

Zenner Engineers

References / services

Testing and Research & Development Laboratory and Field Measurements



WHO ARE WE?

With more than 50 years in the field, we bring strong experience to every project. Our project management is based on years of refinement and proven expertise. Our engineers have decades of knowledge, supported by ongoing professional development. Our qualifications are top level and externally certified (FISE & FINAS). Across our two laboratories, we offer over 600 m² of testing space for diverse services. Visit zenner.fi for details.

OUR SERVICES

Acoustics

Energy & life cycle

Special systems

HVAC & automation

Modeling

Numerical computation

Testing services

RnD services



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- Throw pattern measurements and modelling of ventilation supply air devices
- Comprehensive testing of air handling units and product development consulting
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CFD, FEM, and FEA computational services

Model accuracy and input parameters can be calibrated using laboratory measurement data

- Flow and thermal modelling
- Acoustic modelling
- Emission modelling

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ACOUSTIC MEASUREMENTS IN THE LABORATORY

* THE MEASUREMENT IS INCLUDED IN THE LABORATORY'S ACCREDITATION



SOUND POWER LEVEL MEASUREMENTS IN A LABORATORY

SFS-EN ISO 3741 *

- Determination of sound power levels of equipment in a reverberation room
- Sound power levels of ventilation terminals and components, duct diameters $\varnothing 80$ – $\varnothing 1250$

ATTENUATION MEASUREMENTS OF EQUIPMENT AND SILENCERS

SFS-EN 7235 *

- End insertion loss of supply and exhaust air devices
- Measurements of silencers

SOUND ABSORPTION MEASUREMENTS AND ABSORPTION CLASSIFICATIONS

SFS-EN ISO 354 *

SFS-EN ISO 11654 *

- Absorptive materials, furnishings, curtains, acoustic panels, etc.
- Airflow resistivity measurements

ACOUSTIC MEASUREMENTS IN THE LABORATORY

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AIRBORNE SOUND INSULATION MEASUREMENTS OF BUILDING PRODUCTS

SFS-EN ISO 10140

SFS-EN ISO 15186

- Doors, windows, air supply vents, wall structures
- Determination of noise maps using the intensity method (mapping of sound leakage paths)

MEASUREMENTS OF THE IMPROVEMENT IN IMPACT SOUND INSULATION OF FLOOR MATERIALS

SFS-EN ISO 10140-3

- Impact sound insulation materials, raised floors, etc.

NOISE LEVEL MEASUREMENTS OF SANITARY FITTINGS

ISO 3822 *

- Determination of noise levels of taps, valves, and similar fittings

ACOUSTIC MEASUREMENTS IN THE LABORATORY

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DRAINAGE NOISE LEVEL MEASUREMENTS

SFS-EN 14366

- Noise level measurements of drainage pipes and components

STRUCTURE-BORNE NOISE LEVEL MEASUREMENTS OF TECHNICAL EQUIPMENT

EN 15657

EN 14366

- Structure-borne noise emissions from technical building equipment (pumps, compressors, plumbing fixtures, fans, etc.)
- Engineering design and product development consulting for vibration and noise control solutions

SOUND INSULATION MEASUREMENTS OF ACOUSTICALLY INSULATED WORKSPACES / PHONE BOOTHS

ISO 23351-1

- Sound insulation measurements of acoustically insulated workspaces and phone booths in accordance with relevant standards
- Product development consultancy

ACOUSTIC FIELD MEASUREMENTS

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MEASUREMENTS AND ASSESSMENT OF AIRBORNE AND IMPACT SOUND INSULATION

SFS-EN ISO 16283-1/-2 *

SFS-EN ISO 717-1/-2 *

- Determination and evaluation of sound insulation ratings and sound level difference values
- Reporting and comparison with applicable regulations, including corrective measures and remedial design

MEASUREMENTS AND ASSESSMENT OF AIRBORNE SOUND INSULATION OF BUILDING FAÇADES

SFS-EN ISO 16283-3 *

SFS-EN ISO 717-1 *

- Determination and assessment of sound insulation indices
- Reporting and comparison with regulatory requirements, including remedial recommendations and design

ROOM ACOUSTICAL MEASUREMENTS

SFS-EN ISO 3382-2 *

SFS-EN ISO 354 *

- Reverberation time measurements
- Determination of speech intelligibility, distraction distance, and related parameters
- Assessment of all other room acoustic parameters (ETD, G, C50, etc.) for spaces such as open-plan offices, auditoria, restaurants, classrooms, etc.
- Reporting and benchmarking against guideline values, including improvement recommendations and room acoustic design

ACOUSTIC FIELD MEASUREMENTS

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ENVIRONMENTAL NOISE MEASUREMENTS

Ympäristöopas 15/1996 *, YM ohje 1 /1995 *

- Road traffic noise, railway noise, aircraft noise, and similar sources
- Environmental noise measurements, including noise from technical equipment and industrial facilities
- Noise monitoring and reporting for outdoor concerts
- Reporting, assessment of measurement results and regulatory compliance, and design of noise control solutions

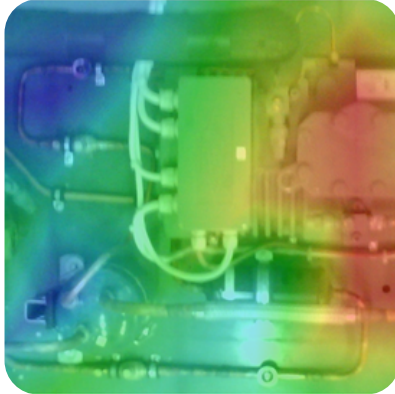
INDOOR NOISE MEASUREMENTS

SFS-EN ISO 16032 *

- Technical equipment, ground source heat pump systems and similar installations, restaurant and music noise
- Noise levels from ventilation systems and drainage systems
- Reporting, evaluation of results and regulatory compliance, including noise control and remedial design

ACOUSTIC FIELD MEASUREMENTS

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NOISE SURVEYS AND INVESTIGATIONS OF SOUND INSULATION PERFORMANCE

SFS-EN ISO 15186

- Detection and localization of sound leakage from doors, windows, and similar structures, and noise mapping using sound intensity measurement techniques
- Vibration measurements and investigations, including localization and analysis of noise and vibration issues

SOUND POWER LEVEL MEASUREMENTS USING THE INTENSITY METHOD

SFS-EN ISO 9614

- On-site sound power level measurements of equipment and components
- Determination of noise maps, acoustic holography

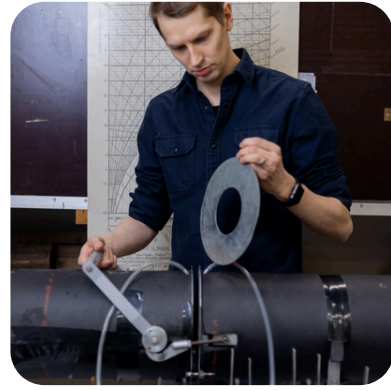
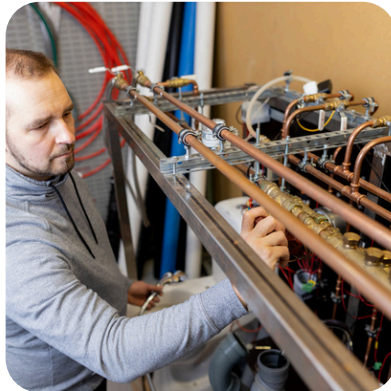
SOUND INSULATION MEASUREMENTS OF ACOUSTICALLY INSULATED WORKSPACES AND PHONE BOOTHS

ISO 23351-1 (SOVELTAEN)

- Sound insulation testing of sound-insulated workspaces and phone booths
- Product development consulting services

FLUID DYNAMICS MEASUREMENTS

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AIR VOLUME FLOW RATE MEASUREMENTS

SFS-EN ISO 5801 *

SFS-EN ISO 5167-1/-2 *

- Air volume flow rate and pressure loss measurements, airflows from 1 to 10,000 dm³/s
- Ventilation terminals and components, air handling units, exhaust fans, duct components, etc.
- Expert statements and investigations, including assessment of suitability for use as fire dampers
- Airtightness testing and susceptibility/interference testing
- Product development and consultancy

HYDRAULIC AND PHYSICAL TESTING OF SANITARY FITTINGS

SFS-EN 807 *

SFS-EN 1111 *

- Type approval testing of sanitary fixtures (taps, valves, etc.)
- Single-lever taps, thermostatic mixers, washing machine valves, etc.
- Leak tightness testing
- Independent third-party investigations and expert opinions in damage cases

TESTING OF DRAINAGE SYSTEMS

- Noise level measurements of drainage pipes and components
- Sound insulation and sound attenuation testing of drainage insulation materials and casing/enclosure structures
- Evaluation of pipe support systems and development of structure-borne noise control solutions
- Numerical modelling in fluid dynamics and materials engineering, including product development testing

AIR VOLUME AND THERMAL MEASUREMENTS

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FLOW PERFORMANCE AND ACOUSTIC MEASUREMENTS OF SUPPLY AND EXHAUST AIR DEVICES AND OTHER VENTILATION COMPONENTS

SFS-EN 12238

SFS-EN 5167-1/-2 *

SFS-EN ISO 3741 *

SFS-EN 7235 *

- Volume flow rate and pressure loss measurements, sound power level and end attenuation measurements
- Valves, regulating dampers and control devices, IMS units, ductwork elements and components

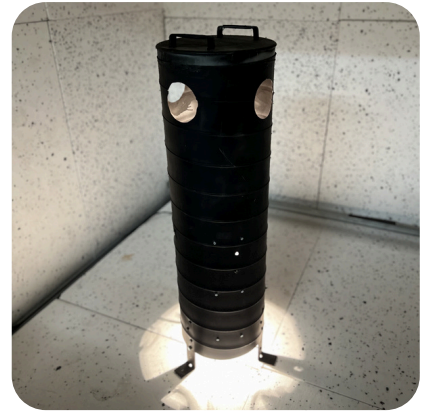
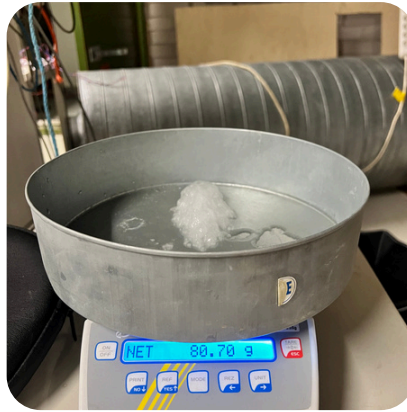
THROW PATTERN MEASUREMENTS AND MODELLING OF VENTILATION SUPPLY AIR DEVICES

SFS-EN 12238

- Air throw patterns and throw distances for isothermal, cooling, and heating conditions
- Product development services based on numerical modelling

AIR VOLUME AND THERMAL MEASUREMENTS

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COMPREHENSIVE TESTING OF AIR HANDLING UNITS AND PRODUCT DEVELOPMENT CONSULTING

- Airflow rates and pressure losses of air handling units (fan curves), electrical power input, SFP
- Sound power levels into connected ducts and to the surrounding environment (through the casing)
- Airtightness measurements and physical testing
- Thermal performance testing (temperature efficiency, frost tests, etc.)
- Development of sizing and calculation software and consultancy services, including annual efficiency and energy calculations

MEASUREMENTS OF HEATING AND COOLING CAPACITIES

SFS-EN 14037-2/-4

SFS-EN 1397

- Heating and cooling panels / radiant emitters, convectors
- Product development services using numerical modelling

TESTING OF HEATING AND COOLING COILS

SFS-EN ISO 5167 *

SFS-EN 1216

- Volume flow rate and pressure loss measurements on the air and liquid sides
- Cooling and heating capacity measurements

AIR VOLUME AND THERMAL MEASUREMENTS

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THERMAL PERFORMANCE TESTING OF AIR HANDLING UNITS, HEAT RECOVERY UNITS, AND HEAT PUMPS

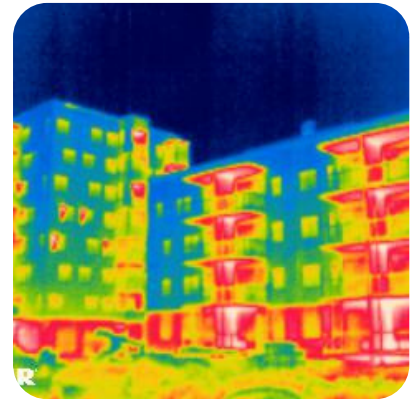
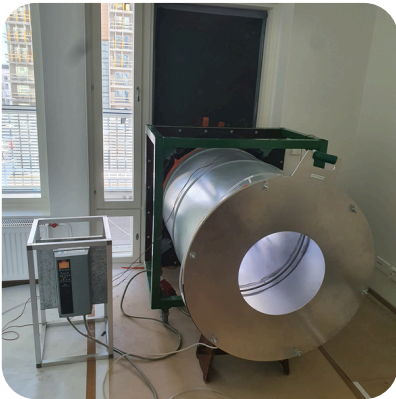
SFS-EN 13141-7

- Temperature efficiency measurements of air handling units
- Testing of air handling units under cold conditions (frost tests)
- Product development measurements carried out in cooperation with equipment manufacturers, e.g. full-scale testing of anti-frost and defrosting functions
- Performance testing of heat pumps (EER and COP values)

THERMAL PERFORMANCE TESTING AND FROST TESTING OF BUILDING PHYSICS PRODUCTS

- Testing of anti-frost functions of air handling units
- Freezing tests of ventilation exhaust air terminals
- Moisture and thermal stress testing of equipment, components, and furniture

BUILDING PHYSICS FIELD MEASUREMENTS AND OTHER RELATED MEASUREMENTS



FIELD TESTING OF AIR HANDLING UNITS

- Verification measurements of the technical performance of air handling units
- Airflow rates, temperature efficiency, SFP value
- Inspection and measurement of heat recovery systems
- Apartment-specific air handling units, large modular AHUs, etc

BUILDING AIR TIGHTNESS MEASUREMENTS

SFS-EN ISO 9972
RT 80-10974

- Air leakage and airtightness of buildings (n_{50} and q_{50} values)
- Individual apartments or entire apartment buildings measured in a single test

THERMAL IMAGING SURVEYS

RT 14-11239

- Thermal imaging surveys of buildings and building components (doors, windows)
- Localization of thermal leaks and quality assurance measurements

BUILDING PHYSICS FIELD MEASUREMENTS AND OTHER RELATED MEASUREMENTS



INDOOR ENVIRONMENTAL CONDITION MEASUREMENTS

SSFS-EN 12599

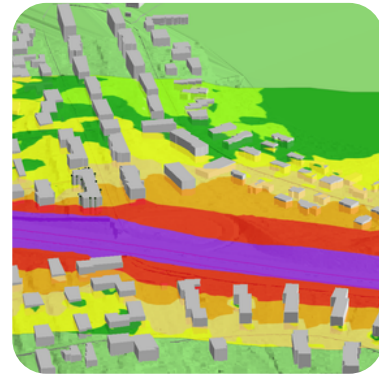
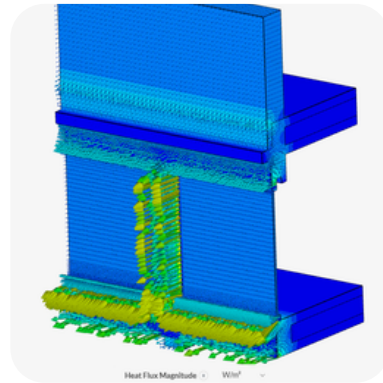
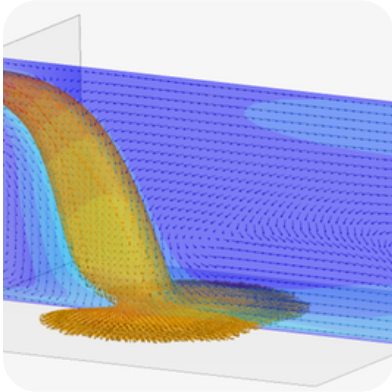
- Indoor air temperature, humidity, airflows/draught, and noise levels
- Also long-term monitoring measurements
- Assessment of cooling and heating systems and planning of improvement measures

FIELD TESTS OF SANITARY FITTINGS

- Verification measurements of the measurement accuracy of apartment-specific water meters
- Investigation of temperature stability and oscillations of thermostatic mixing valves
- Assessment of domestic hot water temperatures and flow rate measurements
- Noise measurements of plumbing fixtures and drainage systems, and investigations of noise problems

NUMERIC COMPUTATION AND MODELING

- CFD, FEM, AND FEA COMPUTATIONAL SERVICES
- MODEL ACCURACY AND INPUT PARAMETERS CAN BE CALIBRATED USING LABORATORY MEASUREMENT DATA



FLOW AND THERMAL MODELLING

- For example, pressure losses and airflow rates / throw patterns of ventilation components and valves
- Pressure losses and flow profiles in piping systems
- Wind effects on buildings, exhaust air devices, etc.
- Modelling of large-scale projects, e.g. tunnels and entire city district

ACOUSTIC MODELLING

- Structure-borne noise modelling
- Structural dynamic behaviour and natural frequencies

EMISSION MODELLING

- For example, dispersion modelling of vehicle emissions
 - Dispersion modelling of flue gases and simulation of smoke control systems
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CONTACT



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