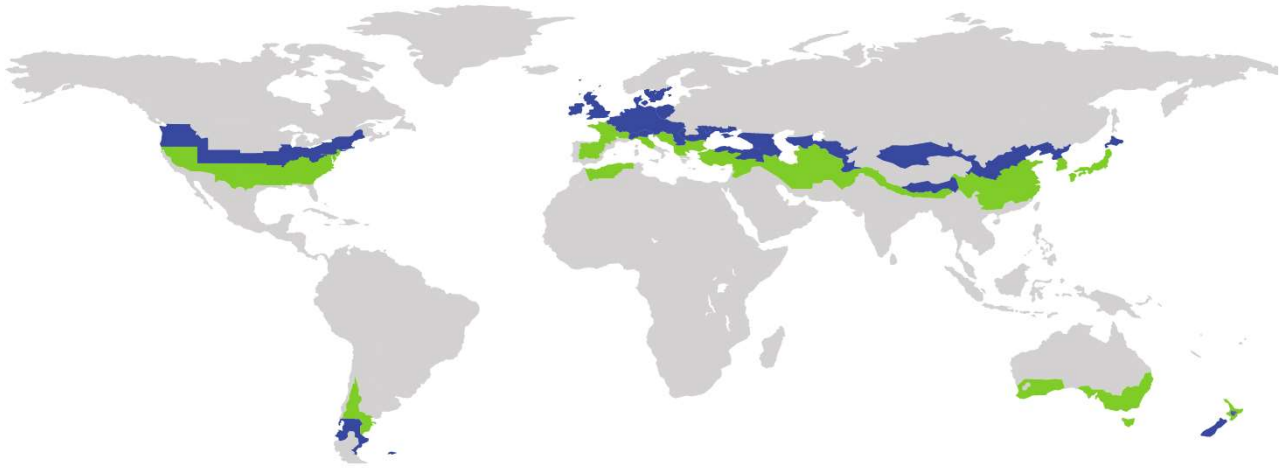


CERTIFICATE

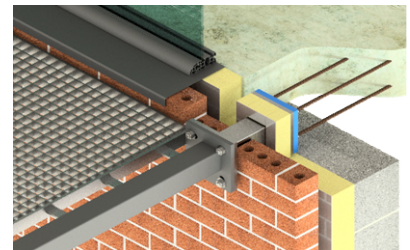
Certified Passive House Component

ID: 1451bc03 valid until 31. December 2026

Passive House Institute
Dr. Wolfgang Feist
64342 Darmstadt
GERMANY



Category **Balcony connection**
Type **Cantilevered**
Manufacturer **Farrat Isolevel Limited**
WA15 8HJ Altrincham
United Kingdom
Product name **FARRAT TBK & TBF**



This certificate was awarded based on the following criteria for the climate zone

Hygiene and comfort criterion

The minimum temperature factor of the internal surfaces is

$$f_{Rsi=0.25m^2K/W} \geq 0.86$$

Energy criterion

The linear thermal bridge loss coefficient is

$$\Psi \leq 0.25 \text{ W/(mK)}$$

Efficiency criterion

The heat losses depending on the possible load bearing do not exceed

$$\text{Eff.t.} \leq 10.00 \text{ W/(kNmK)}$$



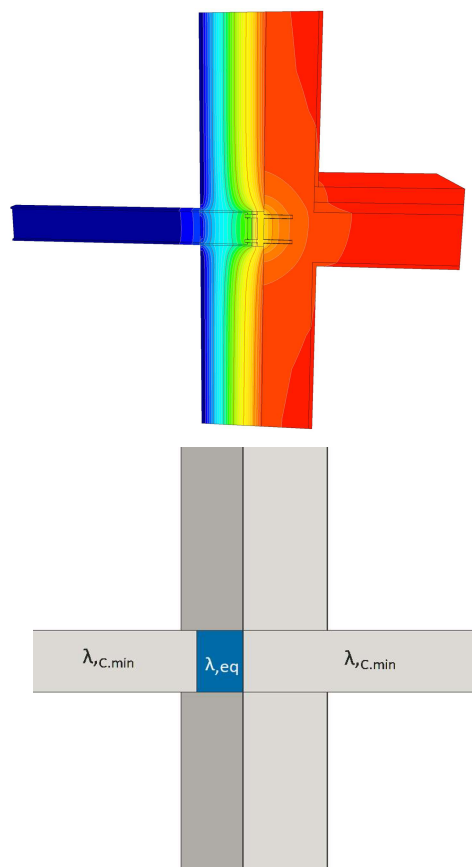
Determined values

Product	h [mm]	d [mm]	$\lambda_{C,min}$ [W/(mK)]	λ_{eq} [W/(mK)]	ψ_{WB} [W/(mK)]	$m_{Rd,y}$ [kNm/m]	f_{Rsi} [-]	Eff.t. [W/(kNmK)]	Efficiency - class
TBK with IPE 140 - Distance 2 m	140	25	-	-	0.0650	-35.00	0.96	1.9	phA+
TBK with IPE 140 - Distance 1.5 m	140	25	-	-	0.0867	-35.00	0.96	2.5	phA
TBK with IPE 140 - Distance 1 m	140	25	-	-	0.1300	-35.00	0.96	3.7	phB
TBF with IPE 140 - Distance 2 m	140	25	-	-	0.0651	-35.00	0.95	1.9	phA+
TBF with IPE 140 - Distance 1.5 m	140	25	-	-	0.0868	-35.00	0.95	2.5	phA
TBF with IPE 140 - Distance 1 m	140	25	-	-	0.1301	-35.00	0.95	3.7	phB

All thermal properties have been determined through a 3D-FEM Simulation. The simulation model consists of an IPE 140 beam, with a head-plate, the TBF/TBK thermal separation element (25 mm) and a 25 mm stainless steel plate. The determination of linear thermal bridges is dependent on the distance between the connectors. The punctiform thermal bridge X accounts to 0.1300 W/K for the TBK and 0.1301 W/K for the TBF. These values can be used to determine a linear surcharge, dependent on the distance. A methodology using an equivalent conductivity as a linear element as for linear thermal separations is not recommended here.

$\lambda_{C,min}$	=	Min. conductivity reinf. Concrete
λ_{eq}	=	Equivalent conductivity balcony connection
ψ_{WB}	=	Linear thermal bridge coefficient
f_{Rsi}	=	Temperature-factor
Eff.t.	=	Efficiency-value
$m_{Rd,y}$	=	Design resistance

Using the equivalent thermal conductivity λ_{eq} , linear thermal bridge loss coefficients can be determined for other connection situations using 2D FEM simulations. The minimum thermal conductivity of the reinforced concrete $\lambda_{C,min}$ of the balcony is to be used for the cantilever slab and the false ceiling. The rectangular replacement geometry of the balcony connection element has the dimensions of height h and width d, as well as the thermal conductivity λ_{eq} .



Notice

The thermal bridge loss coefficients can be interpolated approximately linearly. Calculations and boundary conditions according to the criteria and algorithms "Certified Passive House Component – Balcony Connection, Version 2.1"