



by UL Solutions

TESTING LABORATORY CAPABILITIES HOUSEHOLD

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Electromagnetic capability testing capacity

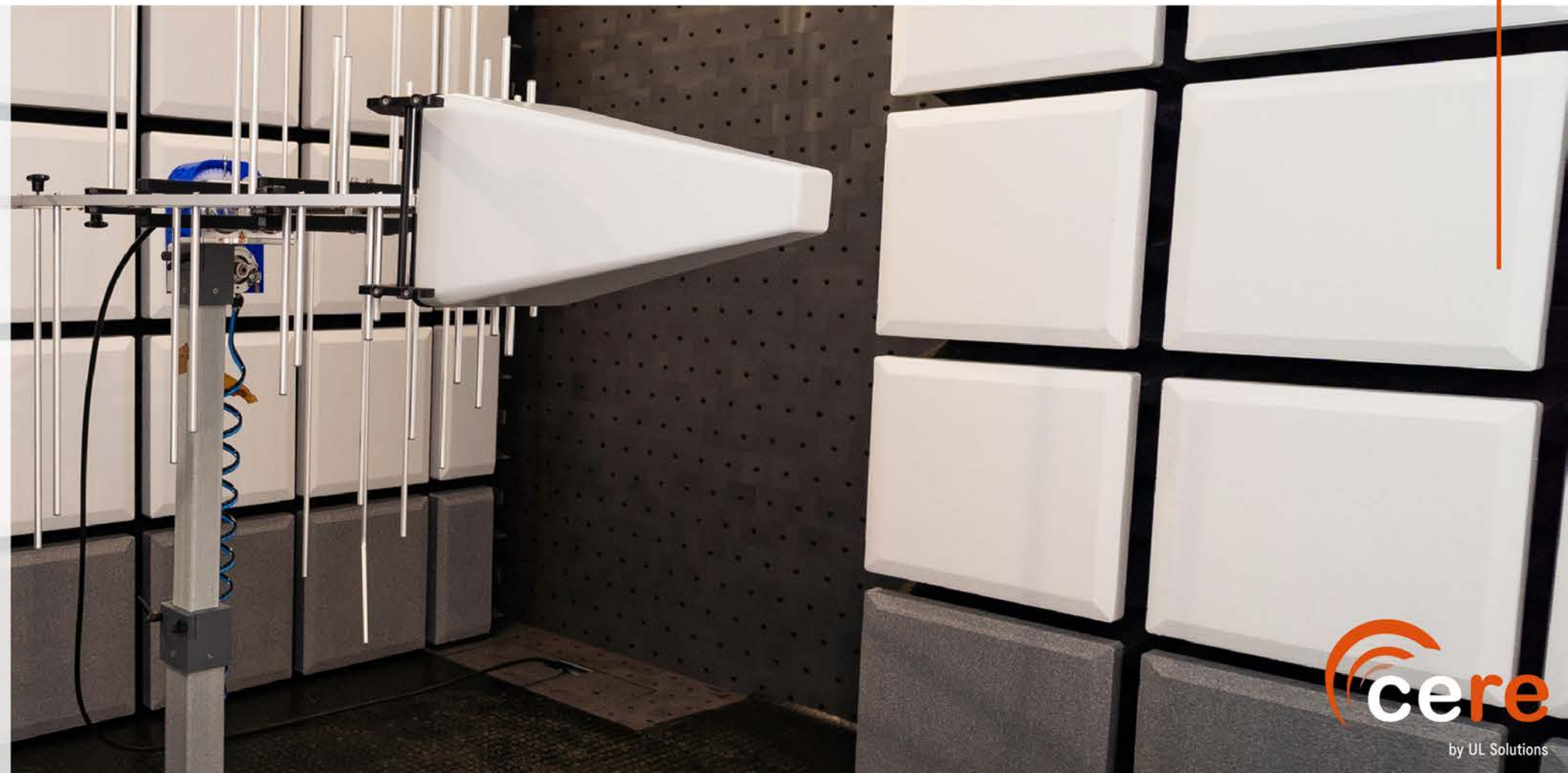
FULL ANECHOIC

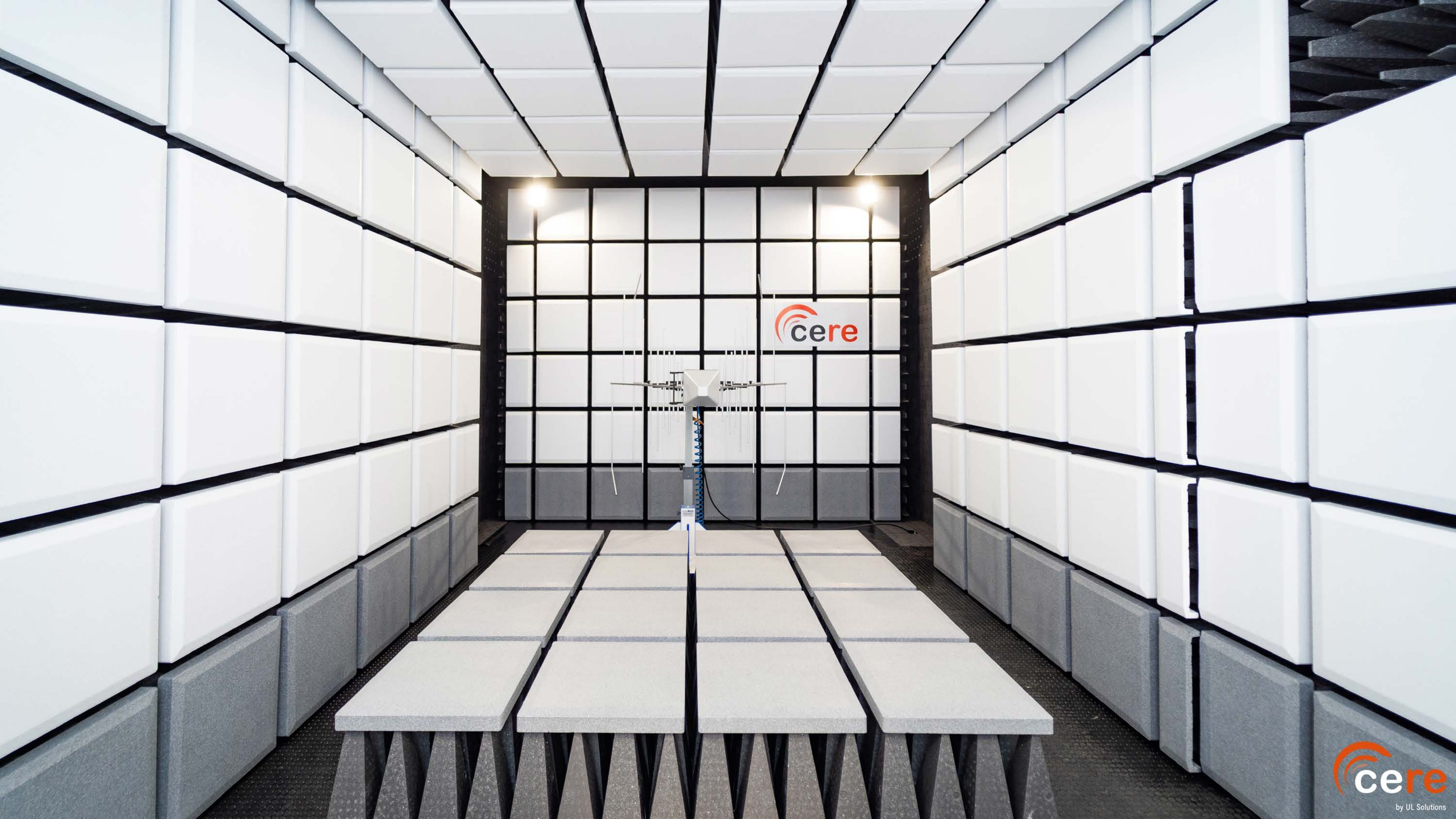
CERE, by UL Solutions has a Chamber in its facilities Anechoic, with Quiera Zone (QZ) Ø1.5m (rotary platform), to perform Electromagnetic compatibility tests at 3m for Radiated Immunity and emission, and domestic and Industrial Environments: 80MHz range capability up to 6GHz

Exterior dimensions:
approx. 8.10m x 4.80m x 3.975m

Rotatory platform: 1,5m of diameter.
Door 1,5m x 2,4m H

Inner dimensions in between hybrid
absorbers (HT45 model):
(L x W x H) approx. 7.08m x 3.78m x 2.81m.





Dimensions

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approx. 8.10m x 4.80m x 3.975m

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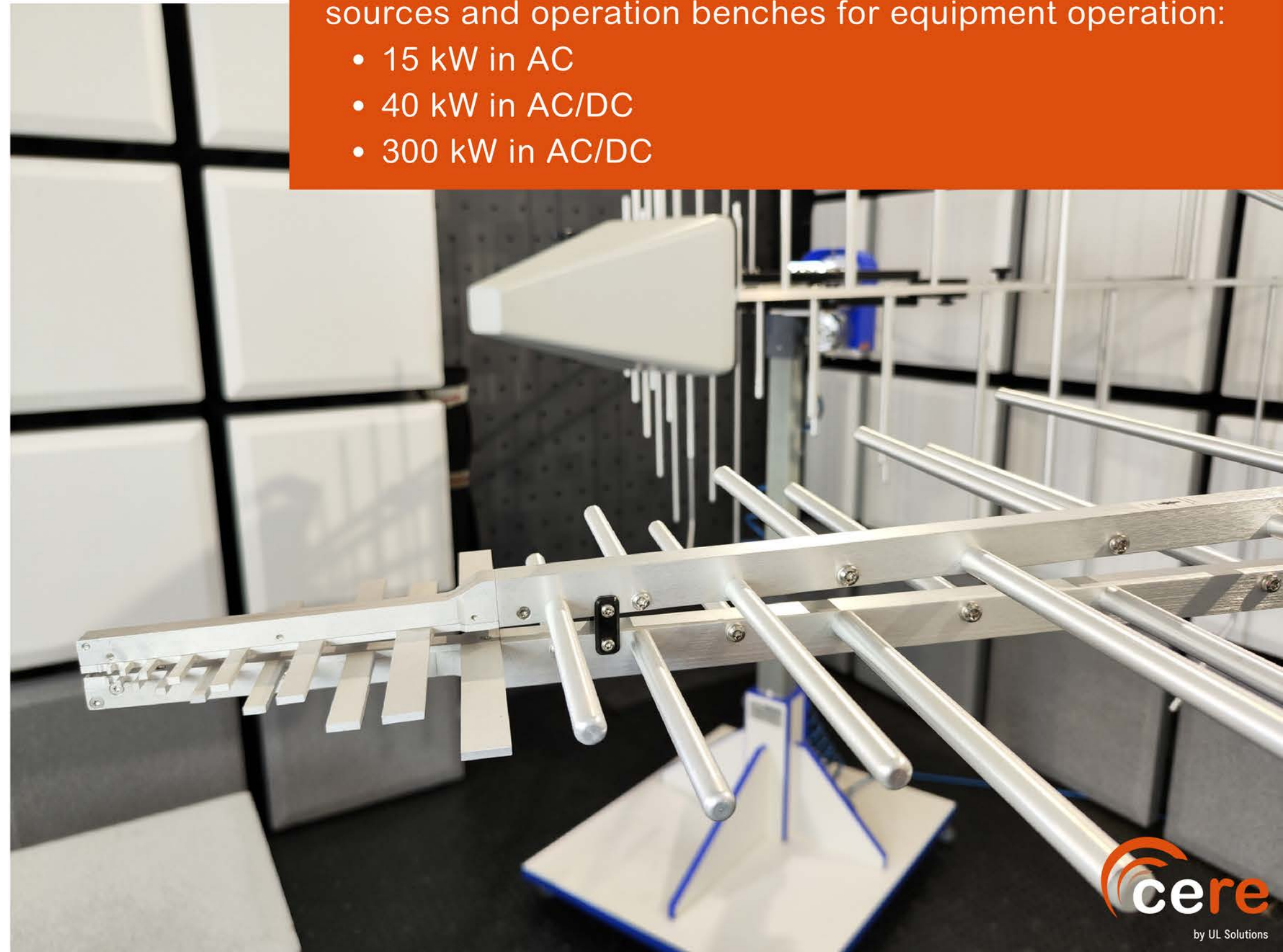
Inner dimensions in between hybrid absorbers (HT45 model):
(L x W x H) approx. 7.08m x 3.78m x 2.81m.

Maximum weight: 700kg.
Equipment up to 1 ton could be considered.

Operating power of the equipment under test

There are three possible configurations based on CERE sources and operation benches for equipment operation:

- 15 kW in AC
- 40 kW in AC/DC
- 300 kW in AC/DC



Technical features

Fully anechoic 3-meter chamber working in the time domain. The combination of these innovative technologies results in measurement time effort between 8 and 10 times shorter than timing required a classic chamber, providing more complete results, since it offers final results with all points in QP. 3D graphical representation of the equipment's emissions.

Measurements up to 6 GHz both in emission and radiated immunity.

Testing capacity for equipment with a power up to 300kW.

Emission

- Radiated emission
- Conducted emission measurements by LISN, voltage and current probe
- Clicks
- Harmonics and Flicker

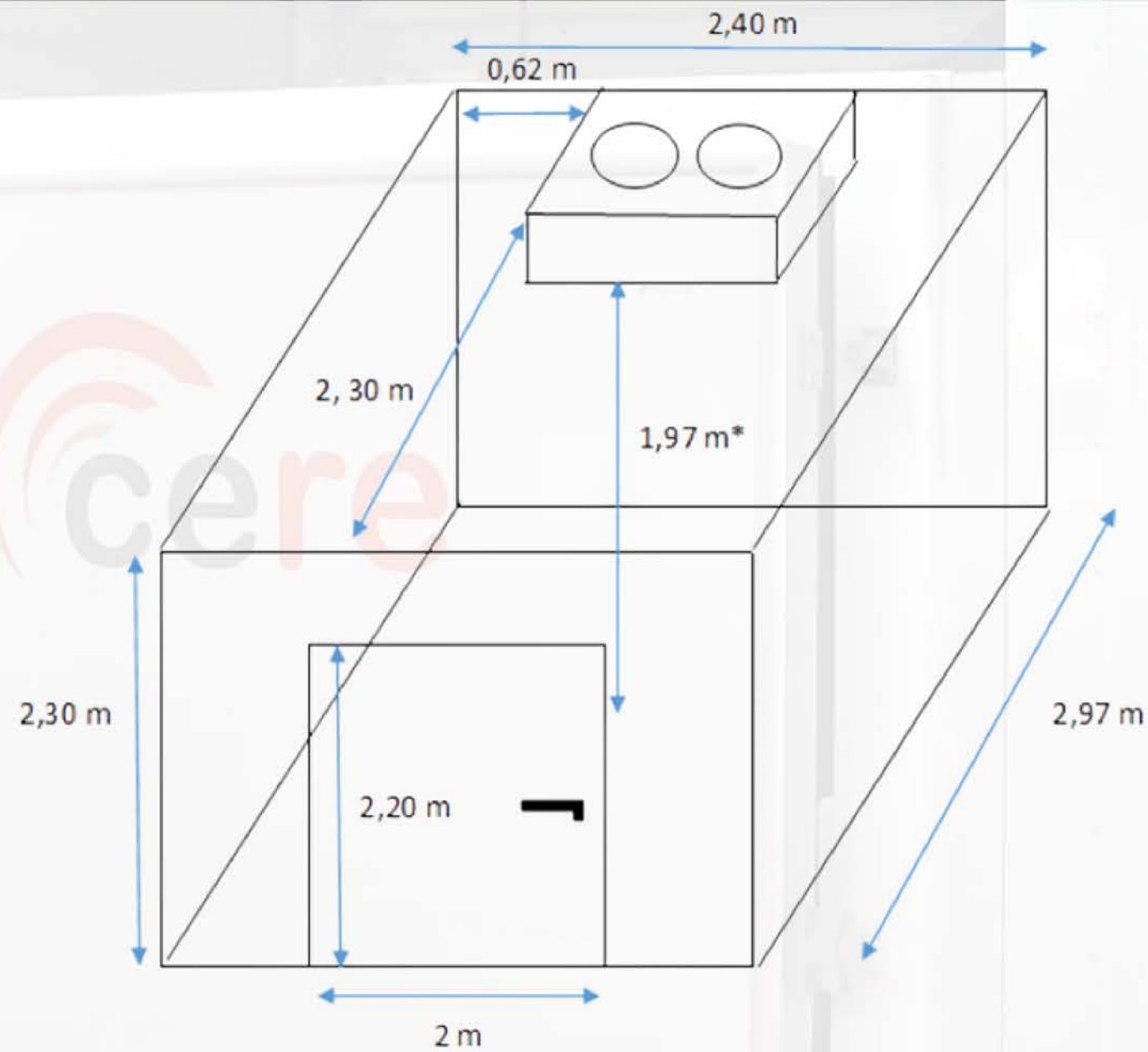
Immunity

- IEC 61000-4-2: Electrostatic discharges (ESD)
- IEC 61000-4-3: Radiated immunity to electromagnetic fields
- IEC 61000-4-4: Bursts
- IEC 61000-4-5: Shock waves
- IEC 61000-4-6: Conducted immunity
- IEC 61000-4-8: Electromagnetic fields immunity
- IEC 61000-4-11 & IEC 61000-4-34: Abnormal voltages
- IEC 61000-4-12: Ring wave

Environmental testing capability

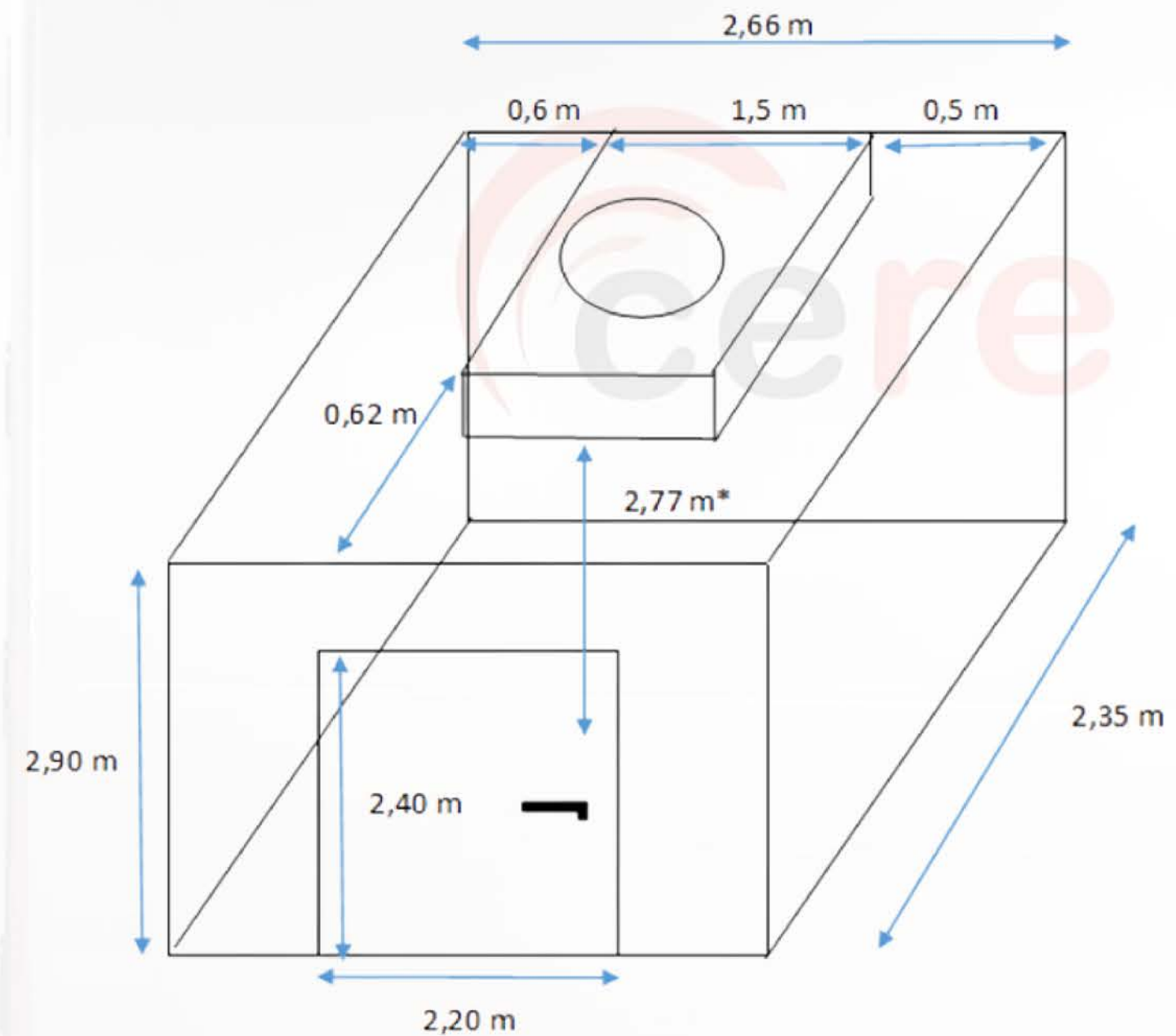
CERE, by UL Solutions has several climatic chambers on the Laboratory facilities for temperature and humidity testing, for EUT within 3 tones and 2.4 meter high. Our capabilities include cycle programming, gradients, temperature steps, and all kind of variations. Temperature range is within -40°C and +125°C and RH up to 95%.





* Ground clearance

High temperature Chamber



* Ground clearance

Low temperature Chamber

Low temperature chamber

- Upper and lower operating temperature limits: +5°C to -40°C
- Gradients range: Manual selection
- EUT operating power: Power connected to power benches 1, 2 and 3 independently or in parallel up to 500kVA.

High temperature chamber

- Upper and lower operating temperature limits with their respective relative humidity values: 85 °C with up to %RH: 85± 3 %, 70 °C with up to %RH: 95± 3 %
- Gradients range: Manual selection
- Max %RH: 95± 3 %
- EUT operating power: Power connected to power benches 1, 2 and 3 independently or in parallel up to 500kVA.

The dry heat test (without humidity), is performed at rated power and for the high humidity test, the equipment is not connected

Heat drying oven

- Dimensions: 420x395x350 mm
- Volume: 50 liters
- Temperature Range: 25°C to 250°C
- Also used for pressure ball testing.

Dycometal temperature chamber

- Dimensions: 780 x 810 x 720 mm
- Upper and lower operating temperature limits: -40 to 125 °C without humidity / 85° and 85 % H.R.
- Programable gradient range: 2°C / minute of heating 1°C / minute of cooling
- Max %RH: 95± 3 %
- EUT operating power: Depending on the source or operating bench.

Binder temperature chamber

- Dimensions: 650 x 785 x 485 mm
- Upper and lower operating temperature limits: -40 to 125 °C without humidity / 85° and 85 % H.R.
- Programable gradient range: 2°C / minute of heating 1°C / minute of cooling
- Max%RH: 95± 3 %
- EUT operating power: Depending on the source or operating bench

IPXX and Nema Laboratory Capabilities

- Tests can be performed up to IP 65
- Dust chamber dimensions for IP5X / IP6X: (960 x 960 x 980)
- NEMA tests: Rain Test
- Sprinkler test

CTS Climatic chamber

CLIMATIC TESTS

- Upper and lower operating temperature limits: 10 to 95 °C
- Temperature fluctuation: Temporary of $\pm 0,1$ to $\pm 0,3$ K
- Humidity range: 10 % to 98 %
- Dew point range: 5 to 89 °C
- Humidity fluctuation: Temporary of $\pm 1\%$ to ± 3 %

- Chamber dimensions: 1000 x 1050 x 2000 mm
- Capacity: Aprox. 2000 l

TEMPERATURE TESTS

- Upper and lower operating temperature limits: -70 to 180 °C
- Temperature fluctuation: Temporary of $\pm 0,3^{\circ}\text{C}$
- Programable gradient ranger: 2°C / minute of heating 2°C / minute of cooling
- EUT: 200 Kg of photovoltaic panel

Incandescent wire chamber

- Chamber dimensions: 1100 × 700 × 1300 mm, exhaust hole Ø100mm
- Power: 800 VA, 220 V, 48-60 Hz
- Capacity : >0.5 m³
- Upper and lower operating temperature limits: 500-1000°C ± 2 °C continuously adjustable
- Glow wire: Ø 4 mm ± 0.04 mm Ni/Cr (80/20)
- Penetration depth: 7 mm ± 0.5 mm

CTI test chamber

- Chamber dimensions: 1100 x 700 x 1300 mm.
- Power: 800 VA, 220 V, 48-60 Hz
- Capacity: >0.5 m³
- Electrode distance: 4 mm ± 0.1 mm, 60 ± 5° angle.
- Test voltage: 100 - 600 V adjustable.
- Test current: Limited to 1 A ± 0.1 A adjustable.

Salt fog chamber

- Chamber dimensions: 600 x 450 x 400 mm
- Power: 220 V, 1.5 KW, 50 Hz
- Capacity : Aprox. 108 l
- Salt spray test: $35^{\circ}\text{C} \pm 1^{\circ}\text{C}$ (Test room temperature), $47^{\circ}\text{C} \pm 1^{\circ}\text{C}$ (Saturated air barrel temperature)
- Corrosion test: $50^{\circ}\text{C} \pm 1^{\circ}\text{C}$ (Test room temperature), $63^{\circ}\text{C} \pm 1^{\circ}\text{C}$ (Saturated air barrel temperature)

Needle flame chamber

- Chamber dimensions: 1100 x 700 x 1300 mm, exhaust orifice $\varnothing 100\text{mm}$
- Power: 800 VA, 220 V, 48-60 Hz
- Capacity: $>0.5 \text{ m}^3$
- Test temperature range: $0 - 1000^{\circ}\text{C}$
- Flame temperature: from $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ liters to $700^{\circ}\text{C} \pm 3^{\circ}\text{C}$ liters in $23.5 \text{ s} \pm 1 \text{ s}$

Standards for household and similar electrical appliances products

ELECTROMAGNETIC COMPATIBILITY STANDARDS

Electromagnetic compatibility product standards for household and similar electrical appliances products are covered by the following series:

- CISPR 55014-1
- CISPR 55014-2

SAFETY STANDARDS IEC 60335

The IEC 60335 series of standards covers the safety requirements for household and similar electrical appliances.

They are divided into two parts:

- General standard: IEC 60335-1
- Specific standard: IEC 60335-2-XX

Product standards - EMC

Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus

CISPR 55014-1: Emission
CISPR 55014-2: Immunity

IMMUNITY

- IEC 61000-4-2: Electrostatic discharges (ESD)
- IEC 61000-4-3: Radiated immunity to electromagnetic fields
- IEC 61000-4-4: Bursts
- IEC 61000-4-5: Shock waves
- IEC 61000-4-6: Conducted immunity
- IEC 61000-4-8: Electromagnetic fields immunity
- IEC 61000-4-11 & IEC 61000-4-34: Abnormal voltages
- IEC 61000-4-12: Ring wave

EMISSION

- CISPR 11: Radiated emission
- Conducted emission measurements by LISN, voltage and current probe
- Clicks
- IEC 61000-3-2: Harmonics
- IEC 61000-3-3: Flicker

Normas específicas IEC 60335 - Seguridad

| STANDARD | EQUIPMENT UNDER TEST |
|----------------|--|
| IEC 60335-2-2 | Vacuum cleaners and water-suction cleaning appliances |
| IEC 60335-2-3 | Electric irons |
| IEC 60335-2-4 | Spin extractors |
| IEC 60335-2-5 | Dishwashers |
| IEC 60335-2-6 | Stationary cooking ranges, hobs, ovens and similar appliances |
| IEC 60335-2-7 | Washing machines |
| IEC 60335-2-8 | Shavers, hair clippers and similar appliances |
| IEC 60335-2-9 | Grills, toasters and similar portable cooking appliances |
| IEC 60335-2-10 | Floor treatment machines and wet scrubbing machines |
| IEC 60335-2-11 | Tumble dryers |
| IEC 60335-2-12 | Warming plates and similar appliances |
| IEC 60335-2-13 | Fat fryers, frying pans and similar appliances |
| IEC 60335-2-14 | Kitchen machines |
| IEC 60335-2-15 | Appliances for heating liquids |
| IEC 60335-2-16 | Food waste disposers |
| IEC 60335-2-17 | Blankets, pads, clothing and similar flexible heating appliances |

| STANDARD | EQUIPMENT UNDER TEST |
|----------------|--|
| IEC 60335-2-21 | Storage water heaters |
| IEC 60335-2-23 | Appliances for skin or hair care |
| IEC 60335-2-24 | Refrigerating appliances, ice-cream appliances and ice makers |
| IEC 60335-2-25 | Microwave ovens, including combination microwave ovens |
| IEC 60335-2-26 | Clocks |
| IEC 60335-2-27 | Appliances for skin exposure to optical radiation |
| IEC 60335-2-28 | Sewing machines |
| IEC 60335-2-29 | Battery chargers |
| IEC 60335-2-30 | Room heaters |
| IEC 60335-2-31 | Range hoods and other cooking fume extractors |
| IEC 60335-2-32 | Massage appliances |
| IEC 60335-2-34 | Motor-compressors |
| IEC 60335-2-35 | Instantaneous water heaters |
| IEC 60335-2-36 | Commercial electric cooking ranges, ovens, hobs and hob elements |
| IEC 60335-2-37 | Commercial electric doughnut fryers and deep fat fryers |
| IEC 60335-2-38 | Commercial electric griddles and griddle grills |
| IEC 60335-2-39 | Commercial electric multi-purpose cooking pans |
| IEC 60335-2-40 | Electrical heat pumps, air-conditioners and dehumidifiers |

Normas específicas IEC 60335 - Seguridad

| STANDARD | EQUIPMENT UNDER TEST |
|----------------|---|
| IEC 60335-2-41 | Pumps |
| IEC 60335-2-42 | Commercial electric forced convection ovens, steam cookers and steam-convection ovens |
| IEC 60335-2-43 | Particular clothes dryers and towel rails |
| IEC 60335-2-44 | Ironers |
| IEC 60335-2-45 | Portable heating tools and similar appliances |
| IEC 60335-2-47 | Commercial electric boiling pans |
| IEC 60335-2-48 | Commercial electric grillers and toasters |
| IEC 60335-2-49 | Commercial electric appliances for keeping food and crockery warm |
| IEC 60335-2-50 | Commercial electric bains-marie |
| IEC 60335-2-51 | Stationary circulation pumps for heating and service water installations |
| IEC 60335-2-52 | Oral hygiene appliances |
| IEC 60335-2-53 | Sauna heating appliances and infrared cabins |
| IEC 60335-2-54 | Surface-cleaning appliances for household use employing liquids or steam |
| IEC 60335-2-55 | Electrical appliances for use with aquariums and garden ponds |
| IEC 60335-2-58 | Commercial electric dishwashing machines |
| IEC 60335-2-59 | Insect killers |
| IEC 60335-2-60 | Whirlpool baths and whirlpool spas |

| STANDARD | EQUIPMENT UNDER TEST |
|----------------|--|
| IEC 60335-2-61 | Thermal storage room heaters |
| IEC 60335-2-62 | Commercial electric rinsing sinks |
| IEC 60335-2-64 | Commercial electric kitchen machines |
| IEC 60335-2-65 | Air-cleaning appliances |
| IEC 60335-2-66 | Water-bed heaters |
| IEC 60335-2-67 | Floor treatment machines, for commercial use |
| IEC 60335-2-68 | Spray extraction machines, for commercial use |
| IEC 60335-2-69 | Wet and dry vacuum cleaners |
| IEC 60335-2-70 | Milking machines |
| IEC 60335-2-71 | Electrical heating appliances for breeding and rearing animals |
| IEC 60335-2-72 | Floor treatment machines with or without traction drive |
| IEC 60335-2-73 | Fixed immersion heaters |
| IEC 60335-2-74 | Portable immersion heaters |
| IEC 60335-2-75 | Commercial dispensing appliances and vending machines |
| IEC 60335-2-76 | Electric fence energizers |
| IEC 60335-2-77 | Pedestrian controlled mains-operated lawnmowers |
| IEC 60335-2-78 | Outdoor barbecues |
| IEC 60335-2-79 | High pressure cleaners and steam cleaners |
| IEC 60335-2-80 | Fans |

Normas específicas IEC 60335 - Seguridad

| STANDARD | EQUIPMENT UNDER TEST |
|-----------------|---|
| IEC 60335-2-81 | Foot warmers and heating mats |
| IEC 60335-2-82 | Amusement machines and personal service machines |
| IEC 60335-2-83 | Heated gullies for roof drainage |
| IEC 60335-2-84 | Toilet appliances |
| IEC 60335-2-85 | Fabric steamers |
| IEC 60335-2-86 | Electric fishing machines |
| IEC 60335-2-87 | Electrical animal stunning equipment |
| IEC 60335-2-88 | Humidifiers intended for use with heating, ventilation, or air-conditioning systems |
| IEC 60335-2-89 | Commercial refrigerating appliances and ice-makers |
| IEC 60335-2-90 | Commercial microwave ovens |
| IEC 60335-2-91 | Walk-behind and hand-held lawn trimmers and lawn edge trimmers |
| IEC 60335-2-92 | Pedestrian-controlled mains-operated lawn scarifiers and aerators |
| IEC 60335-2-94 | Scissors type grass shears |
| IEC 60335-2-95 | Drives for vertically moving garage doors for residential use |
| IEC 60335-2-96 | Flexible sheet heating elements for room heating |
| IEC 60335-2-97 | Drives for shutters, awnings, blinds and similar equipment |
| IEC 60335-2-98 | Humidifiers |
| IEC 60335-2-99 | Commercial electric hoods |
| IEC 60335-2-100 | Hand-held mains-operated garden blowers, vacuums and blower vacuums |

| STANDARD | EQUIPMENT UNDER TEST |
|-----------------|--|
| IEC 60335-2-101 | Vaporizers |
| IEC 60335-2-102 | Gas, oil and solid-fuel burning appliances having electrical connections |
| IEC 60335-2-103 | Drives for gates, doors and windows |
| IEC 60335-2-104 | Appliances to recover and/or recycle refrigerant from air conditioning and refrigeration equipment |
| IEC 60335-2-105 | Multifunctional shower cabinets |
| IEC 60335-2-106 | Heated carpets and for heating units for room heating installed under removable floor coverings |
| IEC 60335-2-107 | Robotic battery powered electrical lawnmowers |
| IEC 60335-2-108 | Electrolysers |
| IEC 60335-2-109 | UV radiation water treatment appliances |
| IEC 60335-2-110 | Commercial microwave appliances with insertion or contacting applicators |
| IEC 60335-2-111 | Electric ondol mattress with a non-flexible heated part |
| IEC 60335-2-113 | Beauty care appliances incorporating lasers and intense light sources |
| IEC 60335-2-114 | Self-balancing personal transport devices |
| IEC 60335-2-115 | Skin beauty care appliances |
| IEC 60335-2-116 | Furniture with electrically motorized parts |
| IEC 60335-2-118 | Professional ice-cream makers |
| IEC 60335-2-119 | Commercial vacuum packaging appliances |

Contact

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