PROMAT® TL Board – Fixing Details to Soffit and Beam Sections

Introduction

PROMAT® TL Board is designed to offer the specifier a solution for upgrading of the thermal performance of semi-exposed concrete decks, in both the conversion and refurbishment of existing buildings and in new build constructions.

PROMAT® TL Board combines Promat's moisture resistant calcium silicate and Kingspan's phenolic insulation technologies, to achieve the required U-value, using the lowest installed insulation thickness.

Direct and Indirect Fixing

Consideration needs to be given to a number of factors when determining how the PROMAT® TL Boards are to be fastened to a concrete soffit.

Installation may be by direct or indirect fix. Direct fix is selected where there is limited ground to soffit height, little or no existing surface-mounted services and a level, regular concrete soffit. Suitable anchors such as the Ejot DDS 7.3 concrete anchor (steel fixings) or Fischer Hammerset DIPK 10mm (plastic fixings) may be used. It should be remembered however, that the cold bridging effects of the steel fixings might result in typically 10mm greater board thickness being required to achieve a particular U-value.

Indirect fix may be required, using either treated timber battens or metal furring, where there is a need to create "line of level", due to the uneven nature of the concrete soffit or to accommodate surface mounted services.

These fixing details to a soffit are covered in the PROMAT® TL Board brochure (August 2004).

Cladding to Supporting Structural Concrete and Steel Beams

The concrete deck is normally supported with either concrete or steel beams. In addition to any fire protection measures that may be required to these supporting elements, they will affect the thermal behaviour of the deck and contribute to the heat loss from the building. They must therefore be taken into account in calculating the overall U-value of the deck, together with any fire protection.

Concrete Beams

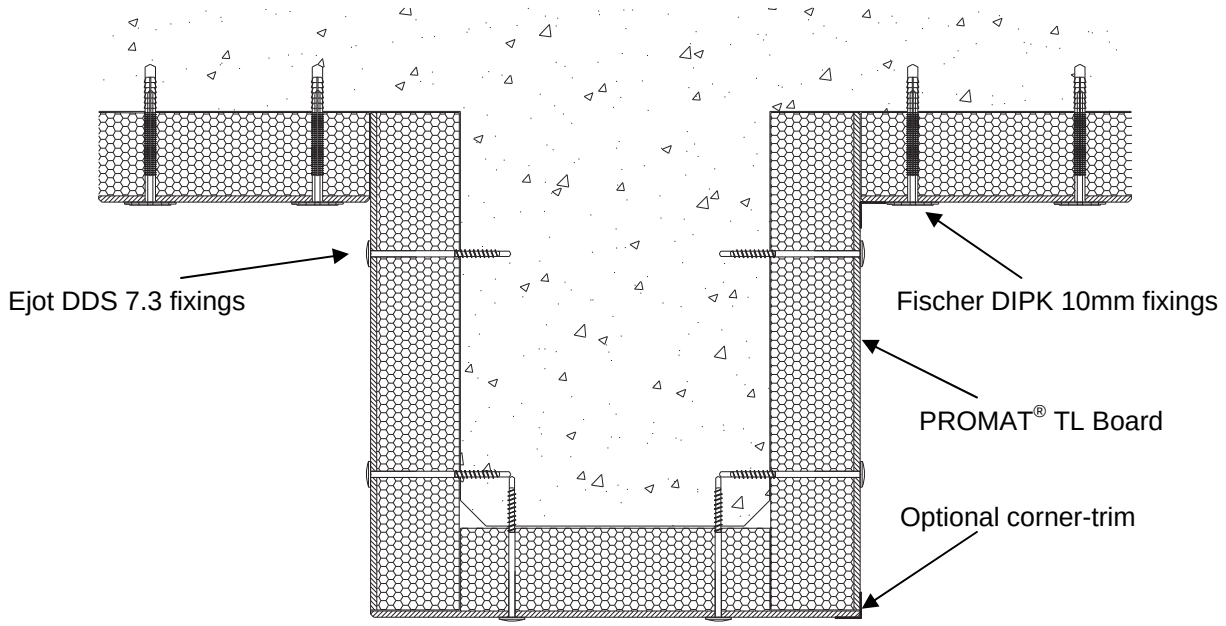

Figure 1

AUTHORITY: Promat Recommendation - Based on in-house knowledge and Technical Experience

Promat UK Limited
Technical Services Department
The Sterling Centre, Eastern Road
Bracknell, Berkshire RG12 2TD
Tel: 01344 381 400
Fax: 01344 381 401
E-mail: technicaluk@promat.co.uk

It may not necessarily be a requirement that the concrete beam sections are over-clad, however, if they are not, then it is likely to result in higher levels of insulation being required to the main soffit area to the deck. This may not be an economic proposition (or may make it impossible to achieve the overall U-value required).

Where the beams are to be insulated, it is normal for a single thickness of PROMAT® TL Board to be used for both the concrete soffit, and for the cladding of any down standing concrete beams (as shown in figure 1). The actual thickness required will be determined with due regard to the effect that the beam construction will have in the U-value calculation.

Since the surface of concrete soffit and beams are prone to being uneven, installing PROMAT® TL Board to achieve a good finish requires some care.

It is recommended therefore, that the skirt/side sections to the beam cladding be installed first in order to establish the finish line equal to the soffit board thickness below the beam soffit. The fixings on these vertical PROMAT® TL Boards should be metal, as they offer a higher shear resistance, and a more stable fix than plastic fastenings.

The insulation on the PROMAT® TL Board of the beam soffit panel will need to be cut back to permit the insulation layer to be inserted between the two skirt sections in order that the facing board can be accurately dressed up to the bottom edges of the two skirts panels. Some latitude in fit may be achieved by adjusting the tightness of the soffit fastenings.

The main field of soffit panels to the concrete deck can finally be installed, between the beam sections. If any unacceptable gaps are evident on the external and/or internal corners of the beam cladding, for example where it has been difficult to establish an accurate line of level, these may be sealed with a suitable sealant bead. If necessary, they may be finished by applying a lightweight corner trim angle, using either liquid nails or screw fixings. Boards are supplied with a bevel edge as standard, and this may be copied onto to the cut boards for effect.

Where head room below the beam is of particular concern but where the finish to the beams is required to conform with that of the concrete soffit, it may be necessary to reduce the insulation thickness at that point, (in part, or completely). If no insulation is to be used on the beam soffit, PROMATECT® HD board may be used in place of the PROMAT® TL Board. However, this may make it impossible to fully comply with the insulation requirements.

Steel Beams

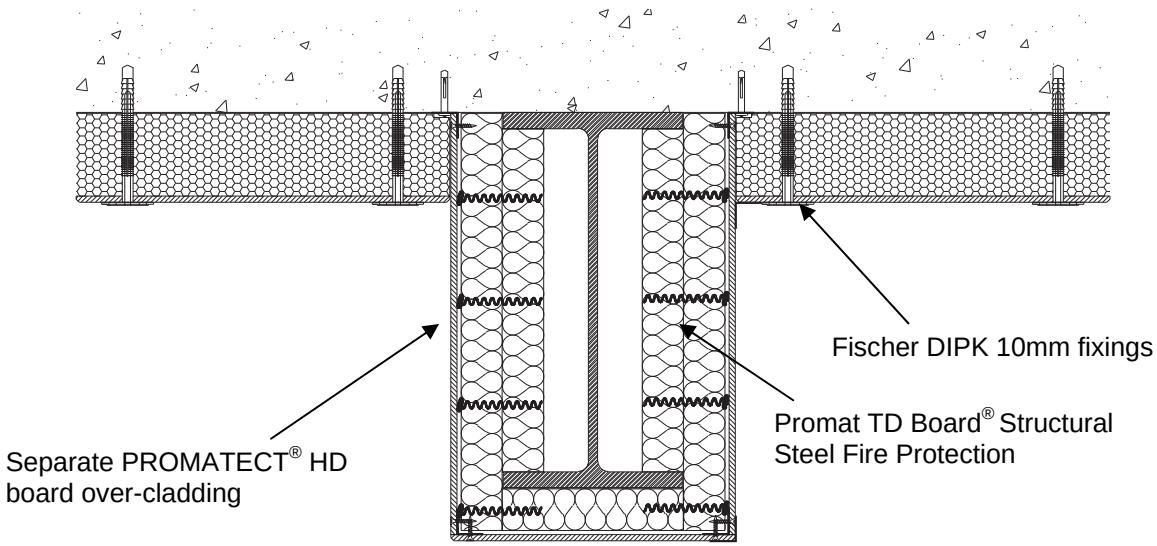

Figure 2

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Promat UK Limited
Technical Services Department
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Bracknell, Berkshire RG12 2TD
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Concrete decks supported by steel beams present a more significant problem in terms of thermal bridging than those supported by concrete beams. They will more commonly require separate fire protection.

It is not acceptable to simply over-clad fire protection boards (or intumescent paint), with PROMAT® TL Board. The fire protection must remain free to function in fire, without hindrance that may arise from the bulky over-cladding. Similarly it is not normally acceptable to augment the insulation internally to the fire protection, with say, mineral wool within the beam webs.

If the Promat PROMATECT® 250 or Promat VERMICULUX® boards are applied to the beam to provide the structural steel protection (and to give a fair face finish) cannot achieve adequate insulation to compensate for the thermal bridging of the steel beam, then the fire protection board can be increased in thickness (this effectively will increase the level of structural fire protection). However, this is unlikely to provide an acceptable or economical solution, and the following alternative is recommended.

Promat TD Board® structural steel protection, in addition from being able to provide fire resistance for up to 4 hours, has a significantly lower thermal conductivity than those of the Promat fire protection boards considered above. It may therefore be used to advantage in providing thermal insulation as well as fire resistance, and may be over-clad with an independently supported lightweight casing of PROMATECT® HD.

A typical installation where Promat TD Board® is used to provide the fire protection is shown in Figure 2. The normal Promat TD Board® soldiers (minimum 40mm thick), may be extended to form a continuous membrane, adhered to the steel using VICUBOND® WR (Consult the Promat Passive Fire Protection Handbook for further details). An increase in thickness of the Promat TD Board® may be established, to achieve a compromise between an increase in fire resistance and the thermal insulation required to address the thermal bridging issues of the steel beam.

PROMATECT® HD may be used as a lightweight over-cladding provided that it is independently supported. That is, fastened to lightweight angle to the concrete soffit and at the lower corners.

The combinations of deck construction, fire resistance periods and beam sizes makes it difficult to identify the preferred construction to achieve a particular U-value. Please consult Promat Technical Services Departments for further details and advice on specific applications.

Thermal Conductivities of Material Components

Table 1 below, shows the thermal conductivities for common material components likely to be associated with providing thermal insulation fire protected steel beams supporting concrete decks. These are provided in order that alternative solutions may be examined to identify the most appropriate way to control cold bridging at steel beams in individual cases.

Table 1 - Thermal Conductivities

Material	Thermal Conductivity @20°C W/mK
Hot Rolled Steel	60.0
Stainless Steel	17.0
Promat PROMATECT® HD	0.350
Promat PROMATECT® 250	0.189
Promat SUPALUX®	0.170
Promat VERMICULUX®	0.130
Promat Promat TD Board®	0.034
Kingspan Phenolic Insulation	0.022

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