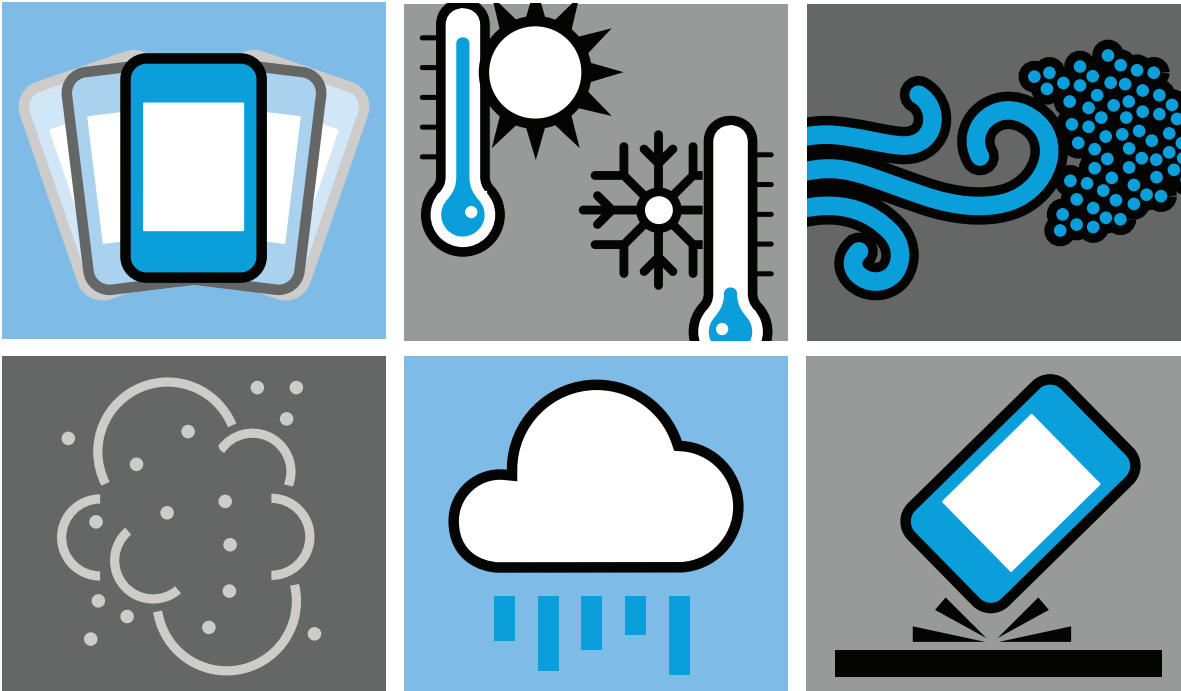




**ZEBRA**  
CAPTURE  
YOUR EDGE



## Does Your Mobile Device Pass the Torture Test?

A look at the benefits of buying rugged mobile devices and the standards that define their durability

The number of mobile workers is exploding. In the United States alone, 96.2 million mobile workers exist today. And that number is expected to grow to 105.4 million workers by 2020, according to International Data Corporation (IDC). In fact, by 2020, IDC expects almost three quarters of all U.S. workers will be mobile. This growing segment of the workforce needs the peace of mind that comes from having tools that can withstand the unique challenges of a mobile environment. From checking retail inventory and scanning medical and package barcodes to printing critical documents such as invoices, labels and citations, mobile devices must be able to handle the rigors of 24/7 everyday use in all kinds of environments.

### Rugged Mobile Devices: Protecting the Bottom Line



**Rugged Devices**



**Non-Rugged Devices**

**80 Minutes**  
Of Productivity



**100 Minutes**  
Of Support Time

#### Cost of Each Failure

##### 1,000 Non-Rugged Devices

Failure Rate of 23% Results In:

**41,400 Minutes**  
Of Lost Productivity  
(690 Hours)

**\$17,250/Year**  
In Added Operational Costs  
**\$51,750 over 3 Years**



##### 5,000 Non-Rugged Devices

Failure Rate of 23% Results In:

**207,000 Minutes**  
Of Lost Productivity  
(3,450 Hours)

**\$86,250/Year**  
In Added Operational Costs  
**\$258,750 over 3 Years**



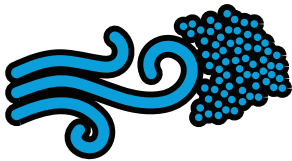
## The High Cost of Mobile Device Failure

A truly ruggedized mobile device is built to withstand the harshest abuse, including extreme heat, water, dust, vibration and – probably most important – being dropped. Of course, different levels of durability are required for different applications. A mobile device that's used in an indoor retail environment likely will not require the same level of durability as one that supports mobile workers that spend a large portion of their days outside.

For mobile applications that require durability, a ruggedized device is well worth the investment because it will save you money and headaches in the long run. When you invest in rugged devices, you can be confident that your team has the right tools for the job – and won't experience costly downtime.

## How Durable Are Your Mobile Devices?

Mobile devices can be used in a variety of applications – including transportation, logistics, field service, government and law enforcement, to name just a few. From delivery drivers to field service technicians, mobile workers are always on the go. And their equipment must be able to withstand extreme environmental conditions as well as the abuse that comes from rigorous daily use. That's why industry standards are so important in defining the level of durability a ruggedized device offers when exposed to challenging environmental conditions.



### Liquids, Moisture, and Solids

Exposure to liquids, moisture and solid particles such as dust poses a danger to any electronic device. Not only can exposure to these materials cause immediate short-circuiting, it can also lead to corrosion, clogging and other issues. Of course, the level of protection your device needs depends on your application. For instance, a device used in a retail environment that is never taken outside will not need the same level of protection as a device that's constantly exposed to rain and snow. Mobile devices in a desert, construction or even a retail warehouse environment may need a higher level of protection against dust and other dirt particles than devices used for other applications.

**Relevant Standards:** A device's durability against moisture is defined by the International Protection Marking or Ingress Protection Marking standards, also known as the IP Code. The International Electrotechnical Commission (IEC) publishes these standards. The IP Code standards cover protection against liquid, moisture and solids, with the first number representing protection against solids and the second number representing protection against liquids. For solids, level 6 offers the highest level of protection, also known as "dust tight." For liquids, the levels of protection range from 1 – which protects against dripping water – to the highest level of 8, which protects against immersion beyond 1 meter.

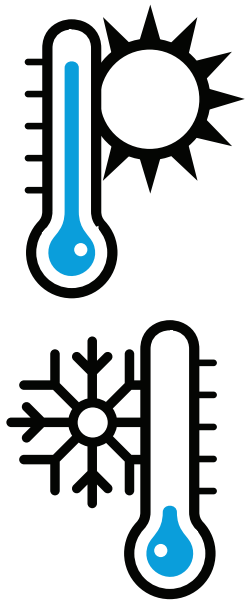
### Drops, Tumbles and Vibrations

Drops can be deadly for mobile devices – and mobile devices get dropped a lot. In fact, one study found that most iPhones® are broken or damaged about 10 weeks from purchase – and 90 percent of the time, the damage was related to a fall. That's why the ability to withstand a fall is one of the most important testing criteria for mobile devices. Of course, devices often tumble after a fall – so it's important to select a mobile device that's been tested for tumbling durability. Excessive vibrations can also take a toll on an electronic device, and selecting a mobile device that's been tested for vibration durability is particularly important for mobile workers riding in high-vibration vehicles such as trucks, boats, forklifts or even retail carts.



**Relevant Standards:** Drop and vibration durability is guided by the military standards (MIL-STD) and many mobile devices are tested based on the 810F or 810G standard. The MIL-STD 810 focus on test methods that replicate the effects of the environment on equipment. They cover a broad range of environmental conditions, including altitude testing, temperature shock, humidity, fungus, shock, vibration and many others. They are considered "flexible" standards, which means they give manufacturers the ability to customize their test methods based on the application. However, their flexibility also means that two devices that both comply with a particular standard might be very different in terms of their durability.

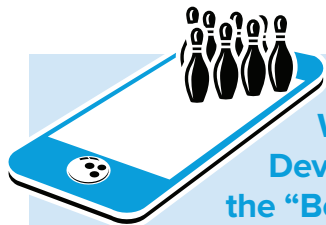
Tumble tests are defined in the IEC 68-2-32 specification. Specifically, these tests are conducted using a specification-defined test device that rotates while the device is inside, causing the device to free-fall drop, tumble, bump and scrape similar to clothes in a dryer.



## Extreme Temperatures, Humidity, Sun Exposure and Air Quality

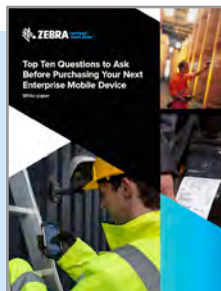
Mobile devices must be able to operate reliably in a wide range of temperatures – particularly in mobile applications such as manufacturing, construction, transportation and logistics, mining, utilities and more. That’s why many rugged mobile computers, for instance, are designed to operate in temperatures ranging from -4 to +122 degrees Fahrenheit. Mobile devices must also be able to continue operations when moving from an extremely cold environment to an extremely hot environment and vice versa – such as when delivery drivers or warehouse workers move items in and out of freezers or other forms of cold storage. In addition, devices need to hold up in the face of other extreme environmental conditions such as extreme humidity, salty environments or constant sun exposure.

**Relevant Standards:** The specifications governing a device’s durability when exposed to challenging environmental conditions such as extreme temperatures, humidity, sun exposure and air quality are also outlined by MIL-STD 810.



### Why Your Mobile Device Should Pass the “Bowling” Test

Your device must be able to withstand repetitive drops from both high and low heights as well as multiple tumbles, which are common in everyday mobile use. Before you buy, ask your manufacturer if your device has survived multiple “bowling” or tumble tests. If not, ask if you can test the device before you buy. Once you’ve tried rolling the device on the ground multiple times, you might be surprised how that so-called “rugged” device fails to pass a simple tumble test. The bottom line is that while most mobile devices are put through multiple drop scenarios, many are not subjected to real-life tumbling tests.



### Can Your Device Handle Real-World Challenges?

The durability of mobile devices – including computing devices as well as rugged mobile printers and scanners – varies widely. And even if a mobile device meets industry durability standards, that doesn’t mean that device is truly equipped to handle the very real rigors of daily mobile life. That’s why it is important to ask the right questions before you invest. See the white paper, “Top Ten Questions to Ask Before Purchasing Your Next Enterprise Mobile Device.”

## Zebra's Rugged Mobile Devices: Testing at a Grade Above the Rest

Zebra's mobile devices have undergone rigorous durability testing that goes beyond basic standards requirements and simulates the real-world environment of mobile workers.



### Mobile Computers

With the industry's largest portfolio of Android™ mobile computers and extensive line of rugged mobile tablets each optimized for real-world productivity and harsh environments. Designed specifically for the demands of your industry to endure hazardous conditions, temperature extremes, repeated drops to concrete, exposure to water and dirt. When it comes to mobility, no one can push your performance edge like Zebra.



### Mobile Printers

Zebra's rugged ZQ511™ and ZQ521™ mobile printers exhibit a patented, military-grade design that provides exceptional durability and reliability in the toughest environments. These printers can withstand the drops, bangs, bumps, accidents and environmental extremes that are common in a wide range of mobile workplaces — making them ideal for on-the-go employees whose productivity depends on maximum printer functionality.



### Scanners

Zebra offers a wide array of ruggedized scanners built to withstand heavy use and harsh conditions in a variety of mobile applications, including warehouses, manufacturing facilities, outdoor yards and seaports. The 3600 Ultra-Rugged Series of handheld scanners combine superior scanning performance, the highest drop, tumble and sealing specification in their class, and unrivaled manageability. Sixteen corded and cordless models are available to meet the needs of virtually any industrial scanning application.

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## Zebra Rugged Device Leadership Series

This white paper is one of a series examining how rugged devices help enterprise workers face the unique challenges of a mobile environment.

For more information on Zebra Technologies products or to find a supplier near you, please visit [www.zebra.com](http://www.zebra.com)



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