TOUGH™

TOUGH BY NAME, TOUGH BY NATURE

MIL-STD-810F Testing

Each Panasonic Toughbook® is designed and manufactured to meet a level of durability matched to an intended work environment. The range of Toughbooks cover the ruggedised Toughbook 28, and Toughbook 34 and Toughbook 07 and include models with selected durability features like the remaining semi-rugged models.

At the very least, each Toughbook features a magnesium alloy LCD case, 20 times stronger than ABS plastic, to protect this critical and expensive-to-replace component. Other models include full magnesium cases to protect all system components. Hard disk drives are equipped with various degrees of shock insulation to protect mission-critical data from the dangers of shocks, bumps and drops. Some Toughbooks also offer spill-resistant keyboards to provide protection from the spills and splashes that are a frequent part of mobile computing environments.

Reliability

Panasonic's most rugged Toughbooks have been designed using MIL-STD-810F test procedures to measure levels of environmental reliability. Created by the U.S. government, the MIL-STD-810Fspecifications cover a broad range of tests that measure the durability of equipment used under harsh conditions. These tests include drop-shock, moisture-, dust- and vibration-resistance, exposure to extremely low and high temperatures, and many others.

Passed the Test

And even though Panasonic conducts these environmental tests in their factories with their own equipment, they didn't stop there. After they finished our in-house tests on the ruggedised Toughbook 28, they gave it to one of the leading independent environmental test agencies in the United States to repeat all of the tests again. In the end, the results confirmed Panasonic's own: the Toughbook 28 passed all challenges without failure.

Testing Procedures

And while not every Toughbook is designed to be as ultra-rugged as the Toughbook 28 or Toughbook 34, tests like the MIL-STD-810F Panasonic to understand how to design all of their Toughbooks with the best focus on durability features for the type of user and work conditions. The information below describes the tests Panasonic use to measure Toughbook durability

MIL-STD-810F Testing Procedures

Drop Test

The Drop test was performed in accordance with MIL-STD-810F, Method 516.5, Procedure IV (Transit Drop Test). The Toughbook 28 was sequentially dropped in non-operating mode, onto each face, edge and corner for a total of 26 drops from a height of 36 inches. The drop surface was defined as two-inch-thick plywood over a steel plate over concrete. The Toughbook 28s were visually inspected after each drop and a functional check (boot-up into Windows) was performed after each drop.

Results:
The Toughbooks boot Windows® following each drop.

Vibration

The Vibration test was performed in accordance with MIL-STD-810F, Method 514.5, Procedure I, Category 24 (Minimum Integrity Test) for the non-operational condition and Category 4 (Truck Transportation over U.S. Highways) for the operational condition. The units were clamped to an aluminum plate (approximating rigid mounting), and were subjected to the following levels of vibration:

Non-Operational (from Figure 514.5C-17 of MIL-STD-810F) 0.04 g^2 /Hz at 20-1000 Hz, -6 dB/Octave at 1000-2000 Hz, 1 hour/axis duration
Operational (Figure 514.5C-1 of MIL-STD-810F) 0.015 g^2 /Hz at 10-40 Hz, 0.00015 g^2 /Hz at 500 Hz, 1 hour/axis duration simulating 1000 miles of transportation.

Water Resistance

The Water Resistance test was performed in accordance with MIL-STD-810F, Method 506.4, Procedure III (Drip). The test items were subjected to this test with the LCD open and the unit operating, but with ports closed. The Toughbooks were opened following testing to inspect for water intrusion.

Results:
The Toughbooks continued to operate during and following the 15-minute water drip test. There was no evidence of water intrusion.

Humidity

The Humidity test was performed in accordance with MIL-STD-810F, Method 507.4 (Aggravated). The test items were tested for operation near the conclusion of the fifth and tenth cycles. Each cycle was one day (24 hours) and the entire test was performed over ten days.The temperature was cycled between 30 and 60°C with the relative humidity at 95% constant.

Results:
The Toughbooks continued to boot up and operate following each test, and there were no visual anomalies.

Dust Resistance

The Dust Resistance test was performed in accordance with MIL-STD-810F, Method 510.4, Procedure I (Dust). An operating temperature of 60°C was used for this test. The upper non-operating temperature of 60°C was incorporated into the test as this is the "default" temperature given by the MIL-STD-810F guidelines. Silica flour as defined by the test standard was used. Failure was considered to have occurred if moving parts bind or are blocked, or if contacts or relays malfunctioned. The units must have continued to function also.

Results:
The Toughbooks continued to operate following dust testing. The keyboards were usable.

High Temperature

High Temperature tests were conducted in accordance with MIL-STD-810F, Method 501.4 Procedures I (Storage) and Procedure II (Operation). Panasonic set the testing parameters as follows:
60°C Operational, 71°C Non-Operational

Results:
The Toughbooks continued to operate during the operational test and to boot and operate following the non-operational test. There were no visual anomalies.

Low Temperature

The Low Temperature test was performed according to MIL-STD-810F, Method 502.4, Procedures I (Storage) and II (Operation). Panasonic set the low operating temperature at -28°C and non-operating temperature at -51°C.

Results:
The Toughbooks continued to boot and operate following each test, and there were no visual anomalies.

Thermal Shock

The Thermal Shock test was performed in accordance with MIL-STD-810F, Method 503.4. Panasonic set the high temperature non-operating temperature at 96°C and the low temperature non-operating temperature at -51°C. Three cycles were performed (high to low = one cycle).

Results:
The Toughbooks continued to operate during the operational test and to boot and operate following the non-operational test. There were no visual anomalies.

The Toughbooks continued to boot up and operate following the test exposure cycles of thermal shock from 96°C to -51°C.

Altitude

The Altitude test was performed in accordance with MIL-STD-810F, Method 500.4, Procedure I (Storage) and II (Operation). The altitude level used for both procedures was 4,572 meters (highest equivalent altitude given within MIL-STD-810F for cargo pressures of military aircraft).

Results:
All Toughbooks passed the test without incident.

Full details of each test are contained in a test report that was produced by an independent, internationally recognized test laboratory.

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