

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 relevant Australian 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 Standard.

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Warranty

Knauf products are guaranteed by a 10 Year Warranty. Visit knaufplasterboard.com.au

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



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.

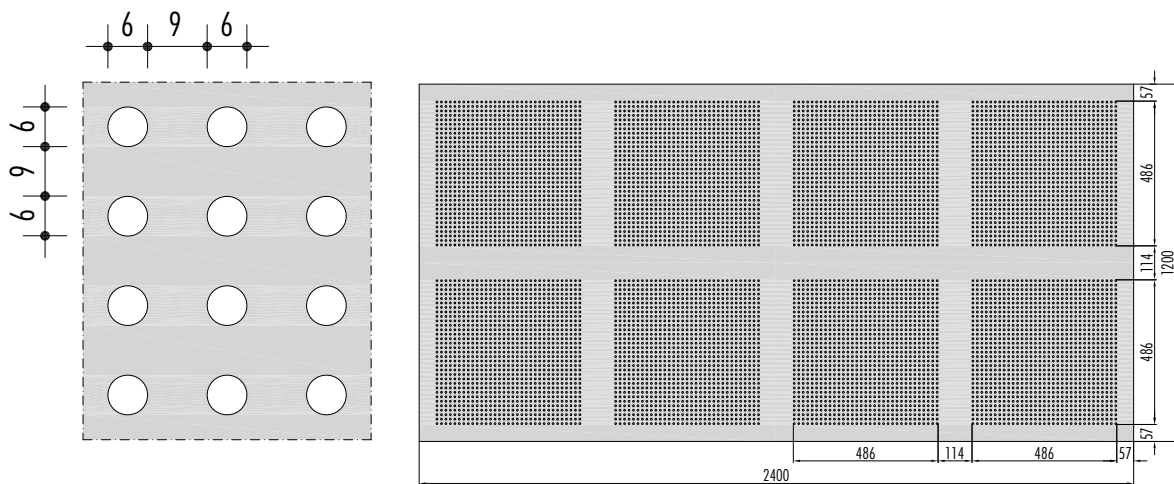
The range of square, round and oval perforations allow for the creation of several distinct styles, complementing both the form and function of interior design.

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.

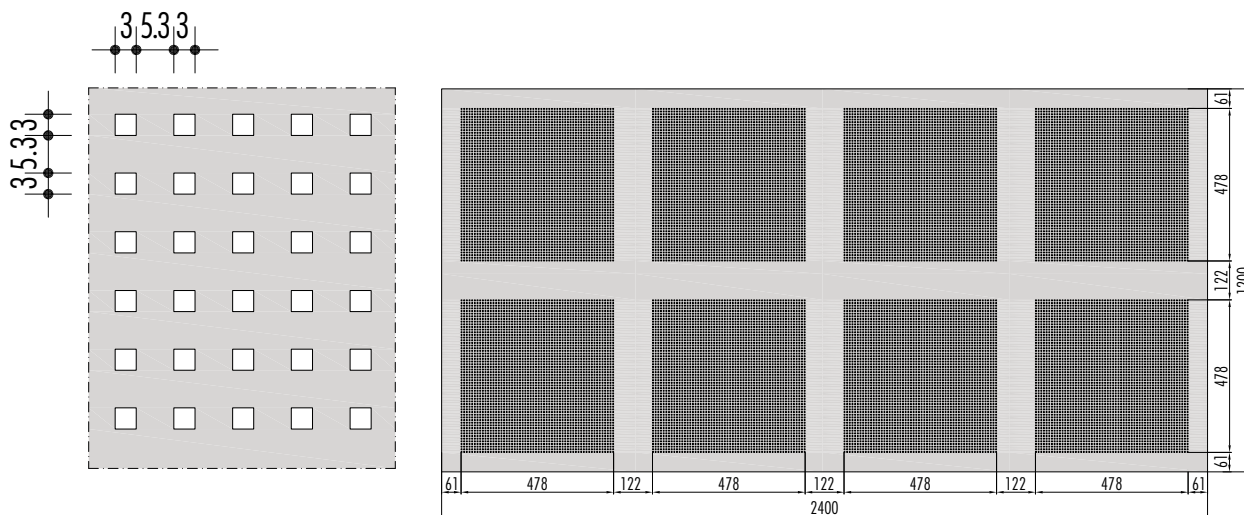
Designpanel Range

GLOBE G2F



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight** (kg/m ²)
6mm circles	8.6	12.5	1200	2400	8.9

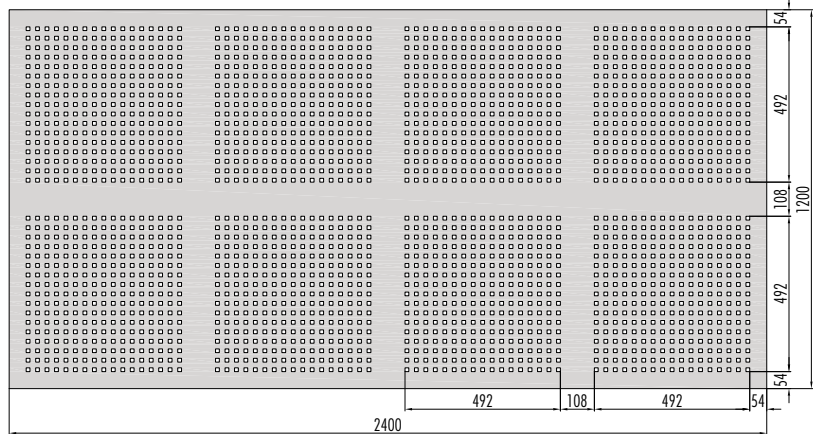
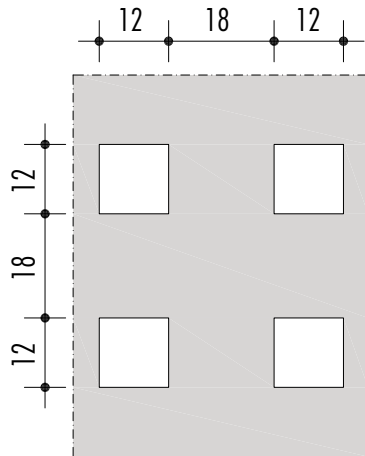
MICRO M2F



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight** (kg/m ²)
3 x 3mm squares	8.6	12.5	1200	2400	8.9

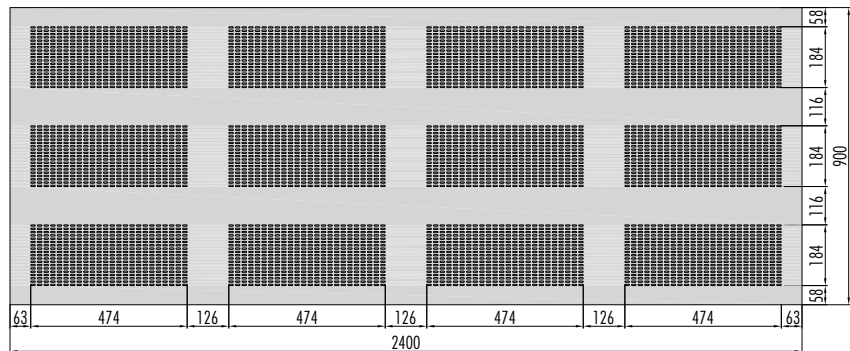
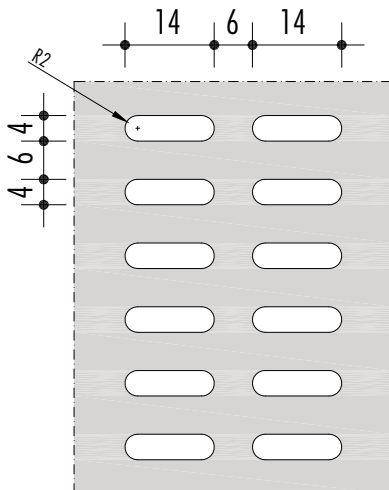
**Weights indicated are nominal

QUADRIL Q2F



Perforation	Open Area (%)	Thickness (mm)	Width (mm)	Length (mm)	Weight** (kg/m ²)
12 x 12mm squares	11.6	12.5	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	12.5	900	2400	8.8

* Non stock item - subject to minimum quantities and lead times

**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 peaks or troughs in one area of the frequency range.

By using Designpanel, it is not necessary to compromise on 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 evenly throughout the frequency range. This is typically required in rooms with high ceilings, schools and other public buildings.

> ACOUSTIC CALCULATOR

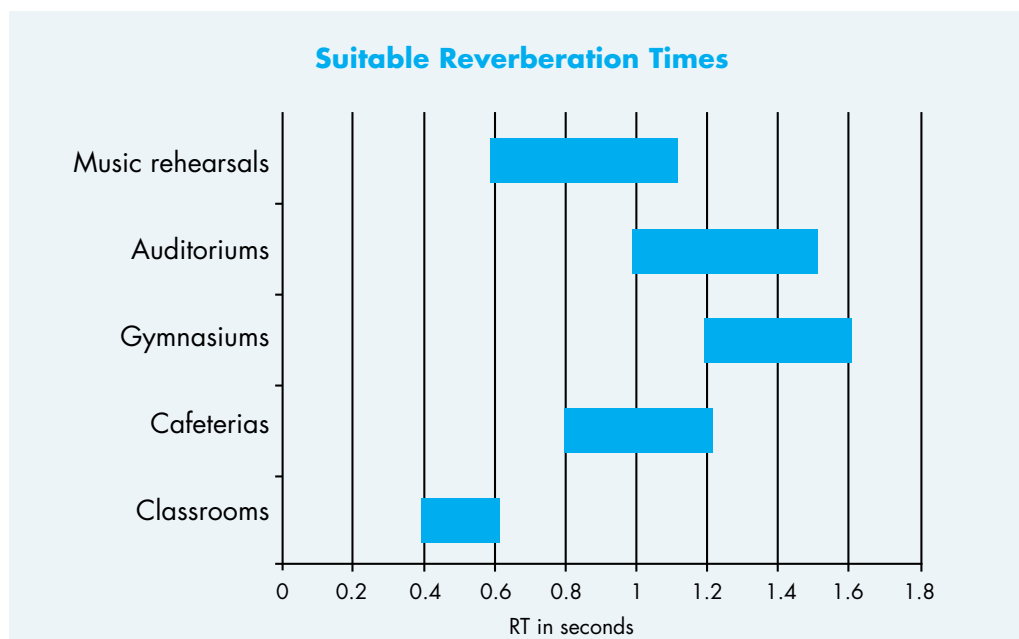
Knauf Reverberation Time Calculator is an innovative acoustic online tool that calculates the Reverberation Time (RT60 or T) of a room.

The acoustic calculator has been developed in-house and is unique and exclusive to Knauf.

Find it at <http://www.knaufplasterboard.com.au/calculators>

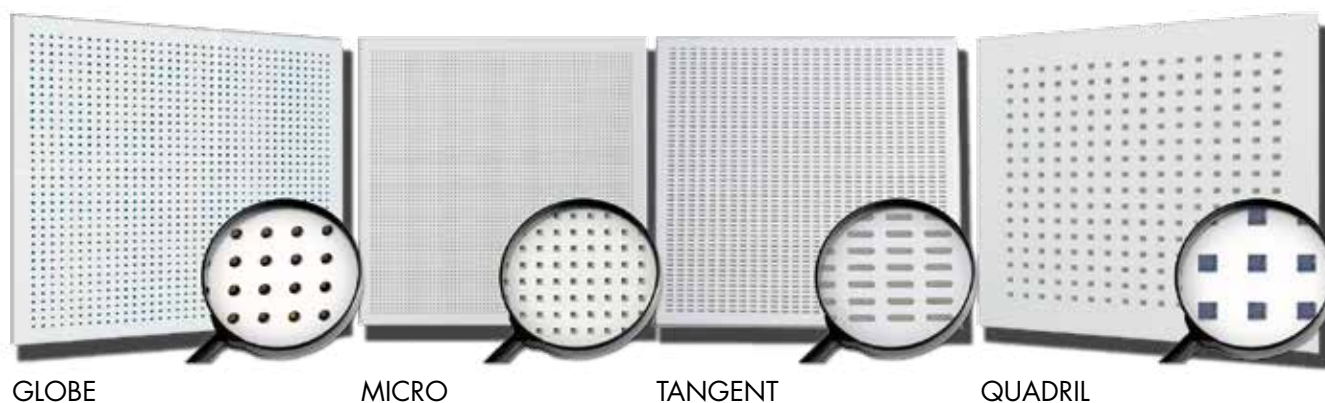
*Quadril Q2F, 200mm cavity with 50mm EarthWool 14kg/m³

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.



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.

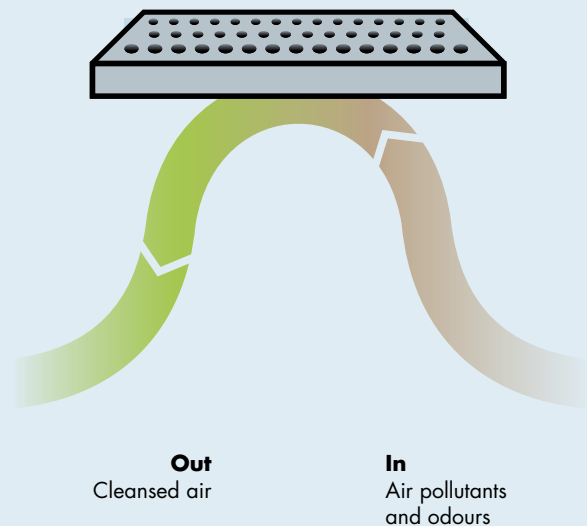
Everyday substances including paints and lacquers, cleaning and fabric-care products, perfumes, hair sprays, glues and solvents all create potentially harmful emissions, including a family of chemicals called Volatile Organic Compounds (VOCs), which have been linked to allergies, asthma and even cancer.

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.

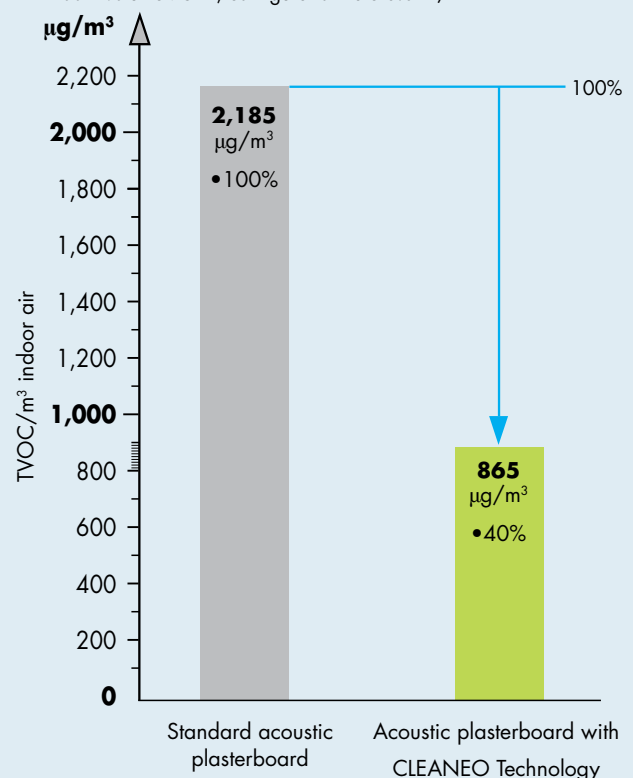
To make matters worse, in a bid to maximise energy efficiency, many new buildings are effectively airtight cells. As well as effectively containing heat, some modern buildings can trap pollutants, allowing the contaminants to build up.

In most commercial buildings, ceilings and walls provide the greatest surface area interacting with indoor air. When the ceiling or walls are lined with Designpanel 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 Fraunhofer 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.



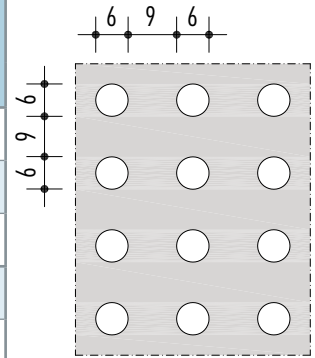
Project: Østre School, Holbæk, Denmark

Acoustic Performance

GLOBE G2F

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

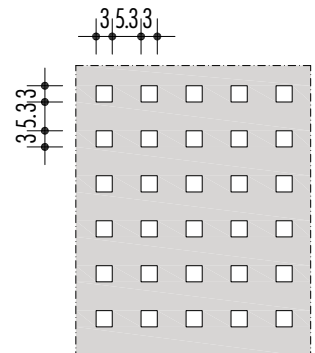
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.15	0.3	0.55	0.7	0.5	0.35	0.5	0.5
	200	0.4	0.55	0.65	0.55	0.45	0.35	0.5	0.55
	500	0.35	0.65	0.65	0.7	0.6	0.55	0.65	0.65
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.35	0.6	0.7	0.65	0.5	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:** 8.6%

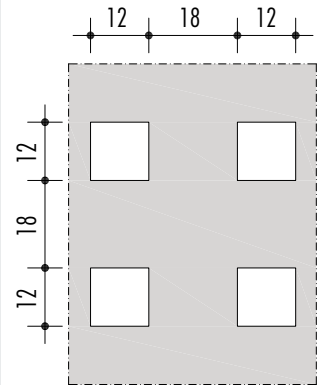
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.2	0.35	0.5	0.6	0.55	0.45	0.55	0.5
	200	0.4	0.5	0.55	0.5	0.5	0.45	0.55	0.5
	500	0.35	0.5	0.5	0.55	0.55	0.5	0.55	0.55
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.4	0.55	0.6	0.55	0.5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

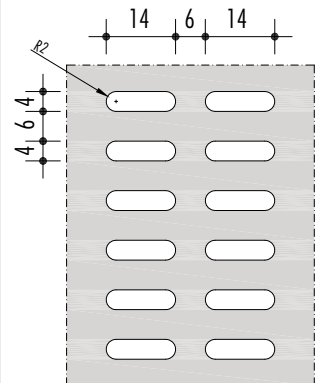
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.15	0.3	0.55	0.7	0.55	0.35	0.5	0.55
	200	0.45	0.55	0.65	0.6	0.5	0.4	0.55	0.6
	500	0.5	0.6	0.55	0.65	0.65	0.5	0.6	0.6
50mm EarthWool 14 kg/m ³ or 75mm EarthWool 11 kg/m ³	65	0.4	0.6	0.7	0.65	0.55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

A Material Safety Data Sheet (MSDS) for Designpanel is available at knaufplasterboard.com.au or by calling **1300 724 505**.

- 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.

Use the Knauf Reverberation time calculator to assist in determining how much of the ceiling and or wall area should be covered.

Alternatively involve an acoustic consultant, especially for very high ceilings and unusually shaped rooms such as those with domed or sloping ceilings.

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 Designpanel ceilings from other building elements, such as walls and columns by creating control joints that allow for movement, e.g. utilising a shadow line profile or tear away head.

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 Designpanel ceilings to 2 kg/m² for 600mm framing centres.

Limit dead loads on Designpanel ceilings to 2.5 kg/m² for 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 Knauf Metal 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

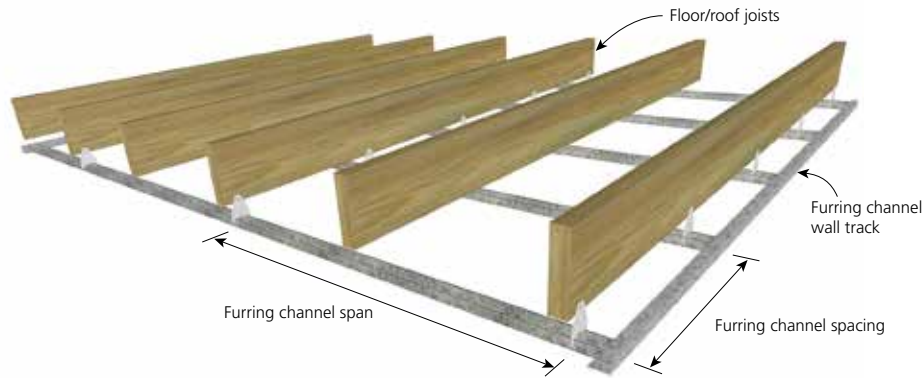
Perforation	Max Span
Globe G2F	600mm
Micro M2F	600mm
Quadril Q2F	600mm
Tangent T3L4	600mm

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

LAYOUT

- Install Designpanel perpendicular to framing.
- Fix short edges on a framing member.
- Line up perforations in both directions.

FIGURE 1 Furring Channel Span and Spacing



MAXIMUM SPAN OF FURRING CHANNEL

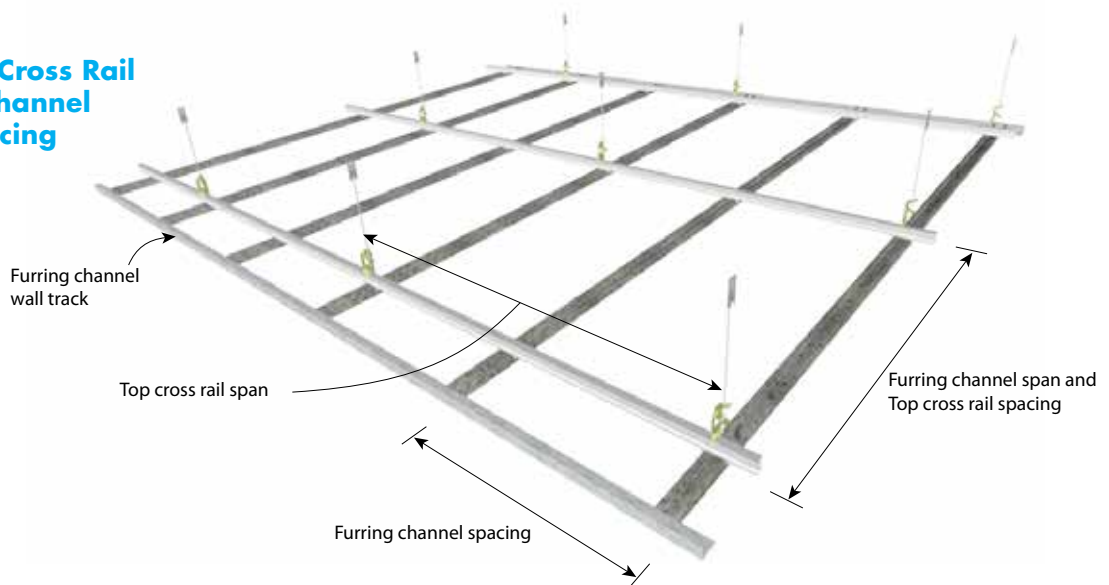
Plasterboard	28mm Furring Channel (AFC28) at 600mm spacing		18mm Furring Channel (AFC18) at 600mm spacing	
	Single Span (mm)	2 - or - more Spans (mm)	Single Span (mm)	Continuous Span (mm)
1 layer of 13mm Designpanel	1200	1260	800	970

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 $L/200$].

FIGURE 2 Top Cross Rail and Furring Channel Span and Spacing



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

System	TCR span (mm)	TCR spacing (mm)	Demand per hanger (kN)
1 Layer of 13mm Designpanel with TCR 25	1200	750	1.01
1 Layer of 13mm Designpanel with TCR 30	1200	860	1.16
1 Layer of 13mm Designpanel with TCR 38	1200	1050	1.42

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

² 2 - or - more spans only.

³ $W_{ultimate} = 0.5 \text{ kPa}$, Strength Load Case: $1.2G + W_u$.

⁴ $W_{serviceability} = 0.325 \text{ kPa}$, Serviceability Load Case 1: G [Limit is $L/600$], Serviceability Load Case 2: $G + W_s$ [Limit is $L/200$]

⁵ Connections to be independently checked.

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	25mm screw
Timber Walls	25mm screw
Timber Ceilings	30mm screw

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

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.

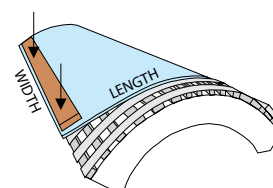
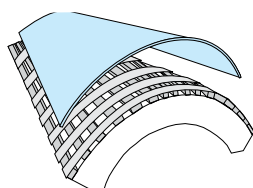
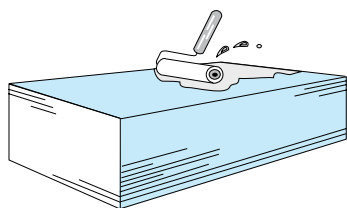
JOINTING

- 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.

CURVING



- Apply water on the front face and leave for 30 minutes.
- Lay the panel over a template. Secure the panel on one side of the template.
- Press the panel against the template using a batten, moving it every 100mm. Secure the panel on the other side of the template. Drying time: 1 1/2 – 2 hours.

Minimum Curve Radius	Concave (mm)	Convex (mm)
All perforations in length direction	2000	2000
G2F, M2F, Q2F in width direction	2500	3000
T3L4 in width direction	3500	—



- If necessary, Designpanel can be covered in plastic to assist it in absorbing the water.

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

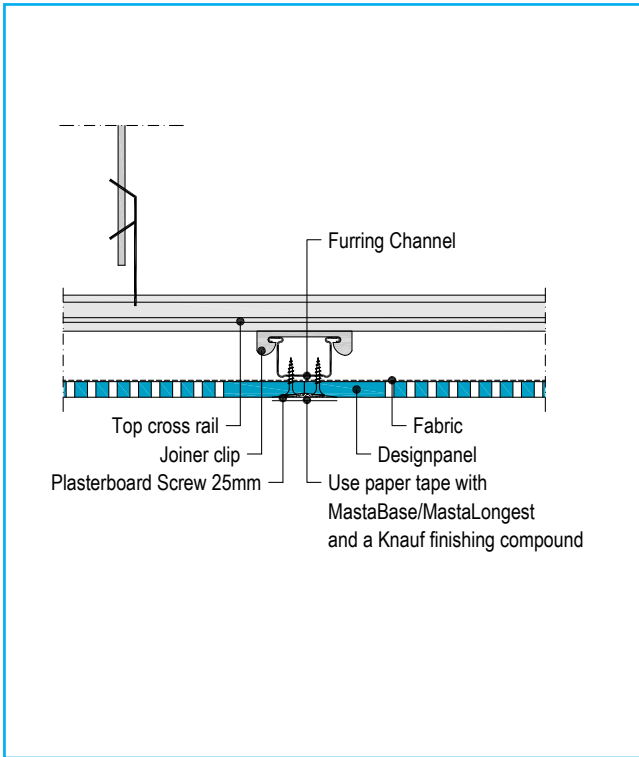


FIGURE 3 Short Edge Joint

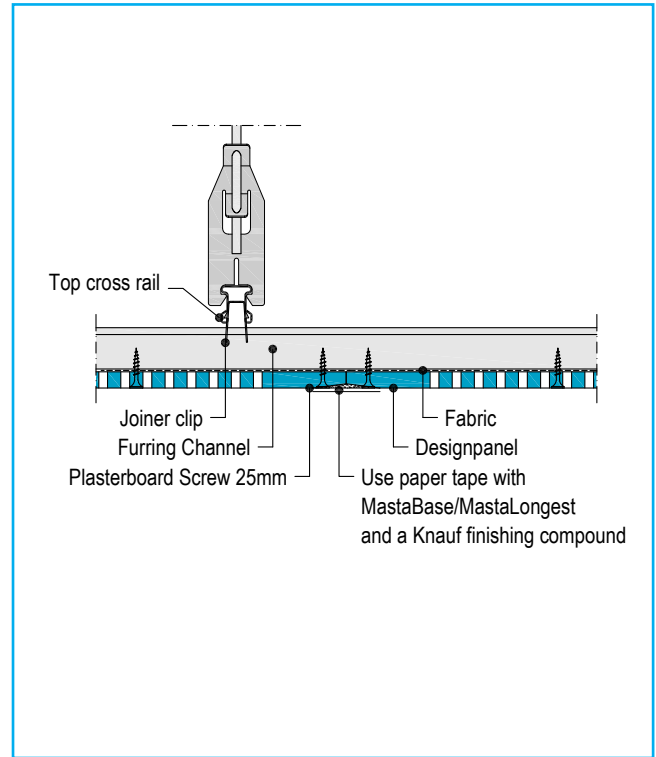


FIGURE 4 Long Edge Joint

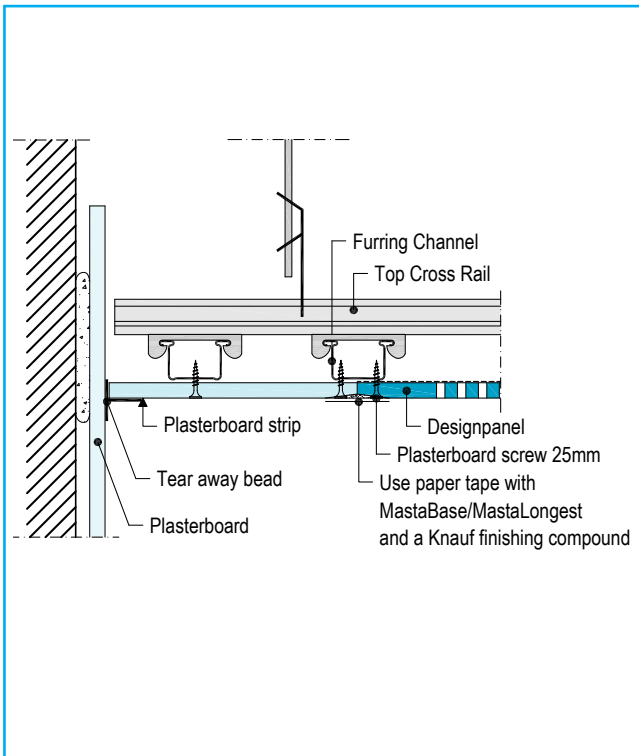


FIGURE 5 Connection to Wall

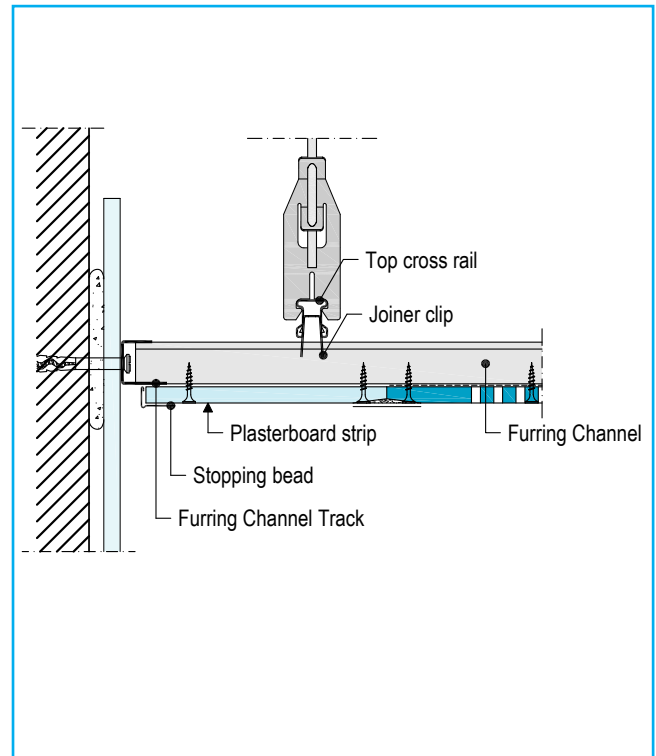


FIGURE 6 Connection to Wall with Shadowline

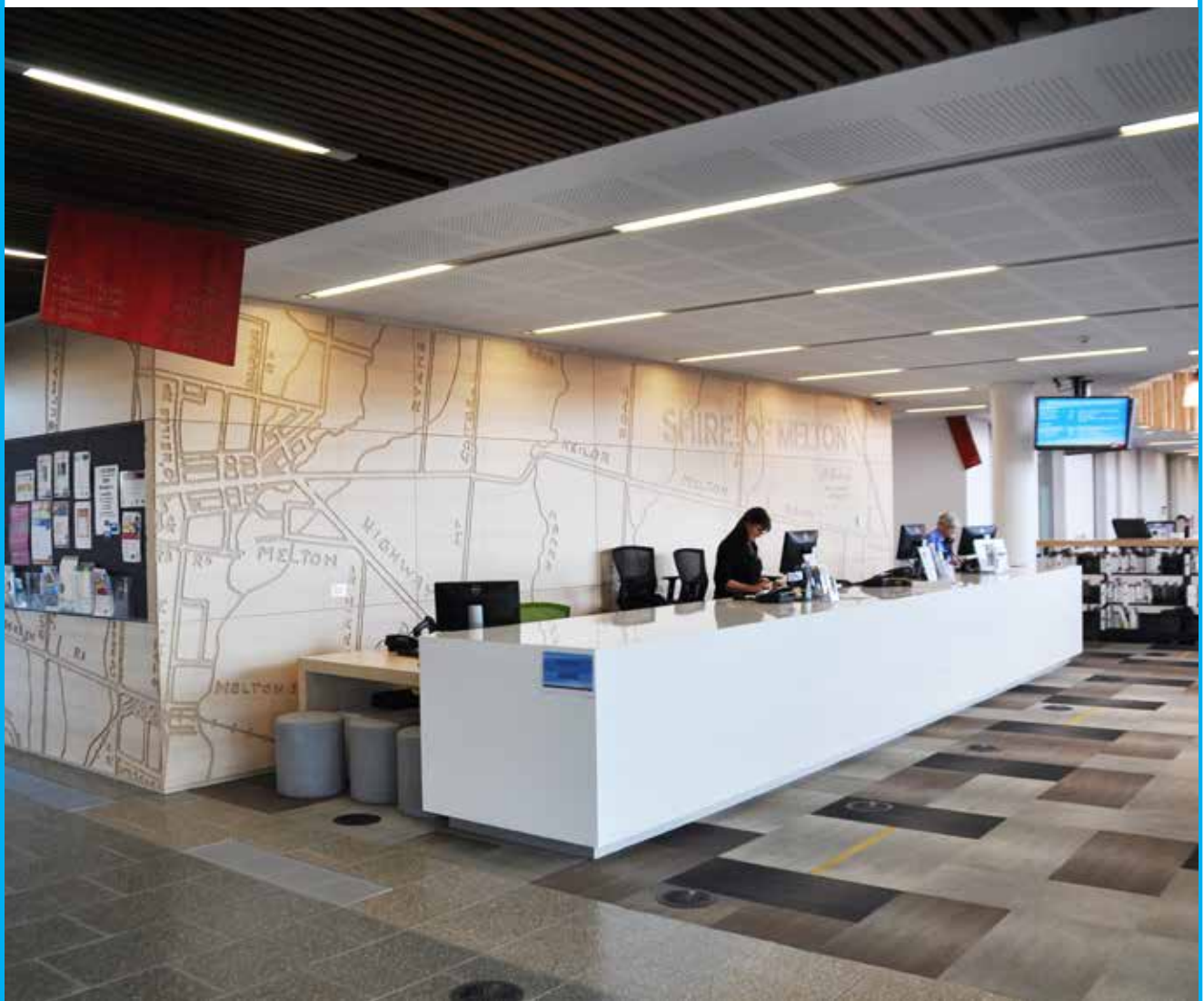
Case Study

PROJECT: Melton Library, Victoria, Australia

In collaboration with fjmt architects, Melton local council in Victoria embarked on a \$20 million design and build project that was ambitious from the outset; to create a 5 Star Green Star Design and As-Built Rated building (against the Green Building Council of Australia Public Building PILOT tool) that would serve the community.

With their goal to spread their Green Star points across the whole project the team at fjmt were very particular in the specification of products to be used. Knauf Designpanel perforated plasterboard sheets were used in the ceilings.

“One of the important factors when choosing products that boast environmental credentials is that they are 3rd party accredited. The Knauf Designpanel product used in the ceilings, in addition to being 3rd party certified GreenRate Level A, is made up of 90% recycled content, giving it the highest environmental credentials,” says Lance White, Senior Associate, fjmt. “This was a significant deciding factor for us.





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