




# Rapid Decompression Testing



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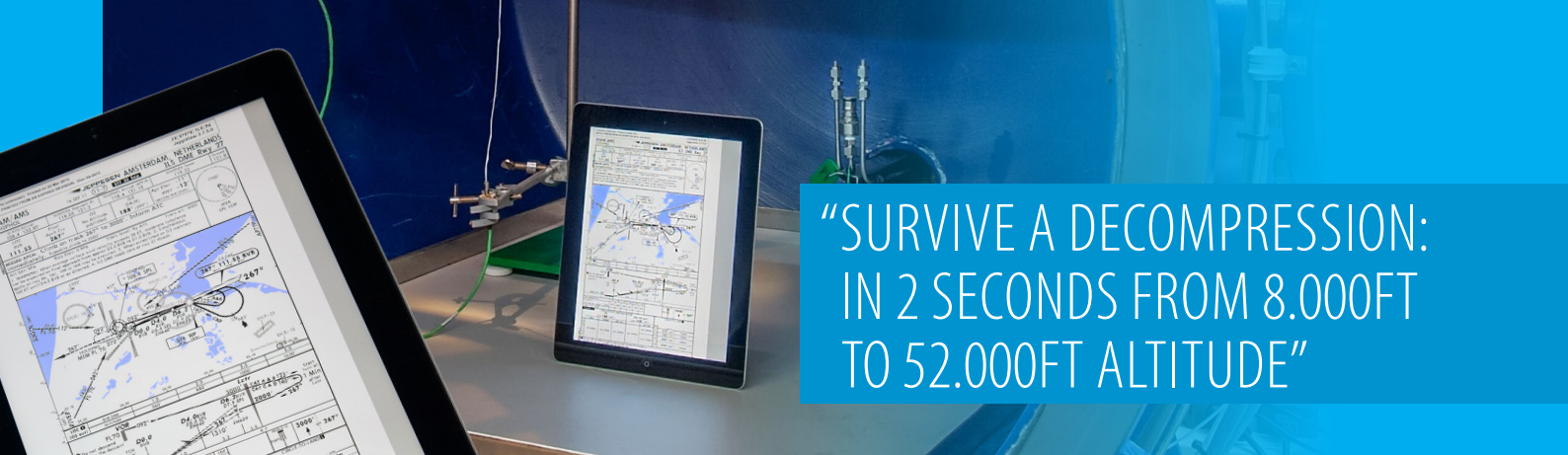
## "SURVIVE A RAPID DECOMPRESSION INCIDENT"

The challenge for an engineer is to design and develop equipment that survives a decompression event; it is our profession to prove that.

As part of the NLR's "One-stop shop" for Environmental testing, the NLR operates a Rapid Decompression test facility. This facility is developed to test the performance characteristics of avionics or materials during and after decompression.

The main components of the Rapid Decompression Facility are two vacuum vessels. A decompression test vessel can be evacuated to cabin pressures equivalent to 6000ft or 8000ft. A big vacuum buffer can be evacuated to pressures well below operation altitude. After opening a valve between both vessels, complete decompression of the test vessel can take place in 2 or 15 seconds to a maximum flight height of 52.000ft. Besides electrical malfunction, some of the problems that can be determined during decompression tests are: leakage, deformation, rupture or explosion of (gasket sealed) containers, or a change in physical properties of low density materials.

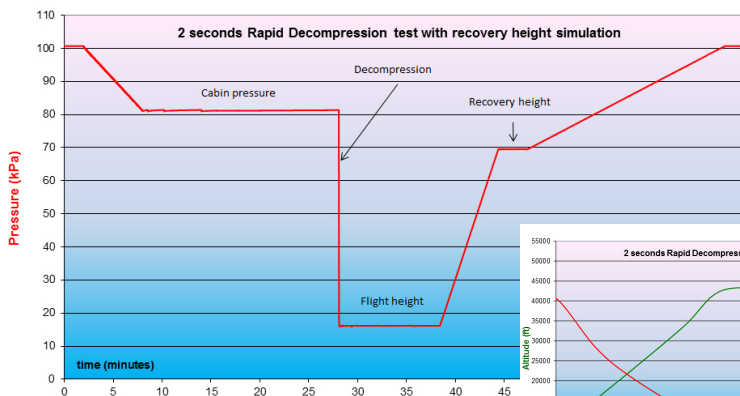




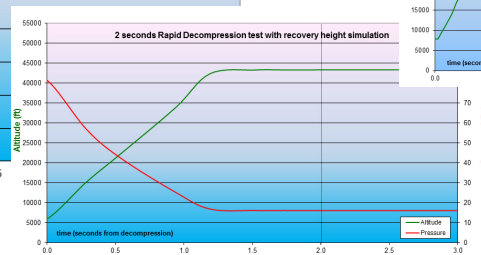
# "SURVIVE A DECOMPRESSION: IN 2 SECONDS FROM 8.000FT TO 52.000FT ALTITUDE"

## Decompression test on an iPad used as Electronic Flight Bag (EFB)

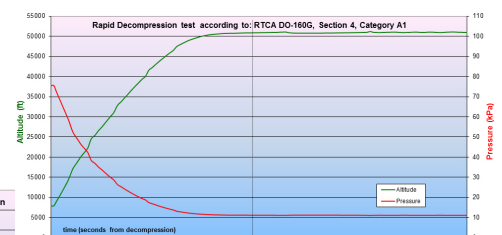
In the past NLR has tested NH90-avionics, night-vision cameras, AED's, galley equipment like bun warmers, convection- and steam- ovens, and all types of iPad used as Electronic Flight Bag (EFB). For an video of a decompression test on an EFB see:



Test profile of a Customized decompression test from 6000ft to 43.000 in 2 seconds



Pressure and equivalent altitude during the first seconds after decompression



"Standard" RTCA-DO160"-decompression test from 8000ft to 52.000 in 15 seconds

## Special Decompression Requirements

Decompression test profiles can be customized down to a decompression time of only 2 seconds. Modifying pressure change rates or implementing a recovery-height plateau is also possible. The maximum operation altitude to be simulated is 52.000 ft. The low pressure test, most often also required during certification tests, can easily be combined with the decompression test. For overpressure tests our pressure chamber can be utilized.

## Control and Instrumentation

The control and data acquisition of the facility is combined in a Labview program. For tests with a test article in operating condition a complete range of power supplies is available. A test article can be connected to the power supply and a functional test system via patch panels inside and outside the facility. Video monitoring is available to monitor the behavior of the equipment under test.

## Specifications:

- Test according:
  - RTCA DO-160G section 4
  - MIL-STD-810G Procedure III
  - Customer specifications
- Test Article dimensions 700x700x700mm
- Max. operation altitude: 52.000ft (MSL)
- Min. decompression time: 2 seconds
- Data acquisition (up to 20hz)
- Signal feed troughs for:
  - Power supply (3phase, Neutral & ground)
  - 9 thermocouples channels for K- or T-type
  - Video system
  - 19 Pins connector for test article data
  - Cooling water
  - 3x USB

## Plot

NLR is a founding member of the Dutch Association for Environmental Technology (PLOT)

