fischer Test Report



Fixing Tests for Wienerberger 'Porotherm' blocks









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1. Test Parameters

The fixings were tested into both Wienerberger Porotherm 190 & Porotherm 365 Fired clay construction Blocks.

The tests were carried out by Laurence Parker - fischer Technical Field Engineer on 11th March 2009

Tests were carried out on walls constructed from Porotherm 190 and Porotherm 365 at the Wienerberger Factory complex in the UK.

Fixings were fitted in to block ends and randomly into Wall sides to simulate the unpredictability of locating fixings into a plastered surface where the structure of the block cannot be determined.

All drilling operations into these blocks should be done without the Hammer action using rotary only.

All tests were carried out using a calibrated Hydrajaws 2000 tensile meter 0-20 kN Gauge seriel No CF S1, conforming to CFA (Construction Fixings Association) guidelines each type of fixing was tested six times.





Fischer/TB

5th August 2009

fischer fixings UK Limited Whitley Road Hithercroft Industrial Estate Wallingford Oxon OX10 9AT

For the attention of Mrs Mirka Valovicova.

Dear Mrs Valovicova,

Testing of Fischer Fixings in Porotherm Vertically Perforated Clay Blocks

We confirm that the test as detailed in your document titled "*Fixing Tests for Wienerberger Porotherm Blocks,*" were carried out on masonry walls constructed from Porotherm 190 and 365 at our site in Surrey on 11th March 2009.

The tests were carried out using a range of fischer products, which were fixed into the block ends and randomly into wall sides. We can confirm that the results are a true record of the tests.

Therefore, we can recommend that the fixings described are suitable for use in our vertically perforated clay blocks, up to the safe working loads stated.

Yours faithfully, For Wienerberger UK Ltd.

Tim Burgess

Technical Development Manager Porotherm







Porotherm 365



Porotherm 190



Installation



Porotherm Core Range

	DIMENSIONS W x L x H (mm)	QUANTITY/ m ²	QUANTITY/ PACK No. (m²)	WEIGHT EACH Kg	WEIGHT PACK (inc. pallet) Kg
POROTHERM 100	100 x 300 x 224	15	160 (10.6)	6.4	1032
POROTHERM 140	140 x 300 x 224	15	120 (8)	7.9	955
POROTHERM 190	190 x 300 x 224	15	80 (5.3)	10.7	870
POROTHERM 365 (T12)	365 x 248 x 249	16	60 (3.7)	14.1	854

STANDARD

CONSTRUCTION METHOD



First course bedded in normal mortar



Double check levels in all directions



Mix only enough Porotherm bed joint mix



Apply using roller tool, so



3. Fixing Products Tested

3.1 fischer Nylon UX Plug



The UX plug is a Universal nylon wall plug suitable for fixing light duty applications in to, plasterboard, solid brickwork, perforated brick (such as the Porotherm 190 & 365), Aerated block & concrete (both solid and Hollow). The range extends from UX 5 to UX 14 for use with wood & chipboard screws from 4mm to 12mm. The UX 8 x 50 R (with Rim) for pre-installation was used for the tests into Porotherm blocks with 4.5 mm Wood screws.

It combines nylon with a 2-way expansion zone and anti-rotation fins to perform into solid substrates, and a patent knotting system that form locks in hollow section and perforated brick. This results in higher load bearing capacity in perforated substrates where conventional plugs are unable to hold. It was developed as a universal fixing giving good performance into many different substrates.

The design of the UX permits "push-through" installation, thereby saving valuable time and energy. A "knock-in" lock effectively prevents the fixing from expanding prematurely. All of these points mean that the fischer UX plug is an ideal light duty fixing for use with Porotherm blocks.

Typical Installation;

Light duty fixing for general fixings, ie battens, curtain rails, light weight shelving, bathroom cabinates etc.



Below UX plug ready for testing





3.2 fischer Nylon FUR Frame Fixing



The FUR nylon universal frame fixing is a revolutionary design. Thanks to its asymmetrical teeth in the expansion zone the FUR is suitable for every substrate from low density blocks to concrete. Solid and hollow materials can be fixed to using this product and it is particularly suitable for perforated blocks. The 70mm expansion zone gives good penetration into most blocks ensuring excellent form locking in perforated substrates. The use of the fischer safety screw with the FUR also gives excellent bending moment figures and the smooth outer geometry and stability of the screw facilitate push through assembly. A strong collar prevents expansion of the plug when being tapped into the hole. The FUR range covers 8mm, 10mm & 14mm frame fixings, in lengths from 80mm - 270mm with various head options. For testing purposes the FUR 10 x 80 FUS Hex head with built in washer was used. The FUR is a Medium duty mid range fixing that is available in Zinc plated and A4 stainless safety screw options for internal and external applications.

Typical Applications;

Façade fixing (wooden & metal Substructures):

Anchorage of laths, wall plates, beams and frames, metal consoles. Supports & rails on inner & outer walls.



Form Locking in perforated Blocks, the teeth lock in the voids preventing the fixing from being pulled out...









3.3 fischer Frame Fixing SX R



The fischer SXR frame fixing for "through-fixing" whereby a hole can be drilled through the assembly item and into the substrate. The embedment depth /Expansion zone is 50mm so the fixing is most suited to solid substrates and vertically perforated block with closely spaced webs. The SXR has European Technical Approval for concrete and brickwork as multiple fixing for non-load bearing systems. In addition to this the SXR has a Fire resistance Classification of R 90 for facades. The SXR comes in a range of Ø from 6 -10mm and usable lengths (frame or plate thickness) up to 210mm.

Typical Applications;

The SXR is a Light - Medium duty fixing and can be used to fix door frames, battens for cladding, shelving and with the A4 grade screws, external fixtures & fittings

Typical Installation diagram;



ETA Approvals;

ETA approval is available for the SXR Frame fixing in to various Porotherm Blocks. (Please refer to fischer Fixings Technical Department 01491 827 920 for further details)



3.4 FIS V 360 S Hybrid Vinyl Ester Resin with FIS H 16x85 K sleeve and M10 Rod



The fischer Injection System FIS V 360 S contains a styrene free, quick-setting, high quality hybrid resin mortar, this combined with the Nylon sleeve gives the system the versatility to be used in perforated block such as Porotherm 190 & 365. The resin is pushed through the holes in the sleeve which form locks in the voids making an extremely strong fixing which is stronger than the surrounding substrate. It achieves maximum strength values in almost all building materials and anchors safely and without expansion pressure. The 2 components are mixed together inside the static mixer. A simple exchange of the static mixer allows the renewed use of cartridges after they have been opened.

Typical Applications:

This is a Heavy duty Fixing for Door frames, Wall plates and any application where a recommended load of up to 1.4 kN per fixing is required.



Installation Detail



Suspended Ceiling Grids



Building Services





4.1 Test Results Porotherm 190 & 365

4.1 fischer Nylon UX into PTH 190 & PTH 365 using Ø8mm drill hole, embedment depth of 50mm fixed for this plug, screw length will depend on fixture thickness.

4.1a	fischer Nv	on UX 8x	50 R with	5mm wood	screw into	PTH 190
1.14	inscrict ruy				Selew miles	

Test No	Load in kN	Mode of Failure	
1	1.0	Block End 1 st Tensile Slip	
2	0.9	Block end 1 st Tensile Slip	
3	0.5	Mid Block 1 st Tensile slip	
4	0.7	Mid Block 1 st Tensile Slip	
5	0.5	Mid Block 1 st Tensile Slip	
6	0.5	Mid Block 1 st tensile Slip	

Average Ultimate Tensile Load = 0.68kN

Using a global safety factor of 7, safe working load in tension = 0.10kN

4.1b fischer Nylon UX 8x50 R with 5mm woodscrew into PHT 365

Test No	Load in kN	N Mode of Failure	
1	1.0	Block End 1 st Toncilo Slip	
1	1.0	DIOCK EIIU T TEIISILE SUP	
2	0.7	Block end 1 st Tensile Slip	
3	1.5	Mid Block 1 st Tensile slip	
4	0.7	Mid Block 1 st Tensile Slip	
5	1.0	Mid Block 1 st Tensile Slip	
6	0.6	Mid Block 1 st tensile Slip	

Average Ultimate Tensile Load = 0.91kN Using a global safety factor of 7, safe working load in tension = 0.13kN



4.2 fischer Nylon FUR Frame fixing in PTH 190 & PTH 365 using Ø10mm drill hole.

Test No	Load in kN	Mode of Failure
1	1.1	Block End 1 st Tensile Slip
2	0.5	Block Mid Wall 1 st Tensile Slip
3	1.8	Block Mid Wall 1 st Tensile Slip
4	1.5	Block Mid Wall 1 st Tensile Slip
5	1.5	Block Mid Wall 1 st Tensile Slip
6	1.0	Block Mid Wall 1 st Tensile Slip

4.2a fisher FUR 10 x 80 FUS into PTH 190

Average Ultimate Tensile Load = 1.23kN

Using a global safety factor of 7, safe working load in tension = 0.17kN

4.2b fischer FUR 10 x 80 FUS into PTH 365

Test No	Load in kN	Mode of Failure
1	1.2	Block End 1 st Tensile Slip
2	1.3	Block Mid Wall 1 st Tensile Slip
3	0.8	Block Mid Wall 1 st Tensile Slip
4	1.3	Block Mid Wall 1 st Tensile Slip
5	1.1	Block Mid Wall 1 st Tensile Slip
6	1.2	Block Mid Wall 1 st Tensile Slip

Average Ultimate Tensile Load = 1.15kN Using a global safety factor of 7, safe working load in tension = 0.16kN

Choice of FUR frame fixing length will depend on the fixture thickness, but all FUR s both 8mm & 10mm require a full 70mm embedment to perform correctly.



fischer SXR Fame Fixing into PTH 190 & PTH 365 with Ø10mm drill hole.

Test No	Load in kN	Mode of Failure
1	1.0	Block End Substrate Failure
2	1.4	Mid Block Substrate Failure
3	0.8	Mid Block Substrate Failure
4	1.0	Mid Block Substrate Failure
5	0.9	Mid Block Substrate Failure
6	1.2	Mid Block Substrate Failure

4.3a fischer SXR 10 x 100 T into PTH 190

Average Ultimate Tensile Load = 1.05 kN Using a global safety factor of 7, safe working load in tension = 0.15 kN

4.3b fischer SXR 10 x 100 T into PTH 365

Test No	Load in kN	Mode of Failure
1	0.9	Block End Substrate Failure
2	1.0	Block End Substrate Failure
3	1.2	Block Side Substrate Failure
4	1.2	Block Side Substrate Failure
5	1.6	Block Side Substrate Failure
6	1.6	Block Side Substrate Failure

Average Ultimate Tensile Load = 1.25 kN Using a global safety factor of 7, safe working load in tension = 0.17 kN

Choice of SXR frame fixing length will depend on the fixture thickness, but all SXR s both 8mm & 10mm require a full 50mm embedment to perform correctly.



4.3 fischer FIS V 360 S Resin + Sleeve and M8 Stud in to PTH 190 & PTH 365

Test No	Load in kN	Mode of Failure
1	6.0	Block Failure
2	6.1	Block Failure
3	6.2	Block Failure
4	7.0	Block Failure
5	9.9	Block Failure
6	5.0	Block Failure

4.4a FIS V 360 S with FIS H 16 x 85 Sleeve + M 8 Stud in to PTH 190

Average Ultimate Tensile Load = 6.7 kN

Using a global safety factor of 4, safe working load in tension = 1.67 kN

4.4b FIS V 360 S Resin + Sleeve & M 8 Stud into PTH 365

Test No	Load in kN	Mode of Failure
1	4.5	Block Failure
2	6.0	Block Failure
3	7.0	Block Failure
4	5.0	Block Failure
5	6.0	Block Failure
6	6.1	Block Failure

Average Ultimate Tensile Load = 5.7 kN

Using a global safety factor of 4, safe working load in tension = 1.44 kN



Conclusion

fischer has a range of fixings suitable for both the Wienerberger Porotherm 190 & 365 perforated fired clay building blocks. From heavy duty fixing requirements to light duty applications, the correct solution can be found.

For the most demanding Heavy Duty applications, in both blocks, the Resin anchor FIS V 360 S with FIS H Nylon Sleeve and threaded rod gives the best results with recommended loads of up to 1.67kN in Porotherm 190 & 1.44kN in Porotherm 365.

For Medium Duty applications up to 0.17kN the FUR and SXR frame fixings are the most suitable. The FUR with an embedment depth of 70mm is generally a more efficient fixing and easier to install where web spacing is 50mm apart, being particularly useful in block ends. The SXR however is a powerful fixing in blocks with web spacing's of between 15mm and 20mm as in the Porotherm 365.

The UX plug offers a first class light duty fixing for general applications in both blocks. It friction locks in blocks with close spaced webs and knot locks behind 1st web or outer skin in blocks with larger web spacing's and block ends. Recommended loads in the region of 0.10kN were achieved in both blocks.

N.B All drilling operations in these Blocks should be done without Hammer action.

Porotherm 190						
Product testedAverage UltimateAverageAverage FailureLoad (kN)RecommendedModeLoad (kN)Load (kN)						
UX 8 Plug	0.68	0.10	1 st Tensile Slip			
FUR 10	1.23	0.15	1 st Tensile Slip			
SXR 10	1.05	0.15	Substrate Failure			
FISV 360 S + FIS H K	6.7	1.67	Block Failure			

Summary

Porotherm 365			
Product tested	Average Ultimate Load (kN)	Average Recommended Load (kN)	Average Failure Mode
UX 8 Plug	0.91	0.13	1 st Tensile Slip
FUR 10	1.15	0.16	1 st Tensile Slip
SXR 10	1.25	0.17	Substrate Failure
FIS V 360 S + FIS H K	5.7	1.44	Block Failure



5.