

CAUTIONARY NOTES



Conditions That May Adversely Affect TC-417 Installed on Metal Substrates

Definition: Metal substrates referred to in this information sheet are those commonly used in the construction industry as wall cladding and roofing, and their supporting structures. Most common are galvanised steel, primed steel, "galvalum", and to a lesser extent, aluminium. Copper and other metals are also used, but they are unlikely to act as a substrate for **TC-417**.

Although they happen very rarely, conditions affecting metal substrates can arise that adversely affect **TC-417** installations. Some conditions are related to structural design and resultant substrate behaviour, some are usage-induced, while others are related to materials present on the substrate prior to installation.

NOTE: The following information is relevant to both conditioned and unconditioned buildings. However, there are additional issues related to buildings in these categories, their locations in terms of climatic conditions and existing insulation, if any, and its placement in relation to the vapour retarder. For information concerning such structures, please see our information sheet titled **Use of TC-417 to Control Condensation in Metal Buildings**.

1. Structural Design:

In buildings erected in areas subject to wide variations in daily temperatures, spacing of roof joists and studs can, if great enough, result in excess movement of roof panels and/or wall cladding because of a process known as "oil canning" taking place as the panels expand and contract with the temperature changes.

"Oil canning" is defined as the deflection of the panel, inward or outward midway between its attachment points to the joists or studs, as the temperature increases, and then returns to its normal position as temperature decreases. Unless adequately allowed for in the manufacturer's design, oil canning will occur when metal panels fixed along their edges are subject to broad temperature changes, the degree of deflection changes in direct relation to:

- a) Spacing between the supports;
- b) Panel profile;
- c) The range of temperature change;
- d) The surface temperature of the panel.

Roof panels are much more likely to experience large deflections than wall cladding because of exposure to direct sunlight.

Excess oil canning of metal panels may result in fracturing of the installed **TC-417** matrix with resultant fall out of some of the material. Fallout will be in a band following the centre line of the deflection, with width determined by the:

- a) Thickness of the installation;
- b) Amount of deflection.

When considering the use of **TC-417** in a metal building, the decision should be based on the following criteria:

- a) Location of the building and ambient temperature fluctuations;
- b) In the case of roof decking, is external insulation in place or to be added, and if so, its R (RSI) value;
- c) Panel profile;
- d) Spacing of the structural members (e.g. beams, posts, joists, studs, etc.), supporting the panels;
- e) Thickness of the **TC-417** installation.

Note: If in doubt as to whether the panel profile will adequately control oil canning under the given circumstances, the manufacturer should be consulted.

After the foregoing information has been gathered, a decision as to whether to install **TC-417** can be made using the following criteria:

- a) Spacing between structural members shall be such that deflection of the panels used in the stated circumstances will not exceed the deflection limit quoted below;
- b) Deflection must not exceed 1/240 of the span between the supporting members when subject to deflection testing according to ASTM E759 – 92 (Reapproved 2000) or other applicable test protocol;
- c) Thickness of installed **TC-417** not to exceed 125 mm / 5 in. on a horizontal surface and 175 mm / 7 in. on a vertical surface.

2. Presence of Other Materials on the Substrate:

Because our material adheres to the surface of the substrate, fallout can occur if the metal has been previously coated with:

- a) Paint that has not properly adhered. In this situation our material adheres to the paint, but the additional weight is too much for the paint to substrate bond and fallout occurs. Fallout caused by poorly bonded paint will most likely be in patches rather than widespread;
- b) Paint that is incompatible with galvanised steel. When such paint is applied, a process called "soapification" occurs. This results in a greasy, soapy film forming on the galvanised surface that is incompatible with TC-417 adhesive resulting in possible staining and/or fallout over part of, or the entire, painted surface;
- c) If **TC-417** is installed over poorly adhered fireproofing the additional weight can cause some or all of the material to fall out, carrying our product with it;
- d) Paint or other coating present on the steel substrate that may re-emulsify when our adhesive is applied. It is very unlikely that this situation will occur unless the building is quite old;
- e) Presence of a coating on the substrate that is

incompatible with a water-based material such as our adhesive. **Note:** Some galvanised materials are coated with a petroleum-based material at the time of manufacture. If this coating is not removed prior to the installation of **TC-417**, one or more of the following will occur:

- The spray operator will not be able to make the material stay up in the overhead position;
- If he is successful in getting the material to stay up, patchy fallout will occur when spraying into difficult locations;
- Any material that does stay in place will fall out when the water evaporates from the installation.

3. Surface Staining of Cured Installation:

If **TC-417** is being installed on an old galvanised steel substrate on which rust patches appear, it is a virtual certainty that rust-coloured stains will appear on the surface of the cured material unless the rust was sealed prior to the installation.

Similarly, stains from other materials present on the substrate that are water-soluble or water-carried such as dust and dirt may migrate to the surface of the cured **TC-417** unless the surface was cleaned and/or sealed prior to installation.

Notes:

- a) Surface staining is just that. It rarely extends more than 3 mm (1/8") into the installation, and it is unlikely to be widespread over the entire surface;
- b) Such staining cannot be eliminated by over spraying it with more TC-417. The stain will simply dissolve and migrate to the fresh surface;
- c) If the stained area is small, the best solution is to carefully cut it away from the rest of the installation. The cut area can then be filled with fresh product;
- d) If the staining is widespread, the only satisfactory solution may be to overspray the entire surface of the



installation with a stain-blocking primer followed by any good quality water-borne paint.

4. Heavily Oxidised Aluminum:

In some instances, **TC-417** will not adhere properly to a heavily oxidised aluminum substrate. We are not aware if this is a universal situation involving aluminum, or if it restricted to certain alloys.

Therefore, we strongly advise that all heavily oxidised aluminum be cleaned or sealed with an aluminum-compatible primer prior to **TC-417** installation.

5. Vibration:

Cured **TC-417** is very vibration resistant. However, an uncured installation (still wet within the matrix and at the substrate) is vulnerable to vibration-induced fallout.

We have encountered a situation in which our material, applied to steel decking topped with reinforced concrete that formed a driveway above, fell out prior to curing. Fallout was due to vibration caused by vehicular travel over the area during the curing period.

Note: We strongly recommend that, in circumstances where vibration is to be present, either intermittently, or as part of the everyday life of the structure, the installing contractor makes it clear to the authority in charge that **TC-417** must be completely cured prior to being subject to vibration.

6. Panel Deflection Caused by Intermittent Load

Metal cladding, used on roofs and/or walls, will deflect when subjected to any load. If the load applied is intermittent, its application may cause sufficient deflection on each occasion to exceed the elastic limits of installed and cured TC-417, resulting in material fracture and fallout.

7. Structurally Sound Steel Decking

The following two pictures illustrate an excellent thermal/acoustic installation on structurally sound steel decking.



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