Technical Whitepaper

MIL-STD-810 Testing for HP Business PCs

June 2026



Commitment to quality

A product is only as great as its quality. And quality built into the overall product design requires more than just a mix of technologies, best practices, and high standards; it requires a mindset that understands that each design detail is as important as the next, each potentially a spark of quality innovation.

At HP, we make a quality commitment and stand by it. We follow through with our promises. We believe that we can always do it better—and then we do. And that belief pushes our quality standards ever higher.

Quality delivers a higher return on investment to our customers. We want them to be happy with their product throughout its lifecycle.

We care about quality – it's in our DNA

At HP, we believe quality matters. Quality is core to HP's legacy. HP's strong focus on quality design and engineering innovations dates back to its early beginnings with Bill Hewlett and Dave Packard.

Quality is foremost at every stage of HP's product development process. From the earliest design stage through product testing, manufacturing, service and support, and eventual end-of-life, we remain alert for new opportunities to improve our products, services, and customer relationships.

Striking a perfect balance

Our goal is to make our products the highest possible quality with the lowest total cost of ownership. We are focused on enhancing our customers' experience with products that deliver the best price, features set, and value proposition. The HP Business PC portfolio gives customers that perfect balance of cost efficiency, reliability, durability, and innovative design.

Quality is built into every product as a design requirement. HP Business PCs are designed to meet the demands of leading businesses. Built from high-quality materials and backed by legendary HP reliability, these stylish and sturdy devices are powerful yet simple to use.

Performance you can trust

As part of the design process, all HP Elite, HP Pro, HP Z by HP, HP Chromebooks and select HP Thin Clients undergo the HP Total Test Process (TTP)[1] – an exhaustive series of rigorous tests and validation procedures that demonstrate superior quality and reliability in a wide range of applications and operating environments. To help make our business PCs more robust and a more dependable tool for our customers' evolving business needs, our testing process is constantly reviewed and enhanced.

The HP Total Test Process is an outgrowth of the longstanding HP commitment to quality. That's why we go to extreme measures to build high reliability into every HP Business PC.

Our comprehensive and proven testing program consists of a minimum of 120,000 hours of rigorous multi-tiered testing and validation procedures per computing platform. The program, driven by rigid quality specifications and standards, includes 50,000 test steps, with 240 industry-standard hardware and software products tested for compatibility.

Pre-launch HP Business PCs are exposed to rigorous conditions including harsh drops and vibration, high temperatures, and enduring mechanical and functional tests that simulate rough handling over the life of the product. Strong reliability can mean less downtime and a lower cost of ownership.

Knowledge gained through the HP Total Test Process leads to many innovations that allow HP Business PCs to deliver an enhanced computing experience. Customers can rely on HP Business PCs to help them perform at their very best when their most demanding work is on the line.

World-class design

First impressions are important, as they set the expectations for the rest of the user experience. HP design engineers excel at designing that very important first experience. Clean implementation of innovative PC technologies starts with a holistic design approach to quality. Design engineers work in conjunction with the manufacturing engineers to optimize the design for production in a way that upholds extremely high quality.

Any given HP Business PC design will go through multiple small builds to fine-tune the design for optimal quality and manufacturability before the design is finalized. HP Business PCs are subject to multiple design enhancements prior to our first-production build, resulting in a final design that is as elegantly built as was originally envisioned by the design engineer.

HP's attractive enterprise-class industrial designs, which combine innovation with style, use high-quality materials and flawless finishes. HP's leading-edge chassis construction, component accessibility, electrical and air flow designs elevate the customer experience with product quality and reliability.

Going above and beyond

After careful material selection and precision-engineered construction, HP Business PCs are put to the test. Our MIL-STD-810 testing[2] procedures go above and beyond what a PC may endure on a typical day in business and enterprise environments. This testing helps to demonstrate overall HP product quality and reliability.

HP Business PC models tested

All HP Elite, HP Pro, HP Chromebooks, and Z by HP notebooks, convertibles and detachables, as well as select desktop PCs and Thin Clients, undergo multiple MIL-STD-810 test procedures as a way to help demonstrate product quality and reliability. This standard, though created specifically for the U.S. Department of Defense (DoD), is widely used as a benchmark for quality for commercial products in multiple industries. It outlines a broad range of tests that can be tailored to measure the reliability of specific pieces of equipment and includes multitiered climatic and environmental test methods.[2]

The products identified below have all undergone multiple MIL-STD-810 testing procedures.
Click on each category to see test results.

HP ZBook Mobile Workstation

Tested under 810H:

- HP ZBook Fury G10, G11, G1i 16/18
- HP ZBook Power G10 & G10A, G11 & G11A
- HP Zbook Firefly 14 G10 & G10A, G11 & G11A
- HP Zbook Firefly 16 G10, G11
- HP ZBook Studio G10, G11
- HP ZBook 8 G1i 14/16 & G1a 14
- HP ZBook X G1i 16
- HP ZBook Ultra G1a 14

HP Z Desktop Workstation

Tested under 810H:

- HP Z1 Tower G9
- HP Z1 Tower G1i
- HP Z1 Tower G1i Workstation
- HP Z2 Tower G9 Workstation
- HP Z2 Tower G1i Workstation
- HP Z2 Small Form Factor G9 Workstation
- HP Z2 Small Form Factor G1i Workstation
- HP Z2 Mini G9 Workstation
- HP Z2 Mini G1i & G1a Workstations
- HP Z4/Z6/Z8/Z8 Fury G5 Workstation
- HP Z6 A G5 Workstation

HP EliteDesk Desktop PC

Tested under 810H:

- HP EliteDesk 805 G8 DM
- HP Elite Mini/SFF 600/800 G9
- HP Elite SFF 805 G9
- HP Elite Tower 600/680/800/880 G9
- HP EliteDesk 8 Mini G1a/G2a/G2i Next-Gen AI PC
- HP EliteDesk 8 Mini G1a Desktop PC
- HP EliteDesk 8 Mini G1i AI PC
- HP EliteDesk 8 SFF/Tower G1i AI PC
- HP EliteDesk 8 SFF G2a Next-Gen AI PC/G2a Desktop PC

HP EliteOne All-in-one Desktop PC

Tested under 810H:

- HP EliteOne 840/870 G9 All-in-One
- HP EliteStudio 8 23.8"/27" G1i All-in-One AI PC

HP Pro and ProOne All-in-One Desktop PC

Tested under 810H:

- HP Pro Mini/SFF 400 G9
- HP Pro Tower 400/480 G9
- HP ProOne 440 G9 All-in-One
- HP ProStudio 4 23.8" G1i All-in-One AI PC
- HP ProDesk 4 Mini G1i AI PC
- HP ProDesk 4 SFF/Tower G1i AI PC

HP EliteBoard Keyboard PC

Tested under 810H:

- HP EliteBoard G1a AI PC

HP Dragonfly Notebook PC

Tested under 810H:

- HP Dragonfly G2
- HP Elite Dragonfly 13.5 inch G4

HP Elite Convertible Notebook PC

Tested under 810H:

- HP Elite x2 G8
- HP EliteBook x360 830 G9, G10, G11
- HP Elite x360 1040 G9,G10, G11 2-in-1

HP EliteBook Notebook PC

Tested under 810H:

- HP EliteBook 630/635 Aero 640/645/660/665 G11
- HP EliteBook 6 G1a & G1q 14 Next Gen AI PC & HP ZHAN66 14+ G1a AI
- HP EliteBook 6 G1i 13/14/16 & G1a 14/16 AI PC & HP ZHAN66 14+/16+ G1i
- HP EliteBook 6 G1iR 14/16 & G1ah 14/16
- HP EliteBook 830/840/860 G11
- HP EliteBook 835/845/865 G11
- HP EliteBook 8 G1i 14/16 & G1a 13/14/16 Next Gen AI PC & HP ZHANX 14/16 G1i AI
- HP EliteBook 8 G1i Flip 13/13/14/16 & G1a 13/14/16 AI PC
- HP EliteBook 1040 G11
- HP EliteBook X/X Flip G1i & X G1a 14 Next Gen AI PC
- HP EliteBook X Flip F2i & X G2a/i/q Next Gen AI PC
- HP EliteBook Ultra G1q/G1q8 & G1i 14 Next Gen AI PC & HP ZHAN X Ultra 14 G1i AI
- HP EliteBook 8 G2i Flip 13/13/14/16 & G2a 14/16 Next Gen AI PC
- HP EliteBook 6 G2i 14/16 & G2iR 14 & G2a 14/16 Next Gen AI PC
- HP EliteBook 6 G2q 14 Next Gen AI PC
- HP EliteBook 6 G2i 14/16 & G2a 14/16 AI PC
- HP EliteBook 6 G2ah 14/16

HP ProBook & Fortis Convertible PC

Tested under 810G:

- HP ProBook x360 440 G1
- HP ProBook x360 11 G1, G2, G3, G4 EE

Tested under 810H:

- HP ProBook x360 11 G5 EE
- HP Pro x360 Fortis 11" G10, G11
- HP Fortis Flip G1i 11"

HP ProBook Notebook PC

Tested under 810H:

- HP ProBook Fortis 14" G9, G10
- HP ProBook 440/445/460/465 G11
- HP ProBook 4 G1q 14 Next Gen AI PC
- HP ProBook 4 G1i 14/16 & G1a 14/16 AI PC & HP ZHAN66 14/16 G8a
- HP ProBook 4 G1iR 14/16 & & G1ah 14/16& HP ZHAN66 14/16 G8R
- HP ProBook 4 G2i 14/15 & G2iR 14 & G2a 14/16 Next Gen AI PC
- HP ProBook 4 G2i Flip 13/13/14/16 & G2a 14/16 AI PC
- HP ProBook 4 G2ah 14/16

HP Thin Client

Tested under 810H:

- HP Elite mt645 G7, G8 Mobile Thin Client
- HP Pro mt440 G3 Mobile Thin Client
- HP Elite t660/t655/t755 & HP Pro t550 Thin Client
- HP tz655 Trusted Zero Client

HP Notebook PC

Tested under 810H:

- HP 240/240R/245/246 14 inch G9; 240/245 14 inch G10 Notebook PC
- HP 250/250R/255/256 15.6 inch G9; 250/255 15.6 inch G10 Notebook PC
- HP ZHAN 14 inch G7 Notebook PC

HP Chromebook Convertible

Tested under 810H:

- HP Chromebook x360 11 G4 EE
- HP Chromebook Enterprise x360 11 G4
- HP Fortis x360 11" G3 J Chromebook
- HP Fortis x360 11" G5 Chromebook & Chromebook Enterprise
- HP Fortis Flip G1i 11" Chromebook
- HP Fortis Flip G1m 11" Chromebook

HP Fortis, Chromebook & Chromebook Enterprise

Tested under 810H:

- HP Chromebook 14 G7
- HP Chromebook Enterprise 14 G7
- HP Fortis 14" G10, G11 Chromebook & Chromebook Enterprise
- HP Fortis 11" G9 Q & G10 Chromebook & Chromebook Enterprise
- HP Fortis G1i 14" Chromebook
- HP Fortis G1i/G1m 11" Chromebook
- HP Elite Dragonfly 13.5 inch Chromebook & Chromebook Enterprise
- HP Elite c640 G3 & c645 G2 Chromebook & Chromebook Enterprise
- HP Chromebook 11 G9 EE
- HP Chromebook Enterprise 11 G9
- HP Chromebook G1m 11"
- HP Elite 6 G2i 14 Chromebook Plus

HP Retail & Industry Solutions (HP Engage)

Tested under 810G:

- HP Engage One All-in-One
- HP Engage Flex Pro Retail System
- HP Engage Flex Pro-C Retail System
- HP Engage One Pro 15.6/19.5/23.8 G1 AiO Systems

Tested under 810H:

- HP Engage Go 10 Convertible/Mobile System
- HP Engage Go 10 Mobile Dock
- HP Engage Flex Mini Retail System
- HP Engage Flex Mini G2 Retail System
- HP Engage Go 13.5" Mobile System
- HP Engage Go 13.5" Convertible System
- HP Engage Flex Pro G2 & Pro-C G2 Retail Systems
- HP Engage One Pro 15.6/19.5/23.8 G2 AiO Systems

Test results

The following tables summarize the independent third-party MIL-STD-810 test methods[2] that HP products passed. Note: A dash (-) in the Test Results tables indicates that the test was not conducted on the PC model.

HP ZBook Mobile Workstation

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Test Tested Under	HP ZBook Studio G10; G11 810H	HP ZBook Firefly G10 & G10A; G11 & G11A 810H	HP ZBook Fury G10, G11, G1i 16/18 810H	HP ZBook Power G10 & G10A; G11 & G11A 810H	HP ZBook Ultra G1a 14 810H	HP ZBook X G1i 16 810H	HP ZBook 8 G1i 14/16, G1a 14 810H
Drop	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 5)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Sand	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Explosive Atmosphere	Passed	-	Passed	-	Passed	Passed	Passed
Freeze/Thaw	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Bench Handling Shock	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Crash Hazard Shock	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Transportation Shock	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Solar Radiation	Passed	-	Passed	-	Passed	Passed	Passed

HP Z Desktop Workstation

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Test Tested Under	HP Z4/Z6 G5 Workstation 810H	HP Z8/Z8 Fury G5 Workstation 810H	HP Z2 Tower G9 Workstation 810H	HP Z1 & Z2 Tower G1i Workstation 810H	HP Z2 Small Form Factor G9 & G1i Workstation 810H	HP Z1 Tower G9, HP Z2 Mini G9/G1i/G1a, HP Z6 A G5 Workstation 810H
Drop	Passed		Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 24)		Passed	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	-	Passed	Passed	Passed

HP EliteDesk Desktop PC

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Test Tested Under	HP EliteDesk DM 805 G8 810H	HP Elite Mini/SFF 600/800/805 G9 810H	HP Elite Tower 600/680 800/880 G9 810H	HP EliteDesk 8 Mini G1a/G2a/ G2i NGAI PC & G1a DT PC; 8 Mini/SFF/TWR G1i AI PC; 8 SFF G2a NGAI PC & G2i DT PC 810H
Drop	Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed

HP EliteOne All-In-One Desktop PC

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Test Tested Under	HP EliteOne 840/870 G9 All-in-One 810H	HP EliteStudio 8 AiO G1i 23.8"/27" AI PC 810H
Drop	-	-
Functional Shock	Passed	Passed
Vibration (Category 4)	Passed	Passed
Vibration (Category 24)	Passed	Passed
Dust	Passed	Passed
Humidity	Passed	Passed
Altitude (Procedure I)	Passed	Passed
Altitude (Procedure II)	Passed	Passed
High Temperature (Procedure I)	Passed	Passed
High Temperature (Procedure II)	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed
Temperature Shock	Passed	Passed

HP Pro and ProOne All-in-One Desktop PC

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Test Tested Under	HP Pro Mini/SFF 400 G9; HP Pro Tower 400/480 G9 810H	HP ProDesk 4 Mini/SFF/TWR G1i AI PC 810H	HP ProOne 440 G9 All-in-One 810H	HP ProStudio 4 AiO G1i 23.8" AI PC 810H
Drop	Passed	Passed	Passed	-
Functional Shock	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed

HP EliteBoard Keyboard PC

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Test Tested Under	HP EliteBoard G1a AI PC 810H
Drop	Passed
Functional Shock	Passed
Vibration (Category 4)	Passed
Vibration (Category 24)	Passed
Dust	Passed
Humidity	Passed
Altitude (Procedure I)	Passed
Altitude (Procedure II)	Passed
High Temperature (Procedure I)	Passed
High Temperature (Procedure II)	Passed
Low Temperature (Procedure I)	Passed
Low Temperature (Procedure II)	Passed
Temperature Shock	Passed

HP Dragonfly Notebook PC

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Test	HP Dragonfly G2	HP Elite Dragonfly 13.5 inch G4
Tested Under	810H	810H
Drop	Passed	Passed
Functional Shock	Passed	Passed
Vibration (Category 4)	Passed	Passed
Vibration (Category 5)	Passed	Passed
Vibration (Category 24)	Passed	Passed
Dust	Passed	Passed
Humidity	Passed	Passed
Altitude (Procedure I)	Passed	Passed
Altitude (Procedure II)	Passed	Passed
High Temperature (Procedure I)	Passed	Passed
High Temperature (Procedure II)	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed
Temperature Shock	Passed	Passed
Sand	Passed	Passed
Freeze/Thaw	Passed	Passed
Bench Handling Shock	Passed	Passed
Crash Hazard shock	Passed	Passed
Transportation Shock	Passed	Passed

HP Elite Convertible Notebook PC

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Test	HP Elite x2 G8	HP EliteBook x360 830 G11	HP Elite x360 1040 G9/G10/G11 2-in-1
Tested Under	810H	810H	810H
Drop	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed
Dust	Passed	Passed	Passed
Humidity	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed
Sand	Passed	Passed	Passed
Freeze/Thaw	Passed	Passed	Passed
Bench Handling Shock	Passed	Passed	Passed
Crash Hazard Shock	Passed	Passed	Passed
Transportation Shock	Passed	Passed	Passed

Test	HP EliteBook 630/635 Aero/640/645/660/665 G11	HP EliteBook Ultra G1q/G1q8; HP EliteBook Ultra G1i; HP ZHAN X Ultra 14 G1i AI; X/X Flip G1i; X G1a; HP EliteBook X Flip G2i & X G2a/i/q; 830/840/860/835/845/865 G11; 1040 G9/G10/G11	HP EliteBook 8 G1i 14/16 & G1a 13/14/16 Next-Gen AI PC; HP EliteBook 8 G1i Flip 13/13/14/16 & G1a 13/14/16 AI PC; HP ZHANX 14/16 G1i AI; HP EliteBook 8 G2i Flip 13/13/14/16 & G2a 14/16 Next-Gen AI PC	HP EliteBook 6 G1a & G1q 14 Next-Gen AI PC; HP EliteBook 6 G1i 13/14/16 & G1a 14/16 AI PC; HP EliteBook 6 G1iR 14/16 & G1ah 14/16 PC; HP ZHAN66 14+/16+ G1i; HP ZHAN66 14+ G1a AI; HP EliteBook 6 G2i 14/16 & G2a 14/16 & G2q 14 & G2iR 14 Next-Gen AI PC; HP EliteBook 6 G2i 14/16 & G2a 14/16 AI PC; HP EliteBook 6 G2ah 14/16
Tested Under	810H	810H	810H	810H
Drop	Passed	Passed	Passed	Passed
Drop at 48”				Passed (EliteBook 6 G1iR 14 only)
Functional Shock	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed
Vibration (Category 5)	Passed	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed
Sand	Passed	Passed	Passed	Passed
Freeze/Thaw	Passed	Passed	Passed	Passed
Bench Handling Shock	Passed	Passed	Passed	Passed
Crash Hazard Shock	Passed	Passed	Passed	Passed
Transportation Shock	Passed	Passed	Passed	Passed

HP ProBook & Fortis Convertible PC

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Test	HP ProBook x360 440 G1	HP ProBook x360 11 G1/G2 EE	HP ProBook x360 11 G3/G4 EE
Tested Under	810G	810G	810G
Drop	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed
Vibration (Category 5)	-	-	-
Vibration (Category 24)	Passed	Passed	Passed
Dust	Passed	Passed	Passed
Humidity	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed
Sand	-	Passed	-
Freeze/Thaw	-	Passed	-
Bench Handling Shock	-	-	-
Crash Hazard Shock	-	-	-
Transportation Shock	-	-	-

HP ProBook & Fortis Convertible PC Continued

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Test	HP ProBook x360 11 G5 EE	HP Pro x360 Fortis 11 G10/G11; Fortis Flip G1i 11"
Tested Under	810H	810H
Drop	Passed	Passed
Functional Shock	Passed	Passed
Vibration (Category 4)	Passed	Passed
Vibration (Category 5)	-	Passed
Vibration (Category 24)	Passed	Passed
Dust	Passed	Passed
Humidity	Passed	Passed
Altitude (Procedure I)	Passed	Passed
Altitude (Procedure II)	Passed	Passed
High Temperature (Procedure I)	Passed	Passed
High Temperature (Procedure II)	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed
Temperature Shock	Passed	Passed
Sand	-	Passed
Freeze/Thaw	-	Passed
Bench Handling Shock	-	Passed
Crash Hazard Shock	-	Passed
Transportation Shock	-	Passed

HP ProBook Notebook PC

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Test	HP ProBook Fortis 14 G9/G10	HP ProBook 440/445/460/465 G11	HP ProBook 4 G1q 14 Next-Gen AI PC; HP ProBook 4 G1i 14/16 & G1a 14/16 AI PC; HP ProBook 4 G1iR 14/16 & G1ah 14/16 PC; HP ZHAN66 14/16 G8R; HP ZHAN66 14/16 G8a; HP ProBook 4 G2i 14/16 & G2a 14/16 & G2iR 14 Next Gen AI PC; HP ProBook 4 G2i Flip 13/13/14/16 & G2a 14/16 AI PC; HP ProBook 4 G2ah 14/16
Tested Under	810H	810H	810H
Drop	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed
Vibration (Category 5)	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed
Dust	Passed	Passed	Passed
Humidity	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed
Sand	Passed	Passed	Passed
Freeze/Thaw	Passed	Passed	Passed
Bench Handling Shock	Passed	Passed	Passed
Crash Hazard Shock	Passed	Passed	Passed
Transportation Shock	Passed	Passed	Passed

HP Notebook PC

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Test	HP 240/240R/245/246 14 inch G9; 240/245 14 inch G10 Notebook PC; HP ZHAN 14 inch G7 Notebook PC	HP 250/250R/255/256 15.6 inch G9; HP 250/255 15.6 inch G10 Notebook PC
Tested Under	810H	810H
Drop	Passed	Passed
Functional Shock	Passed	Passed
Vibration (Category 4)	Passed	Passed
Vibration (Category 5)	-	-
Vibration (Category 24)	Passed	Passed
Dust	Passed	Passed
Humidity	Passed	Passed
Altitude (Procedure I)	Passed	Passed
Altitude (Procedure II)	Passed	Passed
High Temperature (Procedure I)	Passed	Passed
High Temperature (Procedure II)	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed
Temperature Shock	Passed	Passed
Sand	-	-
Freeze/Thaw	-	-
Bench Handling Shock	-	-
Crash Hazard Shock	-	-
Transportation Shock	-	-

HP Thin Client

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Test	HP Pro mt440 G3, Elite mt645 G7, G8 Mobile Thin Client	HP Elite t655; tz655 Trusted Zero Client	HP Pro t550 Thin Client	HP Elite t755/t660 Thin Client
Tested Under	810H	810H	810H	810H
Drop	Passed	-	-	Passed
Functional Shock	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed
Vibration (Category 5)	Passed	-	-	-
Vibration (Category 24)	Passed	Passed	-	Passed
Dust	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed
Sand	Passed	-	-	-
Freeze/Thaw	Passed	-	-	-
Bench Handling Shock	Passed	-	-	-
Crash Hazard shock	Passed	-	-	-
Transportation Shock	Passed	-	-	-

HP Chromebook Convertible

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Test	HP Chromebook x360 11 G4 EE	HP Chromebook Enterprise x360 11 G4	HP Fortis x360 11" G3 J Chromebook	HP Fortis x360 11" G5 Chromebook & Chromebook Enterprise	Fortis Flip G1i 11" Chromebook	Fortis Flip G1m 11" Chromebook
Tested Under	810H	810H	810H	810H	810H	810H
Drop	Passed	Passed	Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 5)	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed	Passed	Passed
Sand	Passed	Passed	Passed	Passed	Passed	Passed
Freeze/Thaw	Passed	Passed	Passed	Passed	Passed	Passed
Bench Handling Shock	Passed	Passed	Passed	Passed	Passed	Passed
Crash Hazard Shock	Passed	Passed	Passed	Passed	Passed	Passed
Transportation Shock	Passed	Passed	Passed	Passed	Passed	Passed
Mechanical Shock	-	-	-	-	-	Passed
Non-Operating High Temperature (Procedure I) Basic Hot, Induced	-	-	-	-	-	Passed
Operating High Temperature - I (Procedure II) Hot Dry, Ambient Air	-	-	-	-	-	Passed
Operating High Temperature - II (Procedure II) Basic Hot, Ambient Air	-	-	-	-	-	Passed
Non-Operating Low Temperature - I (Procedure I) Storage & Transit	-	-	-	-	-	Passed
Non-Operating Low Temperature - II (Procedure I) Storage & Transit	-	-	-	-	-	Passed
Operating Low Temperature I (Procedure II) Operational Cond	-	-	-	-	-	Passed
Operating Low Temperature II (Procedure II) Operational Cond	-	-	-	-	-	Passed

HP Fortis, Chromebook, & Chromebook Enterprise

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Test	HP Elite c640 G3, c645 G2 Chromebook; HP Elite c640 G3, c645 G2 Chromebook Enterprise	HP Elite Dragonfly 13.5 inch Chromebook & Chromebook Enterprise	HP Fortis 11" G9 Q Chromebook; HP Fortis 11" G9 Q Chromebook Enterprise	HP Chromebook 14 G7, HP Chromebook Enterprise 14 G7
Tested Under	810H	810H	810H	810H
Drop	Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed
Vibration (Category 5)	Passed	Passed	Passed	Passed
Vibration (Category 24)	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed
Sand	Passed	Passed	Passed	Passed
Freeze/Thaw	Passed	Passed	Passed	Passed
Bench Handling Shock	Passed	Passed	Passed	Passed
Crash Hazard Shock	Passed	Passed	Passed	Passed
Transportation Shock	Passed	Passed	Passed	Passed

HP Fortis, Chromebook, & Chromebook Enterprise

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Test	HP Fortis 14" G10, G11 Chromebook; HP Fortis 14" G10, G11 Chromebook Enterprise	HP Chromebook 11 G9 EE; HP Chromebook Enterprise 11 G9;	HP Fortis 11" G10 Chromebook & Chromebook Enterprise; HP Fortis G1i 14" Chromebook; HP Fortis G1i/G1m 11" Chromebook	HP Chromebook G1m 11"
Tested Under	810H	810H	810H	810H
Drop	Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	Passed	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed
Vibration (Category 5)	Passed	Passed	Passed	-
Vibration (Category 24)	Passed	Passed	Passed	Passed
Dust	Passed	Passed	Passed	Passed
Humidity	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed
Temperature Shock	Passed	Passed	Passed	Passed
Sand	Passed	Passed	Passed	-
Freeze/Thaw	Passed	Passed	Passed	-
Bench Handling Shock	Passed	Passed	Passed	-
Crash Hazard Shock	Passed	Passed	Passed	-
Transportation Shock	Passed	Passed	Passed	-

HP Retail & Industry Solutions (HP Engage)

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Test	HP Engage One All-in-One	HP Engage One Pro 15.6/19.5/23.8 G1 AiO Systems	HP Engage Flex Pro Retail System	HP Engage Flex Pro-C Retail System	HP Engage Flex Mini Retail System	HP Engage Flex Mini G2 Retail System
Tested Under	810G	810G	810G	810G	810H	810H
Drop	-	-	Passed	Passed	Passed	Passed
Functional Shock	Passed	Passed	-	-	-	Passed
Vibration (Category 4)	Passed	Passed	Passed	Passed	Passed	Passed
Vibration (Category 24)	-	-	-	-	-	Passed
Dust	Passed	Passed	Passed	Passed	Passed	Passed
Humidity	-	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Temperature Shock	-	-	-	-	-	Passed
Sand	-	-	-	-	-	-
Freeze/Thaw	-	-	-	-	-	-

HP Retail & Industry Solutions (HP Engage)

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Test	HP Engage Go 10 Convertible System	HP Engage Go 10 Mobile System	HP Engage Go 10 Mobile Dock	HP Engage Go 13.5" Convertible/ Mobile System	HP Engage Flex Pro G2 & Pro-C G2 Retail Systems	HP Engage One Pro 15.6/19.5/23.8 G2 AiO Systems
Tested Under	810H	810H	810H	810H	810H	810H
Drop	Passed	Passed	-	Passed	Passed	-
Functional Shock	-	-	-	-	Passed	Passed
Vibration (Category 4)	Passed	Passed	-	Passed	Passed	Passed
Vibration (Category 24)	-	Passed	-	-	Passed	Passed
Dust	-	Passed	-	-	Passed	Passed
Humidity	Passed	Passed	Passed	Passed	Passed	Passed
Altitude (Procedure I)	-	-	-	-	Passed	Passed
Altitude (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
High Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure I)	Passed	Passed	Passed	Passed	Passed	Passed
Low Temperature (Procedure II)	Passed	Passed	Passed	Passed	Passed	Passed
Temperature Shock	-	Passed	-	-	Passed	Passed
Sand	-	-	-	-	-	-
Freeze/Thaw	-	-	-	-	-	-

MIL-STD-810 test

Created by the U.S. government, the MIL-STD-810 test method standard is intended to help organizations prepare environmental tests to evaluate how well a particular piece of equipment can perform in the field. The standard outlines dozens of test methods, each associated with a source of environment stress, such as vibration, moisture, dust, extreme temperatures, or humidity; for example, Method 500.5 describes Low Pressure (Altitude) testing, while Method 501.5 describes High Temperature testing. While there is not a recommended or required list of tests for device categories, most major PC vendors generally perform between 5 and 8 test methods.

Each test method outlines multiple test procedures; for example, Method 501.5 describes Procedure I (Storage) and Procedure II (Operation). Thus, Procedure I can be used to evaluate the effects of high temperature storage on the subsequent performance of a business PC; Procedure II evaluates the effects of high temperature while the PC is running.

Test scenarios

A third-party facility tested the durability of the HP Business PC models using procedures tailored from MIL-STD-810. HP used the MIL-STD-810 test menu to select tests that most closely reflect the challenges faced by today's professionals.

Drop test[2]

The Drop test was performed in accordance with MIL-STD-810G, Method 516.6 or 516.7, or MIL-STD-810H, Method 516.8 Procedure IV. The objective of this test was to determine whether the unit could be safely operated after being dropped from desk height. For this test, 26 drops were performed from 30 inches (and 48 inches for HP EliteBook 6 G1iR 14) onto every side, angle and edge onto 2 inch of plywood over steel over concrete. Unit is powered down and checked for operation.

Functional Shock test[2]

The Shock test was performed in accordance with MIL-STD-810G, Method 516.6 or 516.7, or MIL-STD-810H, Method 516.8 Procedure I. The objective of this test was to determine whether the unit could be safely operated after being exposed to sudden physical shock events while operational. For this test, 3 shocks were performed across each axis and direction for a total of 18 shocks.

Vibration test[2]

The Vibration Resistance tests were performed in accordance with MIL-STD-810G Test Method 514.6 or

514.7, or MIL-STD-810H, Method 514.8 Procedure I, Cat 24, Cat 4, and Cat 5.

Non- operational test with box. Test parameters were set to simulate the following:

- Operate the unit during a 1000-mile simulation of vibrations created by a truck driving on a U.S. highway
- Operate the unit after it has been subjected to higher levels of vibration while in storage

Terrain, road and surface discontinuities, vehicle speed, loading, structural characteristics, and suspension system are all reflected in this simulation.

See Key Parameters below for test specifications.

Dust Draft test[2]

The Dust Resistance test was performed in accordance with MIL-STD-810G, Method 510.5 or 510.6, or MIL-STD-810H, Method 510.7 Procedure I (Dust). Test parameters were set so that the unit was dusted with Arizona Road Dust for six hours while being operated.

Humidity test[2]

The Humidity test was performed in accordance with MIL-STD-810G, Method 507.5 or 507.6, or MIL-STD-810H, Method 507.6 Procedure II with the aggravated temperature-humidity cycle. Each cycle was one day (24 hours); ten cycles with the temperature being cycled between 30°C (86°F) and 60°C (140°F); and relative humidity was a constant 95%.

Altitude test[2]

The Altitude test was performed in accordance with MIL-STD-810G, Method 500.5 or 500.6, or MIL-STD-810H, Method 500.6 Procedure I (Storage) and II (Operation). The altitude level simulated for both procedures was 15,000 feet (the highest equivalent altitude given within MIL-STD-810 for cargo pressures within military aircraft).

High Temperature test[2]

The High Temperature test was performed in accordance with MIL-STD-810G, Method 501.5 or 501.6,or MIL-STD-810H, Method 501.7 Procedure I (Storage) and II (Operation). This test evaluated the unit's performance while it was being exposed to high temperature conditions: 60°C (140°F) operational and 71°C (160°F) non-operational.

Low Temperature test[2]

The Low Temperature test was performed in accordance with MIL-STD-810G, Method 502.5 or 502.6, or MIL-STD-810H, Method 502.7 Procedure I (Storage) and II (Operation). This test evaluated the unit's performance while it was being exposed to low temperature conditions: -29°C (-20°F) operational and -51°C (-60°F) non-operational.

Temperature Shock test[2]

The Thermal Shock test was performed in accordance with MIL-STD-810G, Method 503.5 or 503.6, or MIL-STD-810H, Method 503.7 Procedure I. The objective of this test was to determine whether the unit's could be safely operated after being exposed to sudden changes in ambient temperature while non-operational. The high temperature was set to be 60°C (140°F) and the low temperature to be -51°C (-60°F); three high-to-low cycles were performed.

Sand test[2]

The Sand test was performed in accordance with MIL-STD-810G, Method 510.5 or 510.6, or MIL-STD-810H, Method 510.7 Procedure II. The objective of this test was to determine whether the unit could be safely operated after being exposed to blowing sand of up to 20M/S at a temperature of 60°C (140°F) for 4.5 hours (every 90 minutes, the unit is rotated 90°).

Explosive Atmosphere test[2]

The Explosive Atmosphere test was performed in accordance with MIL-STD-810G, Method 511.5 or 511.6, or MIL-STD-810H, Method 511.7 Procedure I. The objective of this test was to determine whether the notebook could be safely operated in fuel-air explosive atmospheres without causing ignition.

Freeze/Thaw test[2]

The Freeze/Thaw test was performed in accordance with MIL-STD-810G, Method 524.1, or MIL-STD-810H, Method 524.1 Procedure III. The objective of this test was to determine whether the unit could be safely operated after being exposed to a temperature drop of -10°C (14°F) for two hours. Unit is removed and checked for operation.

Bench Handling Shock test[2]

The Bench Handling test was performed in accordance to the MIL-STD-810G, Method 516.6 or 516.7, or MIL-STD-810H, Method 516.8 Procedure VI. This test was designed to test whether the unit can withstand levels of shock resulting from bench handling, bench maintenance, and/or packaging.

Crash Hazard Shock test[2]

The Crash Hazard test was performed in accordance to the MIL-STD-810G, Method 516.6 or 516.7, or MIL-STD-810H, Method 516.8 Procedure V. The purpose of this test was to ensure that the unit does not eject sub-elements and that its restraining devices will not fail during crash situations.

Transportation Shock test[2]

The Transportation Shock test was performed in accordance with MIL-STD-810G Test Method 516.7, or MIL-STD-810H, Method 516.8 Procedure II. Simulation of this environment requires use of a package tester (Annex C, Figure 514.7C-5) that imparts a 25.4 mm (1.0 inch) peak-to-peak, circular synchronous motion to the table at a frequency of 5 Hz. This motion takes place in a vertical plane.

Solar Radiation Shock test[2]

The Solar Radiation Shock test was performed in accordance with MIL-STD-810G Test Method 505.6, or MIL-STD-810H, Method 505.7 Procedure II. Use Procedure II to investigate the effects on materiel of long periods of exposure to sunshine. The approach is to use an accelerated test that is designed to reduce the time to reproduce cumulative effects of long periods of exposure. The 4-hour "lights-off" period of each 24-hour cycle allows for test item conditions (physical and chemical) to return toward "normal" and provide some degree of thermal stress exercising.

ESD (Electrostatic Discharge) test[2]

The ESD test was performed in accordance with IEC 61000-4-2. The objective of this test was to determine whether the unit could be safely operated after being exposed to sudden electrostatic discharge events of up to 8,000 volts. Electrostatic discharge points were performed at horizontal and vertical ground planes, chassis screw, serial port ground, screen, finger pad, power cable, power button, keyboard, speaker button, and trackball for a total of 11 discharge points.

Pass/fail criterion

The third-party verified that the tested unit was operational after each environmental exposure by booting the Microsoft® Windows® operating environment.

Test descriptions

The following table includes the tests performed with specific MIL-STD-810 method references and key test parameters.

Test	MIL-STD-810G Reference	Procedures	Key Test Parameters
Vibration	MIL-STD-810G Test Method 514.6 or 514.7 or MIL-STD-810H, Method 514.8	Procedure I, Category 24 (Minimum Integrity Test)	Non-operational 0.04 g2/Hz at 20-1000 Hz, -6 dB/octave at 1000-2000 Hz; One hour/axis duration
		Procedure I, Category 4 (Ground Vehicle)	Operational U.S. highway truck exposure 1000 mile Simulation; One hour/axis duration
		Procedure II, Category 5 (Loose Cargo)	Non-operational test with box. Simulation of this environment requires use of a package tester that imparts a 25.4 mm (1.0 inch) peak-to-peak, circular synchronous motion to the table at a frequency of 5 Hz. This motion takes place in a vertical plane.
Dust Resistance	MIL-STD-810G, Method 510.5 or 510.6 or MIL-STD-810H, Method 510.7	Procedure I (Blowing dust)	Particles of Arizona Road Dust, 10.6 +/-7 grams per cubic foot
Sand	MIL-STD-810G, Method 510.5 or 510.6 or MIL-STD-810H, Method 510.7	Procedure II (Blowing sand)	Blowing sand of up to 20M/S at a temperature of 60°C (140°F) for 4.5 hours. Every 90 minutes, the unit is rotated 90°.

Test	MIL-STD-810G Reference	Procedures	Key Test Parameters
Humidity	MIL-STD-810G, Method 507.5 or 507.6 or MIL-STD-810H, Method 507.6	Procedure II	Relative humidity 95%; Temperature cycled between 30°C and 60°C (86°F and 140°F); Test cycle 24 hours; test consisted of ten cycles
Altitude	MIL-STD-810G, Method 500.5 or 500.6, or MIL-STD-810H, Method 500.6	Procedure I (Storage/air transport) Procedure II (Operation/ air carriage)	Non-operational 15,000 feet at 57 kPa One hour duration Operational 15,000 feet at 57 kPa One hour duration
High Temperature	MIL-STD-810G, Method 501.5 or 501.6, or MIL-STD-810H, Method 501.7	Procedure I (Storage) Procedure II (Operation)	Non-operational Temperature cycled between 35°C and 71°C (95°F and 160°F) Test cycle 24 hours; test consisted of seven cycles Operational 60°C (140°F) Four hours duration
Low Temperature	MIL-STD-810G, Method 502.5 or 502.6, or MIL-STD-810H, Method 502.7	Procedure I (Storage) Procedure II (Operation)	Non-operational -51°C (-60°F) Four hours duration Operational -29°C (-20°F) Four hours duration
Temperature Shock	MIL-STD-810G, Method 503.5 or 503.6 or MIL-STD-810H, Method 503.7	Procedure I	Non-operational High temperature 60°C (140°F) Low temperature -51°C (-60°F); Three cycles (a cycle consists of a dwell low, low to high, dwell high, high to low) One hour dwell time
Functional Shock	MIL-STD-810G, Method 516.6 or 516.7 or MIL-STD-810H, Method 516.8	Procedure I	Operational 3 shocks/axis/direction for a total of 18 shocks; 40 Gs peak, 11 ms
Drop	MIL-STD-810G, Method 516.6 or 516.7, or MIL-STD-810H, Method 516.8	Procedure IV	26 drops from 30 in. onto every side, angle and edge onto 2 in. of plywood over steel over concrete. Unit is powered down and checked for operation.
Explosive Atmosphere	MIL-STD-810G, Method 511.5 or 511.6 or MIL-STD-810H, Method 511.7	Procedure I	Unit could be safely operated in fuel-air explosive atmospheres without causing ignition.
Freeze/Thaw	MIL-STD-810G, Method 524.1 or 524.5 or MIL-STD-810H, Method 524.1	Procedure III	Non-operational Exposed to a temperature drop of -10°C (14°F) for two hours Unit is removed and checked for operation
Crash Hazard Shock	MIL-STD-810G, Method 516.6 or 516.7 or MIL-STD-810H, Method 516.8	Procedure V	Non Operational 2 shocks in each axis/direction for
Bench Handling Shock	MIL-STD-810G, Method 516.6 or 516.7 or MIL-STD-810H, Method 516.8	Procedure VI	16 drops from 4 inches on a wooden bench top on all sides, edges and corners that could be impacted during normal handling or during maintenance.
Solar Radiation	Method 505.6	Procedure II Sample condition: Non-Operation Radiation source: Metal halide lamp Irradiance: Spectral irradiance of (1120+/-47 W/m2 at (300-3000) nm Chamber temperature: 49 degree Exposing duration: 20 hours irradiation and 4 hours darkness per a 24-hour cycle Test duration: 1 Cycle Two units: 1 for lid close, 1 for lid open.	The purpose is to investigate the effects on material of long periods of exposure to sunshine. The approach is to use an accelerated test that is designed to reduce the time to reproduce cumulative effects of long periods of exposure. The 4-hour "lights-off" period of each 24-hour cycle allows for test item conditions (physical and chemical) to return toward "normal" and provide some degree of thermal stress exercising.
Transporation Shock	MIL-STD-810G Test Method 516.7 or MIL-STD-810H, Method 516.8	Procedure II	The purpose is used to evaluate the response of the system to transportation environments that create a repetitive shock load.

ESD Test Descriptions

The following table includes the specific test parameters for the Electrostatic Discharge test.

Test	Reference	Key Test Parameter
ESD (Electrostatic Discharge)	IEC 6100-42	Temperature: 23°C (73°F) Humidity 39% Between 6 to 8,000 Volts applied to: ▪ Horizontal Ground Plane ▪ Vertical Ground Plane ▪ Chassis Screw ▪ Serial Port Ground ▪ Screen ▪ Fingerprint ▪ Power Cable ▪ Power Button ▪ Keyboard ▪ Speaker B

The MIL-STD-810 test specifications can be accessed at iest.org/Standards-RPs/MIL-STD-810.

Learn more about HP business notebooks, tablets, and desktops at hp.com or contact your local HP sales representative.

[1]HP's Total Test Process is not a guarantee of future performance under these test conditions. Accidental Damage or damage under these test conditions requires an optional HP Accidental Damage Protection Care Pack.

[2]MIL - STD - 810 testing is conducted on select HP products. Testing is not intended to demonstrate fitness for U.S. Department of Defense (DoD) contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage or damage under these test conditions requires an optional HP Accidental Damage Protection Care Pack.

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4AA6-0823ENW, June 2026