



## TECHNICAL WHITE PAPER

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# MIL-STD-810 TESTING FOR HP BUSINESS PCs

March 2021

## 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.



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## 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, Z by HP, HP Chromebooks and select HP Thin Clients undergo the HP Total Test Process (TTP)<sup>1</sup> — 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.



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## 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<sup>2</sup> 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 multi-tiered climatic and environmental test methods.<sup>2</sup>

THE PRODUCTS IDENTIFIED BELOW HAVE ALL UNDERGONE MULTIPLE MIL-STD-810 TESTING PROCEDURES. **CLICK ON EACH CATEGORY TO SEE TEST RESULTS.**

### HP ZBOOK DETACHABLE WORKSTATION

Tested under 810G:

- HP ZBook x2 G4

### HP ZBOOK CONVERTIBLE WORKSTATION

Tested under 810G:

- HP ZBook Studio x360 G5

### HP ZBOOK MOBILE WORKSTATION

Tested under 810G:

- HP ZBook 15/17 G3, G5, G6
- HP ZBook 15v G5
- HP ZBook Studio G5
- HP ZBook 14u/15u G5, G6

Tested under 810H:

- HP ZBook Create G7
- HP ZBook Studio G7
- HP ZBook Firefly 14/15 G7, G8
- HP ZBook Fury 15/17 G7
- HP ZBook Power G7, G8
- HP ZBook Fury 15.6 Inch G8 Mobile Workstation PC
- HP ZBook Fury 17.3 Inch G8 Mobile Workstation PC

### HP Z DESKTOP WORKSTATION

Tested under 810G:

- HP EliteDesk 800 G4/G5 Tower Workstation Edition
- HP Z1 Entry Tower G5
- HP Z2 Mini G5 Workstation
- HP Z2 Small Form Factor G5 Workstation
- HP Z2 Tower G5 Workstation

Tested under 810H:

- HP Z1 Entry Tower G6

### HP ELITEDESK DESKTOP PC

Tested under 810G:

- HP EliteDesk 800 G3/G4/G5 TWR/SFF/DM
- HP EliteDesk 705 G3 MT/SFF/DM
- HP EliteDesk 705 G4 MT/SFF/DM

### HP ELITEDESK DESKTOP PC

- HP EliteDesk 705 G5 SFF/DM
- HP EliteDesk 805 G5 SFF/DM

Tested under 810H:

- HP EliteDesk 800 G6 TWR/SFF/DM

### HP ELITE SLICE DESKTOP PC

Tested under 810G:

- HP Elite Slice G1
- HP Elite Slice for Meeting Rooms G2

### HP PRODESK DESKTOP PC

Tested under 810G:

- HP ProDesk 400 / 600 G6 DM
- HP ProDesk 400 G7 SFF, MT; 480 MT
- HP ProDesk 405 G6 SFF & DM

Tested under 810H:

- HP ProDesk 600 G6 SFF
- HP ProDesk 600/680 G6 MT

### HP ALL-IN-ONE DESKTOP PC

Tested under 810G:

- HP EliteOne 1000 G1 34" All-in-One
- HP EliteOne 1000 G2 All-in-One
- HP EliteOne 800 G3 All-in-One
- HP EliteOne 800 G4/G5 All-in-One
- HP EliteOne 800 G4/G5 Healthcare All-in-One

Tested under 810H:

- HP EliteOne 800 G6 All-in-One
- HP ProOne 600 G6 All-in-One
- HP ProOne 400 G6 All-in-One

### HP ELITE X2 DETACHABLE PC

Tested under 810G:

- HP Elite x2 1012 G2
- HP Elite x2 1012 G2 Collaboration Keyboard
- HP Elite x2 1013 G3
- HP Elite x2 G4

Tested under 810H:

- HP Elite x2 G8
- HP Elite Folio 13.5 inch 2-in-1 Notebook PC



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## HP ELITEBOOK CONVERTIBLE NOTEBOOK PC

Tested under 810G:

- HP EliteBook x360 1030 G2/G3/G4
- HP EliteBook x360 1030 G3
- HP EliteBook x360 1030 G4
- HP EliteBook x360 1040 G5, G6
- HP EliteBook x360 830 G5, G6

Tested under 810H:

- HP Elite Dragonfly G2, Max
- HP EliteBook x360 830 G7, G8
- HP EliteBook x360 1030/1040 G7, G8

## HP ELITEBOOK NOTEBOOK PC

Tested under 810G:

- HP EliteBook Folio G1
- HP EliteBook 1040 G4
- HP EliteBook 1050 G1
- HP EliteBook 820/840/850 G3
- HP EliteBook 820/840/850 G4
- HP EliteBook 830/840/850 G5
- HP EliteBook 830/840/850 G6
- HP EliteBook 840r G4
- HP EliteBook 840 G5, G6 Healthcare Edition
- HP EliteBook 725 G4
- HP EliteBook 735/745/755 G5
- HP EliteBook 735/745 G6

Tested under 810H:

- HP EliteBook 830/840/850 G7, G8
- HP EliteBook 835/845/855 G7, G8
- HP EliteBook 840 Aero G8

## HP PRO X2 DETACHABLE PC

Tested under 810G:

- HP Pro x2 612 G2
- HP Pro x2 612 G2 Collaboration Keyboard

## HP PROBOOK CONVERTIBLE NOTEBOOK PC

Tested under 810G:

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

Tested under 810H:

- HP ProBook x360 11 G5, G6, G7 EE
- HP ProBook x360 435 G7, G8

## HP PROBOOK NOTEBOOK PC

Tested under 810G:

- HP ProBook 640/650/645 G4
- HP ProBook 640/650 G5
- HP ProBook 430/440/450/470/455 G5
- HP ProBook 430/440/450 G6
- HP ProBook 445/455/445R/455R G6

Tested under 810H:

- HP ProBook 430/440/450 G7, G8
- HP ProBook 445/455 G7, G8
- Zhan66 Pro A 14" G4
- HP ProBook 445/455 G7
- HP ProBook 640/650 G7
- HP ProBook 630/640/650 G8
- HP ProBook 635 Aero G7, G8

## HP NOTEBOOK PC

Tested under 810G:

- HP 340/348 G5

Tested under 810H:

- HP 340/348 G7

## HP CHROMEBOOK CONVERTIBLE

Tested under 810H:

- HP Chromebook x360 11 G3 EE
- HP Chromebook x360 11MK G3 EE
- HP Chromebook Enterprise x360 11MK G3
- HP Chromebook x360 11 G4 EE
- HP Chromebook Enterprise x360 11 G4

## HP CHROMEBOOK

Tested under 810G:

- HP Chromebook 14A G5

Tested under 810H:

- HP Chromebook 11 G8 EE, 11A G8 EE
- HP Chromebook 14 G6
- HP Chromebook Enterprise 14 G6
- HP Pro c640 Chromebook Enterprise
- HP Pro c640 Chromebook
- HP Elite c1030 Chromebook Enterprise
- HP Elite c1030 Chromebook
- HP Pro c645 Chromebook Enterprise
- HP Pro c645 Chromebook
- HP Chromebook Enterprise 11 G9
- HP Chromebook 11MK G9 EE
- HP Chromebook Enterprise 11MK G9
- HP Chromebook 14 G7
- HP Chromebook Enterprise 14 G7

## HP RETAIL

Tested under 810G:

- HP Engage One All-in-One
- HP Engage Go Mobile System
- HP Engage Go Mobile Dock
- HP Engage Flex Pro Retail System
- HP Engage Flex Pro-C Retail System
- HP Engage One Pro All-in-One

## HP THIN CLIENT

Tested under 810G:

- HP mt43 Mobile Thin Client
- HP mt44 Mobile Thin Client
- HP mt20 Mobile Thin Client
- HP mt21 Mobile Thin Client
- HP mt45 Mobile Thin Client

Tested under 810H:

- HP mt22 Mobile Thin Client
- HP mt46 Mobile Thin Client
- HP mt32 Mobile Thin Client



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# TEST RESULTS

The following tables summarize the independent third-party MIL-STD-810 test methods<sup>2</sup> 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 DETACHABLE WORKSTATION, HP ZBOOK CONVERTIBLE WORKSTATION

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| Test                            | HP ZBook<br>x2 G4 | HP ZBook<br>Studio<br>x360 G5<br>810G |
|---------------------------------|-------------------|---------------------------------------|
| Tested Under                    | 810G              | 810G                                  |
| Drop                            | PASSED            | PASSED                                |
| 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                                |

## HP ZBOOK MOBILE WORKSTATION

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| Test                            | HP ZBook<br>15/17 G3,<br>G5, G6<br>810G | HP ZBook<br>15v G5<br>810G | HP ZBook<br>Studio G5<br>810G | HP ZBook<br>14u/15u<br>G5, G6<br>810G |
|---------------------------------|---|----------------------------|-------------------------------|---------------------------------------|
| Tested Under                    | 810G                                    | 810G                       | 810G                          | 810G                                  |
| Drop                            | PASSED                                  | PASSED                     | 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                        | 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                                |
| Explosive Atmosphere            | PASSED                                  | -                          | PASSED                        | -                                     |
| Freeze/Thaw                     | PASSED                                  | -                          | PASSED                        | PASSED                                |
| Bench Handling Shock            | PASSED                                  | -                          | PASSED                        | PASSED                                |
| Crash Hazard Shock              | PASSED                                  | -                          | PASSED                        | PASSED                                |
| Transportation Shock            | -                                       | -                          | -                             | PASSED                                |
| Solar Radiation                 | -                                       | -                          | -                             | -                                     |



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## HP ZBOOK MOBILE WORKSTATION (CONTINUED)

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| Test                            | HP ZBook Create G7 | HP ZBook Creative/Studio, Fury 15/17 G7 | HP ZBook Firefly 14/15, Power G7, G8; Power G7, G8 810H | HP ZBook Fury 15.6 & 17.3 inch G8 Mobile Workstation PC 810H |
|---------------------------------|--------------------|---|---|--|
| <b>Tested Under</b>             | <b>810H</b>        | <b>810H</b>                             | <b>810H</b>   | <b>810H</b>  |
| 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   |
| Explosive Atmosphere            | 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   |
| Solar Radiation                 | PASSED             | PASSED                                  | -   | PASSED   |

## HP Z DESKTOP WORKSTATION

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| Test                            | HP Z1 Entry Tower G5 | HP Z1 Entry Tower G6 | HP EliteDesk 800 G4, G5 Tower Workstation Edition 810G | HP Z2 Mini G5 Workstation 810G | HP Z2 Small Form Factor G5 Workstation 810G | HP Z2 Tower G5 Workstation 810G |
|---------------------------------|----------------------|----------------------|--|--------------------------------|---|---------------------------------|
| <b>Tested Under</b>             | <b>810G</b>          | <b>810H</b>          | <b>810G</b>  | <b>810G</b>                    | <b>810G</b>                                 | <b>810G</b>                     |
| Drop                            | PASSED               | PASSED               | PASSED   | PASSED                         |   | PASSED                          |
| Functional Shock                | PASSED               |                      | PASSED   | PASSED                         | PASSED                                      | PASSED                          |
| Vibration (Category 4)          | PASSED               | PASSED*              | PASSED   | PASSED                         | PASSED                                      | PASSED                          |
| Vibration (Category 24)         | 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                 | PASSED               | PASSED               | PASSED   | PASSED                         | PASSED                                      | PASSED                          |
| Temperature Shock               | -                    | -                    | -  | PASSED                         | PASSED                                      | PASSED                          |

\*Tested under 810G



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## HP ELITEDESK DESKTOP PC

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| Test                                       | HP EliteDesk<br>800 G3<br>DM/SFF/TWR<br>810H | HP EliteDesk<br>800 G4/G5<br>DM/SFF/TWR<br>810H | HP EliteDesk<br>800 G6 TWR<br>810H | HP EliteDesk<br>800 G6 DM<br>810H | HP EliteDesk<br>800 G6 SFF<br>810H |
|--|--|---|------------------------------------|-----------------------------------|------------------------------------|
| <b>Tested Under</b>                        |  |   |                                    |                                   |                                    |
| <b>Drop</b>                                | PASSED                                       | PASSED  | PASSED                             | PASSED                            |                                    |
| <b>Functional Shock</b>                    | PASSED                                       | PASSED  |                                    | PASSED                            | PASSED                             |
| <b>Vibration<br/>(Category 4)</b>          | PASSED                                       | PASSED  | PASSED*                            | PASSED*                           | PASSED*                            |
| <b>Vibration<br/>(Category 24)</b>         | PASSED                                       | PASSED  | -                                  | PASSED*                           | -                                  |
| <b>Dust</b>                                | PASSED                                       | PASSED  | PASSED*                            | PASSED*                           | PASSED*                            |
| <b>Humidity</b>                            | PASSED                                       | PASSED  | PASSED                             |                                   | PASSED                             |
| <b>Altitude (Procedure I)</b>              | PASSED                                       | PASSED  | PASSED                             | PASSED                            | PASSED                             |
| <b>Altitude (Procedure II)</b>             | PASSED                                       | PASSED  | PASSED                             | PASSED                            | PASSED                             |
| <b>High Temperature<br/>(Procedure I)</b>  | PASSED                                       | PASSED  | PASSED                             | PASSED                            | PASSED                             |
| <b>High Temperature<br/>(Procedure II)</b> | PASSED                                       | PASSED  | PASSED                             | PASSED                            | PASSED                             |
| <b>Low Temperature<br/>(Procedure I)</b>   | PASSED                                       | PASSED  | PASSED                             | PASSED                            | PASSED                             |
| <b>Low Temperature<br/>(Procedure II)</b>  | PASSED                                       | PASSED  | PASSED                             | PASSED                            | PASSED                             |
| <b>Temperature Shock</b>                   | -  | -   | -                                  | -                                 | PASSED                             |

\*Tested under 810G

## HP ELITEDESK DESKTOP PC

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| Test                                       | HP EliteDesk<br>705 G3/G4<br>DM/SFF/MT<br>810G | HP EliteDesk<br>705 G5 DM<br>810G | HP EliteDesk<br>705 G5 SFF<br>810G | HP EliteDesk<br>805 G6 DM<br>810G | HP EliteDesk<br>805 G6 SFF<br>810G |
|--|--|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|
| <b>Tested Under</b>                        |  |                                   |                                    |                                   |                                    |
| <b>Drop</b>                                | PASSED   | PASSED                            | PASSED                             | PASSED                            |                                    |
| <b>Functional Shock</b>                    | PASSED   | PASSED                            |                                    | PASSED                            | PASSED                             |
| <b>Vibration<br/>(Category 4)</b>          | PASSED   | PASSED                            |                                    | PASSED                            | -                                  |
| <b>Vibration<br/>(Category 24)</b>         | PASSED   | PASSED                            |                                    | PASSED                            |                                    |
| <b>Dust</b>                                | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>Humidity</b>                            | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>Altitude (Procedure I)</b>              | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>Altitude (Procedure II)</b>             | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>High Temperature<br/>(Procedure I)</b>  | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>High Temperature<br/>(Procedure II)</b> | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>Low Temperature<br/>(Procedure I)</b>   | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>Low Temperature<br/>(Procedure II)</b>  | PASSED   | PASSED                            | PASSED                             | PASSED                            | PASSED                             |
| <b>Temperature Shock</b>                   | -  | PASSED                            | PASSED                             | PASSED                            | PASSED                             |



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## HP ALL-IN-ONE DESKTOP PC

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| Test                                   | HP EliteOne 1000 G1 34" All-in-One | HP EliteOne 1000 G2 All-in-One | HP EliteOne 800 G3 All-in-One | HP EliteOne 800 G4/G5 All-in-One | HP EliteOne 800 G4/G5 Healthcare All-in-One | HP EliteOne 800 G6 All-in-One, DM | HP ProOne 600 G6 All-in-One, 400 G6 All-in-One |
|--|------------------------------------|--------------------------------|-------------------------------|----------------------------------|---|-----------------------------------|--|
| <b>Tested Under</b>                    | <b>810G</b>                        | <b>810G</b>                    | <b>810G</b>                   | <b>810G</b>                      | <b>810G</b>                                 | <b>810H</b>                       | <b>810H</b>                                    |
| <b>Drop</b>                            | -                                  |                                |                               |                                  |   | -                                 | -  |
| <b>Functional Shock</b>                | PASSED                             | PASSED                         |                               | PASSED                           | PASSED                                      | PASSED                            | -  |
| <b>Vibration (Category 4)</b>          | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED*                           | -  |
| <b>Vibration (Category 24)</b>         | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      |                                   |  |
| <b>Dust</b>                            | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED*                           | PASSED*  |
| <b>Humidity</b>                        |                                    | PASSED                         | PASSED                        | PASSED                           | PASSED                                      |                                   | PASSED   |
| <b>Altitude (Procedure I)</b>          | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED                            | PASSED   |
| <b>Altitude (Procedure II)</b>         | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED                            | PASSED   |
| <b>High Temperature (Procedure I)</b>  | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED                            | PASSED   |
| <b>High Temperature (Procedure II)</b> | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED                            | PASSED   |
| <b>Low Temperature (Procedure I)</b>   | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED                            | PASSED   |
| <b>Low Temperature (Procedure II)</b>  | PASSED                             | PASSED                         | PASSED                        | PASSED                           | PASSED                                      | PASSED                            | PASSED   |
| <b>Temperature Shock</b>               | -                                  | -                              | -                             | -                                | -   | PASSED                            | PASSED   |

\*Tested under 810G

## HP ELITE SLICE DESKTOP PC

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| Test                                   | HP Elite Slice G1 | HP Elite Slice for Meeting Rooms G2 |
|--|-------------------|-------------------------------------|
| <b>Tested Under</b>                    | <b>810G</b>       | <b>810G</b>                         |
| <b>Drop</b>                            | PASSED            | PASSED                              |
| <b>Functional Shock</b>                | PASSED            | PASSED                              |
| <b>Vibration (Category 4)</b>          | PASSED            | PASSED                              |
| <b>Vibration (Category 24)</b>         | PASSED            | PASSED                              |
| <b>Dust</b>                            | PASSED            | PASSED                              |
| <b>Humidity</b>                        | PASSED            | PASSED                              |
| <b>Altitude (Procedure I)</b>          | PASSED            | PASSED                              |
| <b>Altitude (Procedure II)</b>         | PASSED            | PASSED                              |
| <b>High Temperature (Procedure I)</b>  | PASSED            | PASSED                              |
| <b>High Temperature (Procedure II)</b> | PASSED            | PASSED                              |
| <b>Low Temperature (Procedure I)</b>   | PASSED            | PASSED                              |
| <b>Low Temperature (Procedure II)</b>  | PASSED            | PASSED                              |
| <b>Temperature Shock</b>               | -                 | -                                   |





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## HP PROONE ALL-IN-ONE DESKTOP PC, HP PRODESK DESKTOP PC

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| Test                            | HP ProOne 600 G6 AiO, 400 G6 AiO 810H | HP ProDesk 600 G6 SFF 810H | HP ProDesk 400 G7 SFF, MT; 480MT 801G | HP ProDesk 400 / 600 G6 DM 810G | HP ProDesk 600 /680 G6 MT 810H | HP ProDesk 405 G6 SFF 810G | HP ProDesk 405 G6 DM 810G |
|---------------------------------|---------------------------------------|----------------------------|---------------------------------------|---------------------------------|--------------------------------|----------------------------|---------------------------|
| Tested Under                    |                                       |                            |                                       |                                 |                                |                            |                           |
| Drop                            | -                                     | PASSED                     | PASSED                                | PASSED                          | PASSED                         |                            | PASSED                    |
| Functional Shock                | -                                     |                            |                                       | PASSED                          | PASSED                         | -                          | PASSED                    |
| Vibration (Category 4)          | -                                     | PASSED*                    |                                       | PASSED                          | PASSED*                        | PASSED                     | PASSED                    |
| Vibration (Category 24)         |                                       |                            |                                       | 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                    |

\*Tested under 810G

## HP ELITE X2 DETACHABLE PC

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| Test                            | HP Elite x2 1012 G2 | HP Elite x2 1012 G2 Collaboration Keyboard | HP Elite x2 1013 G3 | HP Elite x2 G4 | HP Elite x2 G8 | HP Elite Folio 13.5" 2-in-1 Notebook PC 810H |
|---------------------------------|---------------------|--|---------------------|----------------|----------------|--|
| Tested Under                    | 810G                | 810G                                       | 810G                | 810G           | 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                                       |
| 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         | PASSED                                       |
| Sand                            | PASSED              | PASSED                                     | PASSED              | PASSED         | PASSED         | PASSED                                       |
| Explosive Atmosphere            | 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                                       |
| Transportation Shock            | -                   | -  | -                   | PASSED         | PASSED         | PASSED                                       |



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## HP ELITEBOOK CONVERTIBLE NOTEBOOK PC

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| Test                            | HP EliteBook<br>x360 1030<br>G2<br>810G | HP EliteBook<br>x360 1030<br>G3<br>810G | HP EliteBook<br>x360 1030<br>G4<br>810G | HP EliteBook<br>x360 1040<br>G5, G6<br>810G | HP EliteBook<br>x360 830<br>G5, G6<br>810G |
|---------------------------------|---|---|---|---|--|
| Drop                            | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Functional Shock                | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Vibration (Category 4)          | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Vibration (Category 5)          | -                                       | -                                       | PASSED                                  | -   | PASSED                                     |
| Vibration (Category 24)         | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Dust                            | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Humidity                        | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Altitude (Procedure I)          | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Altitude (Procedure I)          | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| High Temperature (Procedure I)  | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| High Temperature (Procedure II) | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Low Temperature (Procedure I)   | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Low Temperature (Procedure II)  | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Temperature Shock               | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Sand                            | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Explosive Atmosphere            | -                                       | PASSED                                  | -                                       | PASSED                                      | -  |
| Freeze/Thaw                     | PASSED                                  | PASSED                                  | PASSED                                  | PASSED                                      | PASSED                                     |
| Bench Handling Shock            | -                                       | -                                       | PASSED                                  | -   | PASSED                                     |
| Crash Hazard Shock              | -                                       | -                                       | PASSED                                  | -   | PASSED                                     |
| Transporation Shock             | -                                       | -                                       | PASSED                                  | -   | PASSED                                     |

## HP ELITEBOOK CONVERTIBLE NOTEBOOK PC

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| Test                            | HP Elite<br>Dragonfly<br>G2, Max<br>810H | HP EliteBook<br>x360 830<br>G7, G8<br>810H | HP EliteBook<br>x360 1030/1040<br>G7, G8<br>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 I)          | 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   |
| Explosive Atmosphere            | -  | -  | -  |
| Freeze/Thaw                     | PASSED                                   | PASSED                                     | PASSED   |
| Bench Handling Shock            | PASSED                                   | PASSED                                     | PASSED   |
| Crash Hazard Shock              | PASSED                                   | PASSED                                     | PASSED   |
| Transporation Shock             | PASSED                                   | PASSED                                     | PASSED   |



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## HP ELITEBOOK NOTEBOOK PC

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| Test                            | HP EliteBook Folio G1 810G | HP EliteBook 1040 G4 810G | HP EliteBook 1050 G1 810G |
|---------------------------------|----------------------------|---------------------------|---------------------------|
| Tested Under                    |                            |                           |                           |
| 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 1)          | PASSED                     | PASSED                    | PASSED                    |
| Altitude (Procedure 2)          | 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                    |
| Explosive Atmosphere            | PASSED                     | PASSED                    | PASSED                    |
| Freeze/Thaw                     | PASSED                     | PASSED                    | PASSED                    |
| Bench Handling Shock            | -                          | -                         | PASSED                    |
| Crash Hazard Shock              | -                          | -                         | PASSED                    |
| Transportation Shock            | -                          | -                         | -                         |

## HP ELITEBOOK NOTEBOOK PC

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| Test                            | HP EliteBook 820/840/850 G3 810G | HP EliteBook 820/840/850 G4 810G | HP EliteBook 830/840/850 G5 810G | HP EliteBook 830/840/850 G6 810G | HP EliteBook 840r G4 810G |
|---------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------|
| Tested Under                    |                                  |                                  |                                  |                                  |                           |
| Drop                            | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Functional Shock                | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Vibration (Category 4)          | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Vibration (Category 5)          | -                                | -                                | -                                | PASSED                           | PASSED                    |
| Vibration (Category 24)         | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Dust                            | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Humidity                        | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Altitude (Procedure 1)          | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Altitude (Procedure 2)          | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| High Temperature (Procedure I)  | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| High Temperature (Procedure II) | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Low Temperature (Procedure I)   | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Low Temperature (Procedure II)  | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Temperature Shock               | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Sand                            | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Explosive Atmosphere            | PASSED                           | PASSED                           | PASSED                           | -                                | -                         |
| Freeze/Thaw                     | PASSED                           | PASSED                           | PASSED                           | PASSED                           | PASSED                    |
| Bench Handling Shock            | -                                | -                                | -                                | PASSED                           | PASSED                    |
| Crash Hazard Shock              | -                                | -                                | -                                | PASSED                           | PASSED                    |
| Transportation Shock            | -                                | -                                | -                                | PASSED                           | PASSED                    |



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## HP ELITEBOOK NOTEBOOK PC (CONTINUED)

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| Test                            | HP EliteBook<br>840 G5<br>Healthcare<br>Edition<br>810G | HP EliteBook<br>840 G6<br>Healthcare<br>Edition<br>810G | HP EliteBook<br>725 G4<br>810G | HP EliteBook<br>735/745/<br>755 G5<br>810G |
|---------------------------------|---|---|--------------------------------|--|
| <b>Tested Under</b>             |   |   |                                |  |
| Drop                            | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Functional Shock                | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Vibration (Category 4)          | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Vibration (Category 5)          | PASSED  | PASSED  | -                              | -  |
| Vibration (Category 24)         | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Dust                            | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Humidity                        | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Altitude (Procedure 1)          | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Altitude (Procedure 2)          | 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                                     |
| Explosive Atmosphere            | -   | -   | PASSED                         | PASSED                                     |
| Freeze/Thaw                     | PASSED  | PASSED  | PASSED                         | PASSED                                     |
| Bench Handling Shock            | PASSED  | PASSED  | -                              | -  |
| Crash Hazard Shock              | PASSED  | PASSED  | -                              | -  |
| Transportation Shock            | PASSED  | PASSED  | -                              | -  |

## HP ELITEBOOK NOTEBOOK PC

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| Test                            | HP EliteBook<br>735/745<br>G6<br>810G | HP EliteBook<br>830/840/850<br>G7, G8<br>810H | HP EliteBook<br>835/845/855<br>G7, G8<br>810H | HP EliteBook<br>840 Aero G8<br>810H |
|---------------------------------|---------------------------------------|---|---|-------------------------------------|
| <b>Tested Under</b>             |                                       |   |   |                                     |
| 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 1)          | PASSED                                | PASSED  | PASSED  | PASSED                              |
| Altitude (Procedure 2)          | 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                              |
| Explosive Atmosphere            | -                                     | -   | -   | -                                   |
| 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                              |



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## HP PRO X2 DETACHABLE PC

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| Test                            | HP Pro x2<br>612 G2 | HP Pro x2<br>612 G2<br>Collaboration<br>Keyboard<br>810G |
|---------------------------------|---------------------|--|
| <b>Tested Under</b>             | <b>810G</b>         |  |
| 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                            | PASSED              | PASSED   |
| Freeze/Thaw                     | PASSED              | PASSED   |
| Bench Handling Shock            | PASSED              | -  |
| Crash Hazard Shock              | PASSED              | -  |
| Transportation Shock            | -                   | -  |

## HP PROBOOK CONVERTIBLE NOTEBOOK PC

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| Test                               | HP ProBook<br>x360 440<br>G1 | HP ProBook<br>x360 11<br>G1, G2 EE | HP ProBook<br>x360 11 G3,<br>G4 EE | HP ProBook<br>x360 11 G5,<br>G6 EE | HP ProBook<br>x360 435<br>G7, G8; x360<br>11 G7 EE |
|------------------------------------|------------------------------|------------------------------------|------------------------------------|------------------------------------|--|
| <b>Tested Under</b>                | <b>810G</b>                  | <b>810G</b>                        | <b>810G</b>                        | <b>810G</b>                        | <b>810H</b>  |
| Drop                               | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Functional Shock                   | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Vibration (Category 4)             | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Vibration (Category 5)             | -                            | -                                  | -                                  | -                                  | PASSED   |
| Vibration (Category 24)            | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Dust                               | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Humidity                           | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Altitude (Procedure I)             | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Altitude (Procedure II)            | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| High Temperature<br>(Procedure I)  | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| High Temperature<br>(Procedure II) | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Low Temperature<br>(Procedure I)   | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Low Temperature<br>Procedure II)   | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Temperature Shock                  | PASSED                       | PASSED                             | PASSED                             | PASSED                             | PASSED   |
| Sand                               | -                            | -                                  | -                                  | -                                  | PASSED   |
| Freeze/Thaw                        | -                            | PASSED                             | -                                  | -                                  | PASSED   |
| Bench Handling Shock               | -                            | -                                  | -                                  | -                                  | PASSED   |
| Crash Hazard Shock                 | -                            | -                                  | -                                  | -                                  | PASSED   |
| Transportation Shock               | -                            | -                                  | -                                  | -                                  | PASSED   |



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## HP PROBOOK NOTEBOOK PC

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| Test                     | HP ProBook<br>640/650/<br>645 G4<br>810G | HP ProBook<br>640/650<br>G5<br>810G | HP ProBook<br>640/650 G7,<br>630/640/650 G8<br>810H | HP ProBook<br>635 Aero<br>G7, G8<br>810H | Zahan66 ProA<br>14" G4<br>810H |
|--------------------------|--|-------------------------------------|---|--|--------------------------------|
| Drop                     | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Functional Shock         | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Vibration (Category 4)   | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Vibration (Category 5)   | -  | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Vibration (Category 24)  | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Dust                     | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Humidity                 | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Altitude (Procedure I)   | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Altitude (Procedure II)  | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| High Temp (Procedure I)  | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| High Temp (Procedure II) | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Low Temp (Procedure I)   | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Low Temp (Procedure II)  | PASSED                                   | PASSED                              | PASSED  | PASSED                                   | PASSED                         |
| Temperature Shock        | PASSED                                   | 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 NOTEBOOK PC

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| Test                     | HP ProBook<br>430/440/450/<br>455/470 G5<br>810G | HP ProBook<br>430/440/<br>450 G6<br>810G | HP ProBook<br>445/455/<br>445R/455R G6<br>810G | HP ProBook<br>430/440/450<br>G7, G8<br>810H | HP ProBook<br>445/455<br>G7, G8<br>810H |
|--------------------------|--|--|--|---|---|
| Drop                     | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Functional Shock         | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Vibration (Category 4)   | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Vibration (Category 5)   | -  | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Vibration (Category 24)  | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Dust                     | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Humidity                 | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Altitude (Procedure I)   | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Altitude (Procedure II)  | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| High Temp (Procedure I)  | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| High Temp (Procedure II) | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Low Temp (Procedure I)   | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Low Temp (Procedure II)  | PASSED   | PASSED                                   | PASSED   | PASSED                                      | PASSED                                  |
| Temperature Shock        | PASSED   | 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                                  |



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## HP NOTEBOOK PC

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| Test                     | HP 340/348<br>G5<br>810G | HP 340/348<br>G7<br>810H |
|--------------------------|--------------------------|--------------------------|
| Tested Under             | 810G                     | 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 Temp (Procedure I)  | PASSED                   | PASSED                   |
| High Temp (Procedure II) | PASSED                   | PASSED                   |
| Low Temp (Procedure I)   | PASSED                   | PASSED                   |
| Low Temp (Procedure II)  | PASSED                   | PASSED                   |
| Temperature Shock        | PASSED                   | PASSED                   |
| Sand                     | -                        | -                        |
| Freeze/Thaw              | -                        | -                        |
| Bench Handling Shock     | -                        | -                        |
| Crash Hazard Shock       | -                        | -                        |
| Transportation Shock     | -                        | -                        |

## HP CHROMEBOOK

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| Test                            | HP<br>Chromebook<br>x360 11<br>G3 EE | HP Chromebook<br>x360 11 MK G3 EE<br>& HP Chromebook<br>Enterprise x360<br>11MK G3 | HP Chromebook<br>Enterprise x360<br>11 G4<br>and x360<br>11 G4 EE | HP Chromebook<br>14A G5 & HP<br>Chromebook<br>Enerprise 14A G5 |
|---------------------------------|--------------------------------------|--|---|--|
| Tested Under                    | 810H                                 | 810H   | 810H  | 810G   |
| Drop                            | PASSED                               | PASSED   | PASSED  | PASSED   |
| Functional Shock                | PASSED                               | PASSED   | PASSED  | PASSED   |
| Vibration (Category 4)          | PASSED                               | PASSED   | PASSED  | PASSED   |
| Vibration (Category 5)          | -                                    | 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  | -  |
| Explosive Atmosphere            | -                                    | PASSED   | PASSED  | -  |
| Freeze/Thaw                     | -                                    | PASSED   | PASSED  | -  |
| Bench Handling Shock            | -                                    | PASSED   | PASSED  | -  |
| Crash Hazard Shock              | -                                    | PASSED   | PASSED  | -  |
| Transportation Shock            | -                                    | -  | -   | -  |



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## HP CHROMEBOOK

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| Test                            | HP Chromebook<br>11 G8 EE,<br>11A G8 EE | HPChromebook<br>14 G6, HP<br>Chromebook<br>Enterprise 14 G6 | HP Pro c640<br>& c645<br>Chromebook,<br>HP Pro c640<br>& c645<br>Chromebook<br>Enterprise | HP Pro c1030<br>Chromebook,<br>HP Pro c1030<br>Chromebook<br>Enterprise |
|---------------------------------|---|---|---|---|
| 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  |
| 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  |
| Freeze/Thaw                     | -                                       | -   | PASSED  | PASSED  |
| Bench Handling Shock            | -                                       | -   | PASSED  | PASSED  |
| Crash Hazard Shock              | -                                       | -   | PASSED  | PASSED  |
| Transportation Shock            | -                                       | -   | PASSED  | PASSED  |

## HP CHROMEBOOK

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| Test                            | HP Chromebook<br>14 G7 & HP<br>Chromebook<br>Enterprise 14 G7 | HP Chromebook<br>11 G9 EE & HP<br>Chromebook<br>Enterprise 11 G9 | HP Chromebook<br>11MK G9 EE & HP<br>Chromebook<br>Enterprise 11MK G9 |
|---------------------------------|---|--|--|
| 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   |





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| Test                            | HP Engage One All-in-One | HP Engage Go Mobile System | HP Engage Go Mobile Dock | HP Engage Flex Pro Retail System 810G | HP Engage Flex Pro-C Retail System 810G | HP Engage One Pro All-in-One |
|---------------------------------|--------------------------|----------------------------|--------------------------|---------------------------------------|---|------------------------------|
| <b>Tested Under</b>             | <b>810G</b>              | <b>810G</b>                | <b>810G</b>              | <b>810G</b>                           | <b>810G</b>                             | <b>810G</b>                  |
| Drop                            |                          | PASSED                     | PASSED                   | PASSED                                | PASSED                                  |                              |
| Functional Shock                | PASSED                   | PASSED                     | PASSED                   | -                                     | -                                       | PASSED                       |
| Vibration (Category 4)          | PASSED                   | PASSED                     | PASSED                   | PASSED                                | PASSED                                  | PASSED                       |
| Vibration (Category 24)         |                          | PASSED                     | 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                     | PASSED                   | -                                     | -                                       | -                            |
| Sand                            | -                        | -                          | -                        | -                                     | -                                       | -                            |
| Explosive Atmosphere            | -                        | -                          | -                        | -                                     | -                                       | -                            |
| Freeze/Thaw                     | -                        | -                          | -                        | -                                     | -                                       | -                            |

## HP THIN CLIENT

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| Test                            | HP mt43, mt44 Mobile Thin Client 810G | HP mt45 Mobile Thin Client 810G | HP mt20, mt21 Mobile Thin Client 810G | HP mt22, mt32, mt46 Mobile Thin Client 810H |
|---------------------------------|---------------------------------------|---------------------------------|---------------------------------------|---|
| <b>Tested Under</b>             | <b>810G</b>                           | <b>810G</b>                     | <b>810G</b>                           | <b>810H</b>                                 |
| Drop                            | PASSED                                | PASSED                          | 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                                | PASSED                                      |
| Dust                            | PASSED                                | PASSED                          | PASSED                                | PASSED                                      |
| Humidity                        | PASSED                                | PASSED                          | PASSED                                | PASSED                                      |
| Altitude                        | 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                                      |
| Explosive Atmosphere            | PASSED                                | -                               | PASSED                                | PASSED                                      |
| Freeze/Thaw                     | PASSED                                | PASSED                          | PASSED                                | PASSED                                      |
| Bench Handling Shock            | -                                     | PASSED                          | -                                     | PASSED                                      |
| Crash Hazard Shock              | -                                     | PASSED                          | -                                     | PASSED                                      |
| Transportation Shock            |                                       |                                 |                                       | PASSED                                      |



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# MIL-STD-810 TEST BACKGROUND

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.

### NOTE

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.

The following sections describe the grueling test scenarios to which these business-rugged PCs were subjected. All testing was performed by a third-party testing facility, using 810G or 810H methods and procedures.

### DROP TEST<sup>2</sup>

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 in. onto every side, angle and edge onto 2 in. of plywood over steel over concrete. Unit is powered down and checked for operation.

### FUNCTIONAL SHOCK TEST<sup>2</sup>

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<sup>2</sup>

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.



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## DUST TEST<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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.



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## CRASH HAZARD SHOCK TEST<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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<sup>2</sup>

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 g <sup>2</sup> /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°.   |
| 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  |



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| Test                        | MIL-STD-810G Reference   | Procedures                            | Key Test Parameters  |
|-----------------------------|--|---------------------------------------|--|
| <b>Altitude</b>             | MIL-STD-810G, Method 500.5 or 500.6, or MIL-STD-810H, Method 500.6 | Procedure I (Storage/air transport)   | Non-operational 15,000 feet at 57 kPa<br>One hour duration   |
|                             |  | Procedure II (Operation/air carriage) | Operational 15,000 feet at 57 kPa<br>One hour duration   |
| <b>High Temperature</b>     | MIL-STD-810G, Method 501.5 or 501.6, or MIL-STD-810H, Method 501.7 | Procedure I (Storage)                 | Non-operational<br>Temperature cycled between 35°C and 71°C (95°F and 160°F)   |
|                             |  | Procedure II (Operation)              | Test cycle 24 hours; test consisted of seven cycles<br>Operational 60°C (140°F)<br>Four hours duration   |
| <b>Low Temperature</b>      | MIL-STD-810G, Method 502.5 or 502.6, or MIL-STD-810H, Method 502.7 | Procedure I (Storage)                 | Non-operational -51°C (-60°F)<br>Four hours duration   |
|                             |  | Procedure II (Operation)              | Operational -29°C (-20°F)<br>Four hours duration   |
| <b>Temperature Shock</b>    | MIL-STD-810G, Method 503.5 or 503.6 or MIL-STD-810H, Method 503.7  | Procedure I                           | Non-operational<br>High temperature 60°C (140°F)<br>Low temperature -51°C (-60°F); Three cycles (a cycle consists of a dwell low, low to high, dwell high, high to low)<br>One hour dwell time |
| <b>Functional Shock</b>     | MIL-STD-810G, Method 516.6 or 516.7 or MIL-STD-810H, Method 516.8  | Procedure I                           | Operational<br>3 shocks/axis/direction for a total of 18 shocks; 40 Gs peak, 11 ms   |
| <b>Drop</b>                 | 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.   |
| <b>Explosive Atmosphere</b> | 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.  |
| <b>Freeze/Thaw</b>          | MIL-STD-810G, Method 524.1 or 524.5 or MIL-STD-810H, Method 524.1  | Procedure III                         | Non-operational<br>Exposed to a temperature drop of -10°C (14°F) for two hours<br>Unit is removed and checked for operation  |
| <b>Crash Hazard Shock</b>   | 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  |
| <b>Bench Handling Shock</b> | 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.  |



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| Test            | MIL-STD-810G Reference | Procedures   | Key Test Parameters   |
|-----------------|------------------------|--|---|
| Solar Radiation | Method 505.6           | Procedure II<br>Sample condition:<br>Non-Operation<br>Radiation source: Metal halide lamp<br>Irradiance: Spectral irradiance of (1120+/-47 W/m <sup>2</sup> at (300-3000) nm<br>Chamber temperature: 49 degree<br>Exposing duration: 20 hours irradiation and 4 hours darkness per a 24-hour cycle<br>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. |

## 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)<br>Humidity 39%<br>Between 6 to 8,000 Volts applied to: <ul style="list-style-type: none"> <li>• Horizontal Ground Plane</li> <li>• Vertical Ground Plane</li> <li>• Chassis Screw</li> <li>• Serial Port Ground</li> <li>• Screen</li> <li>• Fingerprint</li> <li>• Power Cable</li> <li>• Power Button</li> <li>• Keyboard</li> <li>• Speaker B</li> </ul> |

The MIL-STD-810 test specifications can be accessed at [iest.org/Standards-RPs/MIL-STD-810](http://iest.org/Standards-RPs/MIL-STD-810).

Learn more about HP business notebooks, tablets, and desktops at [hp.com](http://hp.com) or contact your local HP sales representative.

<sup>1</sup>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.

<sup>2</sup>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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