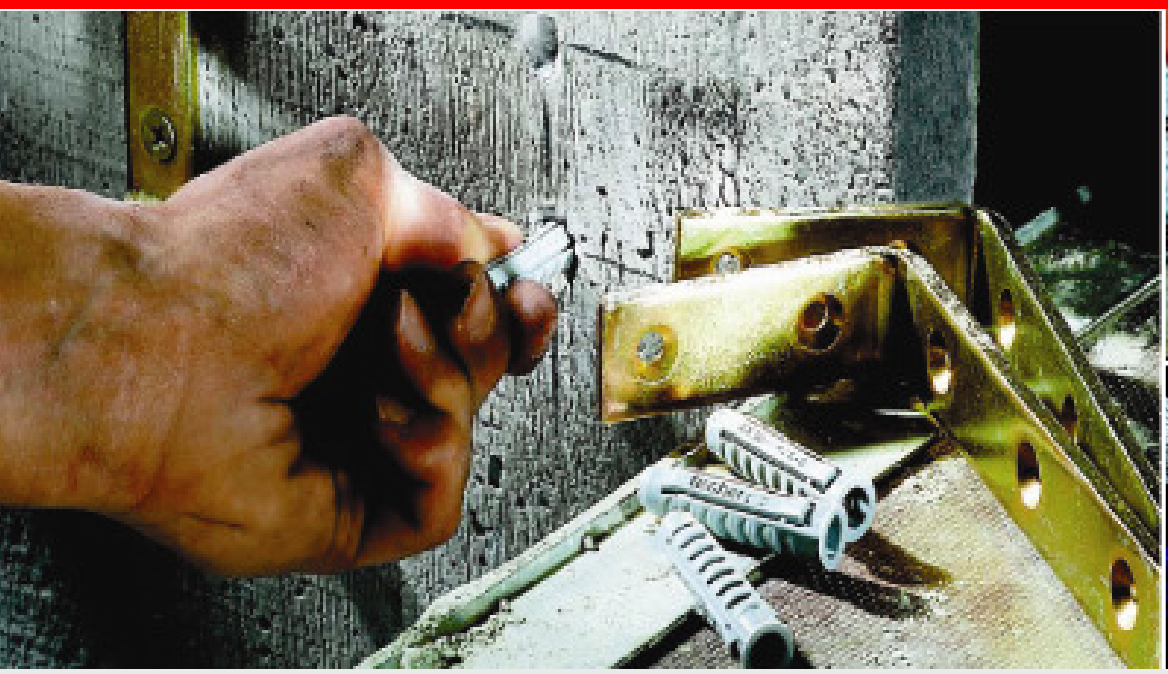
fischer Test Report



Fixing Tests for

MASTERBLOCK

fischer
FIXING SYSTEMS

Testing on Master Block Cellular Blocks

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1. Introduction

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Test Parameters

Three different fixings were tested in to Master Blocks 7N/mm cellular blocks to discover what type of fixings could be used in to this block and what loads they would achieve. The fixings were installed and tested in to individual block and not in a wall configuration

Fischer initially introduced three fixings ranging from light weight Nylon SX plugs to Chemical Resin FISV 360 S with anchor sleeve. In each case two fixings were tested in to each block.

The results for all the fixings tested show a variation in ultimate loads, this allows the engineer/architect/end user to have a few different fixings to choose from depending on both function and load performance.

The test were carried out at:

fischer Fixing (UK) Ltd
Whitley Road
Hithercroft Ind Est
Wallingford
Oxon OX10 9AT

All tests were carried out using a calibrated Hydra Jaws tensile tester with 0-5kN and 0-20kN gauge, in conjunction with an aluminum 150mm load spreading bridge and M8&M10 open ended test adapters. To conform to the CFA (Construction Fixings Association) guidelines each fixing was tested a minimum of six times.

Block Information

Multicell Blocks:

Multicell (Croft Blocks) is a dense masonry product with a face size of 440x215x140mm. It provides the user with comparable performance to solid blocks and gives significant lower weight advantages.

The cellular product comprises of two large voids and can be laid on a full bed of mortar. It can be used for the majority of walling applications including partitions in framed structures, partition and separating walls.

Cellular is an easy to lay product, providing an economical alternative to a heavier block in excess of 20kg.

Solid Block (100mm) Hollow Block (215mm) Cellular Block (100mm)

Physical Characteristics of Masterdenz Dense Blocks

Co-ordinating size	440mm x 215mm 290mm x 215mm (except Trench block – 440mm x 100mm)
Number per square metre as laid	9.88
Vapour Resistivity MNs/gm	90 to 120
Average Drying Shrinkage	0.03%
Average Block Dry Density kg/m³	1970
Thermal Conductivity @ 3% moisture content W/m°C	1.074
@ 5% moisture content W/m°C	1.180

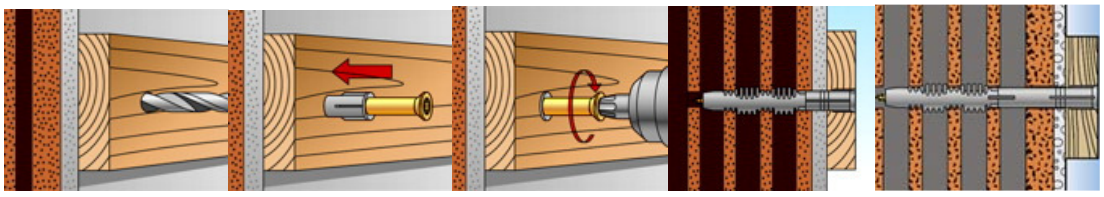
Work Size (mm)	Thickness (mm)	Format	Strengths (N/mm²)	Thermal Resistance (m² K/W) 3% int	5% ext	Dry Block Weight (kg)	Weight Laid (kg/m²)	Sound Reduction (dB)
440 x 215	75*	Solid	7	0.069	0.063	13.90	150	41
	100	Solid	3.5, 7, 10, 14, 20	0.093	0.084	18.50	200	45
	140	Solid	3.5, 7, 10, 14, 20	0.130	0.118	25.90	280	46
	150*	Solid	7, 10, 15, 20	0.140	0.127	27.80	300	47
	190	Solid	7, 10, 15, 20	0.176	0.161	35.20	380	48
	215	Solid	7, 10, 15, 20	0.200	0.182	39.80	430	49
290 x 215	140*	Solid	7	0.130	0.118	17.20	280	46
215 x 100	65*	Course	7			2.57		
		Adjuster						
440 x 100	300*	Trench	7			26.00		
	100 x 65	Reveal	7			21.65		
	100 x 40	Reveal	7			20.50		
440 x 215	100	Cellular	3.5, 7	0.120	0.090	14.90	160	42
	140	Cellular	3.5, 7	0.210	0.190	18.80	200	45
440 x 215	140	Multicell	7	0.210	0.190	18.80	200	45
	140	Hollow	3.5, 7, 10	0.190	0.180	21.40	234	45
	215	Hollow	3.5, 7, 10	0.240	0.230	26.00	300	46

* Note only available at selected sites. Please contact your nearest sales office for more information.
Unit weights are approximate figures. Average dry material density 1970 kg/m³.

2. Fixing Products Tested
FUR Frame Fixings

Material -	Screw:	Zinc Plated and Stainless Steel A4
	Plug:	Nylon
Range -	M8-M14 (In various lengths)	

The fischer FUR sets a new standard for the frame fixing. Its innovative expansion section results in the FUR being suitable for virtually all construction materials with high loads and optimum reliability. Anchorage in solid materials is by friction locking. The close-set teeth provide ideal expansion of the fixing in solid substrates, ensuring constant expansion force along the entire anchorage length. The close set teeth expand and form lock in hollow materials.



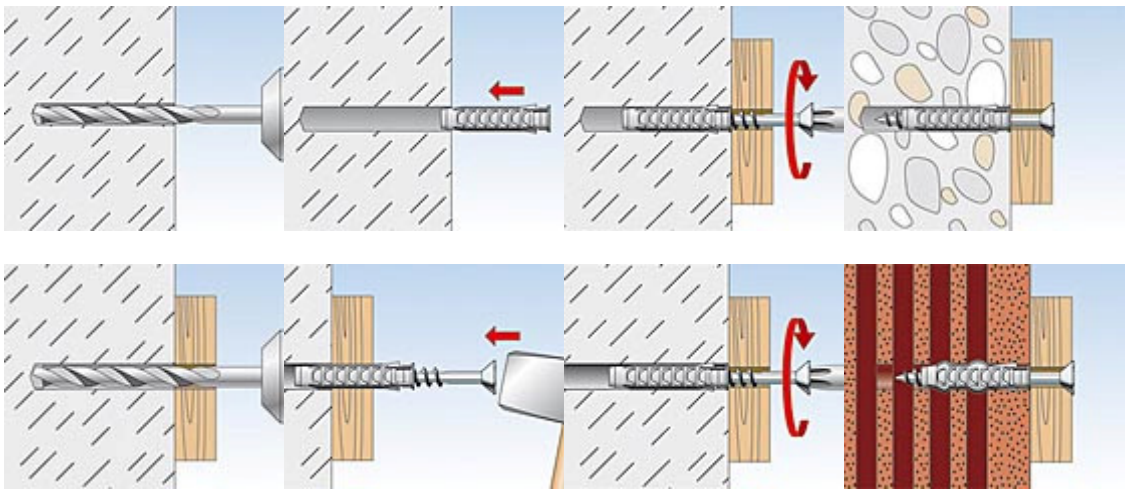
SX Plug

Material -	Screw:	Zinc Plated and Stainless Steel A4
	Plug:	Nylon
Range -	M4-M16 (20mm long-80mm long)	

The fischer SX Plug has a four way expansion compared to conventional two way expansion plugs.

This unique four way expansion gives a greater load capacity as the surface area in contact with the concrete is much greater then the standard plugs. Therefore the SX Plug is designed for both solid and hollow building materials.

Not only can the SX be installed as a flush fixing but it can also be installed as a through fixing due to its retaining collar and ‘knock-in’ lock effect just below the collar. This prevents the plug from expanding prematurely when the plug and screw are being hammered through fixture towards the surface of the building materials.



FISV 360 S & FISH N Anchor Sleeve

Material -	Resin:	Vinylester Hybrid Resin
	Rod:	Zinc Plated grade 5.8 & Stainless Steel A4
	Net:	Plastic frame with flexible yellow net

Range - FISH 16 for M8 Threaded Studs
FISH 18 for M10 Threaded Studs
FISH 20 for M12 Threaded Studs

The outstanding feature of the fischer injection anchoring is its adaptability to varying installation parameters, such as the varying web thickness of the hollow core slabs and resulting damage caused when hammer drilling through to the hollow of slabs.

The FISV 360 S Vinylester resin contains a high-strength, rapid setting, two component hybrid resin. This combination of net with composite resin allows a type of form locking inside the hollow section to provide a stress free fixing solution.

3.0 Test Results
3.1 FUR 10x100 FUS Test Results

FUR 10x100 FUS

Test No:	Load Achieved	Remarks
1	1.2kN	1st Tensile Slip
2	1.5kN	1st Tensile Slip
3	1.3kN	1st Tensile Slip
4	1.4kN	1st Tensile Slip
5	1.6kN	1st Tensile Slip
6	1.5kN	1st Tensile Slip

Average ultimate load is: 1.42kN, using a global safety factor of 7 the safe working load is: 0.20kN.

3.2 SX 10 Test Results

SX 10 Plug and Screw

Test No:	Load Achieved	Remarks
1	0.5kN	1st Tensile Slip
2	0.5kN	1st Tensile Slip
3	0.6kN	1st Tensile Slip
4	0.7kN	1st Tensile Slip
5	0.6kN	1st Tensile Slip
6	0.7kN	1st Tensile Slip

Average ultimate load is: 0.6kN, using a global safety factor of 7 the safe working load is: 0.09kN.

3.3 FISV 360 S Resin & FISH 16x85 N Anchor Sleeve

FISV 360 S Resin with FISH 16x85N anchor sleeve

Test No:	Load Achieved	Remark
1	8.5kN	Block Failure
2	7.0kN	Block Failure
3	6.5kN	Block Failure
4	7.0kN	Block Failure
5	6.5kN	Block Failure
6	7.0kN	Block Failure

Average ultimate load is: 7.08kN, using a global safety factor of 4 the safe working load is: 1.77kN

3.4 FISV 360 S Resin & FISH 18x85 N Anchor Sleeve Test Results

FISV 360 S Resin & FISH 18x85 N Anchor Sleeve

Test No:	Load Achieved	Remark
1	8.2kN	Block Failure
2	9.5kN	Block Failure
3	7.6kN	Block Failure
4	9.0kN	Block Failure
5	8.0kN	Block Failure
6	10.0kN	Block Failure

Average ultimate load is: 8.71kN, using a global safety factor of 4 the safe working load is: 2.17kN.

3.5 Results Summery

Product Tested	Average Ultimate Load	Safe Working Load	Remarks
SX 10	0.6kN	0.09kN	This fixing will be suitable for light weight applications i.e. light fittings etc
FUR 10x100 FUS	1.42kN	0.20kN	This fixing will be suitable for light/medium weight applications i.e. door frames & light radiators
FISV 360 S & FISH 16x85N	7.08kN	1.77kN	This fixing will be suitable for medium/heavy applications i.e. shelving & cupboards
FISV 360 S & FISH 18x85N	8.71kN	2.17kN	This fixing will be suitable for medium/heavy applications i.e. shelving & cupboards

Please note that although the resin is suitable for medium/heavy weight applications the block work is not suitable for very heavy applications, the resin mode of failure was block destruction, therefore it is very important **not** to try and install applications over the safe working load of the fixings stated above.

4. Conclusion

These fixings were selected for their potential suitability in these types of blocks and test results collated in to a summery table.

All fixings were installed and tested in accordance with the manufactures guidelines.

Failure of the fixing was determined by an ultimate load failure or excessive displacement. Displacement was the mode of failure for the SX the shallow embedment depth, it was also the mode of failure for the FUR as the teeth have little to grip on to, however they will be suitable for light applications. As the failure mode was caused from displacement this is technically a serviceability failure rather then an ultimate load failure, however this value was used to ensure conservatism.

The FISV Resin and Anchor Sleeve FISH N performed very well and only failed due to block destruction. The resin system can be used for the heavy weight applications providing the load of the object is not in excess of the safe working load of the resin system – these are shown in the results table.