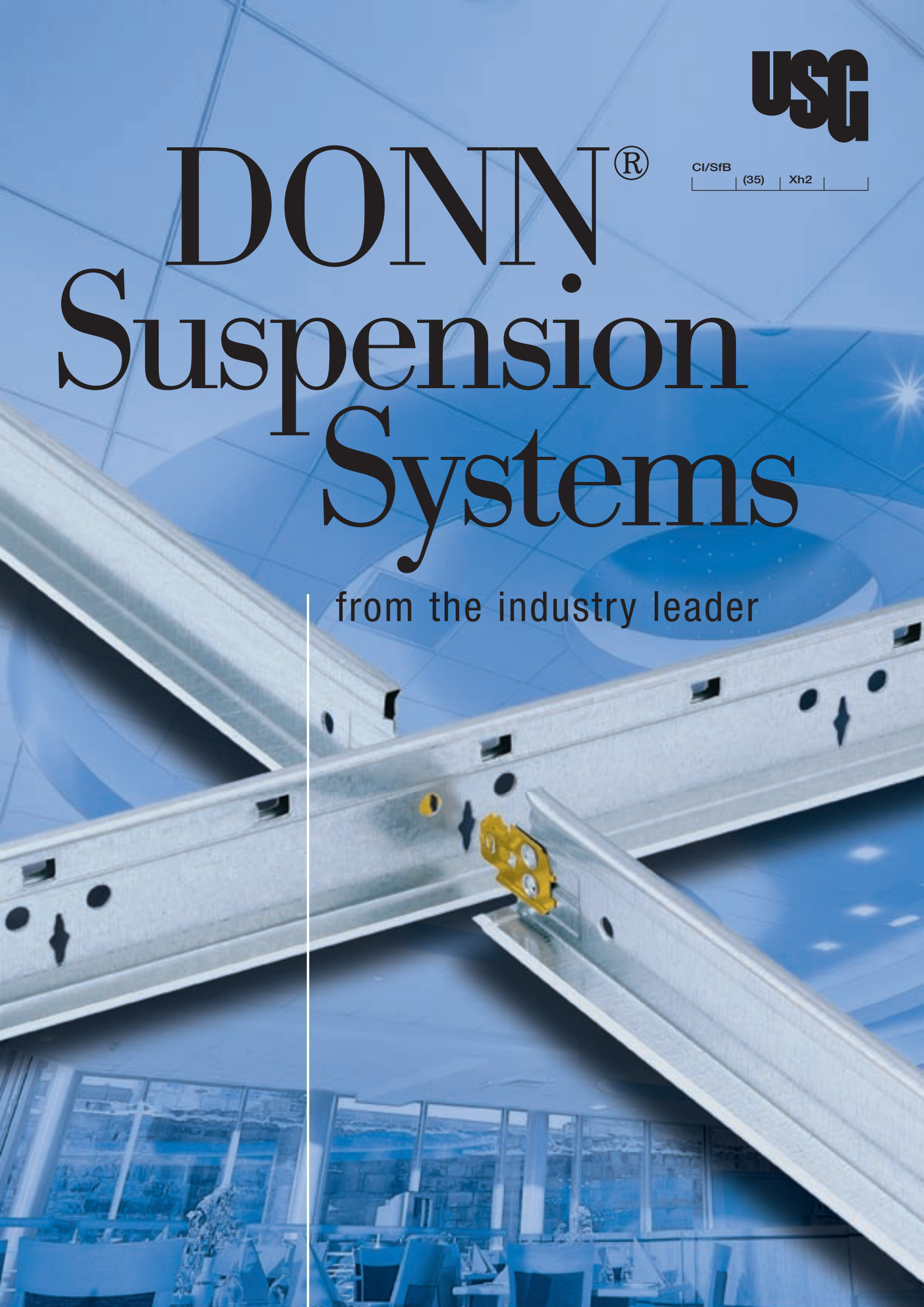




CI/SfB (35) Xh2

DONN[®] Suspension Systems

from the industry leader

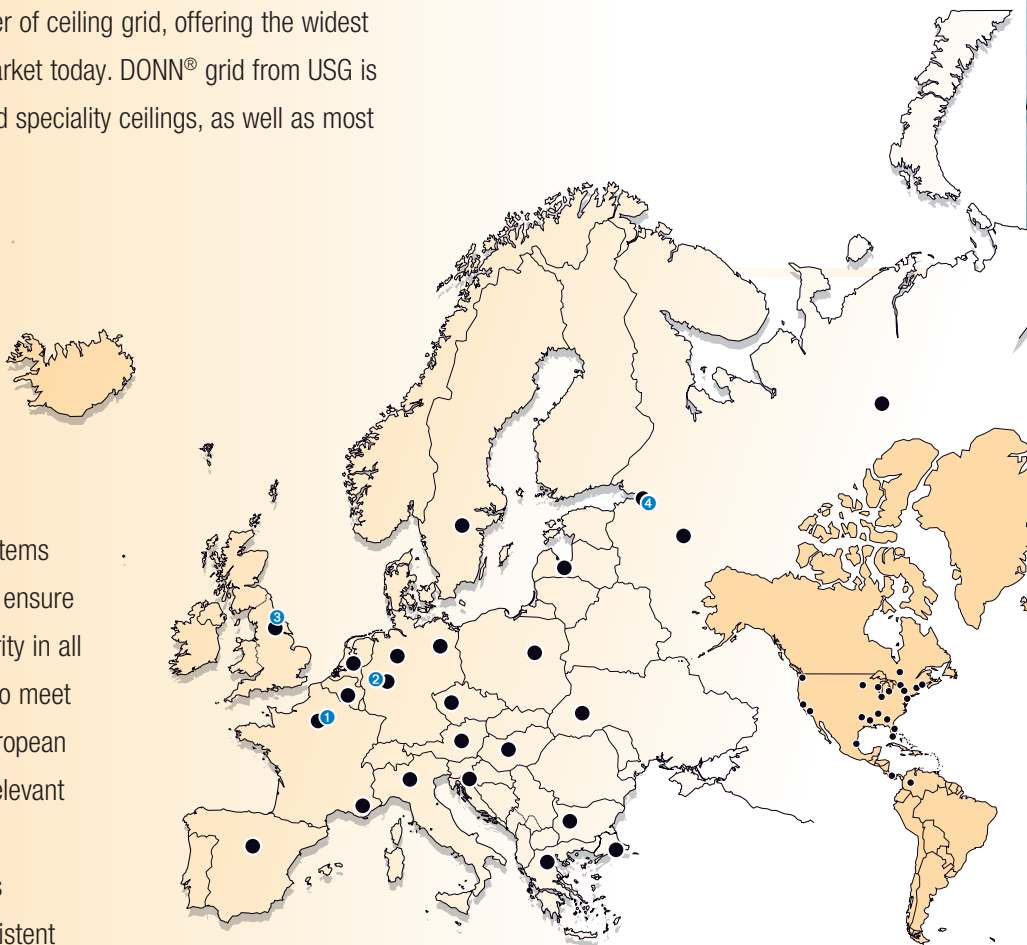


DONN[®] grid system

innovation and quality you

USG is the world's leading manufacturer of ceiling grid, offering the widest range of profiles and colours on the market today. DONN[®] grid from USG is compatible with all USG ceiling tiles and speciality ceilings, as well as most third party brands.

- DONN[®]DX[®] from USG is the most widely specified grid in Europe. The patented clip design makes it fast and easy to install but also easy to remove without the need for tools.
- All USG DONN grid suspension systems are designed and manufactured to ensure both structural and aesthetic integrity in all ceiling designs. They are certified to meet the most stringent national and European standards and to comply with all relevant building codes and norms.
- Strict quality assurance procedures (ISO 9002/EN 29000) ensure consistent manufacturing and finished product quality.
- USG's extensive distribution and sales network has been operating for more than 40 years, supplying technical expertise and support to all our customers. You can rest assured that your products will be delivered wherever you need them, on spec and on time.

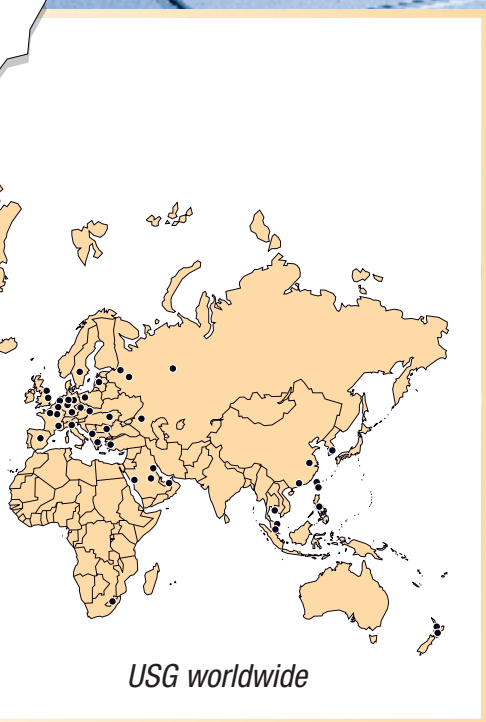


Grid manufacturing plants

- 1 Dreux, France
- 2 Viersen, Germany
- 3 Peterlee, United Kingdom
- 4 St. Petersburg, Russia
- Sales offices/ warehouses

USG sales offices are established throughout Western and Eastern Europe to provide local expertise and support.

Systems can build on



USG has been a world leader in the building materials industry for 100 years supplying ceiling tile and grid, access floors, joint treatment, gypsum wallboard, cement board systems and other products.

Contents

Basic principles

Installing a DONN® grid system.....	4-5
-------------------------------------	-----

DONN® grid suspension systems

■ Standard systems

DONN DX24 - exposed 24mm system	6-7
DONN DXB24 - exposed 24mm system – Butt cut.....	8-9
DONN DX15 - exposed 15mm system	10-11
DONN DX35 - exposed 35mm system.....	12-13
DONN DX Finline - slotted profile 15mm system	14-15

■ Special applications

DONN DX KB - exposed 24mm system – corrosion protected.....	16-17
DONN DX CE - exposed 35mm system – controlled environment.....	18-19
DONN DX Seismic - exposed system – seismic application	20-21

■ Wide span systems

DONN DX Espace - exposed 24mm system	22-23
--	-------

■ Bandraster

DONN DP - bandraster variable design system	24-27
---	-------

■ Gypsum ceiling applications

DONN DX Screw Fix - suspension system	28-29
DONN DX Rapid Fix - suspension system	30-31

■ ~~Curved ceiling systems~~

Curvatura™ 3-D Ceiling System	32-33
Compasso – curved ceiling trim	34-35

■ System components

Perimeter trims	36-37
Hanger options	38

Useful information

BS EN 13964: 2004 European standard for suspended ceilings	39
Frequently asked questions.....	40-41
Technical issues for ceiling design	42-43



When dimensions show measurement suffix, the dimensions should be read as mm.
All load bearing capacities are expressed in kg/m².

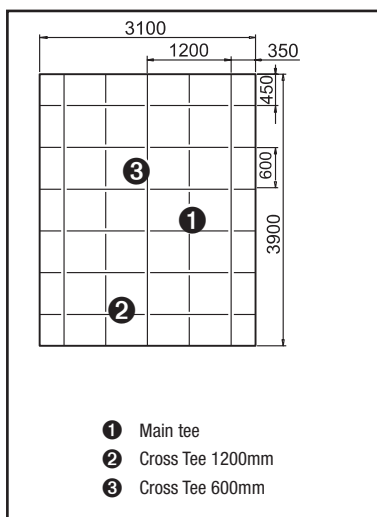
Installing a DONN[®] grid system

The appearance of a suspended acoustical ceiling is dependent both on the materials used and on the quality of the installation. USG manufactures components to meet BS 8290 & BS EN 13964, assuring that the material, structural and quality standards are as prescribed. Installation must meet BS8290, assuring proper level and secure attachment as prescribed. Good construction conditions are very important when successfully installing a suspended ceiling. It is recommended that the temperature and humidity range be 14 – 25°C and max. 75% relative humidity. Store materials in a protected area, store tiles on the job at least 3 days prior to installation.

Step 1

Measuring and planning are key first steps in the installation process.

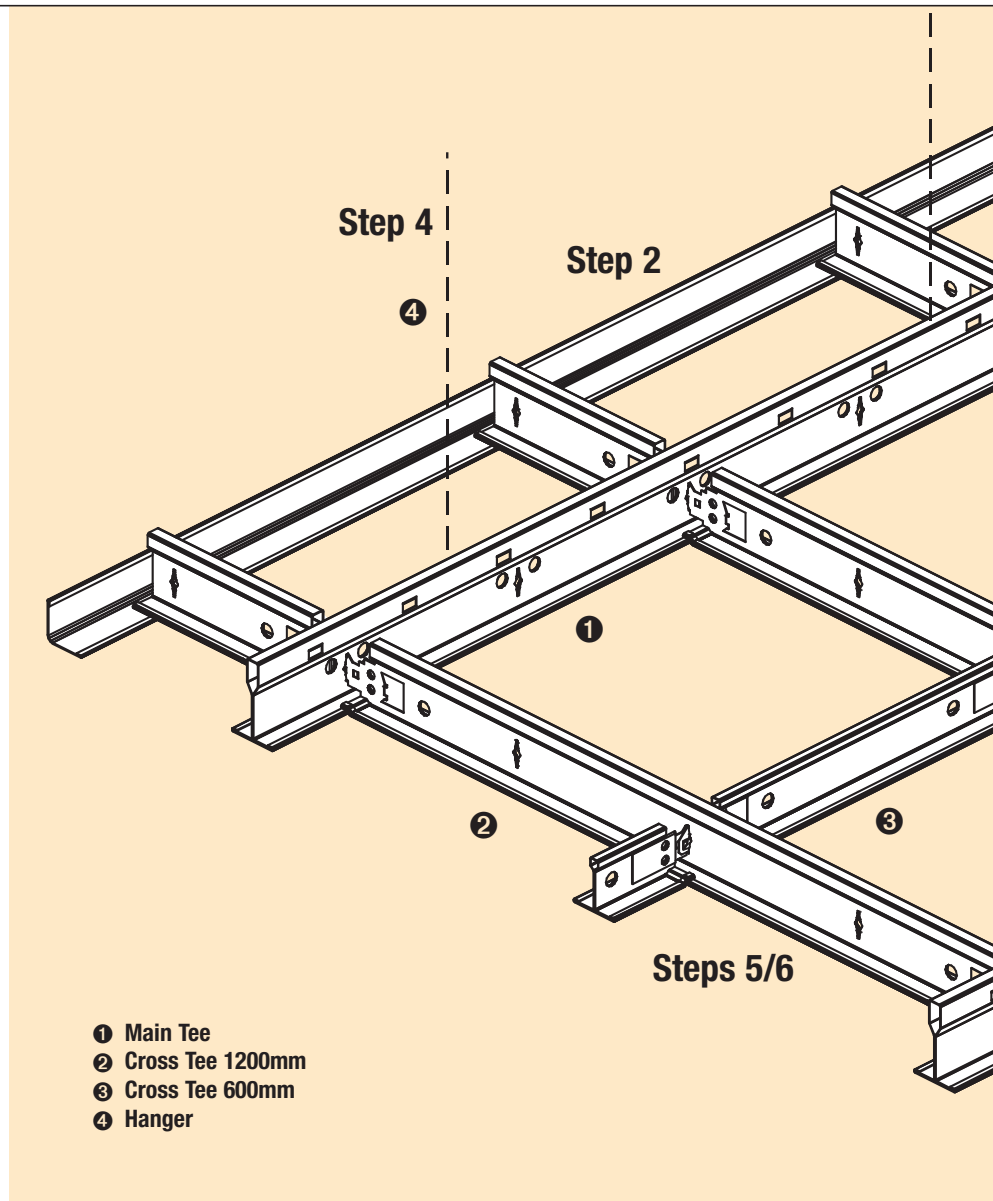
Measurement and placement of the tees will be on centre (o.c.), meaning from the centre of one to the centre of the next. Planning starts with a drawing of the room that shows all walls, including bays, alcoves beams and stairwells. Note which direction the joists (if any) are running, or if architectural drawings necessitate working in one direction or another. Determine the lines for main runners and cross tees in such a way that the tiles that abut the wall are at least half a tile (300mm).



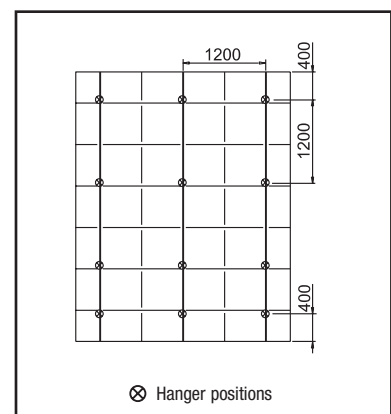
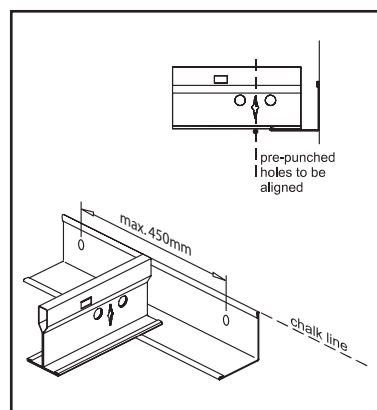
Step 2

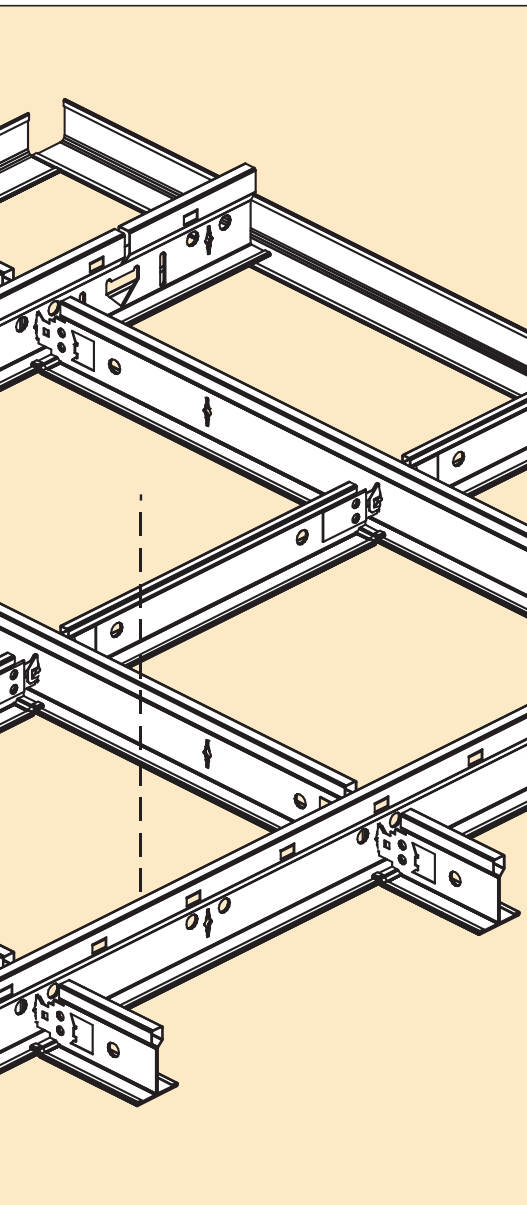
Mark the desired ceiling height (maintaining at least 70mm clearance below the lowest duct, pipe or beam.)

Measure and mark the walls at all corners above the installation level (=add the height of the wall angle to the desired ceiling height.) Snap a chalk line and test for level. Measuring down from joists or up from the floor is not recommended, since



neither may be level. Install wall angle with top edge of angle at the chalk line, spacing appropriate fixings 450mm o.c. or closer. Cut and mitre outside and inside angles at 45°, fitting them snugly together. Alternatively, simply butt angles at corner (as in system illustration).





Step 3

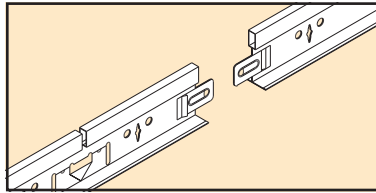
To confirm level, stretch a string until taut along the positions which the main tee will occupy.

Inserting a nail between the wall and the wall angle at marked locations serves as a good anchor for this purpose. Stretch another string across the room where the first row of cross tees will be located. This identifies where the first prepunched slots need to fall. Check to be sure the cross tee string is at 90° to the main tee string via the 3-4-5 method. Install the hangers at 1200mm o.c. above the lines of the main runners. Fix to the structure above using appropriate plugs, screws or other devices.

Step 4

Attach the main runners to the hangers.

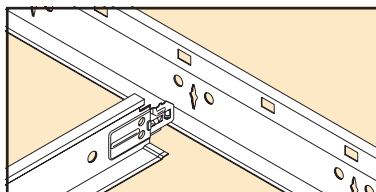
In each row, trim the main tee so that the cross-tee slot will line up with the cross-tee string. Mount main tees, resting the cut end of the main tee on the wall angle. The cut end of the main runner should be about 5mm away from the wall.



Step 5

Install cross tees, assuring that they are adequately connected to main tees (they "click" in place when properly seated).

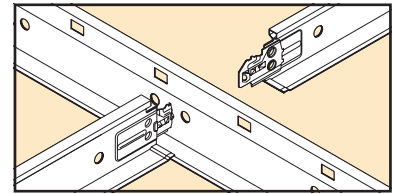
Where two cross tees intersect in the same slot, insert second cross-tee end to the left of the first. Where a cross-tee is installed without an opposing cross-tee, a nail should be slipped into the opening of the cross-tee clip to maintain the pull-out value for the cross-tee.



Step 6

Lay in panels, beginning at one corner and completing row by row.

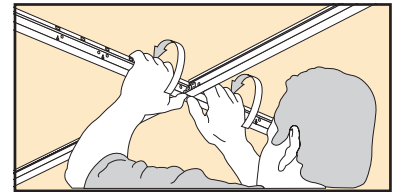
Tilt each panel up through the opening and lower it to rest squarely on all four tees.



Step 7

Removal as easy as installation.

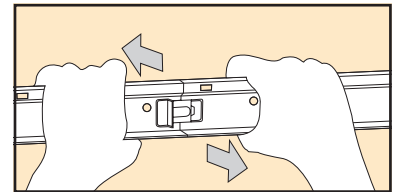
Just grasp the main tee with one thumb under the main tee-cross tee connection and, pushing up with the thumb, give the main tee a quick, short twist. That's all it takes – no tools needed. The strong clip means that the grid can be reinstalled straightaway with no tearing or bending of the clip.



Step 8

Main tee demounting

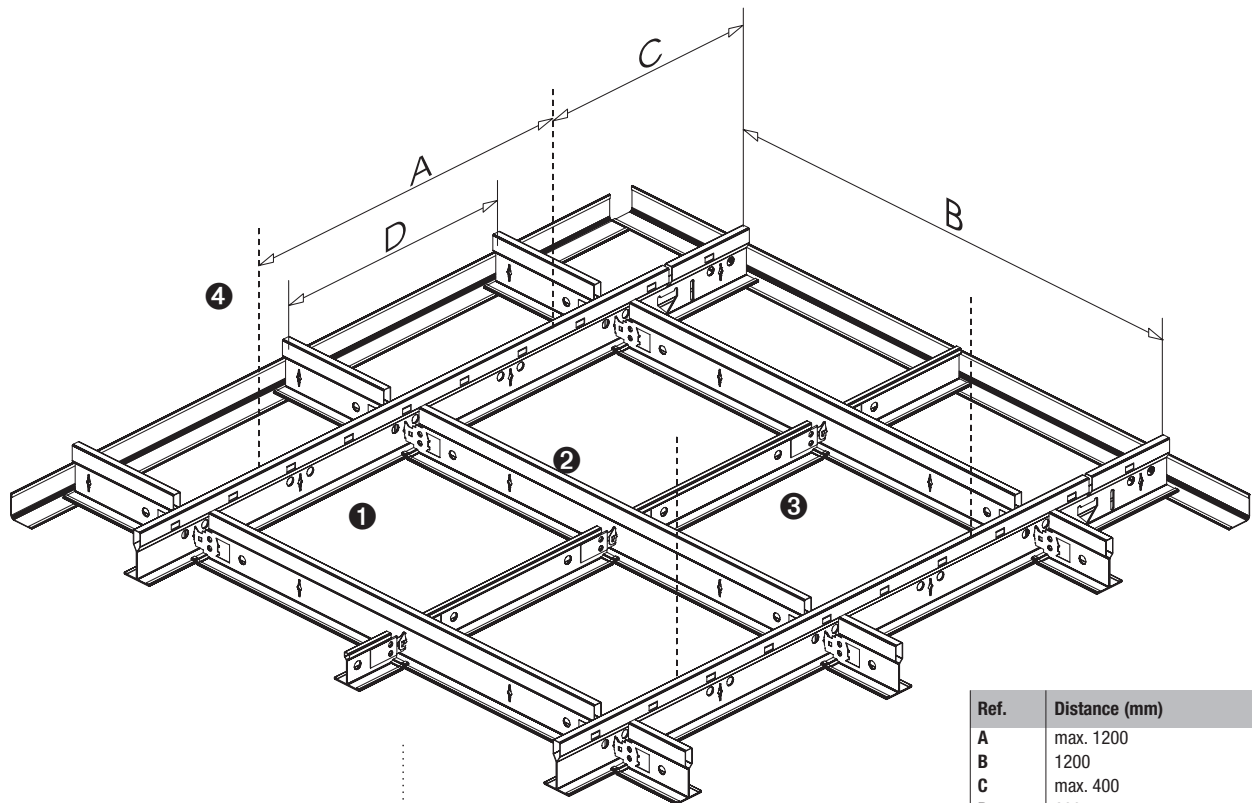
Using a straight shearing motion, push with your left hand and pull with your right hand to disconnect the main runner splice. Note: do not twist the splice during the removal procedure.



Other installation tips

- A** Cut tees with aviation snips, first the stem and then the flanges.
- B** Cut mineral fibre panels with utility knife and straight edge, cutting the face first. Cut panels should be at least 15mm larger than the opening.
- C** To install panels around obstructions, draw their exact locations on the panels and cut out. Then cut the panel in two parts through the largest section of the cut-out to enable fitting.
- D** To trim for Shadowline edge, use a utility knife to cut the panel, first at the face, then from the edge, to the same depth as Shadowline. If windows, stairwells, etc., extend above the ceiling plane, build suitable valances and attach wall angle.

DONN® DX24



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

System characteristics:

- Exposed 24mm system
- The most widely used grid system in the world
- Fast and simple to install
- Maximum economy and design simplicity
- Cross-tees with override-ends resist twisting and give professionally finished look with no exposed steel edges
- Patented QUICK-RELEASE™ clip design: easy to remove without tools
- Compatible with Square edge and SLB edge ceiling tiles
- Designed for fire rated ceilings - see page 40
- Colour options available
- Additional features available in the following systems:
 - DONN DXB24 Lay-in/Butt-cut system
 - DONN DX KB Corrosion-protected
 - DONN DX Seismic

Material needed for DX24 grid construction (per m² ceiling)

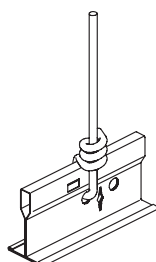
Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
①	Main Runner	DX24XH370	0.83 lin m	0.83 lin m
②	1200 Cross Tee	DX24TH120	1.67 lin m	1.67 lin m
③	600 Cross Tee	DX24TS60	0.83 lin m	
④	Hanger	DSW2	0.70 pieces	0.70 pieces

BS EN 13964:2004

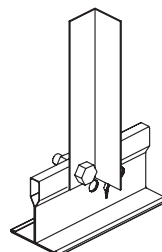
Reaction to fire: A2-s1,d0

Corrosion class: Class B

For further information on EN 13964, see page 39.

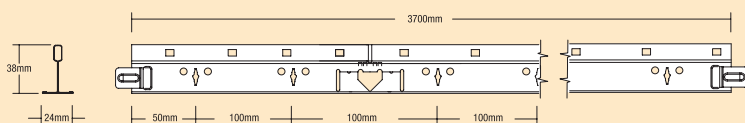


DX24 / Suspension wire - DSW2

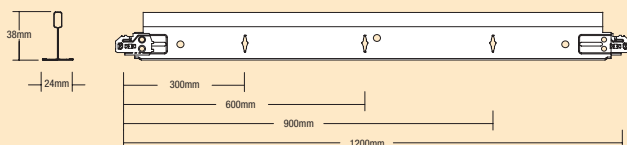


DX24 / Angle section - DGA5

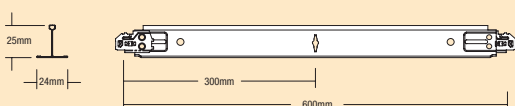
Main Runner DX24XH370



Long Cross Tee DX24TH120



Short Cross Tee DX24TS60



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	23.7	23.9	-	-
1000	23.7	23.9	55.9	56.3
1200	12.8	12.9	26.3	26.6
1500	4.6	4.8	10.0	10.3

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.

Please consult USG for other layouts, load or hanger distance.

Specification DONN DX24

Grid shall be DONN DX24 exposed grid system, hot dipped galvanised steel 'T' section with pre painted capping. Table width 24mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

38 x 24mm, ref DX24XH370 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using pre-straightened 2mm diameter HDG steel wire hangers, ref DSW2, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 24mm ref DX24TH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 25 x 24mm ref DX24TS60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings

appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

Hangers:

Shall be from pre straightened 2mm diameter HDG steel wire, ref DSW2. Hangers shall be fixed through holes in stalk or bulb of main runner and wrapped around itself a minimum of 3 times. Alternatively, hangers can be formed from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

Where applicable, these shall be non removable type clips, ref VB45. These generally will only be required in certain fire protecting assemblies or where there is a risk of tile uplift. Where fitted, these should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

Tile edge supported



DX24 / SQ

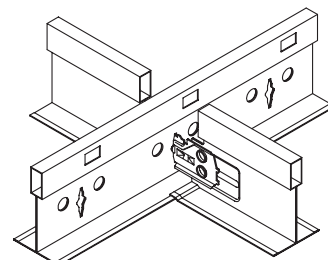


DX24 / SLT



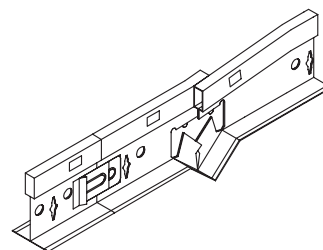
DX24 / SLB

Cross section



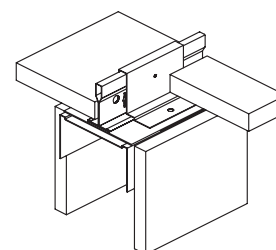
Main tee and cross tee connection.

Fire protection



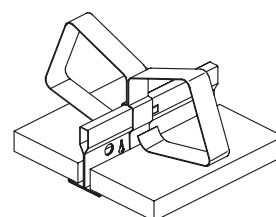
DX main tees are designed to expand at the fire lance in the event of a fire (shown here). This maintains the structural integrity of the ceiling and holds tiles in place.

DX24 / revoc clip



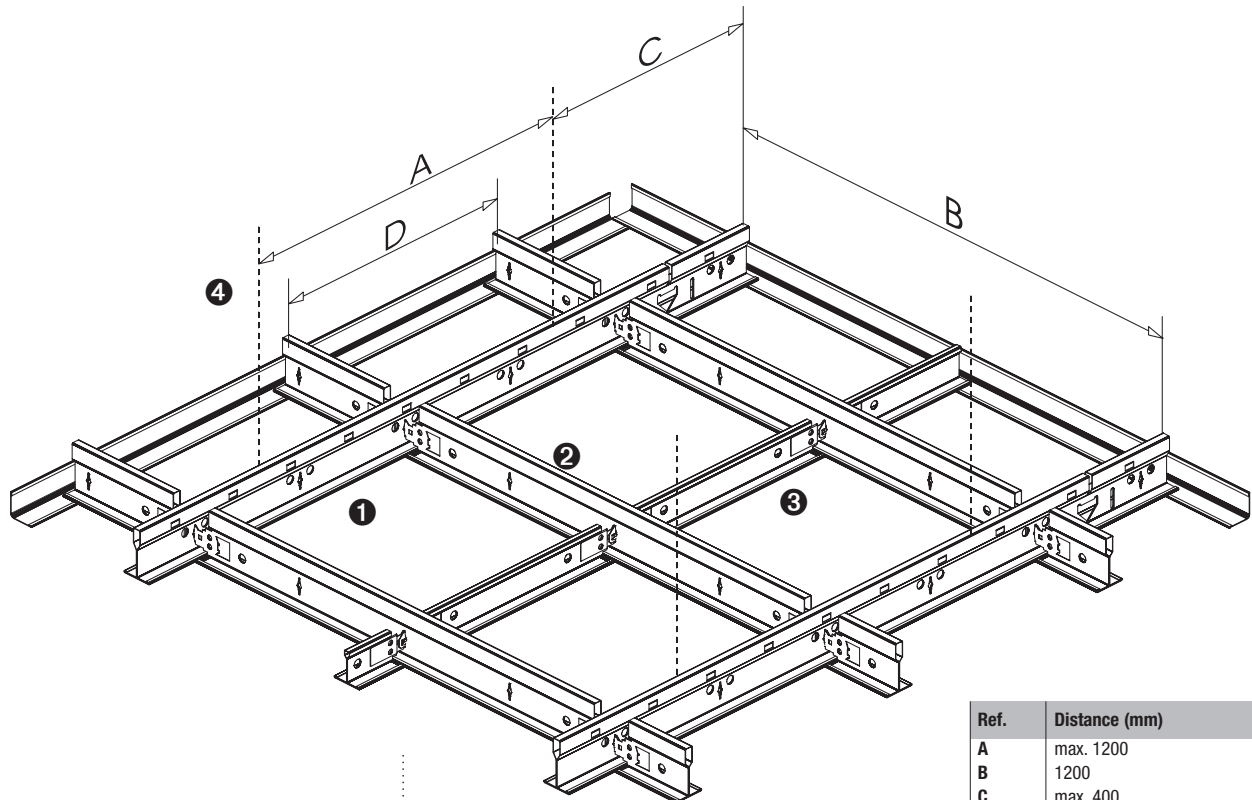
Partition head fixing using revoc clips with DX24.

Spring clip 20248



Spring clip application.

DONN® DXB24



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

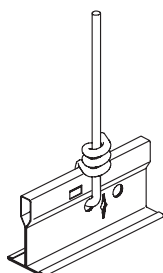
System characteristics:

- Exposed 24mm system
- Butt-cut cross tee system, preferred for flat lay-in metal ceilings and gypsum ceiling applications
- Maximum economy and design simplicity
- Fast and simple to install
- Patented QUICK-RELEASE™ clip design: easy to remove without tools
- Compatible with Square edge and SLB edge ceiling tiles
- Designed for fire rated ceilings - see page 40
- Colour options available

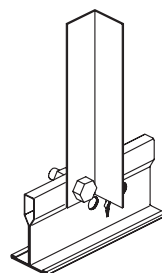
Material needed for DXB24 grid construction (per m² ceiling)

Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
①	Main Runner	DXB24XH370	0.83 lin m	0.83 lin m
②	1200 Cross Tee	DXB24TH120	1.67 lin m	1.67 lin m
③	600 Cross Tee	DXB24TS60	0.83 lin m	
④	Hanger	DSW2	0.70 pieces	0.70 pieces

BS EN 13964:2004
 Reaction to fire: A2-s1,d0
 Corrosion class: Class B
 For further information on EN 13964, see page 39.

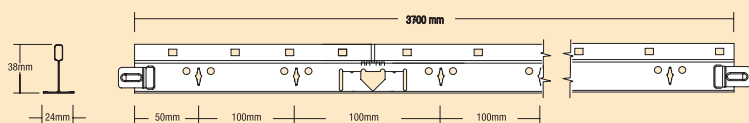


DXB24 / Suspension wire - DSW2

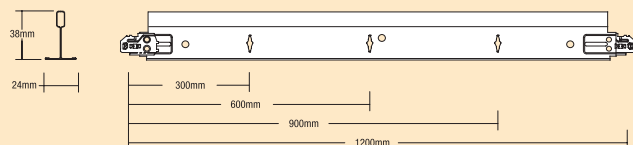


DXB24 / Angle section - DGA5

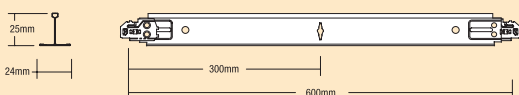
Main Runner DXB24XH370



Long Cross Tee DXB24TH120



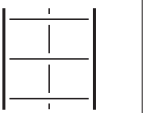
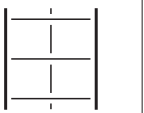


Short Cross Tee DXB24TS60



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	23.7	23.9	-	-
1000	23.7	23.9	55.9	56.3
1200	12.8	12.9	26.3	26.6
1500	4.6	4.8	10.0	10.3

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.

Please consult USG for other layouts, load or hanger distance.

Specification DXB24

Grid shall be DONN DXB24 exposed grid system, hot dipped galvanised steel 'T' section with pre painted capping. Table width 24mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

38 x 24mm, ref DXB24XH370 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using pre-straightened 2mm diameter HDG steel wire hangers, ref DSW2, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 24mm ref DXB24TH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 25 x 24mm ref DXB24TS60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'butt cut' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings

appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

Hangers:

Shall be from pre straightened 2mm diameter HDG steel wire, ref DSW2. Hangers shall be fixed through holes in stalk or bulb of main runner and wrapped around itself a minimum of 3 times. Alternatively, hangers can be formed from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

Where applicable, these shall be non removable type clips, ref VB45. These generally will only be required in certain fire protecting assemblies or where there is a risk of tile uplift. Where fitted, these should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

Tile edge supported

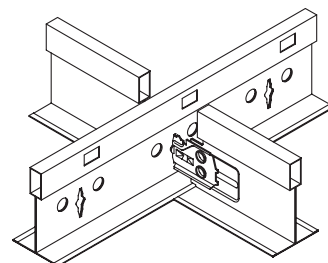


DX24 / SQ

DX24 / SLT

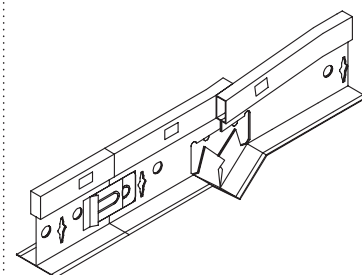
DX24 / SLB

Cross section



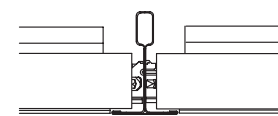
Main tee and cross tee connection.

Fire protection



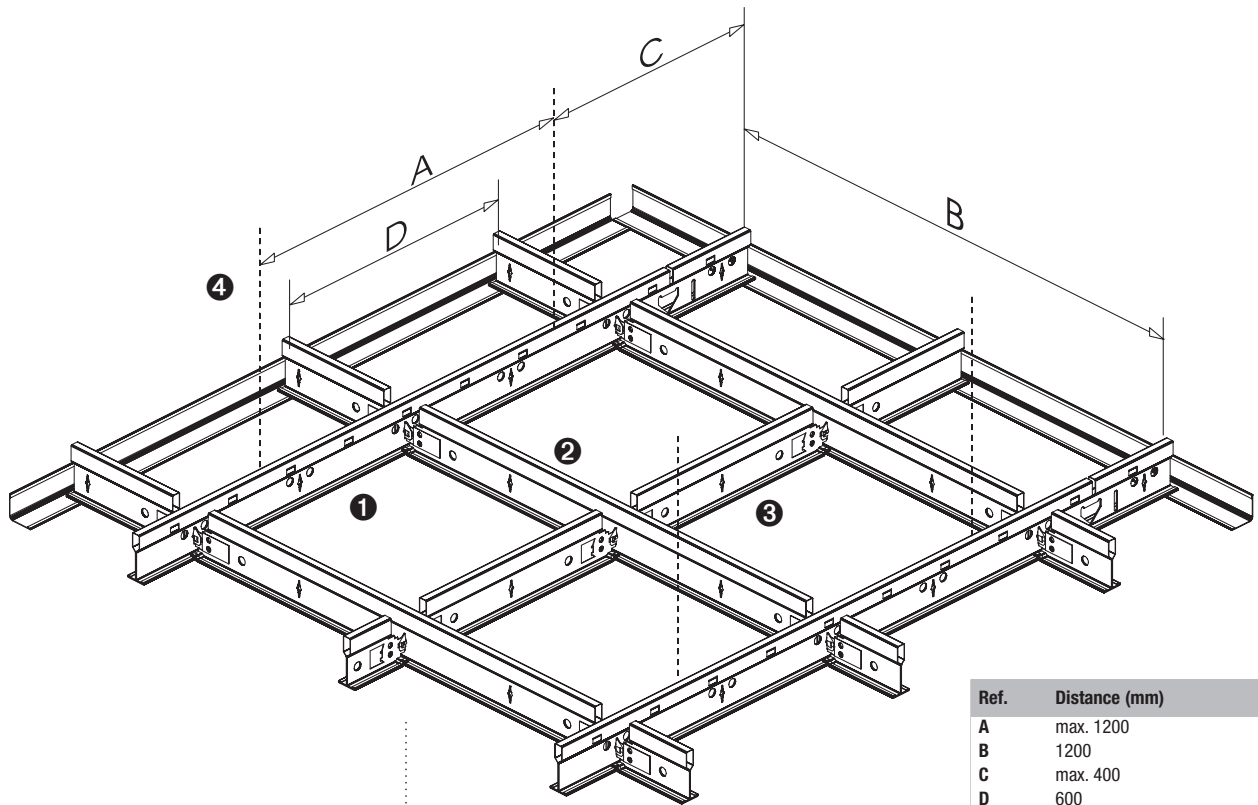
DX main tees are designed to expand at the fire lance in the event of a fire (shown here). This maintains the structural integrity of the ceiling and holds tiles in place.

DXB / metal ceiling tile



Butt cut cross tee detail to ensure that metal tile sits flat on grid.

DONN® DX15



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

System characteristics:

- Exposed 15mm system
- Narrow table grid for subtle visual effect
- Cross-tees with override-ends resist twisting and give professionally finished look with no exposed steel edges
- Patented QUICK-RELEASE™ clip design: easy to remove without tools
- Fast and simple to install and easily accessible
- Standard joggled (overriding) cross tee system
- Suitable for FLB edge and most "face cut design" ceiling tiles
- Designed for fire rated ceilings - see page 40
- Colour options available
- Alternative butt cut cross tee system available (DXB15 in RAL 9010 white) - the recommended system for metal tile applications

Material needed for DX15 grid construction (per m² ceiling)

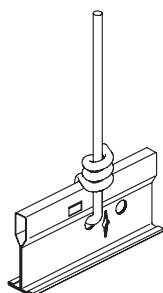
Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
1	Main Runner	DX15XH370	0.83 lin m	0.83 lin m
2	1200 Cross Tee	DX15TH120	1.67 lin m	1.67 lin m
3	600 Cross Tee	DX15TH60	0.83 lin m	
4	Hanger	DSW2	0.70 pieces	0.70 pieces

BS EN 13964:2004

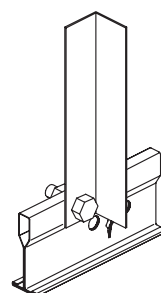
Reaction to fire: A2-s1,d0

Corrosion class: Class B

For further information on EN 13964, see page 39.

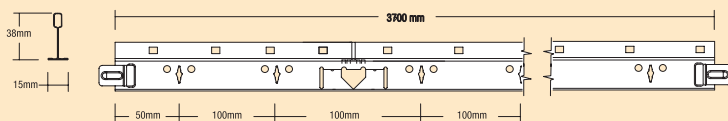


DX15 / Suspension wire - DSW2

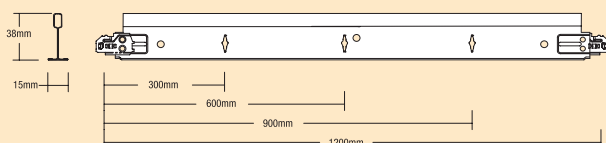


DX15 / Angle section - DGA5

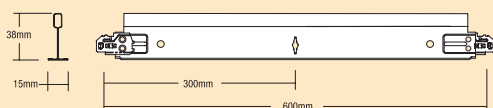
Main Runner DX15XH370



Long Cross Tee DX15TH120



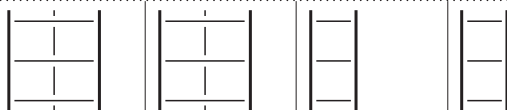
Short Cross Tee DX15TH60



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	24.0	24.2	-	-
1000	24.0	24.2	54.0	54.2
1200	12.4	12.5	25.5	25.7
1500	4.5	4.7	9.8	10.0

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Please consult USG for other layouts, load or hanger distance.

Specification DONN DX15

Grid shall be DONN DX15 exposed grid system, hot dipped galvanised steel 'T' section with pre painted capping. Table width 15mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

38 x 15mm, ref DX15XH370 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using pre-straightened 2mm diameter HDG steel wire hangers, ref DSW2, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 15mm ref DX15TH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 38 x 15mm ref DX15TH60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings

appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

Hangers:

Shall be from pre straightened 2mm diameter HDG steel wire, ref DSW2. Hangers shall be fixed through holes in stalk or bulb of main runner and wrapped around itself a minimum of 3 times. Alternatively, hangers can be formed from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

Where applicable, these shall be non removable type clips, ref VB45. These generally will only be required in certain fire protecting assemblies or where there is a risk of tile uplift. Where fitted, these should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

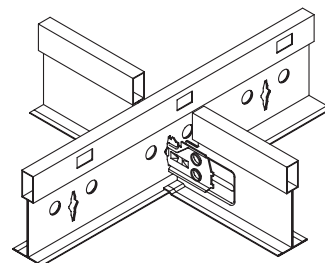
Tile edge supported



DX15 / FL

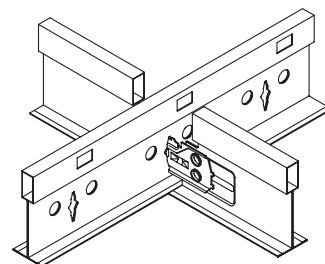
DX15 / FLB

Cross section (joggled)



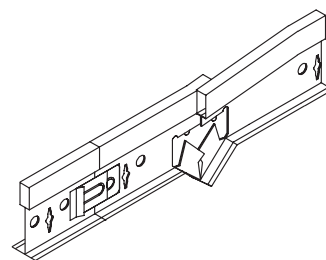
Main tee and cross tee connection.

Cross section (butt cut)



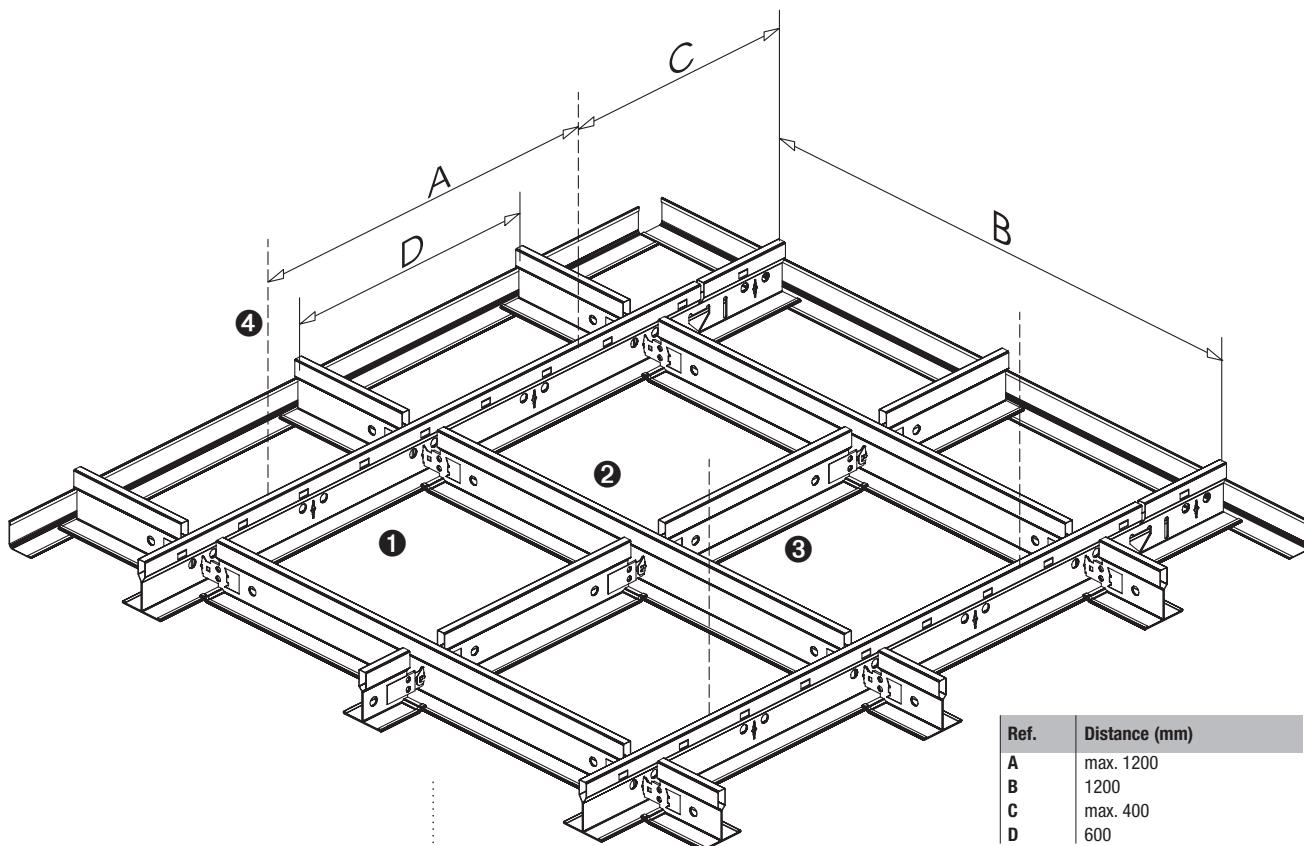
Main tee and cross tee connection.

Fire protection



DX main tees are designed to expand at the fire lance in the event of a fire (shown here). This maintains the structural integrity of the ceiling and holds tiles in place.

DONN® DX35



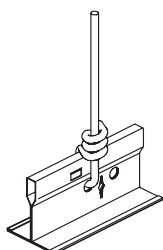
System characteristics:

- Exposed 35mm system
- Wide profile for use with insulation lining panels and large module ceiling tiles
- Cross-tees with override-ends resist twisting and give professionally finished look with no exposed steel edges
- Patented QUICK-RELEASE™ cross tees: easy to remove without tools
- Fast installation
- Joggled (overriding) ends ensure no exposed metal edges
- Available in galvanised finish and white painted
- Additional features available in the following systems:
 - DONN DX CE controlled environment system

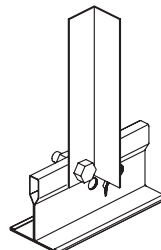
Material needed for DX35 grid construction (per m² ceiling)

Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
①	Main Runner	DX35XH370W	0.83 lin m	0.83 lin m
②	1200 Cross Tee	DX35XH120W	1.67 lin m	1.67 lin m
③	600 Cross Tee	DX35XH60W	0.83 lin m	
④	Hanger	DSW2	0.70 pieces	0.70 pieces

BS EN 13964:2004
 Reaction to fire: A2-s1,d0
 Corrosion class: Class B
 For further information on EN 13964, see page 39.

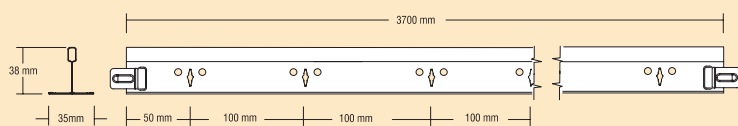


DX35 / Suspension wire - DSW2

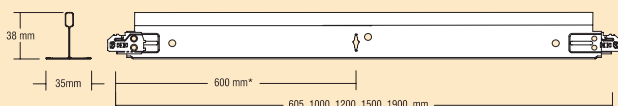


DX35 / Angle section - DGA5

Main Runner DX35XH370W



Long Cross Tee DX35XH120W



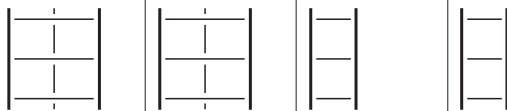
Short Cross Tee DX35XH60W



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	29.0	29.5	-	-
1000	29.0	29.5	61.3	61.8
1200	13.6	13.9	28.7	29.1
1500	4.5	4.9	10.7	11.1

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Please consult USG for other layouts, load or hanger distance.

Specification DONN DX35

Grid shall be DONN DX35 exposed grid system, hot dipped galvanised steel 'T' section with pre painted capping. Table width 35mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

38 x 35mm, ref DX35XH370 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using pre-straightened 2mm diameter HDG steel wire hangers, ref DSW2, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 35mm ref DX35XH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 38 x 35mm ref DX35XH60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings

appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

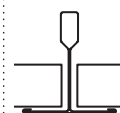
Hangers:

Shall be from pre straightened 2mm diameter HDG steel wire, ref DSW2. Hangers shall be fixed through holes in stalk or bulb of main runner and wrapped around itself a minimum of 3 times. Alternatively, hangers can be formed from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

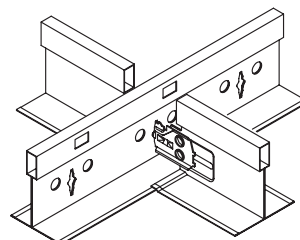
Where applicable, these shall be non removable type clips, ref VB45. These generally will only be required in certain fire protecting assemblies or where there is a risk of tile uplift. Where fitted, these should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

Tile edge supported



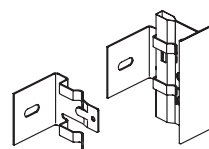
DX35 / SQ

Cross section



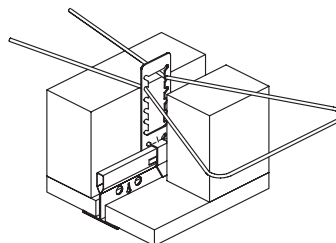
Main tee and cross tee connection.

DX35 / GFV



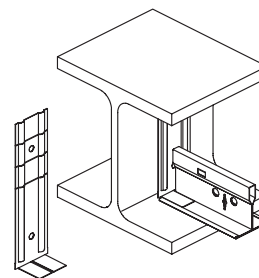
GFV clip for vertical fixing of DX35 to wall.

DX35 / DCL150 + EP25



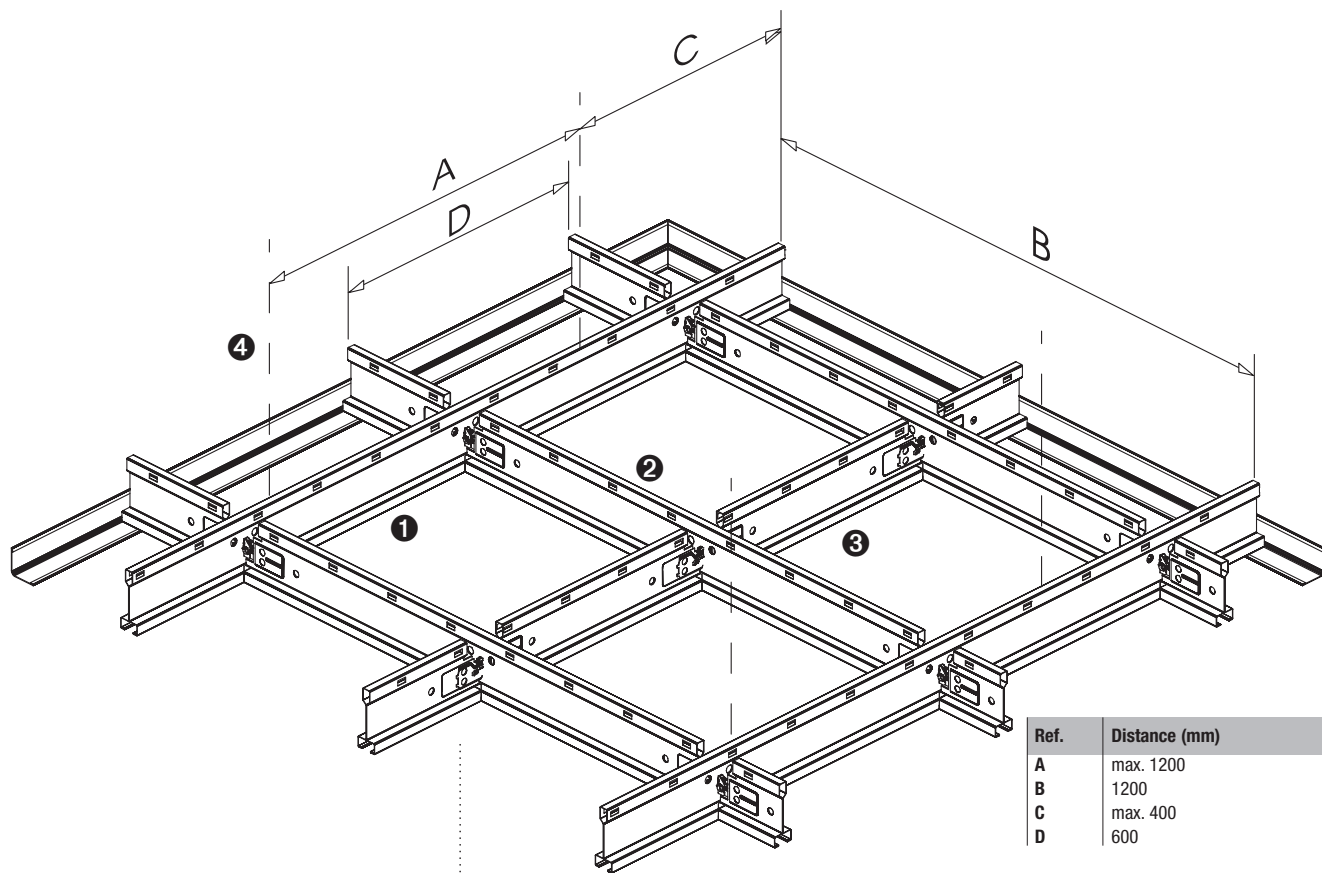
Variable hold-down clip for thick insulation overlay.

DX35 / DCL011



DCL 011 bracket for direct fixing of DX35 tee to "I" beam.

DONN® DX Finline



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

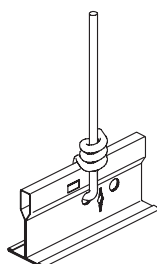
System characteristics:

- Innovative narrow profile slotted grid with 6.5mm reveal
- Mitred joints offer clean, tailored appearance
- Patented QUICK-RELEASE™ cross tee connection
- Easy attachment of partitions or signage directly to the grid
- White/white as standard; other colour combinations available on request
- Fast and simple to install, easily accessible
- Compatible with FL edge ceiling tiles

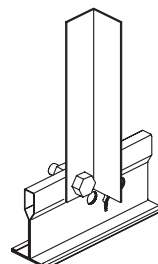
Material needed for DX Finline grid construction (per m² ceiling)

Nr	Description	Item reference	Module
			600 x 600
1	Main Runner	DXF300W	0.83 lin m
2	Cross Tee	DXF120W	1.67 lin m
3	Cross Tee	DXF60W	0.83 lin m
4	Hanger	DSW2	0.70 pieces

BS EN 13964:2004
 Reaction to fire: A2-s1,d0
 Corrosion class: Class B
 For further information on EN 13964, see page 39.

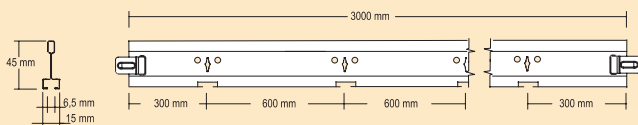


DX Finline / Suspension wire - DSW2

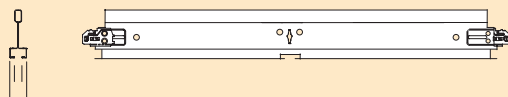


DX Finline / Angle section - DGA5

Main Runner DXF300



Long Cross Tee DXF120



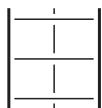
Short Cross Tee DXF60



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module	
	Main runner at 1200mm 600 x 600	Main runner at 600mm 600 x 600
800	25.5	-
1000	25.5	53.6
1200	12.0	25.1
1500	4.1	9.5

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Please consult USG for other layouts, load or hanger distance.

Specification DONN DX Finline

Grid shall be DONN DXF Finline exposed grid system, steel narrow profile slotted grid section with 6.5mm reveal. Table width 15mm. To suit module size 600 x 600mm.

Main runners:

45 x 15mm, ref DXF300 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using pre-straightened 2mm diameter HDG steel wire hangers, ref DSW2, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 45 x 15mm ref DXF120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. 600mm cross tees, 45 x 15mm ref DXF60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature mitred ends for continuity of reveal detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

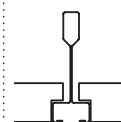
Hangers:

Shall be from pre straightened 2mm diameter HDG steel wire, ref DSW2. Hangers shall be fixed through holes in stalk or bulb of main runner and wrapped around itself a minimum of 3 times. Alternatively, hangers can be formed from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

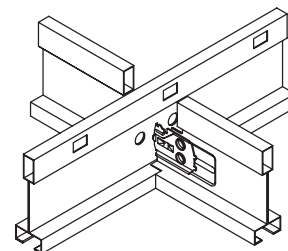
Where applicable, these shall be non removable type clips, ref VB45. These generally will only be required in certain fire protecting assemblies or where there is a risk of tile uplift. Where fitted, these should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

Tile edge supported



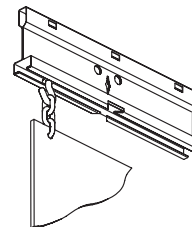
DXF / FL

Cross section



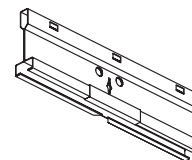
Main tee and cross tee connection.

DXF / AH1



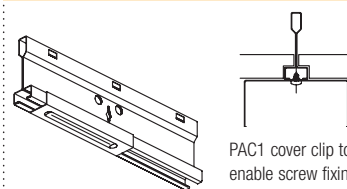
AH1 hook to hang signage from ceiling.

DXF / MCC2



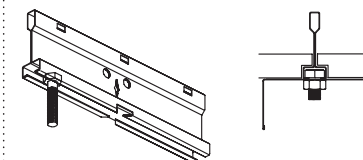
MCC2 cover clip to close grid mitre.

DXF / PAC1



PAC1 cover clip to enable screw fixing of partition head to grid.

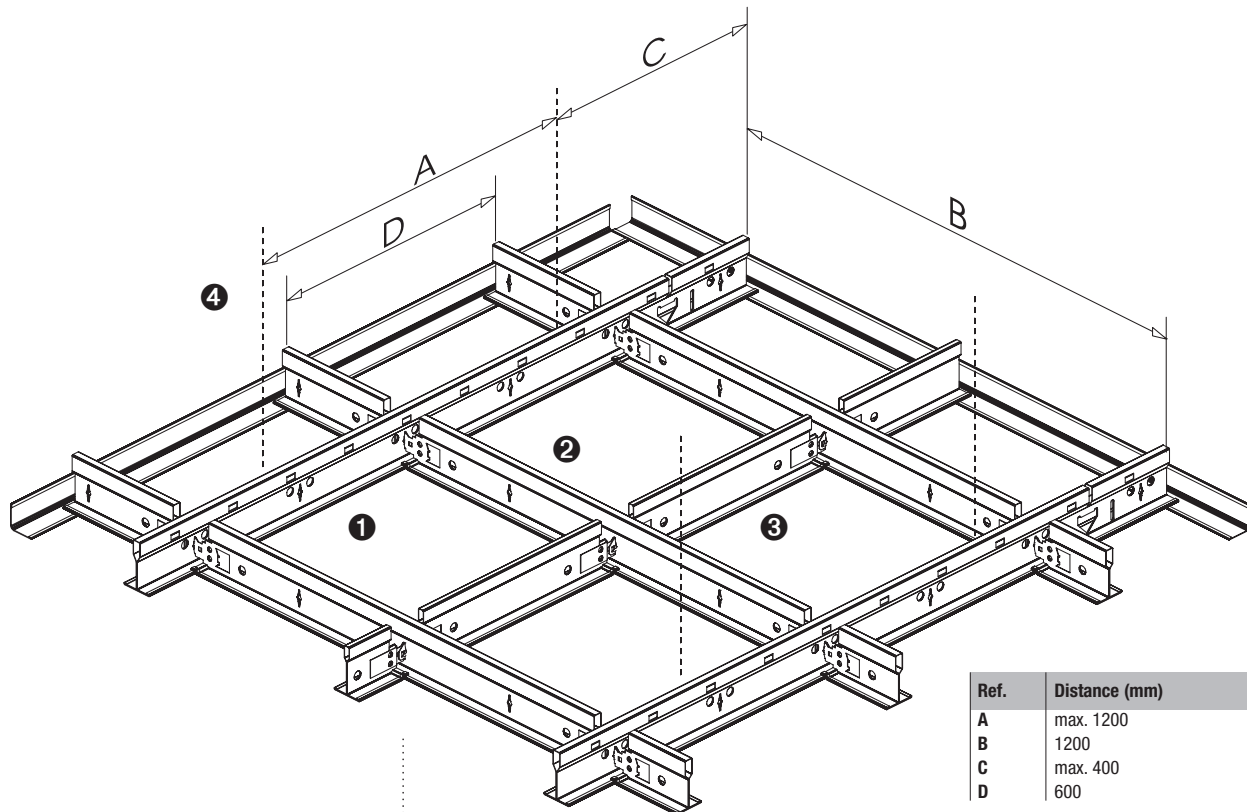
DXF / TB1F



TB1F "T" bolt for fixing partition head to grid.

DONN® DX KB

Corrosion protected



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

System characteristics:

- Exposed 24mm system
- Ideal for high humidity environments or wet-cleaned areas
- Cross-tees with override-ends resist twisting and give professionally finished look with no exposed steel edges
- Patented QUICK-RELEASE™ cross tees: easy to remove without tools
- For applications requiring sustained exposure to high humidity (e.g. >95% RH)
- For applications requiring resistance to other corrosive atmospheres
- Galvanised and painted construction with clip
- Corrosion-treated accessories available
- Designed for fire rated ceilings - see page 40.

Material needed for DX KB grid construction (per m² ceiling)

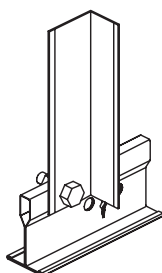
Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
①	Main Runner	DX24XH370WK	0.83 lin m	0.83 lin m
②	1200 Cross Tee	DX24XH120WK	1.67 lin m	1.67 lin m
③	600 Cross Tee	DX24XH60WK	0.83 lin m	
④	Hanger (corrosion resistant)	MIA3219WK	0.70 pieces	0.70 pieces

BS EN 13964:2004

Reaction to fire: A2-s1,d0

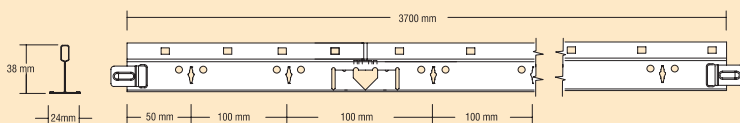
Corrosion class: Class C

For further information on EN 13964, see page 39.

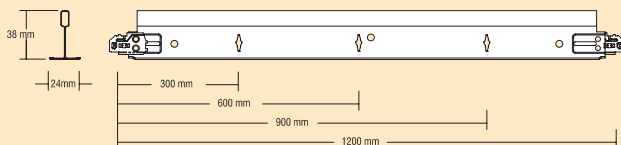


DX KB / Angle section - MIA3219WK

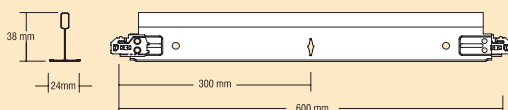
Main Runner DX24XH370WK



Long Cross Tee DX24XH120WK



Short Cross Tee DX24XH60WK



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	26.7	26.9	-	-
1000	26.7	26.9	56.0	56.4
1200	12.6	12.9	26.4	26.7
1500	4.4	4.7	10.0	10.3

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.

Please consult USG for other layouts, load or hanger distance.

Specification DONN DX KB

Grid shall be DONN DX KB exposed grid system, hot dipped galvanised steel 'T' section with additional corrosion resistant coating and pre painted white aluminium capping. Table width 24mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

38 x 24mm, ref DX24XH370WK shall be normally spaced at 1200mm centres and suspended from the structure or soffit using 32 x 19mm corrosion resistant perimeter angle, ref MIA3219WK, at maximum 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 24mm ref DX24XH120WK, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 38 x 24mm ref DX24XH60WK, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail and corrosion resistant stainless steel DX clips.

Perimeter trims:

32mm x 19mm hot dipped galvanised steel angle section with additional corrosion resistant coating and pre painted white aluminium capping, ref MIA3219WK, fixed to perimeter wall using fixings appropriate to the structure and environment at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

Hangers:

Shall be from 32 x 19mm corrosion resistant perimeter angle, ref MIA3219WK, fixed to main runners using appropriate HDG steel self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit and environment.

Hold down clips:

Where applicable, these shall be corrosion resistant clips, ref V17. These generally will only be required where there is a risk of tile uplift. Where fitted, these should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

Tile edge supported

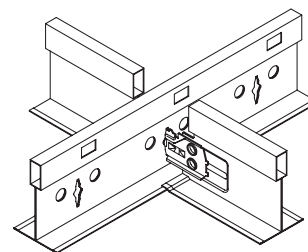


DX24 / SLT

DX24 / SQ

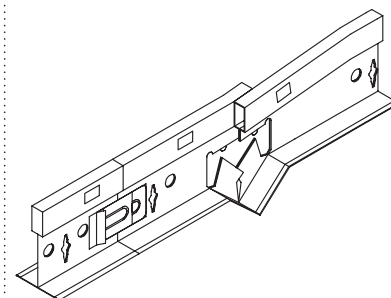
DX24 / SLB

Cross section



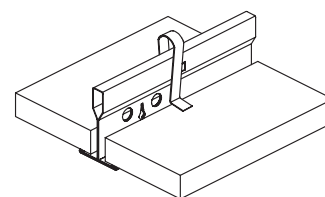
Main tee and cross tee connection.

Fire protection



DX main tees are designed to expand at the fire lance in the event of a fire (shown here). This maintains the structural integrity of the ceiling and holds tiles in place.

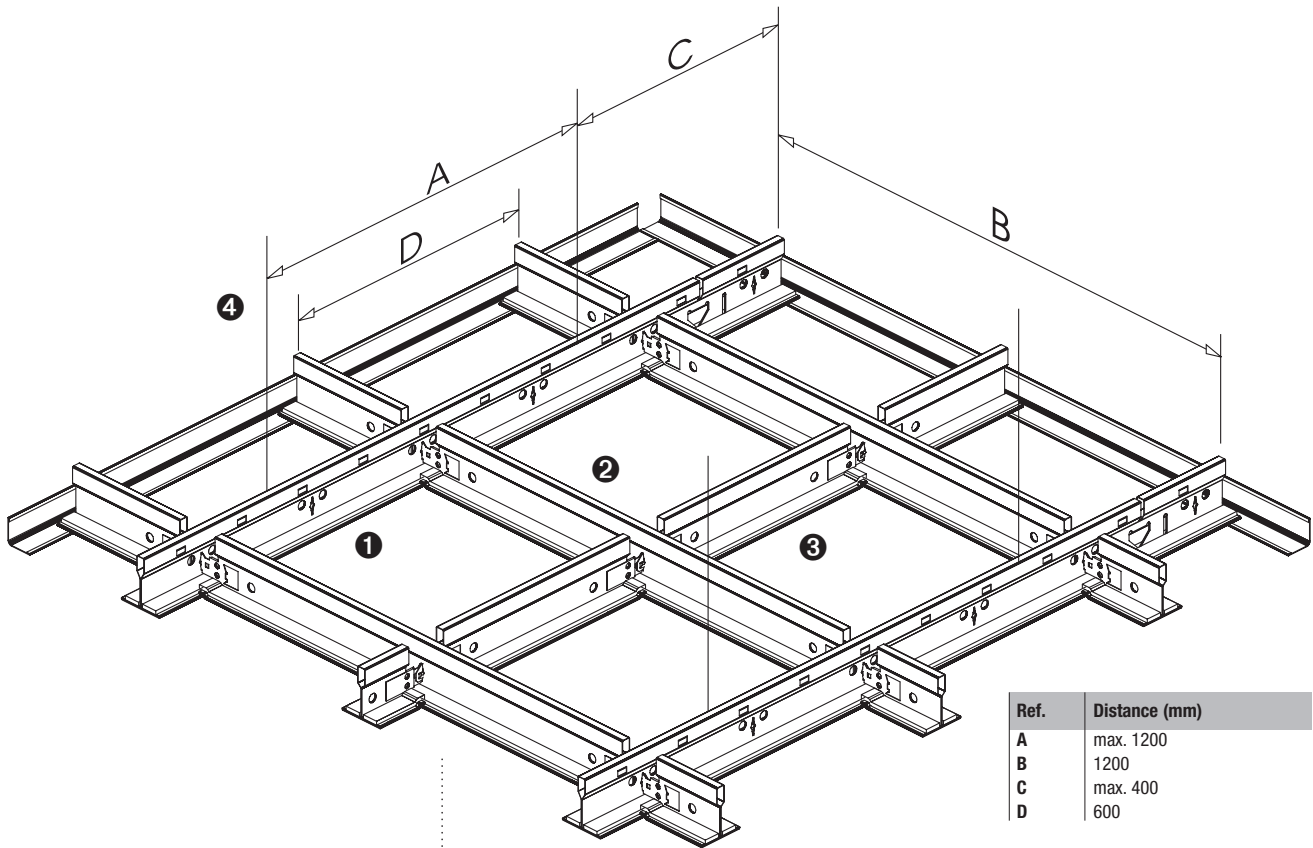
Hold down clip V17 corrosion protected



V17 hold down clip application.

DONN[®] DX CE

Controlled environment



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

System characteristics:

- Exposed 35mm system
- Factory applied sealing gasket to provide dust seal for installed ceiling
- Suitable for cleanroom Federal Spec. 209E class applications up to class 100 (when used with appropriate tile)
- Wide profile for use with insulation lining panels and large module ceiling tiles
- Cross-tees with override-ends resist twisting and give professionally finished look with no exposed steel edges
- Patented QUICK-RELEASE™ cross tees: easy to remove without tools
- Fast installation
- Joggled (overriding) ends ensure no exposed metal edges
- High gloss anti-static paint finish for ease of cleaning
- Colour options available to special order

Material needed for DX CE grid construction (per m² ceiling)

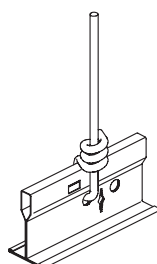
Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
①	Main Runner	DX35XH370W-CE	0.83 lin m	0.83 lin m
②	1200 Cross Tee	DX35XH120W-CE	1.67 lin m	1.67 lin m
③	600 Cross Tee	DX35XH60W-CE	0.83 lin m	
④	Hanger	DSW2	0.70 pieces	0.70 pieces

BS EN 13964:2004

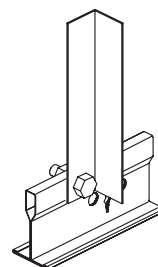
Reaction to fire: A2-s1,d0

Corrosion class: Class B

For further information on EN 13964, see page 39.

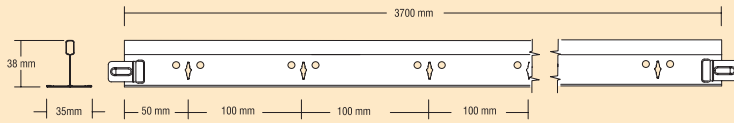


DX CE / Suspension wire - DSW2

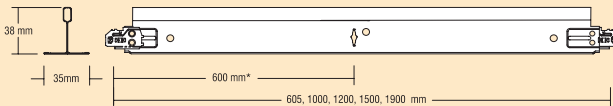


DX CE / Angle section - DGA5

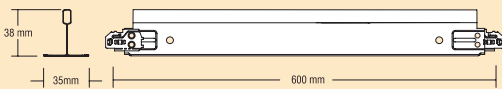
Main Runner DX35XH370W-CE



Long Cross Tee DX35XH120W-CE



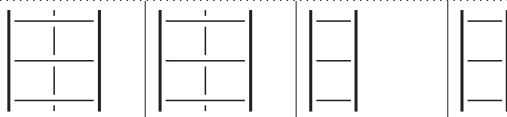
Short Cross Tee DX35XH60W-CE



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	29.0	29.5	-	-
1000	29.0	29.5	61.3	61.8
1200	13.6	13.9	28.7	29.1
1500	4.5	4.9	10.7	11.1

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Please consult USG for other layouts, load or hanger distance.

Specification DONN DX CE

Grid shall be DONN DX35CE controlled environment exposed grid system, hot dipped galvanised steel 'T' section with pre painted capping. Table width 35mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

38 x 35mm, ref DX35XH370-CE shall be normally spaced at 1200mm centres and suspended from the structure or soffit using pre-straightened 2mm diameter HDG steel wire hangers, ref DSW2, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area. Both flanges of the main runner will have factory applied 3mm thick foam strips to provide a flexible seal between flange and tile.

Cross tees:

1200mm cross tees, 38 x 35mm ref DX35XH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 38 x 35mm ref DX35XH60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail. Both flanges of all cross tees will have factory applied 3mm thick foam strips to provide a flexible seal between flange and tile.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings appropriate the structure at maximum 450mm centres. Corners shall normally be finished with a butt joint. The horizontal flange of the trim will have factory applied 3mm thick foam strip to provide a flexible seal between flange and tile.

Hangers:

Shall be from pre straightened 2mm diameter HDG steel wire, ref DSW2. Hangers shall be fixed through holes in stalk or bulb of main runner and wrapped around itself a minimum of 3 times. Alternatively, hangers can be formed from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

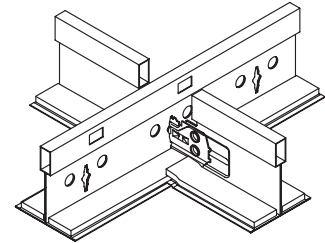
The use of clips is essential to ensure a seal of tile to grid. These shall be non-removable type clips, ref VB45. These should be applied to all grid members, at a rate of 1 clip per 600mm of tile edge.

Tile edge supported



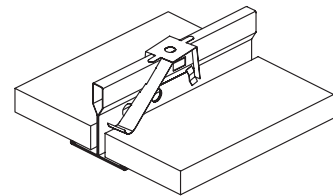
DX35CE / SQ

Cross section



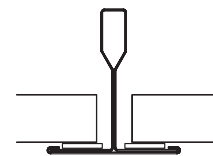
Main tee and cross tee connection showing factory applied sealing gasket.

DX35CE / VB45



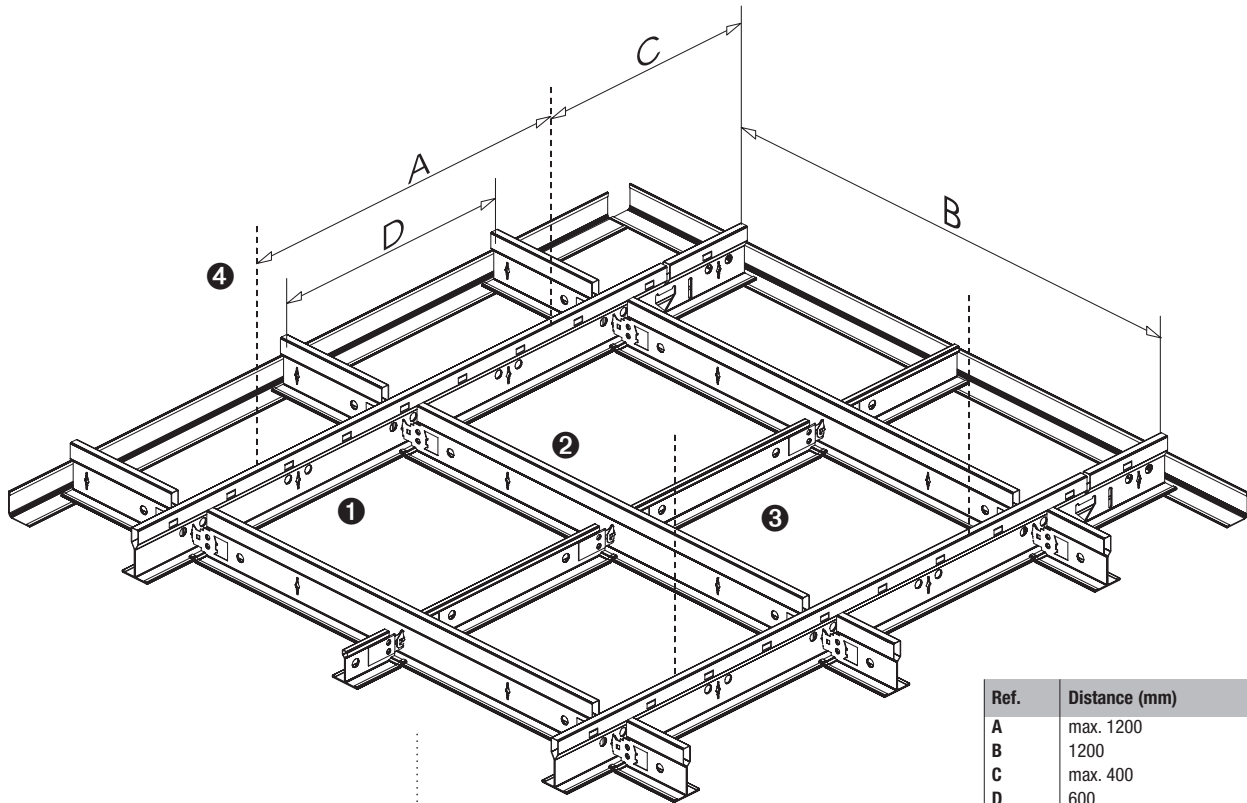
VB45 hold down clip - required application.

Integral gasket



Tile and grid form a dust and particle seal for clean environments.

DONN[®] DX Seismic



Ref.	Distance (mm)
A	max. 1200
B	1200
C	max. 400
D	600

System characteristics:

- Exposed 24mm system
- Standard DX system installed with special bracing
- Patented QUICK-RELEASE™ Clip provides superior pull out strength of 180kg
- Unique capability to resist seismic damage and maintain ceiling integrity
- Tested to meet ASTM seismic resistance standards
- Comprehensive design and installation recommendations are available from USG Technical Services

Material needed for DX24 grid construction (per m² ceiling)

Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
1	Main Runner	DX24XH370	0.83 lin m	0.83 lin m
2	1200 Cross Tee	DX24TH120	1.67 lin m	1.67 lin m
3	600 Cross Tee	DX24TS60	0.83 lin m	
4	Hanger	DSW2	0.70 pieces	0.70 pieces

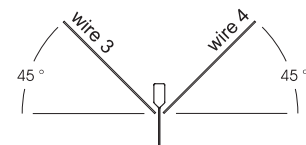
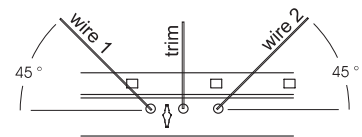
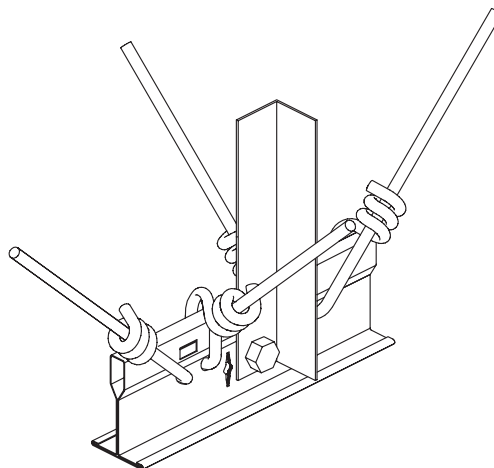


BS EN 13964:2004

Reaction to fire: A2-s1,d0

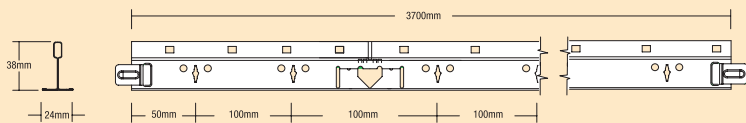
Corrosion class: Class B

For further information on EN 13964, see page 39.

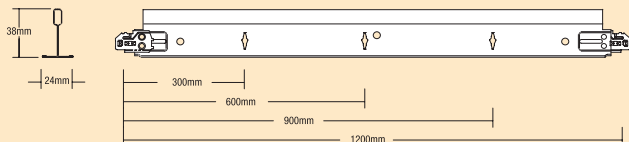


DX24 - example of seismic bracing

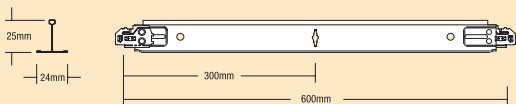
Main Runner DX24XH370



Long Cross Tee DX24TH120



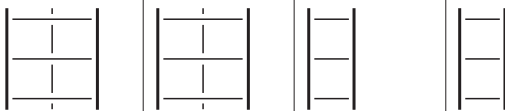
Short Cross Tee DX24TS60



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
800	23.7	23.9	-	-
1000	23.7	23.9	55.9	56.3
1200	12.8	12.9	26.3	26.6
1500	4.6	4.8	10.0	10.3

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Please consult USG for other layouts, load or hanger distance.

Specification DONN Seismic

Grid shall be DONN DX24 exposed grid system, hot dipped galvanised steel 'T' section with pre painted capping. Table width 24mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runner:

38 x 24mm, ref DX24XH370 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using HDG steel angle section, ref AGA5, at typically 1200mm centres. First hanger shall be no more than 200mm from the perimeter or any other abutment or column. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 24mm ref DX24TH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 25 x 24mm ref DX24TS60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

Hangers:

Shall be from 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit. In addition, bracing and struts will be installed as appropriate in accordance with local building regulations and codes.

Hold down clips:

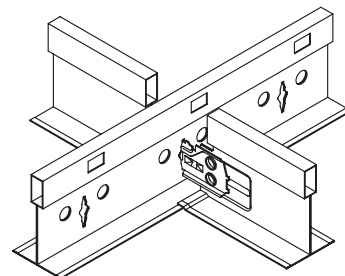
All panels must be clipped to prevent danger of dislodged tiles in the event of an earthquake or tremor. These shall be non-removable type clips, ref VB45. These should be applied to all grid members at a rate of 1 clip per 600mm of tile edge.

Tile edge supported



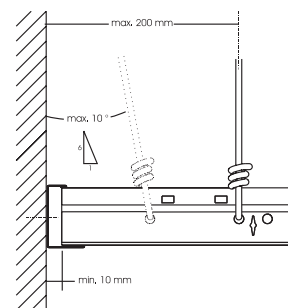
DX24 / SQ DX24 / SLT DX24 / SLB

Cross section

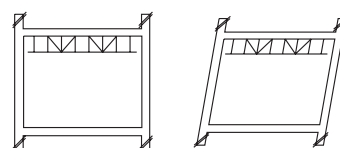


Main tee and cross tee connection.

Wall bracing

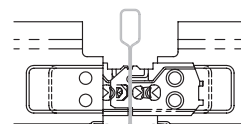


Effect of ceiling bracing



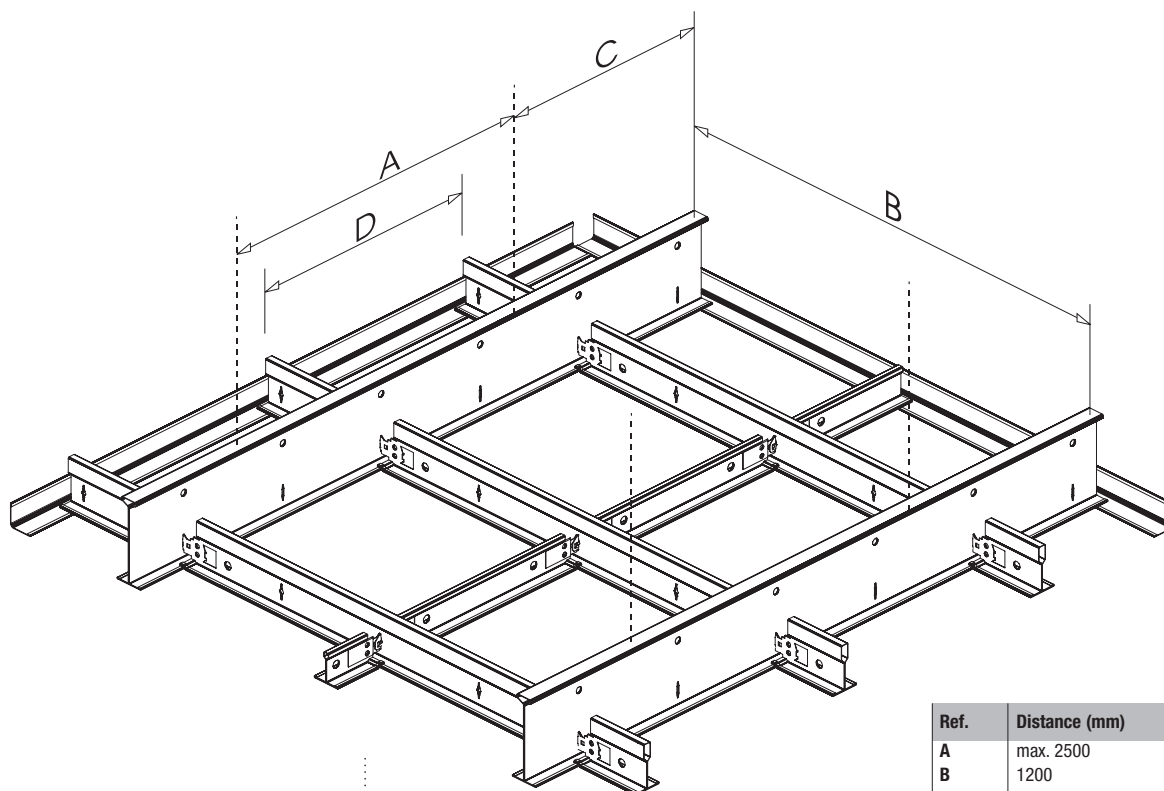
Securing the ceiling in the event of structural movement due to seismic activity.

Clip to clip security



Clip to clip connection.

DONN[®] DX Espace



Ref.	Distance (mm)
A	max. 2500
B	1200
C	400 (typical)
D	600

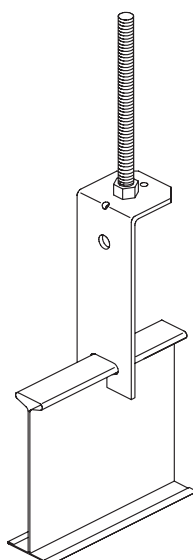
System characteristics:

- Exposed 24mm system
- 70mm high main runners enable high loading capacities for the system
- Less hangers needed for standard modules
- Span up to 2.5 metres between hangers
- Special main tee splice allows easy extension of the system
- Full compatibility with standard DX cross tees
- 35mm wide option available to special order

Material needed for DX Espace grid construction (per m² ceiling)

Nr	Description	Item reference	Module	
			600 x 600	600 x 1200
1	Main Runner	DXE24360W	0.83 lin m	0.83 lin m
2	1200 Cross Tee	DX24TH120W	1.67 lin m	1.67 lin m
3	600 Cross Tee	DX24TS60W	0.83 lin m	
4	Hanger	PSS1	0.35 pieces*	0.35 pieces*

*Based upon hanger spacing at 2400mm.

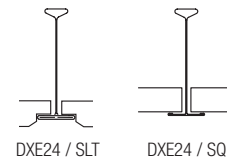


DXE / PSS1

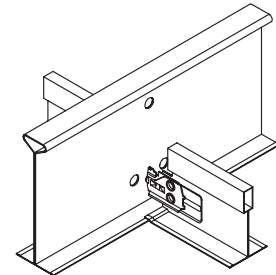
BS EN 13964:2004
Reaction to fire: A2-s1,d0
Corrosion class: Class B
For further information on EN 13964, see page 39.



Tile edge supported



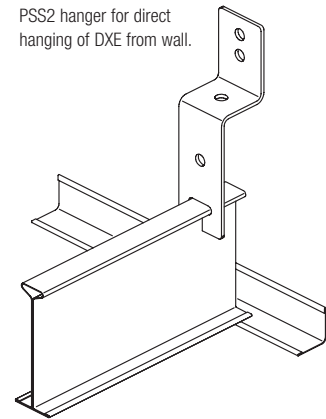
Cross section



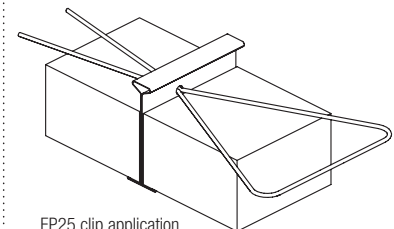
Main tee and cross tee connection.

DXE24/PSS2

PSS2 hanger for direct hanging of DXE from wall.

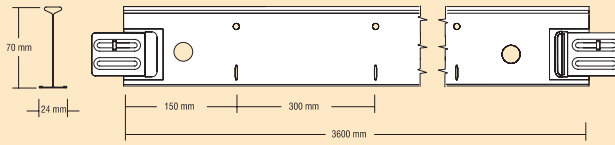


DXE24/EP25

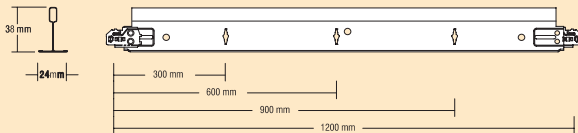


EP25 clip application for insulation overlay.

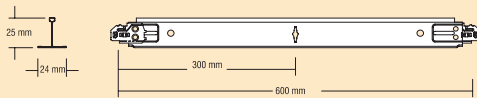
Main Runner DXE24360W



Long Cross Tee DX24TH120W



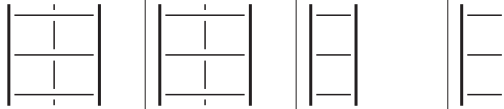
Short Cross Tee DX24TS60W



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger distance (mm)	Module			
	Main runner at 1200mm		Main runner at 600mm	
	600 x 600	600 x 1200	600 x 600	600 x 1200
1500	23.8	24	-	-
1800	22.5	22.6	45.7	46.0
2100	11.5	11.6	23.8	24.0
2400	6.2	6.3	13.1	13.4

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Please consult USG for other layouts, load or hanger distance.

Specification DONN DX Espace

Grid shall be DONN DX Espace exposed grid system for long span applications. Hot dipped galvanised steel 'T' section with pre painted capping. Table width 24mm. To suit variable module sizes, most typically 600 x 600mm and 1200 x 600mm.

Main runners:

70 x 24mm, ref DXE24360W shall be normally spaced at 1200mm centres and suspended from the structure or soffit using 25 x 25mm HDG steel angle section, ref DGA5, fixed to a proprietary hanger ref PSS-1 slotted onto the main runner bulb. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 24mm ref DX24TH120, shall be installed perpendicular between the main runners at 600mm centres to form a 1200 x 600mm module. If applicable, 600mm cross tees, 25 x 24mm ref DX24TS60, shall be installed perpendicular between the 1200mm cross tees to form a 600 x 600mm module. All cross tees feature a 'joggled' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

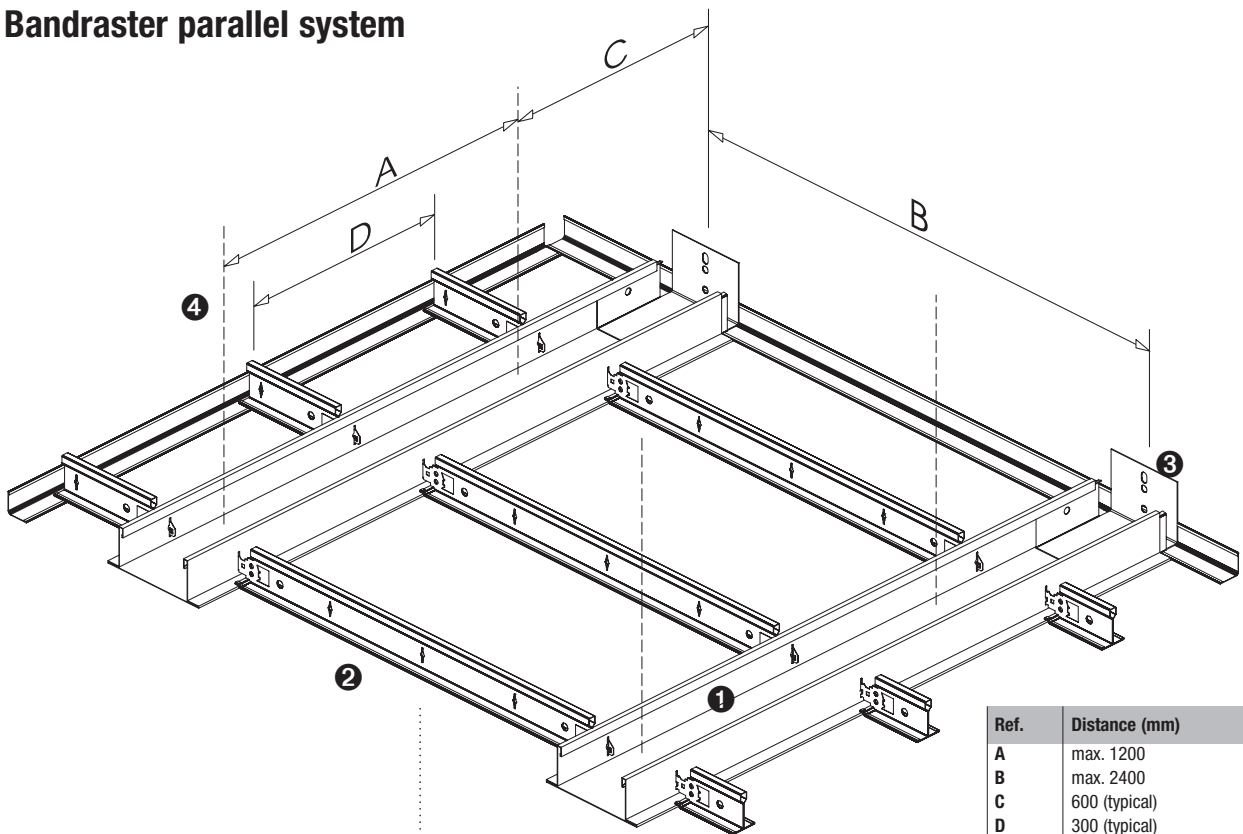
Hangers:

Shall be from 25 x 25mm HDG steel angle section, ref DGA5, fixed to a proprietary hanger ref PSS-1 slotted onto the main runner bulb. Hangers can be spaced up to 2400mm apart provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

Hold down clips:

Where applicable, these shall be non removable type clips, ref VB45, fitted with cross tees only. These generally will only be required where there is a risk of tile uplift. Where fitted, these should be applied to cross tees only at a rate of 1 clip per 600mm of tile edge.

Bandraster parallel system



Ref.	Distance (mm)
A	max. 1200
B	max. 2400
C	600 (typical)
D	300 (typical)

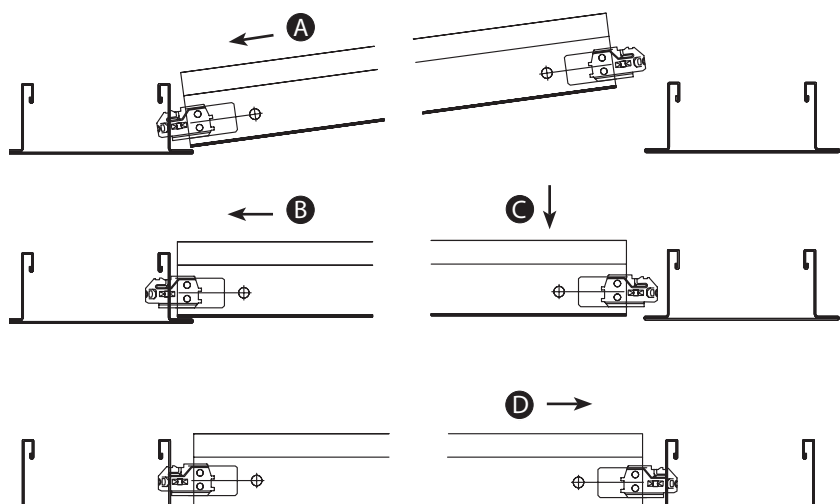
System characteristics:

- Variable design system: free choice of module
- Offers great flexibility in creating rooms with partitions
- Available in different widths: 50, 75, 100, 125 and 150mm
- Strong module visibility due to profile width
- Exposed and semi-concealed installation possible
- Linear and perpendicular installation possible
- Special punches in Bandraster profiles allow quick and easy connection with DX cross tees
- All connection accessories available for all widths
- Allows an easy set-up of cable support and moveable partitions
- Ideal for large module or corridor applications
- Compatible with the standard grid system DONN DX24

Material needed for DP construction (per m² ceiling)

Nr	Description	Item reference	Module 1800 x 300
1	Main Runner	DP-100-60	0.56m
2	Cross Runner	DX24TH	3.18 m
3	Wall Connector	P-313	ca. 0.18 pieces
4	Hanger	P-18	0.70 pieces
	Splice	P-31	0.16 pieces

Installation steps



BS EN 13964:2004

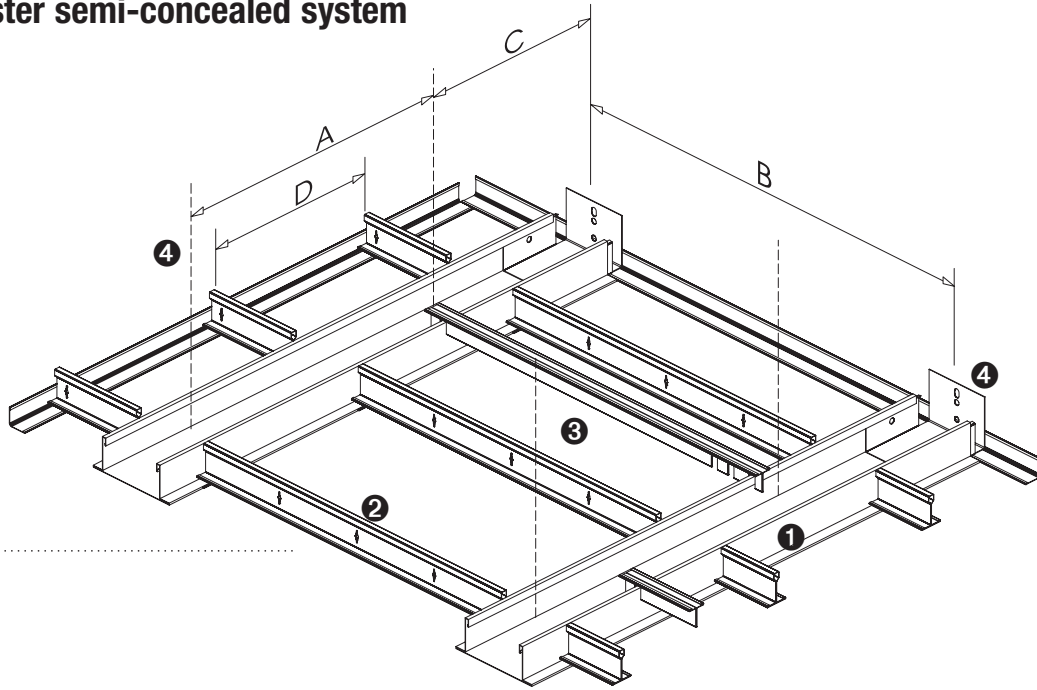
Reaction to fire: A2-s1,d0

Corrosion class: Class B

For further information on EN 13964, see page 39.



Bandraster semi-concealed system



Material needed for DP construction (per m² ceiling)

Nr	Description	Item reference	Module 1800x300
1	Main Runner	DP-100-60	0.56m
2	Cross Runner	VM-DX* VA/L**	3.18 m 6.37 m
3	Spacer Bar	DM	0.53 m
4	Wall Connector	P-313	ca. 0.18 pieces
5	Hanger	P-18	0.70 pieces
	Splice	P-31	0.16 pieces

* For edge detail Besk/SQ ** For edge detail Shiplap/SQ

Ref.	Distance (mm)
A	max. 1200
B	max. 2400
C	600 (typical)
D	300 (typical)

Specification DONN DP (parallel system)

Grid shall be DONN DP Bandraster exposed grid system, pre painted hot dipped galvanised steel 'omega' section. Table width from 50 to 150mm in 25mm increments. To suit variable module sizes. Specification written to suit DP100 100mm wide bandraster section.

Main runners:

35 x 100mm, ref DP100 shall be normally spaced at 1800mm centres and suspended from the structure or soffit using 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using proprietary hanger bracket ref P18, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of a splice plate ref P31. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1800mm cross tees, 38 x 24mm ref DX24XH180, shall be installed perpendicular between the main runners at 300mm centres to form a 1800 x 300mm module. All cross tees feature a 'joggled' end detail.

Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings appropriate

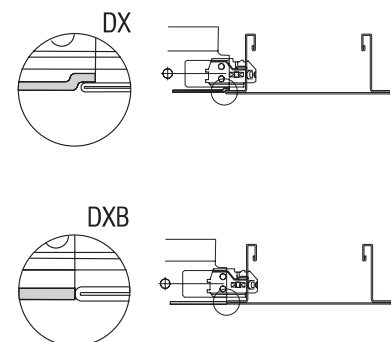
to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joint.

Hangers:

Shall be from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using proprietary hanger bracket ref P18 fixed with appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

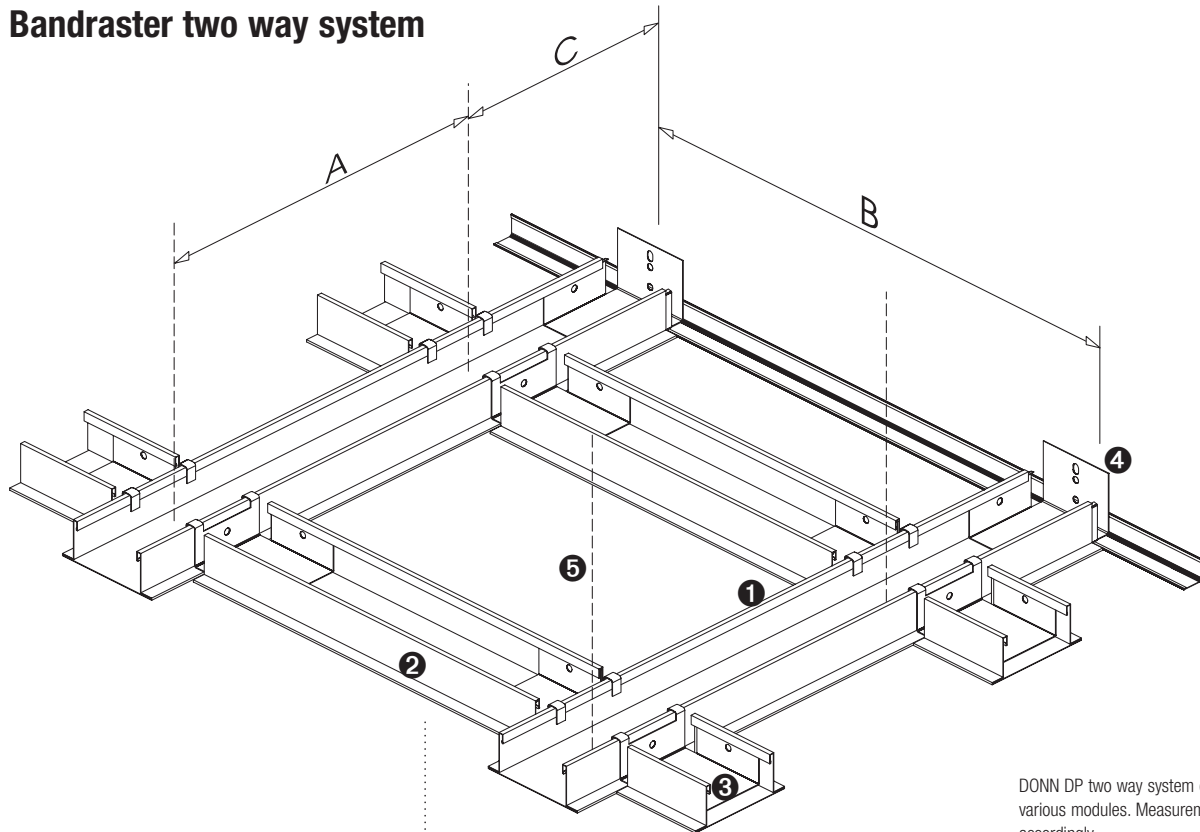
Hold down clips:

Where applicable, these shall be non-removable type clips, ref VB45. These generally will only be required where there is a risk of tile uplift. Where fitted, these should be applied to cross tees only at a rate of 1 clip per 600mm of tile edge.

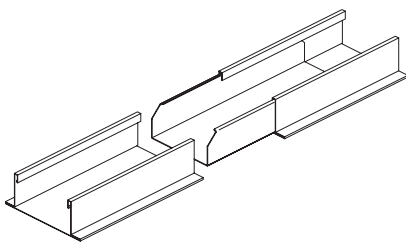


Comparison DX and DXB

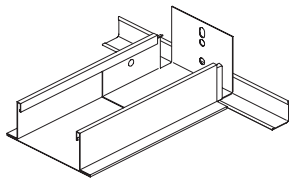
Bandraster two way system



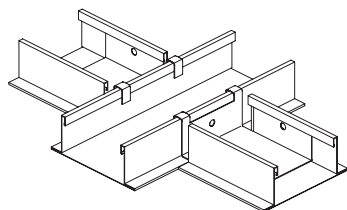
DONN DP two way system comprises various modules. Measurements vary accordingly.



Bandraster splice



Wall connector

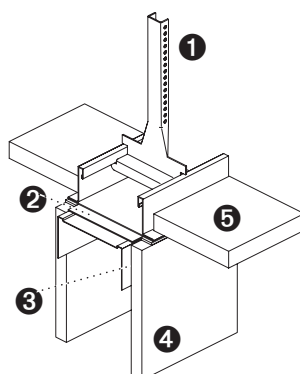


Cross connector

Material needed for DP construction (per m² ceiling)

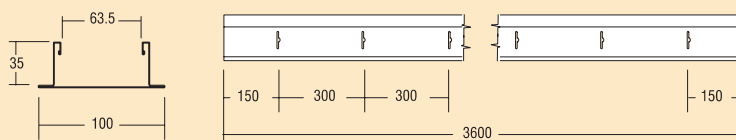
Nr	Description	Item reference	Module 1200x1200
1	Main Runner	DP-100-60	0.83
2	Cross Runner	DP-100-60	0.76
3	Cross Connector	P-813	1.40 pieces
4	Wall Connector	P-313	approx. 0.35 pieces
5	Hanger	P-18	0.70 pieces

Partition wall application



Nr	Description
1	Hanger
2	Acoustical seal
3	Partition top track
4	Wall panel
5	Ceiling tile

DP-100 (pre-punched module 300)



DP Accessories

DP-Profile	Accessories				
	DP-50-60	P-11	P-311	P-811	P-12
	DP-75-60	P-21	P-312	P-812	P-14
	DP-100-60	P-31	P-313	P-813	P-18
	DP-125-75	P-41	P-314	P-814	P-22
	DP-150-75	P-51	P-315	P-815	P-24

Maximum allowed weight of tiles per m² of ceiling

▼ DP types	Module			
	Equal main runner o.c. and cross tee o.c.		Equal main runner o.c. and cross tee o.c.	
	900 x 900	1200 x 1200	1500 x 1500	1800 x 1800
DP50	48.4	36.0	12.3	4.6
DP75	53.0	39.1	14.0	5.2
DP100	59.0	43.2	16.2	5.9
DP125	87.4	63.5	25.1	9.2
DP150	-	68.0	28.3	10.2

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch.



Hangers 1200mm o.c. on main runners only. Please consult USG for other layouts, load or hanger distance.

Specification DONN DP (two way system)

Grid shall be DONN DP Bandrastrer exposed grid system, pre painted hot dipped galvanised steel 'omega' section. Table width from 50 to 150mm in 25mm increments. To suit variable module sizes. Specification written to suit DP100 100mm wide bandrastrer section.

Main runner:

35 x 100mm, ref DP100 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using proprietary hanger bracket ref P18, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of a splice plate ref P31. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross runners:

1150mm (nominal 1200mm) long cross runners, 35 x 100mm, ref DP100, shall be installed perpendicular between the main runners at 1200mm centres to form a 1200 x 1200mm (nominal) module.

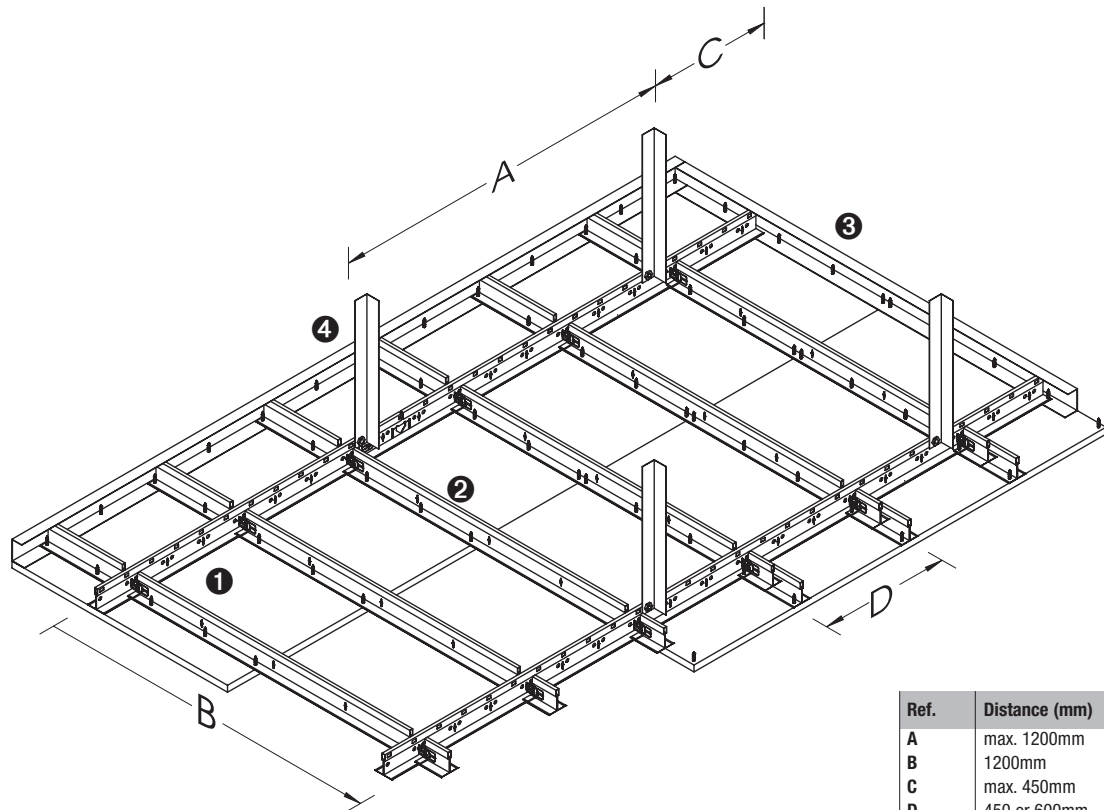
Perimeter trims:

29mm x 19mm painted HDG steel angle trim, ref MI 2919, fixed to perimeter wall using fixings appropriate to the structure at maximum 450mm centres. Corners shall normally be finished with a lapped or butt joints.

Hangers:

Shall be from 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using proprietary hanger bracket ref P18 fixed with appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

DONN® DX Screw Fix



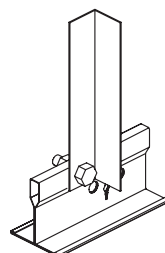
Ref.	Distance (mm)
A	max. 1200mm
B	1200mm
C	max. 450mm
D	450 or 600mm

System characteristics:

- Fast and simple to install – up to 50% faster when compared to conventional gypsum ceiling suspension systems
- Pre-indexed hole locations on main tees reducing measuring, aligning and squaring time
- Pre-engineered splice – eliminating overlap waste and connection time
- Patented QUICK-RELEASE™ clip design: easy to remove without tools
- Knurled face on DX components – easier screw attachment
- System flexibility – easy transitions from soffits, flat and curved surfaces Easy transitions to acoustical ceilings and USG speciality range, Curvatura, Compásso
- Designed for fire rated ceilings - contact USG Technical dept for further details
- Multi transitional features including borders to acoustical ceilings, boxed soffits, upstands etc.
- See DONN DXSF technical brochure for details

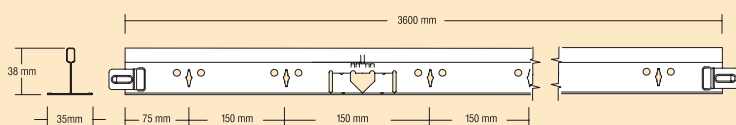
Material needed for DONN DXSF Screw Fix grid construction (per m² ceiling)

Nr	Description	Item reference	Module	
			1800 x 900mm	2400 x 1200mm
1	Main Runner	DXSF360	0.833 lin m	0.833 lin m
2	1200 Cross Tee	DXSF120	2.23 lin m	1.66 lin m
3	Perimeter Channel	DCSF41X30X19		
4	Rigid Hanger	DGA5	0.694 no	0.694 no

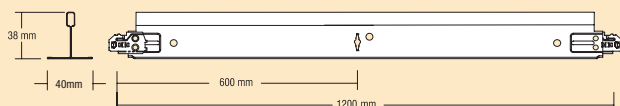


DX35 / Angle section - DGA5

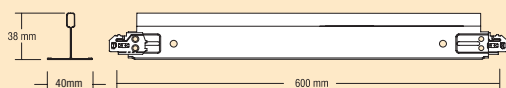
Main Runner DXSF360



Long Cross Tee DXSF120



Short Cross Tee DXSF60 (where applicable)



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger dist (mm)	Module			
	Main runner 1200		Main runner 600	
	1800 x 900	2400 x 1200	1800 x 900	2400 x 1200
800	36.2	36.93	-	-
1000	36.2	36.93	-	-
1200	19.46	19.85	38.91	39.7
1500	7.01	7.15	14.01	14.3

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch. Maximum loads above have been determined by calculation.

Specification DONN DXSF

Grid shall be DONN DXSF Screw Fix concealed grid system for fixing of gypsum and other boards. Hot dipped galvanised steel 'T' section with knurled hot dipped galvanised steel capping for easier screw attachment. Table width 35mm. To suit variable module sizes, most typically accommodating board sizes 1800 x 900mm and 2400 x 1200mm.

Main runners:

38 x 35mm, ref DXSF360 shall be normally spaced at 1200mm centres and suspended from the structure or soffit using 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 40mm ref DXSF120, shall be installed perpendicular between the main runners at either 450mm or 600mm centres dependant upon the board size being used. All cross tees feature a 'joggled' end detail.

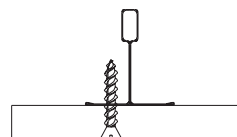
Perimeter trims:

41 x 30 x 19mm knurled hot dipped galvanised steel channel trim ref DCSF41X30X19, fixed to perimeter wall using fixings appropriate to the structure at maximum 450mm centres. Cut ends of main runner or cross tees will fit into the web of the channel to be held secure when fixing boards up to the grid.

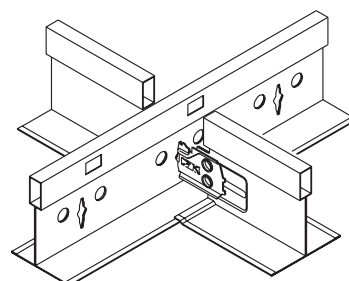
Hangers:

Shall be 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

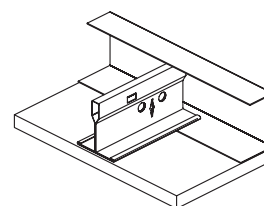
Tile edge supported



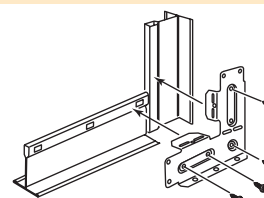
Cross section



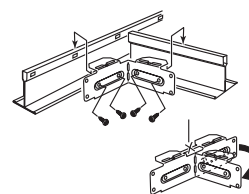
Screw Fix perimeter channel



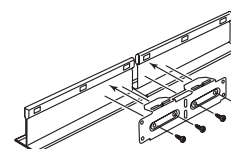
Uprand detail using DGTC-90



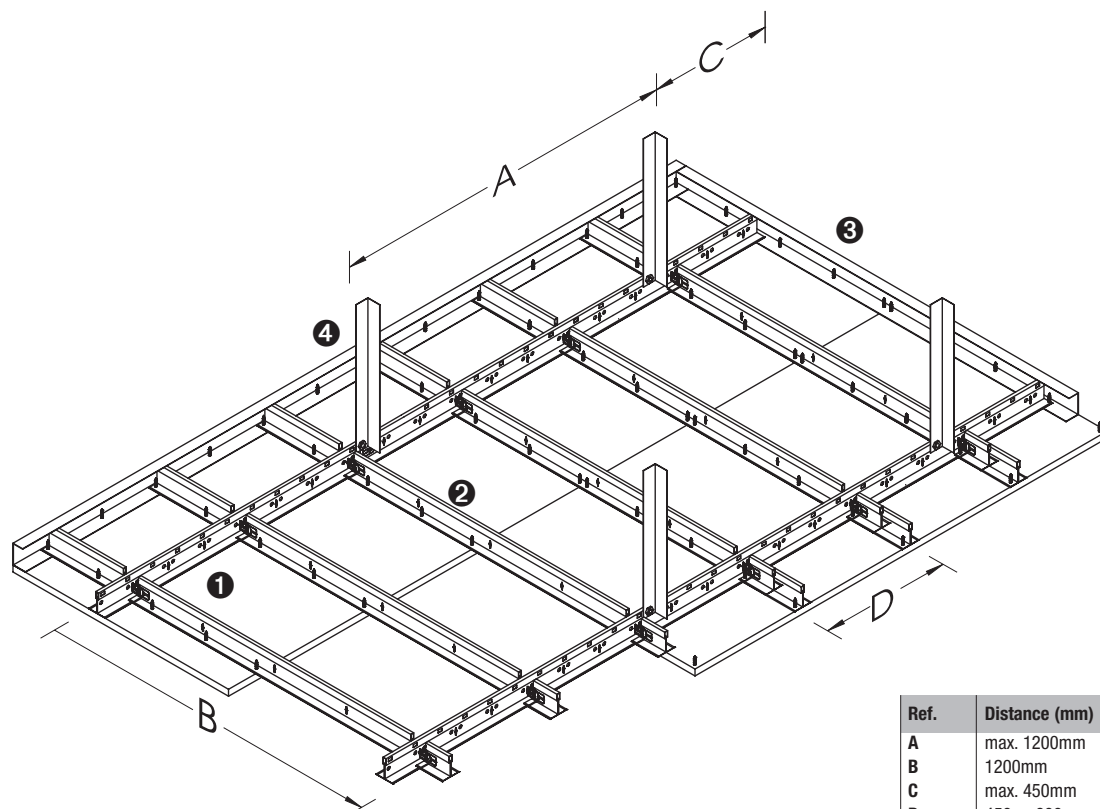
Junction detail using DGSC-180



Splice detail using DGSC-180



DONN[®] DX Rapid Fix



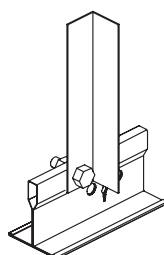
Ref.	Distance (mm)
A	max. 1200mm
B	1200mm
C	max. 450mm
D	450 or 600mm

System characteristics:

- Fast and simple to install – up to 50% faster when compared to conventional gypsum ceiling suspension systems
- Pre-indexed hole locations on main tees reducing measuring, aligning and squaring time
- Pre-engineered splice – eliminating overlap waste and connection time
- Patented QUICK-RELEASE™ clip design: easy to remove without tools
- Knurled face on DX components – easier screw attachment
- System flexibility – easy transitions from soffits, flat and curved surfaces Easy transitions to acoustical ceilings and USG speciality range, Curvatura, Compàsso
- Multi transitional features including borders to acoustical ceilings, boxed soffits, upstands etc.
- See DONN DXSF technical brochure for details

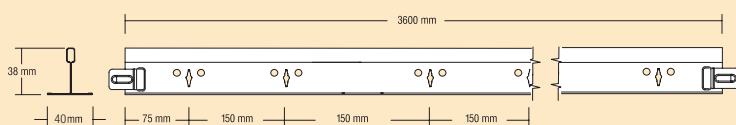
Material needed for DONN DXSF Screw Fix grid construction (per m² ceiling)

Nr	Description	Item reference	Module	
			1800 x 900mm	2400 x 1200mm
1	Main Runner	DXSF40X H360 X	0.833 lin m	0.833 lin m
2	1200 Cross Tee	DXSF120	2.23 lin m	1.66 lin m
3	Perimeter Channel	DCSF41X30X19		
4	Rigid Hanger	DGA5	0.694 no	0.694 no

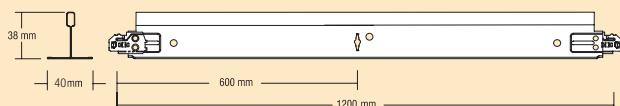


DX35 / Angle section - DGA5

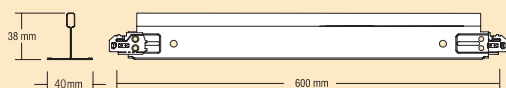
Main Runner DXSF40X H360 X



Long Cross Tee DXSF120



Short Cross Tee DXSF60 (where applicable)



Maximum allowed weight of tiles per m² of ceiling

▼ Hanger dist (mm)	Module			
	Main runner 1200		Main runner 600	
	1800 x 900	2400 x 1200	1800 x 900	2400 x 1200
1000	27.5	28.0	-	-
1200	14.7	15.0	29.5	30.1
1500	-	7.15	10.6	10.8

Note: The load per m² must be distributed uniformly (no point loads) over the ceiling area. After loading, the deflection of any grid component will remain within the maximum deflection per span as stated in BS: 8290: 1991, provided the grid layout is as presented in the sketch. Maximum loads above have been determined by calculation.

Specification DONN DX Rapid Fix

Grid shall be DONN DX Rapid Fix concealed grid system for fixing of gypsum and other boards. Hot dipped galvanised steel 'T' section with knurled hot dipped galvanised steel capping for easier screw attachment. Table width 40mm. To suit variable module sizes, most typically accommodating board sizes 1800 x 900mm and 2400 x 1200mm.

Main runners:

38 x 40mm, ref DXSF40X H360 X shall be normally spaced at 1200mm centres and suspended from the structure or soffit using 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings, at typically 1200mm centres. First hanger shall be no more than 450mm from the perimeter. Main runners joined end on by means of the integral splice. Splice connections shall be supported within 150mm with a hanger, and shall be staggered across the ceiling area.

Cross tees:

1200mm cross tees, 38 x 40mm ref DXSF120, shall be installed perpendicular between the main runners at either 450mm or 600mm centres dependant upon the board size being used. All cross tees feature a 'joggled' end detail.

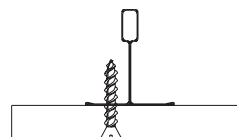
Perimeter trims:

41 x 30 x 19mm hot dipped galvanised steel channel trim ref DCSF41X30X19, fixed to perimeter wall using fixings appropriate to the structure at maximum 450mm centres. Cut ends of main runner or cross tees will fit into the web of the channel to be held secure when fixing boards up to the grid.

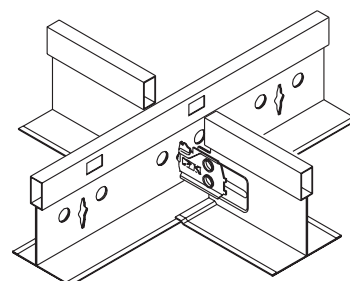
Hangers:

Shall be 25 x 25mm HDG steel angle section, ref DGA5, fixed to main runners using appropriate self drilling screws or nut and bolt fixings. Hangers shall be normally spaced at 1200mm centres although alternative spacings are acceptable provided maximum loadings stated above are not exceeded. Hangers to be fixed to structure or soffit using fixings appropriate to the structure or soffit.

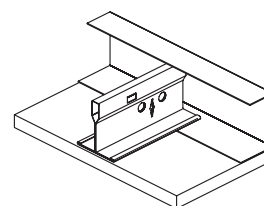
Tile edge supported



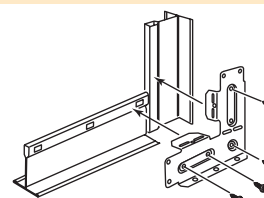
Cross section



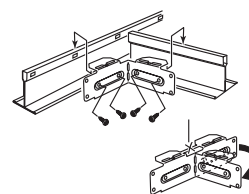
Screw Fix perimeter channel



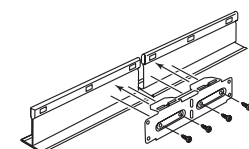
Uprand detail using DGTC-90



Junction detail using DGSC-180

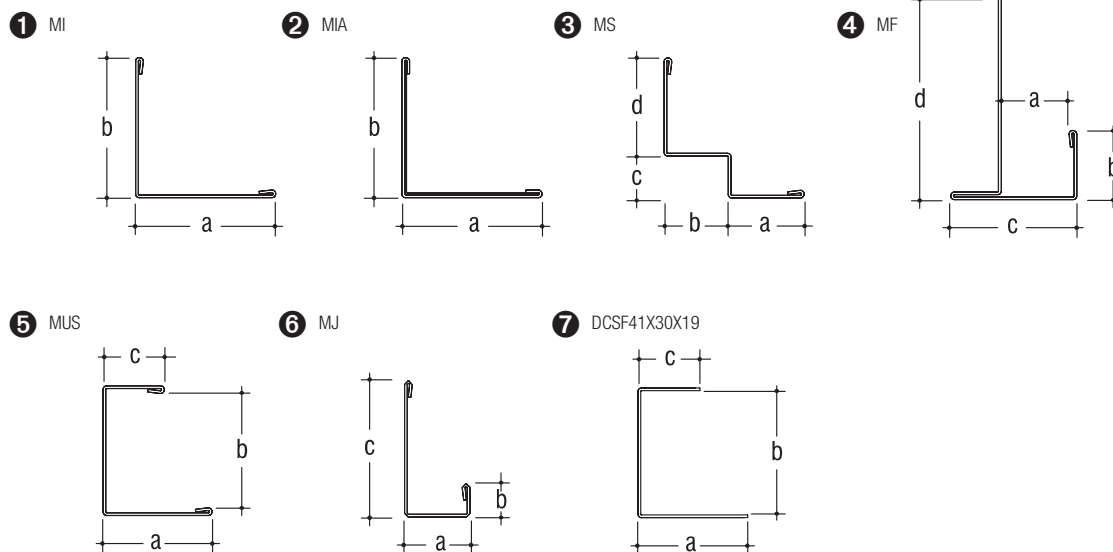


Splice detail using DGSC-180



System components - perimeter trims

Perimeter options



Dimensions in mm

Type	Item Ref	a	b	c	d	Thickness	Length	Colour*
1	MI1919	19	19	-	-	0.6	3000	Y
1	MI2020	20	20	-	-	0.5	3000	P
1	MI2919	29	19	-	-	0.6	3000	W, P, Y
1	MI5025	50	25	-	-	0.7	3000	W, Y
2	MIA3219	32	19	-	-	0.6	3000	L, A, M, Q, WK
3	MS11	19	9	9	19	0.6	3000	W, Y
3	MS12	20	12	20	20	0.7	3000	W
3	MS15	15	15	8	25	0.6	3000	Y
4	MF8	13	16	27	42	0.5	3000	W, Y
4	MF10	16	16	30	39	0.5	3000	W, Y
5	MUS22	38	19	19	-	0.5	3000	W, Y
5	MUS25	40	25	13	-	0.5	3000	Y
6	MJ14	14	7	29	-	0.5	3000	W, Y
7	DCSF41X30X19 ⁽¹⁾	30	41	19	-	0.5	3600	S

*Colour code: W = white; Y = 9010; A = aluminium; L = black; M = chrome; P = platinum; Q = bright gold; S = steel (no paint); WK = corrosion-protected.

⁽¹⁾ Measurements are nominal.

BS EN 13964:2004

Reaction to fire: A2-s1,d0

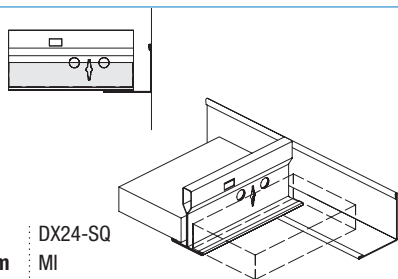
Corrosion class: Class B

For further information on EN 13964, see page 39.

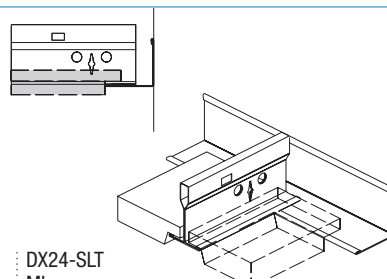


Perimeter application details

L-trim - typical applications of options ① ②

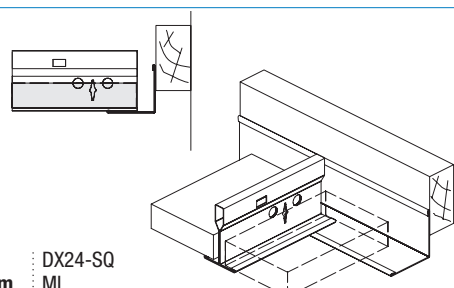


Grid-Edge DX24-SQ
Perimeter trim MI
Application L-trim Economic version
 Perimeter tile is square cut to sit into grid as per all other edges. L-trim Economic version before Perimeter

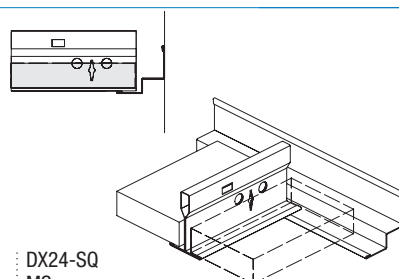


Grid-Edge DX24-SLT
Perimeter trim MI
Application L-trim Economic version
 Perimeter tile is cut with a rebated edge to offer full support on all 4 edges of the tile. Face of the tile will finish proud of the button face of the grid.

Shadowline trim - typical applications of option ③

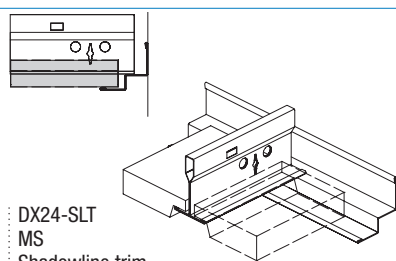


Grid-Edge DX24-SQ
Perimeter trim MI
Application L-trim Economic version
 Perimeter tile is square cut to sit into grid as per all other edges. Combination with a black painted wood lath. Look is nearly similar to a Shadowline trim.

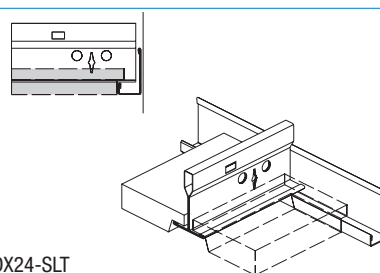


Grid-Edge DX24-SQ
Perimeter trim MS
Application Shadowline trim
 Perimeter tile is square cut to sit into grid as per all other edges. The grid and tile to be sited on the bottom flange of the Shadowline trim.

Shadowline trim - typical applications of option ④

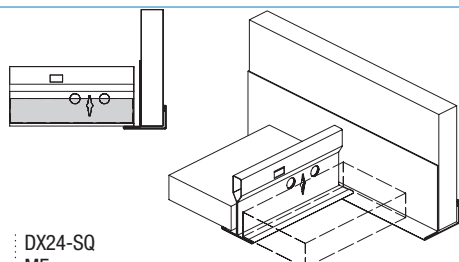


Grid-Edge DX24-SLT
Perimeter trim MS
Application Shadowline trim
 Perimeter tile is square cut. Cut edge to be sited on bottom flange of the Shadowline trim. Face of the tile will finish flush with the bottom face of the trim. The grid member will be sited on the upper horizontal flange of the Shadowline trim

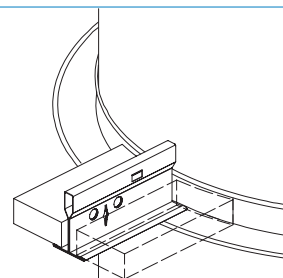


Grid-Edge DX24-SLT
Perimeter trim MJ
Application J-trim Economic version
 Perimeter tile is cut with a rebated edge as normal to offer a full support on all 4 edges. Face of the tile will finish level with the bottom face of the 'J' mould.

X-trim - typical applications of option ⑤



Grid-Edge DX24-SQ
Perimeter trim MF
Application Perimeter trim to create upstand trim section. Perimeter tile is square cut. Use plasterboard to do vertical ceiling. The grid and tile to be sited on the bottom flange of the trim.



Grid-Edge DX24-SQ
Perimeter trim Curved trim (not manufactured by USG)
Application Perimeter tile is square cut. The grid and tile to be sited on curved trim.

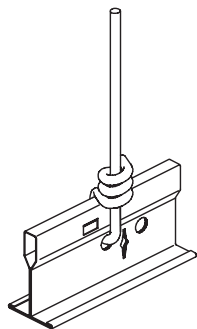
Application tips

- Perimeter trims must be fixed to the perimeter wall at max. 450mm centres.
- DX and tile must lay on 2/3 of perimeter trim
- Use thicker material (0.6mm to 1mm) if the wall is not levelled exactly.
- Use pan head screw to fix the perimeter trim - do not use gypsum screws.

System components - hanger options

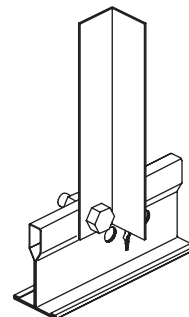
1 Type Suspension Wire

Item	DSW2
Combination with Profile	-
Other Profile	DX24
Dynamic load*	DX15, DX35, DX Finline
Min. Length**	250 N
	80mm



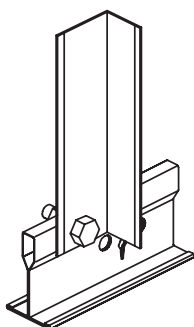
2 Type Galv. Angle section

Item	DGA5
Combination with Profile	M4 roofing quality nut and bolt
Other Profile	DX24
Dynamic load*	DX15, DX35, DX Finline
Min. Length**	150 N
	75mm



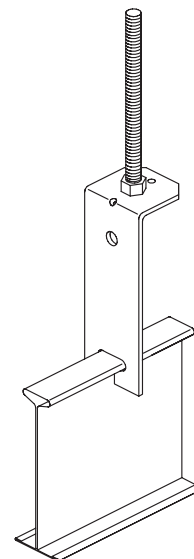
3 Type Angle section / corrosion protected

Item	MIA3219 WK
Combination with Profile	M4 roofing quality nut and bolt
Other Profile	DX WK
Dynamic load*	-
Min. Length**	150 N
	75mm



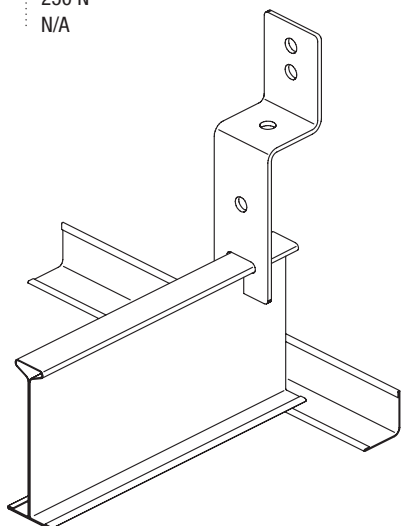
4 Type 90° hanger

Item	PSS-1
Combination with Profile	Threaded rod M6
Other profile	DX Espace
Dynamic load*	-
Min. length**	250 N
	200mm



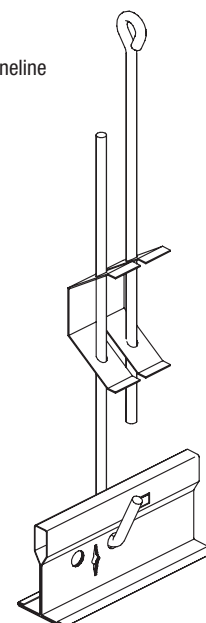
5 Type Wall suspension

Item	PSS-2
Profile	DX Espace
Other profile	-
Dynamic load*	250 N
Min. length**	N/A



6 Type Butterfly spring

Item	SA-50
Profile	DX24
Other profile	DX15, DX35, DX Finline
Dynamic load*	150 N
Min. length**	220mm



BS EN 13964:2004

European Standard for suspended ceilings



is the harmonised European standard applicable from 1st January 2005, which provides information for the parties responsible for designing, manufacturing and specifying/selecting suspended ceilings used for interior applications. It covers suspended ceilings sold as kits, individual components & membrane components and describes test methods & methods of assessment as well as provisions for the evaluation of conformity of the products to the requirements of this standard. It should be noted that the standard does not cover the following types of suspended ceiling:

- ceilings in mobile buildings
- caravans and other forms of transportation,
- ceilings with heating or cooling properties,
- ceilings subject to water penetration requirements,
- ceilings used externally where requirements other than covered by this scope would apply (tunnels, canopies, petrol stations, arcades, open sports facilities, car parks, etc.),
- heavy duty suspended ceilings or their supporting construction,
- ceilings formed in-situ with no prefabricated membrane (e.g. plastered ceilings).

The standard will in the main cover the following essential characteristics for most interior suspended ceilings. Those highlighted are directly relevant to the products in this publication:

- **reaction to fire**
- fire resistance (kits only)
- **release of asbestos**
- **release of formaldehyde**
- shatter properties (brittle materials only)
- **flexural tensile strength**
- load bearing capacity (grids)
- electrical safety
- sound insulation (kits only)
- **sound absorption**
- **thermal conductivity**
- condensation

Many of these performance characteristics have in the past been assumed or even deemed unnecessary, however under the banner of EN13964, manufacturers have to prove or justify the performance of the products. As a result we will have to become familiar with some new terminology in making reference to product performances. We will cover some of the main ones in the following section.

Performances and terminology

We have become very familiar with the existing terminology used to clarify test performance of ceiling products. Typical examples such as Class 1/0 to describe fire reaction performance, 90%RH @ 40°C for humidity resistance and αW 0.7 for sound absorption are in common use within our industry. The advent of EN 13964 means that some of these familiar expressions will disappear and a number of new ones will be introduced.

Some of these such as sound absorption and thermal conductivity remain the same. We will highlight the new requirements below with explanations as to what they mean.

Reaction to fire

Possibly the most complex change. The existing test procedure in the U.K. to determine fire reaction performances of ceiling linings is to test in accordance with British Standard BS 476: pt 7 and BS 476: pt 6. Under the requirements of BS EN 13964 we must now test in accordance with the requirements of EN 13501-1: 2002. Without overcomplicating this here with excessive detail, EN 13501-1 dictates which specific test options are available to achieve performance levels. For fire reaction of ceiling linings this is now to be expressed involving 3 distinct factors; Combustibility (Flame spread and propagation) expressed from A2 (best) to F; Smoke production expressed from s1 (best) to s3; and Burning Droplets expressed from d0 (best) to d2.

Where currently we are used to referring to Class 0, Class 1 etc, we must become familiar with the expressions *A2-s1, d0* or *B-s2, d3* for example. In simple terms, *A2* means the membrane component is of limited combustibility; *s1* means that smoke production is light and *d0* means that no burning droplets were released from the specimen. There is also a category *A1*, which basically means non combustible, similar to the current BS 476: pt 4, which does not require reference to smoke production or burning droplets.

The latest edition of Building Regulations Approved Document B (2006 Edition, Volumes 1 & 2) now includes these new performance requirements and illustrates a general comparison of performance requirements between current and new standards. Please refer to Building Regulations Approved Document B: Volume 1 - Section 3, Table 1; and Volume 2 - Section 6, Table 10.

Release of formaldehyde

Where Formaldehyde containing material is part of the formulation of a ceiling component this component must be tested to determine the level of formaldehyde likely to be released. This is to be tested and classified in accordance with ENV 717-1 & 717-2, and classified *E1* or *E2*. An *E1* classification means that formaldehyde release is either nil or negligible.

Release of asbestos

No part of a ceiling shall contain asbestos.

Sound absorption

No change. The absorption performance of USG Acoustical Ceiling products will be stated as before on the product page.

Thermal conductivity

No change. The Thermal Resistance (R-value) of USG Acoustical Ceiling products will be stated as before on the product page.

Flexural tensile strength

This new requirement effectively illustrates the ability of a membrane component to support its own mass when installed in the substructure (grid), under specific environmental conditions. It is intended to determine the aesthetic appearance of the membrane component in installation. This must be determined by testing in accordance with the procedures specified in EN 13964. The result of the test shall be declared as a classification of deflection (expressed from Class 1 [best] to Class 3) in combination with a classification of exposure (expressed as A [lowest] to D) and the applied load. The results are expressed as, for example, *Class 1/B/No load*, where *Class 1* means the deflection of the membrane component is no more than 1.2mm (based upon a 600mm edge); *B* indicates an environment of up to 90% RH @ 30°C; and *No Load* means no additional load was applied to the component in test.

Certificates of conformity

In respect of membrane components (ceiling tiles), USG engaged the services of Warrington Certification Ltd (EC Reference Number: 1121) to test, collate and present the test documentation, and produce a Certificate of Conformity to provide independent proof of the component compliance with the standard. Copies of these certificates are available from USG upon request.

CE Marking of suspended ceilings

Compliance with all the relevant requirements of BS EN 13964 allows a manufacturer to apply a CE mark symbol to his products. This will show that the product is approved and certified with the requirements of the applicable European Directive and is therefore legally able to be sold and marketed in those countries participating in the European Economic Area (EEA) agreement. The Construction Products Directive (CPD) relevant to Suspended Ceilings is Council Directive 89/106/CE. This identifies the requirements for suspended ceiling products upon which the new standard BS EN 13964 has been based.

Period of coexistence

BS EN 13964 was introduced and applicable from 1st January 2005. Originally a 12 month period of coexistence with existing local standards meant that BS EN 13964 was to become mandatory on 1st January 2006. It should be noted that EN 13964 is currently being discussed at European level with a view to making amendments to the standard. This will result in a revised standard and a guidance document being published at some point in the future. With this in mind, the European Commission Standing Committee on Construction has agreed to extend the coexistence period of EN 13964. At the time of publication, the date for the end of the coexistence period is 1st July 2007, at which point any Suspended Ceiling product placed into the European Economic area must be CE marked in accordance with EN 13964 Suspended Ceilings.

Frequently asked questions

1. Grid loads

1.1 What weight will the suspended ceiling grid carry?

Answer. This is dependent upon the spacing of hangers and main runners not to mention the actual grid system. For the most frequent suspension systems, main runner and hanger spacing, you will find the answer in the loading tables per system.

1.2 If loads are exceeded on a standard ceiling configuration how should the ceiling be installed?

Answer. The loading tables in the catalogue give both possibilities: either reducing the main runner spacing or reducing the spacing of the hangers. The lower the span between supports, the greater the load that the main runner can carry. If you can't find a solution in our loading tables, consult USG Technical Support.

1.3 What is the maximum weight for a light fitting to be used with our standard ceiling grid? Should extra hangers be used?

Answer. This is dependent upon other factors such as configuration of grid and type of tile being installed. As a measure of good practice, if in any doubt install additional hangers within 150mm of each corner of the light fitting. Alternatively suspend the light fitting independently.

2. Fire rated ceilings

2.1 Are hold-down clips required?

Answer. Hold-down clips are recommended for all fire rated ceiling installations. Whilst tests can and are passed without the use of clips, what can be achieved under laboratory conditions and what actually happens in a real fire are completely different. Hold-down clips will provide resistance to the air pressures that will be present in the event of a fire thus maintaining an unbroken membrane.

2.2 What is the recommended grid layout for a particular floor construction?

Answer. Ensure that a copy of the relevant fire test is obtained before proceeding with installation as each construction will differ based upon the grid, tile and structure in question.

2.3 What is the minimum void between structure and suspended ceiling?

Answer. The void depth is an important consideration in a fire rated ceiling and again reference must be made to the relevant test report prior to commencement of installation. For easy demountability of the ceiling tile we advise a minimum void depth of 170mm.

2.4 Can insulation be used on the back of a fire rated ceilings?

Answer. No. The use of insulation in an exposed grid fire rated ceiling will actually reduce rather than improve the performance. Insulation is a requirement in certain monolithic jointless ceiling installation types but is not required for exposed grid. Again refer to the relevant test report. If the report does not state the use of insulation then it should not be used.

2.5 How do you protect the ceiling when services are installed?

Answer. Light fittings and other services that cause a break in the integrity of the ceiling membrane must be protected to maintain the integrity. It is usual to provide some kind of a proprietary hood or box of some description to cover the services unit. These must be tested to the same standard and in a similar construction in order to be approved. If too many services are introduced into the ceiling system then it will become very difficult to maintain the integrity and other means of providing fire protection should be sought.

2.6 Can the USG DONN grid be used with a competitor's tile to achieve a certain fire rating?

Answer. Testing with competitors' products has confirmed that grid and tiles from different manufacturers can be mixed to provide a fire rated construction. This is generally termed 'Mix and Match'. Care must be taken however as 'Mix and Match' is largely theory based upon selected product tests. Usually it is not possible to provide specific fire test reports for the exact combination so it is vitally important that the relevant authority grants approval for the mix and match ceiling prior to installation. It may be necessary to obtain some kind of assessment from the fire test laboratory to confirm suitability of the mix and match combination but this must be done with the permission of both suppliers involved.

3. Acoustics, light and colour

3.1 What is the influence on absorption when I replace tiles by light fittings?

Answer. Assuming that the light fittings absorb nothing (worst case scenario), the absorption goes down with the percentage of the surface taken by the light fittings. Taking into account that lighting normally takes about 10% of the ceiling surface, the actual absorption will be reduced by less than 10%.

3.2 Although I bought grid and tiles in standard white, my ceiling seems to have another colour. How is this possible?

Answer. Most probably, the colour of the floor or walls is another colour than white. Especially when these colours are uniform, they will reflect on the white ceiling and give the impression that the ceiling is not white.

3.3 All products in the ceiling are the same colour - RAL9010? However, there are different white colours. How is this possible?

Answer. Obtaining exactly matching colours is very difficult. Therefore a standard deviation of approximately $\Delta E \leq 1$ is acceptable. In most colour ranges, this allowed deviation is smaller than the colour difference the human eye can notice. However in some ranges of white, the average human eye is very sensitive and will distinguish a colour difference of $\Delta E \approx 0.3$. Colour difference may also be influenced by gloss, by light reflection and/or by the basic material on which the paint or colour is applied.

3.4 What is the closest RAL colour to our standard white and what is the gloss level?

Answer. All DONN grid colours are unique and are not made to match specific RAL or other standard colours. Please contact USG Customer Services to confirm the closest match. For the standard DONN White colour, the closest RAL colour is RAL 9016.

4. Miscellaneous questions

4.1 What is the maximum suspension depth with galvanised wire?

Answer. This is dependent upon the ability of the fixer to pre-straighten the wire efficiently without causing undue stress in the steel. As a rule of thumb, 4-5m should be considered the maximum effective depth.

4.2 How should both the grid and tile be finished at the perimeter to suit certain edge details?

Answer. Please refer to the edge detail options shown in this brochure. There are many combinations and features that can be achieved using different materials and trims.

4.3 What is the maximum splay on 2mm galvanised wire supporting a suspended ceiling grid?

Answer. Hangers should, wherever possible, be maintained in a vertical position. If it is necessary to splay a hanger for any reason, this should be kept to a maximum of 15° from vertical and must always run in the direction of the main runner.

4.4 How can a cross tee be connected to the grid off module?

Answer. USG can supply a bracket ref. DB3 that can be used to connect tees off module. Details are available from Customer Services on request.

4.5 What are your recommendations for suspending a corrosion resistant ceiling?

Answer. Corrosion resistant grids must be suspended using the corrosion resistant perimeter trim as a rigid angle suspension. This is because the trim is treated with the same protection as the rest of the grid. All fixings should be roofing quality galvanised steel. The fixing centres of the main runners and hangers should be considered to suit the tile being installed. Certain tiles will absorb moisture in high humidity environments and thus will increase in weight as a result. The grid must be able to support the maximum potential weight of the tile, which should be determined before installation.

4.6 Which hold down clip should be used to suit a certain tile thickness?

Answer. USG supplies a range of clips to suit different tile thicknesses and applications. Reference should be made to current catalogues for details. In most cases the VB45 variable clip can be used, as this will suit a number of different tile thicknesses.

4.7 How do you attach a partition to the ceiling grid?

Answer. - DONN DX24, DONN DX15 standard systems. Use the DX24 Revoe Clip.

- DONN DX Finline system. Use M6 'T' bolt slotted in centre reveal of grid to secure partition head.

- DONN DP Bandraster. Screw fixing into grid to secure partition head. Brace the grid with additional hangers at 45°C.

4.8 How do I install a sloping ceiling?

Answer. If the slope is less than 15°, install it as per a flat ceiling.

If the angle is greater than 15°, install the main runners in the direction of the slope. Secure the main runners with rigid hangers fixed to the grid with nut and bolt, or approved self drilling screws.

If the angle is greater than 45°, please consult USG Technical Services for detailed advice.

5. Maintenance

5.1 How do you clean the grid?

Answer. Remove ceiling tiles and clean grid with a non-solvent based commercial cleaner.

5.2 Do I need a tool to demount the grid?

Answer. No. DONN DX grids are designed to be easily removed with a simple technique which needs no tools - see page 5 of this brochure.

Technical issues for ceiling design

Ceiling suspension systems are one of the interior elements in building construction where architects can realise their aesthetic ideas. However beautiful and elegant modern ceilings can be, they also need to provide for specific technical functions. The most important are: fire protection, acoustical behaviour, humidity resistance, shock resistance, seismic restraint, load bearing capacity and last, but not least, colour and light reflection.

1. Fire Protection

When a ceiling assembly comes in contact with fire, several indicators on the ceilings behaviour can become important.

1.1 Fire reaction

Ceiling products are generally considered suitable for multi-use buildings when the products conform to BS 476 part 6 and 7.

BS 476 part 6 is the fire propagation classification which compares the constitution of combustible materials to the development of fire – performance class 0.

BS 476 part 7 is the surface spread of flame classification which indicates the tendency of materials to support the spread of flame across the surface. (Best performance Class 1, worst performance Class 4.)

As all DONN suspension systems are manufactured from steel and aluminium components they are classed as non combustible elements as defined in the current Building Regulations approved document B.

1.2 Fire protection

A ceiling assembly's fire protection refers to the period of time that the ceiling assembly will protect the buildings structure directly above the ceiling from the effects of flame and heat from a fire originating in the room below.

The fire protection rating of the ceiling assembly, normally either 30 minutes or 60 minutes can be defined as the period of time that the ceiling assembly will act as a protective barrier to prevent the effects of a fire from affecting the buildings structure. Where the building structure is steelwork, the suspended ceiling assembly is acting as a barrier to protect that steelwork from the effects of mainly the heat of the fire to ensure that the steel will maintain its strength and load bearing capability. In the case of suspended ceilings providing protection to timber or mezzanine floor structures, the ceiling assembly becomes part of the overall floor structure, and it is this total structure that is then deemed to offer fire resistance, i.e. acting as a containment for fire from the area below to the floor above through different

building compartments. It is important to note that the ceiling assembly alone cannot provide this sort of containment.

Structural fire protection BS 476 parts 21 and 23.

Suspended ceilings can be used to provide protection to the structural elements of a building. In the event of a fire, the ceiling membrane protects the structure for a period of time enabling evacuation and fire fighting. The period of protection is determined by testing to BS 476 part 23. Testing to BS 476 part 21, section 7, determines the protection provided to a loaded timber floor structure. In order to ensure the validity of a "fire protecting" ceiling, installation must be as described in the relevant test report. Any alteration may affect the fire protection capabilities of that ceiling system.

For further information or advice on our testing, products or relevant standards, please contact your local representative or our Technical Services Department.

USG DONN ceiling suspension systems have been tested with appropriate panels and have obtained up to 60 minutes structural fire protection in accordance with BS 476: pt 21 and 23. Test reports as well as details on other standards can be obtained from your local USG Technical department.

1.3 Fire: other criteria

Some materials spread toxic gases when burning or inflamed. In general they may not be used as structural or integral parts of a building. It is possible that contents of rooms in a building may contain such materials, brought in by occupants. However, USG DONN ceiling suspension systems – even factory or pre-painted elements - do not emit hazardous fumes and thus present no risk for occupants or fire fighters.

1.4 Fire codes, standards and tests

Codes and standards on fire reaction, fire resistance and toxicity are regulated by national standards. There are new European standards for fire performance applicable to Suspended Ceilings. Make reference to EN 13964. See page 39 for more details. Please check on your local standards for exact details and specifications. For a wide number of system and tile combinations, fire resistance tests have been done in most European countries. Test certificates can be obtained from your local USG Technical Services.

2. Acoustics

Acoustics is the study of the behaviour of sound in all its aspects. But sound is also a "subjective" element of nature. The best "subjective" example is music: what some call nerve-wracking noise is

regarded as heavenly music by others. Essentially, sound is waves, and thus a form of energy that can be measured. To control sound in a building there are three different ratings :

2.1 Absorption " αW " and NRC (Noise Reduction Coefficient)

NRC or αW measure the sound absorption characteristics of a ceiling (panel). The absorption characteristics of a ceiling are expressed in an absorption coefficient which is a value " α " that lies between 0 (no absorption at all) and 1 (full absorption.) As no material absorbs sound equally over the whole spectrum, tests generally measure the absorption at 125, 250, 500, 1000, 2000 and 4000 Hz. The sound absorption αW or NRC of a panel is a weighed average of the absorption coefficients over the total tested spectrum. The use of the proper type of absorption reduces the disturbing echos and improves audibility (see also 2.3). Too much noise reduction can lead to a dead room, where all noise is absorbed by all surfaces, so there is no reflection of sound. Not enough absorption leaves too much disturbing noise. Depending on the use of a room, its dimensions and function, the echo-time (= reverberation) can be defined, and the proper absorption can then be calculated using the Sabine formula.

αW and NRC values are available for all USG ceiling panels. Due to a slightly different calculation formula αW and NRC only slightly differ from each other. Sound absorption is regulated in international standards ISO 20354 and ISO 11654, which are recognised as European as well as national standards in most countries.

2.2 CAC (Ceiling Attenuation Class)

When the noise in a room is absorbed (see αW and NRC), than the absorbed sound must go somewhere. In buildings, it travels in most cases to the next room, causing unwanted noise there. Although ceilings should absorb sound to keep the in-room environment friendly, they should also prevent too much sound going to adjacent rooms. The Ceiling Attenuation Class is a measure of sound transmission loss as noise travels between rooms. Essentially, it is the ability of a ceiling panel to block sound between rooms. The rate is expressed in dB (decibels), representing the loss of noise when travelling to the next room, whereby both rooms are estimated to have identical ceilings. The CAC is also named DncW, the latter being pure lab value. DncW is regulated in the European standard EN 20140-9 which is recognised as a national standard in most European countries.

2.3 AC (Articulation Class)

Articulation Class is a measurement of ceiling sound attenuation which represents the ability to hear or understand transmitted or processed speech within a space. The articulation class rates

the listener's ability to understand the spoken word within a space. It is especially valid in open space offices, where privacy should be guaranteed and noise disturbance by others reduced. It hangs together with the AI (Articulation Index) which measures speech audibility in a room. In an open plan office an AI of 0.1 is low, indicating that little, if any, of a conversation will be intelligible on the other side of a screen. An AI of 0.6 would make for very poor speech privacy.

As AC and AI ratings may differ from application to application, contact your local USG Technical Services for advice on application of our products.

3. Humidity

USG DONN ceiling suspension systems have been developed for normal inside environments, with a maximum RH (Relative Humidity) of 75% at max 29°C. They will also resist occasional higher relative humidity values, but if general or regular higher values are expected, the special corrosion protected system DXKB24 should be used. For environments that contain chemicals or outside applications, please consult USG Technical Services.

Although ceiling suspension systems will not "sag" due to high humidity levels, one should take into account that humidity levels of over 70% may cause normal mineral fibre panels to absorb part of the humidity. The extra weight (up to 1.5 kg/m²) should be taken into account to establish the proper system configuration (see deflection). Standard grid systems comply with the requirements stated in BS 8290. For compliance with any other standards please consult your local USG Technical Department. The special corrosion protected system DXKB24 complies with line 2 of table 1 of the BS8290 part 1. For compliance with other standards please consult your local USG Technical Services.

4. Shock resistance and seismic restraint

4.1 Shock resistance

Shock resistant ceilings are mainly used in closed sports areas to resist impact damage. The only existing standard – generally accepted in all European countries – is DIN 18032. Although our clip-connection is ideal for such applications, no tests have been conducted so far.

4.2 Seismic restraint

Seismic restraint is regulated in Europe by Eurocode 8. The code requires no tests for ceiling structures. Tests according to ASTM (American standard) have proven that all DX clip connected systems may be used in seismic designs in

the U.S. As countries have different codes and standards, it is imperative to compare the designs with these local rules. For assistance in cases of shock resistance or seismic applications consult USG Technical Services.

5. Load bearing capacity

With every system mentioned in this catalogue, you will find a load bearing table for standard modules and applications. The results come from a combination of practical tests and theoretical calculations. Most of the tables are limited due to two main factors: deflection due to weight and twist during installation. For the tables the limits used were according to the requirements of BS8290. For compliance with any other standards please consult your local USG Technical Department.

All tests and calculations are worst case scenarios, so in general your deflection will stay under the limit. For other configurations, modules and standards call your local Technical Sales.

6. Colour, gloss and light reflection

6.1 Colour

The most frequently used colour denomination is a RAL number. The full RAL range contains about 9000 pre-defined colours. The USG standard white does not match any of them: the nearest standard white is RAL 9016.

Currently worldwide colours are measured according ISO 7724 which defines the LAB values, where "L" is the range dark/light (black white), "A" is the range red-green and "B" is the range blue yellow. Based on this system, any colour can be defined.

The more recent NCS (Natural Colour System) – which becomes more and more popular amongst paint and colour manufacturers - defines colours by the LAB format. The colour deviation is expressed as a direct relation of the colour being measured to its original, by defining the deviation on all three ranges. The deviation value is called DE, which should not be greater than 1.

6.2 Gloss

Gloss defines how mirror-like or matt a colour is. It ranges from 1 (being extremely matt) to 100 (the ultimate mirror). Standard white in USG DONN grid systems ranges generally between 10 and 15. USG's suspension systems are thus rather matt. Other colours have other glosses, and may range from high-gloss 70 to low gloss black at about 8. Consult your local USG Technical Services for more detailed information.

6.3 Light reflection

As light reflects on all objects (it is a fact that we see the reflection rather than the object), the reflection can be tested. The range is from 0% (no reflection) to 100% (full reflection.) USG DONN white grid systems have a light reflection of +/- 85%. Consult your local USG Technical Services for more detailed information.

7. Quality and international standards

Our grid plants all are certified ISO 9002 or 9001, and are working towards achieving the new ISO 9000. We manufacture products that comply or exceed technical specifications in most local rules as well as in international product standards, installation procedures and Building codes. Our ceiling suspension systems and accessories already comply with the new European ceiling standard (BS EN 13964:2004).

8. Environmental control

As a manufacturer, USG recognises the importance of safeguarding the environment. Our solid history of environmental responsibility includes providing product solutions that reduce environmental impact, reduce waste, conserve resources and recycle materials whenever possible. USG also manufactures products that are environmentally acceptable, safe and effective when used as intended.

On average, the content of recycled and recaptured material in our purchased products for suspension systems and their packing is as follows (figures are 2000 averages):

Steel +/- 25%

Aluminium over 50%

Carton over 75%

Furthermore we pay a lot of attention to environmentally friendly production, and recycle all waste, where possible. As a valued customer you can also help the environment by taking care that waste steel, aluminium and packing material are properly recycled.



United Kingdom, Ireland

USG (UK) Ltd.
1 Swan Road
South West Industrial Estate
Peterlee
Co. Durham SR8 2HS
United Kingdom
Tel: +44 (0)191 586 1121
Fax: +44 (0)191 586 0097
e-mail: Info-uk@usg.com

Deutschland, Österreich, Schweiz

USG Deutschland GmbH
Metallstrasse 1
D-41751 Viersen
Deutschland
Tel: +49 (0)2162 9570
Fax: +49 (0)2162 4461
e-mail: Info-de@usg.com

España, Portugal, Marruecos

USG Interiors España S.L.
C/José Lázaro Galdiano, 4
28 036 Madrid
España
Tel: +34 (91) 457 00 50
Fax: +34 (91) 457 10 16
e-mail: Info-es@usg.com

France, Belgique, Luxembourg

USG France S.A.
Z.I. Nord - BP 287
9 Rue des Livraindières
28109 Dreux Cedex
France
Tel: +33 2 37 38 50 50
Fax: +33 2 37 42 10 73
e-mail: Info-fr@usg.com

Italia

USG Italia SRL
Via Avv. Ambrosoli, 10/A
20090 Rodano-loc.
Millepini (MI)
Italia
Tel: +39 02 95 32 85 87
Fax: +39 02 95 32 86 37
e-mail: Info-it@usg.com

*Russia, Ukraine, Byelorussia,
Kazakhstan & CIS countries*

USG Building Systems RUS
ul. Salova 45 F
192 102 St. Petersburg
Russia
Tel: +7 812 347 79 26
Fax: +7 812 347 79 27
e-mail: Info-ru@usg.com

*Sverige, Norge, Danmark,
Finland, Island*

USG Scandinavia
Ankdammsgatan 28
S-171 43 Solna
Sweden
Tel: +46 (0)8 444 38 30
Fax: +46 (0)8 626 94 51
e-mail: Info-se@usg.com

Middle East

USG Middle East Ltd.
PO Box 2897
Dammam 31461
Saudi Arabia
Tel: +966 3 812 0995/1075
Fax: +966 3 812 1029

USG International Inc
550 West Adams Street
Chicago, Illinois 60661-3676
USA
Tel: +1 312 436 4000
Fax: +1 312 672 7726

USG reserves the right to change specifications or design and supply products which may differ from those described and illustrated without notice and without liability. All weights and measures are nominal.

DONN® is a trademark of USG Interiors Inc. or affiliated companies.

DC/02/UK/04/07

© 2007