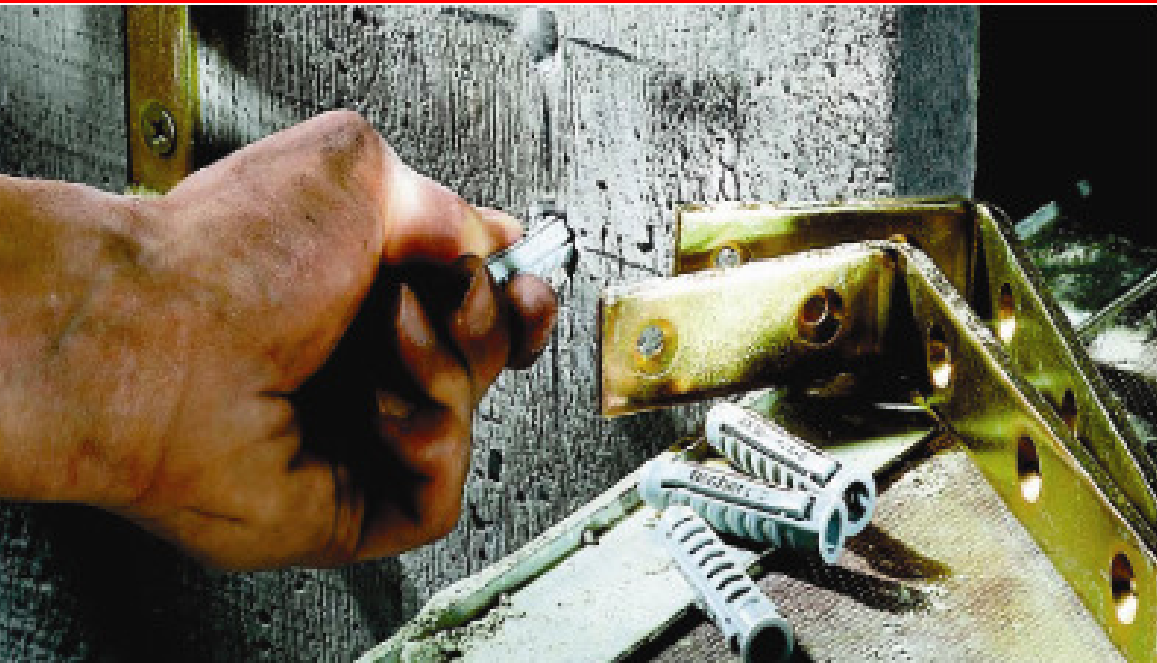


# fischer Test Report



## Fixing Tests for



# Testing On NBT Z Blocks

## 1. Contents

## 2. Test Parameters

## 3. Fixing Products Tested

3.1 fischer Universal Frame Fixing FUR 8 x 80 T

3.2 fischer Universal Plug UX 6 x 50R

3.3 fischer FIS V 360 S Hybrid Vinyl Ester Resin with FIS H18x85N net and M10 Rod

## 4. Test Results

4.1 Z1 Block

4.2 Z2 Block

4.3 Z3 Block

4.4 Z4 Block

4.5 Z5 Block

4.6 Z6 Block

4.7 Z7 Block

## 5. Results Summary

## 6. Pictures from Testing

## 2 Test Parameters

fischer Fixings was requested by Natural Building Technologies to recommend fixings suitable for use in a range of “Ziegel” or hollow blocks. No previous test data was available for these types of block and specific testing was required before recommendations could be made.

NBT supplied 7 types of block, numbered Z1 – Z7, each with a different internal structure. Blocks Z1, Z2, Z3 and Z5 are designed for external use, and have densities between 650 – 800 kg/m<sup>3</sup>. Blocks Z4, Z6 and Z7 are designed for internal use with densities of 800 – 900 kg/m<sup>3</sup>. All have ribs on one end and corresponding recesses opposite. The original manufacturers of the blocks are believed to be Unipor and Poroton.

Initial tests established the fischer FUR 8 frame fixing and fischer UX 6x50 R universal plug were likely to be the most suited for general applications. This report concentrates on these 2 products, although further testing may confirm other fixings such as PD, SXL, WS8L and FIS VS injection resin as suitable for certain applications.

The tests were carried out between 04/10/04 and 08/10/04 at:

fischer Fixings UK Ltd  
Whitely Road  
Hithercroft Industrial Estate  
Wallingford  
Oxon  
OX10 9AT

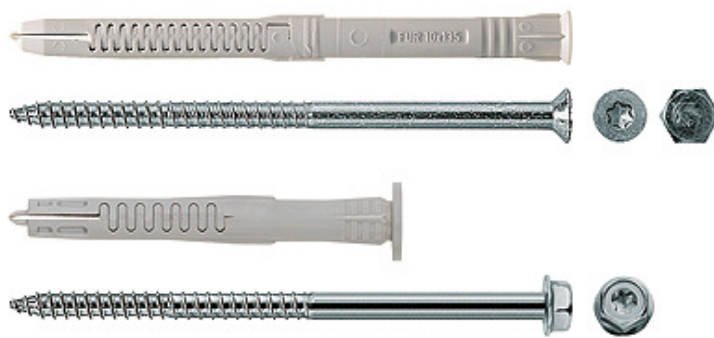
All test results were recorded using a Hydrajaws calibrated tensile load cell with 0-1.0kN and 0-5.0kN gauges, in conjunction with a 150mm load spreading bridge.

### 3. Fixing Products Tested

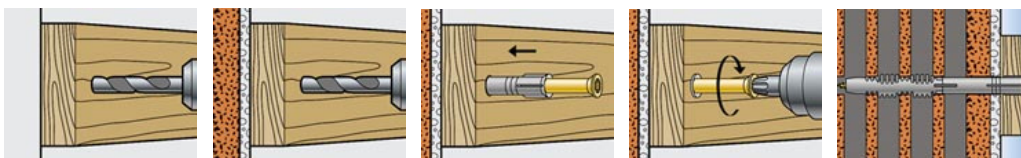
#### 3.1 fischer Universal Frame Fixing FUR 8 x 80T

Material: Nylon (Polyamide 6) Metal Screw 6 x 85

Range: FUR 8 to FUR 14



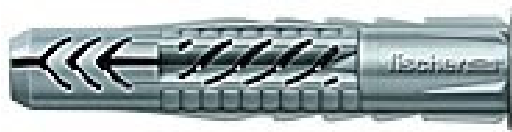
The fischer FUR sets a new standard for the frame fixing. Its innovative expansion section results in the FUR being suitable for virtually all construction materials with high loads and optimum reliability. Anchorage in solid materials is by friction locking. The close-set teeth provide ideal expansion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



### 3.2 fischer Universal Plug UX 6 x 50R

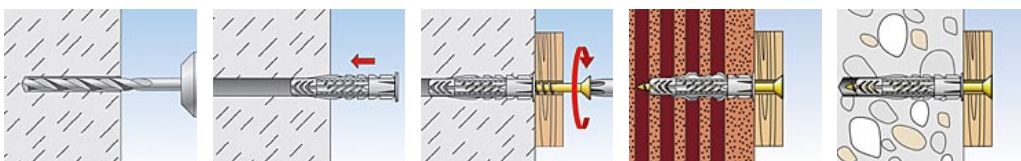
Material: Nylon (Polyamide 6) Metal Screw 5mm

Range: UX6 R to UX10 R



Its innovative design features guarantee easy and convenient installation when inserting the fixings and tightening the screw. The result is a perfect highly durable connection.

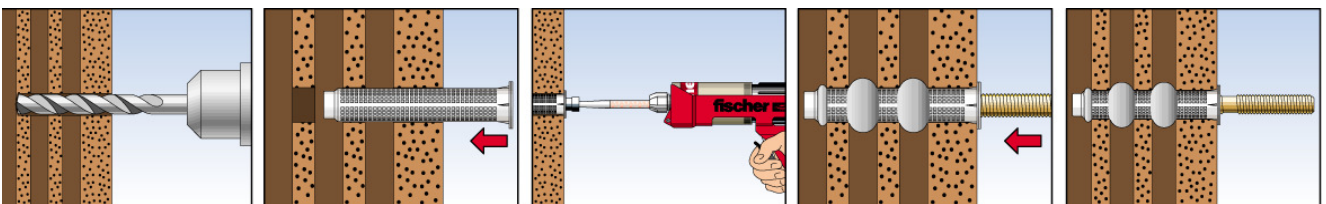
The fischer Universal Plug UX has a reliable knot-formation in all cavities. With the new twist stop there is no turning of the fixing even in soft materials or loose drill holes. The universal fixings are suitable for every screw type, chipboard, wood and stud screws, plus various diameter fit several screw diameters. Through hammer lock means that premature expansion is prevented when pushing the fixing through the component being installed.



### 3.3 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.



## 4. Test Results

### 4.1 - Z1 Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	1.1kN	End of Block – Ripped
2	FUR 8 x 80 T	8mm	6 x 85	1.2kN	End of Block – Ripped
3	FUR 8 x 80 T	8mm	6 x 85	1.3kN	End of Block - Ripped
4	FUR 8 x 80 T	8mm	6 x 85	1.3kN	End of Block – Ripped
5	FUR 8 x 80 T	8mm	6 x 85	1.1kN	End of Block – Ripped
6	FUR 8 x 80 T	8mm	6 x 85	2.2kN	Side of Block
7	FUR 8 x 80 T	8mm	6 x 85	2.2kN	Side of Block
8	FUR 8 x 80 T	8mm	6 x 85	2.4kN	Side of Block
9	FUR 8 x 80 T	8mm	6 x 85	2.2kN	Side of Block
10	FUR 8 x 80 T	8mm	6 x 85	2.2kN	Side of Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	1.2kN	End of Block – Ripped
2	UX 6 x 50R	6mm	5mm	1.1kN	End of Block – Ripped
3	UX 6 x 50R	6mm	5mm	1.0kN	End of Block – Ripped
4	UX 6 x 50R	6mm	5mm	1.2kN	End of Block – Ripped
5	UX 6 x 50R	6mm	5mm	0.9kN	End of Block – Ripped
6	UX 6 x 50R	6mm	5mm	1.2kN	Side of Block
7	UX 6 x 50R	6mm	5mm	1.1kN	Side of Block
8	UX 6 x 50R	6mm	5mm	1.1kN	Side of Block
9	UX 6 x 50R	6mm	5mm	1.0kN	Side of Block
10	UX 6 x 50R	6mm	5mm	1.1kN	Side of Block





## 4.2 - Z2 Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	1.0kN	End of Block - Ripped
2	FUR 8 x 80 T	8mm	6 x 85	0.7kN	End of Block – Ripped
3	FUR 8 x 80 T	8mm	6 x 85	0.7kN	End of Block – Ripped
4	FUR 8 x 80 T	8mm	6 x 85	0.8kN	End of Block – Ripped
5	FUR 8 x 80 T	8mm	6 x 85	0.7kN	End of Block – Ripped
6	FUR 8 x 80 T	8mm	6 x 85	0.8kN	Side of Block
7	FUR 8 x 80 T	8mm	6 x 85	1.1kN	Side of Block
8	FUR 8 x 80 T	8mm	6 x 85	0.7kN	Side of Block
9	FUR 8 x 80 T	8mm	6 x 85	0.8kN	Side of Block
10	FUR 8 x 80 T	8mm	6 x 85	1.0kN	Side of Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	0.8kN	End of Block - Ripped
2	UX 6 x 50R	6mm	5mm	0.9kN	End of Block – Ripped
3	UX 6 x 50R	6mm	5mm	0.8kN	End of Block – Ripped
4	UX 6 x 50R	6mm	5mm	0.7kN	End of Block – Ripped
5	UX 6 x 50R	6mm	5mm	0.7kN	End of Block – Ripped
6	UX 6 x 50R	6mm	5mm	1.1kN	Side of Block
7	UX 6 x 50R	6mm	5mm	1.1kN	Side of Block
8	UX 6 x 50R	6mm	5mm	1.0kN	Side of Block
9	UX 6 x 50R	6mm	5mm	1.2kN	Side of Block
10	UX 6 x 50R	6mm	5mm	1.0kN	Side of Block



Z2 Block



### 4.3 – Z3

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	1.7kN	Side of Block
2	FUR 8 x 80 T	8mm	6 x 85	0.9kN	Side of Block
3	FUR 8 x 80 T	8mm	6 x 85	1.1kN	Side of Block
4	FUR 8 x 80 T	8mm	6 x 85	1.7kN	Side of Block
5	FUR 8 x 80 T	8mm	6 x 85	1.0kN	Side of Block
6	FUR 8 x 80 T	8mm	6 x 85	2.4kN	End of Block – Ripped
7	FUR 8 x 80 T	8mm	6 x 85	2.3kN	End of Block – Ripped
8	FUR 8 x 80 T	8mm	6 x 85	2.1kN	End of Block – Ripped
9	FUR 8 x 80 T	8mm	6 x 85	2.1kN	End of Block – Ripped
10	FUR 8 x 80 T	8mm	6 x 85	2.5kN	End of Block – Ripped

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	1.0kN	Side of Block
2	UX 6 x 50R	6mm	5mm	1.5kN	Side of Block
3	UX 6 x 50R	6mm	5mm	0.8kN	Side of Block
4	UX 6 x 50R	6mm	5mm	1.3kN	Side of Block
5	UX 6 x 50R	6mm	5mm	0.9kN	Side of Block
6	UX 6 x 50R	6mm	5mm	1.2kN	End of Block – Ripped
7	UX 6 x 50R	6mm	5mm	1.2kN	End of Block – Ripped
8	UX 6 x 50R	6mm	5mm	0.9kN	End of Block – Ripped
9	UX 6 x 50R	6mm	5mm	1.1kN	End of Block – Ripped
10	UX 6 x 50R	6mm	5mm	1.1kN	End of Block – Ripped



Z3 Block

## 4.4 – Z4 Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	1.8kN	Side of Block
2	FUR 8 x 80 T	8mm	6 x 85	1.6kN	Side of Block
3	FUR 8 x 80 T	8mm	6 x 85	1.9kN	Side of Block
4	FUR 8 x 80 T	8mm	6 x 85	1.7kN	Side of Block
5	FUR 8 x 80 T	8mm	6 x 85	1.8kN	Side of Block
6	FUR 8 x 80 T	8mm	6 x 85	2.4kN	End of Block – Ripped
7	FUR 8 x 80 T	8mm	6 x 85	2.6kN	End of Block – Ripped
8	FUR 8 x 80 T	8mm	6 x 85	2.2kN	End of Block – Ripped
9	FUR 8 x 80 T	8mm	6 x 85	2.7kN	End of Block – Ripped
10	FUR 8 x 80 T	8mm	6 x 85	2.0kN	End of Block – Ripped

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	1.2kN	Side of Block
2	UX 6 x 50R	6mm	5mm	1.3kN	Side of Block
3	UX 6 x 50R	6mm	5mm	1.6kN	Side of Block
4	UX 6 x 50R	6mm	5mm	0.7kN	Side of Block
5	UX 6 x 50R	6mm	5mm	0.8kN	Side of Block
6	UX 6 x 50R	6mm	5mm	1.3kN	End of Block – Ripped
7	UX 6 x 50R	6mm	5mm	2.2kN	End of Block – Ripped
8	UX 6 x 50R	6mm	5mm	1.1kN	End of Block – Ripped
9	UX 6 x 50R	6mm	5mm	2.0kN	End of Block – Ripped
10	UX 6 x 50R	6mm	5mm	1.4kN	End of Block – Ripped



Z4 Block

## 4.5 – Z5 Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	0.6kN	End of Block – Ripped *
2	FUR 8 x 80 T	8mm	6 x 85	1.4kN	End of Block – Ripped
3	FUR 8 x 80 T	8mm	6 x 85	1.2kN	End of Block – Ripped
4	FUR 8 x 80 T	8mm	6 x 85	0.6kN	End of Block – Ripped *
5	FUR 8 x 80 T	8mm	6 x 85	1.1kN	End of Block – Ripped
6	FUR 8 x 80 T	8mm	6 x 85	1.2kN	Side of Block
7	FUR 8 x 80 T	8mm	6 x 85	1.1kN	Side of Block
8	FUR 8 x 80 T	8mm	6 x 85	0.9kN	Side of Block
9	FUR 8 x 80 T	8mm	6 x 85	1.3kN	Side of Block
10	FUR 8 x 80 T	8mm	6 x 85	1.1kN	Side of Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	0.5kN	End of Block – Ripped
2	UX 6 x 50R	6mm	5mm	0.3kN	End of Block – Ripped *
3	UX 6 x 50R	6mm	5mm	0.2kN	End of Block – Ripped *
4	UX 6 x 50R	6mm	5mm	0.5kN	End of Block – Ripped
5	UX 6 x 50R	6mm	5mm	0.5kN	End of Block – Ripped
6	UX 6 x 50R	6mm	5mm	0.9kN	Side of Block
7	UX 6 x 50R	6mm	5mm	0.8kN	Side of Block
8	UX 6 x 50R	6mm	5mm	0.7kN	Side of Block
9	UX 6 x 50R	6mm	5mm	0.8kN	Side of Block
10	UX 6 x 50R	6mm	5mm	0.7kN	Side of Block

\* Note: For all tests in to end of Z5 the lowest results were for fixings positioned between the ribs.



## Z5 Block

### 4.6 – Z6 Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	2.3kN	Side of Block
2	FUR 8 x 80 T	8mm	6 x 85	2.0kN	Side of Block
3	FUR 8 x 80 T	8mm	6 x 85	1.6kN	Side of Block
4	FUR 8 x 80 T	8mm	6 x 85	1.2kN	Side of Block
5	FUR 8 x 80 T	8mm	6 x 85	1.8kN	Side of Block
6	FUR 8 x 80 T	8mm	6 x 85	1.6kN	End of Block – Ripped
7	FUR 8 x 80 T	8mm	6 x 85	1.1kN	End of Block – Ripped
8	FUR 8 x 80 T	8mm	6 x 85	1.0kN	End of Block – Ripped
9	FUR 8 x 80 T	8mm	6 x 85	1.7kN	End of Block – Ripped
10	FUR 8 x 80 T	8mm	6 x 85	1.8kN	End of Block – Ripped

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	1.0kN	Side of Block
2	UX 6 x 50R	6mm	5mm	0.7kN	Side of Block
3	UX 6 x 50R	6mm	5mm	1.4kN	Side of Block
4	UX 6 x 50R	6mm	5mm	0.8kN	Side of Block
5	UX 6 x 50R	6mm	5mm	1.0kN	Side of Block
6	UX 6 x 50R	6mm	5mm	1.3kN	End of Block – Ripped
7	UX 6 x 50R	6mm	5mm	0.7kN	End of Block – Ripped
8	UX 6 x 50R	6mm	5mm	0.6kN	End of Block – Ripped
9	UX 6 x 50R	6mm	5mm	1.1kN	End of Block – Ripped
10	UX 6 x 50R	6mm	5mm	0.8kN	End of Block – Ripped



Z6 Block

## 4.7 – Block Z7

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	FUR 8 x 80 T	8mm	6 x 85	2.1kN	Side of Block
2	FUR 8 x 80 T	8mm	6 x 85	1.4kN	Side of Block
3	FUR 8 x 80 T	8mm	6 x 85	1.0kN	Side of Block
4	FUR 8 x 80 T	8mm	6 x 85	1.0kN	Side of Block
5	FUR 8 x 80 T	8mm	6 x 85	1.5kN	Side of Block

Test No:	Fixing Tested	Drill Diameter (mm)	Screw Size (mm)	Loads (kN)	Fixing Position
1	UX 6 x 50R	6mm	5mm	1.0	Side of Block
2	UX 6 x 50R	6mm	5mm	0.9	Side of Block
3	UX 6 x 50R	6mm	5mm	0.8	Side of Block
4	UX 6 x 50R	6mm <td 5mm	1.0	Side of Block	
5	UX 6 x 50R	6mm	5mm	0.8	Side of Block



Z7 Block

## 5. Results Summary

Block Type	FUR 8 x 80 T Average Ultimate Load	FUR 8 x 80 T Safe Working Load *	UX 6 x 50 R Average Ultimate Load	UX 6 x 50 R Safe Working Load *	FIS V 360 S Safe Working Load
Z1	1.72kN	0.2kN	1.09kN	0.15kN	0.30kN
Z2	0.83kN	0.11kN	0.93kN	0.13kN	
Z3	1.78kN	0.25kN	1.1kN	0.15kN	
Z4	2.07kN	0.29kN	1.36kN	0.19kN	
Z5	1.05kN	0.15kN	0.59kN	0.08kN	
Z6	1.61kN	0.23kN	0.94kN	0.13kN	
Z7	1.4kN	0.2kN	0.9kN	0.12kN	

\* Note: Safe working load have a global safety factor of 7 (4 for resin) applied.



## 6. Pictures from Testing

