



TUFS

THERMAL UNDER FLOOR SYSTEM

Patent pending 2007-00617

INTRODUCTION

Thermal insulation of buildings is becoming increasingly relevant as energy costs rise and climate change a reality.

Expanded polystyrene (EPS) is one of the most efficient and cost effective materials to provide thermal insulation in buildings.

One area that acts as a thermal heat soak is the under floor area of any building drawing heat generated inside buildings into the ground.

The TUFS under floor insulating system acts as a easy to install under floor insulation system as well as having a number of other functions and benefits.

PRODUCT DESCRIPTION

- TUFS is a 40mm thick, EPS, under floor, thermal insulating system used as an integral part of ground floor slab systems between conventional foundation walls.
- TUFS panels are 1,2 x 1,2 m square and are joined together by tongue and groove edging and a propriety expanded polystyrene adhesive.
- TUFS prime function is to insulate ground floor concrete slabs but it also acts as a moisture proof barrier replacing the continuous plastic sheeting normally used for this purpose.
- The TUFS sheets substitute approximately 50% of the concrete used in conventional concrete floors and due to the lower concrete volume the steel mesh size used can also be reduced.
- TUFS can also be used as an EPS thermal insulating cavity former in external brick walls. In this application it will also have a dual function of creating an 'in wall' moisture barrier.

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SYSTEM APPLICATION

UNDER FLOOR:

- 1) Concrete strip foundations and foundation walls are built as normal
- 2) Stepping of external walls to accommodate the floor slab is done as normal.
- 3) Compact earth up to the under side level of the floor slab.
- 4) Strip plastic DPC is laid on top of the brick course on which the floor slab will rest.
- 5) TUFs sheets are laid from the inner edge of the brickwork over the compacted area starting from a corner, glueing and locating the tongue and groove sheets as the area is covered. TUFs sheets are cut with a handsaw or knife to fit exactly into the walled area and offcuts kept to use elsewhere and prevent wastage.
- 6) The bottom of the TUFs sheets should be about 20mm below the top surface of the inner brick to allow a 65mm covering of concrete.
- 7) 35mm thick 40 x 40mm EPS steel mesh spacer blocks are fitted to the underside of the steel mesh before laying this onto the TUFs sheets. This ensures that the steel mesh is located where it is most needed to prevent shrinkage cracking of the concrete - just below the top of the concrete surface. 4 spacer blocks are used per TUFs sheet.
- 8) Electrical ducting etc can still be run in the concrete top section but if larger piping is run in the floor this can be cut into the EPS sheets.
- 9) Concrete is then poured to complete the composite floor construction and surface finished as normal.

IN WALL:

- 1) Build one skin of brick wall place TUFs sheets vertically against the bricks and then proceed to build other brick skin wedging the TUFs sheets in the centre.
- 2) Glue the tongue and groove sheets and cut to fit around windows and doors.
- 3) Final wall thickness will be 260mm as opposed to conventional 220mm.

PRODUCT BENEFITS

Ground floor insulation

EPS is used in a multiplicity of applications for its thermal insulating properties. TUFs acts as a thermal barrier to prevent under floor cold penetrating rooms and keeping heat generated in houses from being dissipated into the ground.

As a vertical brick wall 'cavity former' TUFs will act as an in wall thermal insulation barrier.

Water proof barrier

EPS is impervious to water and with the combination of the TUFs tongue and groove joining of the sheets secured by a glue line provides a continuous under floor moisture barrier. Plastic sheet DPC membranes are thus no longer necessary.

If used for wall insulation TUFs will also work to create a vertical moisture barrier.

Concrete reduction and reduction of potential for surface cracking

The 40mm TUFs sheets replace almost half of the concrete used in a conventional 85mm ground floor slab reducing cement usage and the heavy labour required in placing the concrete.

As the concrete volume is halved the shrinkage stress of the concrete is reduced and as the EPS spacer blocks ensure the reinforcing mesh sits just below the floor surface its function to reduce cracking is optimised.

Reinforcement mesh size reduction

As the concrete volume is reduced the mesh size can be reduced typically from a 193 mesh to a 100 mesh. This reduces the cost and eases material handling.

Optimisation of underfloor heating systems

If under floor heating is installed the TUFs system should be obligatory. TUFs will ensure that heat generated is not absorbed by the ground and is forced upwards into the house itself.

Floor Loading

Typically design loadings for floors should be:

	Domestic	Non-domestic
Intensity of distributed load (kPa)	1,5	2,5
Concentrated loads (kN)	1,4	2,7

TUFs flooring can support these loadings without undue deflection.

Long life

EPS is rot and rodent proof and dimensionally stable and thus will retain its thermal insulating and moisture barrier effectiveness for the life of the building.

Cost

The elimination of the need for plastic sheet DPC, the substitution of concrete with EPS at near cost equivalence and the reduction of the size of the reinforcing mesh means that the TUFs composite floor system will give the advantages of thermal insulation at no extra cost.

When used as a vertical thermal insulating cavity TUFs will ass a nominal amount to the building cost providing significant benefits reducing energy consumption required for heating and cooling.

PRODUCT SPECIFICATION

EPS sheets:

Expanded polystyrene sheet size:	1,2 x 1,2 m x 40mm thick
EPS density:	16 gm/lt
Fire retardant additive:	YES
Edge configuration:	2 sides 10mm deep x 20mm thick rectangular tongue and 2 sides 10mm deep x 20mm high groove.
Thermal conductivity:	0,038 w/mK

EPS spacers:

Expanded polystyrene blocks:	35mm high x 40mm square with 5mm cross groove on upper surface
Number:	4 per each standard TUFs sheet

Adhesive:

Polyglue SBR expanded polystyrene adhesive packed in 1 and 5lt tins.
1lt of Polyglue will be sufficient to glue 20-25 TUFs sheets.

Sales code:

TUFs001 = 1,2m X 1,2m x 40mm TUFs sheets