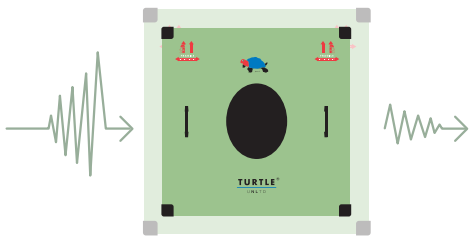
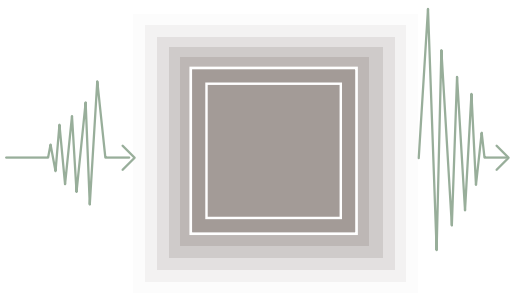
Turtle Performance Overview

Turtle is the safe, most innovative and sustainable museum crate in the world.
The claims illustrated below are founded in the results of research of Turtle uNLtd
in comparison to a museum quality double-walled wooden crate.

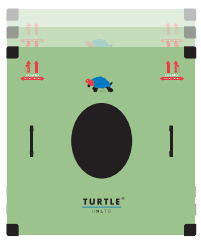


Turtle uNLtd

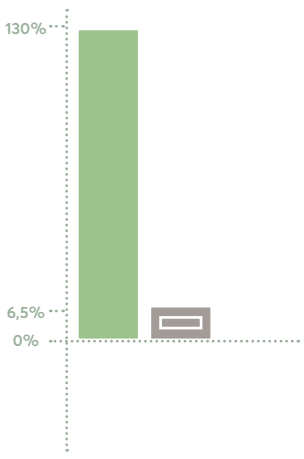


Double-walled wooden crate

Vibration Reduction Air Freight

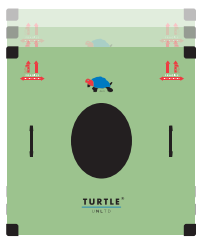


Turtle uNLtd and a double-walled wooden crate compared to the performance of a single-walled wooden crate (benchmark).

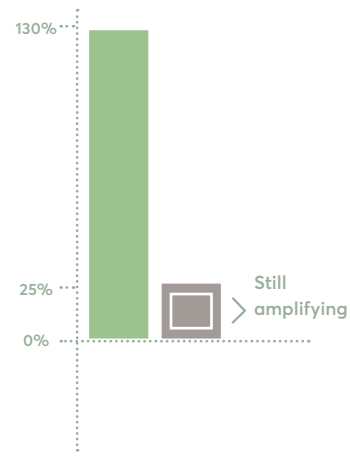


* 2 Hz to 300 Hz

Vibration Reduction Road Transport

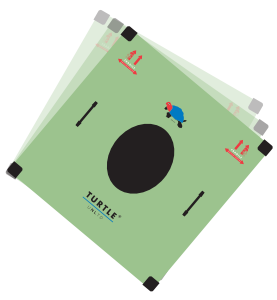


Turtle uNLtd and a double-walled wooden crate compared to the performance of a single-walled wooden crate (benchmark).

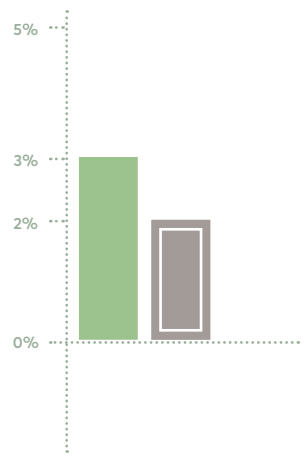


* 2 Hz to 200 Hz

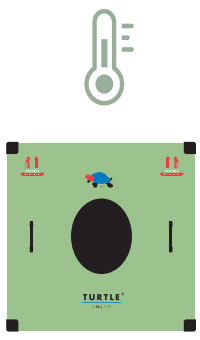
Shock Reduction



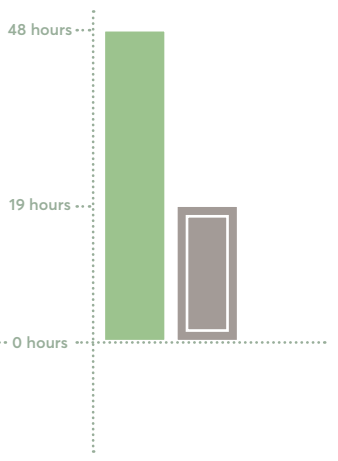
Turtle uNLtd and a double-walled wooden crate compared to the performance of a single-walled wooden crate (benchmark).



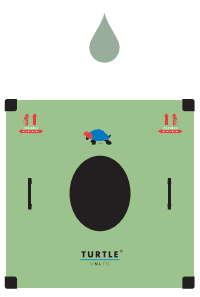
Temperature Performance



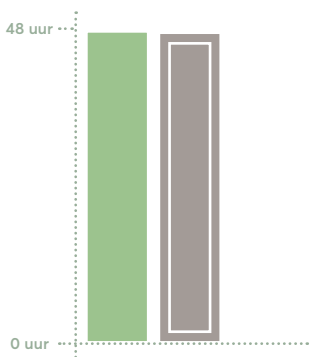
Gradual acclimatisation of micro climate over more than 48 hours.



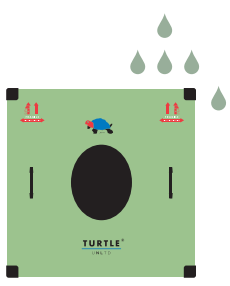
Humidity Performance



Humidity of micro climate is comparable in both crates.



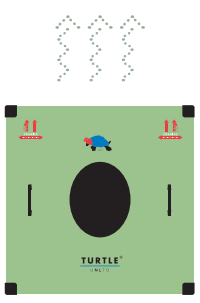
Water Resistance Performance



Turtle passed the rain test.

* IEC 60529 IPX3
  IEC 60529 IPX4

Off-gassing Performance



Turtle passed the Oddy test.

Legend

Turtle uNLtd

Double-walled wooden crate

TURTLE

Turtle Chart

		Climate performance	Vibration reduction	Shock protection	Versatility
	Single-walled wooden crate lined with 5cm high density + 5cm low density foam				
	Double-walled wooden crate lined with 5cm high density + 5cm low density foam				
	Yellow Turtle with standard corner blocks				
	Green Turtle uNLtd with standard corner blocks				
	Green Turtle uNLtd with advanced corner block T+				

Colophon

Testing facilities

BFSV · APD Applied Polymer Developments · topa institute · MASER ENGINEERING · smart vibrations

Accreditation

ista — Topa Institute & BFSV

DAkkS Deutsche Akkreditierungsstelle — BFSV

CERTIFIED ISO 9001:2015 COMPANY — Topa Institute

Test series (mechanical)	Transport simulation standard ASTM D4728-15	Transport simulation standard ASTM ASTMD4169	Real transport in truck	Modal analysis of truck and Turtle	Modal analysis of both crates	3-d shaker testing of painting dummies	3-d shaker testing	Modal testing of crates

Testing equipment	Modal shaker with force cell TMS-2025E PCB-208C02	16-Channel-Siemens/LMS SCADAS Mobile 1a	Accelerometer (triaxial) PCB-356A16	Geophon Geospace HS-1	Modal hammer 1 PCB-086C03	Modal hammer 2 PCB-086D20	Software Siemens Testlab Impactesting and MIMO FRF Testing
	Shaker2018 RMS TGD 6000-000.00, Shaker2020 L.A.B. – HV 60X60	3-D shaker IMV TS-3000-3.2H-CE	Vibration measurement System 16-Channel-Siemens/LMS SCADAS Mobile 1a	High speed camera measurement software LIMESS Istra 4.0			

Test series (climate): ASTM-standard D4332-14

Wooden crates benchmark museum specification

Single-walled wooden crate
- Panels: 18mm ply ISPM 15
- Structure: 25mm x 27mm batons ISPM 15
- Foam: 50mm Museum Art Foam 3010 / 50 mm Museum Art Foam 241 on bottom of the crate
- Seal: Stainless steel capture bolts. Neoprene gasket
- Feet: 100mm x 500mm timber ISPM 15
- Finish: Varnished

Double-walled wooden crate
- Panels: 18mm ply ISPM 15
- Structure: 25mm x 27mm batons ISPM 15
- Foam: 50mm Museum Art Foam 241 PE
- Inside box: 15 mm ply ISPM15
- Foam: 50mm polyether MAF3010
- Seal: Stainless steel capture bolts. Neoprene gasket
- Feet: 100mm x 500mm timber ISPM 15
- Finish: Varnished

TURTLE®