

Panasonic

NOT ALL RUGGED IS CREATED EQUAL



EVERYTHING
YOU NEED
TO KNOW
ABOUT
RUGGED
TABLET AND
LAPTOP
CLAIMS

INTRODUCTION

In today's mobile computing market, it can be difficult to understand what the term "rugged" really means. It is reasonable for a buyer to expect that a device marketed as rugged is at least a little more durable than a standard off-the-shelf consumer product, but how durable and in what ways? How can buyers of laptops or tablets be assured the devices they are investing in will be reliable when it counts the most?

This may seem like a matter of semantics, but questions about ruggedization can have real consequences for end users. Due to our growing dependence on mobile technology there are few instances where computer downtime does not have a major impact on productivity. In the case of first responders and military personnel, to declare computer uptime as "mission-critical" is to understate the challenging environmental conditions they face and the important responsibilities they are tasked with every day.

RUGGED TESTING: MIL-STD-810G DEFINED

In 1962, the U.S. Department of Defense (DoD) developed a series of tests, called MIL-STD-810G specifications (Mil-Spec), used to validate the level of ruggedization in a piece of technology.¹ Rather than a single test, these Military standards include dozens of tests with strict parameters used to simulate how a mobile device will operate under a variety of stressors and environmental conditions. Once a device passes MIL-STD-810G specifications, they are approved for use by all departments and agencies of the United States DoD.

The tests have been revised throughout the years to reflect the ever-changing needs of military personnel, and have become a common benchmark across the industry in validating whether or not a device can be considered "rugged." MIL-STD-810G covers a variety of scenarios like drops and vibrations, extreme temperatures, high altitudes, water resistance and dust intake, and also includes criteria that limit the number of devices that can be used to pass a specific test. Successful completion of these tests helps identify truly durable devices that survive mission-critical jobs and weed out rugged claims that miss the mark.

You might be surprised to know that although enterprise mobility is entering more areas of businesses and is becoming increasingly critical to performance and profitability, there is no body that regulates the growing number of durability and MIL-STD-810G claims. Each manufacturer does its own testing. With that in mind, understanding each test and knowing what questions to ask is critical.

First and foremost, ask the manufacturer if they have third-party validations of all Mil-Spec claims using a reputable testing facility like Southwest Research Institute (SWRI). If not, stop there and move on to the next manufacturer. Once you find a manufacturer who uses third-party validations, there are a variety of tests available. Below is a list of the critical tests that matter when evaluating a truly rugged device, along with the questions you should be asking:



Transit Drop Test: MIL-STD-810G Method 516.6 Procedure IV

What is it? A device is dropped from various heights at 26 different angles (every edge, corner and side) onto 2-inch thick plywood over steel plate on concrete. The height at which the unit will still turn on and operate, generally between 12 and 72 inches, is the rated drop specification.

Why does it matter? Drops are one of the most common causes of damage to business mobile devices and given their often non-traditional working environments, mobile workers are more likely to drop their computers during the course of their day than an office worker.

Question to ask: While MIL-STD-810G specifications allow for companies to use up to five devices to pass drop testing, Panasonic conducts all tests on the same unit to mirror our users' true working conditions. Does your device's manufacturer do the same? How many devices did it take to pass? At what height was the unit tested?



Blowing Rain Test: MIL-STD-810G Method 506.5 Procedure I

What is it? A device is blasted with 5.8 inch-per-hour rain and 70 mph winds, for 30 minutes per surface while operational.

Why does it matter? Few mission-critical workers can put their work on hold due to a rainstorm. This test simulates using the device in inclement weather or on a job site around water.

Question to ask: Many devices are marketed as "water resistant." What does this really mean? Is it just spill resistant? Did it merely pass the vertically falling rain/drip test (Procedure III)? Is the device only showing an Ingress Protection (IP) rating instead of submitting to this test?

**MIL-STD-810G:
Tailors design and test
criteria to the specific
environmental conditions a
device is likely to encounter
during its service life**



Vibration Test: MIL-STD-810G Method 514.6 Procedure I

What is it? This test simulates the vibrations typically experienced in an off road vehicle or even helicopter mounted environment.

Why does it matter? Personnel who use devices in-vehicle, or workers conducting business on the road, need a reliable device to function in their everyday work environment. Mobile devices experience heavy vibration when mounted in jeeps, tanks or trucks; or in the public safety market, mounted in patrol cars, fire engines, ambulances and even helicopters.

Question to ask: Was the device operating during the test? Was it mounted during testing as it actually would be in use? Ask about the specific conditions and duration of testing to ensure they mirror the types of environments your workers will face in the field. Also, ask what parameters the manufacturer set for the test conditions. This could be anything from simulating gentle driving on paved surfaces to a rocket launch. For helicopter mounting, make sure the units are tested using Category 24 of this test.



Sand and Dust Resistance Test: MIL-STD-810G Method 510.5 Procedure I

What is it? Dust then sand is blown at a device over several hours in an environment of 140°F while operational.

Why does it matter? This test simulates situations like desert sandstorms or environments where unsealed devices, and those with fans, can have internal components exposed and damaged due to contaminants.

Question to ask: Ask for details about how the test was performed, to ensure the test is reflective of the environment your workers may find themselves needing to operate in. Factories, mills and mines can have these types of conditions as much as outdoor environments can.



Altitude Test: MIL-STD-810G Method 500.5 Procedure II

What is it? A performance test is conducted on a device in an altitude chamber simulating 15,000 feet above sea level, while operational.

Why does it matter? Workers collecting valuable data or leveraging data to make mission-critical decisions in high-altitude locations can't easily replace a failed device. This situation can be a challenge for standard hard drives, where the needle floats on a cushion of air above the platter. With the reduced atmosphere at 15,000 feet, it is much easier for vibrations to cause an impact between the needle and the platter. This simulates use in an unpressurized cargo aircraft or in mountainous locales.

Question to ask: For unpressurized aircraft environments, ask if the device was also tested for vibration to see how a standard hard drive will hold up. Might this device be used in mountainous regions above the altitude for which it's been tested?



High Temperature Test: MIL-STD-810G Method 501.5 Procedure II

What is it? An operational test of the device is performed at 140°F for thirty minutes.

Why does it matter? This test simulates a device being exposed to high temperatures for an extended amount of time, like a device being left in a vehicle on a sunny day or in a hot factory environment. Most processors run well at room temperature, but when exposed to extreme hot or cold can experience catastrophic failure. This test simulates the ability of the unit to survive and operate at extreme temperatures.

Question to ask: Find out how long the device was tested in the extreme heat.



Low Temperature Test: MIL-STD-810G Method 502.5 Procedure II

What is it? A device is placed in a -20°F environment for thirty minutes and powered on in the extreme cold.

Why does it matter? Successful completion means the device is able to boot in extreme temperatures without damaging the hard drive, and losing valuable data. This test simulates the ability to start and operate at extreme winter conditions, without damaging the hard drive or experiencing data migration in an SSD. In many cases, a laptop will not start when the hard drive is frozen—in fact, trying to start a frozen hard drive may damage the device.

Question to ask: If you ever work in a cold environment, ask if this test was performed and how data integrity was tested.



Temperature Shock Test: MIL-STD-810G Method 503.5 Procedure I

What is it? A device goes through three cycles of testing where it is placed in an environment of 200°F then -60°F to test reliability when moving between extreme temperatures.

Why does it matter? Typical, commercial-grade devices can experience severe usability issues at temperature extremes. This test simulates the environment a delivery driver might encounter when restocking foods from a freezer truck or moving from a cooler. Thermal shock can cause fogging/condensation inside device which can impact the screen readability and the internal electronics.

Question to ask: Was this test performed and do I want to risk damage from thermal shock if it was not?



Humidity Test: MIL-STD-810G Method 507.5 Procedure II

What is it? A device is tested in temperature cycles of 86°F to 140°F at 95% relative humidity.

Why does it matter? This test simulates how a unit might work outdoors in a tropical environment or in many plant locations. The main issue in these environments is the ability to transfer heat (reduced by the level of moisture in the air). If the device becomes overheated, units can become inoperable, temporarily or permanently.

Question to ask: Has the device been tested for high humidity? Will it survive everywhere it may be needed?



MAKING IT TOUGH

Unlike most other manufacturers, Panasonic builds many of the critical components in its mobile computers and controls nearly every aspect of the manufacturing process, from product design to testing and delivery.

Scratch-resistant paint on exterior keeps outer casing looking new

Magnesium alloy case protects against bumps, drops and knocks

Internal dampers and seals prevent component damage

Sealed LCD provides extra protection against moisture and dust

Fully-sealed hinges are dust and water-resistant

Optional backlit keyboard for easy use during nighttime without impairing night vision

Fanless designs utilize heat pipes to keep out water and dust, reduce weight and allow use in extreme temperatures

Environmental seals protect the multimedia pocket, PC card slots and all ports and connectors from moisture and dust

Reinforced integrated antenna is built into the case design to protect against loss or damage

Integrated GPS with WAAS correction provides accurate readings in all weather conditions

Raised bezel protects display from drops and impacts

Screen film protects touchscreen from scratches and wear

Panasonic CircuLumin™ and TransflectivePlus technologies provide easily readable displays in all conditions including direct sun

Optional SmartCard reader ensures authenticated user access

Hard drive heater enables operation in extreme cold without fear of damage

Flexible connectors between the hard drive and system board protect against the transfer of shock from drops and bumps

Sealed keyboard and touchpad protect against damage from spills and inclement weather

Optional fingerprint reader for added security

Encased quick-release hard drive is shock-mounted to insulate against vibration and drop-shock

Carry handle helps prevent accidental drops



*Pictured: Toughbook CF-30. Rugged features vary by model. See product specs for details.

RUGGED DEVICE BUYER'S GUIDE

Understanding Mil-Spec testing is the first step in selecting the highest quality, most reliable rugged device for your needs. Customers that are armed with the key questions they should be asking are best positioned to understand the product they are investing in. When evaluating products, look beyond the spec sheet. Were the products merely designed to meet Mil-Spec or were they actually tested? Ask for third-party testing results to be 100% confident in the results. With no governing body conducting Mil-Spec testing, third-party validation is the only way to ensure rugged testing claims are true. It is important to ask for independent lab testing results and details on each specific test, the number of products used and what parameters were given and any modifications made during testing. Consider how the device will fit into your total mobility solution. Investing in rugged means that your devices need to keep up with the demanding environments of your workers, and last for years to come. Here are the questions you should be asking:

- **Were the right tests passed?**

Potential buyers shouldn't hear "Mil-Spec certified" and assume the device is rugged in all the potential testing categories. There are numerous types of tests, all done independently, so verify the device has passed the ones that best reflect the environment it will be deployed in. For example, customers that are purchasing a computer that will be mounted in an Arizona police car should put considerable priority on it successfully passing the extreme heat and vibration tests. A manufacturer may claim to have a "Mil-Spec" ruggedized device, but when you read the fine print, you may see it was only tested for altitude and not drops or spills, the most common causes of failure.

- **What is the Fine Print?**

Currently, the Armed Services do not conduct actual tests or certify that rugged devices meet Mil-Spec standards. Each supplier of rugged computing equipment is expected to assure or guarantee adherence to the standards and can set their own parameters for the testing. Always ask for third-party validation of the tests that were passed. Also, remember to ask for details—for drop tests, for example, ask how many devices it took to pass and from what height. While MIL-STD-810G allows up to five devices to be used, Panasonic only used one unit during the testing for fully rugged models like the Toughbook 19. Even more noteworthy, the Toughbook 19 successfully passed the drop test which included 26 drops at 4 feet, 26 drops from a height of 5 feet, and 26 drops from a height of 6 feet—all with a single device.

- **What is the average annual failure rate?**

In the end, reliability, as seen in low failure rates, is what counts—After all, Mil-Spec is just a test. Whether a computer continues to operate smoothly after several years of hard use in extreme environments is the best determinant of how rugged it really is. Ask the manufacturer to share verifiable data on how their computers have actually held up under real-world conditions.

- **What features are included?**

Make sure you select a device that works the way your workers do. For example, first responders and service members spend a significant amount of time outdoors and need daylight-viewable screens, as well as devices that can function in rain, snow and other extreme weather conditions. Gloved touch capability and a sturdy handle, for minimizing the potential for drops while carrying the device—are valuable features to consider.

- **What warranty and support is provided?**

Beyond device warranty, consider the support available during and after deployment. Find a provider that will provide assistance should problems arise and work with you to resolve any issues. Investing in a device that is easily compatible with other systems can save headaches during future technology integrations.

- **What security measures are put in place?**

Security is important to all business but especially critical for government workers. When valuable data is on the line, invest in a solution that will protect mission-critical information. Ask about features like a fingerprint reader or a SmartCard reader. Additional security features to ask for might include the Opal standard for hardware-based disk encryption necessary for DoD applications and Mobile Device Management (MDM) capabilities that enable IT administrators to monitor and manage devices in real-time, guard against unauthorized device access, remotely wipe or lock devices when lost or stolen, and perform other tasks such as updating applications or virus definitions.

Panasonic's Toughbook product line has an average failure rate of 2.2%. A 2014 study of laptop failure rates by PC Magazine showed 13% of business laptops fail on average

CONCLUSION

The simple fact is, any device can be labeled “rugged.” Customers must be armed with the right information to ensure they get the ruggedized mobile computer or tablet that meets their needs and offers the lowest total cost of ownership (TCO).

Therefore it is important to remember;

- Consumer grade devices disguised as “rugged” do not offer the same level of durability or security as mobile computers that are built from the ground up for enterprise-grade applications and to perform reliably in the harshest environments.
- Customers evaluating rugged devices need information that helps them understand what MIL-STD-810G tests mean, which tests really matter, and what questions they should ask to ensure the device will be the right technology for their needs.
- Tight budgets require mobile computing technology to last longer than ever. Customers should evaluate TCO based on the cost of owning the technology over the full lifespan of the product, not just the initial investment.

Whether you are looking for mobile computers or tablets, it is essential to understand how and where the devices may be used to ensure you get what you expect and select the right technology that can provide a durable and reliable solution for years to come.

Panasonic recommends Windows.

Panasonic

**FOR MORE INFORMATION OR TO PURCHASE
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OR TOUGHPAD TABLETS:**

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