

Vojenský technický ústav, s.p. The certified quality system according to ČSN EN ISO 9001   Test Laboratory No. 1103 accredited by CAI according to CSN EN ISO/IEC 17025:2018 SPECIAL MEASUREMENT TEST LABORATORY		Task/Order No: 25-19-5-93-3073-003 Test Report No: 194200-6/2025 Copy No: 1 Number of Pages: 6 Annex: -
TEST REPORT MECHANICAL RESISTANCE		
Name and address of submitter (customer): SEC Technologies, s.r.o., 1. Mája 4265, 031 01 Liptovský Mikuláš, Slovakia		
Tested Item: MTU-1A2 Pan Tilt Positioner Identification: SN: MU0101 Producer: SEC Technologies, s.r.o., Liptovský Mikuláš, Slovakia Technical documentation: -		
Date of entrance test: 13 January 2025	Test methods: ČSN EN 60068-2-64 ČSN EN 60068-2-27 MIL-STD-810	
Date of test, place of test: 14, 15 January 2025 Special measurement test laboratory	Test leader: testing engineer Jiří Lenikus Test carried out by: testing engineer Michal Štrajtl	
Issue date: 31 January 2025	Authorized by technical manager: Special measurement test laboratory leader Ivan ŠTUCHAL  	
Test results: The tested item was subjected to the mechanical resistibility tests (random vibration test, shock test). The test results are presented in the test report. <i>The expanded measurement uncertainty is a product of a measurement standard uncertainty and a coverage factor $k = 2$, this corresponds to a coverage probability of 95 % for a normal distribution.</i>		
Address: Vojenský technický ústav, s.p. odštěpný závod VTÚPV Úsek zkoušení techniky- Zkušební laboratoř č.1103 Víta Nejedlého 691 682 01 VYŠKOV THE CZECH REPUBLIC Telephone: 00420 910 107 600 Fax: 00420 910 107 499 E-mail: ivan.stuchal@vtusp.cz		Note: This document is issued in English only.

The results contained within this report relate to the tested item only as it was received. This report shall not be reproduced except in full and only with written approval of testing laboratory. The test laboratory is not responsible for the data and information supplied by the customer, affecting the validity of the results.

1 Tested Item (Equipment under test-EUT)

MTU-1A2 Pan Tilt Positioner

2 Test Aim

The test aim was to verify the mechanical resistance of the tested item according to customer requirements [4]: random vibration according to the standard ČSN EN 60068-2-64:2009 ed. 2 [1] and shock test according to the standard ČSN EN 60068-2-27 ed. 2 [2] with test parameters set according to the standard MIL-STD-810G [3]:

- dynamic vibration stresses according to the standard ČSN EN 60068-2-64 ed. 2 [1], shaker control system set in compliance with customer requirements-technical specifications of the standard MIL-STD-810G [3], Method 514.6 Vibration (Common carrier (wheeled), Fig. 514.6C-1 – Category 4), random vibration test, frequency range 5 Hz–500 Hz, Grms 1.04 (vertical Z axis), 0.20 (transverse X axis), 0.74 (longitudinal Y axis - driving direction), test duration 60 min per axis, test in each of perpendicular axis – X, Y, Z. The test duration represents (simulates) 1,609 km. EUT was not in operational mode during the test.

Note: In the horizontal test axes (X, Y) a higher spectrum (for longitudinal Y test axis) was used for the tests.

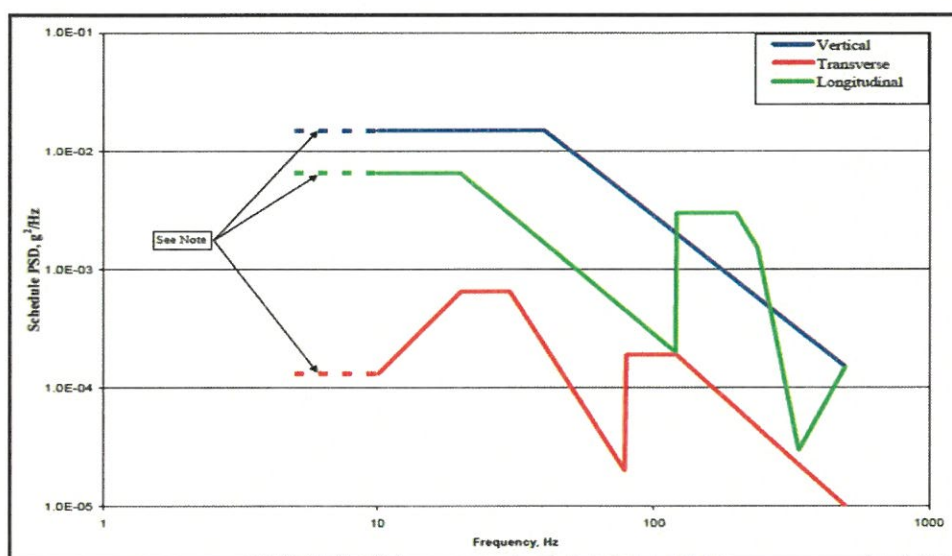


Figure 1: Common carrier

- Functional shocks. Method 516.6 Shock (Tab. 516.6C-II „Functional Test for Ground Equipment“): Terminal peak sawtooth pulse, 6 shocks (3 positive pulses and 3 negative pulses) per axis, three orthogonal test axes: transverse - X, longitudinal - Y, vertical - Z, peak acceleration 40 g, pulse duration: 11 ms. EUT was not in operational mode during the test.



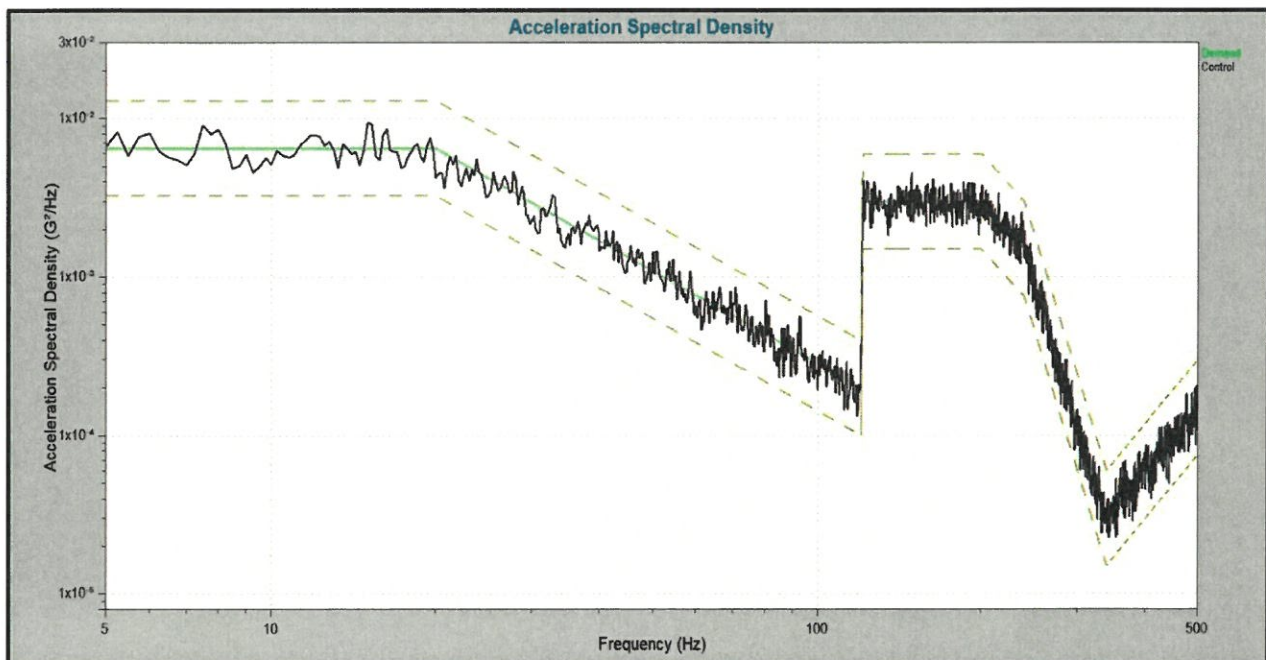
3 Test Procedure and Test Results

The tested item was fixed to the test vibration equipment table "DONGLING ES 80WLS3-445 (SN: D2301004), electro-dynamic vibration test system with control system Vibration Testing Controllers: Vibration Research VR9500, SW VibrationVIEW 2023.1.2" using the original platform (screws 6 × M6) and test laboratory fastening parts-steel plate (45 × 45 × 3) cm and screws M12 (see photo-documentation).

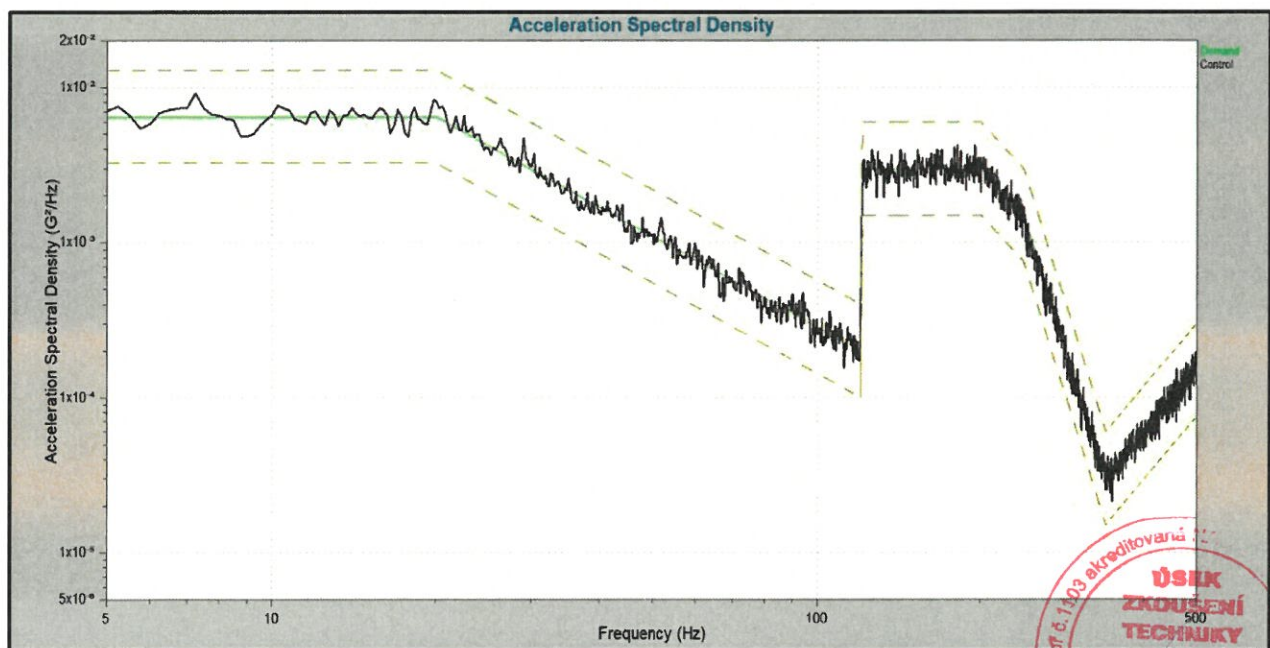
Input (pre-test) check (visual inspection and function checks by the customer) was carried out before the beginning of the test

3.1 Mechanical resistance test-random vibration (common carrier)

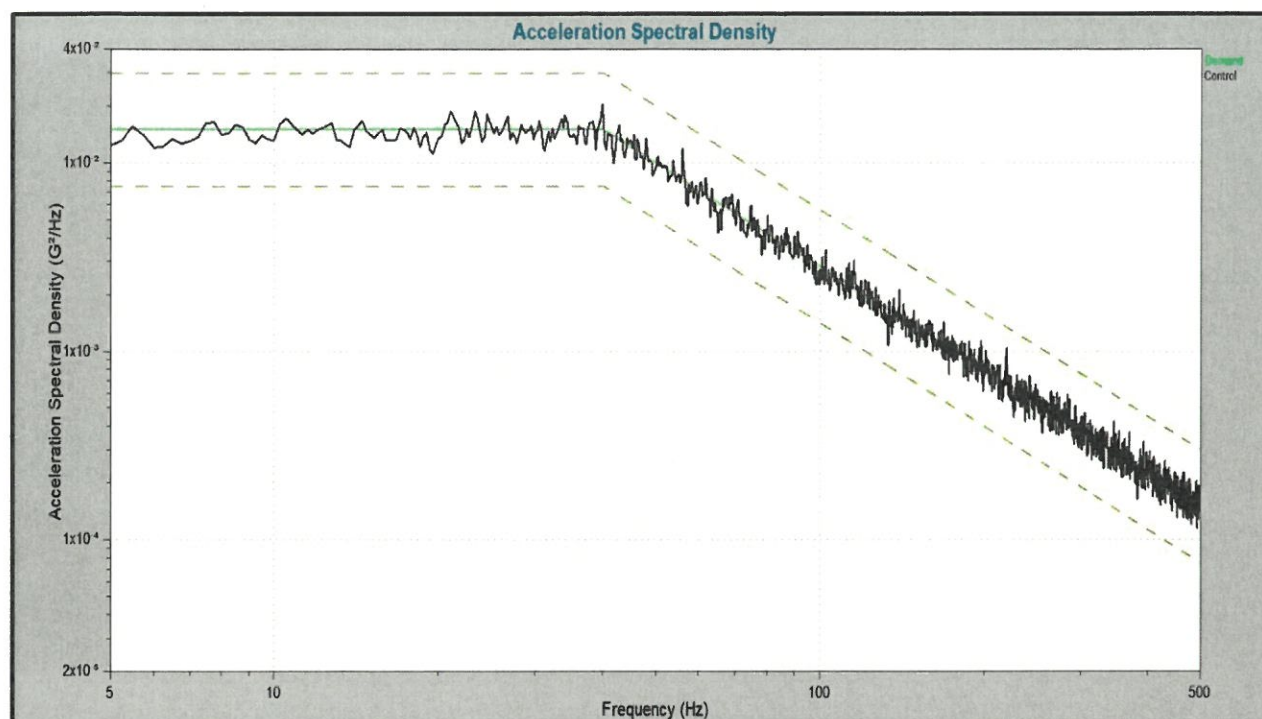
The tested item was subjected to the mechanical resistance test - random vibration test (Graphs 1, 2, 3-Test spectra) in X, Y, Z test axes (Fig. 2, 3, 4, 5, 6, 7). EUT was not in operational mode during the test.



Graph 1: Test spectrum (X axis)



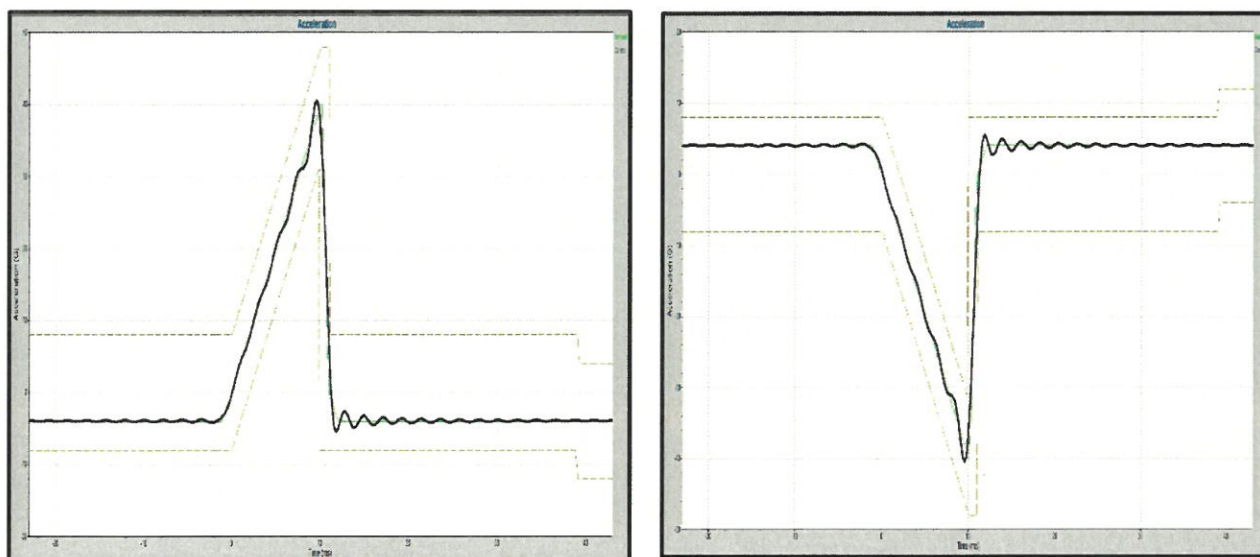
Graph 2: Test spectrum (Y axis)



Graph 3: Test spectrum (Z axis)

3.2 Mechanical resistibility test-random vibration (functional shock)

The tested item was subjected to the mechanical resistance test - shock test (Graphs 4, 5-Test pulse) in X, Y, Z test axes (Fig. 2, 3, 4, 5, 6, 7).



Graph 4, 5: Test pulse – positive and negative pulse (all test axis X, Y, Z)



3.3 Test results

The tested item was subjected to the mechanical resistance tests (random vibration test, shock test) according to the customer requirements.

There was not apparent mechanical failure, damage or failure of mounting attachment caused by the tests. There was not EUT parts releasing and screws loosening. Functional checks were carried out after the tests by the customer, results are described in a separate document [5].

4 Uncertainty: Extended uncertainty of acceleration measurement 2.0 %.

5 Measuring instruments:

Name	ID number	Calibration Validity
Accelerometer PCB J353B33, SN 109010	22f-61537	24.03.2026

6 References

- [1] ČSN EN 60068-2-64 ed.2:2009 (idt IEC 60068-2-64:2008) „Environmental testing-Part 2-64: Tests-Test Fh: Vibration, broadband random and guidance“. April 2009.

This standard is the Czech version of the European Standard EN 60068-2-64:2008. It has the same status as the official version.

- [2] ČSN EN 60068-2-27, ed. 2:2010 “Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock“, February 2010.

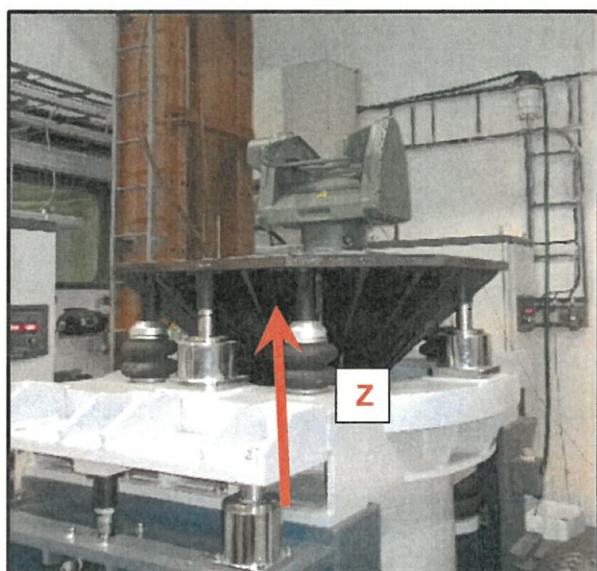
This standard is identical with EN 60068-2-27:2009. It has the same status as the official version.

- [3] MIL-STD-810G. Environmental Engineering Considerations and Laboratory Tests. Department of Defense. Test Method Standard. 31 October 2008.

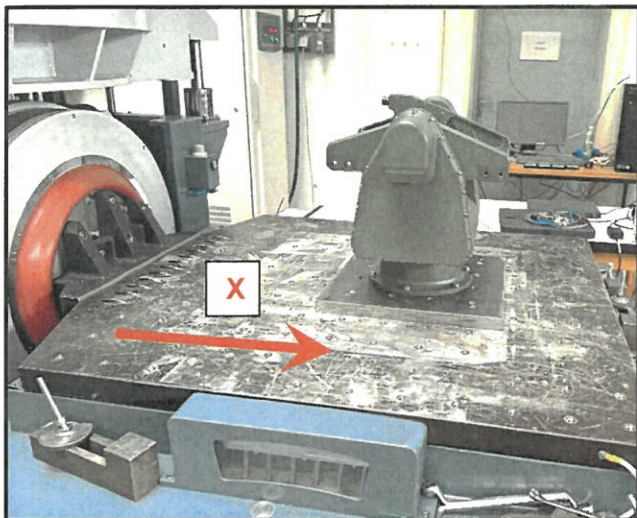
- [4] Customer test specification to Order No. 25-19-5-93-3073-003 (SEC Technologies, s.r.o., 03.01.2025).

- [5] TECHNICAL COMMENTARY to test results - test report No. 194200-6/2025. VTÚ (Military Technical Institute), s. e., branch VTÚPV Vyškov. Equipment testing centre. Special measurement test laboratory. 1/2025.

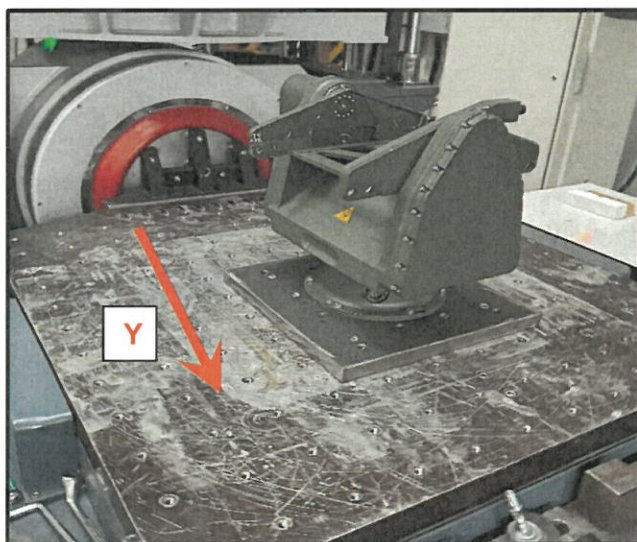
7 Photo-documentation



Figures 2, 3: EUT (Z test axis orientation)



Figures 4, 5: EUT (X test axis orientation)



Figures 6, 7: EUT (Y test axis orientation)



Figure 8: EUT (function check)

TEST REPORT END

TECHNICAL COMMENTARYto test results - test report No. **194200-6/2025****Name and address of submitter (customer):** SEC Technologies, s.r.o., 1. Mája 4265,
031 01 Liptovský Mikuláš, Slovakia**Tested item: (Equipment under test-EUT):** MTU-1A2 Pan Tilt Positioner**Test participants:** VTÚPV Vyškov: Michal Štrajt
SEC Technologies, s.r.o: Róbert Kudla

The test aim was to verify the mechanical resistance of the tested item according to customer requirements: random vibration according to the standard ČSN EN 60068-2-64:2009 ed. 2 and shock test according to the standard ČSN EN 60068-2-27 ed. 2 with test parameters set according to the standard MIL-STD-810G:

- Common (wheeled) carrier.
Method 514.6 Vibration (Fig. 514.6C-1 – Fig. 1, Tab. 514.6C-II)
- Functional shocks.
Method 516.6 Shock (Tab. 516.6-I, II „Functional Test for Ground Equipment“)

The visual inspection was carried out during the tests. Function checks were carried out by the customer after the tests using its check device: The EUT was turned on and set to operational mode. Manipulation check was performed.

There was no apparent mechanical failure or damage and no parts (components) releasing caused by the tests. There was no mechanical integrity failure and fixing failure during the tests and after the tests. There was no malfunction.

Technical commentary of the test results has an information character
and is beyond scope of testing laboratory accreditation.

Vyškov: 31 January 2025

Ivan Štuchal
Test laboratory head