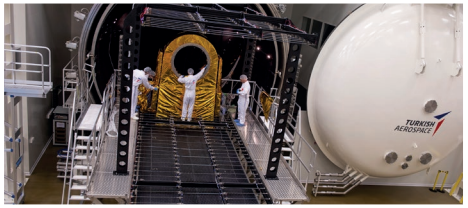
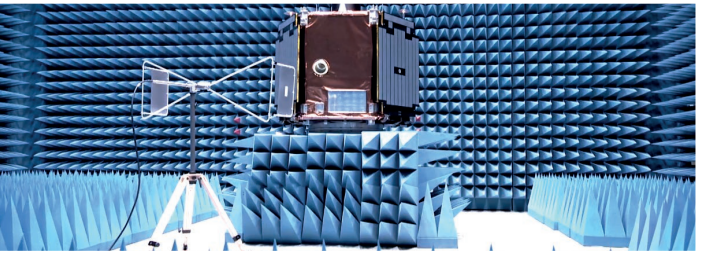
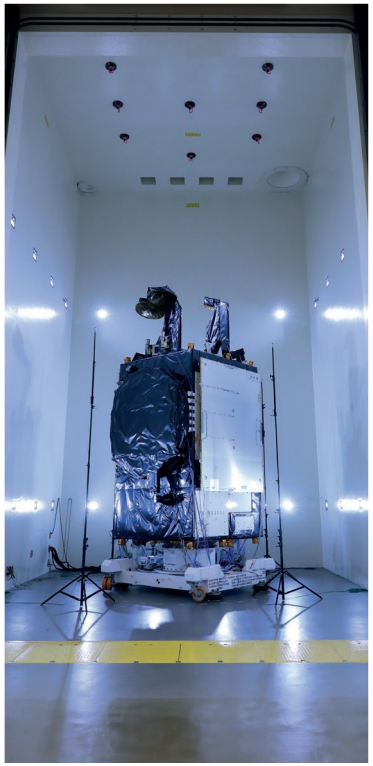
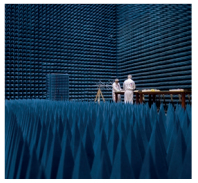
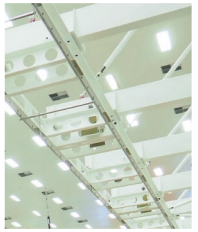
TURKISH AEROSPACE





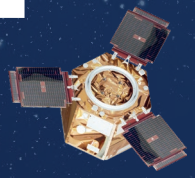






SPACE SYSTEMS

ASSEMBLY INTEGRATION AND TEST (AIT) CENTER



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SPACE SYSTEMS
ASSEMBLY INTEGRATION
AND TEST (AIT) CENTER


TURKISH
AEROSPACE

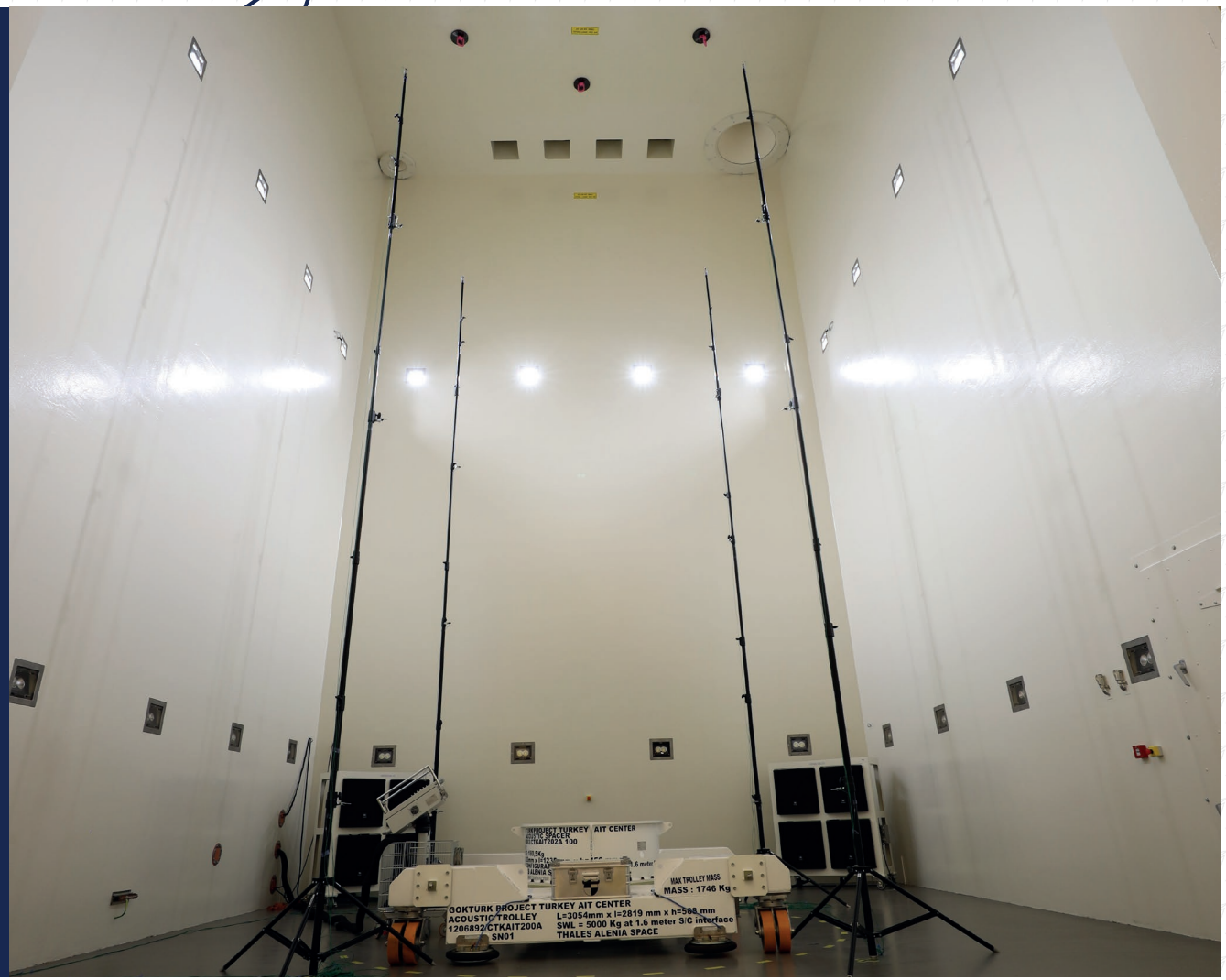

TÜRKSAT 6A

VIBRATION
TEST SYSTEM

SYSTEM SPECIFICATIONS

Max. load capacity	8000 kg
Max. force	289 kN sine 266 kN random 578 kN shock
Frequency range	5 – 2000 Hz
Slip table dimensions	2.4 m x 2.4 m
Head expander diameter	2.1 m
Distance between vibration interface tools and overhead crane hook	8 m

SHAKER AND SLIP TABLE OF TEST SYSTEM



REVERBERANT ROOM OF TEST SYSTEM

ACOUSTIC TEST SYSTEM

SYSTEM SPECIFICATIONS

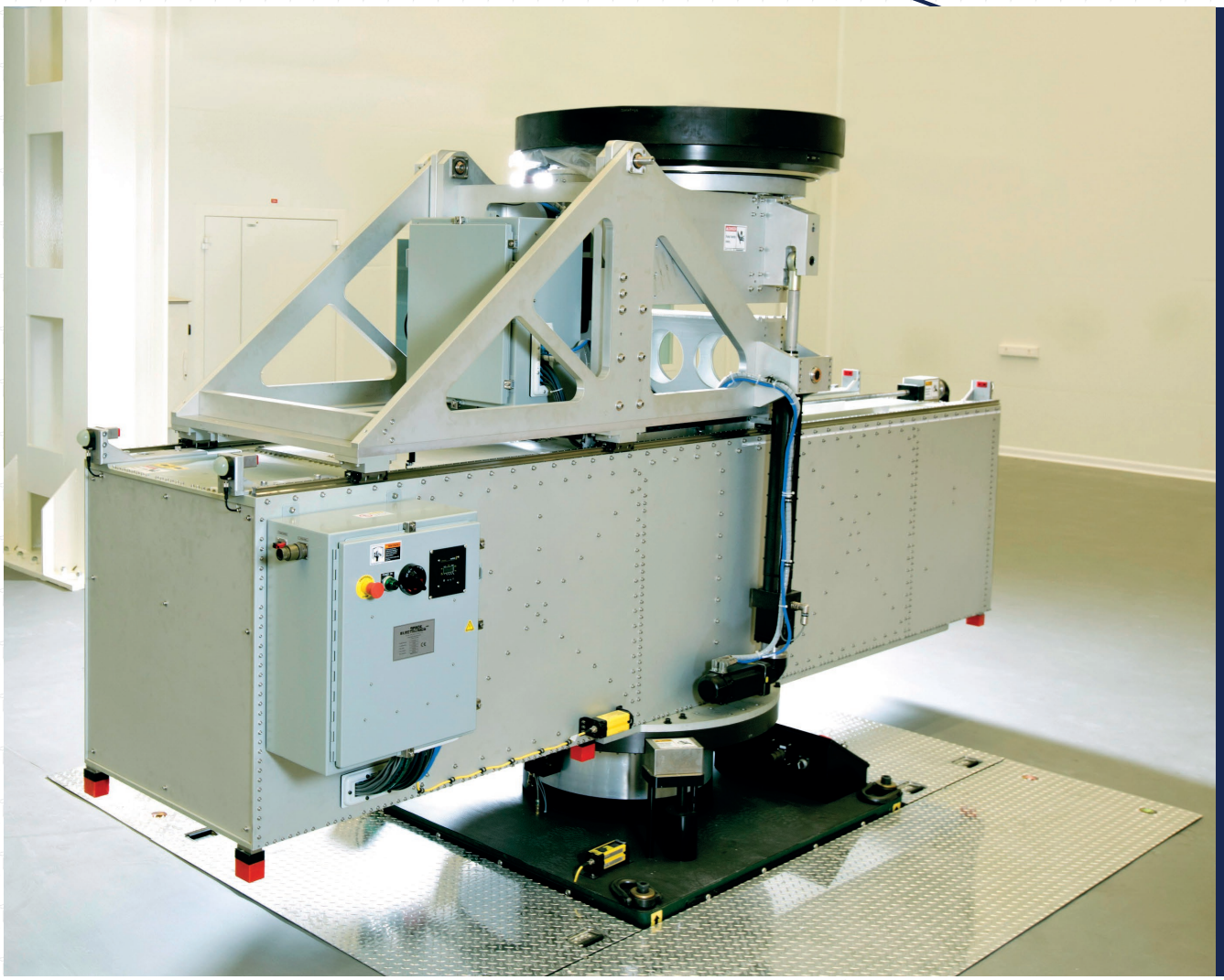
Max. sound pressure	156 dB
Frequency range	25 - 10000 Hz
Control closed loop	Control via up to 16 microphones
Test room dimensions	Length: 9.5 m Width: 7.9 m Height: 12.6 m
Control and data acquisition system	512 accelerometer channel 64 control channel 32 strain gauge channel 64 universal channel

MASS PROPERTIES MEASUREMENT

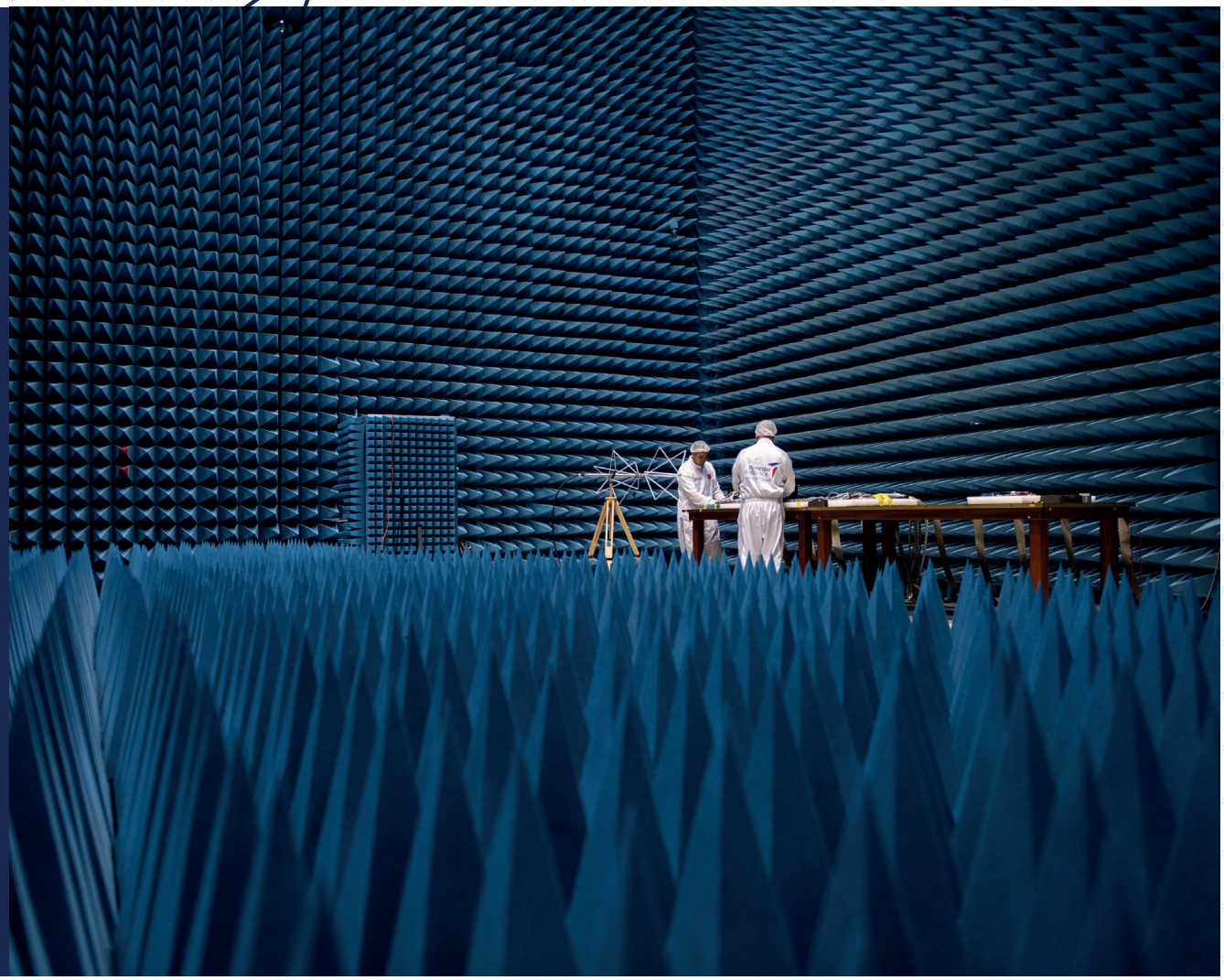
SYSTEM SPECIFICATIONS

Mass properties measurement	50 - 9000 kg
Mass measurement	5850 kg
Max. mass of DUT on the positioner	3500 kg
Positioner mass	3500 kg
Interface plate diameter	1180 mm
Max. CoG height of DUT above interface plate	6000 kg at 3.5 m (moment: 205 kNm)
Dimensions of DUT on the positioner	Length: 3 m Width: 3 m Height: 6 m
CoG of DUT on the positioner	2500 mm (max. of longitudinal CoG) 100 mm (max. of lateral CoG)

* DUT: Device Under Test



POSITIONER OF MEASUREMENT SYSTEM



ANECHOIC ROOM OF TEST SYSTEM

EMI/EMC TEST SYSTEM

SYSTEM SPECIFICATIONS

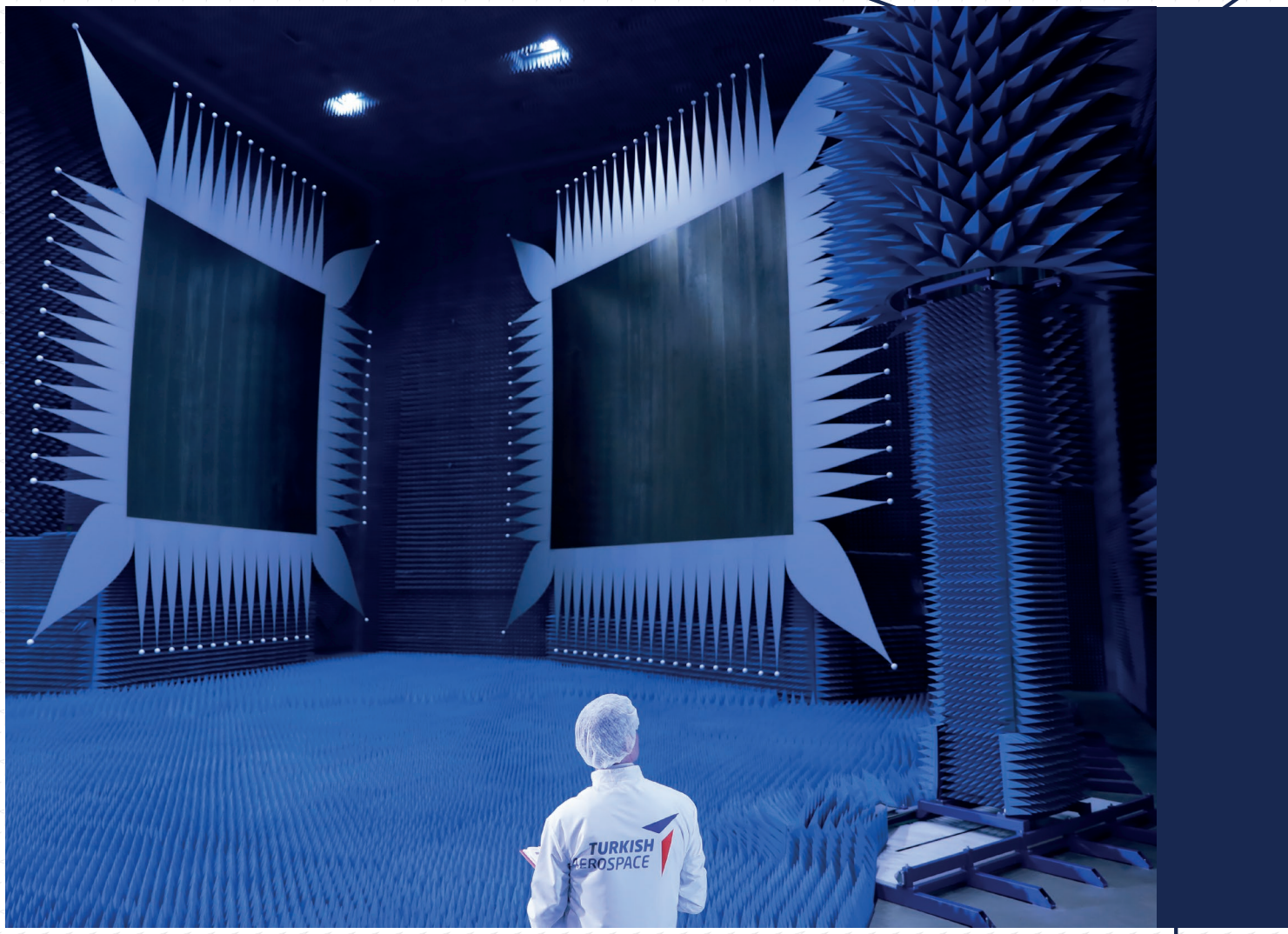
Test room dimensions	Length: 12 m Width: 10 m Height: 12 m
Magnetic field attenuation	109 dB (10kHz - 1MHz)
Electric field attenuation	106 dB (10 MHz - 18 GHz) 88 dB (40 GHz)
RF power dissipation	0,2 kW/m^2
Test capability	MIL-STD-461E/F/G (space applications up to 40 GHz) Conducted susceptibility tests CS-101, CS-103, CS-104, CS-105, CS-114, CS-115, CS-116 Radiated susceptibility tests RE-101 - RS-103 (2MHz - 1GHz 50 V/m) (1GHz - 40GHz 60 V/m) Conducted emissions tests CE-101, CE-102, CE-106 Radiated emissions tests RE-101, RE-102, RE-103 ESD Test <30 kV

COMPACT ANTENNA *TEST SYSTEM*

SYSTEM SPECIFICATIONS

Test room dimensions	*Length: 27 m* *Width: 19 m* *Height: 14 m*
DUT Positioner capacity	*6000 kg*
Frequency range	*1 GHz - 200 GHz*
Electric field attenuation (1 GHz - 40 GHz)	*95 dB (min)* *137 dB (max)*
Max. RF flux on wall	*1.5 kW/m²*
High power RF absorber wall dimensions	*3 m x 3 m*
Test room RF flux density	*0.2 kW/m²*

** DUT: Device Under Test*



ANECHOIC ROOM OF TEST SYSTEM

POSITIONER OF TEST SYSTEM

COMPACT ANTENNA TEST SYSTEM

SYSTEM SPECIFICATIONS

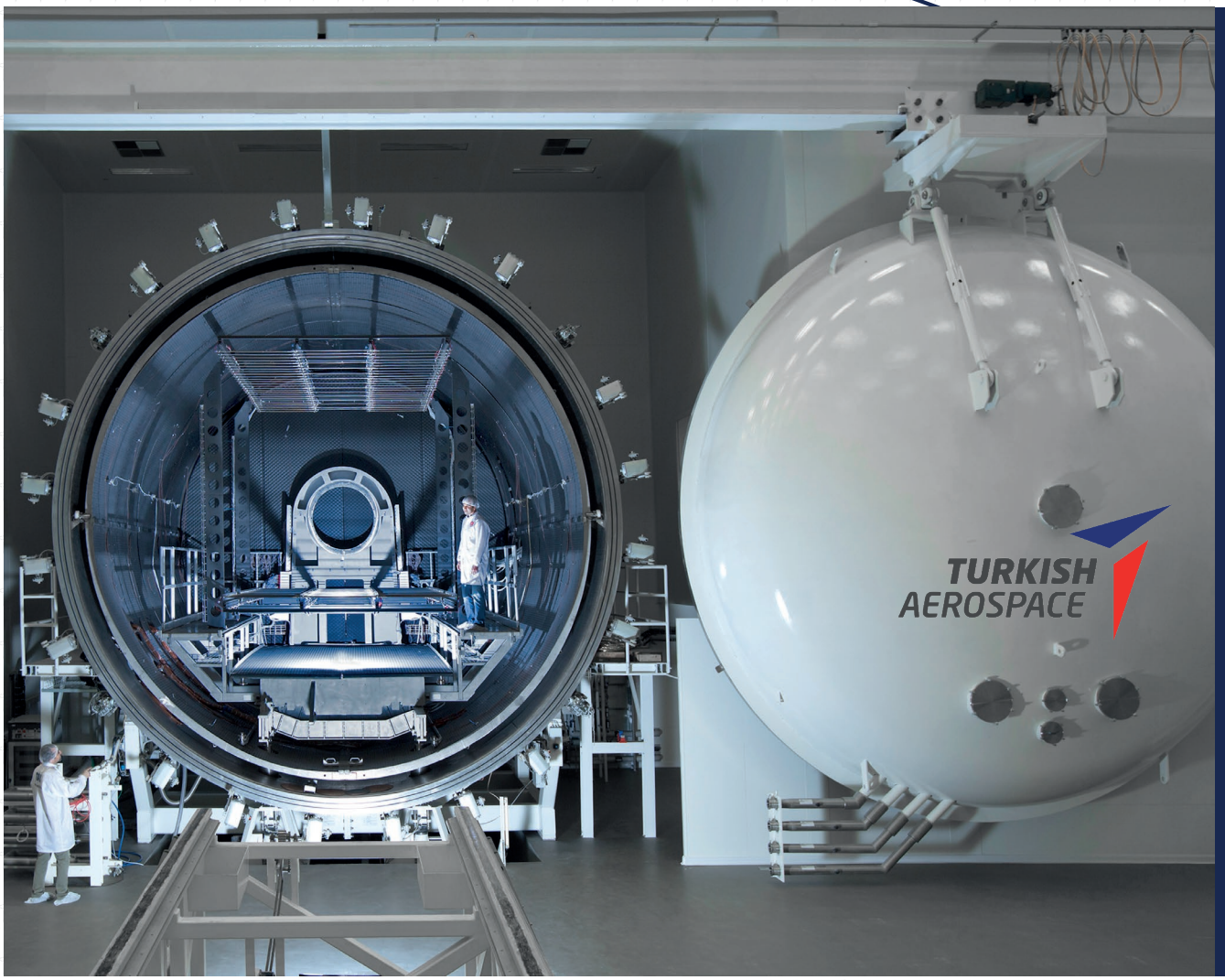
Quiet zone dimensions	Diameter: 5 m Length: 6 m Height from floor: 6 m
Distance between DUT positioner and overhead crane hook	10 m (DUT positioner height in satellite configuration: 4 m)
Measurement capability	Co-polar / cross polar radiation pattern, gain EIRP - Effective Isotropic Radiated Power IPFD - Input Power Flux Density Passive PIM - Passive Intermodulation Antenna radiation pattern & gain

* DUT: Device Under Test

LARGE THERMAL VACUUM TEST SYSTEM

SYSTEM SPECIFICATIONS

Usable volume of chamber	Diameter: 6.2 m Length: 7 m
Usable volume with thermal frame	Length: 3 m Width: 3 m Height: 5.8 m (from satellite interface)
Mounting interface	1194 flight interface (≤ 3500 kg)
Vacuum level	10^{-6} mbar
Shroud temperature	-180°C ± 5 °C (via LN2)
Data acquisition system	1200 channel
Power supplies	40 pieces AC (0-220 V & 0-32 A) 36 pieces DC (0-60 V & 0-12,5 A) 4 pieces DC (0-60 V & 0-55 A)



VESSEL OF TEST SYSTEM

THERMAL FRAME OF TEST SYSTEM

LARGE THERMAL VACUUM TEST SYSTEM

SYSTEM SPECIFICATIONS

Additional utilities	*Horizontality control (± 4 mm/m)* *Water thermal control for RF thermal conditioning* *60 pieces Type-K coaxial RF connection*
Vacuum pumping systems	*Primary vacuum pumping system* • *2 sets of pumping station* • *1 set cold trap feed by LN2* *Secondary vacuum pumping system* • *2 sets turbo-molecular pumps* • *2 cryogenic pumping stations*
Vacuum performance	*Pumping speed* *< 10^{-6} mbar (within 10 hours)* *Total He leak rate* *< 10^{-6} mbar l/s* *Lowest pressure* *3.1 x 10^{-8} mbar*
Recovery	*GN2 or clean room air*

LARGE THERMAL VACUUM *TEST SYSTEM*

SYSTEM SPECIFICATIONS

Thermoregulation system	*Shroud material: SS-304L* *Shroud emissivity: > 0.90* *Temperature range: -180 °C ± 5 °C* *Thermoregulation system Shroud cooling time: 4 hours* *(from 22 °C to - 180 °C)* *Thermal regulation: Shrouds are feed by LN2 pumps* *(1 nominal, 1 redundant)* *Water thermal control for RF thermal conditioning*

RADIATIVE HEAT FLUX SUPPLY

CONTROL ROOM OF TEST SYSTEM

LARGE THERMAL VACUUM TEST SYSTEM

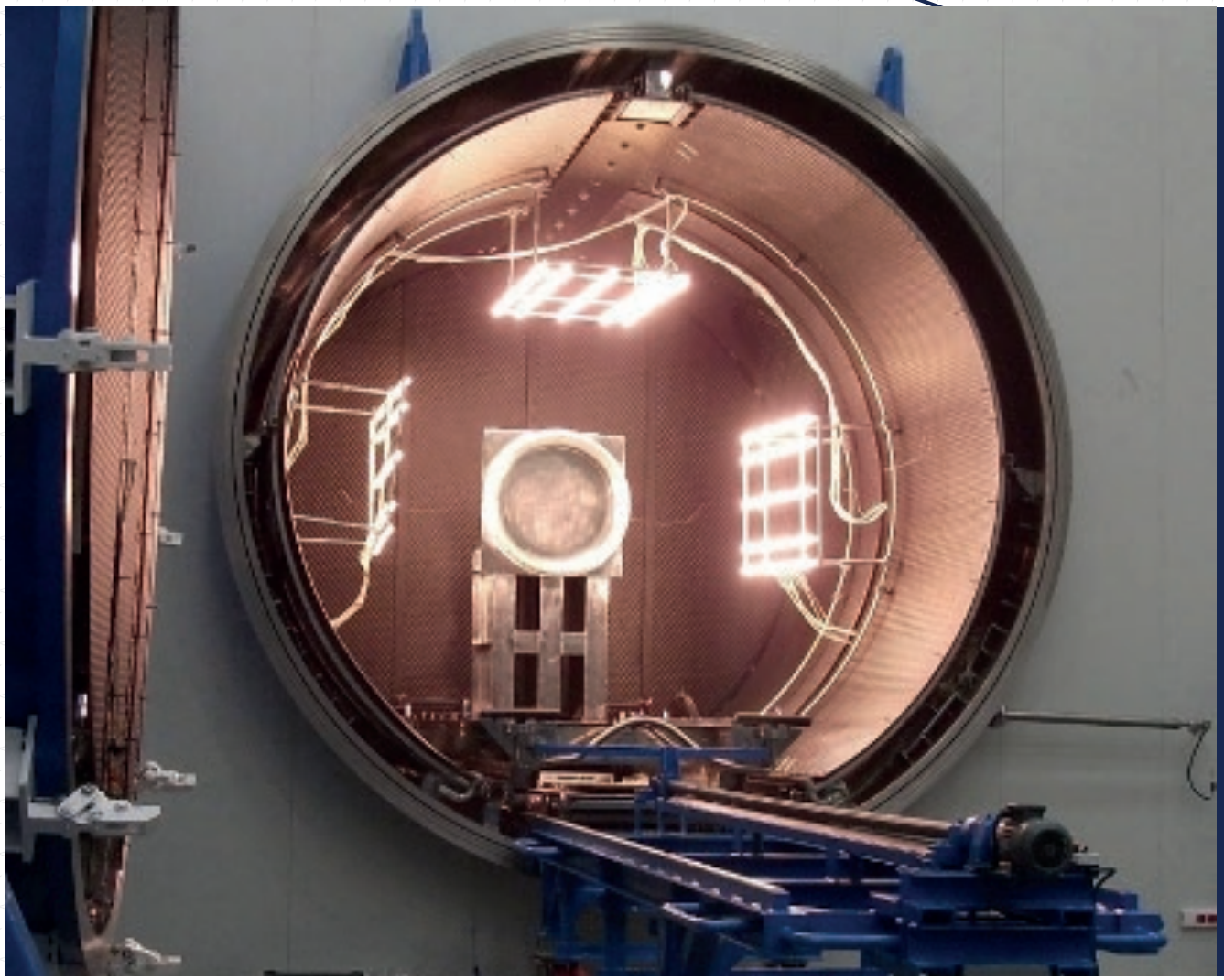
SYSTEM SPECIFICATIONS

Horizontality control system	Horizontality control system has 4 jacks to obtain horizontality There are 2 horizontality sensors (nominal and redundant) each of them gives inclination in miliradians for x and y directions The range of the system is ±4 mm/m with 0.5mm/m accuracy
Satellite handling	Horizontal position with 1194 clamp band
Redundancy methodology	Hot redundancy (2 PLC, 2 server, 2 switches)
EGSE area	65 m^2 with 3 m height

MEDIUM THERMAL VACUUM TEST SYSTEM

SYSTEM SPECIFICATIONS

Usable volume of chamber	Diameter: 4 m Length: 4.1 m
Usable volume with thermal frame	Diameter: 2.2 m Length: 2.8 m
Mounting interface	Bolted joint (≤ 1500 kg)
Vacuum level	10^{-6} mbar
Shroud temperature	-165 °C to +110 °C ± 5 °C (via GN2) -180 ± 5 °C (via LN2)
Data acquisition system	256 T - type thermocouple
Power supplies	50 pieces DC (0-100 V & 0-8 A) 36 pieces DC (0-40 V & 0-3 A)



VESSEL OF TEST SYSTEM

THERMAL TROLLEY OF TEST SYSTEM

MEDIUM THERMAL VACUUM TEST SYSTEM

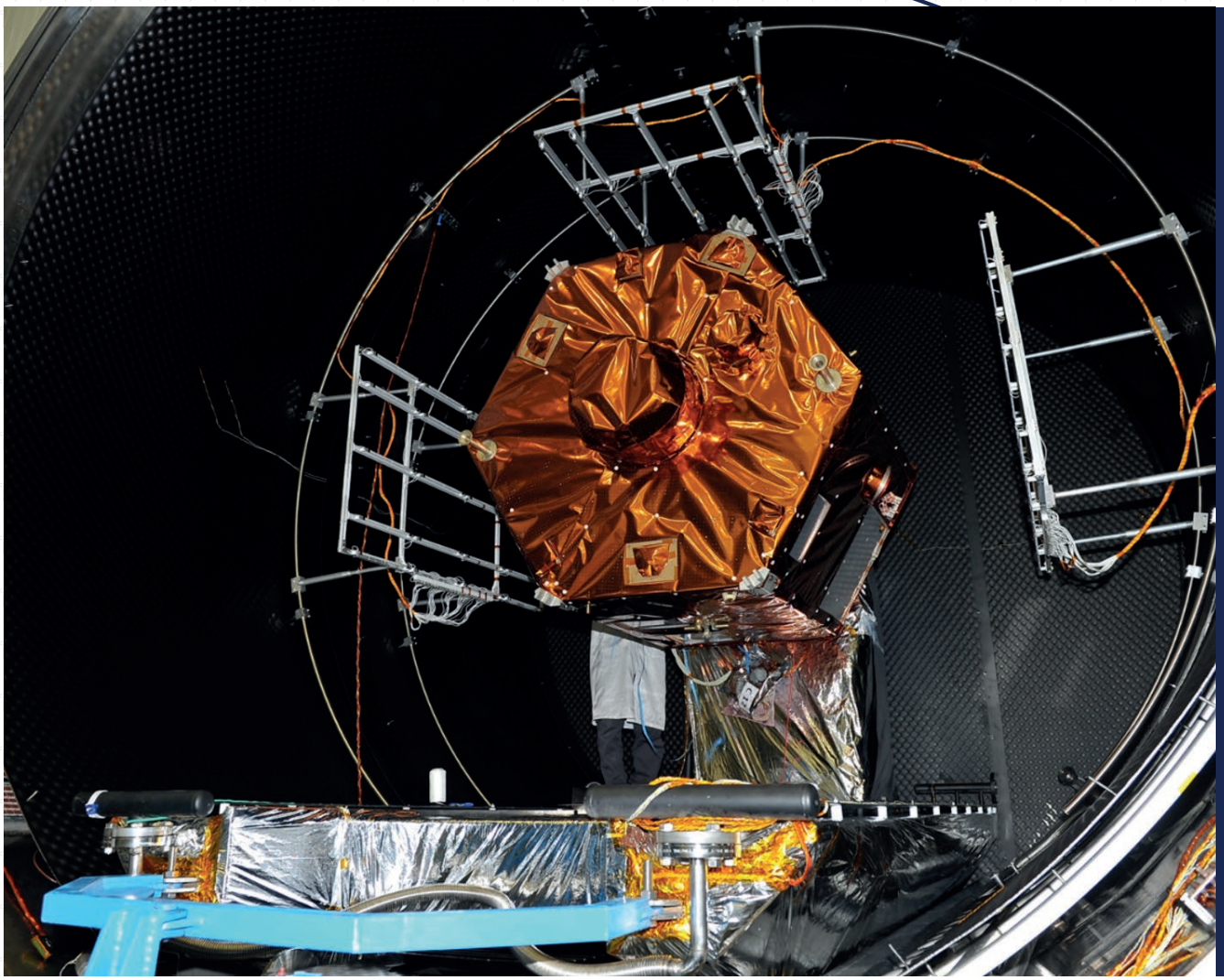
SYSTEM SPECIFICATIONS

Additional utilities	*Residual Gas Analyzer (RGA)* *Infra-red lamp heating*
Vacuum pumping systems	*Primary vacuum pumping system* • *2 sets of pumping station* • *1 set cold trap feed by LN2* *Secondary vacuum pumping system* • *1 set turbo-molecular pump* • *2 cryogenic pumping stations*
Vacuum performance	*Pumping speed* *< 10-6 mbar (in 9 hours)* *Total He leak rate* *< 10-6 mbar l/s* *Lowest pressure*
Recovery	*GN2 or clean room air*

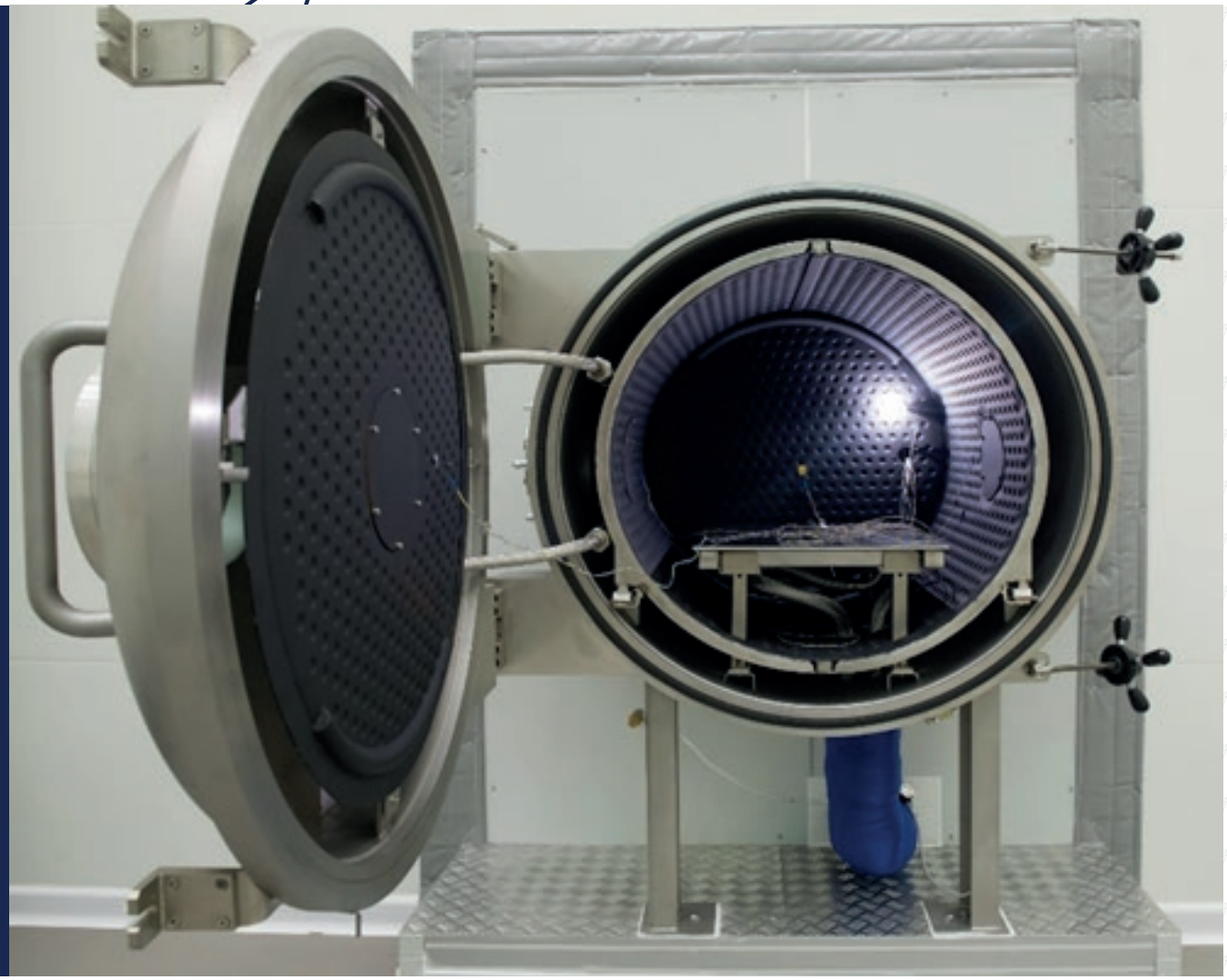
MEDIUM THERMAL VACUUM TEST SYSTEM

SYSTEM SPECIFICATIONS

Thermoregulation system	Shroud material: SS-304L Shroud emissivity: > 0.90 Temperature range: 165 °C to +110 °C ± 5 °C (via GN2) -180 °C ± 5 °C (via LN2) Shroud cooling time: 4 hours (from 22 °C to - 180 °C) Thermal regulation: Shroud are feed by LN2 pumps
Redundancy methodology	Hot redundancy (2 PLC, 2 server, 2 switches)
EGSE area	15 m² with 3 m height



RADIATIVE HEAT FLUX SUPPLY



VESSEL OF TEST SYSTEM

SMALL THERMAL VACUUM TEST SYSTEM

SYSTEM SPECIFICATIONS

Usable volume of chamber	Diameter: 0.8 m Length: 0.8 m
Vacuum level	10^{-6} mbar
Shroud temperature	-60 °C to +125 °C ± 2 °C
Data acquisition system	4 PT100 type temperature sensor
Temperature gradient rate	Heating: 1.5 °C/s Cooling: 1.5 °C/s
Auxiliary system	Auxiliary system Thermal conditioning on DUT plate

CLIMATIC AND VIBRATION COMBINED TEST SYSTEM

SYSTEM SPECIFICATIONS

Usable volume of chamber	Length: 1 m Width: 1.13 m Height: 1.08 m
Humidity	10 % to 95 % ± 5 %
Vessel Temperature	-75 °C to + 180 °C ± 0.8 °C
Data acquisition system	4 PT100 type temperature sensor
Temperature gradient rate	Heating: 10 °C/s Cooling: 10 °C/s

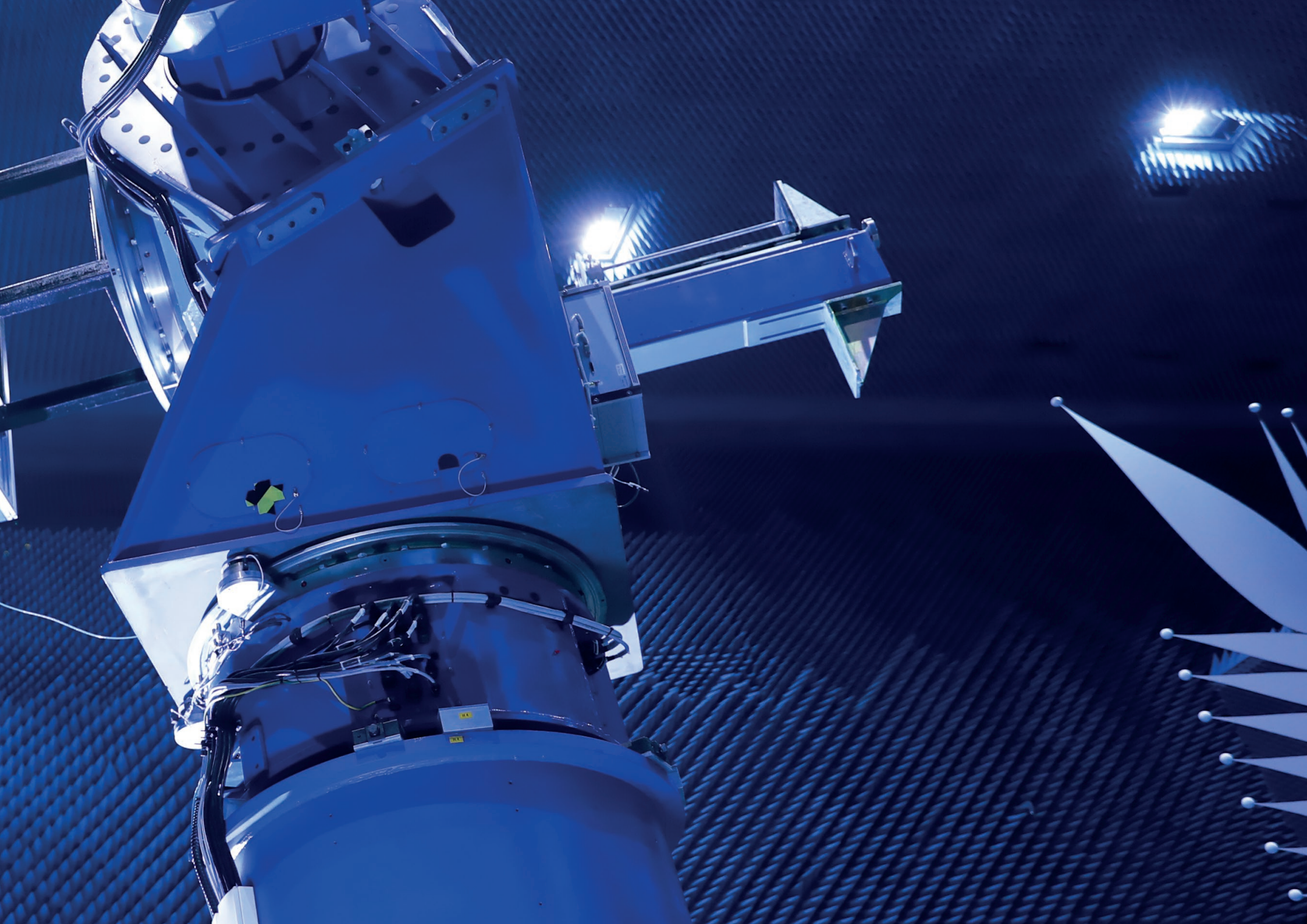
CLIMATIC AND VIBRATION COMBINED SYSTEM

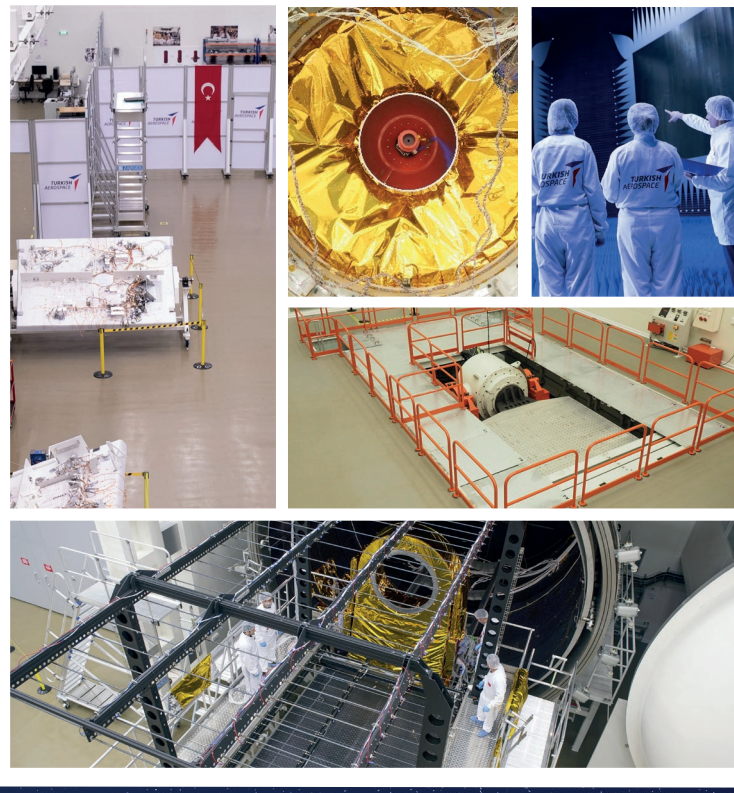
CLIMATIC AND VIBRATION COMBINED SYSTEM

CLIMATIC AND VIBRATION COMBINED TEST SYSTEM

SYSTEM SPECIFICATIONS

Max. load capacity	250 kg
Max. force	15 kN sine 13 kN random 45 kN shock
Frequency range	5 - 2000 Hz
Control and data acquisition system	4 control channel 64 universal channel





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