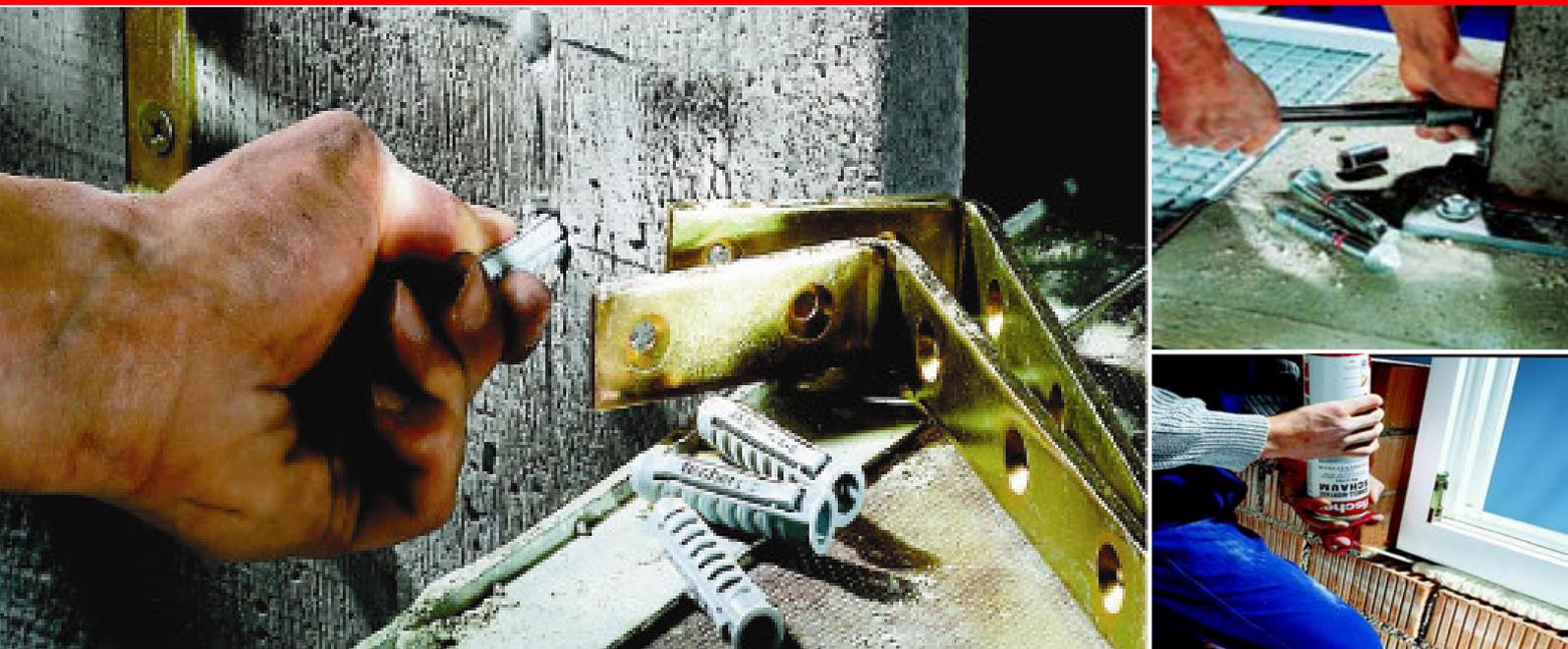
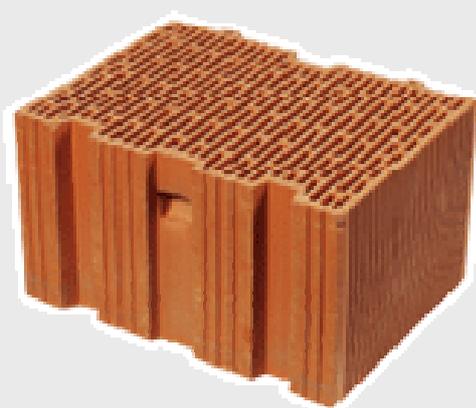
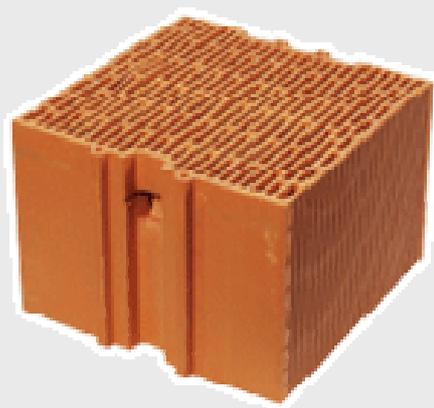


fischer Test Report



Fixing Tests for Clay Bio Bricks



CONTENTS

1. Test Parameters

2. Substrates Tested

Clay Bio Brics

3. Fixings Products Tested

2.1 Fischer Nylon SX Plug

2.2 Fischer Nylon FUR Frame Fixing

2.3 Fischer FFS Frame Fixing Screw

2.4 Fischer FIS V 360 S Hybrid Vinyl Ester Resin with FIS H18x85N net and M10 Rod

4. Test Results

4.1 Fischer Nylon SX Plug (SX8R with 12 gauge wood screw)

4.2 Fischer Nylon FUR Frame Fixing

4.3 Fischer FFS Frame Fixing Screw

4.4 Fischer FIS V 360 S Hybrid Vinyl Ester Resin with FIS H18x85N net and M10 Rod.

5. Conclusion

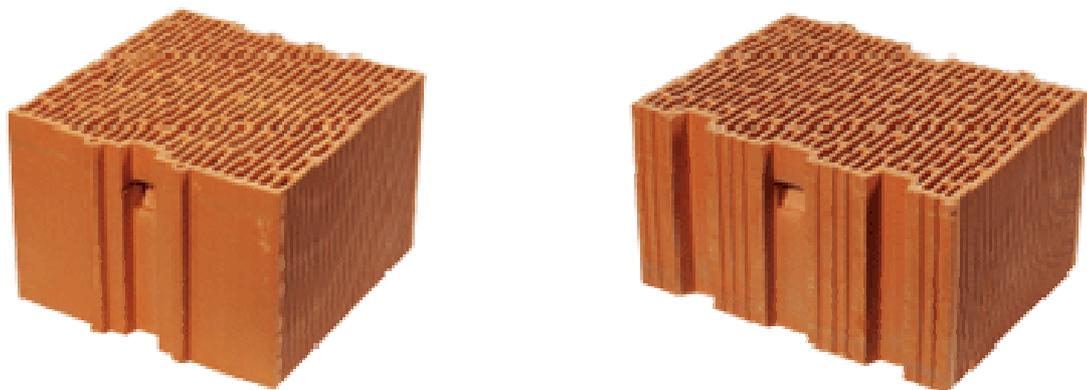
1. Test Parameters

The fixings were tested into both an internal bio brick and an external bio brick.

The tests were carried out by our Senior Technical Field Engineer

All tests were carried out using a calibrated Hydrajaws tensile test meter. To conform to CFA (Construction Fixings Association) guidelines each type of fixing was tested six times.

2. Substrates Tested



3. Fixing Products Tested

3.1 fischer Nylon SX Plug



The SX plug is a nylon wall plug for the universal installation of machine screws or metric threaded studs.

It combines nylon with a 4-fold expansion of the fixing. This results in higher load bearing capacity in solid materials. Although it was developed with solid materials in mind, it shows good performance in hollow materials, which exceeds that of many universal fixings. The design of the SX 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 SX plug is an ideal lightweight fixing for hollowcore floor slabs.

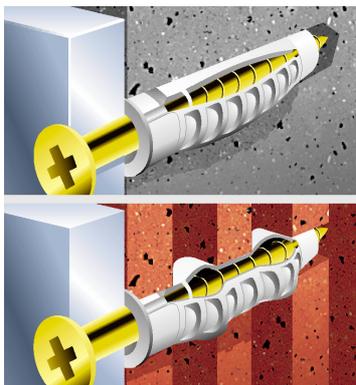
Typical Applications;



M&E Services Hanger Rods



Bracketry for Suspended Ceilings



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, both solid and hollow materials can be fixed to using this product. 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.

Typical Applications;

Façade fixing (wooden Substructures):

Anchorage of laths, beams and frames mainly on outer walls.

Façade fixing (metal substructures):

Anchorage of metal consoles, supports, rails on outer walls

Roof:

Anchorage of laths and deals e.g. at the roof end. Partially the same application as for façade fixing.

Metal construction:

Anchorage of angles, rails, profiles, internal and external frames, fire proof doors.

Interior Completion:

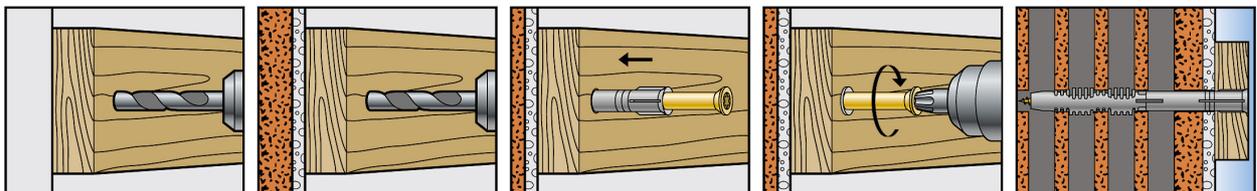
Anchorage of laths, beams, metal angles and similar materials, mainly the interior.

Window construction (wood/plastics/metal):

Anchorage of angles, profiles for direct window assembly and supporting constructions.

Remaining applications:

Anchorage of different wooden, plastic and metal parts such as radiators, cupboards, remedial wall ties, cable ducts, shelves, insulation disks and rails for WDVS.

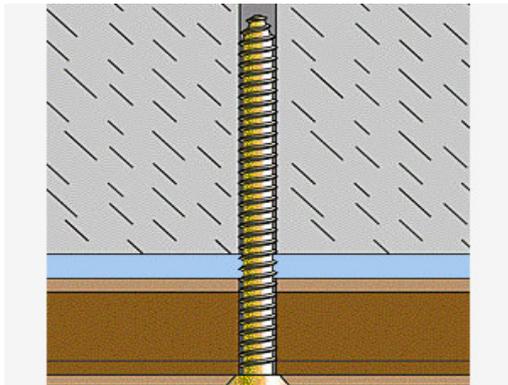


3.3 fischer FFS Frame Fixing Screw



The fischer frame fixing screw type FFS allows a stress-free “through-fixing” whereby a 6mm diameter hole can be drilled through the assembly item and through the web of the floor slab, and the 7.5mm diameter screw subsequently installed through the item into the hollow of the slab. Providing the screw penetrates into the hollow, the maximum possible load capacity of the FFS is achieved. The screw itself has a tapered lead-in thread for easy attachment and an easy turning action due to a smooth-hardened screw surface and slim thread.

Typical Application;



Typical Timber batten installation detail



Bracketry for suspended ceilings

3.4 FIS V 360 S Hybrid Vinyl Ester Resin with FIS H18x85 N net and M10 Rod



The fischer Injection System FIS V 360 S contains a styrene free, quick-setting, high quality hybrid resin mortar, which is characterized by its universal suitability for many applications. 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;



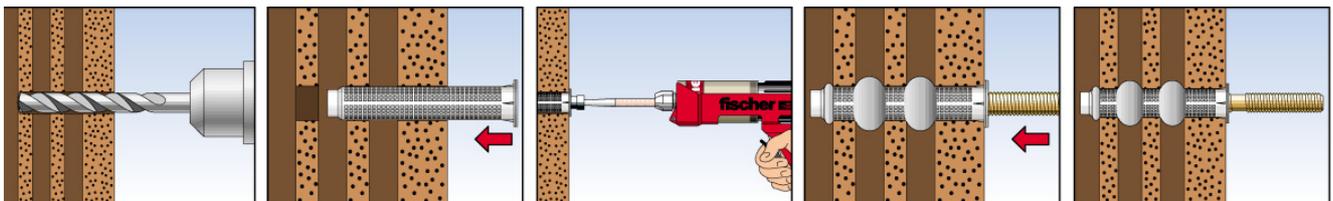
Installation Detail



Suspended Ceiling Grids



Building Services



4. Test Results

4.1 fischer Nylon SX Plug (SX 8R with 12 gauge wood screw) in Interior Block

Test No	Load in kN	Mode of Failure
1	1.8	Block Failure
2	1.5	Tensile slip
3	1.6	Block Failure
4	1.6	Block Failure
5	1.6	Block Failure
6	1.5	Block Failure

Average Ultimate Tensile Load = **1.6 kN**

Using a global safety factor of 7, safe working load in tension = **0.23 kN**

4.2 fischer Nylon FUR Frame fixing in Exterior block using 9 mm hole as problems encountered using standard 10 mm hole diameter

Test No	Load in kN	Mode of Failure
1	1.0	Pull Through
2	1.0	Pull Through
3	1.0	Pull Through
4	1.4	Pull Through
5	1.4	Pull Through
6	1.6	Block Split

Average Ultimate Tensile Load = **1.17 kN**

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

4.3 fischer FFS Fixing Screw

Test No	Load in kN	Mode of Failure
1	1.2	Pull Through
2	0.4	Pull Through
3	1.0	Pull Through
4	0.2	Pull Through
5	1.4	Pull Through
6	0.2	Pull Through

Average Ultimate Tensile Load = **0.73 kN**

Using a global safety factor of 4, safe working load in tension = **0.18 kN**

NB: We would recommend a minimum axial spacing of 50mm for FFS frame fixing screws 7.5mm diameter, based on the stress cones for pairs of anchors when loaded simultaneously does not occur, and the safe working load as quoted above would not have to be reduced accordingly.

4.4 FIS V 360 S Hybrid Vinyl Ester Resin with FIP 18x85 net and M10 Rod

Test No	Load in kN	Mode of Failure
1	2.8	Block Failure
2	3.4	Block Failure
3	2.8	Block Failure
4	2.2	Block Failure
5	2.6	Block Failure
6	3.6	Block Failure

Average Ultimate Tensile Load = **2.9 kN**

Using a global safety factor of 4, safe working load in tension = **0.73 kN**

5. Conclusion

After carrying tests on these bio bricks with various fixings, although the bricks may be very good for their use in construction they give rise to problems when it comes to fixing to them. It may therefore be necessary to perform further testing to ensure that we have the best fixing solutions for these substrates.

Summery Table:

Fixing	Average Ultimate Load	Typical Failure Mode
SX Plug	1.6kN	Block Failure
FUR Frame Fixing	1.17kN	Pull Through
FFS Screw	0.73kN	Pull Through
FISV 360 S Resin	2.9kN	Block Failure