Environmental and Rough Handling Durability Challenge Tests

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Project Overview

- Purpose of Tests
- Goal
- General Assumptions
- Type of Durability Test
  - Assumptions
  - Rationale for the Test

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Project Overview Project Overview

- **Purpose of Tests**: To ensure that integrity is integral to the design and packaging of the CBRN Escape Respirator because of the One-Time Use Application.

- **Goal:** To ensure APR provides adequate respiratory protection after being subjected to potential environmental and normal transportation storage conditions by the user.

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General Assumptions

- Tests represent conditions induced by the user that a CBRN Escape Respirator may experience from the point of issue.
- CBRN Escape Respirator will be subjected to the test conditions in the "Ready-to-Use" Configuration, individual unit pack.
- CBRN Escape Respirator individual unit pack will remain sealed until use.
- Non-industrial use scenario – for CBRN emergency use only.

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Type of Environmental Test

- High Temperature: 71 ^{0}C (160 ^{0}F), Constant; MIL-STD-810F, Method 501.4.
- Duration: 5 weeks
- Assumption: Simulates Solar Loading Representative of Climatic Conditions in southwest U.S.
- Rationale: Meteorological Data obtained for Phoenix, AZ from ASU and NOAA; factored in Inducement Factor from MIL-STD-810F

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Type of Environmental Test

- Low Temperature: –31 ^{0}C (-24 ^{0}F), Constant; MIL-STD-810F, Method 502.4.
- Duration: 3 Days
- Assumption: Simulates outside storage in the U.S. Basic Cold Region.
- Rationale: Representative of minimum temperature in U.S. intermediate zones per MIL-STD-810F (Basic Cold); Duration is minimum 810F recommended exposure period.

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Type of Environmental Test

- Humidity: 31 ^{0}C (88 ^{0}F) to 41 ^{0}C (105 ^{0}F), at 88% - 59% RH, MIL-STD-810E, Method 507.3, Figure 507.3-I (cycle 1), Natural Diurnal Humidity Cycle.
- Duration: 5 Days ("quick look")
- Assumption: Represents natural temperature humidity profile in humid regions of U.S. per MIL-STD-810E such cities as Miami, FL.
- Rationale: Duration is minimum 810E recommended exposure period.

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Type of Transportation Test

- Vibration: MIL-STD-810F, Method 514.5, Vibration, Annex A, Category 4, Over U.S. Highways, Figure 514.5C-1, Unrestrained
- Duration: 3 Axes, 12 Hours per axis (36 hours total = 12,000 miles simulation)
- Assumption: replicates conditions of an unrestrained Respirator stored in a vehicle driven over U.S. roadways.
- Rationale: To determine if there are any potential initial life cycle failures.

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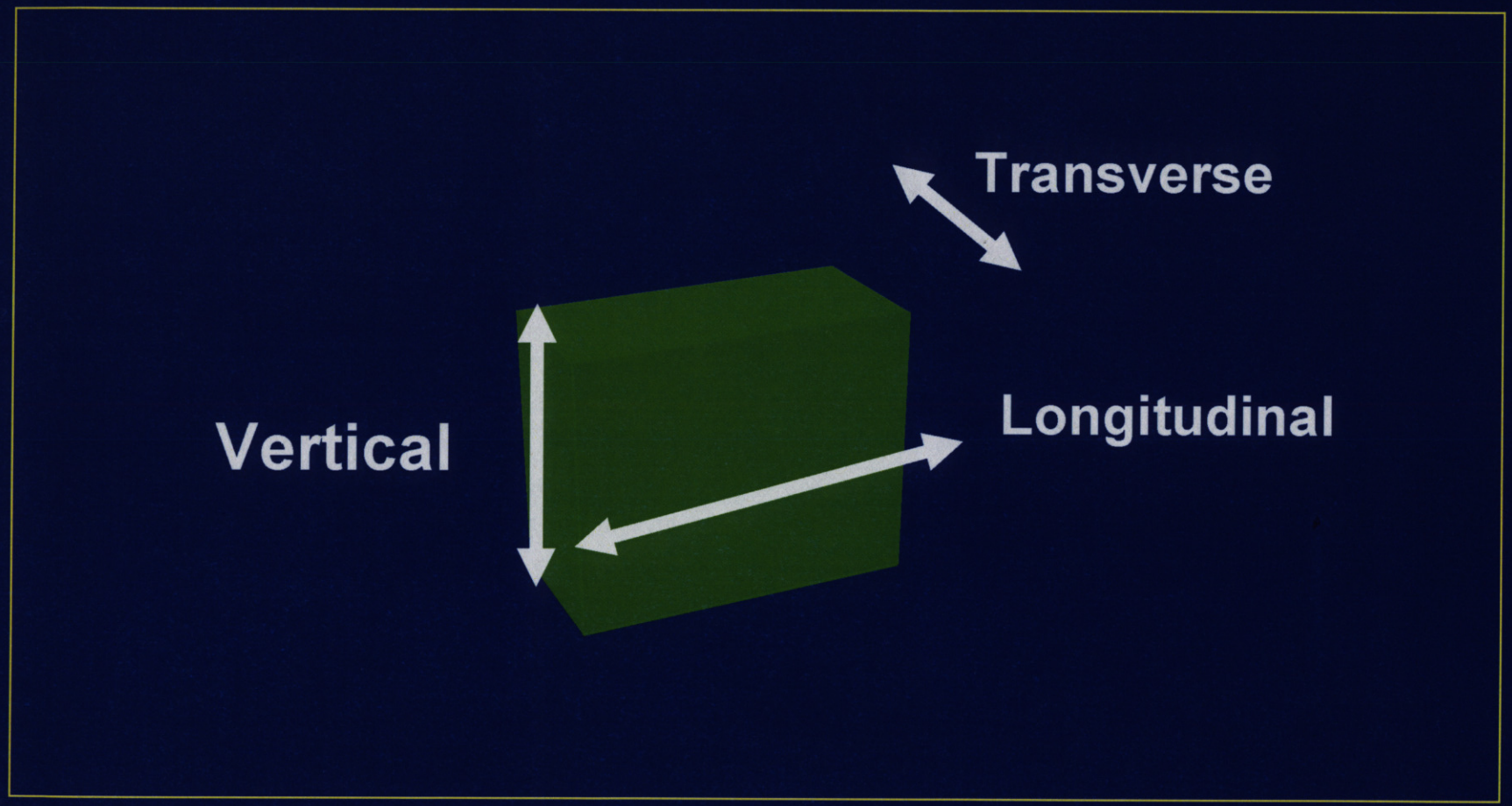
3 Axes of Vibration



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Rough Handling Test

- Drop Test: Height of 3 Feet
- Duration: Intent is to Drop Each Unit on each of the 3 Axes (1 Impact Surface per Axis)
- Assumption: To replicate several falls from a table or an automobile trunk
- Rationale: To ensure that integrity is integral to the design and packaging of the CBRN Air-Purifying Escape Respirator

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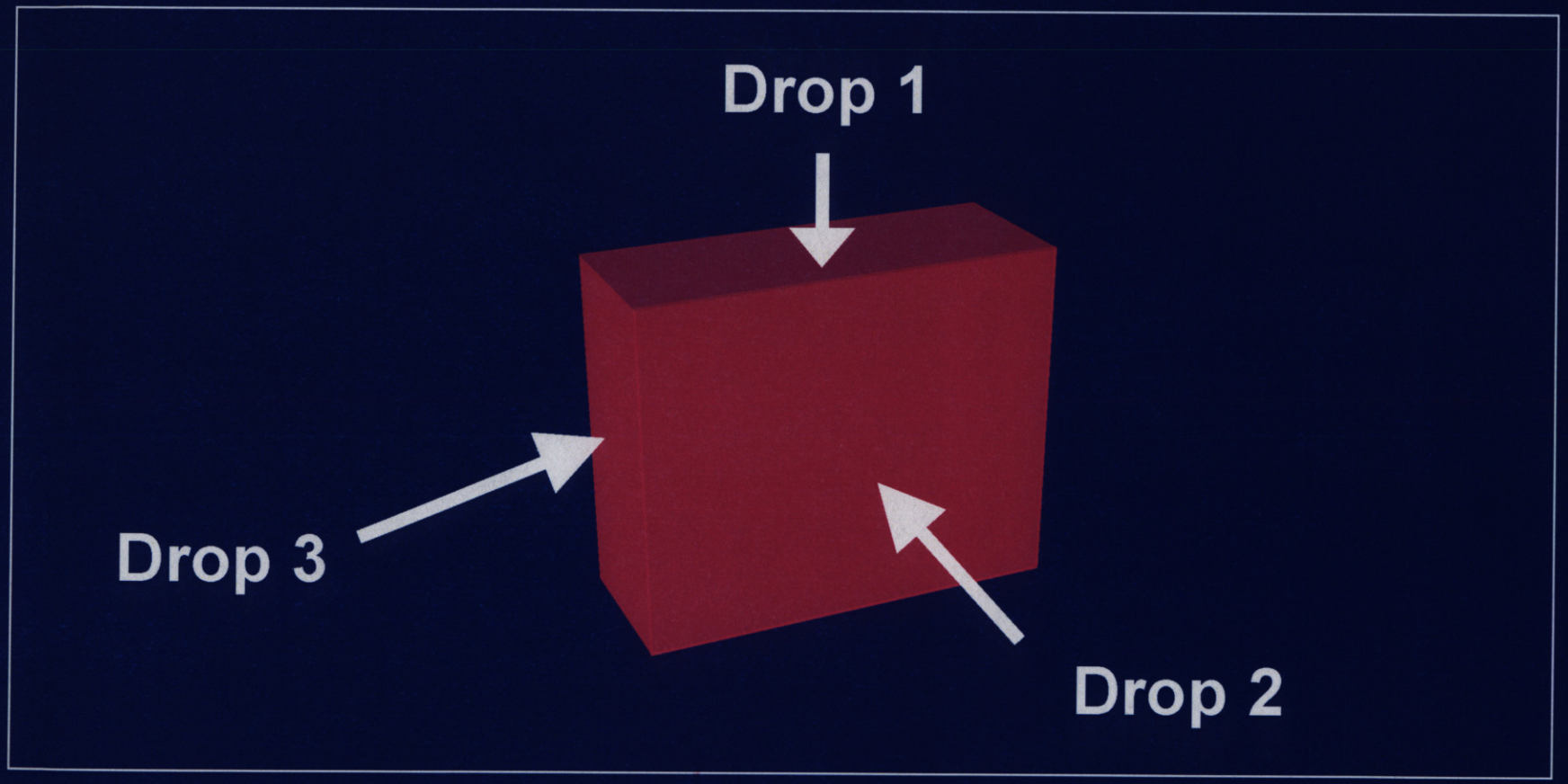
Axes of Drops



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Durability Test Matrix: Environmental, Transportation and Drop Tests

Test	Test Method	Test Condition	Duration
Hot Constant •	MIL-STD-810F, 501.4	71 ^{0}C (160 ^{0}F), Constant	5 Weeks
Cold Constant	MIL-STD-810F, 502.4	Basic Cold, -32 ^{0}C (-24 ^{0}F), Constant	3 Days
Humidity	MIL-STD-810E, 507.3	Realistic, Natural Cycle Humidity Profiles in the U.S.	5 Days "quick look" Mil-Std-810E Table 507.3-II
Transportation Vibration	MIL-STD-810F, 514.5	U. S. Roadway Vibration, Unrestrained	12 hours/axis, 3 Axes; Total Duration = 36 hours = 12,000 miles
Drop	Adopted from NIOSH, CBRN Full Facpiece Gas Mask	Height of 3 Feet	1 Drop on each of the 3 Axes per Unit

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