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Autoneum Measurement Systems Isokell

Autoneum. Mastering sound and heat.

The ISOKELL System for the Measurement of the Acoustic Insulation of Flat or Moulded Parts of large Dimensions

The Measurement of Airborne Noise Insulation

The acoustical behaviour of the parts, such as floor, dash, etc., insulating the car interior from airborne noise is of very great importance. There is a correspondingly high interest in being able to measure the acoustic insulation of such parts, which are usually quite large and of complex forms. The current trend towards multifunctional parts that incorporate several acoustical functions makes these measurements even more important.

The internationally standardised measurement method for acoustical insulation (ISO Standard 140/III) involves mounting the part under investigation in a "window" in the dividing wall between two chambers. This method is aimed rather at the requirements of building acoustics than those of the automobile. The SAE Recommended Practice J1400 is more flexible and more suitable for automotive applications, while still allowing the results to be correlated with those from the international standards.

For this reason, Autoneum developed the ISOKELL apparatus, which is less cumbersome, less costly and better adapted to the requirements of automotive acoustics.

Main advantages:

- **A small-size Transmission Loss suite where frequency range and sample size is adapted to the requirements of automotive acoustics.**
- **All Autoneum Isokells worldwide are produced in the same way and deliver comparable results (standardized chamber).**
- **Save time and effort** thanks to horizontal sample mounting.
- **Possible to measure small samples or components.**
- **Flexibility.** Thanks to the reduced size the Isokell can, with limited effort, be moved to another room or building.
- **Results comparable with ISO standards facilities.**

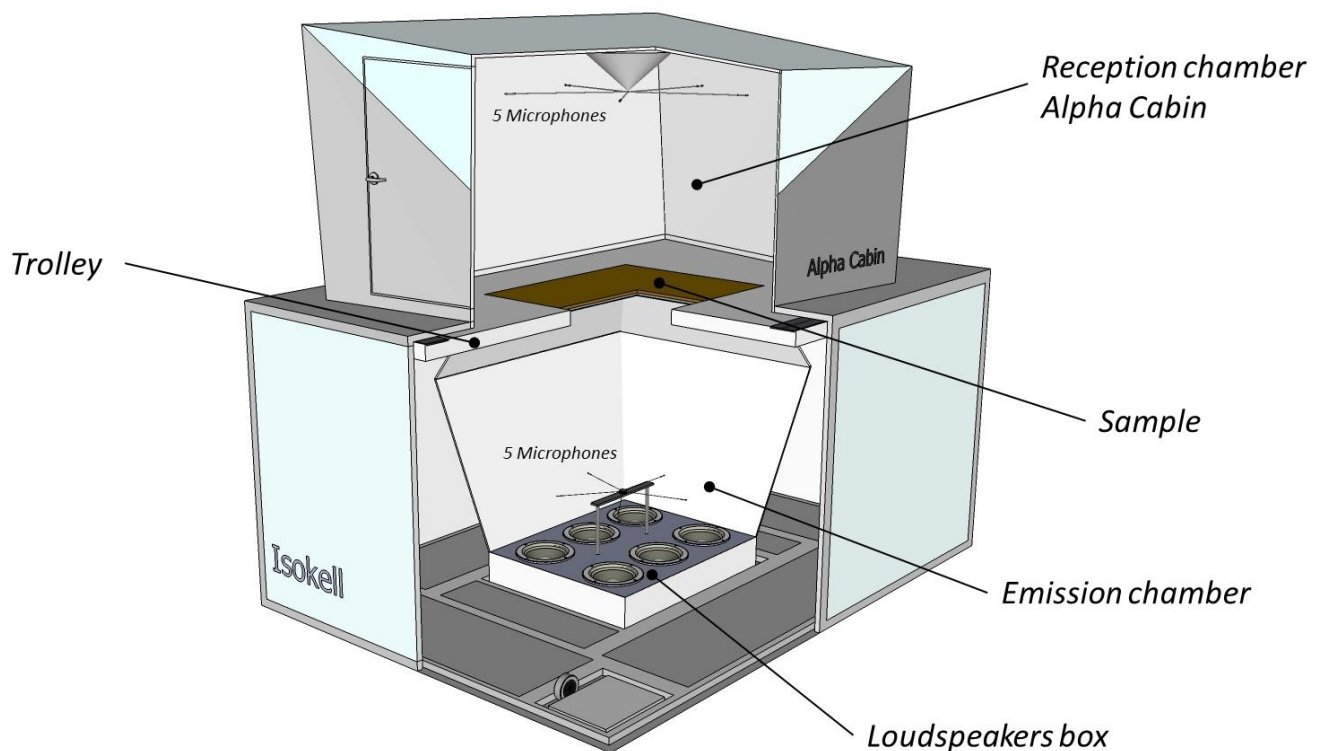
The Autoneum Measurement System ISOKELL Apparatus A system adapted to the requirements of automotive acoustics

The ISOKELL system has been developed with the objective of measuring the transmission loss of the part in an efficient and adequate manner, still compatible with the standards. For this reason, the measurement method is based on the difference of the noise levels measured in reverberation chambers on both sides of the sample. The system was conceived to be convenient in use and designed so that the sound fields in these two chambers are as diffuse as possible and the secondary transmission paths reduced to a minimum.

The ISOKELL Apparatus**New version with reduced measurement duration by 30% for flat sample measurements**

The ISOKELL apparatus comprises essentially:

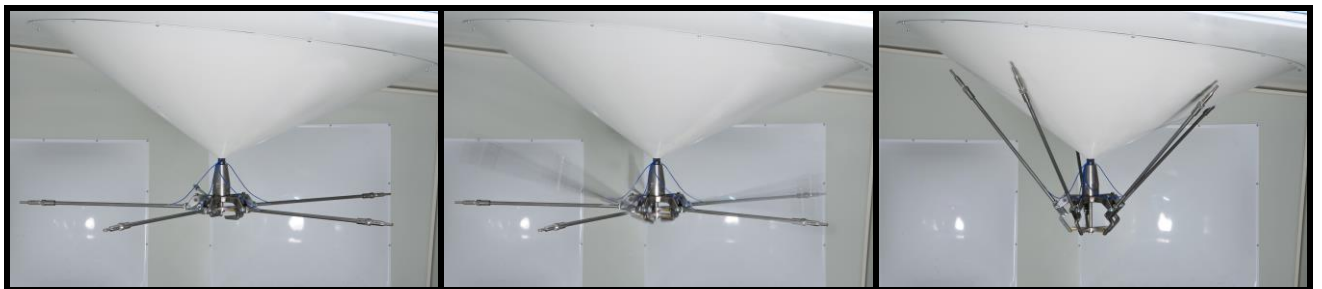
- a trolley on which an emission chamber with six independently powered high-performance loudspeakers is mounted. The emission chamber is equipped with 5 microphones for the measurement of the average sound pressure level in 5 positions,
- an intermediate case connecting the emission chamber to a frame in which the sample is mounted horizontally. A range of exchangeable frames permits different parts, modules and samples of various sizes and shapes to be mounted,
- an Autoneum Alpha Cabin as reception chamber, supported on a fixed housing,
- pneumatic lifting device which raises the trolley, emission chamber and sample holder into firm, well-sealed contact with the fixed housing and the reception chamber.
- Measurement electronics, cables and software



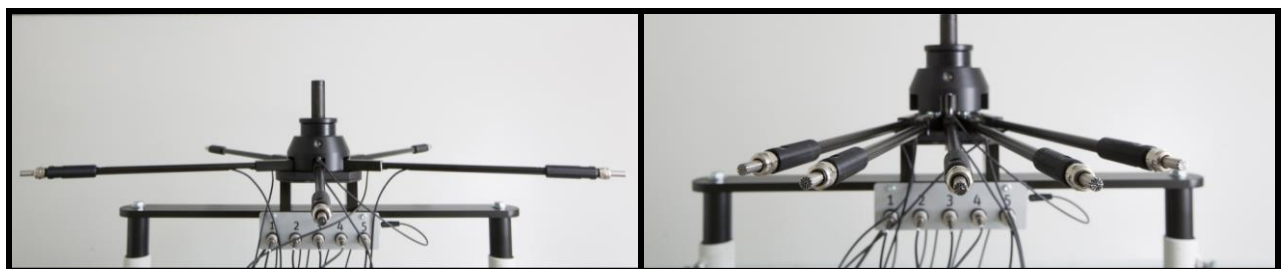
The use of the Alpha Cabin (a small reverberation chamber specially designed for the measurement of the acoustic absorption of automotive soundproofing treatments) as reception chamber offers several advantages:

- the shape of the cabin has been developed to give an optimally diffuse sound field,
- the measurement of the equivalent absorption area of the reception chamber, a prerequisite for the correct measurement of acoustic insulation, is simplified,
- the cabin is already equipped with 5 microphones for the measurement of the average sound pressure level in 5 positions.
- the overall cost of the system is reduced for those companies who already possess an Alpha Cabin.

The microphones in the reception chamber are controlled by the software and are folded like an umbrella by a motor when the measurement is finalized, so it becomes easy to work in the cabin.



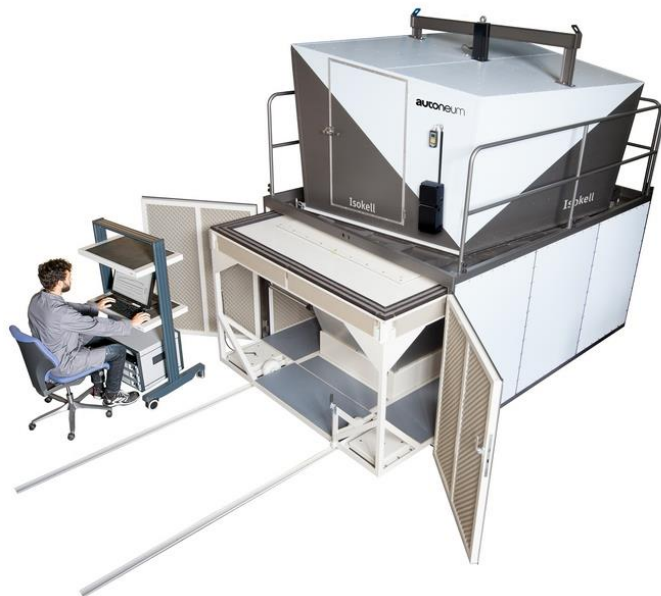
The microphone arms in the emission chamber can be manually moved towards the opening for easier access during calibration. A holder with sensor is controlling if the microphones are in the correct position in order to avoid doing measurements with the microphones in the wrong position.



Main advantages with the new Autoneum Isokell:

- Effective measurement duration for flat sample measurements **reduced by about 30%**
- Improved signal excitation system allowing **measurements up to at least 6300Hz**
- **Increased efficiency** - 5 microphones in both emission and receiver chambers
- **Easier to work** inside the cabin thanks to a new microphone folding systems
- New user friendly **software with several improvements.**
- **Latest** data acquisition and control **technology** and electronics
- Improved light inside both emission and receiver chambers thanks to **environmentally friendly LED** lights
- Well documented measurements - **Integrated camera – saves time!** [Optional]
- **Remote control** for easy calibration of the microphones – saves time! [Optional]

All the Isokell systems are constructed to the same high standards, are subjected to careful acoustic checks both before leaving our plant and after installation and are matched to one another. This means that you can rely on the consistency of the results obtained, independently of where in the world they are measured.



To summarize: The Isokell is a standardized Transmission Loss suite adapted to the requirements of automotive acoustics and is

- **practical in use**
- **consistent**
- **reliable**

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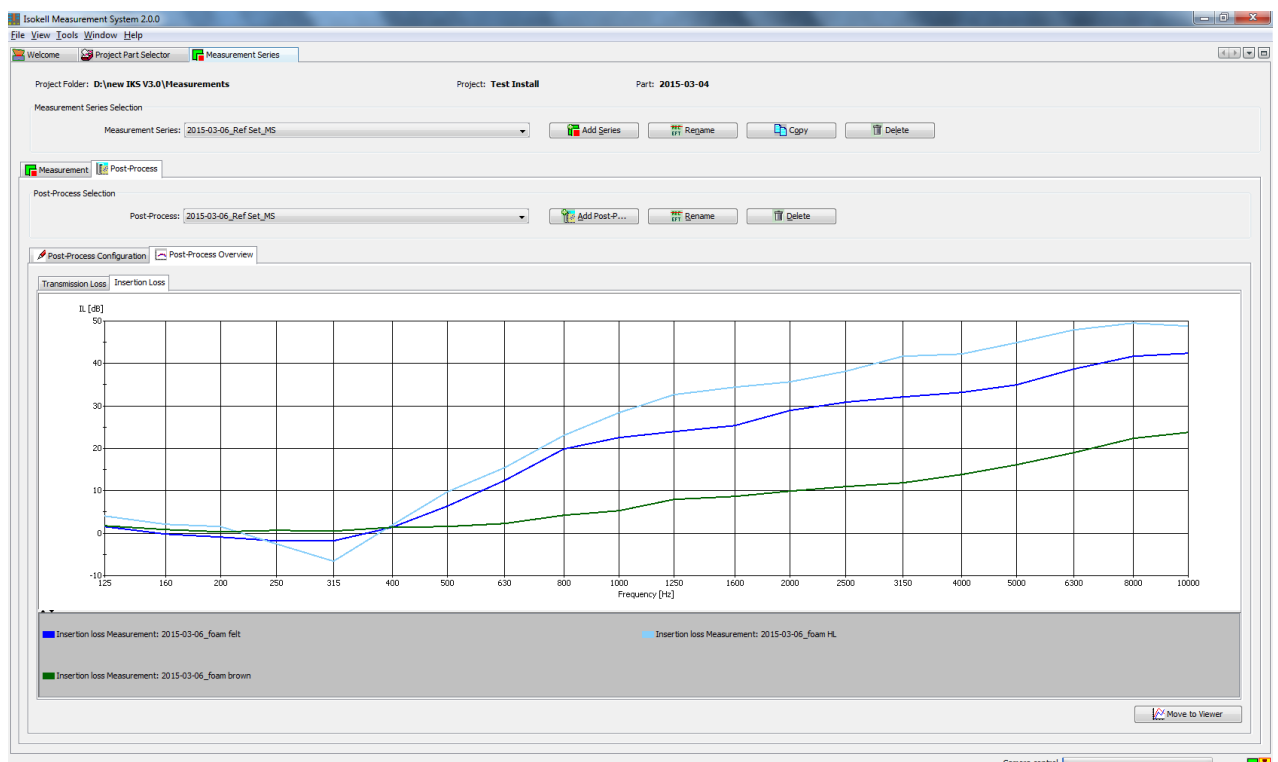
The equipment required for the measurement of Transmission Loss in the Isokell comprises electronics and software. The complete measurements are controlled by a PC running under Windows®. The control electronics are integrated into a 19" rack.



Software:

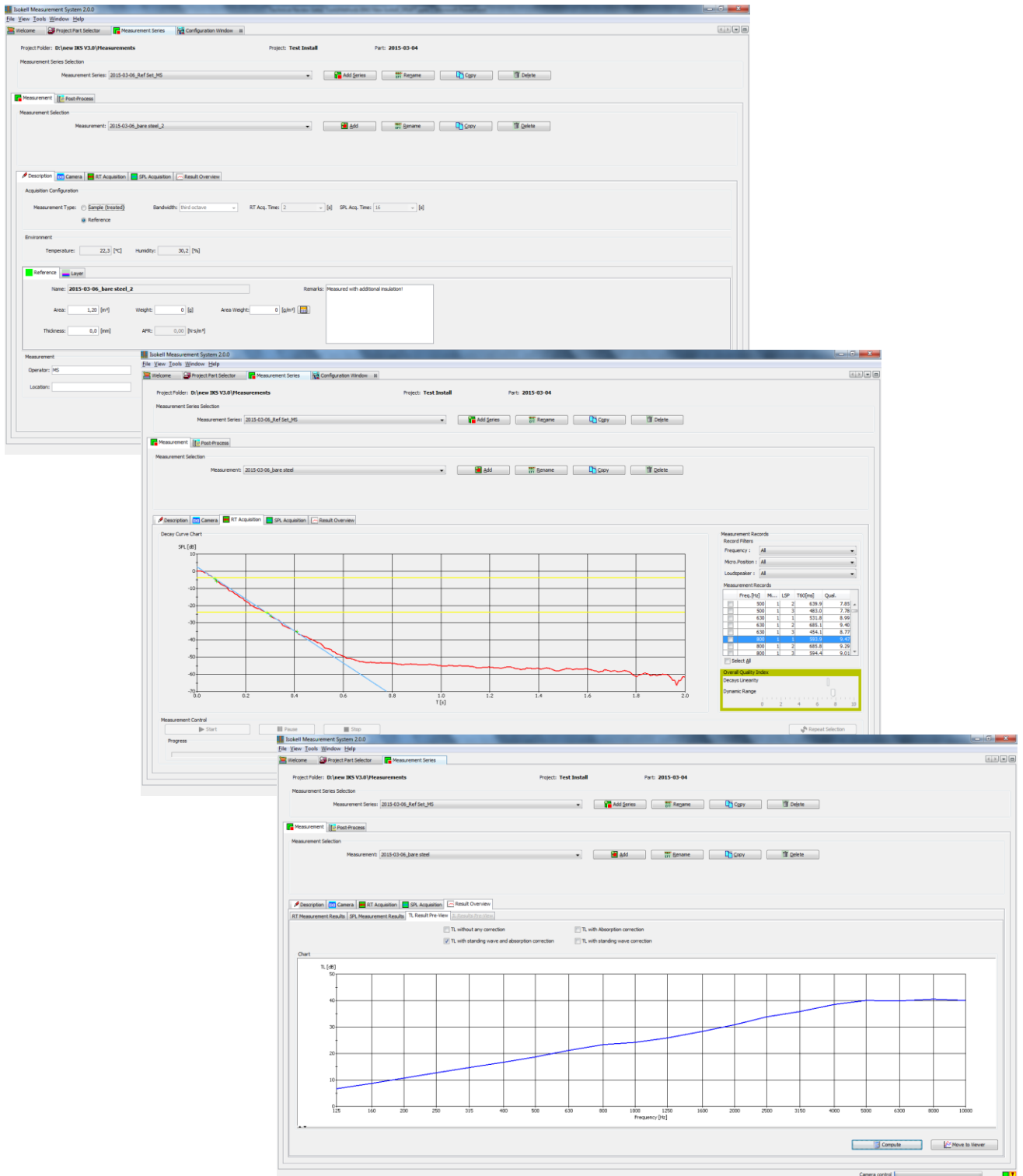
The software package that controls the sound Transmission Loss measurement and data evaluation is a user-friendly program using a modern Windows-based graphical user interface. The operator is guided in his own language* through the measurement and data evaluation processes. The fully documented results may be viewed on the screen within the software or exported to Microsoft® Excel.

*At the moment English and German is available



The procedure chosen and the measurement methods used guarantee that the system is:

- accurate
- stable
- widely applicable
- flexible
- easy to use



The ISOHELL Measurement

Software for control of the test set up, calibration, reverberation time and insulation measurements. Graphical evaluation of the results as individual spectra on both sides of the sample, acoustical insulation of sample and as comparison between the insulation levels of samples.

The measurement procedure involves the measurement of the equivalent absorption area of the reception chamber (reverberation time measurements), calibration of the microphones and the measurement of the average sound pressure levels in the emission and reception chambers. The measurement instrumentation is fully controlled by the PC.

Output of Results

The measurement results (transmission loss, insertion loss and SPL) are displayed as graphs. Alternatively, the results may be exported to Microsoft® Excel

The Samples, which may be measured in the ISOHELL Apparatus

The ISOHELL apparatus is designed to measure the acoustic insulation of a wide range of materials and parts.

Flat samples of standard dimensions

A flat 1m x 1.2m rectangular sample is normally placed on a steel panel that is linked to the frame of the trolley by a flexible joint. Both the steel panel alone and the steel panel with sample have to be measured.

Pressed or moulded parts

The sample must be extended if necessary so that its edge lies in one plane. A flat panel of steel or other material is required to attach the edge to one of the three standard exchangeable frames of the emission chamber. These have apertures of:

- 1.0 m x 1.2 m for standard flat samples
- 1.0 m x 1.8 m for dashboards
- 1.5 m x 2.0 m for larger parts e.g. floors.

All the additional surfaces formed by the sample supports must be covered by sandwiches of very high acoustical insulation efficiency so that the acoustic radiation from these surfaces is negligible in comparison to the one of the sample.

Safety rails

The Isokell is delivered with safety rails, to be used when working on the trolley in the outer position:

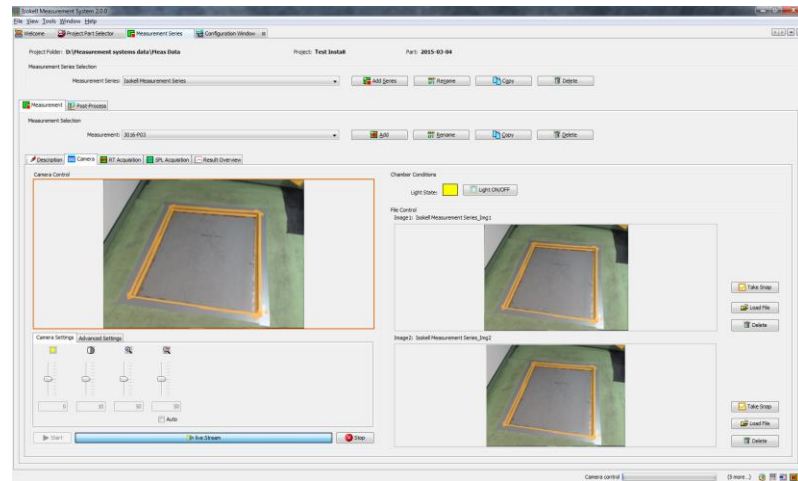


The safety rails are removed before the trolley is moved into the Isokell lower housing.

Integrated Webcam (OPTION)

This option includes:

- Webcam
- Cables
- Driver Software integrated into the Isokell application.



Remote control for calibration of the microphones (OPTION)

This option includes:

- 10" Touch screen
- Cables
- Driver Software integrated into the Isokell application.



The microphone calibrator is not included in this option

Disclaimer:

Images and software screen shots are for representation purpose only. Actual products may differ slightly compared to images and software screen shots shown

System Specifications**a) ISOHELL Apparatus**

Emission Chamber volume	~ 2.0 m ³ , depending on sample
Acoustic Excitation	6 Loudspeakers, LF/HF 700/180W each
Microphone type:	G.R.A.S. Type 40PL or equivalent
Standard number of microphone positions:	5
Sample Aperture:	1.0m x 1.2m (standard flat samples) 1.0m x 1.8m (dash-boards) 1.5m x 2.0m (dash-boards or larger parts)
Maximum Sample Depth:	0.55m
Overall dimensions of lower housing (in operation)	3.4 x 2.5 x 1.7 m (L x W x H)
Total weight including the Alpha Cabin	about 3800 kg
Total Height including the Alpha Cabin	about 3.40* m
*(+0.15m space for positioning the Alpha Cabin + space for a crane)	

b) Excitation electronics

System built into 19" rack comprising modules:	
Splitter	2 x 6 Speakers processor
Power Amplifiers	3 x 1100 W

c) Alpha Cabin (reception chamber)

Volume of cabin:	~ 6.9 m ³ , depending on sample
Interior surface area:	~ 23.5 m ² , depending on sample
Acoustic excitation:	3 Loudspeakers, 8 Ω, 50 W
Microphone type:	ICP with BNC connector, e.g. PCB 130E20
A-filter:	e.g. PCB 426B02
Standard number of microphone positions:	5
Overall dimensions of cabin (L x W x H):	3.22 x 2.37 x 2.03 m
Weight of complete cabin (no floor):	1080 kg

d) Reverberation time measurement system Type 1950
comprising:

Mounted in a 19" rack.

- Data acquisition and control electronics.
- 4-channels Power amplifier
- Signal Cable Junction Box

- Measurement system control software
- PC with Windows 7, Office and Screen

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Measurement frequency range:

1/3 octave bands:

0.125 to 6.3 kHz

Equivalent filter characteristics of 1/3

octave pulses fulfil standard:

IEC 225-1966

e) **Compressed air supply**

- A supply of compressed air (minimum pressure 5 bar), with an appropriate pressure gauge for control purposes, are required for the operation of the integrated pneumatic lifting device. **This air supply is not included in the system**

f) **Floor surface.**

The floor surface must be smooth and in level. A tolerance of maximum +/- 5 mm over the surface is allowed.

g) **Minimum Space Requirements**

The **minimum** space required for the complete ISOKELL system is approximately

8 x 4 x 3.75* m high (*from floor to crane hook)

in addition to working space, sample and frames storage space, etc is needed. Note that the above quoted room height allows only a minimum space for the tackle required to lift the Alpha Cabin and for manoeuvring the Cabin safely.

A minimum room size is about 12 x 9 meters gives a comfortable workspace.

i) **Background noise.**

Maximum back ground noise level maximum 75dB(A) [over all].

j) **Crane**

A crane or lift with a capacity of minimum 400 kg is needed to lift larger samples into place as well as lifting the frames and adapters into place. **This crane is not included.** During installation of the Isokell the receiving chamber (1100kg) must be lifted onto the lower Isokell chamber.

k) **Power Requirements**

230V, 50Hz, (Other mains voltages and frequencies are available on request)

1000 W Power consumption (complete system including PC and screen)