

KNAUF



Designpanel

ACOUSTIC PERFORATED PLASTERBOARD

WITH AIR PURIFYING **CLENEO**
TECHNOLOGY

FOR CEILINGS AND WALLS

Contents

Disclaimer

Products manufactured and systems designed by Knauf are produced in accordance with the Building Code of Australia and the New Zealand Building Code, and also relevant Australian and New Zealand Standards. Information in this document is to be used as a guide only and is subject to project approval as many aspects of construction are not comprehensively covered. It is also the responsibility of the project to determine if Knauf's products and systems are suitable for the intended application. Knauf Plasterboard will not be held responsible for any claims resulting from the installation of its products or other associated products not in accordance with the recommendations of the manufacturer's technical literature or relevant Australian or New Zealand Standard.

Knauf technical information is regularly updated. To ensure this document is current with the latest information, visit: knaufplasterboard.com.au or knaufplasterboard.co.nz or please contact Knauf Customer Service Centre on **1300 724 505** (AU) or **0800 884 326** (NZ) .

Warranty

Knauf products are guaranteed by a 10 Year Warranty. Visit knaufplasterboard.com.au or knaufplasterboard.co.nz for details.

Version 5

July 2014



Designpanel is manufactured in accordance with quality systems certified as complying to ISO 9001:2008.



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Project: Dorpat Hotel, Estonia

Designpanel is part of Knauf's DesignLine range of acoustic plasterboard products, developed and manufactured by Knauf Danoline in Denmark. Designpanel offers not only great acoustic performance with beautiful aesthetic, but now also offers air cleaning properties with inbuilt CLEANEO Technology.

It is ideal for use in a range of commercial applications where controlling the sound reverberation time is required for large open areas such as lecture theatres, shopping centres and schools. Designpanel can also be installed in residential ceiling and wall systems, to provide noise absorption in open plan living areas and home theatres.

The acoustic performance of Designpanel is achieved through a combination of sound diffusion, whereby reflected sound is spread out and through sound absorption whereby sound travels through the perforation holes and acoustic fleece backing.

The result is a high quality sound experience with excellent speech intelligibility. Additional optional insulation improves the sound absorption.

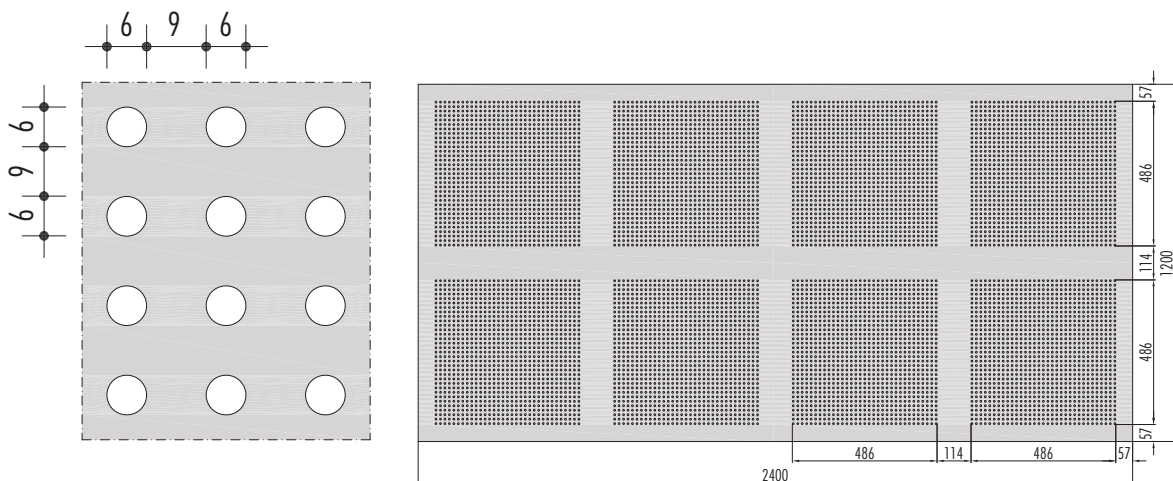
The range of square, round and oval perforations allow for the creation of several distinct styles, complementing both the form and function of interior design.

Designpanel now has the added advantage of CLEANEO Technology for air cleaning and with four recessed edges, Designpanel is also easy to install.

Designpanel has been certified by Global Green Tag to GreenRate Level A, recognised by the GBCA for materials and VOC credits, and by the NZGBC.

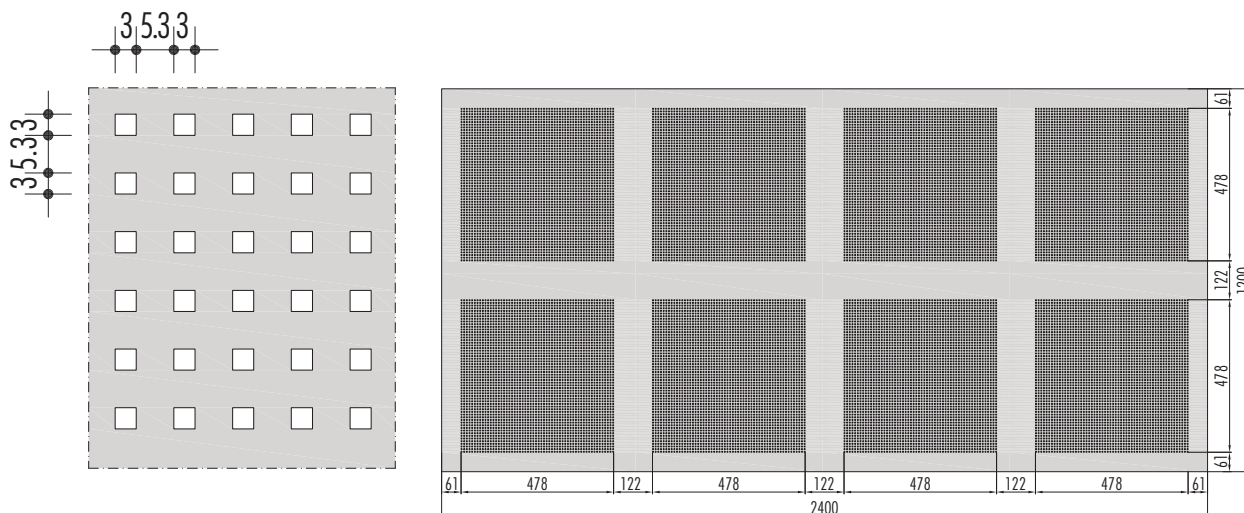
Designpanel Range

GLOBE G2F



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight* (kg/m ²)
6mm circles	8.6	13	1200	2400	8.9

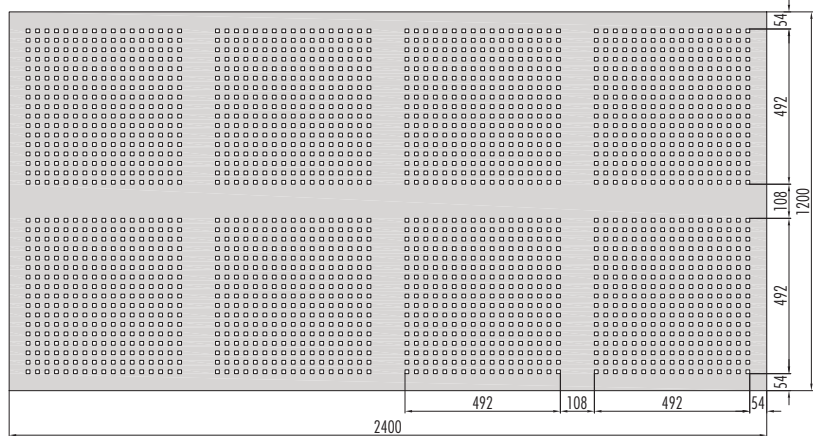
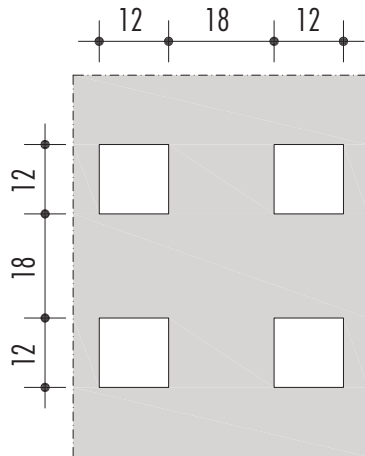
MICRO M2F



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight* (kg/m ²)
3 x 3mm squares	8.6	13	1200	2400	8.9

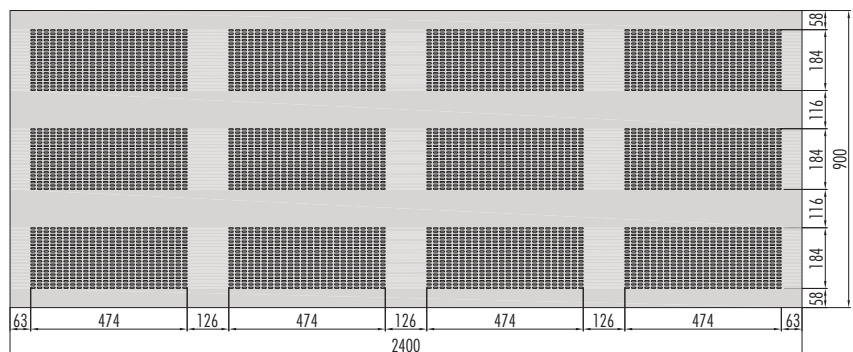
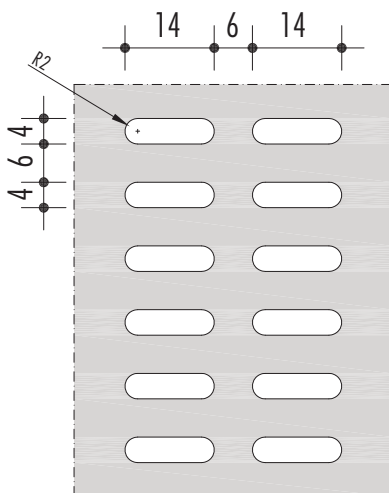
*Weights indicated are nominal

QUADRIL Q2F



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight* (kg/m ²)
12 x 12mm squares	11.6	13	1200	2400	8.8

TANGENT T3L4



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight* (kg/m ²)
4 x 14mm ovals	13.3	13	900	2400	8.8

*Weights indicated are nominal

Performance

ACOUSTIC COMFORT

Design of any building is about creating an experience of space, and acoustic comfort is a major factor in that experience. To achieve that comfort, it is essential that all sound frequencies are evenly absorbed and that the sound is spread out and distributed where it is required.

All rooms present acoustic challenges, whether it be high ceilings, large expanses of glass or other hard surfaces, sparse furnishing and/or excessive noise. Where design constraints don't allow architecture to solve these acoustic challenges, absorbent ceiling and wall linings must be used.

Designpanel's acoustic performance is achieved by vibrations in the board and by generating resonance vibrations through air gaps in the perforation resulting in good sound absorption.

The degree to which sound is reflected or absorbed can be described by "reverberation time" which is the time it takes for sound to bounce around a room before being absorbed by the materials and the air in the room. Spaces without absorbing materials such as empty rooms have long reverberation times and spaces with lots of absorbent materials such as cinemas have short reverberation times.

The α_w rating and NRC of a product describes how much it absorbs sound and therefore influences the

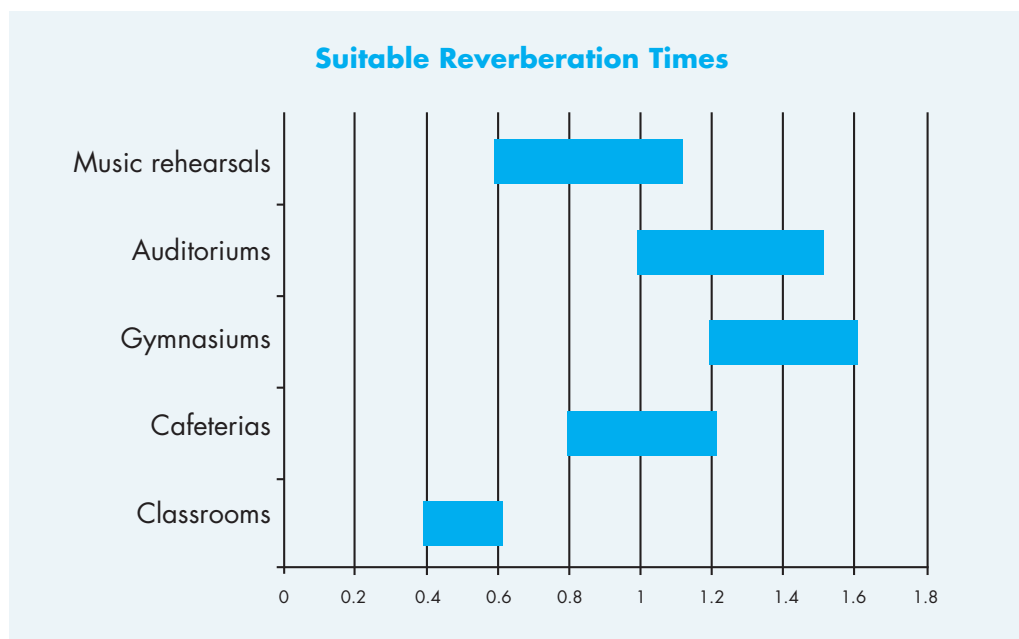
reverberation time. All materials respond to sound in some way such as reflecting, diffusing or absorbing sound. Well designed acoustic materials absorb sound evenly across the frequency range, avoiding high peaks or troughs in one area of the frequency range.

By using Designpanel, it is not necessary to compromise acoustic performance. Designpanel has good sound absorption values across the frequency range and achieves an α_w rating of up to 0.65 or an NRC of up to 0.7*.

The range of perforation patterns; Globe, Quadril and Tangent, provide good sound absorption in the intermediate frequency range. This is ideal in medium sized rooms with hard materials or in larger furnished and carpeted rooms. Designpanel Micro is better suited to provide good sound absorption throughout the frequency range where acoustic conditions are more critical. This is typically required in rooms with high ceilings, schools and other public buildings.

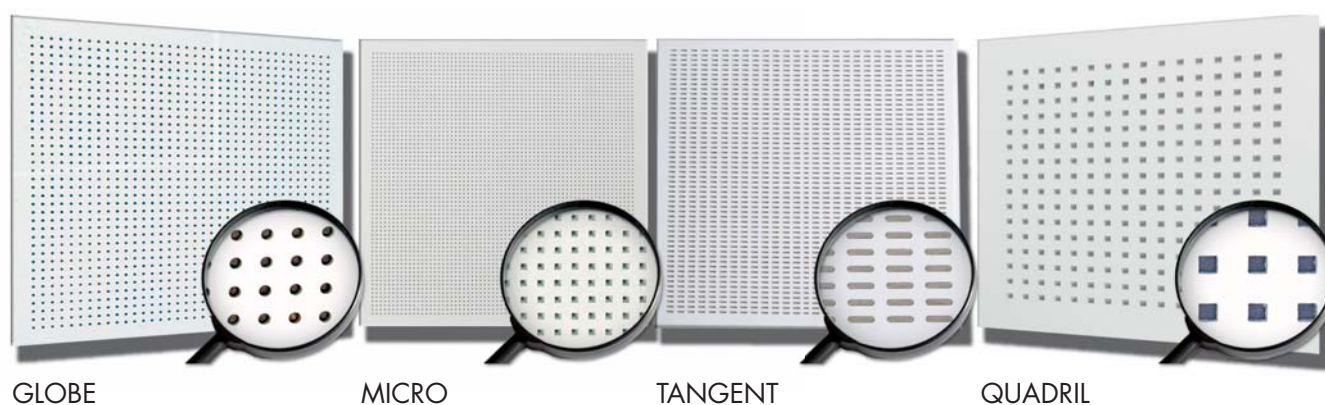
*Quadril Q2F, 200mm cavity with 50mm EarthWool 14kg/m³

The ideal reverberation time depends on the use of the space. The chart below highlights some suggested reverberation times to optimise the acoustic environment.



AESTHETICALLY STYLISH

The Designpanel range is manufactured to a high degree of precision creating sharp, clean perforation lines. It is not just the perforations that are significant, the edges are also important. The Designpanel range is available with four recessed edges to eliminate butt joints and incorporate seamless set joints all round, thus ensuring a consistent finish across the whole area.



GLOBE

MICRO

TANGENT

QUADRIL

Air Cleaning

The quality of the air we breathe has a profound effect on human health and wellbeing.

Apart from just being generally unpleasant, poor air quality in buildings can lead to headaches, fatigue and concentration problems. Studies show that we spend up to 90% of our time indoors, so it's vitally important that we maintain the quality of the air in buildings. But the air in many public and private buildings is heavily contaminated with toxic compounds and unpleasant odours and the problem isn't confined to offices and residential buildings. Many schools suffer from very poor indoor air quality, which can impact the concentration and performance of students. The air in hospitals can also be contaminated and despite so much care being taken to keep wards and operating theatres clean, patients can be exposed to health risks from breathing contaminated air.

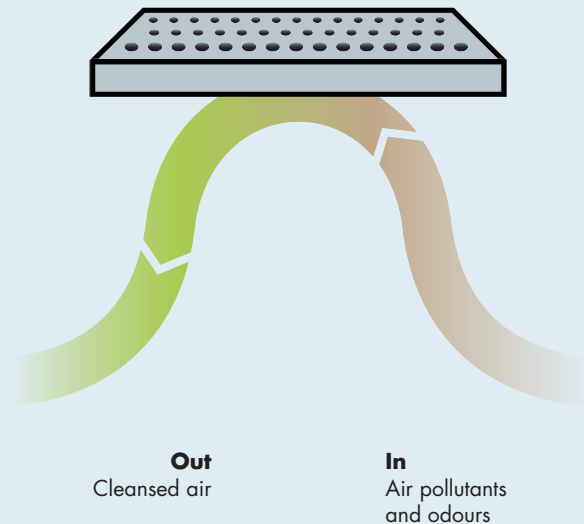
Everyday substances including paints and lacquers, cleaning and fabric-care products, perfumes, hair sprays, glues and solvents all create potentially harmful emissions, including a family of chemicals called Volatile Organic Compounds (VOCs), which have been linked to allergies, asthma and even cancer.

Computers and electronic equipment further contribute to the problem. Even the very materials that the building's made of can release pollutants, from plywood or particleboard to foam insulation and other materials. It's an unsettling thought that the room you're sitting in right now, may be silently exhaling a mixture of toxins, including formaldehyde, benzene and trichloroethylene, into the air that you're breathing.

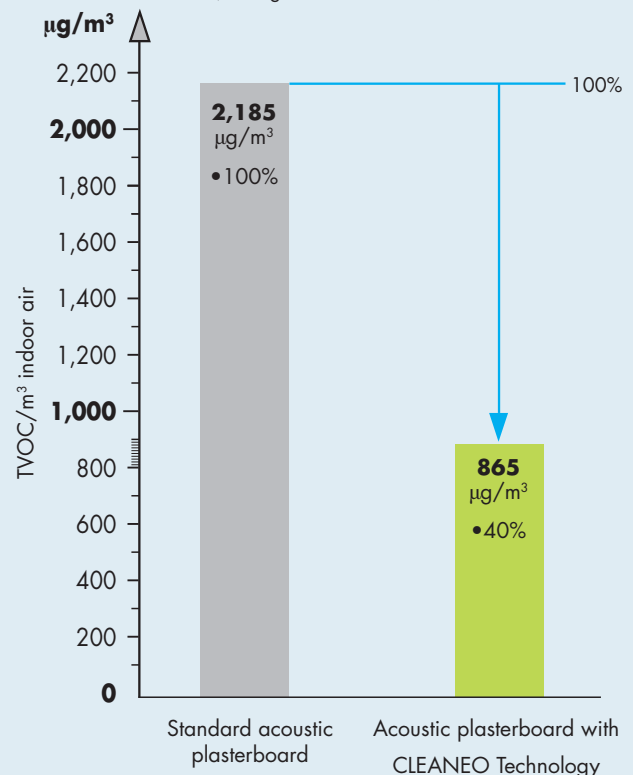
To make matters worse, in a bid to maximise energy efficiency, many new buildings are effectively airtight cells. As well as effectively containing heat, some modern buildings can trap pollutants, allowing the contaminants to build up.

In most commercial buildings, ceilings and walls provide the greatest surface area interacting with indoor air. When the ceiling or walls are lined with Stratopanel with CLEANEO Technology, cleaner air and a major impact on wellbeing can be achieved.

How CLEANEO Technology Works



Example*: **Reduction TVOC in room for smokers** comparing measurements with samples from passive accumulations, room volume 75m³, configuration rate 0.3m²/m³



*Source: Stuttgart College of Technology with supporting measurements and tests undertaken by Stuttgart Central Laboratory, University of Kaiserslautern and others.

HOW IT WORKS

CLEANEO Technology is derived from a natural volcanic rock called Zeolite. Designpanel contains zeolite which absorbs and eliminates a host of environmental air pollutants including VOCs such as formaldehyde. As the air streams through the perforations in the Designpanel, unpleasant pollutants are removed, leaving the air cleaner. And the CLEANEO effect continues to improve air quality long after installation.

With a three dimensional pore system and pore diameters of less than one millionth of a millimetre,

the zeolites help create a gigantic inner surface layer which acts as a naturally occurring 'sieve' capable of capturing and removing gas and liquid impurities from the air.

Independent laboratory tests at the Fraunhof Institute for Building Physics in Germany highlight the effectiveness of CLEANEO products, demonstrating a significant reduction in the number of airborne pollutants including tobacco smoke, triethylamine, ammonia, formaldehyde, benzene, aromatic hydrocarbons and chlorinated hydrocarbons.



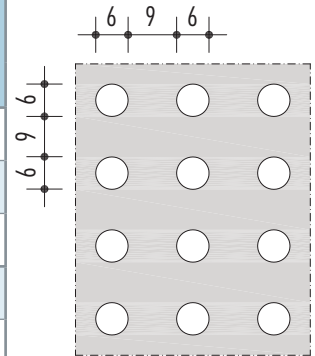
Project: Østre School, Holbæk, Denmark

Acoustic Performance

GLOBE G2F

Maximum Furring Channel Centres: 600mm **Open Area: 8.6%**

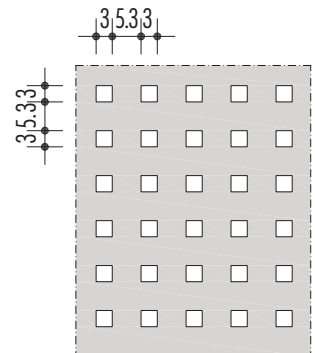
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.15	0.3	0.55	0.7	0.5	0.35	0.5	0.5
	200	0.4	0.55	0.65	0.55	0.45	0.35	0.5	0.55
	500	0.35	0.65	0.65	0.7	0.6	0.55	0.65	0.65
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.35	0.6	0.7	0.65	0.5	0.45	0.55	0.6
	200	0.5	0.65	0.65	0.55	0.5	0.45	0.55	0.6



MICRO M2F

Maximum Furring Channel Centres: 600mm **Open Area: 8.9%**

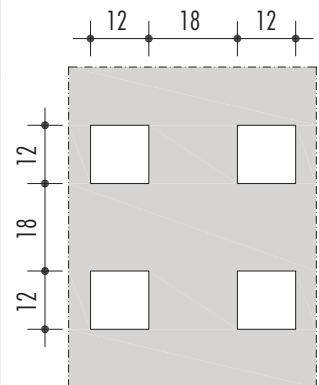
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.2	0.35	0.5	0.6	0.55	0.45	0.55	0.5
	200	0.4	0.5	0.55	0.5	0.5	0.45	0.55	0.5
	500	0.35	0.5	0.5	0.55	0.55	0.5	0.55	0.55
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.4	0.55	0.6	0.55	0.5	0.5	0.55	0.55
	200	0.45	0.6	0.6	0.6	0.6	0.6	0.6	0.6



QUADRIL Q2F

Maximum Furring Channel Centres: 600mm Open Area: 11.6%

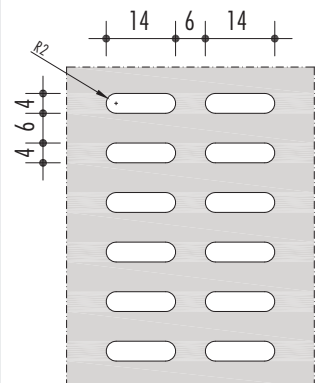
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.15	0.3	0.55	0.7	0.55	0.35	0.5	0.55
	200	0.45	0.55	0.65	0.6	0.5	0.4	0.55	0.6
	500	0.5	0.6	0.55	0.65	0.65	0.5	0.6	0.6
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.4	0.6	0.7	0.65	0.55	0.45	0.6	0.65
	200	0.5	0.7	0.75	0.65	0.6	0.5	0.65	0.7



TANGENT T3L4

Maximum Furring Channel Centres: 600mm Open Area: 13.3%

	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.2	0.25	0.35	0.5	0.5	0.45	0.45	0.4
	200	0.35	0.55	0.65	0.55	0.5	0.55	0.55	0.55
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.35	0.5	0.6	0.55	0.5	0.55	0.55	0.55
	200	0.55	0.6	0.55	0.5	0.55	0.55	0.55	0.55
	400	0.4	0.6	0.6	0.6	0.55	0.6	0.6	0.6



Care and Use



Project: Club 7 at La Cigale Hotel, Qatar

SAFETY

Designpanel is not classified as hazardous according to the criteria of the National Occupational Health and Safety Commission (NOHSC). It is non-toxic and non-flammable.

Material Safety Data Sheets (MSDS) for Designpanel are available at knaufplasterboard.com.au or knaufplasterboard.co.nz or by calling **1300 724 505** (AU) or **0800 884 326** (NZ).

- Care should be taken not to damage edges or the surface of the board.
- Exposure to excessive humidity during storage can result in plasterboard becoming damp and soft, and may appear defective. In this case the plasterboard should be allowed to dry out and handled with care during installation.

HANDLING, DELIVERY AND STORAGE

To ensure Designpanel remains in the best condition prior to installation it is important to follow these key recommendations. Generally the board should be protected from any damage or conditions which could affect the final appearance or performance.

- Designpanel must be kept dry and should be stacked clear of the floor, fully protected from the weather and delivered to sites when lock up stage is complete.
- To reduce the possibility of damage, delivery to site should occur immediately before installation.

To help protect plasterboard from absorbing humidity:

- Avoid open sources of water such as wet floors
- Wrap the plasterboard with plastic
- Provide ventilation
- Install soon after delivery
- Install during dry weather for best results.

Installation

GENERAL REQUIREMENTS

Plan the ceiling layout to suit the Designpanel size in order to minimise the number of joints and create symmetrical patterns.

For the best acoustic and aesthetic results involve an architect or acoustic consultant when determining the quantity and layout of Designpanel.

As Designpanel is a perforated plasterboard all requirements for plasterboard installation on ceilings apply to Designpanel.

Install control joints in plasterboard ceilings at:

- 12m maximum intervals
- All control joints in the structure
- Any change in the substrate material
- At the junction of a large room and passageway.

Separate plasterboard from building elements made with other materials, such as columns by creating control joints that allow for movement, e.g. utilising a shadow line profile or incorporating Trenn-Fix Adhesive Strip.

All ceilings in this section are non-trafficable. Do not walk on plasterboard ceilings!

Attach ceiling fixtures to framing members only. Ensure the framing is designed to carry any additional load.

Limit dead loads on plasterboard ceilings to 2 kg/m² for plasterboard spanning 600mm framing centres.

Limit dead loads on plasterboard ceilings to 2.5 kg/m² for plasterboard spanning 450mm framing centres.

FRAMING

- Framing members in this section are designed using either steel or timber joists, Lipped C type steel studs or a furring channel system.
- Steel framed ceiling systems must be designed by an engineer according to the relevant Australian Standard.
- Cut Top Cross Rail (TCR) and furring channel to leave 20mm expansion gaps at each wall.
- Stagger joints in TCR and furring channel by 1200mm.
- Install additional framing members around openings.

The framing tables in this section apply to Rondo steel components.

Alternative components may only be used:

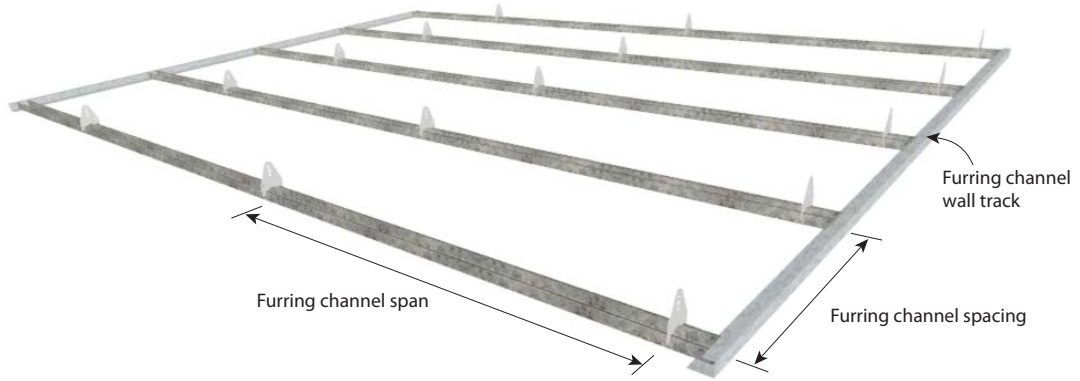
- In accordance with the manufacturer's literature, or
- If their performance is equivalent or better and they comply with the relevant standard.

MAXIMUM SPAN (FRAMING CENTRES) FOR DESIGNPANEL

Perforation	Max Span
Globe G2F	600mm
Micro M2F	600mm
Quadril Q2F	600mm
Tangent T3L4	600mm

* For areas of intermittent high humidity, decrease the spans to 300mm.

FIGURE 1 Furring Channel Span and Spacing



MAXIMUM SPAN OF FURRING CHANNEL

Plasterboard	28mm Furring Channel Rondo No.129 at 600mm spacing		28mm Furring Channel Rondo No.308 at 600mm spacing	
	Single Span (mm)	Continuous Span (mm)	Single Span (mm)	Continuous Span (mm)
1 layer of 13mm Designpanel	1300	1540	920	1040

¹ If furring channel track is not used, the furring channel must be supported 200mm from ends.

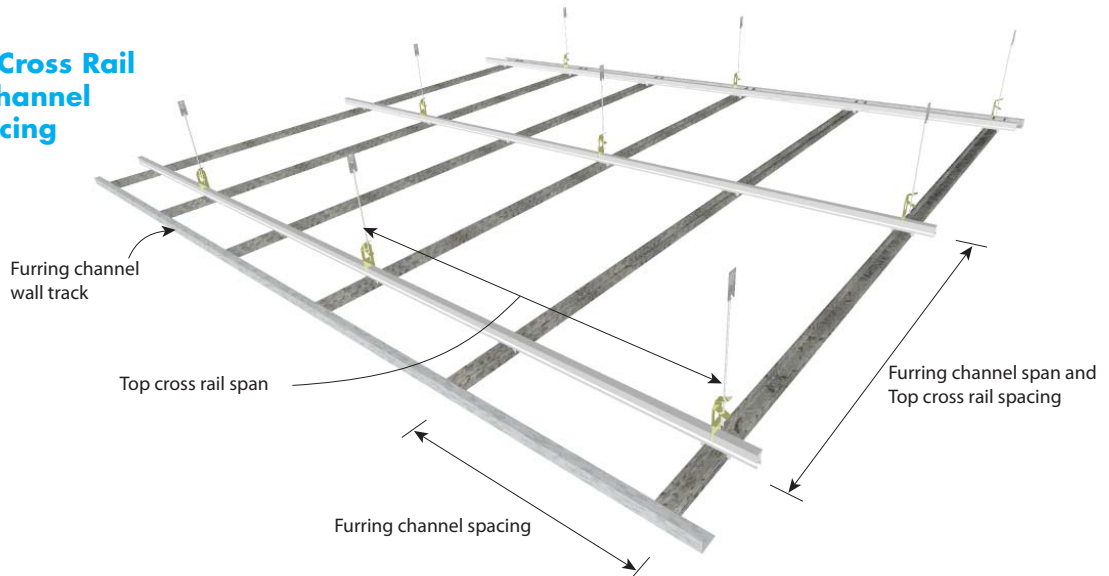
² $W_{ultimate} = 0.5 \text{ kPa}$, Strength Load Case: $1.2G + W_u$

³ $W_{serviceability} = 0.325 \text{ kPa}$, Serviceability Load Case 1: G [Limit is $L/600$], Serviceability Load Case 2: $G + W_s$ [Limit is $L/200$].

⁴ Strength check of unrestrained flange in compression.

⁵ Connections to be independently checked.

FIGURE 2 Top Cross Rail and Furring Channel Span and Spacing



SELECTED TOP CROSS RAIL (TCR) AND FURRING CHANNEL FRAMING OPTIONS

System	TCR Rondo No.	TCR span	TCR spacing	Furring Channel Rondo No.
1 Layer of 13mm Designpanel	125	1200	1200	129

¹ If furring channel track is not used, the furring channel must be supported 200mm from ends.

² $W_{ultimate} = 0.5 \text{ kPa}$, Strength Load Case: $1.2G + W_u$

³ $W_{serviceability} = 0.325 \text{ kPa}$, Serviceability Load Case 1: G [Limit is $L/600$], Serviceability Load Case 2: $G + W_s$ [Limit is $L/200$].

⁴ Strength check of unrestrained flange in compression.

⁵ Connections to be independently checked.

LAYOUT

- › Install Designpanel perpendicular to framing.
- › All short edges must be supported over a framing member.
- › The perforated fields must be lined up in both directions.

FIXING

- › Use screws only. Adhesive is not permitted.
- › Maximum screw spacing is 200mm along short edges and 300mm in the field of the boards.
- › Drive fasteners to just below the sheet surface, taking care not to break the paper linerboard.

FASTENER TYPE AND MINIMUM SIZE FOR THE INSTALLATION OF DESIGNPANEL

Frame	Fastener
Steel	30mm MastaMate Screw
Softwood Timber	30mm MastaMate Screw
Hardwood Timber	30mm MastaMate Screw for ceilings

For steel up to 0.8mm BMT use needle point screws.
For steel 0.8mm to 2.0mm BMT use drill point screws.

CURVING

- › Bend Designpanel in the length direction only.
- › Use a roller to apply water on the front face and leave for 30 minutes.
- › Lay the panel over a template and secure.



- › If necessary, Designpanel can be covered in plastic to assist it in absorbing the water.
- › Minimum curving radius for Designpanel is 2000mm.

JOINTING

Knauf jointing compounds must be used with Designpanel and reinforced with paper tape or corner beads. All joints, internal and external corners and fastener heads must be evenly finished with compound and lightly sanded to remove tool marks and ridges prior to decoration.

JOINTING

- › Use paper tape and two coats of MastaBase or MastaLongset and a final coat of MastaFinish, MastaGlide or MastaLite.
- › Do not obstruct perforations during jointing.

SANDING

Sanding is a critical part of achieving a high quality finish. Care should be taken when sanding joints to achieve flat smooth surfaces. Lightly sand to a smooth even surface using a sand paper of between 150 and 220 grit, to suit the desired method of sanding.

Finishing



Project: Adnec Exhibition Centre, Abu Dhabi, UAE

COMPOUNDS

- All joints, internal and external corners and fastener heads must be evenly finished with compounds and lightly sanded to remove tool marks and ridges prior to decoration.
- Both setting and air-drying compounds can be used for jointing Designpanel.
- Hot and dry conditions may dry out the setting compound before it sets resulting in reduced strength and tape adhesion issues.
- Setting compounds must not be applied over air-drying compounds.
- Previous coats of air-drying or setting compound must be completely dry before applying the next coat and before sanding.
- Air-drying compounds must not be used in temperatures lower than 10°C.

PAINTING

A three coat paint system must be applied in accordance with Australian Standard AS/NZS 2311, *Guide to the painting of buildings*. Both the quality of the paint and how it is applied have a large effect on the finished appearance of the plasterboard.

- Only use roller application for painting.
- Spray application of paint is not permitted.
- Follow the paint manufacturer's instructions for application.
- Apply the paint with a short napped roller and avoid the application of excess paint at any time.

Roller application applies a uniform texture over the entire surface and ensures the paint does not clog up the perforations or contact the acoustic felt on the back of the plasterboard.

Construction Details

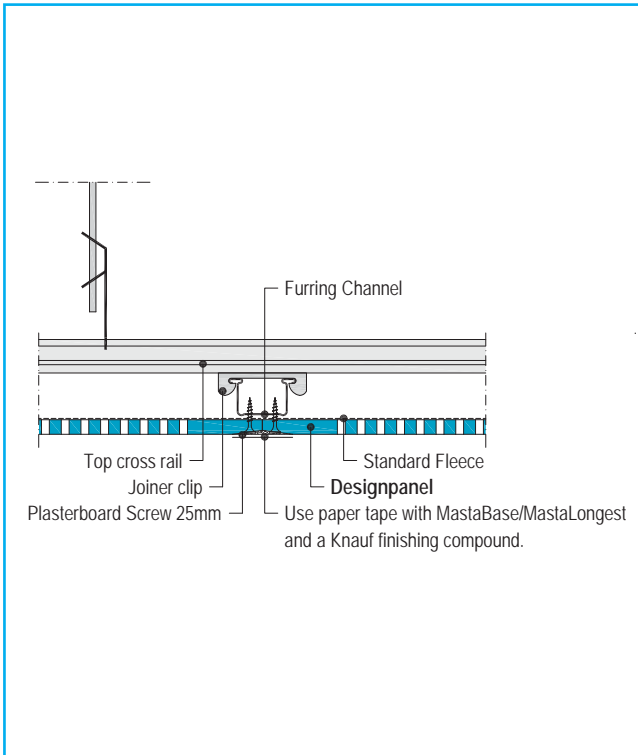


FIGURE 3 Short Edge Joint

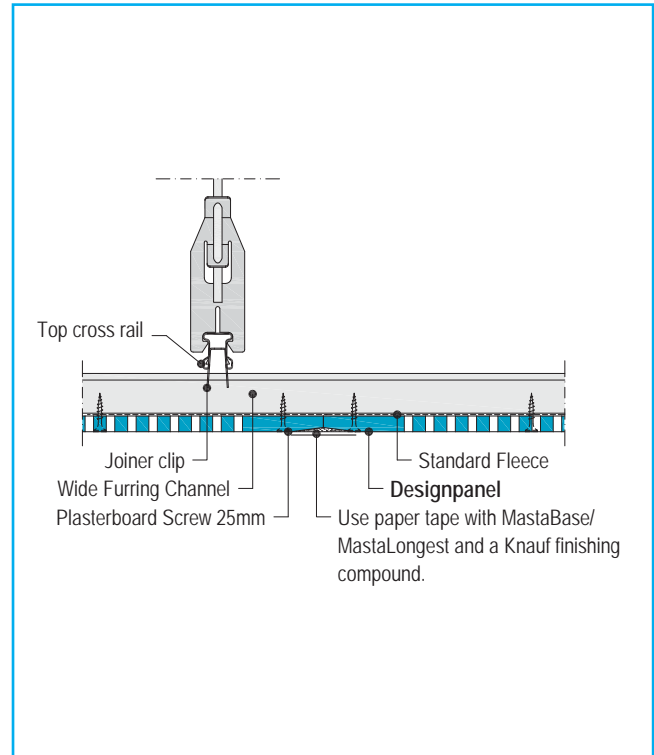


FIGURE 4 Long Edge Joint

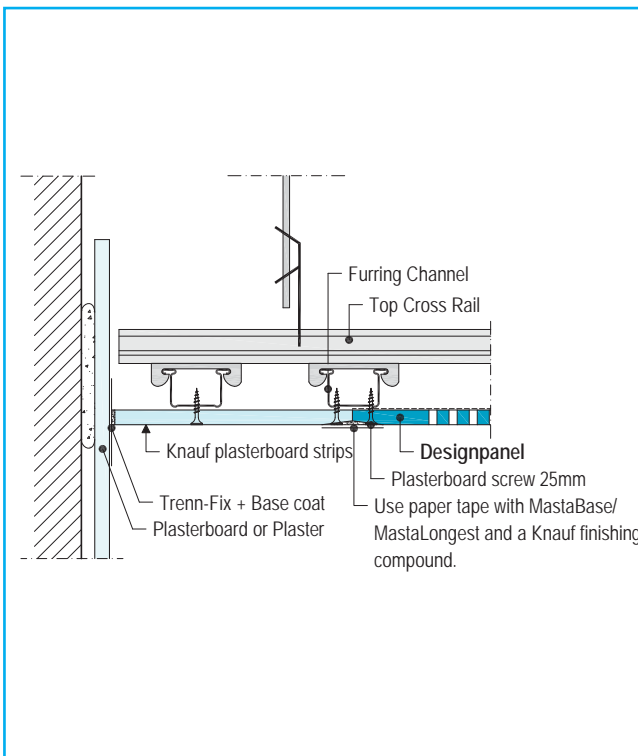


FIGURE 5 Connection to Wall

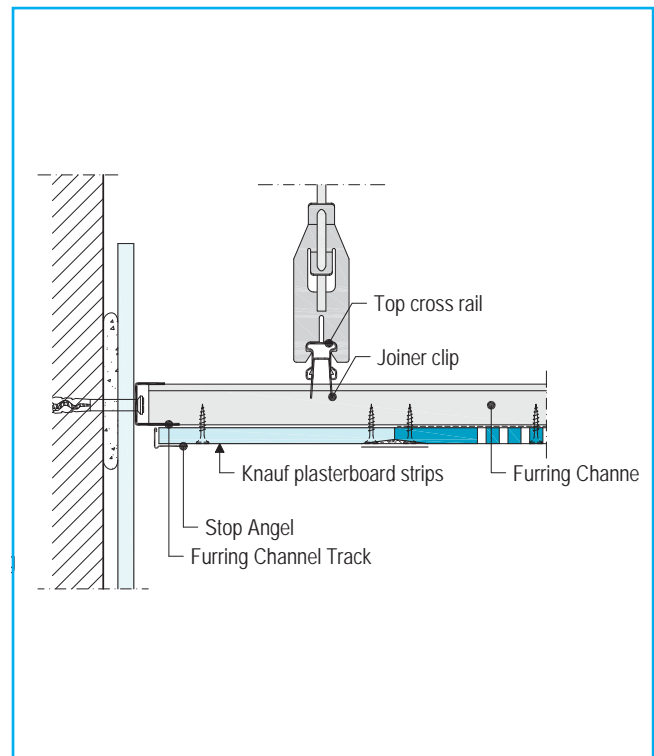


FIGURE 6 Connection to Wall with Exposed Joint



Knauf Plasterboard Pty Ltd

ABN 61 003 621 010

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Customer Service AU 1300 724 505

Customer Service NZ 0800 884 326

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