

KNAUF



AcoustiShield
Designpanel

PRECISION ENGINEERED ACOUSTIC CEILING AND WALL LINING

danoline

Contents

Disclaimer

Products manufactured and systems designed by Knauf are produced in accordance with the Building Code of Australia and relevant Australian Standards. Designpanel installation and construction details are a guide only as many aspects of construction are not comprehensively covered. Knauf Plasterboard Pty Ltd will not be held responsible for any claims resulting from the installation of its products not in accordance with the manufacturer's technical literature or relevant Australian Standards.

Knauf technical information is regularly updated. To ensure this guide is current with the latest information, visit knaufplasterboard.com.au or please contact Knauf Customer Service Centre on **1300 724 505**.

Warranty

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

Version 2

April 2012



Project: Dahlske High School, Grimstad, Norway

Introduction	1
Designpanel Range	2
Performance	4
Case Studies	6
Acoustic Performance	8
Installation	10
Construction Details	15



Quality
ISO 9001





Designpanel by Danoline is a perforated plasterboard that has been developed to provide high acoustic performance.

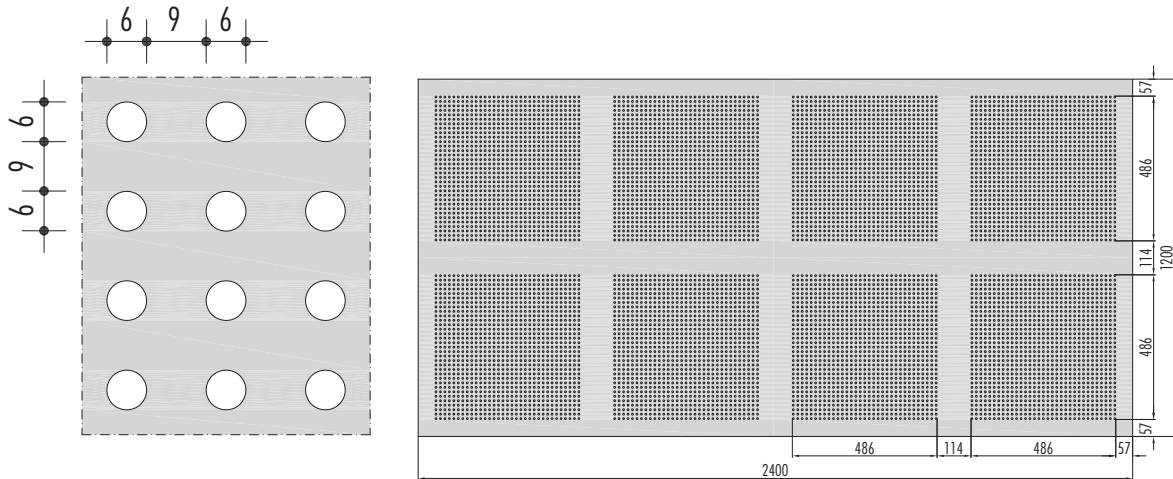
It is ideal for use in a range of commercial applications where controlling the sound reverberation time is required for large open areas such as lecture theatres, shopping centres and schools. Designpanel can also be installed in noise absorbing residential ceiling and wall systems, such as open plan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

The acoustic performance of Designpanel is achieved through perforations in the plasterboard with an acoustic fleece lining and insulation, enabling both sound diffusion and absorption. The result is enhanced audibility and a high quality sound experience.

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.

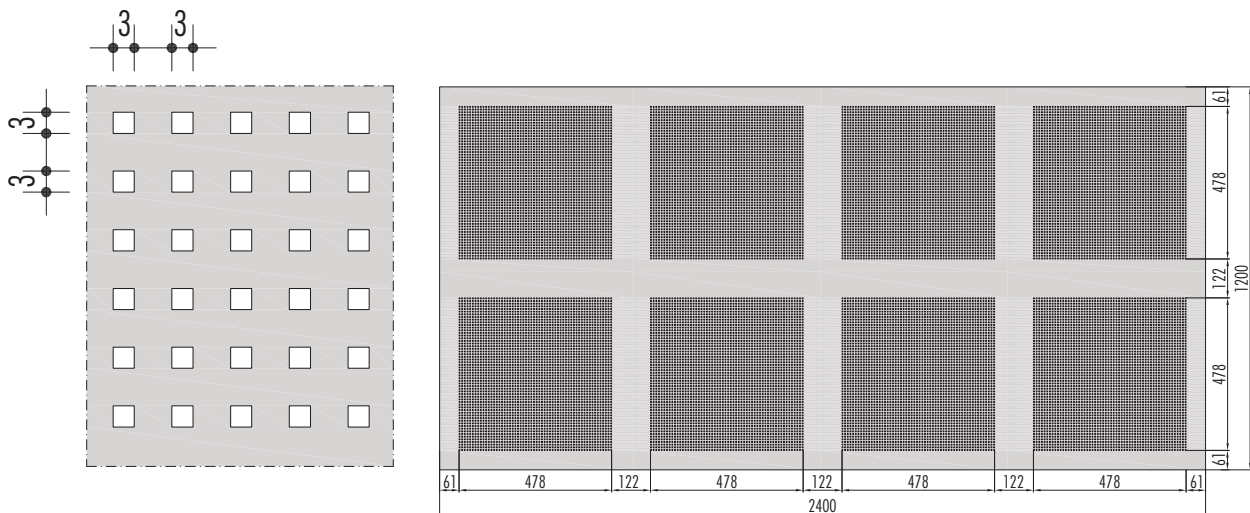
Designpanel Range

GLOBE G2F



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

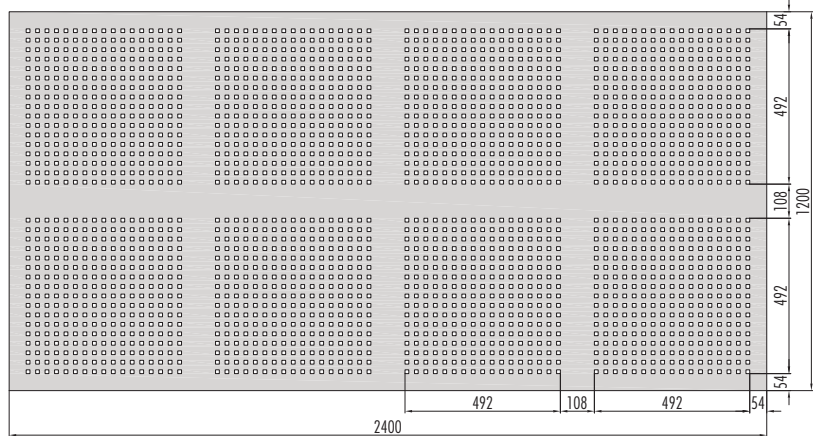
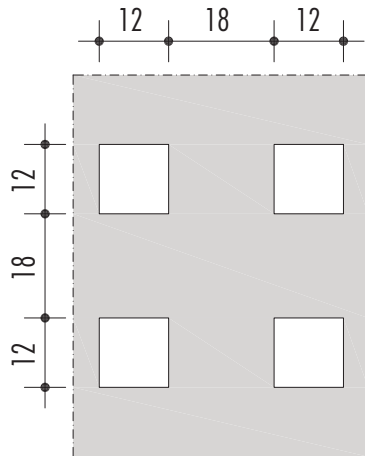
MICRO M2F



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

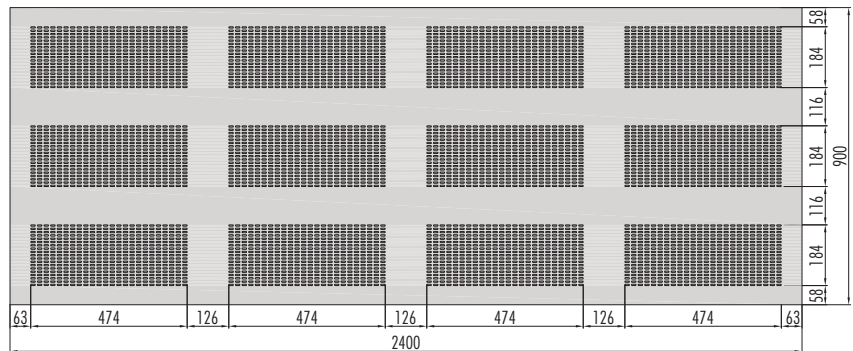
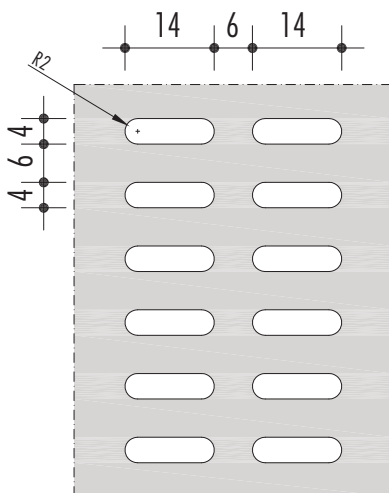
*Weights indicated are nominal

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



Project: Royal College of Music, Stockholm, Sweden

ACOUSTIC EXPERIENCE

Design of any building is about creating a future experience of space and acoustic comfort is a major factor in that experience. Achieving the level of comfort, making sure that all sound frequencies are evenly absorbed and that the sound is distributed where it is required is essential.

Large rooms with high ceilings, with a minimal amount of furnishings, or with large windows and other hard surfaces present acoustic challenges. To solve the potential problem, good ceiling and wall absorbers should 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", i.e. echo within a room. The α_w rating, or NRC to a more limited extent, of a product describes how well it absorbs sound and therefore controls the reverberation time. Well designed acoustic products absorb sound evenly across the frequency range, therefore no area of the frequency range has low sound absorption and

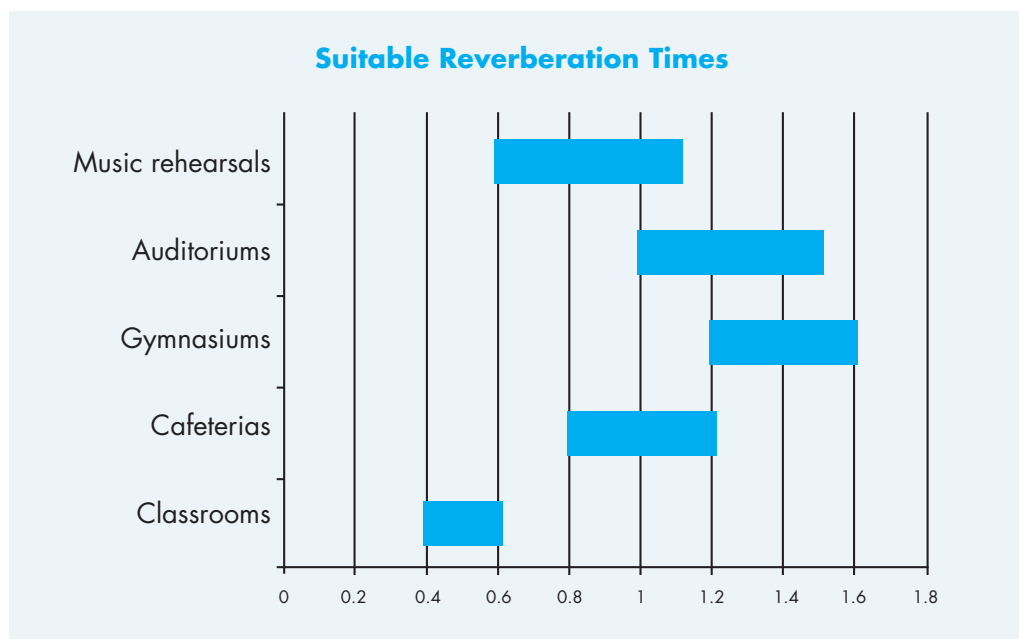
high reverberation. By using Designpanel, it is not necessary to compromise acoustic performance.

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 large ceilinged rooms, schools and other public buildings.

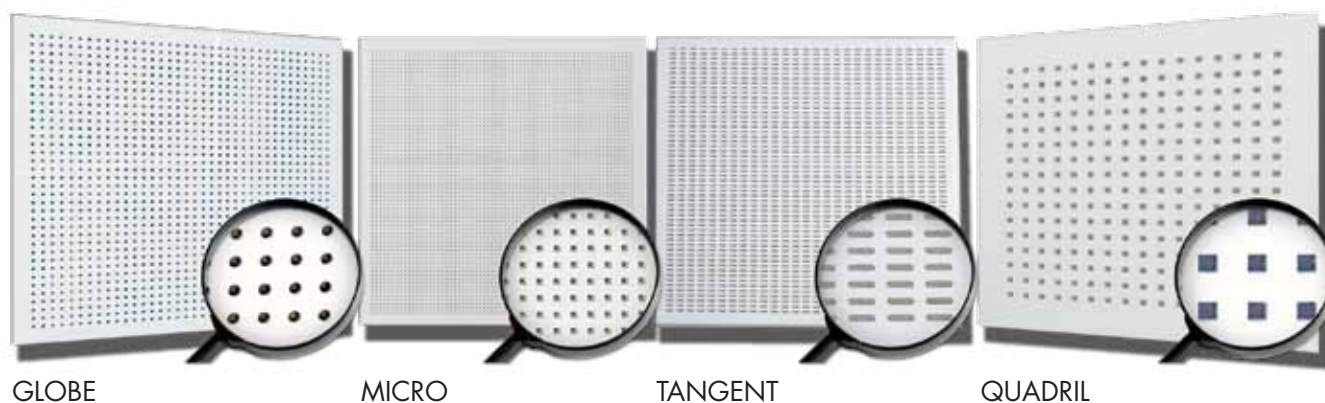
*Quadril Q2F, 200mm cavity with 50mm EarthWool 14kg/m³

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

Case Studies

PROJECT: Bahrain Chamber of Commerce, Bahrain

Designpanel was installed on the wall and ceiling surfaces in the new auditorium at the Bahrain Chamber of Commerce. The large open area in the auditorium is a good example of why creating excellent acoustics is vital. Chief Designer Aref Sadeq puts it this way. "Early in the design phase of the Bahrain Chamber of Commerce Auditorium, we acknowledged the requirement to achieve the highest standards of acoustic performance in order to create a state-of-the-art presentation environment, but we also understood that we must not sacrifice aesthetics in our choice of materials and interior finishes."

"We chose Designpanel acoustic ceilings and wall panels as an integral part of the interior design. We did so because the Designpanel product range allowed us the flexibility to create beautiful shapes and architectural lines while achieving our acoustic objectives," Aref Sadeq explains.



PROJECT: Lecture Halls, Istanbul Bilgi University, Turkey

TeamFores Akustik Design Groups specification included rooms with reduced sound reverberation times, because the rooms, although multipurpose, would be used most often as lecture halls. To achieve that, they incorporated some reflective surfaces in the front area and increased the amount of absorbent surfaces on the side walls. The back walls were designed to work as wide band absorbers with panel absorbers at the lower parts and perforated absorbers on top.

Turker Talayman of TeamFores Akustik Design Group said, "For the sake of unity and installation speed, we specified Designpanel and regular plasterboard, all with mineral wool insulation. Extensive use of Designpanel proved to be a flexible, well balanced, predictable and reliable element to the acoustic solution."

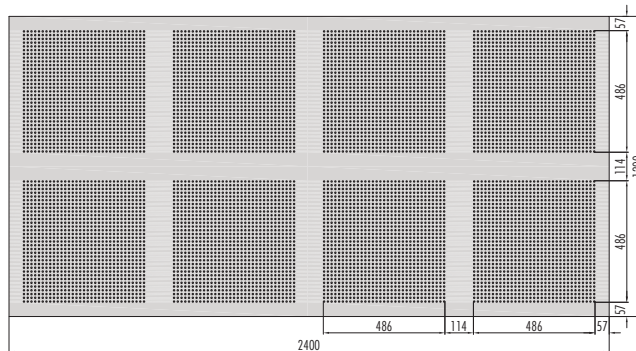
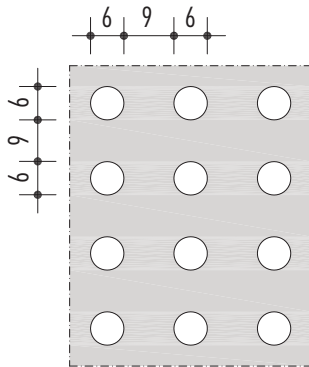


Acoustic Performance

GLOBE G2F

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

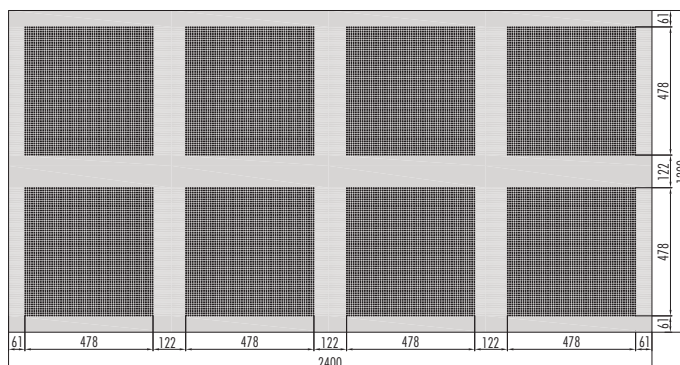
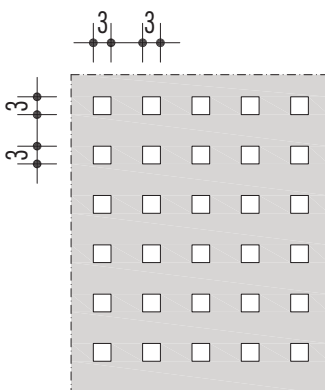
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.15	0.3	0.55	0.7	0.5	0.35	0.5	0.5
	200	0.4	0.55	0.65	0.55	0.45	0.35	0.5	0.55
	500	0.35	0.65	0.65	0.7	0.6	0.55	0.65	0.65
50mm EarthWool 14kg/m ³ or 75mm EarthWool 11kg/m ³	65	0.35	0.6	0.7	0.65	0.5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

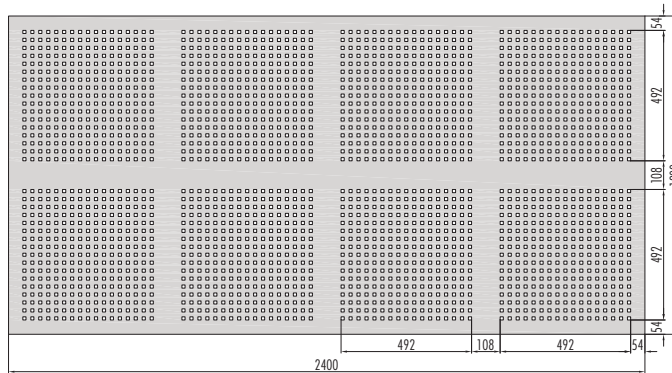
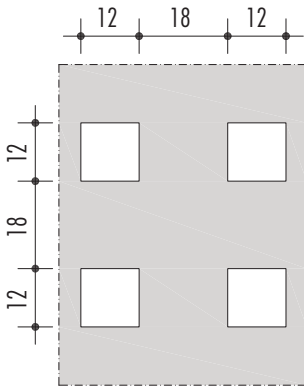
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.2	0.35	0.5	0.6	0.55	0.45	0.55	0.5
	200	0.4	0.5	0.55	0.5	0.5	0.45	0.55	0.5
	500	0.35	0.5	0.5	0.55	0.55	0.5	0.55	0.55
50mm EarthWool 14kg/m ³ or 75mm EarthWool 11kg/m ³	65	0.4	0.55	0.6	0.55	0.5	0.5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

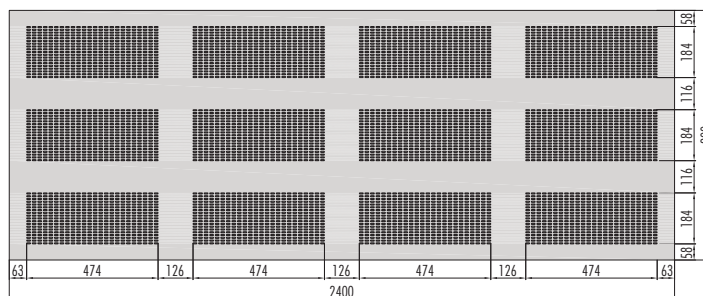
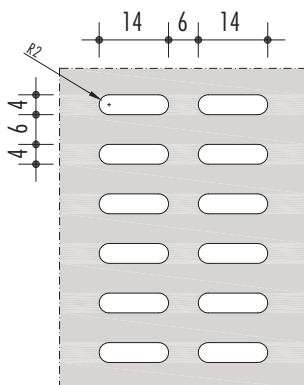
	Ceiling Cavity (mm)	α_p Frequency (Hz)						α_w	NRC
		125	250	500	1000	2000	4000		
Without Insulation	65	0.15	0.3	0.55	0.7	0.55	0.35	0.5	0.55
	200	0.45	0.55	0.65	0.6	0.5	0.4	0.55	0.6
	500	0.5	0.6	0.55	0.65	0.65	0.5	0.6	0.6
50mm EarthWool 14kg/m ³ or 75mm EarthWool 11kg/m ³	65	0.4	0.6	0.7	0.65	0.55	0.45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



Installation



CARE AND USE

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 by calling **1300 724 505**.

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.

- 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.
- Designpanel is UV resistant and will not become discoloured if exposed to direct sunlight or fixed and left standing unpainted for long periods.

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.

GENERAL REQUIREMENTS

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

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!

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.

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

FRAMING

- 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.

- Steel framed ceiling systems must be designed by an engineer according to the relevant Australian Standard.
- Framing members in this section are designed using either steel or timber joists, Lipped C type steel studs or a furring channel system.

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

Alternative components may only be used:

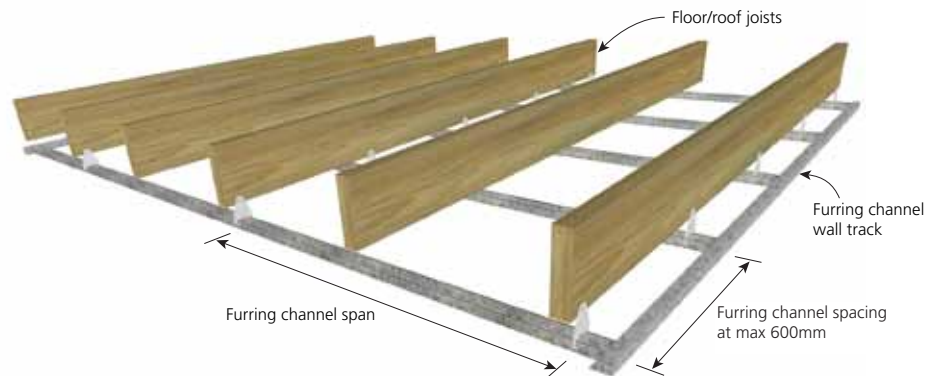
- In accordance with the manufacturer's literature, or
- If their performance is equivalent or better and they comply with the relevant standard.

More ceiling framing combinations are available than those described in this section. *[Refer to Rondo building services literature or equivalent]*

MAXIMUM SPAN (FRAMING CENTRES) FOR DESIGNPANEL

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

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.

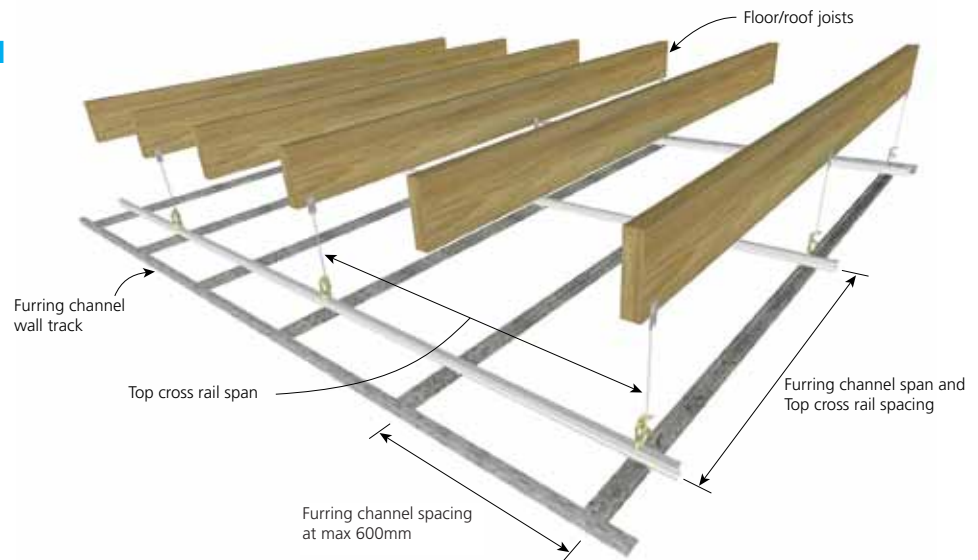
² $W_{ultimate} = 0.5 \text{ kPa}$, Strength Load Case: $1.2G + W_u$

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

- Sheet ceilings perpendicular to framing members.
- All short edges must be over a framing member.

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

FIXING

- Use fasteners 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.
- Do not fix plasterboard to steel more than 2mm BMT.

FASTENER TYPE AND MINIMUM SIZE FOR THE INSTALLATION OF DESIGNPANEL

Frame	Fastener
Steel	25mm – 6g S screw
Softwood Timber	40mm x 2.8 galvanised nail or 30mm x 2.8 ring shank nail or 30mm – 6g Type W screw
Hardwood Timber	30mm x 2.8 galvanised nail or 25mm x 2.8 ring shank nail or 30mm – 6g W screw for ceilings

For steel up to 0.8mm BMT use Type 'S' fine thread needle point screws.
For steel 0.8mm to 2.0mm BMT use Type 'S' fine thread drill point screws.
For timber use Type 'W' coarse thread needle 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

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

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.



Project: Adnec Exhibition Centre, Abu Dhabi, UAE

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.

The paint manufacturer's instructions for application must be followed. Only use the roller application for painting Designpanel. Roller application applies a uniform texture over the entire surface and ensures the paint does not contact the protective mat fixed to the back of the plasterboard. Spray application of paint is not permitted.

For more information, contact Technical Services on **1300 724 505** or visit **knaufplasterboard.com.au**

Construction Details

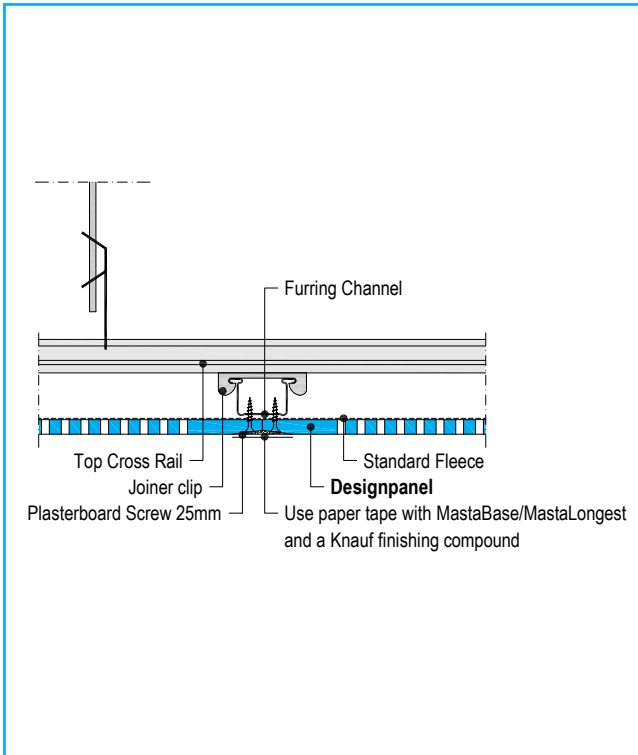


FIGURE 3 Short Edge Joint

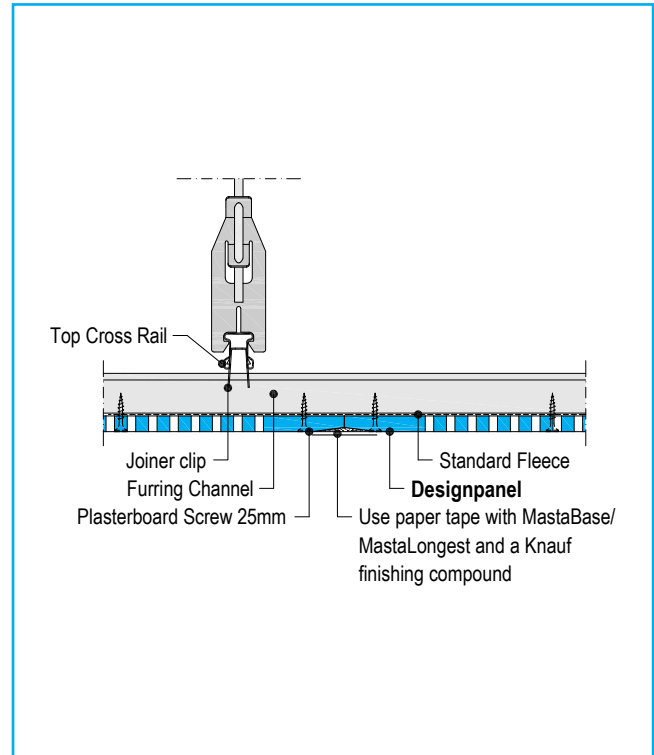


FIGURE 4 Long Edge Joint

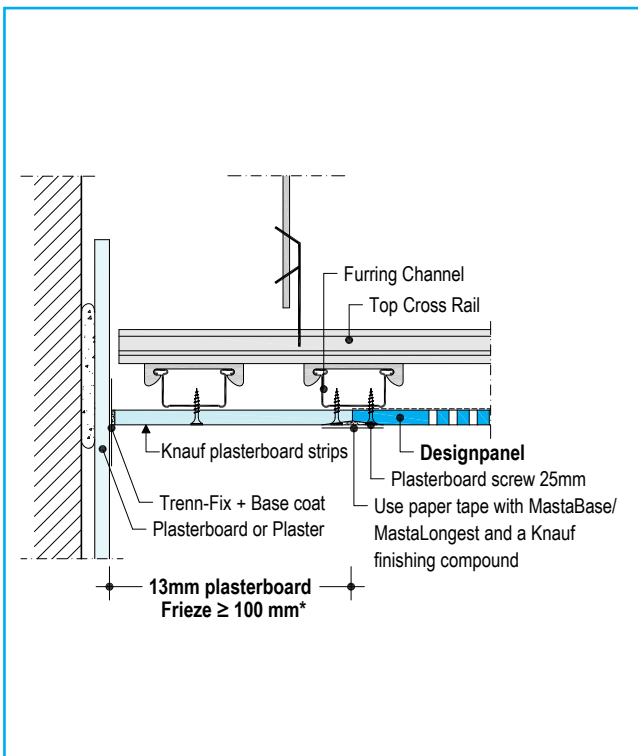


FIGURE 5 Connection to Wall

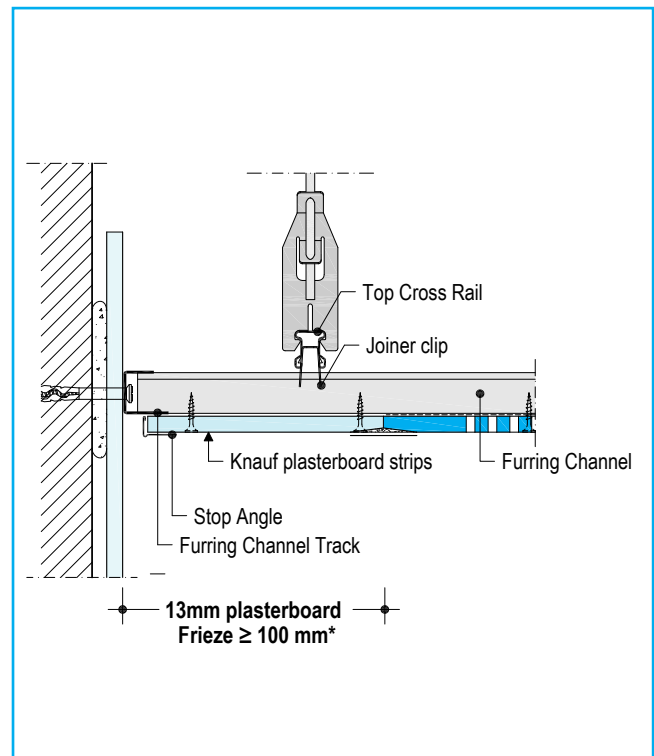


FIGURE 6 Connection to Wall with Exposed Joint

*Pre-cut plasterboard strips (Frieze)

Compounds



Plasterboard walls and ceilings are jointed using compounds and reinforced with paper tape or corner beads.

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.

Knauf compounds must be used with Knauf systems. Performance of all systems rely on using nominated Knauf compounds. Use of non-Knauf compounds may reduce a system's fire and acoustic rating, appearance or other aspects of performance.

There are two types of products used for jointing plasterboard: setting cements and air-drying compounds.

SETTING CEMENTS

Setting cements are plaster based, supplied in powder form and when combined with water harden by chemical reaction. They create the strongest joint.

Setting cements can be completely set but still damp. In cold and humid conditions, additional coats of setting cement can be applied to the joints when the cement is hard but before it is completely dry.

Hot and dry conditions may dry out the cement before it sets resulting in reduced strength and tape adhesion issues. Accelerating and retarding additives must not be used as they can also reduce strength.

Setting cements must not be applied over air-drying compounds.

AIR-DRYING COMPOUNDS

Air-drying compounds are generally premixed and harden by drying out. They are softer than setting cements and are designed for easy sanding.

Previous coats of air-drying compound or setting cement must be completely dry before applying the next coat and before sanding.

In cold and humid conditions air-drying compounds may take longer to dry. Ventilation such as open windows or an exhaust fan may be required.

Air-drying compounds must not be used in temperatures lower than 10°C.



Knauf Plasterboard Pty Ltd

ABN 61 003 621 010

31 Military Road

Matraville NSW 2036

Customer Service 1300 724 505

knaufplasterboard.com.au