THERMAL MOVEMENT & EXPANSION

TECHNICAL GUIDANCE — METAL PROFILED SHEETS

Applies to Briarwood Leathergrain PVC Plastisol coated steel sheets — 32/1000, 34/1000, 13/3 and 20/1000

This is Briarwood's published guidance on thermal movement and expansion: what a coated steel sheet does with temperature, and what has to be allowed for at the fixing so that it can.

It covers what thermal movement is, when a design has to make provision for it, how a fixing is set so that a sheet can move without damaging itself, and what movement looks and sounds like in service. Cutting and edge protection, storage and handling, fixings and fasteners, oil canning, and cleaning and maintenance each have their own note and are not repeated here.

1. Understanding thermal movement

Metal roof and wall cladding expands and contracts with changes in temperature. This is known as thermal movement, or thermal expansion, and it is a normal characteristic of all metal materials. A sheet increases slightly in length when it is warmed by the sun and contracts again as it cools. Allowing for that movement is essential to long-term performance and appearance.

It has to be allowed for because the sheet and the structure it is fixed to do not move together. A coated steel sheet in the open gains and loses heat quickly; the purlin behind it, and the frame behind that, lag well behind it and never reach the same range. The difference between the two has to go somewhere, and where it goes is decided at the fixing.

How far a sheet moves along its length depends on three things: the length of the sheet, the range of surface temperature it actually experiences, and the metal itself. The first two belong to the job. The third is a property of the material, and it is Briarwood's to publish.

> **THESE PROFILES ARE STEEL**
> Briarwood does not supply 32/1000, 34/1000, 13/3 or 20/1000 in aluminium. Aluminium moves substantially more than steel for the same temperature change, and an expansion figure taken from an aluminium source, from another manufacturer's literature or from a general reference work is not Briarwood's published figure and must not be applied to these sheets.

This guidance sets out what you must allow for when installing Briarwood profiled steel sheets. A sheet that cannot move takes the movement into itself, and section 6 sets out what that looks like.

> **ALLOW FOR IT, OR THE SHEET TAKES IT**
> Movement that is not allowed for at the fixing does not disappear. It goes into the sheet — as an elongated hole, a worn washer, a buckled flashing or an opened lap — and every one of those is a place water gets in.

2. How much a sheet moves

The movement of a sheet along its length is its length, multiplied by the change in temperature, multiplied by a coefficient for the material. Two of those three come off the job in front of you. The third is a single published figure, and this section is where it belongs.

NO EXPANSION FIGURE IS PUBLISHED IN THIS VERSION
Briarwood is confirming the coefficient of thermal expansion to be published for these sheets, and until it is issued this note carries no expansion figure and no worked example. The figures given in the November 2025 version of this document are withdrawn and must not be used. A figure taken from an earlier version, from a merchant's datasheet, from another manufacturer's literature or from a general reference work is not Briarwood's published figure. Where a movement calculation is needed for a particular building, ask Briarwood Technical in writing before ordering and keep the answer with the guarantee certificate.

What does not depend on the figure: the movement is real, it accumulates along the length of the sheet, it is largest on the longest sheets and on the darkest colours, and it is accommodated in exactly the same way whatever its size turns out to be. Section 4 sets out how, and section 4 does not change when the figure is published.

SURFACE TEMPERATURE IS NOT AIR TEMPERATURE
A dark sheet in direct summer sun reaches a far higher surface temperature than the air around it, and moves accordingly. The range a roof sees between a frosty winter night and a still summer afternoon is much wider than the range in the forecast. Allow for surface temperature, not for air temperature.

3. When it matters

A short sheet moves a small distance in absolute terms, and correctly set fixings absorb it without anything being asked of the design. Movement accumulates along the length, so the cases that need thought are the long sheet, the long continuous run of sheets fixed end to end, and the long unbroken flashing or trim.

Sheet length	Status	What it means for movement
500 mm	Minimum length	The shortest sheet Briarwood cuts. Movement over a length this short is small and is taken at the fixings without special provision.
Up to 8,000 mm	Standard maximum	The normal range. Movement is shared between sheets, and each end lap takes a little of it, so no single point carries the whole run.
Up to 15,000 mm	Non-standard, made to order	Fewer end laps, which is a real benefit, but the whole of one sheet's movement is then concentrated at its two ends. Refer to Briarwood Technical before ordering.

Lengths as published in the June 2026 metal brochure. A longer sheet is not automatically the better answer.

An end lap is itself a small movement joint: the lapped sheets slide very slightly against one another as they expand and contract. A lap whose fixings have been over-driven cannot do it, and the movement it should have absorbed is pushed out to the ends of the run instead.

REFER THE LONG ONES BEFORE YOU ORDER
Briarwood has not yet published the sheet length at which special provision for movement begins. Until it does, treat a non-standard length, a continuous run of sheets fixed end to end across many bays, and any run the designer is unsure of as a case to refer: ask Briarwood Technical before ordering, and keep the answer. Referring the question is what gets the run designed for movement. Guessing at it is not.

4. Fixing so the sheet can move

This is the operative section of this note. On a fixed-through profiled sheet the allowance for thermal movement is made at the fixing: the sheet moves a little against a sealing washer that is compressed but not crushed, and the washer takes it. Every rule below exists so that it can.

1. Set each fixing square to the sheet, and drive it until the sealing washer is evenly compressed and has just begun to extrude from under the head. Stop there. That is the whole setting.
2. Do not over-tighten. An over-driven fixing dishes the sheet around the head, distorts the washer so that it no longer seals, and clamps the sheet hard to the purlin, so that the movement which should have been taken at the washer is forced into the sheet instead.
3. Do not under-tighten. A washer that has not been compressed does not seal, and the sheet works against the shank of the fixing every time the temperature changes, wearing through the coating at the hole.
4. Do not force a sheet into position. If it will not sit down without persuasion, the setting out is wrong and the setting out is what to correct. A sheet sprung into line carries that stress for the life of the roof, and it has nowhere to put its thermal movement on top of it.
5. Isolate the sheets from preservative-treated timber. Where sheets are fixed to treated timber purlins, apply a suitable PVC barrier tape to the purlin face before the sheet goes on.

BOTH FAULTS LOOK THE SAME FROM THE GROUND
An over-driven fixing and an under-driven one are indistinguishable at a glance and both fail, for opposite reasons. The only reliable check is the washer: evenly compressed all the way round, just beginning to extrude, and not squeezed out on one side. Check a sample on every elevation before the access equipment comes down, because after that nobody will.

What this section does not set

Fixing centres, purlin spacing and fixing lengths are not set by this note. They are determined from Briarwood span and load data and the project engineer's design, and they are covered by Briarwood's published Fixings & Fasteners schedule and the installation instructions. Where those documents and a project engineer's design differ, the engineer governs.

The component doing the work here is the fixing, and it is worth choosing as carefully as the sheet. The washer that takes the movement for the life of the roof is the one that was specified, not the one that was to hand.

TREATED TIMBER ATTACKS THE COATING FROM THE BACK
Preservative in treated timber corrodes the coating where the sheet bears on it, and copper, lead and other dissimilar metals do the same where they touch the sheet or wash over it. Barrier tape on the purlin face is what stops that contact, and thermal movement is why it cannot be relied on to stay where it was put: the sheet works against the purlin every day of its life. Briarwood's published Anti-Condensation Felt guidance asks for the same tape where felt-lined sheets are fixed to timber.

5. Expansion joints in long runs

A continuous run of sheets fixed end to end across many bays does not behave as a single long sheet, because each end lap takes a little of the movement. Movement still accumulates along the run, and it has to be released somewhere rather than building up against a gable, a corner, or a long length of rigid flashing.

Briarwood does not currently publish an expansion joint rule for these profiles. Briarwood does publish a movement joint rule for its fibre cement sheeting; that rule is for a different material, derived from a different standard, and it does not apply to steel. Do not transfer it, and do not transfer a rule from another manufacturer's metal literature either, because it will have been written against that manufacturer's profile, gauge and fixing pattern.

WHAT TO DO ABOUT A LONG RUN
Until Briarwood publishes a joint rule for these profiles, refer the run to Briarwood Technical in writing before ordering, install to the answer given, and keep that answer with the guarantee certificate. A long run installed without either is a long run nobody has designed for movement.

Refer the run, not the sheet. State the overall length of the continuous run in each direction, the profile and gauge, the colour, the sheet lengths proposed, the purlin material and spacing, whether the run is roof or wall, and any point where the run meets something rigid — a gable, a parapet, a firewall, an existing building or a long flashing.

A RUN THAT IS REFERRED IS A RUN THAT IS DESIGNED
A written answer from Briarwood Technical, kept with the certificate, is the record of how the run was designed for movement. It costs one email before the order goes in, and it is the difference between a run somebody thought about and a run nobody did.

6. What you will see in service

Movement is audible, and sometimes visible. None of the following is a defect.

- Slight noises, or 'pings', as sheets expand and contract, most often first thing in the morning and at the end of a hot afternoon. Normal and harmless.
- Minor changes in appearance as reflection lines shift across the sheets, and small apparent changes in the spacing of joints.
- Slight waviness in the flat of a sheet. That is oil canning rather than movement: an inherent characteristic of profiled metal, not a defect, and Briarwood's published Oil Canning guidance covers it.

These are expected characteristics of a metal roof or wall. A building that ticks as the sun comes onto it is a building behaving normally.

What is not normal, and should be reported

Report any of these

- A fixing that has worked loose
- An elongated or slotted fixing hole
- An end lap or side lap that has opened
- A perished, split or badly squeezed washer
- Coating worn away around a fixing
- A flashing buckled or split at a fixing

Each of these is a sign that movement is being taken somewhere it should not be. They are what the twelve-monthly inspection is looking for, and Briarwood's published Cleaning & Maintenance guidance sets out that inspection and the record it produces. Anything that looks like a defect in the sheets themselves should be reported to Briarwood in writing straight away, and within 30 days of finding it.

7. What is normal, and what is not

Thermal movement is a characteristic of the product, not a defect in it. A sheet that expands, contracts, ticks as it does so and shows a shifting reflection line is performing as it was designed to, and none of that is a claim.

Damage that follows from failing to allow for that movement is a different matter. A sheet forced into position, a fixing over-driven so that the sheet is clamped rather than held, a long run designed with no provision at all: these are installation faults, and responsibility for the installation rests with the contractor.

What to keep

- Any written answer from Briarwood Technical on sheet length, a long run or an expansion joint, kept with the guarantee certificate and its Certificate Number.
- Dated photographs of fixings set at representative positions on each elevation, taken before the access equipment came down.
- The twelve-monthly inspection record, which the Cleaning & Maintenance guidance sets out.

> **IF YOU ARE NOT SURE, ASK BEFORE YOU ORDER**
> Sheet length, run length and the provision made for movement are all decided before anything is made, and none of them can be changed once the sheets are cut. Briarwood's contact details are on the first page of this note.

Thermal movement is not a fault to be prevented. It is a behaviour to be allowed for, and the allowance is made at the fixing.