

NOT ALL RUGGED IS CREATED EQUAL

How Panasonic designs and engineers rugged products for the way you work, in the moments that matter



TRULY RUGGED MOBILE DEVICES

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1. Durability matters

If your employees work in challenging, harsh or unpredictable environments, they need mobile technology that's rugged enough to withstand the toughest conditions.

That's why it's important to understand the standards and testing used to evaluate rugged mobile devices. And to know the right questions to ask during the evaluation process.

For example, many consumer-grade mobile devices are labeled "rugged" but don't really offer the level of durability or service as those that have been specifically engineered and purpose-built from the ground up to perform reliably for workforces in a variety of harsh conditions.

This guide explains MIL-STD-810H certifications and ingress protection (IP) and clarifies which tests really matter for your specific use cases. It also highlights the essential features to consider when outfitting mobile workers with the right device for today's connected environment.

Decision makers evaluating rugged devices need to know:

- What questions to ask to ensure rugged reliability
- How to evaluate mobile devices for long-term reliable performance
- What MIL-STD-810H certification means and which tests really matter
- What an IP rating means
- How to tell if a device labeled as rugged is purpose-built



RUGGEDNESS AND RELIABILITY



2. Evaluating ruggedness and reliability

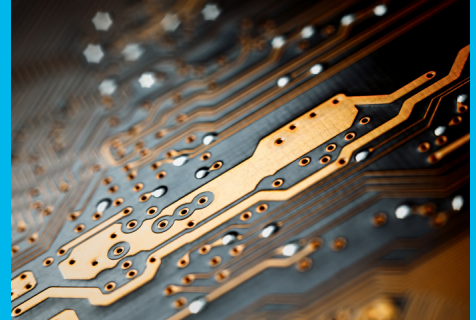
Understanding MIL-SPEC testing is the first step in selecting the most reliable and highest-quality rugged device for your needs. When evaluating products, look beyond the spec sheet and consider how the device will fit into your total mobility solution.

Make sure you're investing in truly rugged devices that will last for years to come and can keep up with demanding environments and your evolving technology needs.

To ensure that a mobile device meets your specific rugged requirements, be sure to ask the following questions:

- **Were the products merely designed to meet MIL-SPEC, or were they actually tested?**
Ask for details on each specific test, the number of products used, what parameters were given and whether any modifications were made during testing.
- **Who did the testing?**
Ask for third-party independent-lab testing results and validation to be 100% confident in the data.
- **Were the right tests passed?**
Don't assume that a MIL-SPEC-certified device has passed all potential rugged testing categories. There are a variety of tests; verify that the device has passed the ones that best reflect the environments it will be deployed in.
- **What's the fine print?**
Since the armed services don't currently conduct actual MIL-SPEC testing on rugged devices, suppliers have the freedom to set their own testing parameters. That's why it's important to ask for test details. For example, how many devices did they have to use before they got one that passed a certain test?
- **Is the device certified for ingress protection?**
In addition to MIL-SPEC certification, it's important to know how resistant a device enclosure is to water and dust. IP test ratings provide objective evidence of such resistance.
- **What is the annual failure rate?**
The best reliability determination is if a device can continually operate smoothly after several years of hard use in extreme environments. So ask manufacturers for verifiable data on how their devices actually hold up under real-world conditions.
- **Which features are included?**
Select mobile devices that have the features your people need. If they spend a lot of time outdoors, they'll need daylight-viewable screens, as well as devices that can work in rain, snow and other extreme weather conditions. Glove-touch capability and sturdy handles that minimize potential drops are also valuable features to consider. Also, investing in a device that integrates easily with work systems will simplify deployment and operations.
- **What is the warranty and what level of support is provided?**
In addition to the device warranty, find a provider that will help you resolve problems that might arise during and after deployment.
- **What security measures are in place?**
Security is critical for all organizations, but especially for government agencies. Invest in a solution that will protect mission-critical information and meet your organization's security requirements. Are there specific security certifications or standards your devices need to meet? Do you need hardware-based disk encryption, biometric authentication, threat management or other security technologies?

MIL-SPEC TESTING



3. Understanding MIL-SPEC testing

Since the 1960s, the U.S. Department of Defense (DOD) has set standards for rugged device performance. Through a series of tests collectively known as MIL-STD-810H (MIL-SPEC), manufacturers simulate how a mobile device will operate under a variety of extreme stressors and environmental conditions. Once a device passes certain MIL-SPEC certifications, it's approved for use by DOD workers. This validation indicates that the device should be able to meet the demands of mobile professionals in challenging work environments.

MIL-STD-810H has become a common benchmark across the industry in validating whether or not a device can be considered rugged. As shown in the table below, MIL-SPEC covers a variety of scenarios that can help you determine if a mobile device is durable enough to support your mission-critical work.

TRANSIT DROP

Method 516.8—Procedure IV

The top height from which a device is dropped and still turns on and operates.

Drops are one of the most common causes of damage to mobile devices, especially in nontraditional working environments. In this test, a device is dropped from various heights at 26 different angles onto 2-inch-thick plywood over a steel plate on concrete. The spec allows up to five units to be tested. But Panasonic devices typically use just one unit and typically are tested over multiple drop heights. Be sure to check the summary test report to confirm the details for each model.

BLOWING RAIN

Method 506.6—Procedure I

Ability to stay operational in a simulated rain- and windstorm.

Few mission-critical workers can put their work on hold due to a rainstorm. This test blasts a device with 5.8 inches per hour or more of rain and 70 mph winds for 30 minutes per surface.

HIGH TEMPERATURE

Method 501.7—Procedures I & II

Impact of extreme high temperatures on a device.

Mobile workers need to trust that their devices have the ability to operate at extreme temperatures. For example, temperatures in a vehicle can reach 120°F in less than 40 minutes on a 93° day. This test determines whether a device can continue to operate at high temperatures for

30 minutes and while in storage for 7 days. Be sure to check the summary test report to confirm the details for each model.

LOW TEMPERATURE

Method 502.7—Procedures I & II

Impact of extreme low temperatures on a device.

To verify that a device can operate in extreme winter conditions without experiencing hard-drive damage or SSD data loss, this test places the device at low temperatures for several hours. Check the test report to confirm the details for each model.

TEMPERATURE SHOCK

Method 503.7—Procedure I

Thermal shock impact on a device's screen readability and internal electronics.

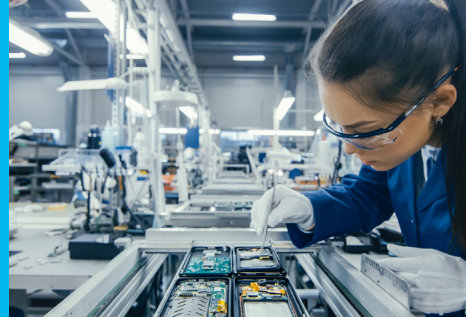
This tests how the device reacts to going from one extreme temperature to another, with three cycles of moving temperatures. Check the test report to confirm the range for each model.

HUMIDITY

Method 507.6—Procedures I & II

How a device handles humidity and adapts to extreme environments.

The device is first tested for a 15-day cycle with varying temperatures and humidity levels. It's then tested in temperature cycles of 86°F to 140°F at 95% relative humidity. Be sure to check the test report to confirm the details for each model.



INGRESS PROTECTION

HIGH ALTITUDE

Method 500.6—Procedures I & II

Measures high-altitude impact on a device while it's being used and at rest.

The reduced atmosphere at high altitudes makes it easier for vibrations to cause impacts between a device's needle and platter. This test measures device performance in an altitude chamber while operating and while nonoperational. Be sure to check the test report to confirm the details for each model.

SAND AND DUST

Method 510.7—Procedures I & II

How a device handles dusty environments and desert sandstorms.

This test blows dust and sand at an unsealed device over several hours in a high-temperature environment. Be sure to check the test report to confirm the details for each model.

VIBRATION

Method 514.8—Procedures I & II

Reliability of device operation in environments with significant vibrations.

Whether used in patrol cars, tanks, ambulances, forklifts or helicopters, mobile devices need to reliably function in heavy-vibration environments. This test simulates the vibrations typically experienced in flight or in an off-road vehicle.

EXPLOSIVE ATMOSPHERE

Method 511.7—Procedure I

Verifies device won't cause an ignition in explosive-gas environments.

Places the device in a sealed chamber with highly flammable hexane, while under pressure and elevated temperature. Be sure to check the test report to confirm the details for each model.

4. What is ingress protection?

Rather than simply describing a device as waterproof or dustproof, the International Electrotechnical Commission (IEC) developed ingress protection ratings to uniformly

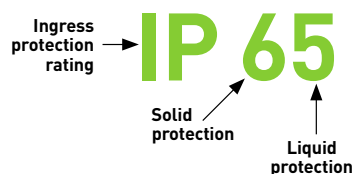
quantify the level of resistance a device has to liquids, particulates and solid objects. An IP rating is made up of two numbers: The first indicates protection against dust on a scale from 0 to 6, with 6 being the highest level of protection; the second is protection against liquids on a scale from 0 to 9, with 9 being the highest level of protection. For example, a device with a rating of IP65 would have an enclosure rated as dust-tight with the ability to withstand powerful water jets (see the table below for details).

First numeral in IP rating—resistance to solid objects

| | |
|---|--|
| 0 | No protection |
| 1 | Protected against solid foreign objects of 50 mm and greater |
| 2 | Protected against solid foreign objects of 12.5 mm and greater |
| 3 | Protected against solid foreign objects of 2.5 mm and greater |
| 4 | Protected against solid foreign objects of 1.0 mm and greater |
| 5 | Dust-protected |
| 6 | Dust-tight |

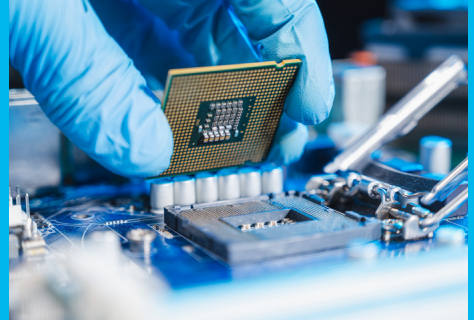
Second numeral in IP rating—resistance to water

| | |
|---|--|
| 0 | No protection |
| 1 | Protected against vertically falling water drops |
| 2 | Protected against vertically falling water drops when device enclosure is tilted up to a 15° angle |
| 3 | Protected against water sprayed at a 60° angle |
| 4 | Protected against water splashed from any direction |
| 5 | Protected against jets of water hitting enclosure from any direction |
| 6 | Protected against powerful jets of water hitting enclosure from any direction |
| 7 | Protected against the effects of temporary immersion in water |
| 8 | Protected against the effects of continuous immersion in water |
| 9 | Protected against high-pressure and high-temperature water jets |



In this example, the rating indicates protection against dust and jets of water hitting from any direction.

TESTING



5. TOUGHBOOK testing rigor

At Panasonic, we are dedicated to ensuring that our devices uphold the promise of rugged reliability in a wide variety of environments. Each year, over 1,000 Panasonic TOUGHBOOK® devices are tested to reveal and amend any weaknesses before they arrive in our customers' hands. A primary goal of these testing procedures is to confirm that TOUGHBOOK devices not only meet, but exceed, the MIL-STD-810H requirements, delivering an even higher degree of rugged certification.

In addition to military-standard tests, rigorous testing by national third-party independent labs for a range of conditions (including electromagnetic compatibility, drops, shocks, vibration, humidity, altitude, dust and temperature extremes) provides confidence that our TOUGHBOOK devices can withstand any job.

PANASONIC OUTPACES RUGGED COMPETITION IN RELIABILITY

TOUGHBOOK rugged devices have the lowest failure rates in the industry and are 72% more reliable than other rugged devices (based on comparing device failure rates).¹



ENDURANCE TESTS

Our devices have gone through rigorous tests for drop and vibration to make sure they can withstand accidents or just survive day after day on the job. Our devices endure testing beyond the standard MIL-STD-810H requirements, so we can deliver an even higher degree of rugged certification.



ENVIRONMENT TESTS

We've doused our devices with rain, blasted them with dirt and sand, and exposed them to mountain-high altitudes and jungle-like humidity—and they keep working. TOUGHBOOK mobile computers are IP certified, which means casings and electrical enclosures are protected against interferences such as dust, accidental contact and water.



TEMPERATURE TESTS

Our devices have undergone multiple tests in temperatures ranging from -60°F to 200°F and don't even break a sweat.



CONNECTIVITY TESTS

We put our antenna through various over-the-air (OTA) tests in our own (and one of the world's largest) anechoic chamber, assessing performance in real-world environments—heat, cold, rain and more.

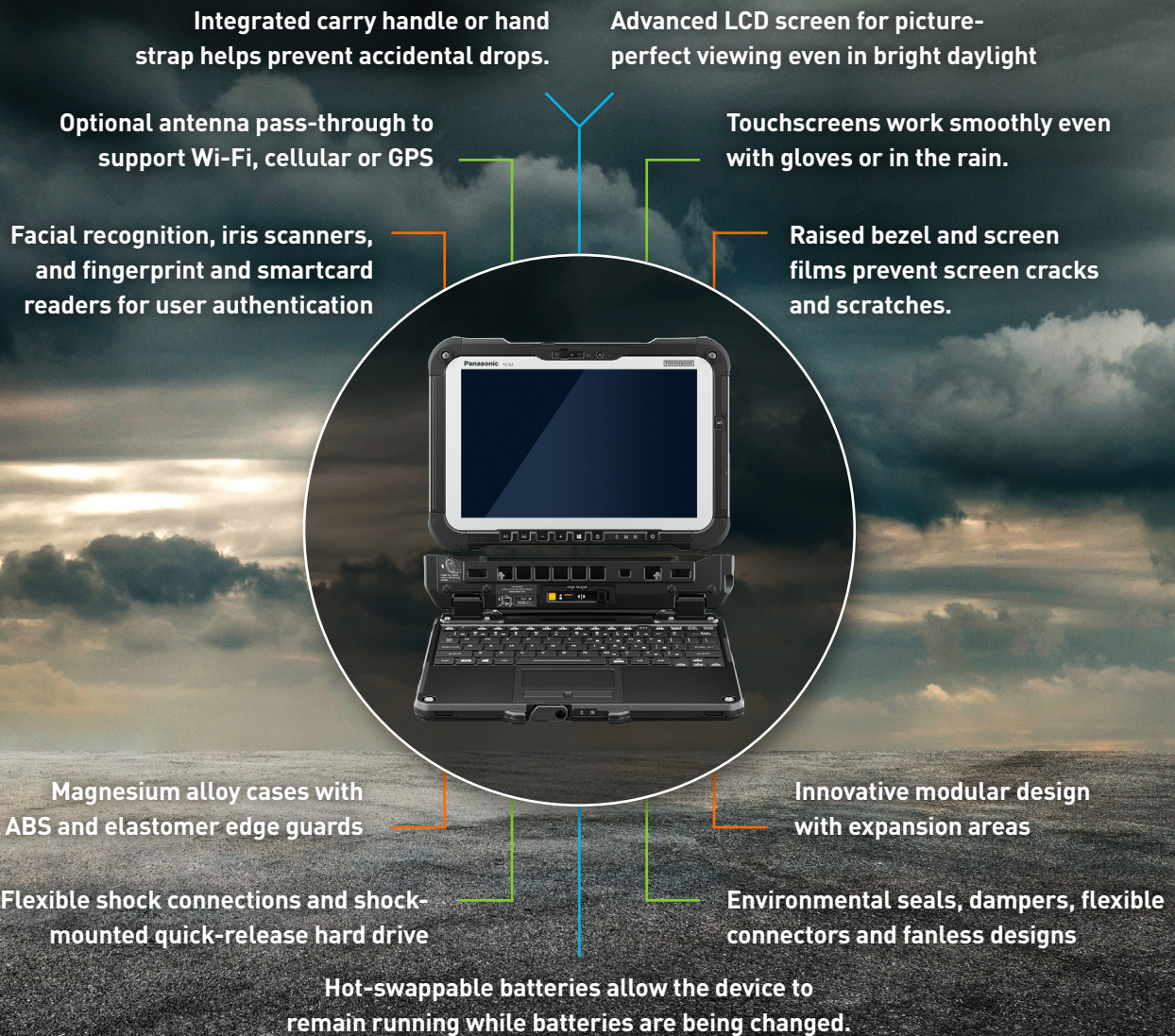
1. Compares Panasonic actual data for TOUGHBOOK computers to data gathered by IDC on consumer and rugged laptops, tablets and handheld devices and reported in [The Case for Deploying Rugged Devices in Your Organization](#). IDC (November 2021)

FEATURES



TOUGHBOOK features that define our rugged promise

Panasonic offers a wide range of laptops, tablets and 2-in-1 devices to meet your unique rugged requirements, with a variety of features and optional add-ons and running on Windows® operating systems.



Note: Not all features are available on every model.

Panasonic is the only rugged manufacturer that offers an innovative modular design that makes it easy for users to swap accessories, such as smartcard readers, barcode readers, DVD players, a second local area network (LAN) and more, and still maintains its rugged certifications.



DESIGNED FOR THE EXTREME

6. Rugged reliability designed for the extreme

Panasonic is committed to delivering mobile devices that can truly stand up to the rigors of harsh environments. Plus, to help you get the most out of your TOUGHBOOK mobile devices, our ProServices team will work closely with you across the device life cycle, from predeployment consultation through planning, deployment, kitting, installation, maintenance and repairs. We also have an ecosystem of certified partners to help customize your mobile device to your specific application and needs.

When you invest in rugged technology from Panasonic, you can count on it to deliver reliable results in your extreme work environments for years to come.

TOUGHBOOK IS DESIGNED FOR THE WAY YOU WORK

For over 25 years, Panasonic has raised the bar for rugged mobile technology. From product design to delivery, we control every aspect of the manufacturing process to ensure that our devices hold up to the rugged standards our customers expect.

For more information on Panasonic
TOUGHBOOK rugged solutions ▶

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CONNECT

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