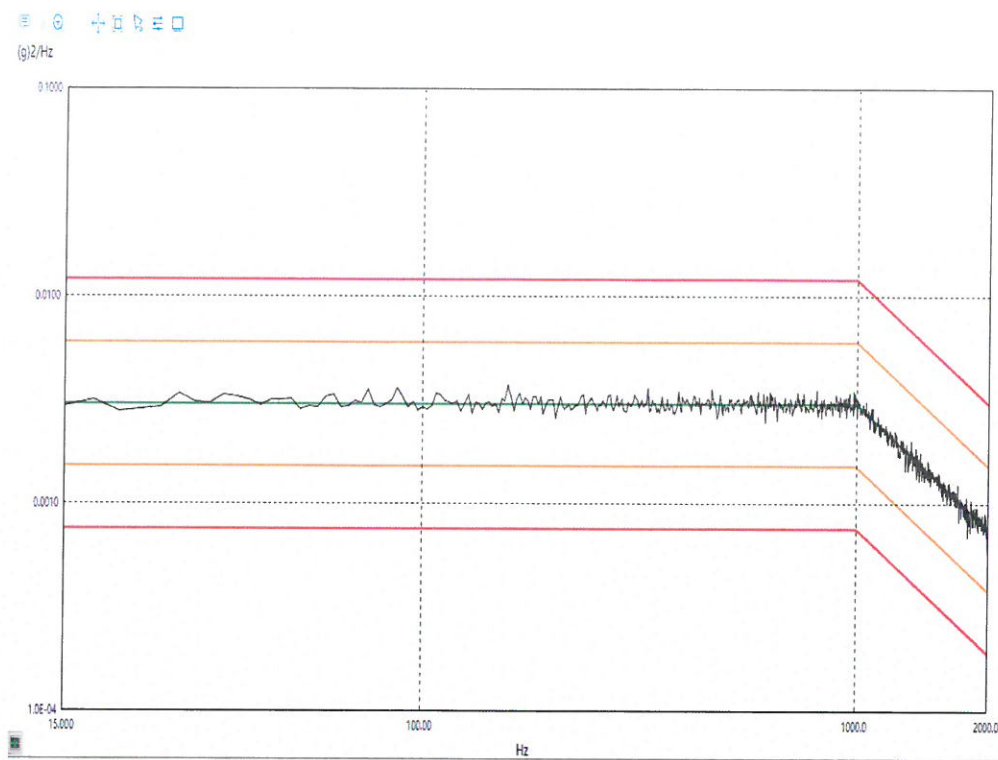
Attached figure 2.10 Z-axis of "Road Transportation" vibration test Control diagram



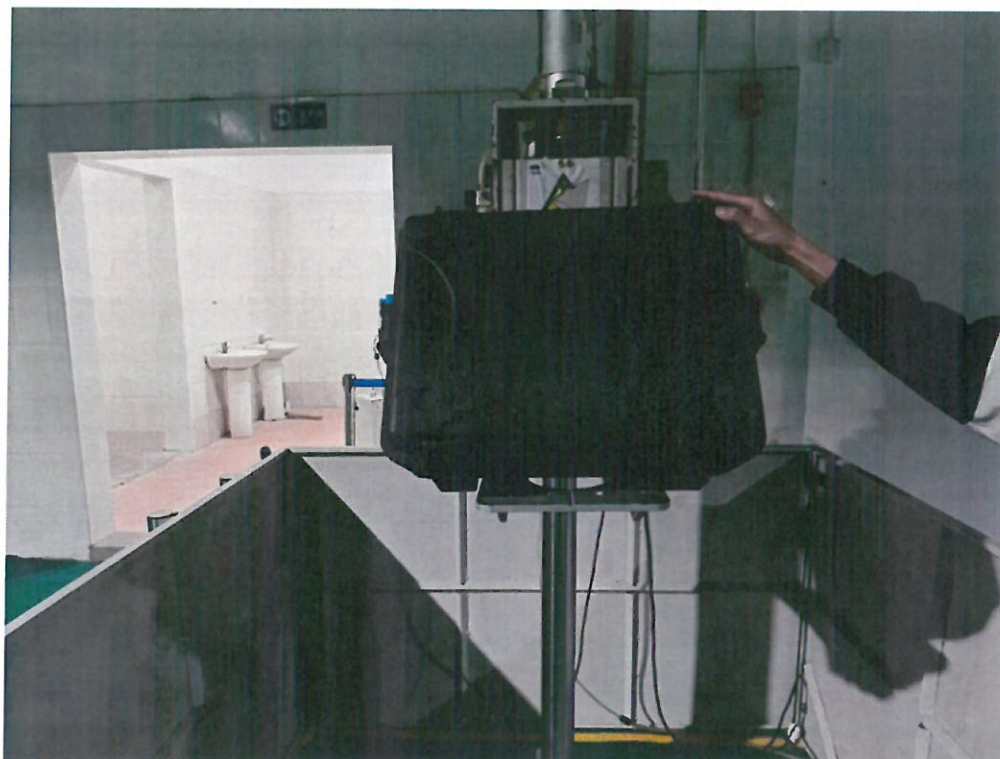
Attached figure 2.11 Z-axis diagram of "Jet C-5" vibration test control diagram



Attached figure 2.12 Y-axis diagram of "Jet C-5" vibration test control diagram



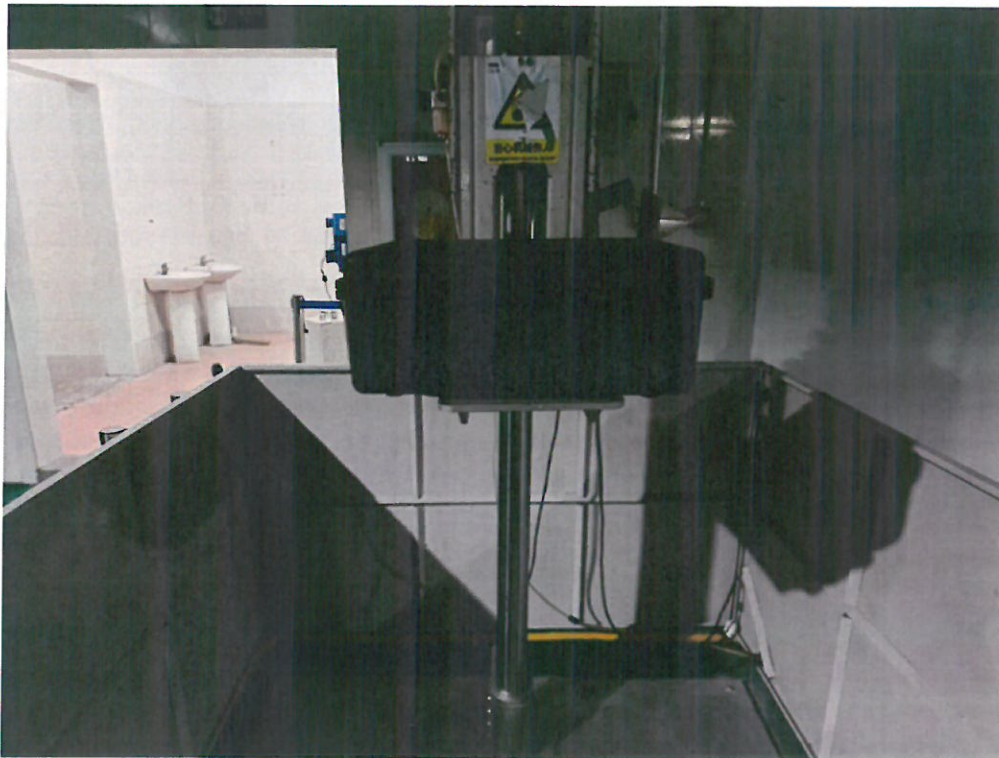
Attached figure 2.13 X-axis diagram of "Jet C-5" vibration test control diagram



Attached figure 2.14 Drop test subjects erection typical diagram-Edge



Attached figure 2.15 Drop test subjects set up typical graph-Angles



Attached figure 2.16 Drop test subjects set up typical figure-Face



Attached figure 2.17 drawing of drop height 122cm (H202312204372-0004)



Attached figure 2.18 drawing of appearance inspection of subject
(H202312204372-0004)

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