



Troldtekt® akustik

Natural ceiling and wall panels

Why choose Trolldtekt®?

- **Good acoustics**
 - high sound absorption
- **Efficient fireproofing**
 - fire-resistant
- **Healthy indoor climate**
 - ecologically and biologically sound
- **High durability**
 - robust and impact-resistant, unaffected by high humidity
- **Simple installation**
 - versatile and easy to install
 - low life cycle cost
- **Thinking new**
 - special products and sizes available, all colours possible

Trolldtekt® Acoustic Panels

Natural ceiling and wall panels

Trolldtekt is an extensively tested Danish product which has undergone continuous development and been used in the construction industry for more than 75 years. Furthermore, it is a 100% natural product.

Trolldtekt is known – and renowned – for its excellent sound absorption qualities, which help to reduce noise and create good acoustics in every room. So Trolldtekt is the 'natural' choice for ceilings in most types of building.



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Photography by: Helene Høyer Mikkelsen, Thomas Mølvig,
David Bering and Henrik Bjerregrav

Design: www.ineo.dk

Text: www.protekst.dk

Acoustic ceiling tile

Troldtekt acoustic panels consist of spruce shredded into long thin shavings – wood wool – which is then mixed with cement.

When wood is coated with cement in this way, it cannot burn or rot. So Troldtekt is not only synonymous with good acoustics – it also means efficient fireproofing.

Structure

- Ultrafine structure: 1.0 mm fibre width
- Fine structure: 1.5 mm fibre width
- Coarse structure: 3.0 mm fibre width



Coloured screws

Troldtekt screws are coloured to match the panels.



Light natural, ultrafine structure



Light natural, fine structure



Light natural, coarse structure

Colours

Troldtekt is available untreated and completely natural, but painted Troldtekt panels – particularly white-painted ones – are always available.

The Troldtekt panels are spray-painted with water-based paint in our new, modern painting facility at the factory in Troldhede. The paint nozzles spray from several angles to ensure uniform colour and good coverage. Troldtekt panels can be supplied in any RAL/NCS-code.

If you prefer, you can also paint the Troldtekt panels yourself using a long-haired roller or hand sprayer. Please note, however, that the open structure of the Troldtekt panels makes it difficult to achieve the same uniform coverage as the ready painted panels from the factory.



White 101
Approx. RAL 9010



Grey 202
Approx. RAL 7035



Charcoal grey 208
NCS 5500 N



Black 207
RAL 9004



Purple, approx. RAL 4001



Blue, approx. RAL 6012



Yellow, approx. RAL 1018

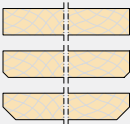
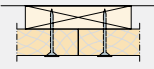
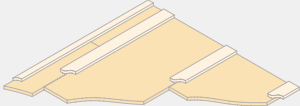
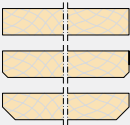
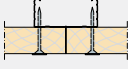
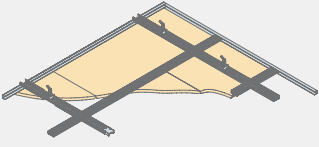
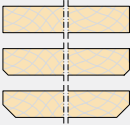
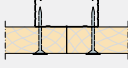
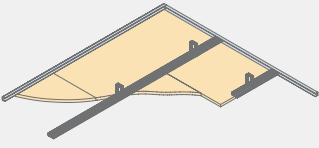
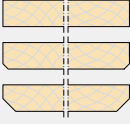
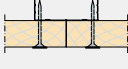
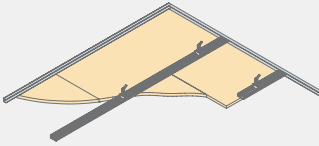
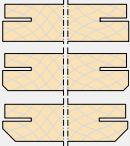
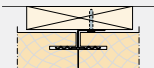
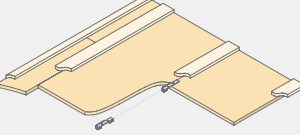


Green, approx. RAL 6019



Troldtekt® edge design and installation

Click on the product generator on www.troldtekt.com and select your Troldtekt solution. You can then find detailed description for your selection and download installation instructions.

Edge design	Edge design	Section	Axometric section
<p>K0, K5, K11</p> <p>K0: square edge K5: 5 mm bevel K11: 11 mm bevel</p> <p>Installed with Troldtekt screws on wooden battens</p> <p>Modular dimensions: 25/35 × 600 × 600/1200/2000/2400 mm</p>			
<p>K0, K5, K11</p> <p>K0: square edge K5: 5 mm bevel K11: 11 mm bevel</p> <p>Installed with self-tapping Troldtekt screws in suspended C60 profile system</p> <p>Modular dimensions: 25/35 × 600 × 600/1200/2000/2400 mm</p>			
<p>K0, K5, K11</p> <p>K0: square edge K5: 5 mm bevel K11: 11 mm bevel</p> <p>Installed with self-tapping Troldtekt screws in C60 profiles, suspended with adjustable suspension bracket (27-120 mm)</p> <p>Modular dimensions: 25/35 × 600 × 600/1200/2000/2400 mm</p>			
<p>K0, K5, K11</p> <p>K0: square edge K5: 5 mm bevel K11: 11 mm bevel</p> <p>Installed with self-tapping Troldtekt screws in C60 profiles, suspended with suspension hanger quick-fit suspension bracket (> 120 mm)</p> <p>Modular dimensions: 25/35 × 600 × 600/1200/2000/2400 mm</p>			
<p>K0-N, K5-N, K11-N</p> <p>Groove 2 long edges</p> <p>K0-N: square edge K5-N: 5 mm bevel K11-N: 11 mm bevel</p> <p>Installed with concealed KN brackets on wooden battens</p> <p>Modular dimensions: 25/35 × 600 × 600/1200 /2400 mm</p>			

Edge design	Edge design	Section	Axometric section
<p>K0-N, K5-N, K11-N Groove 2 long edges</p> <p>K0-N: square edge K5-N: 5 mm bevel K11-N: 11 mm bevel</p> <p>Installed with concealed KN brackets in suspended C60 profile system</p> <p>Modular dimensions: 25/35 × 600 × 600/1200/2400 mm</p>			
<p>K0-S, K0-FS</p> <p>K0-S: square edge K0-FS: rebate</p> <p>Installed in exposed T24 profiles in removable, suspended ceiling system</p> <p>Modular dimensions: 25 × 600 × 600/1200 mm</p>			
<p>K5-FU Rebate for u-groove and 5 mm bevel</p> <p>Installed with Troldtekt screws on wooden battens</p> <p>Modular dimensions: 35 × 600 × 600/1190/2400 mm</p>			
<p>K5-FU Rebate for u-groove and 5 mm bevel</p> <p>Installed with self-tapping Troldtekt screws in suspended C60 profile system</p> <p>Modular dimensions: 35 × 600 × 600/1190/2400 mm</p>			
<p>K5-FN Rebate and groove 1 long edge, 5 mm bevel</p> <p>Removable, in concealed corridor profiles, with a free span of max. 2400 mm</p> <p>Modular dimension: 35 × 600 × 2400 mm</p>			
<p>K5-FN Rebate and groove 1 long edge, 5 mm bevel</p> <p>Removable, in suspended, concealed T35 profile system</p> <p>Modular dimensions: 35 × 600 × 600/1200 mm</p>			
<p>K5-FP Rebate for decorative strip and 5 mm bevel</p> <p>Installed with Troldtekt screws on wooden battens</p> <p>Modular dimensions: 35 × 600 × 600/1200/2400 mm</p>			
<p>K5-V V-groove</p> <p>The two v-grooves and the 5 mm bevel give your ceiling or wall a sleek plank-look</p> <p>Modular dimensions: 25/35 × 600 × 600/1200/2000/2400 mm</p>			

6 good reasons for choosing Trolldtekt

- Good acoustics
- Efficient fireproofing
- Healthy indoor climate
- High durability
- Simple installation
- Thinking new

Good acoustics

A very good reason for choosing Trolldtekt acoustic panels is the excellent sound absorption performance of the material. The panels contribute to a good acoustic environment in the rooms where they are installed. The following is a short introduction to acoustic concepts and some advice on how to best use the products.

Reverberation time

When saying that the products contribute to a good acoustic environment, we are really talking about reverberation time. In layman's language, this is an expression which indicates how fast a sound dies away in a room. In a church, the reverberation time is long, i.e. it takes the sound a long time to die away. In a furnished living room, the reverberation time will be short. More accurately, the term reverberation time denotes the number of seconds it takes the sound level to drop 60 dB after the sound has ceased. If you clap your hands (once!) in a church, this will give you a clear idea of the concept.

The reverberation time is measured on site using special equipment, or it is calculated in advance. The reverberation time is often related to recommended or required values. In the UK, for example, The Building Regulations document E "Resistance to the passage of sound" Parts 3 (section 7) and E4 (section 8 acoustic conditions in schools) sets requirements for reverberation times. For building projects such as these, it must be possible to specify by means

of calculations how the requirements in question will be met. This normally means that you have to submit a description of the measures you are going to implement.

Sound absorption value

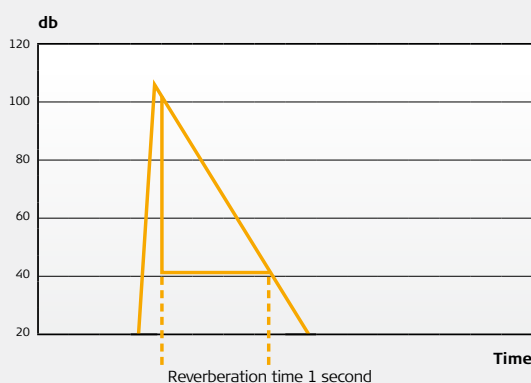
The efficiency of a sound-absorbing material is expressed by means of its sound absorption value, which is measured in a laboratory. The sound absorption value is indicated with the Greek letter α (alpha), and alpha values are measured/stated in a wide frequency area (bass, mid range and treble). Graphs of alpha values make it easy to see how efficiently the material absorbs sound. It is usually desirable for the material to function over as large a frequency range as possible.

The sound absorption value depends not only on the material itself, but also on how the material is installed, i.e. the construction.

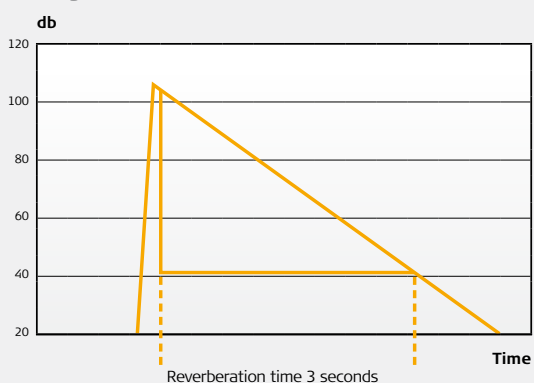
Absorption

The sound-absorbing effect of a material such as Trolldtekt depends partly on how efficient the material is in itself, and

Short reverberation time



Long reverberation time





partly on how many square metres are installed. The effect is called the absorption, and is simply the product of the sound absorption value and the actual number of square metres of material. If you install 100 square metres of acoustic material with a sound absorption value of 0.6, the absorption will be 100×0.6 , i.e. 60. The bigger the absorption, the shorter the reverberation time in the room.

A practical example

Imagine a rather large, empty room measuring 100 square metres and with a ceiling three or four metres high, consisting exclusively of hard, sound-reflecting surfaces. The reverberation time is long and the room is unpleasant to be in. In this case, a complete acoustic ceiling covering the entire area, would provide effective sound reduction.

It is usually practical, fast and cost-effective to place the sound-absorbent material in the ceiling. However, requirements may mean that it will be necessary to include additional panels on the walls.

Wall absorbents

If – in addition to the ceiling – you install absorbents on the walls, you will achieve greater 'acoustic comfort'. You will find that the 'comfort' you feel in a room with short reverberation is increased if there are also sound absorbents on the walls. It is not known exactly why, but it is probably related to the fact that this attenuates the sound in every direction.

To achieve the best result in an average rectangular room, you should install wall absorbants along one long wall and along one end wall.

Troldtekt and mineral wool

To achieve the best possible sound absorption, install mineral wool behind the Troldtekt panels. Figure 1 and 2 show the improvement gained from installing mineral fibre between the two types of installation.

Suspended versus directly installed ceilings

For acoustic ceilings in general, the construction itself is an important factor when trying to achieve the best possible sound absorption. The best effect, i.e. the widest possible effective area, is typically achieved by installing the acoustic ceiling 200-300 mm from the fixed ceiling. However, with Troldtekt acoustic ceilings you can achieve almost the same effect with a directly installed ceiling as long as there is mineral wool behind the panels. This (figure 2) achieves almost the same absorption as a suspended ceiling (figure 3). This means that you can reduce both fitting space and costs.

Figure 1

Ceiling section



Absorption coefficient α

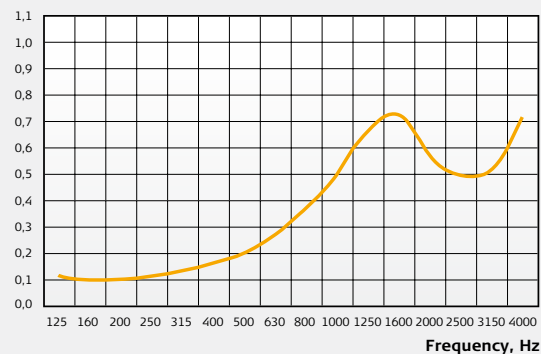
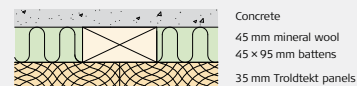


Figure 2

Ceiling section



Absorption coefficient α

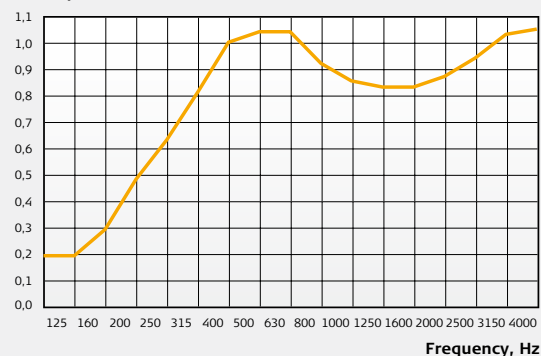
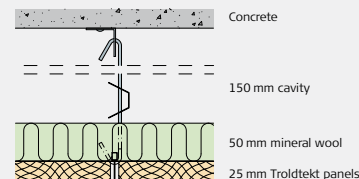
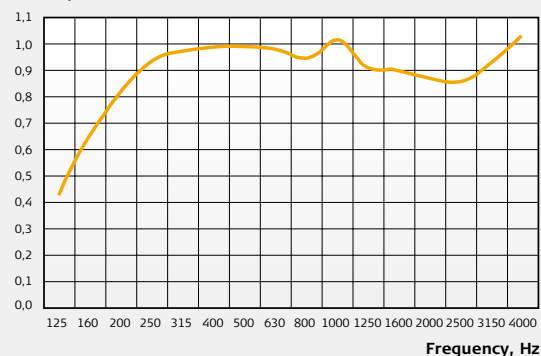


Figure 3

Ceiling section



Absorption coefficient α



Efficient fireproofing

Fire safety

Troldtekt consists of wood and cement, and wood is, of course, a combustible material. However, the wood wool in Troldtekt products is coated with cement, which makes the wood very hard to ignite and, in case of fire, results in low heat emission and low smoke formation. Therefore, Troldtekt products cannot burn with a naked flame, but will only smoulder slowly with low heat emission and low smoke formation.

Troldtekt products are CE-marked and comply with B-s1,d0 fireproofing requirements.

B-s1,d0: The 'B' denotes the extent to which the material contributes to fire. The classification ranges from A1 as the best to F. An F, however, means that the panel has not been tested and may not be sold and used for ceiling cladding. The 's' denotes the level of smoke formation and ranges from s1 as the best to s3 as the worst. The 'd' denotes burning drops, ranging from d0 as the best and down to d2.

Troldtekt declaration

Troldtekt products are CE-marked, and this marking scheme ensures that the products meet the declared fire classification.

Troldtekt is CE-marked in accordance with the European norm for cement-bonded wood wool, EN 13168 – Thermal insulation products for buildings – Factory made wood wool (WW) products. As of 1 July 2007, it has been mandatory to use the European harmonised standard under the construction product directive for suspended ceilings, EN 13964. The introduction of this standard means that the many different national classifications for suspended ceilings in the European market have now been

harmonised. We mark the Troldtekt panels in accordance with both standards, EN 13168 and EN 13964 in order to provide our customers with optimum safety.

The approval is based on the Troldtekt screws and fittings used in the actual fire tests. Therefore, the approvals are only valid when the Troldtekt panels are used with original Troldtekt screws and fittings or fasteners of similar quality.

Certificates



CE marking in accordance with EN 13168 and EN 13964

0615-CPD-222958G
0615-CPD-80474G

Product code

WW-EN 13168 - L2 - W2 - T1 - S3 - P1 - CS(10)300 - CL1

Troldtekt panels are tested to BS-476 and are designated class 0 to British Building Regulations.



Healthy indoor climate

Indoor climate and well-being

Most people spend almost all of their time indoors, and much of this time is spent at work. It is therefore vital that these buildings have a good indoor climate which does not cause problems or affect our health or ability to work. A poor indoor climate is a common problem. It affects our health and work capacity, and it can lead to increased absence through sickness, which is expensive for the individual, the workplace and society at large.

Danish Indoor Climate Labelling (Dansk Indeklima Mærkning)

The indoor climate is a combination of air, smell, sound, light, humidity, static electricity, design and colour. Danish Indoor Climate Labelling (DIM) is a voluntary labelling scheme for building materials and their impact on the indoor climate. The indoor climate label is common to Norway and Denmark, and is recognised worldwide. For the indoor climate label to be granted, the product must meet certain requirements during its use, while the product's impact on the indoor air quality is also considered. One factor is the content of chemical substances in the product, another which substances are released from the product to the ambient air. A product certified and labelled under the indoor climate scheme has been subject to extensive testing, proving a minimal release of chemical substances to the air. Ceiling products are also tested for the release of fibres and particles.

Testing for degassing

All products are classified with a time value in days – the time value relevant for indoor climate. The time value is determined on the basis of the time that passes before the degassing 'subsides'. The time value is determined through chemical analysis and sensory (smell) evaluation.

Troldtekt is classified with the time value 10 days, which is the best category.



Testing for particle release

In connection with indoor climate certification, ceiling products are also classified for particle release, determined through sedimentable dust consisting of particles and fibres during the early use of the product.

The release of particles and fibres from Troldtekt is classified as low, which is the best category.

M1 Classification

The emission classification system is developed by the Finnish Indoor Air Association and the Building Information Foundation RTS. This building material classification system promotes the use of low-emission products and has three emission classes. Emission class M1 corresponds to the best quality and emission class M3 includes materials with the highest emission rates.

A product will receive the M1 classification provided that it meets specific requirements and has been tested by an independent laboratory. In addition to chemical tests, the products go through a sensory evaluation process by an Odour Council.

Troldtekt is classified in the M1 category.



High durability

Moisture-resistant

Troldtekt acoustic panels consist of cement-bonded wood wool – a very sturdy and durable material. Due to the material's natural composition of wood and cement, Troldtekt can absorb and give off moisture. Troldtekt is therefore very suitable for cladding ceilings and walls in wet rooms such as bathrooms and – not least – swimming pools.

Troldtekt is also suitable for outdoor use in e.g. arcades, eaves or where it is not directly exposed to the weather.

Ball impact certification

Ceilings and wall cladding in sports facilities can be exposed to considerable impact at ball games. This puts high demands on cladding materials in sports centres, gymnasiums etc.

In Germany, documentation to withstand ball impact is required of the materials in accordance with 'Prüfung der Ballwurfsicherheit, DIN 18032 Teil 3, Sportshallen für Turnen und Spiele' (requirements and testing of ball impact safety, DIN 18032, Part 3, sports facilities). Testing takes place at a laboratory in the facility for research and materials testing for the construction industry (Forschungs- und Materialprüfungsanstalt für das Bauwesen (FMPA)) at the Otto-Graf Institute at the University of Stuttgart. The CE standard for suspended ceilings, EN 13964, also includes ball impact certification as a parameter, and the German tests are performed in accordance therewith. In accordance with EN 13964, Annex D, Impact resistance, Troldtekt is classified as class 1A.

A wide range of constructions using Troldtekt acoustic panels have been tested at the Institute in Stuttgart and have been approved for use as ceiling and wall cladding in sports facilities. This applies to constructions on wooden battens as well as those suspended in C60 profile systems.

DIN 18032, Teil 3, Sportshallen für Turnen und Spiele / EN 13964, Annex D, Impact resistance.

Ceiling cladding

A handball is thrown 36 times against the test ceiling at a velocity of 16.5 ± 0.8 m/s. The shots are fired 2×12 times at an angle of 60° and 1×12 times at an angle of 90° .

Wall cladding

A handball is thrown 54 times against the test wall at a velocity of 22.5 ± 1.2 m/s. The shots are fired 2×12 times at an angle of 45° and 1×30 times at an angle of 90° .

Even wall and ceiling cladding of 25 mm thick Troldtekt panels installed on battens at 600 mm meet the stringent requirements.

Simple installation

Troldtekt acoustic ceilings are very easy to install, and at www.troldtekt.com you can download detailed installation instructions for the many different installation and suspension systems. Just follow these simple guidelines before and after installation to ensure optimum results.

Important to ensure good results

Troldtekt is a 100% natural material largely comprised of wood, and the panels will therefore naturally 'work' to achieve the same temperature and moisture level as their surroundings. The installation of Troldtekt panels should be carried out under controlled temperature and humidity conditions. Troldtekt panels undergo a drying process before leaving the factory at Troldhede, but during transport or storage the panels may again absorb moisture. Troldtekt panels should be acclimatised prior to installation.

After installation

The Troldtekt ceiling can be cleaned with a vacuum-cleaner with a brush nozzle.

If the installation work has resulted in lines or other dirt on light natural panels, these can be removed using a slightly damp cloth. Touch-up paint is available as required.



Thinking new...

In association with architects, designers and industry experts, we have developed a range of new products that add extra functionality and quality to ceilings. You can combine these products and adapt your ceiling to meet any requirements. The multi-functional ceiling is now a reality.

■ TROLDTEKT® PLUS

Extra sound absorption
– ideal for retrofitting



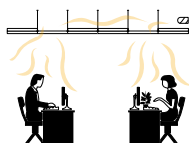
■ TROLDTEKT® SPEAKERS

Built-in sound



■ TROLDTEKT® VENTILATION

Fresh air without draughts



■ TROLDTEKT® DECORATION

A different kind of decoration



■ TROLDTEKT® LIGHTING

Good lighting
– pure and simple





Production and the environment

Danish raw materials

Troldtekt is manufactured from wood and cement. The wood is sourced from Danish forests, and wood is a renewable and CO₂-neutral resource. Generally, forests also contribute to improving the natural environment. It is also possible to purchase Troldtekt made from PEFC-labelled timber, ensuring sustainable forestry. The cement is sourced from Danish geology and produced by Aalborg Portland. The production takes place with due care for the natural environment, and Aalborg Portland is ISO 14001-certified and EMAS-registered.



Troldtekt is
PEFC-certified

Environment-friendly production

Troldtekt is manufactured in Troldhede in Denmark at a highly modernised production facility. The production takes place in a closed system without any waste water discharge. Production is characterised by an extremely environment-friendly use of raw materials, minimising external environmental impact. Approx. 95 percent of the factory's energy consumption for general heating and drying purposes originates from CO₂-neutral wood fuel from wood waste and bark from the production of Troldtekt.

Recycled waste

The waste products which are generated from producing Troldtekt primarily consist of production waste such as off-cuts, sanding dust, rejected panel pieces etc. These waste products are shipped to the environmental facility KomTek Miljø A/S, which receives, processes and reprocesses organic residual products into soil improvers. KomTek only receives residual products which have obvious soil-improving or composting properties. After processing in the composting facility, KomTek sells the products as highly processed soil improvers for the maintenance and establishment of lawns, parks etc.

Service

www.trolldtekt.com provides a clear overview of the many Trolldtekt acoustic solutions. Using our product generator, you can also download accompanying AutoCad drawings, a description of the product range and detailed installation instructions for the chosen solution. The website also contains lots of inspiration, among other things a number of reference pictures, cases and trend articles.

Technical advice

We are happy to provide technical advice for construction professionals. We provide advice on Trolldtekt acoustic solutions and associated products, including the dimensioning of Trolldtekt ventilation and Trolldtekt loudspeakers, and we also carry out light and sound calculations for project planners.

About us

Trolldtekt A/S have produced Trolldtekt acoustic ceiling and wall panels since 1935 at Trolldhede in central Denmark. During this time, the product has undergone continuous development and refinement. The result is a range of

products which are tested to meet today's ever increasing demands for good acoustics in a wide variety of buildings.

International distributors

Details of our international distributors are available on www.trolldtekt.com. They either stock our Trolldtekt products or can obtain them for you. Please contact our

distributors for general information, brochures or data sheets. You are, of course, also welcome to contact Export sales at our Head Office in Denmark.



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