Gridtite System
technical guidance notes

Contents

Introduction

Gridtite is a lightweight spacer bar and bracket system that is designed to provide a controlled space between the inner and outer metal sheets that make up “twin skin” site assembled roofing and walling systems. Insulation goes into this space - usually a fibreglass or mineral wool quilt.
The spacer must be easy to install, strong and stable when sheeted over; be durable, and easy to repair. It must be easy for self-drilling fasteners to drill into, and offer good fastener grip.
In order to comply with the building regulations, Gridtite must limit cold bridging and be able to create a void deep enough to accommodate the required insulation thickness

Gridtite components

1.0 Product description.

The system has two components, the bar, and the bracket.

The bar is rolled out of pre-galvanised high tensile Z39 steel strip. The finished shape is corrugated along its’ length to give strength and stiffness. One end of each bar has a preformed spigot that will push about 40mm into the end of the next bar to give a smooth, continuous line.
The bar length we quote is the finished ‘fitted’ length and ignores this 40mm joint.
A pre-punched hole in both ends allows accurate alignment and, by inserting a fastener, a means to lock the two lengths together.
The bar is printed with the brand name, production batch number, and a unique installing guide at regular intervals.

Brackets come in a variety of lengths from 60mm to 300mm to provide for different thickness of insulation. On the bracket base there are 3 fixing holes and a pad that gives some thermal insulation, allows electrical isolation, and helps to settle the bracket when it is fixed down. It also helps limit air leakage by sealing the fixing holes.

Loads

Spacer systems are fixed to the main structure of the building and exert load forces on the structure in a number of ways. These may be broadly divided into three groups.

1) Service Loads - the loads imposed by the self-weight of the components; applied loads comprising positive [snow and wind pressure] and negative loads [wind suction] and in some instances, cyclic thermal loads caused by expansion and contraction of the outer weather sheet [Usually aluminium sheet which expands by 1mm per lin metre per 10º C temperature rise] during daily temperature changes. These types of loads generally occur from day to day for the whole life of the building. There may be some interaction between them. The design must allow sufficient strength to cope with these loads by providing an adequate safety margin - usually built in redundancy.
2) Construction phase loads. These short term applied loads are encountered during the installation or repair of the roof or wall and can be caused by localised storage of materials, foot traffic, temporary access platforms, scaffolding etc. Construction phase loads may be dealt with by design and / or good working practices, careful locating of platforms, use of temporary supports etc.
3) Impact loads. Clearly it is impossible to foresee all eventualities, however, designers must allow for predictable events by specifying the relevant grade of roofing system [falls through roof lights for example are a common cause of death during construction and maintenance of the roof]. HSE legislation requires all roofing system manufacturers to classify their products as ‘fragile’ or ‘non-fragile’ according to a prescribed impact test regime. The roof is tested as an assembly including spacer system, fasteners, fastener position, frequency, etc. and must be built to the tested design to achieve the required fragility rating. Impact loads can also be caused by the effect of fall arrest systems, safety netting etc. **Unless specifically designed for, spacer systems should never be used as anchor points for safety systems.**

Site work

These notes are for guidance only.

The inherent strength and adaptability of Gridtite and the 'site assembled' sheeting method means that there are endless variations and details that could be used in designing and constructing a twin skin metal clad building. There are also regional and even local variations in the way that site labour assembles the components, so it is impossible to advise on every possibility that might be encountered.
The MCRMA publication 'Guidance for the design of metal roofing and cladding to comply with Approved Document L2 :2001' and the Advisory Committee for Roof work publication 'Recommended Practice for Work on Profiled Sheeted Roofs' are excellent sources of sound advice for the specifier and installer alike. Most roll formers will have standard details too; refer to their technical publications.
Fixing Point also offers a free advisory service – contact our technical dept for further information.

Safety & Storage.

Always use PPE – goggles and gloves. There are no particular hazards when using Gridtite other than those that might be expected when using metal pressings – sharp edges, residual suds oil from manufacture, heavy weights when lifting packs of bars etc.
1 metre of Gridtite bar weighs 1 kilo. Moving packs of bars by forklift can be dangerous due to slipping; we recommend using a sling. Take extra care when moving bars around on the roof - danger of striking others, especially with the longer lengths.
Packs of bars should be evenly supported on bearers; all components should be protected from frost and rain and stored under cover.
Users should observe sensible roofing / walling health and safety procedures. We do not recommend that access walk ways, ladders etc be laid directly onto the Gridtite System before the top sheet is fixed in place
Safety equipment should never be attached to the Gridtite System
COSHH information is to be found in the appendix.

Loading out

On the roof, sections of installed Gridtite are sometimes used as bearers to support packs of sheets prior to fixing. This common practice may be detrimental if the weight of the material is excessive [see load tables in appendix]. It should be noted that Gridtite is **not** intended for this use; if it must be done then temporary packing or supports should be installed between the underside of the Gridtite bar and the surface of the liners [above the purlins] to transmit loads to

the structure. Packs should be positioned above the rafter rather than in mid span, to avoid excessive point loads on the purlin.
Crane drivers should minimise any ‘side swipe’ effect when loading out to avoid causing excessive side ‘sway’ stresses to the system.

Well-supported loading out.

Installation

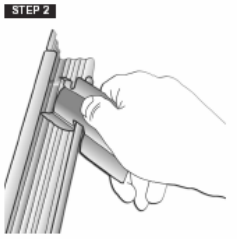
In general use, the system is usually partially pre-assembled by the fitter; this may be done on the ground to save time. Since the bracket needs to stand in a flat part of the liner, it is important to make sure that the pre-assembled product is correctly set out. The required bracket height should be sufficient to allow the bottom edge of the Gridtite bar to clear the liner corrugations. As a guide, add 50mm to the depth of the corrugation. Thus a 1000/20 liner profile [1000 wide x 20 deep] will need a 70mm minimum bracket depth to clear the profile.
Printed on the bar are a set of numbers [1-10]; these are repeated every metre and are intended to help the fitter to ensure that the brackets are fitted at the same location and spacing each time. In turn this ensures that the assembly will drop into the same place on the liner each time.

Some fixers prefer to install all of the liners and Gridtite right across the roof before laying the insulation and top sheet. Whilst this quickly makes the building rain proof for other trades, it can present safety problems and may also lead to bracket fixings missing the top table of the purlins.

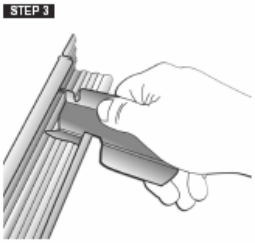
Product assembly

Fitting the bracket uses a simple hook in and twist to lock mechanism

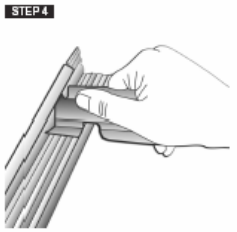
1. Hold the bar and bracket as shown



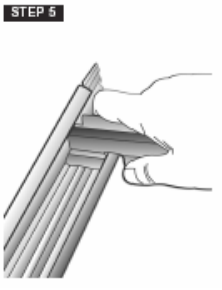
2 Hook the larger of the two tabs into the bar



3 *Rotate the bracket away from you to hook the smaller tab in place under the bar edge*



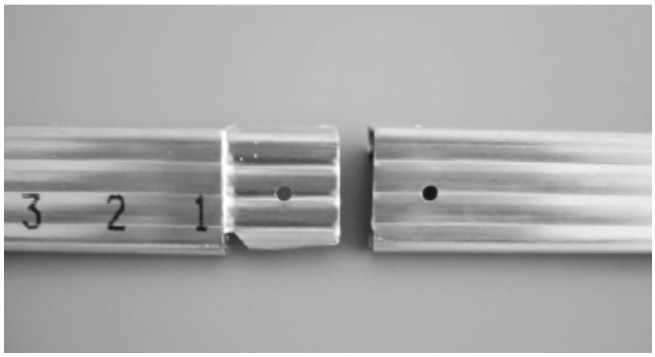
4 Push the bracket base away from you to engage the small tab. You'll feel a distinct click as the small tab slots home



5. *Finally, rotate the bracket round to approx 90º to lock it in place*

The bracket will clip into the bar anywhere along its' length; however a bracket should be positioned within 100mm of the spigot form, [to support the bar to bar joint] and at no more than 1m centres thereafter. In exceptional circumstances brackets may be spaced slightly further apart [max 1200] for instance to span over a width of GRP roof light sheet, but users must check with the roof system manufacturer to ensure their approval and compliance with fragility requirements.

Remember that wind-loading forces will affect the system more in this configuration [see load tables]



Pre-punched spigot /socket lock hole and bracket locating guide numbers

The Gridtite bracket and bar assembly is screwed down to the purlin, using two fasteners into the outer holes in each bracket base. The liner sheet may be marked up with a chalk line etc to define the purlin position.
The next bar in the run is positioned and the bar to bar joint is firmly pushed home, and the bracket [s] fixed. For extra strength and stability, users should insert a fastener into the pre-punched hole in the bar to bar joint to lock them together.

Gridtite awaiting insulation and top sheets on a new build site

Once Gridtite is installed, the insulation is positioned, ensuring that there are no gaps or spaces in the quilt cover. Quilt must be dressed under the bar and neatly around the supporting brackets, leaving no gaps or spaces. [Exception: see fire walls section] Insulation must be kept dry and clean. Finally the fitter lays a top outer sheet onto the Gridtite bar and fixes it down.

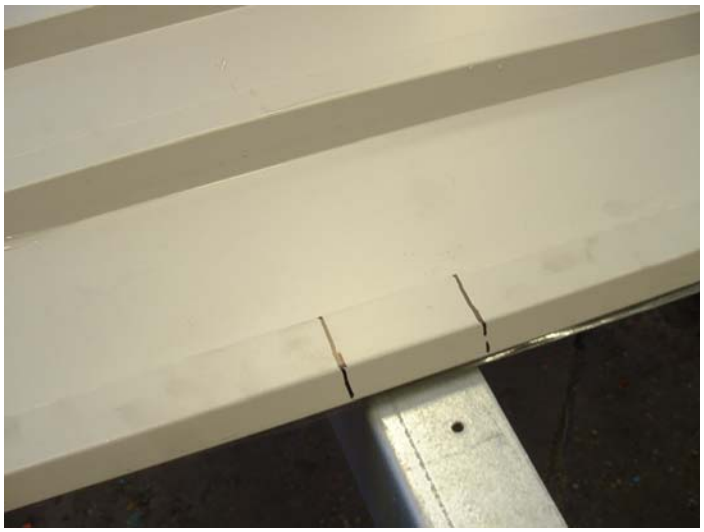
Fasteners

For fixing to typical cold rolled, new steel purlins, use at least **two** self-drilling type fasteners in the outer bracket holes. [The centre hole is for special applications.] A typical 5.5mm self-drilling fastener will give about 4kN pull out resistance from a 2.0mm thick galvanised steel purlin. See load tables for safe working loads.

In walling and steeper [more than about 18º] slope roofs, designers should consider the 'down slope' leverage effect of long spacer grid brackets on the bracket mounting fasteners. In most applications [exception see vertical walling] the Gridtite bracket base sits at right angles to the roof slope, so that when subjected to a down slope load [such as snow slipping down the roof] the 'up slope' fastener will be subjected to more pull out load than the 'down slope' one as the load-force rotates around a fulcrum at the bracket base. Solutions will include specifying fasteners with greater pull out resistance, increasing the bracket frequency / m², and in extreme cases, fitting a separate support or cleat at the ridge / eaves / wall base to carry the load back to the structural steel work. As a guide, a 200mm Gridtite bracket, fixed with 2 no. DT fasteners to a 12º roof at typical purlin centres, using 1.6mm thick purlins will be safe for most UK applications. [See load tables]

The fitter **must** ensure that each fastener engages correctly with the underlying purlin - missing the purlin top flange places a high load on the remaining fixings and may lead to premature failure.
Purlin top flanges should be wide enough to accept the bracket base and associated fasteners. Accurately installed, straight and evenly spaced purlins are the key to accurately installed, straight and evenly spaced Gridtite runs. Some purlin manufacturers use a deep corrugation or crease in the top flange to improve strength. This crease may throw the bracket fastener off line or may even cause damage to the fastener before it is properly in place. Creased purlins of this kind may require a longer fastener to take account of the depth of the crease, where the bracket-fixing hole lies above it.

Good practice is to mark up the liner using a chalk line or laser level etc to identify the line of the purlin as it lies covered over by the liner.



marking the liner

Fixing the top sheet to the Gridtite bar is a straightforward matter of using self-drilling fasteners at appropriate intervals. Typical pull out values from Gridtite bars using a 5.5mm fastener are in the region of 2.1 to 2.5kN per fastener. Good practice is to allow a 100% safety margin to arrive at fastener frequencies. Users should refer to their fastener supplier for advice. Most fastener companies will arrange a site visit to carry out a pull out test, inspect the purlins etc.

Gridtite installed over an old fibre cement roof prior to over cladding with steel sheets

Wind & snow loading

British Standard 6399 provides guidance for calculating wind suction; snow loads and wind pressure and takes into account the site location, distance from the coast, building height and orientation, building type, ground conditions, elevation above sea level etc. Areas of the roof or wall that are subjected to increased loads [i.e. verges, ridges, snowdrifts at parapets etc] are adjusted accordingly. Calculations will provide a target load / m^2 to achieve and will include a wide safety margin to allow for missing fasteners, poor workmanship etc.
The Standard gives further details.

Generally when fixing to light [less than 2mm thick] purlins, the pull out value of the bracket fixings are the weakest link in the spacer assembly. In extreme cases it may be necessary to close up the bracket spacing or purlin spacing to obtain a sufficient margin of safety. The structural engineer will advise.
See load tables and ‘fastener’ section.

Over-roofing and refurbishment

Where Gridtite is used to over-clad an existing roof or wall, the old roof acts as the liner and the grid system is fitted on top to suit the corrugations of the old sheets. The new outer sheet is then fitted to the grid bar producing a new weather resistant finish.
As with new build, the required bracket height should be sufficient to allow the bottom edge of the Gridtite bar to clear the existing corrugations. As a rough guide, add 50mm to the depth of the corrugation. If insulation is to be added, allow extra bracket length, remembering that insulation quilt tends to be compressed where it passes over the top of the old sheet corrugation and beneath the bar. Compressed quilt will not give maximum insulation performance.

Always ensure that the bracket fixings are long enough to engage with the purlins beneath the old top sheet. Problems have occurred where the fixer has assumed that the fastener has only to pass through the old top sheet to reach the purlin, when in fact it has engaged only with the top sheet and an insulation board beneath. Best practice is to remove an old sheet to establish the underlying roof build-up and of course, the purlin type and thickness.
There are a wide range of fasteners available to suit the various substrates to be found under old roofs and it is not within the scope of this data sheet to cover all eventualities.

Note clearance over the old corrugation

Care should be taken to minimise damage to the existing roof, causing subsequent leaks during the work. Over-sheeting the Gridtite system as the work progresses limits this problem. Where brackets are fitted in narrow corrugations, fixers need to be sure that the bracket base is accurately aligned and sealed into the bottom of the profile. Fixing holes through fibre cement sheets should allow for thermal expansion.

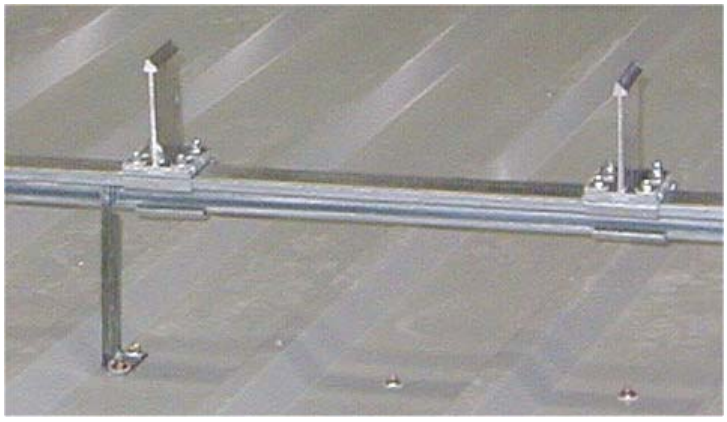
Safety Note
Fixing to old fibre cement roofs may present significant health and safety risks. Old roofs of this type are almost always fragile and pose serious fall risks to roofers who work on them without walkways, scaffolding or other safety equipment in place.
Unless the sheet has been tested it is best to assume that it contains asbestos fibres. Working with asbestos requires particular care; swarf generated by drilling for fixings or by cutting operations may expose installers and workers within the building to a serious health hazard.
If in doubt consult an asbestos removal specialist or the Health and Safety Executive for advice.

Safety equipment should never be attached to the Gridtite System

Overlaying the new top sheet

Standing Seam Roofing.

Aluminium standing seam roofing may be fixed to Gridtite. Most standing seam halters have a 60mm wide footprint and so must be carefully positioned to ensure that they are correctly fixed a) in the up/down slope plane and b) at the specified intervals along the 40mm Gridtite bar. Correct fixing must provide a near vertical load path from the halter head down through the bar and bracket to the purlin. This may involve offsetting the halter to achieve a good position. Some designers specify our Bigfoot™ halter attachment system, which is designed to surmount these difficulties.
Bigfoot is only available through the standing seam supplier as it is a dedicated system component.
It is important to ensure that the halters are installed and zipped in place correctly to allow the top sheet to move up and down slope as designed by the standing seam manufacturer. Thermal expansion and contraction of the top sheet may impose high ‘down slope’ cyclic loads on the halters and supporting structure if binding of the top sheet to the halter occurs.
Fixings must be adequate to resist anticipated standing seam cyclic loads. The standing seam manufacturer will advise on anticipated loads.



bigfoot halter attachment

Wall construction

Generally, twin skin walls with the Gridtite bar fixed horizontally and the cladding running from gutter to floor are constructed in the same way as roofs, but they usually have lower U values, and so use shorter brackets. The insulation quilt hangs down the wall void [like wallpaper] and is usually retained using ‘stick pins’ – adhesive insulation hangers that are bonded to the liner sheet. The quilt is also held and compressed slightly by the Gridtite bar and outer sheet. [Exception – firewalls]. Poor fitting of the insulation hangers can cause slumping of the insulation in the cavity, leading to cold spots and condensation.

Whilst Gridtite is symmetrical we recommend that the printed side is fixed facing up the wall.

When fixed horizontally, the product is intended to support typical metal cladding sheets and will resist imposed wind loads etc only. As with roof ‘down slope’ loads, the pull out resistance of the bracket fastener usually represents the weakest point in the assembly and calculation will inform the wall design accordingly. Heavier materials such as composite panels, fibre cement sheeting and external services [cctv cameras, floodlights, signage etc] should not be fixed to twin skin walls supported by Gridtite unless there are separate arrangements for load bearing. Our technical dept would be pleased to advise in these circumstances.

Vertical fixing of Gridtite

Some designs feature fixing the cladding *horizontally*, with the Gridtite bars standing upright. Whilst this is not an ideal use for the product it can be achieved, bearing in mind the following points.

Gridtite is designed to run parallel to the cladding rail, with a bracket fixed through the liner and into the cladding rail every metre along its’ length.

By fixing the system upright, at right angles to the cladding rails, the bracket intervals along the bar must be stretched out to match the cladding rail intervals, which may be up to 2 metres apart. As it is best to fit a bracket located within 100mm of the bar to bar joint to provide adequate support, the bar joint will need to coincide with the sheeting rails.

As a guide, to achieve a safe working load of 1kN/m² using multispan Gridtite bars across cladding rails spaced at 2m, it is necessary to stand the bars at intervals of approx 600mm along the wall. Even at this frequency the extended spacing of the brackets may allow some deflection of the cladding under high wind pressure loads.
See load tables.
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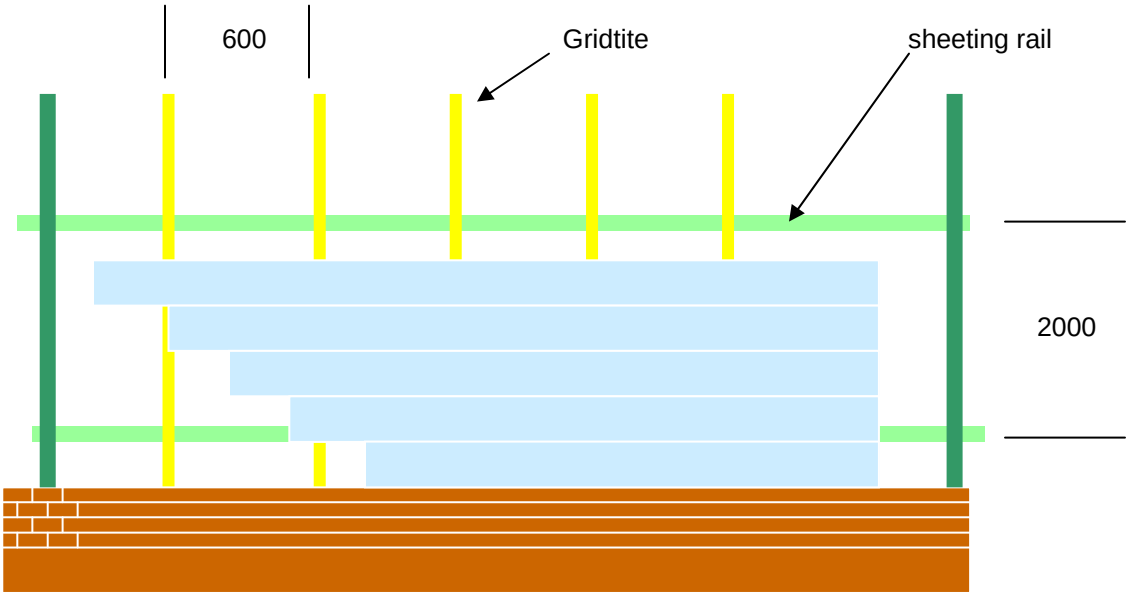
Vertical wall layout



The standard Gridtite <u>bar / bar</u> push fit joint is **not** designed to carry cladding loads applied *along* the bar as is found in upright fixing**.** Inserting a fastener into the pre-punched holes in the socket joint will lock both bars together and will help to transmit loads.

The standard Gridtite <u>bar / bracket</u> fit relies on friction only to lock the two components together. In vertical applications this is not sufficient to support the cladding load. The system **must** have additional support at suitable intervals and at the base of the bar to ensure that the dead weight of the cladding is transmitted to the structure.

Under no circumstances must the weight of the wall be hung off the standard Gridtite System alone *when the bars are fixed upright*.

Current solutions include supporting the base of the bar on a dwarf wall or other structural steel member, and installing ‘top hat’ or similar cleats to fix the bar back [separate from, and in addition to, standard brackets] to the cladding rail at suitable intervals.

[Note that self-drilling fasteners as used for sheeting are not designed to work in sheer.]
We recommend that a structural engineer check the proposed wall construction for safety.

See load tables
Contact our technical dept for further information.

Firewalls

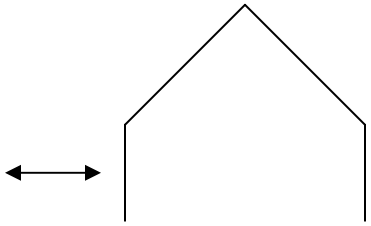
We hold a dedicated Fire Certificate issued by Warrington Fire Research ref Warres 111597. Fire Certificates are bound documents of some 20 pages or more and are a detailed description and specification of the assembly as tested. Warrington will not permit the issue of extracts or drawings from their Certificate; it must only be used as a complete document.

Our Certificate applies to Gridtite in wall situations where the fire is on the liner side of the construction. The document confirms 15 minutes insulation performance and 240 minutes wall integrity in accordance with BS 476 : Part 22 Clause 5.
!5 minutes insulation integrity is measured by monitoring the temperature rise on the outside of the wall assembly as it is heated on the liner side, during the test. The temperature must not rise by more than 180 degrees during the 15-minute period.
The 240-minute element refers to the passage of smoke and flames; the firewall must not allow the passage of either during the 240-minute test period.

Note that in order to comply with the certificate, users must construct their firewall to the design as supplied by us and tested by Warrington. However, it is recognised that it may not be possible for clients to construct using the same branded materials as tested. To enable alternative products to be used we hold a Warrington ‘assessment’ of commonly available alternative sheet profiles and insulation materials.
We also hold an ‘assessment’ of a vertical Gridtite bar version of the firewall design.

Vertical wall application

Safe working loads for Gridtite system Standing Upright



Safe working load in kN / m² for
horizontal cladding - Gridtite standing upright
Multi span between horizontal side rails by others

V / S	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5
0.4	5.95	4.92	4.13	3.52	3.04	2.65	2.33	2.06	1.84	1.65	1.49	1.35	1.23	1.13	1.03	0.95
0.5	4.76	3.94	3.31	2.82	2.43	2.12	1.86	1.65	1.47	1.32	1.19	1.08	0.98	0.90	0.83	0.76
0.6	3.97	3.28	2.76	2.35	2.02	1.76	1.55	1.37	1.22	1.10	0.99	0.90	0.82	0.75	0.69	0.64
0.7	3.40	2.81	2.36	2.01	1.74	1.51	1.33	1.18	1.05	0.94	0.85	0.77	0.70	0.64	0.59	0.54
0.8	2.98	2.46	2.07	1.76	1.52	1.32	1.16	1.03	0.92	0.82	0.74	0.67	0.61	0.56	0.52	0.48
0.9	2.65	2.19	1.84	1.57	1.35	1.18	1.03	0.92	0.82	0.73	0.66	0.60	0.55	0.50	0.46	0.42
1	2.38	1.97	1.65	1.41	1.21	1.06	0.93	0.82	0.73	0.66	0.60	0.54	0.49	0.45	0.41	0.38
1.1	2.16	1.79	1.50	1.28	1.10	0.96	0.85	0.75	0.67	0.60	0.54	0.49	0.45	0.41	0.38	0.35
1.2	1.98	1.64	1.38	1.17	1.01	0.88	0.78	0.69	0.61	0.55	0.50	0.45	0.41	0.38	0.34	0.32

V	Vertical span of Gridtite Bars between side rails in metres
S	Horizontal spacing of Gridtite Bars along side rails in metres

Safe working load in kN / m² for
horizontal cladding - Gridtite standing upright
Single span between horizontal side rails by others

V / S	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5
0.4	4.76	3.94	3.31	2.82	2.43	2.12	1.86	1.65	1.47	1.32	1.19	1.08	0.98	0.90	0.83	0.76
0.5	3.81	3.15	2.65	2.25	1.94	1.69	1.49	1.32	1.18	1.06	0.95	0.86	0.79	0.72	0.66	0.61
0.6	3.18	2.62	2.20	1.88	1.62	1.41	1.24	1.10	0.98	0.88	0.79	0.72	0.66	0.60	0.55	0.51
0.7	2.72	2.25	1.89	1.61	1.39	1.21	1.06	0.94	0.84	0.75	0.68	0.62	0.56	0.51	0.47	0.44
0.8	2.38	1.97	1.65	1.41	1.21	1.06	0.93	0.82	0.73	0.66	0.60	0.54	0.49	0.45	0.41	0.38
0.9	2.12	1.75	1.47	1.25	1.08	0.94	0.83	0.73	0.65	0.59	0.53	0.48	0.44	0.40	0.37	0.34
1	1.91	1.57	1.32	1.13	0.97	0.85	0.74	0.66	0.59	0.53	0.48	0.43	0.39	0.36	0.33	0.30
1.1	1.73	1.43	1.20	1.02	0.88	0.77	0.68	0.60	0.53	0.48	0.43	0.39	0.36	0.33	0.30	0.28
1.2	1.59	1.31	1.10	0.94	0.81	0.71	0.62	0.55	0.49	0.44	0.40	0.36	0.33	0.30	0.28	0.25

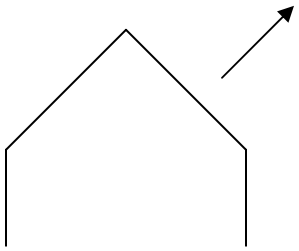
V	Vertical span of Gridtite Bars between side rails in metres
S	Horizontal spacing of Gridtite Bars along side rails 'S' metres

2.0 Mechanical strength

Our load tables give basic values for the product in typical usage. They have been obtained by calculation and laboratory testing, and represent our current views.
Please note the disclaimer at the end of this document

Load Tables

Wind uplift safe load
Gridtite fixed to horizontal purlins



Wind uplift **safe working load** in kN / m²
Gridtite laid along purlins by others

S \ P	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5
0.500	6.00	5.45	5.00	4.62	4.29	4.00	3.75	3.53	3.33	3.16	3.00	2.86	2.73	2.61	2.50	2.40
0.600	5.00	4.55	4.17	3.85	3.57	3.33	3.13	2.94	2.78	2.63	2.50	2.38	2.27	2.17	2.08	2.00
0.700	4.29	3.90	3.57	3.30	3.06	2.86	2.68	2.52	2.38	2.26	2.14	2.04	1.95	1.86	1.79	1.71
0.800	3.75	3.41	3.13	2.88	2.68	2.50	2.34	2.21	2.08	1.97	1.88	1.79	1.70	1.63	1.56	1.50
0.900	3.33	3.03	2.78	2.56	2.38	2.22	2.08	1.96	1.85	1.75	1.67	1.59	1.52	1.45	1.39	1.33
1.000	3.00	2.73	2.50	2.31	2.14	2.00	1.88	1.76	1.67	1.58	1.50	1.43	1.36	1.30	1.25	1.20

S = Gridtite bracket spacing in mm along bar
P = Purlin spacing in m

Component and assembly tests

Load testing methods.

As there are no recognised standard test methods for spacer grid systems, we have devised and developed our own programme over a number of years. Using Ceram Research Ltd, a respected laboratory, our aim is to check Gridtite components and twin skin assemblies as thoroughly as possible. Individual components are tested to destruction; for the assembly tests we replicate site conditions within the limitations of the lab and equipment available. The data gained has helped us in our drive for product development and improvement.

Fixing Point takes the view that it is better to test, albeit to our own standard, and publish the results than *not to test at all.*

We would welcome a performance based British Standard for spacer grid systems.

On site, Gridtite easily copes with typical installation conditions.

Wind Loading

Gridtite has been tested by Ceram Research Limited for negative [wind suction] and positive [wind pressure and snow] loads. Using a 150mm high twin skin roof assembly, tests revealed that in both modes, the system easily resisted the loads applied.

The following table summarises the results obtained.

Test type	Load at first sign of distress kN/m²	Maximum load kN/m²
Negative UDL	5.12	6.50
Positive UDL	8.70	10.80

Mechanical tests

Test summary

a) Point load to centre span. Result: mean load to failure - 2235N

b) Bracket to rail attachment. Result: mean load to failure - 5633N

c) Down slope ‘across the bar’ load. Result: mean maximum load applied, direction 1 – 768N; direction 2 – 967N.
n.b these values reflect the maximum travel of the test equipment.

d) ‘Along the bar’ sway load. Result: mean maximum load applied, direction 1 – 830N; direction 2 – 890N

e) Assembled roof system ‘along the bar’ sway load. Result: maximum resistance before failure was 12kN. All brackets registered a uniform sideways load indicating that the assembly acted as a single unit, distributing the load evenly.

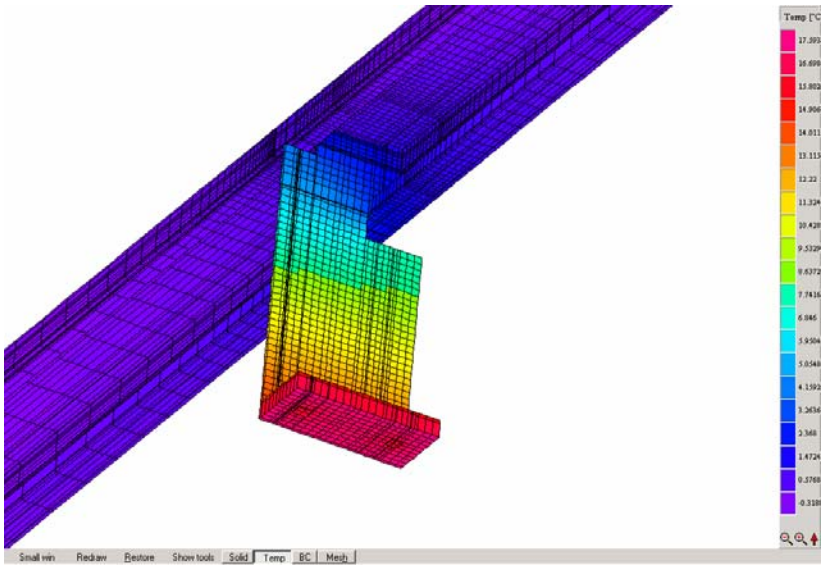
f) Assembled roof system ‘down slope’ load. Result: maximum load applied [maximum measuring equipment travel] was 18kN [equal to 1.2kN per bracket] All brackets registered a uniform deflection indicating that the assembly acted as a single unit, distributing the load evenly, with no component failures. Further work indicates that the ‘up slope’ bracket fastener is the weakest link in the assembly when fixing to light section purlins of less than 2.00mm thickness

A more detailed description of the test programme appears in the Appendix

3.0 Thermal Performance

Twin skin systems incorporating Gridtite offer the designer or installer an ideal solution to 'Part L / Technical Standard J' thermal requirements. Very low U values are possible using the right combination of materials and design.

A detailed 3D thermal model of the Gridtite system was created at Oxford Brookes University. Their calculations demonstrate that Gridtite brackets generate only very limited cold bridging through the insulation barrier and that their impact on the 'plane area' of the roof [or wall] is minimal when constructed in typical twin skin layouts.



Thermal model developed by Oxford Brookes University

U-value calculation software takes account of the Gridtite components, any air gaps around and under the bars, and other variables such as bracket spacing, lambda value of the insulation, sheet profiles etc that contribute to the plane areas of the roof / wall.
However, Part L/J requires designers to produce a complete package of thermal data to demonstrate that the overall building - walls, roof, floors, heating, ventilation, windows, doors etc - complies with the regulations.
A simple plane area U value calculation is not, by itself, enough.

The following table indicates typical build-ups and corresponding U values.

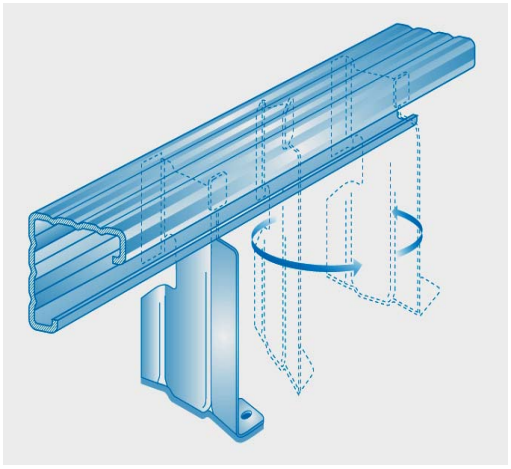
U Value	insulation lambda value	build-up thickness [Gridtite bracket height] required
0.16	0.044	305mm
0.16	0.037	260
0.20	0.044	240
0.20	0.037	200
0.25	0.044	200
0.25	0.037	160
0.30	0.044	155
0.30	0.037	140
0.35	0.044	130
0.35	0.037	115

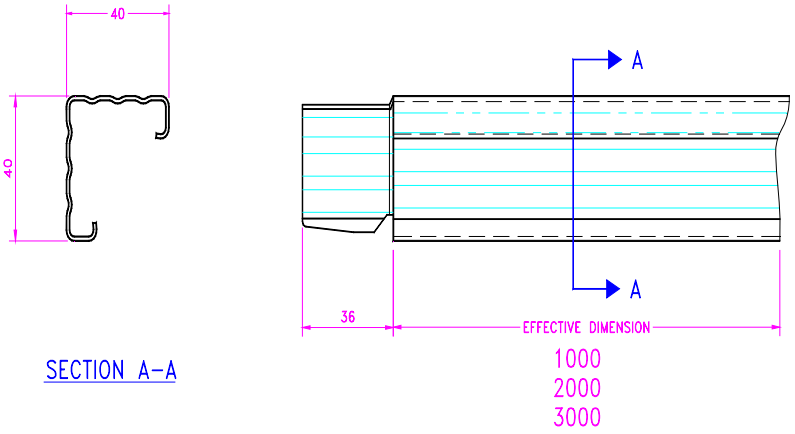
Note that there are a number of variables to consider and the examples are based on sheeting rails / purlins fixed at 1.8m centres, Gridtite brackets fixed at 1m centres, a typical liner and outer sheet profile and basic glass fibre insulation quilt. Using other types of insulation with lower lambda values will improve the performance of the design and reduce the build-up thickness accordingly

4.0 Durability

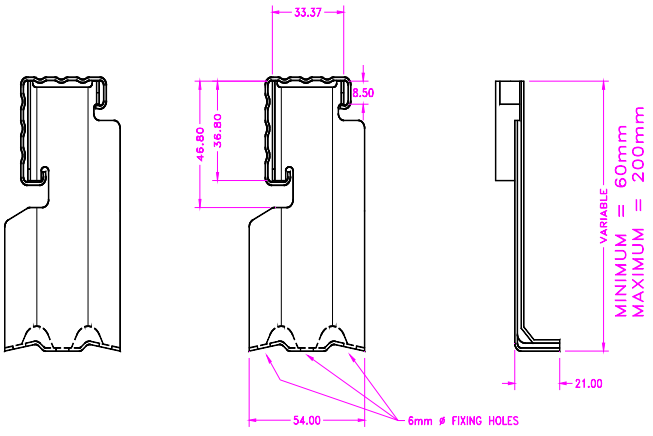
Gridtite is cold rolled and pressed from pre-galvanised Z39 steel. This manufacturing technique is used for the production of many construction components including most of the purlins in twin skin assemblies. When tested in our laboratory both bar and brackets demonstrated excellent levels of corrosion resistance.
Service life is affected by many factors that are outside our control, including the site location, distance from the coast, prevailing weather conditions, building use, localised air pollution and the standard of the installation. For these reasons a definitive service life cannot be given, however we would expect Gridtite to give at least 25 years reliable service in typical non-polluted environments.

5.0 Drawings and Dimensions




40
40
A
A
36
EFFECTIVE DIMENSION
1000
2000
3000

SECTION A–A


33.37
8.50
46.80
36.80
VARIABLE
MINIMUM = 60mm
MAXIMUM = 200mm
21.00
54.00
6mm ø FIXING HOLES

Appendix

Product data sheets

COSHH SAFETY DATA

MATERIAL

Pre-galvanised cold rolled and pressed high tensile steel components, factory applied EPDM rubber adhesive pad.

HEALTH HAZARDS

Risk of minor cuts and abrasions when handling pressed steel components [sharp edges].
General handling risks associated with moving materials around; longer lengths – 2&3 metre bars – present a risk to others on scaffolding, walk ways etc.
Lifting weights. 1 metre of Gridtite rail weighs 1 kilogramme.
Exposure to traces of Zinc based salts on galvanised surfaces.
Exposure to residual traces of production lubricant [suds oil].
Risk to eyes and skin from drilling swarf when installing with self-drilling fasteners [not supplied as part of the product]

STORAGE AND HANDLING

Use basic good practice when lifting boxes and bundles
Protect from weather before use.
Wear gloves when handling and assembling the components.
Barrier cream may be an additional benefit should the user have sensitive skin.
Wash hands at end of each shift and before eating/drinking/smoking.
Use safety goggles when installing fasteners [not supplied as part of the product]

FIRE HAZARDS

Gridtite is non-combustible

ADDITIONAL INFORMATION

PRODUCT - Gridtite® lightweight support bar and bracket system

MATERIAL

Z39 high tensile pre-galvanised steel; EPDM foam rubber self adhesive pad

APPLICATION

Supports outer skin roof / wall sheet and provides clearance for insulation; replaces traditional ferrules and zeds.

CONSTRUCTION

Cold rolled ribbed bar with pre-formed push together joints; clip-in pressed and punched brackets. The product is assembled on site. Pre-punched hole in joint to allow lock-up using a fastener

BAR SIZES

40mm x 40mm cross section, in 1m, 2m, 3m, lengths, special lengths available to order

BRACKET SIZES

60,80,85,90,95,100,120,130,140,150,160,180, & 200mm high, ex-stock, plus up to 300mm to order.
Other sizes can also be produced, depending on quantity. Please call our sales office for details.

MARKING

Production batch number; bracket location numbers; brand name

Load testing programme

Test 1 Point load

Method.
2 no. 140mm high Gridtite brackets were fixed at 1m c/c into a length of Gridtite bar. The brackets were fixed down to a suitable purlin section. A point load was applied to the top face of the bar at the mid point of the two brackets until failure occurred.

Result: Mean load to failure - 2235N

Test 2 Bracket attachment

Method.
A single 140mm bracket was fixed to a 750mm long bar section. The bracket was fixed down to a suitable anchor point. A hook assembly was attached to the bar on either side of, and close up to, the bracket. An increasing load was applied to the hook until the bracket/bar connection failed.

Result: Mean load to failure - 5633N

Test 3 Down slope side load

Method.
3 no. 180mm high Gridtite brackets were fitted to a 3-metre long Gridtite bar, at 1 m c/c. the assembly was fixed down to a rigid steel channel section. A suitable cleat was fixed to the top face of the Gridtite bar, at the mid point of two brackets, so that a load could be applied across the line of the bar [in the direction a roofing sheet would normally be laid]. A steadily increasing load was applied to the cleat and the maximum value applied was measured. The load was released and the assembly was allowed to recover. A load was then applied in the opposite direction and again the value was recorded.
In both cases the bar recovered to its' original position.

Result: Mean maximum load applied, direction 1 – 768N; direction 2 – 967N.
n.b these values reflect the maximum travel of the test equipment.

Test 4 Sway load

Method.

3 no. 180mm Gridtite brackets were fitted to a 3-metre long Gridtite bar at 1m c/c. the assembly was fixed down to a rigid steel channel section. A top load of 200kg was applied to the top face of the bar using a roller. A steadily increasing load was then applied to the end of the bar to simulate 'loading out', until the brackets could no longer offer resistance. The test was repeated using fresh products, applying the load from the other end of the bar in the opposite direction.

Result: Mean maximum load applied, direction 1 – 830N; direction 2 – 890N

Test 5 roof assembly sway load

Method

A 3m x 6.5m roof assembly comprising 5 no, 1.5mm thick purlins set at 1.5m c/c, 0.7mm steel liner panels, 180mm Gridtite brackets, 3m Gridtite bars, aluminium standing seam halters and associated aluminium top sheets were assembled on a test rig. A steadily increasing test load was applied to the end of the central grid bar. Transducers measured the movement of each Gridtite bracket

Result: Maximum resistance was 12kN. All brackets registered a uniform sideways load indicating that the assembly acted as a single unit, distributing the load evenly. Full test reports are available upon application.

Test 6) Assembled roof system down slope test

Method

A 3m x 6.5m roof assembly comprising 5 no, 1.5mm thick purlins surface mounted at 1.5m c/c on a supporting sub-frame, 0.7mm steel liner panels, 180mm Gridtite brackets, 3m Gridtite bars, aluminium standing seam halters and associated aluminium top sheets were assembled. A steadily increasing test load was applied to the leading 'up slope' edge of the roof sheets. Transducers measured the movement of each purlin, Gridtite bracket and bar
Result: maximum load applied [maximum equipment travel] was 18kN. All transducers registered a uniform deflection rate, indicating that the assembly acted as a single unit, distributing the load evenly, with no component failures. Note: The assembly was mounted on typical cold rolled purlins but without purlin fixing cleats in place. Thus an exaggerated purlin top flange rotation was observed.

Load test summary

We believe that Gridtite is the most tested spacer bar system currently available. We are proud of the product and its' ability to offer cost effective, reliable and stable support for twin skin systems complying with Part L / Technical Standard J.

6.0 Disclaimer and conditions

Fixing Point makes every effort to ensure that the data, guidance and opinions given are as accurate as possible, however no liability can be accepted for errors, omissions, or inaccuracies, howsoever caused.

No warranty as to the use or suitability of the product[s] is given or implied.

Users should confirm for themselves the suitability of the product[s] for the proposed application.

We have a policy of continuous product development and improvement and reserve the right to change specifications without notice.
All test data has been obtained in the laboratory.
For your convenience we offer a free advisory service. Please call your nearest Fixing Point Service Centre or our Technical Department at Cheltenham for further details.
All goods supplied are subject to our standard conditions of sale.

Advice on the use of this product is available from:

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