

---

# FLEXIBLE ACOUSTIC CEILING SOLUTIONS

FOR **HOSPITALS** AND  
**HEALTH CARE** FACILITIES







## CONTENTS

Welcome	4
Acoustics	6
Hygiene	10
Air quality	14
Fire safety	18
Robustness	19
Environment	20
Overview	22
– About us	23
– Products that put the 'care' into healthcare	24
– Product guide	26
– Application recommendations	27





---

WELCOME

## KNAUF DANOLINE: PRODUCTS THAT CARE

People have always shaped their environments to serve a particular function: we want our homes to provide comfort, our workplaces to encourage productivity and our hospitals to support good health.

Studies have shown that a hospital with a warm and welcoming physical environment can actually improve patient outcomes and recovery times, as well as having a beneficial effect on the wellbeing of hospital staff themselves<sup>1</sup>.

---

*Did you know: The right architecture  
and design can facilitate patient healing*

But if we want to provide healthcare facilities where the physical environment nurtures the health of patients and staff, and accurately reflects the support and care provided, we need to have a more holistic view of healing and healthcare. One that begins with the environment in which patients, doctors and visitors spend the majority of their time. This means choosing the right combination of construction materials not only in terms of functionality, but also in terms of their aesthetic appeal and design.

That's where Knauf Danoline can help. Our diverse portfolio of robust, sound-absorbing and hygiene-friendly ceilings and wall linings is the ideal choice for healthcare environments. Combining functional excellence with aesthetic appeal, our products enable the creation of superior healing spaces that encourage and support good health and wellbeing. All products come with a 50-year guarantee, too, providing extra reassurance and peace of mind.

<sup>1</sup> Ampt A, Harris P, Maxwell M. 2008 *The Health Impacts of the Design of Hospital Facilities on Patient Recovery and Wellbeing, and Staff Wellbeing: A Review of the Literature*. Centre for Primary Health Care and Equity, University of New South Wales: Sydney.



---

# ACOUSTICS



# CREATING QUIETER HEALTH ENVIRONMENTS

High noise levels in healthcare facilities can lead to an increase in heart rate, blood pressure, respiration rate and blood cholesterol levels<sup>2</sup>. Not to mention the added stress and distractions of working in a noisy environment.

In controlling noise levels, there are two major factors to consider: the source of the noise and the widespread use of hard surface sound-reflecting materials that, although good for hygiene, add to noise levels.

*Did you know: Noisy environments have a negative effect on both staff and patients*

Significantly reducing the number of noise sources is unrealistic. Similarly, decreasing the use of hard surface materials is unlikely in the short term. But there is another way. By using sound absorbent materials, such as Knauf Danoline sound absorbers, it is possible to improve control of noise levels and create positive healthcare environments.



<sup>2</sup> Health Technical Memorandum 08-01: Acoustics

Our acoustic gypsum solutions absorb up to 90% of the sound that hits their surface. They adhere to national acoustic requirements for specific reverberation times and can be tailored to fit the precise needs of different rooms, helping to create quieter, calmer atmospheres.

#### ACOUSTIC RECOMMENDATIONS FOR VARIOUS HOSPITAL ROOMS

Room type	Recommended reverberation time
Consultation/Examination room	$\leq 0.6$ seconds
Foyer/Reception	0.8–1.2 seconds
Cafe/Cafeteria and communal areas	0.8–1.2 seconds
Multi-bed ward	$\leq 0.8$ seconds
Single-bed ward	$\leq 0.8$ seconds
Lounge	$\leq 0.6$ seconds
Staff room	$\leq 0.6$ seconds
Office	$\leq 0.6$ seconds
Corridors and stairwells	$\leq 0.6$ seconds







## CASE STORY

# ÖSTRA HOSPITAL, SWEDEN

"The client's job is to define function and design specifications for the new building.

Where the choice of ceiling materials is concerned, this is closely connected with what the rooms will be used for. In general, our requirement was that the ceilings should meet certain acoustic specifications, be easy to take down, facilitate the installation of light fittings and be easy to clean.

*"We have had good results with Knauf Danoline products from previous hospital projects"*

We have had good results with Knauf Danoline products from previous hospital projects. These results convinced me that it would be a good idea to install Knauf Danoline ceilings in corridors, lounges, activity and staff rooms in the new psychiatric wing of Östra Hospital."

– Claes Henricson, West Götaland Property  
Management Authority, Gothenburg, Planning Unit

## KNAUF DANOLINE PRODUCTS USED

- Designpanel Micro
- Corridor 300 Micro
- Belgravia Micro

### Architect:

Krister Nilsson, White Arkitekter





---

HYGIENE



# PRIORITISING HYGIENE AND CLEANLINESS

Hygiene is important for all healthcare facilities. Building materials therefore need to combine a high level of functionality and design with good hygiene and cleaning properties. They must also have no detrimental impact on air cleanliness - essential in preventing the spread of infections.

*Did you know: Knauf Danoline gypsum products are used in high priority hygiene areas like clean rooms and laboratories across the world*

## Resistance to microbial growth

On most ceiling surfaces, dust and other particles infiltrate the microscopic gaps in the surface structure, making them harder to clean thoroughly. But all Knauf Danoline acoustic ceilings and wall linings are coated with a low polymer, high density paint that has a very low attraction to dust particles.

Rather than infiltrating the gaps and perforations in the ceiling, the dust sits on the surface, allowing for easy and effective cleaning using dry dusters or vacuum cleaners. Meanwhile, the durability of the coating enables tougher stains to be removed using standard cleaning practices and neutral cleaning solutions.

The appearance and reliability of any ceiling system may be affected by continuous high temperatures coupled with high air humidity, or if installed in environments prone to aggressive gases which may provoke the risk of heavy growing mould and bacteria.

Under normal conditions and in temperature controlled environments, the risk of mould growth and bacteria on ceilings is limited. In order to further minimize the risk of mould and bacteria, Knauf Danoline products are manufactured with built-in anti-mould and anti-bacteria agents. All Knauf Danoline products are tested for anti-microbial growth resistance according to DIN EN 1104 (Determination of the migration of anti-microbial substances) Grade 3.





### Clean room

In higher risk areas where outstanding hygiene and cleanliness is imperative, such as clean rooms and operating theatres, more robust cleaning regimes are essential – and Knauf Danoline has the solution here, too. Our foil-covered Danotile can withstand rigorous cleaning with concentrated disinfectants and detergents with both high and low pH values (2.5–13). This includes the mixture of peracetic acid and  $H_2O_2$  commonly used in hospitals, where even after 120 cleaning cycles, Danotile remains ISO 5 compliant and retains its high classification in Excell and Céra-Labo.

### Air pressure control

In some areas of a hospital, air pressure variation between different zones is created in order to control airborne contamination risks for staff, visitors and patients. Danotile is especially useful in such areas as it can withstand pressure variations of up to  $\pm 30$  Pa.

*Did you know: Danotile can withstand tough cleaning and disinfection agents with pH ranging from 2.5 to 13*

### Access for service and maintenance

As well as being aesthetically strong and structurally innovative, our products are deliberately designed to support the functions that are carried out within the building.

Ceiling voids in healthcare facilities often hide essential services infrastructure that needs to be checked or modified fairly regularly, particularly in corridors. So we ensure that our products are easy to mount and de-mount, allowing easy access to the void for service and maintenance tasks.





## CASE STORY

# BRISTOL HOSPITAL, UNITED KINGDOM

"Our goal was simplicity and the use of as few materials as possible. Knauf Danoline ceilings contributed to this simple expression because of their discreet character. We had originally specified mineral wool ceilings throughout the hospital but changed our minds when the hospital management decided to install Danotile in most areas. We took a look at the product and found it was a very good alternative to what we had specified."

*"We had originally specified  
mineral wool ceilings ..."*

The decisive factors for choosing Knauf Danoline for the hospital were infection control and cleaning. In addition the ceilings are attractive, which was important for us. The panels match and complement the radiant heat panels very well. We would not hesitate to recommend Knauf Danoline for other projects."

– Craig Bennett, Coda Architects, Bristol

## KNAUF DANOLINE PRODUCTS USED

- Designpanel Micro
- Corridor 300 Micro
- Corridor 300 Micro

### Architect:

Coda Architects, Craig Bennett



---

# AIR QUALITY

A photograph of a modern building interior, likely a hospital or public space. The image shows a multi-level structure with a prominent glass balcony on the upper level. The ceiling is a complex, white, grid-like structure with recessed lighting. The lower level features a brick wall and a glass entrance. Signs for 'INFORMATION', 'Højhus', and 'Medicinerhus' are visible. The overall color palette is dominated by blue and white, with a blue gradient overlay.



## IMPROVING AIR QUALITY

At Knauf Danoline, we don't only provide products that protect indoor air quality, our products actively improve it.

Indoor air quality in hospitals and healthcare facilities needs careful consideration, as poor air quality can be detrimental to the recovery of patients and may even spread infections.

Everyday substances like paints and lacquers, cleaning and fabric-care products, perfumes, cleaning agents and even electronic devices, all affect air quality. They create potentially harmful emissions, too, including Volatile Organic Compounds (VOCs) linked to allergies, asthma and even cancer.

---

*Did you know: All our perforated products come with the air cleaning Cleaneo Technology*

All our acoustic products contain our unique air purifying technology – Cleaneo Technology®. This has been shown to improve indoor air quality by reducing the concentration of VOCs like alcohol, aldehydes, ketones and esters.

Furthermore, independent laboratory tests at the Fraunhofer Institute for Building Physics in Germany have demonstrated the effectiveness of Cleaneo.

So as well as the superb acoustic properties and sleek, contemporary finishes you expect from Knauf Danoline, our products also offer the added benefit of dynamic air purification.



### Moisture resistance

Mould and other micro-organisms are another health risk, not least for people with existing health problems.

Damp surfaces increase the chances of mould, but this can be avoided through good design and construction practices and the use of moisture and mould resistant building materials.

All Knauf Danoline ceilings are suitable for use in 'normal' environments, i.e. up to 70% relative humidity at 25°C, making them ideal for the majority of the rooms in a hospital.

In addition, a number of our advanced solutions, such as Belgravia, Plaza, Designpanel and Danotile, have also been tested at 90% RH at 30°C. This means they can be used in more extreme conditions, such as kitchens, basements, laboratories and other rooms with frequent and major changes in the temperature and air humidity.



### Minimising particle emissions

Fine particles emitted by building materials increase the risk of infection spreading. Some can even pose a health risk in their own right. As certified by Danish Indoor Climate Labelling, however, Knauf Danoline products have very low particle emissions. The DICL rating covers both degassing over time and particle emission.



Our products are also classified to ISO Class 5 in accordance with ISO 14644-1, which corresponds to Class 100 of US Federal Standard 209E. And they are certified by the Swedish Sunda Hus organisation – an overall assessment of the product's environmental and health impacts.

### Resistance against microorganisms and fungus

In commonly used areas, normal room conditions will naturally inhibit the growth of microorganisms. Paint coated, perforated, grooved gypsum products help maintain and enhance this natural resistance, as they do not give microorganisms any basis for growth.

In more extreme conditions like washrooms and kitchens, where the temperature and the humidity is constantly high, the foil-laminated surface of Danotile delivers extra high mould resistance.



## CASE STORY

# HAMLET PRIVATE HOSPITAL, DENMARK

"Our requirements for the ceilings at Hamlet Private Hospital were that they had to be easy to clean and as light in colour as possible. Furthermore, they had to be sound absorbing in accordance with the building code.

*"They had to be easy to clean and as light in colour as possible"*

The well-being of patients and staff had to be ensured with the help of a pleasant indoor climate and clean air, the right level of humidity and a relaxed atmosphere. In addition, the interior had to give the least possible impression of a hospital. In other words, the layout, lighting and colour scheme on the walls had to create a peaceful expression.

Knauf Danoline's ceilings helped create this expression thanks to their simple, discreet design.

Our consultants' choice of Knauf Danoline as a ceiling supplier was based on the good results they have had with these products over time. As a client we are extremely satisfied with their choice as it made it possible for us to achieve the desired visual goal for the hospital's interior."

– Kasper Færk Jacobsen, Technical Manager, Hamlet

## KNAUF DANOLINE PRODUCTS USED

- Danotile
- Markant Globe

### Architects:

Aarhus Arkitekterne, Nils Jakobsen





## FIRE SAFETY



A fire in a hospital can develop very quickly and have devastating consequences. Besides the incalculable human factor, hospital fires can also have significant economic consequences, as hospitals generally house very costly equipment. Fire prevention is therefore imperative when building or renovating a hospital. So when planning, designing and choosing material for healthcare facilities, it is essential to consider fire safety and compliance with fire regulations.

All Knauf Danoline products are tested according to both EN 13501-1 and ASTM E84 standards. And all solutions meet and exceed all the necessary fire safety requirements, not only for their reaction to fire, but also for fire protection. Knauf Danoline solutions are not only the smart choice, they are also the safe choice.



## STRONG ENOUGH TO LAST



Knauf Danoline products are exceptionally robust with excellent pressure resistance. Under normal conditions, the product properties are preserved and there is no decomposition over time. This makes them ideal for the renovating, adapting and extending that is common in healthcare facilities.

Tested in accordance with EN 14190, our products can bear five times their own weight. This means that a non-perforated Belgravia tile, for example, is tested with a weight up to 17 kg without any damage to the tile, ensuring a strong, high performing ceiling.

The deflection performance of the products is tested in accordance with EN 13964. Furthermore, all products are tested with their working load, such as light fittings. This robust testing regime means that some products can bear up to 3kg of direct weight without any extra support.





---

# ENVIRONMENT

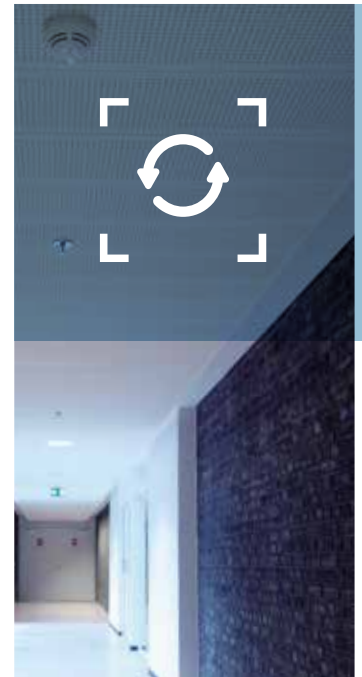


# THE SUSTAINABLE CHOICE

Materials that regularly change their design and appearance make it difficult for healthcare facilities to maintain the same look as they are renovated or updated over time.

That's why we take care to maintain the appearance of our products, even though we are constantly improving them, enabling customers to mix and match new products with existing ones.

The environmental advantages of Knauf Danoline products are another important benefit. The lifetime of our products is more than 50 years. Throughout that time, their properties do not change or diminish. They retain the same strength, the same acoustic characteristics and the same fire resistance. Light reflection is only affected in very dusty environments, and even then it is simple to vacuum clean the surface to remove the dust, or at worst, apply a fresh coat of paint.



## KNAUF DANOLINE: KIND TO THE ENVIRONMENT

- Long lifetime
- Recyclable
- Re-usable
- Re-paintable

Find all our certifications and more  
at [knaufdanoline.com](https://www.knaufdanoline.com)

At the end of their lifespan, our products are wholly recyclable. The crystalline agent which binds the gypsum together can be heated up. When this happens, the gypsum board turns back into a reactive powder. This is combined with waste gypsum powder created as a by-product of the cleaning process at power stations, to create new gypsum. So only a limited percentage of the gypsum in our products comes from virgin natural sources.

The other materials used to make Knauf Danoline products, such as cardboard, colouring, acoustic felt and glue, are all designed to be recyclable and re-usable, too. The result is that only 1% of a Knauf Danoline tile ends up as waste.

There is also a financial benefit, in that the long lifetime, sustained light reflecting ability and impact resistance reduces the total cost of ownership of Knauf Danoline products.

---

# OVERVIEW



## ABOUT US

Headquartered in Denmark, Knauf Danoline develops and markets acoustic ceiling and wall materials based on high grade glass fibre reinforced gypsum.

Several decades working side-by-side with architects has given us an in-depth understanding of the market, its requirements – and the factors which drive your success. We combine this insight with our profound understanding of gypsum, and continual investment in development and technology, to provide in depth expertise, guidance and technical solutions to meet your specific requirements.

---

*Customers in more than 50 countries have explored our passion for the potential of gypsum – with outstanding results.*

At Knauf Danoline, we get involved. Passionately. Our customers are our most valued asset – and we commit to you and your project all the way from inception to installation, and beyond. Our mission is to help make your inspiration a reality, and we leave nothing to chance in pursuit of that goal. You can count on us being part of the whole process and our products will be with you for a lifetime

We pride ourselves on our bespoke gypsum design solutions. For you as a client, this means you can make your impression as exclusive and individualised as you want it to be. Armed with dedication and know-how, we will always find a way to help you overcome a challenge or enhance your impression – whatever stage in the process we are at.





# PRODUCTS THAT PUT THE 'CARE' INTO HEALTHCARE

Knauf Danoline's gypsum-based acoustic ceiling and wall materials enable architects, designers and contractors to create healthcare environments that improve patient outcomes and recovery times, as well as enhancing staff well-being – and lowering the total cost of ownership.

## Acoustics

- Proven to absorb up to 90% of the sound that hits their surface.
- Adhere to national acoustic requirements for specific reverberation times
- Can be tailored to fit the precise needs of different rooms.

## Ease of cleaning

- Very low attraction to dust particles.
- Tougher stains can be removed using standard cleaning practices.
- Danotile can withstand rigorous cleaning products with both high and low pH values (2.5–13).

## Air pressure, air purification and air quality

- Danotile can withstand pressure variations of up to +/- 30 Pa.
- Unique Cleaneo Technology® reduces the concentration of VOCs like alcohol, aldehydes, ketones and esters.

## Moisture resistance

- Suitable for the majority of rooms - able to withstand up to 70% relative humidity at 25°C.
- Advanced solutions ideal for more extreme conditions, such as kitchens, basements and laboratories.

## Minimising particle emissions

- Very low particle emissions.
- Classified to ISO Class 5 in accordance with ISO 14644-1, or Class 100 of US Federal Standard 209E.
- Certified by the Swedish Sunda Hus organisation.





#### **Access for service and maintenance**

- Easy to mount and de-mount
- Easy access to the void for service and maintenance tasks.

#### **Resistance against microorganisms**

- Support the natural resistance to microorganisms of commonly used areas.
- Danotile's foil-laminated surface delivers extra high mould resistance.

#### **Robustness**

- Exceptionally robust with excellent pressure resistance.
- No decomposition over time.

#### **Fire Safety**

- Tested according to both EN 13501-1 and ASTM E84 standards.
- All products meet and exceed all the necessary fire safety requirements, for both reaction to fire and fire protection.

#### **Load-bearing capacity**

- Can bear five times their own weight.
- Some products can bear up 3kg direct weight without extra support.

#### **Environment**

- 50-year lifetime.
- Consistent appearance.
- Excellent light reflection.
- Wholly recyclable – only 1% is wasted.

# PRODUCT GUIDE

	DANOTILE	CORRIDOR 400	CONTUR	PLAZA	BELGRAVIA	LINEAR	DESIGNPANEL
<b>HYGIENE</b>							
DIM indoor label	Best class	Best class	Best class	Best class	Best class	Best class	Best class
VOC Emission	Class A+	Class A+	Class A+	Class A+	Class A+	Class A+	Class A+
Formaldehyde Content (tested by ISO 16000)	Less than 0.05 mg/m <sup>2</sup> h	Less than 0.05 mg/m <sup>2</sup> h	Less than 0.05 mg/m <sup>2</sup> h	Less than 0.05 mg/m <sup>2</sup> h	Less than 0.05 mg/m <sup>2</sup> h	Less than 0.05 mg/m <sup>2</sup> h	Less than 0.05 mg/m <sup>2</sup> h
HTM 60 Category	3, 4, 5, 6	2, 6	2, 6	2, 6	2, 6	2, 6	2, 3, 4, 5, 6
ISEGA grade*	3	3	3	3	3	3	3
<b>SURFACE CLEANING</b>							
Moisture Resistance	90% RH and 30°C	90% RH and 30°C	70% RH and 25°C	90% RH and 30°C	90% RH and 30°C	70% RH and 25°C	90% RH and 30°C
Resistance to Disinfectants	EN 12720/ No changes	Can vary by the paint applied**	Can vary by the paint applied**	Can vary by the paint applied**	Can vary by the paint applied**	Can vary by the paint applied**	Can vary by the paint applied**
Cleaning	Damp cloth Vacuum cleaner High pressure	Damp cloth Vacuum cleaner	Damp cloth Vacuum cleaner	Damp cloth Vacuum cleaner	Damp cloth Vacuum cleaner	Damp cloth Vacuum cleaner	Damp cloth Vacuum cleaner
<b>AIR PURIFICATION</b>							
Up to 70% reduction of formaldehyde***		✓	✓	✓	✓	✓	✓
<b>ACOUSTICS</b>							
NRC Rating	0.05	Up to 0.95	Up to 0.90	Up to 0.90	Up to 0.90	Up to 0.70	Up to 0.75
EN 11654	–	Class A	Class A	Class A	Class A	Class C	Class C
<b>LIGHT REFLECTION</b>							
% Reflectance	86.3%	From 70.9% to 82.6%	From 69.2% to 82.6%	From 69.2% to 82.6%	From 69.2% to 82.6%	From 72.1% to 82.6%	Dependent on paint used
<b>REACTION TO FIRE</b>							
EN 14190 labelling	B-s1 ,d0	A2-s1 ,d0	A2-s1 ,d0	A2-s1 ,d0	A2-s1 ,d0	A2-s1 ,d0	A2-s1 ,d0
<b>SUSTAINABILITY</b>							
LEED credit opportunity	✓	✓	✓	✓	✓	✓	✓
FDES LCA****	✓		✓	✓	✓		

\* SEGA is a testing standard that analyses growth of microorganisms on the surface of products. An ISEGA grade 3 shows that there is no growth of microorganisms on the product's surface.

\*\* The ability of our painted products listed above (not including Danotile) to combat bacteria, resist disinfectants and purify air, can be altered through the chemical properties of the paint mixture that is applied to the panels. Please contact us to discuss the options available.

\*\*\* Also heavily reduces a number of other toxic and non toxic VOC's.

\*\*\*\* FDES LCA is a product declaration that provides insight into the environmental and health/comfort impacts through a life cycle analysis (LCA).



# APPLICATION RECOMMENDATIONS

ROOM AND DESCRIPTION	Hygiene level (HTM 60)	DANOTILE	CORRIDOR 400	CONTUR	PLAZA	BELGRAVIA	LINEAR	DESIGNPANEL
<b>Consultation/ Examination room</b> – Consultation – Confidential atmosphere – Relaxing	3			✓	✓	✓	✓	✓
<b>Foyer/Reception</b> – Communication – Positive impression – Lively – Welcoming	2			✓	✓	✓	✓	✓
<b>Cafe/Cafeteria and communal areas</b> – Many people – Lively atmosphere – Noisy	3	✓		✓	✓	✓	✓	✓
<b>Multi-bed ward</b> – Homely – Comfortable – Focus on recovery	3			✓	✓	✓	✓	✓
<b>Single-bed ward</b> – Homely – Comfortable – Focus on recovery	3	✓		✓	✓	✓	✓	✓
<b>Bathroom and washing facilities</b> – Hygienic – Easy to clean – High level of moisture	4	✓						
<b>Lounge</b> – Relaxing atmosphere – Comfortable speaking and listening milieu	2			✓	✓	✓	✓	✓
<b>Staff room</b> – Relaxing – Subdued acoustic environment	3			✓	✓	✓	✓	✓
<b>Office</b> – Professional atmosphere – Comfortable listening milieu				✓	✓	✓	✓	✓
<b>Corridors and stairwells</b> – Robust materials – Easy access to installations – Noise reduction	3		✓					
<b>Operation room</b> – Clinical – Robust materials – Hygienic and easy to clean	5	✓						
<b>Laboratory</b> – Clinical – Robust materials – Hygienic and easy to clean	5	✓						



KNAUF DANOLINE  
Kløvermarksvej 6  
DK - 9500 Hobro

Phone: +45 96 57 30 00

www: [knaufdanoline.com](http://knaufdanoline.com)  
Email: [info@knaufdanoline.com](mailto:info@knaufdanoline.com)

Scan and be inspired by  
the Knauf Danoline film

