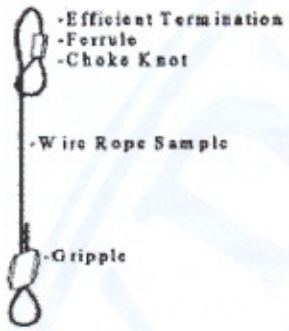
Lloyd's Register

COPY

Project:	Gripple Hangfast	*Certificate Number:*	SHF 0020242/1A1
Client:	Gripple Ltd	*Office:*	Sheffield
Client's Order Number:	Unknown	*Date:*	01.09.00
		Order Status:	Complete
Inspection Dates			
First:	02.02.00	*Final:*	24.08.00

This certificate is issued to Gripple Limited to certify that the undersigned surveyor did at their request attend their premises at The Old West Gun Works, Sheffield on the above dates for the purpose of examining and witnessing tests on the items listed below.



Gripple Hangfast No1, No2, No3, No 4, and No5 Test Configuration

Hangfast Model	MBL of Wire Rope (Galvanised)	Rope Construction	Working Load Limit (WLL)	Failure Load of test	Mode of failure
No. 1	80 kg	7 x 7 (6/1)	10 kg (22 lbs)	85 kg	Wire Break. Housing undamaged
No. 2	260 kg	7 x 7 (6/1)	35 kg (77 lbs)	255 kg	Wire Break. Housing undamaged
No. 3	580 kg	7 x 7 (6/1)	80 kg (176 lbs)	555 kg	Wire Break. Housing undamaged
No. 4	1500 kg	7 x 19 (12/6/1)	225 kg (495 lbs)	1800 kg	Wire Break. Housing undamaged
No. 5	2160 kg	7 x 19 (12/6/1)	325 kg (715 lbs)	2150 kg	Wire Break. Housing undamaged

The above tests were witnessed and found satisfactory.
No deformation was observed on the Gripple Hangfast components that were visually examined on completion of the test.

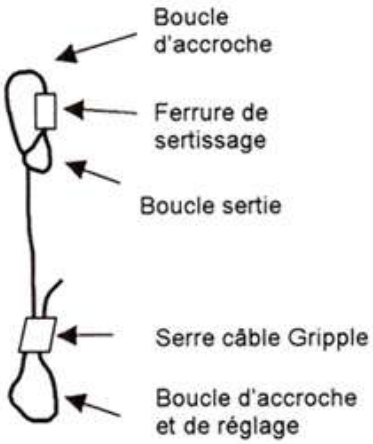
.....
A Whiteley and G. Coull
Surveyor's to Lloyd's Register

NOTICE: This certificate is subject to the terms and conditions overleaf, which form part of this certificate.

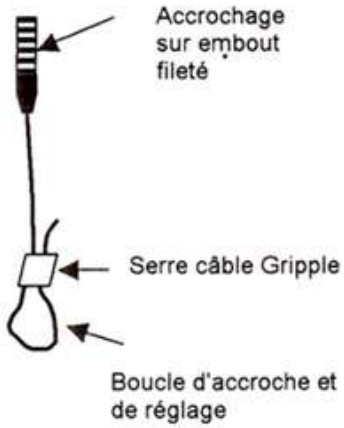
apave parisienne
Association Parisienne de Propriétaires d'Appareils à Vapeur et Électriques - Association loi 1901, fondée en 1874
13 à 17, rue Salneuve, 75854 PARIS CEDEX 17 - Tél. 01 40 54 58 00 - Fax 01 40 54 58 88 - Internet www.appave.com
N° Siret : 775690639 00015 - Code N.A.F. : 743B - N° TVA intra-communautaire : FR 25 775 690 639
Laboratoires : 97 à 103, boulevard Victor-Hugo, 93400 SAINT-OUEN - Tél. 01 40 54 58 00 - Fax 01 40 54 59 50

TYPE DE CABLE ET CONFIGURATION D'ESSAI:

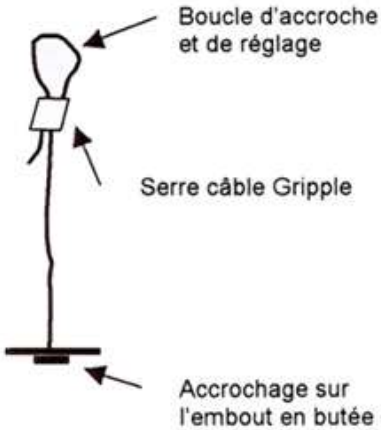
- **EN BOUCLE**



- **EN EMBOUT FILETE**



- **EN BUTEE**



Type		Charge maximale d'utilisation kg (coeff. sécurité: 5)	Charge effective de rupture kg	Mode de rupture
EN BOUCLE	n°1, ∅1,2 mm 7*7 fils	10	84,4	Rupture du câble au niveau du serre câble Gripple. Pas de déficience du serre câble Gripple
	n°2, ∅2 mm 7*7 fils	45	270	Rupture du câble au niveau du serre câble Gripple. Pas de déficience du serre câble Gripple
	n°3, ∅3 mm 7*7 fils	90	670	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	n°4, ∅5 mm 7*7 fils	225	1520	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	n°5, ∅6 mm 7*19fils	325	2340	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	Tout inox ∅2,4 mm	90	510	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
EN EMBOUT FILETE	n°1, ∅1,2 mm 7*7 fils	10	81	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	n°2, ∅2 mm 7*7 fils	45	258	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	n°3, ∅3 mm 7*7 fils	90	452	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
EN BUTEE	n°1, ∅1,2 mm 7*7 fils	10	75	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	n°2, ∅2 mm 7*7 fils	45	246	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple
	n°3, ∅3 mm 7*7 fils	90	497	Rupture du câble au niveau du serre câble Gripple, Pas de déficience du serre câble Gripple

La mission effectuée ne comportait que les essais de traction mécanique ci-dessus à l'exclusion de tout autre avis ou essais.
Les valeurs ci-dessus sont les valeurs minimales obtenues en rupture sur 4 échantillons par type.

LE RESPONSABLE d'ACTIVITE RSC
J.A. PARIS

TÜV Anlagentechnik
Regionalbereich Mönchengladbach/Krefeld

TÜV Rheinland
Berlin Brandenburg

Belegnummer: 68869002/By

TÜV Rheinland Anlagentechnik, Postfach 10 03 48, 41003 Mönchengladbach

Prüfort

Gripple Europe SARL
67 Boulevard de l'Europe

67210 Obernai

Werkstoffprüflabor

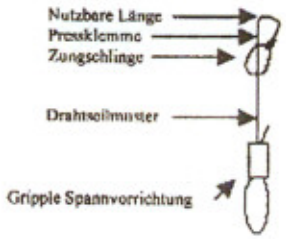
TÜV Anlagentechnik GmbH
Am Grauen Stein, Köln

Bescheinigung über die Prüfung von Lastaufnahmemittel *Gripple Hang Fast*

Hiermit wird der Firma Gripple Europe SARL bescheinigt, daß die Zugversuche im Prüflabor des TÜV Rheinland Berlin Brandenburg auf die Produkte Gripple Hang Fast Nr. 1, 2, 3, 4, 5 mit Schlaufe, Nr. 3 Edelstahl mit Schlaufe sowie Nr. 1, 2, 3 mit Gewindeende und Nr. 1, 2, 3 mit Lasche ausgeführt wurden. Die 5-fache Sicherheit gegen Bruch wurde erfolgreich nachgewiesen. Die Ergebnisse der Prüfung sind nachfolgend aufgeführt.

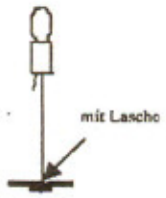
PRÜFBAU

Mit Schlaufe



Mit Gewindeende

Mit Lasche



	Hang Fast Modell Nr./ Seilaufbau	Nennlast bei Sicherheits-faktor 5:1	Bruchlast	Erreichte Nennlast bei Sicherheits-faktor 5:1	Bruchlage/ Bemerkung
Schlaufe	N°1, 1,2 mm 7*7 SWC	10 kg	90 kg	18 kg	Drahtbruch oberhalb Gripple
	N°2, 2,0 mm 7*7 SWC	45 kg	345 kg	69 kg	Drahtbruch oberhalb Gripple
	N°3, 3,0 mm 7*7 SWC	90 kg	515 kg	103 kg	Drahtbruch oberhalb Gripple
	N°4, 5,0 mm 7*7 SWC	225 kg	1450 kg	290 kg	Drahtbruch oberhalb Gripple
	N°5, 6,0 mm 7*19 SWC	325 kg	2655 kg	531 kg	Drahtbruch oberhalb Gripple
	Edelstahl N°3,	90 kg	555 kg	111 kg	Drahtbruch oberhalb Gripple
Gewin-deende	N°1, 1,2 mm 7*7 SWC	10 kg	100 kg	20 kg	Drahtbruch oberhalb Gripple
	N°2, 2,0 mm 7*7 SWC	45 kg	280 kg	56 kg	Drahtbruch oberhalb Gripple
	N°3, 3,0 mm 7*7 SWC	90 kg	540 kg	108 kg	Drahtbruch oberhalb Gripple
Lasche	N°1, 1,2 mm 7*7 SWC	10 kg	98 kg	20 kg	Drahtbruch oberhalb Gripple
	N°2, 2,0 mm 7*7 SWC	45 kg	295 kg	59 kg	Drahtbruch oberhalb Gripple
	N°3, 3,0 mm 7*7 SWC	90 kg	580 kg	116 kg	Drahtbruch oberhalb Gripple

Mönchengladbach, 19.April 2002

Geschäftsfeld Förder- u. Maschinentechnik, Aufzüge
Der Sachverständige

Dipl.- Ing. Volker Bayer

TÜV Anlagentechnik GmbH
Unternehmensgruppe
TÜV Rheinland /
Berlin-Brandenburg

Theodor-Heuss-Straße 93 - 95
D-41065 Mönchengladbach

Telefon 02161/822-171,176,216
Telefax 02161/822-222
tuevatmg@de.tuv.com

Geschäftsführung:
Dr.-Ing. Wolfram Oppermann
Dr.-Ing. Bernd-J. Müller
Dipl.-Ing. Peter Tolls
Dipl.-Volksw. Ulrich Fietz

Amtsgericht Köln
HRB 26876

INSTYTUT TECHNIKI BUDOWLANEJ
PL 00-611 WARSZAWA, ul. FILTROWA 1
tel.: (48 22) 825-04-71; (48 22) 825-76-55; fax: (48 22) 825-52-86
Członek Europejskiej Unii Akceptacji Technicznej w Budownictwie – UEAtc
Członek Europejskiej Organizacji ds. Aprobat Technicznych – EOTA

Seria: APROBATY TECHNICZNE

APROBATA TECHNICZNA ITB AT-15-8058/2009

Na podstawie rozporządzenia Ministra Infrastruktury z dnia 8 listopada 2004 r. w sprawie aprobat technicznych oraz jednostek organizacyjnych upoważnionych do ich wydawania (Dz. U. Nr 249 z 2004 r., poz. 2497), w wyniku postępowania aprobacyjnego dokonanego w Instytucie Techniki Budowlanej w Warszawie na wniosek firmy:

GRIPPLE EUROPE Sarl
1 Rue du Commerce 67210 Obernai, Francja

stwierdza się przydatność do stosowania w budownictwie wyrobów pod nazwą:

Zawieszenia budowlane systemu GRIPPLE

w zakresie i na zasadach określonych w Załączniku, który jest integralną częścią niniejszej Aprobaty Technicznej ITB.

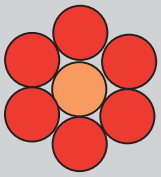
Termin ważności :
20 sierpnia 2014 r.

DYREKTOR
Instytutu Techniki Budowlanej
Marek Kaproń

Załącznik:
Postanowienia ogólne i techniczne

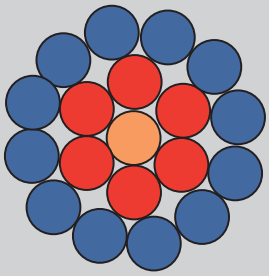
Warszawa, 20 sierpnia 2009 r.

Wire Rope Specification



7 x 7 (6/1) wire rope structure

Gripple sizes: No.1, No.2, & No.3



7 x 19 (12/6/1) wire rope structure

Gripple sizes : No.4, No.5, EP & CTI

Galvanised wire rope:

Manufactured toDIN EN 12385-4

The minimum specifications are as follows:

Gripple sizes	Break load	Wire rope structure	Traction (N/mm^2)
No.1	80	7 x 7 (6/1)	1770
No.2	260	7 x 7 (6/1)	1770
No.3	580	7 x 7 (6/1)	1770
No.4	1500	7 x 19 (12/6/1)	1770
No.5	2160	7 x 19 (12/6/1)	1770

Vibration Transmission Test

TESTING

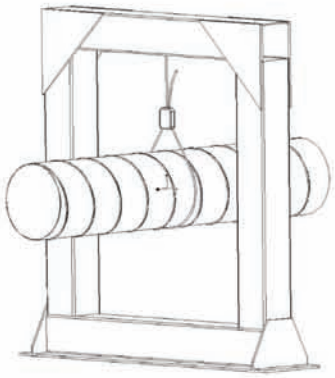
independent vibration testing of Gripple hangers

Environmental Engineering Components (UK) Ltd conducted a series of tests to establish the relative performance of Gripple hangers compared to other suspension systems in limiting vibration transmission.
A summary follows.

methodology:

The tests were carried out on a rigid 'goal post' frame manufactured from rolled hollow section welded together with gusset plates welded at each joint, top and bottom. A 600 mm section of 160 mm diameter spiral duct was suspended from the frame using:

1. An 8 mm dia threaded rod and duct clamp.
2. An 8 mm dia threaded rod and with a neoprene lined duct clamp.
3. An 8 mm dia threaded rod and duct clamp with a neoprene anti vibration mount.
4. A No 1 Gripple hanger with a stud end
5. A No 2 Gripple hanger with a stud end
6. A No 3 Gripple hanger with a stud end



A 20 mm dia. x 30 mm long steel cylinder with an oscillating motor acted as a vibration source. The vibration source was placed on top of the spiral duct and set to oscillate at frequencies
(1) Below 1 Hz **(2)** 1Hz **(3)** 3Hz

Using a Bruel and Kjaer type 2511 vibration metre with a 4370 accelerometer, displacement readings were taken at:

(A) the junction of the duct and suspension
(B) the top of the frame

results:

From these readings comparative percentage isolation values were derived using the formula:

$$\frac{\text{Displacement at (A)} - \text{Displacement at (B)}}{\text{Displacement at (A)}} = \text{\% isolation (absorption)}$$

Gripple: 1st place

Averages of these values showing the relative % isolation (absorption) effectiveness against vibration through the different products and their ranking are summarised below:

		Absorption	Transmittance
1st	Gripple hangers	77%	23%
2nd	threaded rod with anti-vibration fixings	59%	41%
3rd	threaded rod	52%	48%

conclusions:

The main findings of the tests conducted were:

1. Gripple hangers provide better isolation against vibration than threaded rod across all frequencies up to 3 Hz.
2. Gripple hangers provide better isolation against vibration than threaded rod with anti-vibration fixing at frequencies up to 1 Hz.
3. Gripple hangers provide better or equal isolation against vibration across all frequencies up to 3 Hz.

Gripple Limited, The Old West Gun Works, Saville Street East, Sheffield S4 7UQ
telephone: 0800 0184264, fax: 0114 275 1155, email: info@gripple.com or visit www.gripple.com

Ducting - Which Gripple Size to Choose

Spiral Ducting (Galvanised Steel Ducting)

Nominal Diameter (mm)	Nominal Thickness (mm)	Single Wall Galvanised Steel Spiral Ducting Weight (kg/m)	Weight per 3m run* (kg)	Gripple Hanger size required
63	0.5	0.89	2.67	No.2
80	0.45	0.91	2.73	No.2
100	0.45	1.14	3.42	No.2
112	0.5	1.42	4.26	No.2
125	0.45	1.41	4.23	No.2
140	0.5	1.76	5.28	No.2
150	0.5	1.89	5.67	No.2
160	0.5	2.02	6.06	No.2
180	0.5	2.26	6.78	No.2
200	0.5	2.56	7.68	No.2
224	0.6	3.42	10.26	No.2
250	0.5	3.18	9.54	No.2
280	0.6	4.28	12.84	No.2
300	0.6	4.58	13.74	No.2
315	0.6	4.81	14.43	No.2
355	0.6	5.41	16.23	No.2
400	0.6	6.56	19.68	No.2
450	0.7	8.60	25.80	No.2
500	0.7	9.54	28.62	No.2
560	0.8	12.20	36.60	No.2
600	0.7	13.10	39.30	No.2
630	0.7	12.00	36.00	No.2
710	0.8	15.50	46.50	No3
800	0.8	17.40	52.20	No3
900	0.9	21.70	65.10	No3
1000	0.9	24.10	72.30	No3
1120	0.9	27.00	81.00	No3
1250	0.9	30.20	90.60	No.4
1400	1.25	38.00	114.00	No.4
1500	1.25	51.40	154.20	No.4
1600	1.25	54.80	164.40	No.4

* Weight of spiral ducting is based on 3m runs. Weights obtained from data provided by Lindab UK, but should be used as guidance only as can differ by thickness and spefication locally.

Ref:Spiralductchart-issue 1

Rectangular Duct Weights (Galvanised Sheet Steel)

Sum of 2 Sides (mm) **	Weight per linear metre (kg) *		Gripple size required (2.5m spacing)	Gripple size required 3m spacing
	Metal Thickness			
	0.6mm	0.8mm		
200	3.72		No.2	No.2
300	5.39		No.2	No.2
400	7.12		No.2	No.2
500	8.81		No.2	No.2
600	10.5	13.53	No.2	No.2
700	12.21	15.73	No.2	No.2 (0.6mm) No.3 (0.8mm)
800	13.91	17.96	No.2	No.3
900		20.17	No.3	No.3
1000		22.37	No.3	No.3
1100		24.57	No.3	No.3
1200		26.79	No.3	No.3
1300		28.95	No.3	No.3
1400		31.20	No.3	No.4
1500		33.45	No.3	No.4
1600		35.59	No.3	No.4
1700		37.80	No.4	No.4
1800		40.00	No.4	No.4
1900		42.21	No.4	No.4
2000		44.42	No.4	No.4
3000		67.11	No.4	No.4

*Weights in kg/m with allowance for in-line dampers and 40mm thick 48kg/m3 thermal insulation.

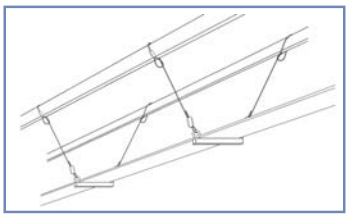
Ref:Spiralductchart-issue 3

Gripple Ltd The Old West Gun Works Savile Street East Sheffield S4 7UQ
Tel: +44 (0)114 275 2255 Fax: +44 (0)114 275 1155 www.gripple.com email: info@gripple.com

Registered in England 1772901

Suspending objects at an angle
Table showing the reduction in load capacity

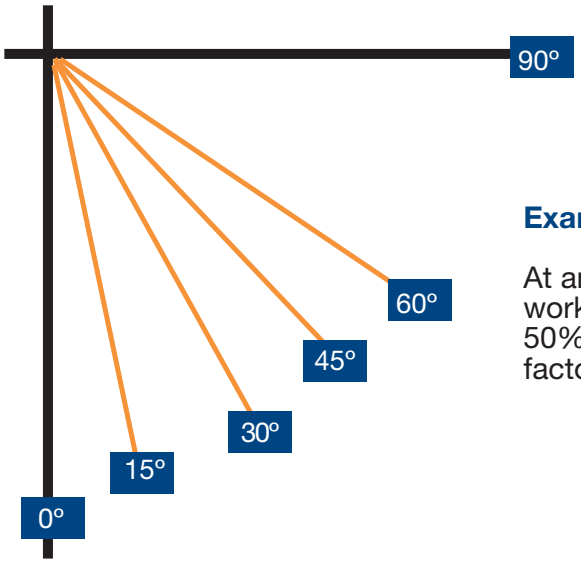
The load rating of a Gripple hanger is calculated for a load suspended vertically



In many cases, the position of the suspension point and the presence of certain suspension constraints makes it necessary to suspend an object at an angle. If the wire rope is suspended at an angle, an additional sideways load is applied which reduces the load capacity of the suspension. The table below shows the variations in safe working load in relation to the angle of suspension.

Never exceed an angle of 60 °

Gripple hanger size	Maximum safe working load (kg) at an angle from the vertical:				
	Verticale 0º	15º	30º	45º	60º
No.1	10	9	8	7	5
No.2	45	43	38	31	22
No.3	90	86	77	63	45
No.4	225	217	194	159	112
No.5	325	313	281	229	162
Loss of load capacity %	**0**	**4**	**14**	**30**	**50**



Example :

At an angle of 60º to the vertical, the working load must be reduced by 50% in order to maintain a safety factor of 5:1

Tensometer testing of No.2 hanger purlin clip

results:

Sample No.	Breaking Load kg	Comment
1	291	wire break at Gripple fastener
2	255	wire break at Gripple fastener
3	295	wire break at Gripple fastener
4	282	wire break at Gripple fastener
5	286	wire break at Gripple fastener

SWL of No.2 @ 5:1 safety = 45 kg.

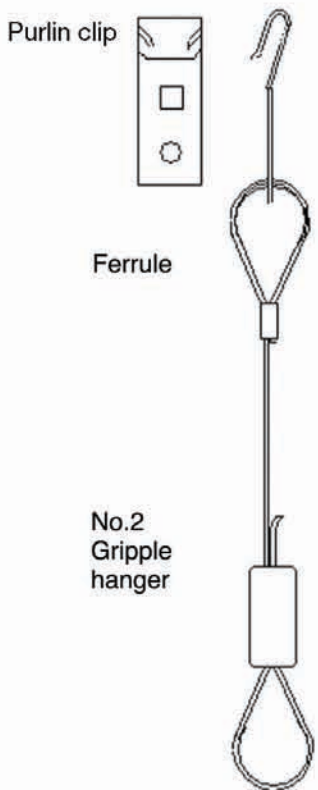
SWL x 5 = 225 kg.

Test Dates: 29/4/99, 30/4/99 and 4/5/99

comment:

In each test, the wire rope broke at a load that was at least 5 times greater than the SWL of the Gripple hanger. The test fully confirmed the tensile strength of the wire rope.

The integrity of the wire rope strands, physically bearing on the purlin clip, was maintained in each test. No strands broke at the purlin clip. For test purposes the clip was secured to the assembly using a ferrule. The assembly was secured in the tensometer machine using a No 2 Gripple at the other end.



Gripple Fire Rating Certificate

Project:	Temperature Test	**Date:**	23/08/2004
Reference:	2004/250/300/123	**Product size:**	No.1, 2 & 3 hangers

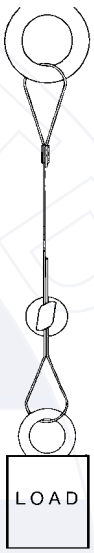
This fire rating certificate is issued by Gripple Limited to certify that the No.1, No.2 & No.3 Gripple hangers have been fire temperature tested, in the presence of Chiltern International Fire Ltd in the UK.

The tests were carried out at the Old West Gun Works, Sheffield, using the Gripple furnace, which was independently calibrated by Chiltern International Fire Ltd, ("CIFL").

The test specimen comprised a Gripple hanger including the accompanying galvanised wire rope (7x7 construction). The assembly was hung from an eyebolt with the Gripple hanger located within the furnace.

The test specimen was loaded with steel weights, which were hung from the bottom of the wire rope. The weights were weighed at CIFL on their calibrated scales (T5.19) before the test. The elapsed test time was monitored using a calibrated stopwatch (T5.86-6 supplied by CIFL).

Test configuration



Results

This certificate records the actual results achieved in the test which was carried out under the auspices of CIFL using their calibrated thermocouples and readout box (FT2.87).

Temperature	Gripple suspension		
	No.1	No.2	No.3
250°c	121 minutes	121 minutes	121 minutes
300°c	68 minutes	28 minutes	96 minutes

Derek Boaler

Gripple Research and Development

Gripple Fire Certified Hangers

Summary of Testing

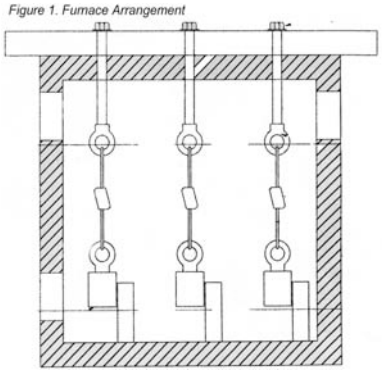
Chiltern International Fire Limited (CIFL) conducted a series of tests on Gripple Fire Certified Hangers in accordance with the temperature and pressure conditions outlined in BS 476 : Part 20 : 1987. The hangers were tested under a series of different loads to establish a certified time and load rating for the product.

Methodology

The Gripple Fire Certified Hanger system comprises three major components; the wire rope, the ferrule and the self-locking grip.

The wire rope is 3mm diameter 7 x 7 (6/1) AISI 316 stainless steel wire rope. One end of the wire rope is passed and returned through a 16mm long AISI 316 stainless steel ferrule and crimped to produce a nominal 60mm diameter loop. The self-locking grip comprises a metal injection moulding MIM-17/4PH stainless steel housing. Incorporated within the body of the grip are 2 sets of spring loaded locking wedges, one set for each wire rope channel. The loaded locking wedges are a three part system incorporating a ceramic locking wedge, a BS 2056 302 526 G2 stainless steel spring and a AISI 316 stainless steel end cap.

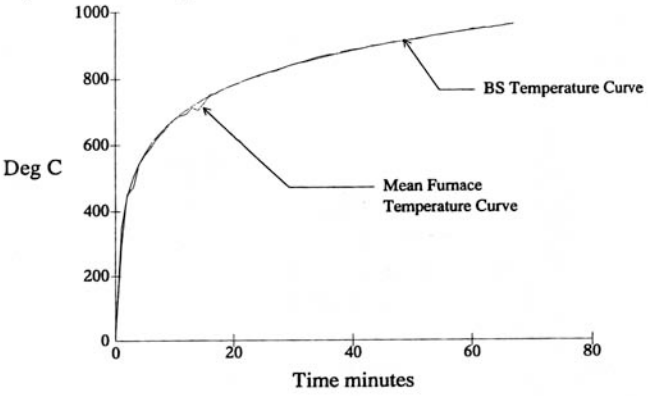
Figure 1. Furnace Arrangement



The Gripple Hangers were placed in a furnace constructed by CIFL for the test as shown in Figure 1
The hangers were suspended from eye nuts attached to M16 threaded bar held on a supporting construction. The loop end of the wire rope was attached to the eye nuts.

The non-looped end of the wire rope was fed through the grip and through the eye on the weight then returned upon itself and fed back through the grip to create a second loop at the bottom of the system. This second loop had the load applied to it. The grip, ferrule and 3mm wire rope were subjected to the furnace conditions but not placed directly in line with the burners.

Figure 2. Furnace Temperature Curve



The furnace was controlled to follow the temperature/time relationship specified in BS 476 : Part 20 : 1987 as shown in Figure 2 using four thermocouples distributed within the furnace.

Results

When tested in accordance with BS 476 : Part 20 : 1987 the load bearing capacity of each test specimen was maintained for the following period

	Load in Kg	Load bearing time
Gripple sample 1	20.015	64 minutes
Gripple sample 2	18.010	67 minutes
Gripple sample 3	15.010	67 minute*
Gripple sample 4	12.005	67 minute*
Gripple sample 5	10.020	67 minute*

** Load bearing capacity maintained until the test was terminated*

Conclusion

The Gripple Fire Certified Hanger has a certified 60 minute fire rating for a 20kg load in accordance with BS 476 :
Part 20 : 1987

References

Chiltern International Fire Limited Test Report : Chilt/F01090
December 2001

GRIPPLE®

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Osvedčenie o skúške prostriedku na uchopenie bremena *Gripple Hang Fast*

Týmto osvedčujeme firme Gripple Europe SARL, že skúšky ťahom v skúšobnom laboratóriu TÜV Rheinland Berlin Brandenburg na výrobky Gripple Hang Fast č. 1, 2, 3, 4, 5 boli vykonané so slučkou, č. 3 ušľachtilá oceľ so slučkou, ako aj č. 1, 2, 3 so závitovým koncom a č. 1, 2, 3 s príložkou. Úspešne bola preukázaná 5-bezpečnosť voči pretrhnutiu. Výsledky skúšky sú uvedené nižšie:

SKÚŠOBNÁ KONŠTRUKCIA

so slučkou

so závitovým koncom

s príložkou

	Hang Fast model č./ konštrukcia lana	menovité zaťaženie pri bezpečnost-nom faktore 5:1	zaťaže-nie na medzi pevnosti	dosiahnuté menovité zaťaženie pri bezpečnost-nom faktore 5:1	poloha pretrhnutia
slučka	č.1, 1,2 mm 7*7 SWC	10 kg	90 kg	18 kg	pretrhnutie drôtu nad Gripple
	č. 2, 2,0 mm 7*7 SWC	45 kg	345 kg	69 kg	pretrhnutie drôtu nad Gripple
	č. 3, 3,0 mm 7*7 SWC	90 kg	515 kg	103 kg	pretrhnutie drôtu nad Gripple
	č. 4, 5,0 mm 7*7 SWC	225 kg	1450 kg	290 kg	pretrhnutie drôtu nad Gripple
	č. 5, 6,0 mm 7*7 SWC	325 kg	2655 kg	531 kg	pretrhnutie drôtu nad Gripple
	ušľachtilá oceľ č. 3	90 kg	555 kg	111 kg	pretrhnutie drôtu nad Gripple
závitový koniec	č.1, 1,2 mm 7*7 SWC	10 kg	100 kg	20 kg	pretrhnutie drôtu nad Gripple
	č. 2, 2,0 mm 7*7 SWC	45 kg	280 kg	56 kg	pretrhnutie drôtu nad Gripple
	č. 3, 3,0 mm 7*7 SWC	90 kg	540 kg	108 kg	pretrhnutie drôtu nad Gripple
príložka	č.1, 1,2 mm 7*7 SWC	10 kg	98 kg	20 kg	pretrhnutie drôtu nad Gripple
	č. 2, 2,0 mm 7*7 SWC	45 kg	295 kg	59 kg	pretrhnutie drôtu nad Gripple
	č. 3, 3,0 mm 7*7 SWC	90 kg	580 kg	116 kg	pretrhnutie drôtu nad Gripple

Mönchengladbach, 19. apríl 2002

Oblasť činnosti dopravníkové a strojné technológie, výťahy
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14 January 2013

Our Ref. 132129

Dear Mr Belafonte

BRE Global report 132129 - supplementary information

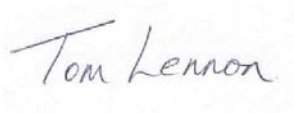
BRE Global client report 132129 sets out the results from a series of nine fire tests to investigate the performance of an innovative hangar system used to support mechanical and electrical installations, services etc. Three different systems were tested under load and exposed to a heating curve corresponding to the standard fire curve for a specified period.

The performance of the product was assessed in terms of the ability to continue to support the applied load when subject to a heating curve corresponding to 30, 60 or 90 minutes standard fire exposure as agreed with the client. However in two cases the test was continued for a period corresponding to 120 minutes exposure to the standard fire curve.

Reference should be made to BRE client report for details of the experimental methodology. In terms of the specific performance criteria set out in BRE Global client report 132129 the performance of the products tested is as follows:

Group	Test ref.	Description	Applied load (kg)	Standard fire exposure (min)	Performance
1	1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	45	30	Pass
	2	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	45	30	Pass
	3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	45	30	Pass
2	1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	20	60	Pass
	2	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	20	60	Pass
	3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	20	60	Pass
3	1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	10	120	Pass
	2	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	10	90	Pass
	3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	10	120	Pass

Yours sincerely



Tom Lennon
Principal Consultant
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Fire performance of innovative hanger system

Prepared for: Gripple Limited

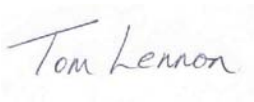
8 November 2012

Client report number 132129

Prepared on behalf of BRE Global by

Name Tom Lennon

Position Principal Consultant

Signature 

Approved on behalf of BRE Global by

Name Steve Manchester

Position Business Group Manager, Fire Safety

Date 8/11/12

Signature 

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Executive Summary

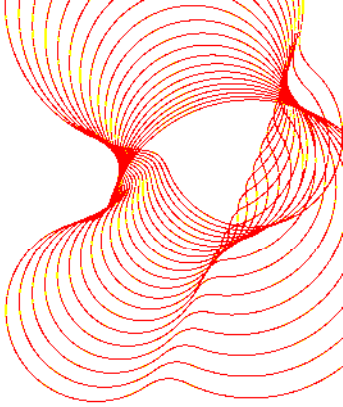
BRE Global has undertaken nine fire tests to investigate the performance of an innovative hanger system used to support mechanical and electrical installations, services etc. Three different systems have been tested under load and exposed to a heating curve corresponding to 30, 60 or 90 minutes standard fire exposure[1,2]. This report contains all relevant test results and observations.

The performance of the product was assessed in terms of the ability to continue to support the applied load when subject to a heating curve corresponding to 30, 60 or 90 minutes standard fire exposure as agreed with the client. In terms of the performance criteria set out in this report the performance of the specimens is as follows:

Group	Test ref.	Description	Applied load (kg)	Standard fire exposure (min)	Performance
1	1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	45	30	Pass
	2	Gripple Trapeze Plus No. 3 unit with 90° eyelet and fixing	45	30	Pass
	3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	45	30	Pass
2	1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	20	60	Pass
	2	Gripple Trapeze Plus No. 3 unit with 90° eyelet and fixing	20	60	Pass
	3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	20	60	Pass
3	1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	10	90	Pass
	2	Gripple Trapeze Plus No. 3 unit with 90° eyelet and fixing	10	90	Pass
	3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	10	90	Pass

[1] British Standards Institution, BS 476-20:1987, Fire tests on building materials and structures – Part 20: Method for the determination of the fire resistance of elements of construction (general principles), BSI, London, 1987

[2]DIN 4102 Part 2, Fire Behaviour of Building Materials and Components, Building components, Definitions, Requirements and Tests, Deutsche Normen, Berlin, September 1977



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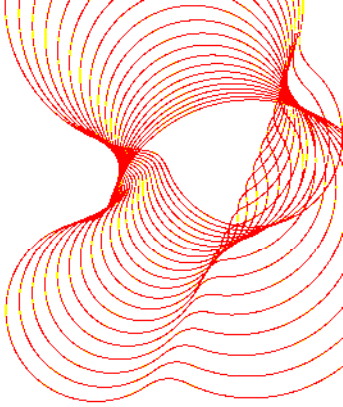


Introduction

BRE Global have undertaken a series of fire experiments to investigate the performance of a number of stainless steel wire rope connecting systems when under load and subject to a thermal exposure corresponding to 30, 60 or 90 minutes of the standard fire curve[1].

Description of the project

The client required information on the performance of a number of steel wire rope suspension systems subject to a standard fire exposure. The experimental programme, as agreed with the client is summarised in Table 1 below.

Group ref.	Test ref.	Duration of exposure to the standard fire curve (min)	Description	Applied load to the cable system (kg)
1	1	30	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	45
	2	30	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	45
	3	30	Gripple Trapeze Plus No.3 unit with straight eyelet end fixing	45
2	1	60	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	20
	2	60	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	20
	3	60	Gripple Trapeze Plus No.3 unit with straight eyelet end fixing	20
3	1	90	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	10
	2	90	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	10
	3	90	Gripple Trapeze Plus No.3 unit with straight eyelet end fixing	10

Table 1 Experimental programme

In each case the load was applied by hanging a weight to a length of channel fixed to the cable by means of a “Gripple” fixing (Figure 1). The fixing to the other end was attached to a threaded bar suspended above the furnace and varied for each test in accordance with the description in the table above. The fixings are illustrated in Figures 2-4. In each case the cable was a stainless steel wire rope of 3mm diameter. In each case both fixings were entirely contained within the furnace.

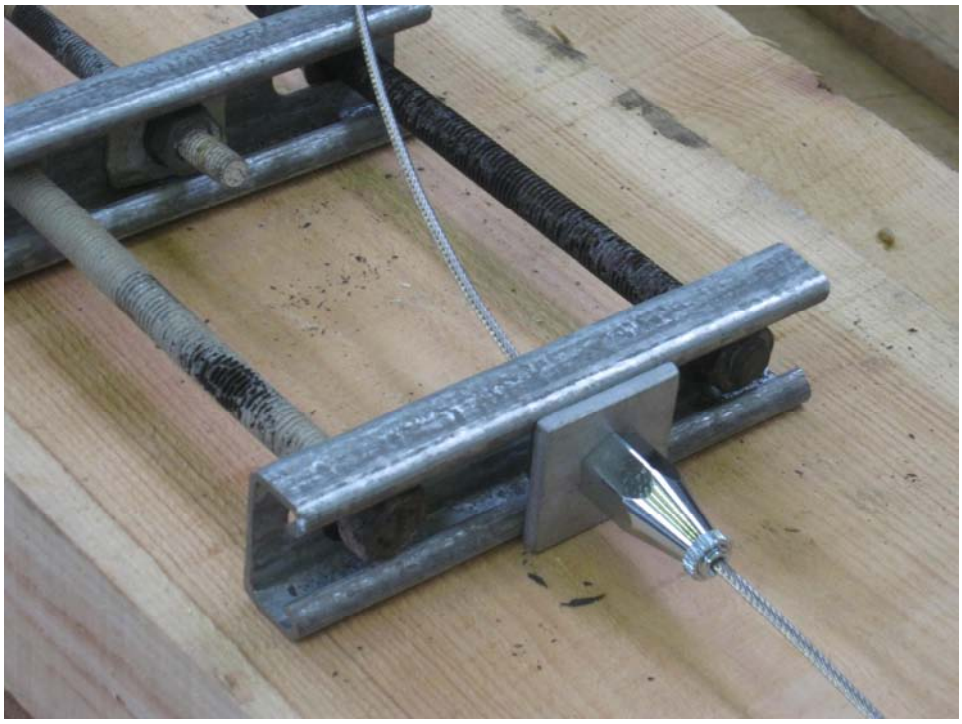
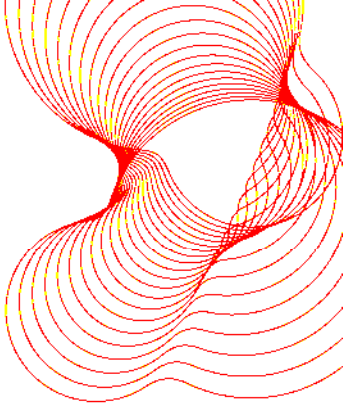


Figure 1 “Gripple” fixing attached to channel

Figure 2 M8 stud end fixing connected to M8 stud

Figure 3 90° eyelet end fixing connected to M8 stud

Figure 4 Straight eyelet end fixing connected to channel



Performance criterion

The systems were evaluated against a performance requirement to continue to support the applied design load (as specified by the client) for the entire duration of the test. In order to provide additional information total elongation was also measured for the duration of the test.

Findings

Group 1 Test 1 Gripple Trapeze Plus No. 3 unit with M8 stud end fixing 45kg load 30 minutes fire exposure

The results from the first fire test are shown in Figure 5 below. The measured temperature within the furnace is shown alongside the standard (BS476) fire curve. The results indicate a good agreement between the measured temperature and the standard curve. The maximum deflection was approximately 30mm after 30 minutes. The system continued to support the applied load for the test period. The sample is shown on removal from the furnace in Figure 6. The sample comprised both the Gripple unit and M8 stud end fixing and approximately 750mm of the wire rope. At the end of the test the sample appeared to be supported on the bottom of the furnace (Figure 7). However for the 30 minute test period the sample continued to deflect so it is likely that the sample was supported on the bottom of the furnace after the test was completed.

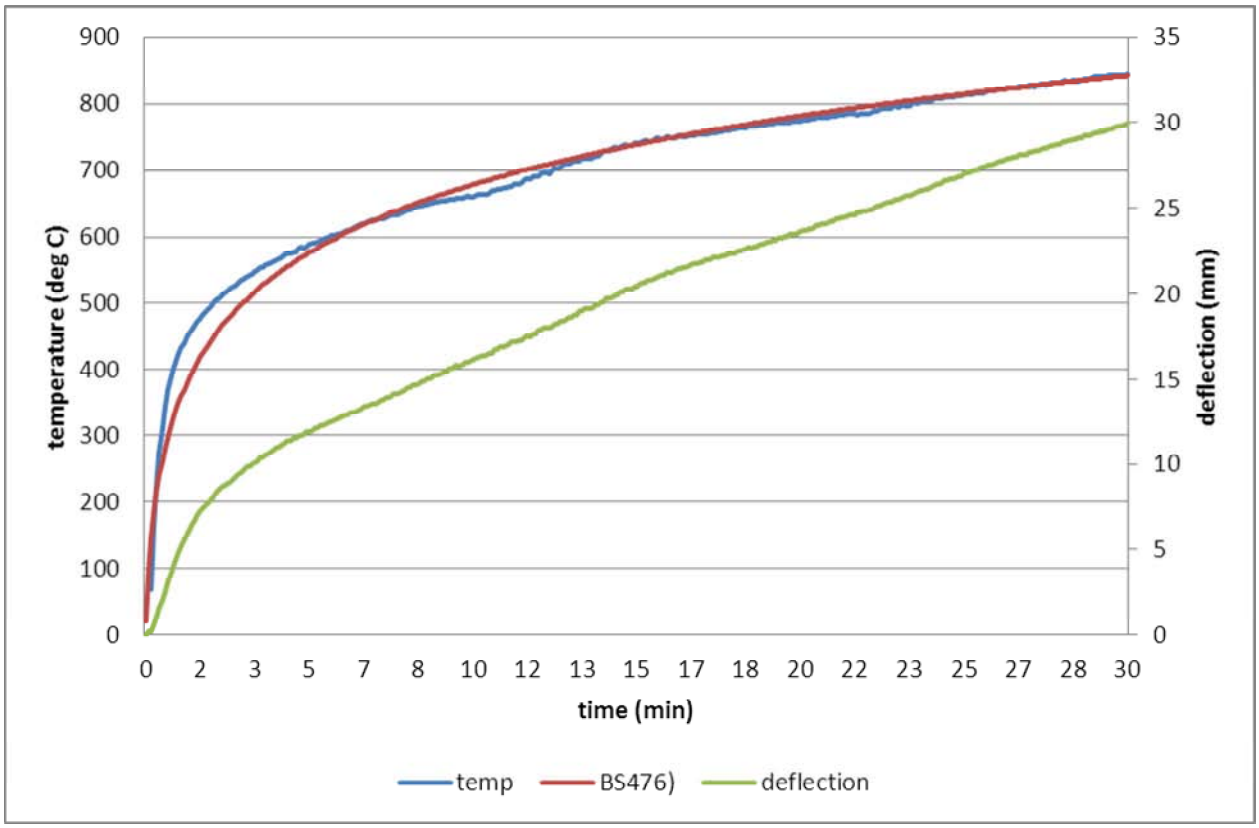


Figure 5 Results from Group 1 test 1

Figure 6 Fixings on removal from the furnace

Figure 7 Sample supported on bottom of the furnace at the end of the test

Group 1 Test 2 Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing 45kg load 30 minutes fire exposure

The results from the second test are shown in Figure 8. Again there is good agreement between the measured temperature within the furnace and the standard fire curve. The system supported the load for the duration of the test. The maximum deflection was approximately 76mm at 30 minutes. The sample is shown on removal from the furnace in Figure 9.

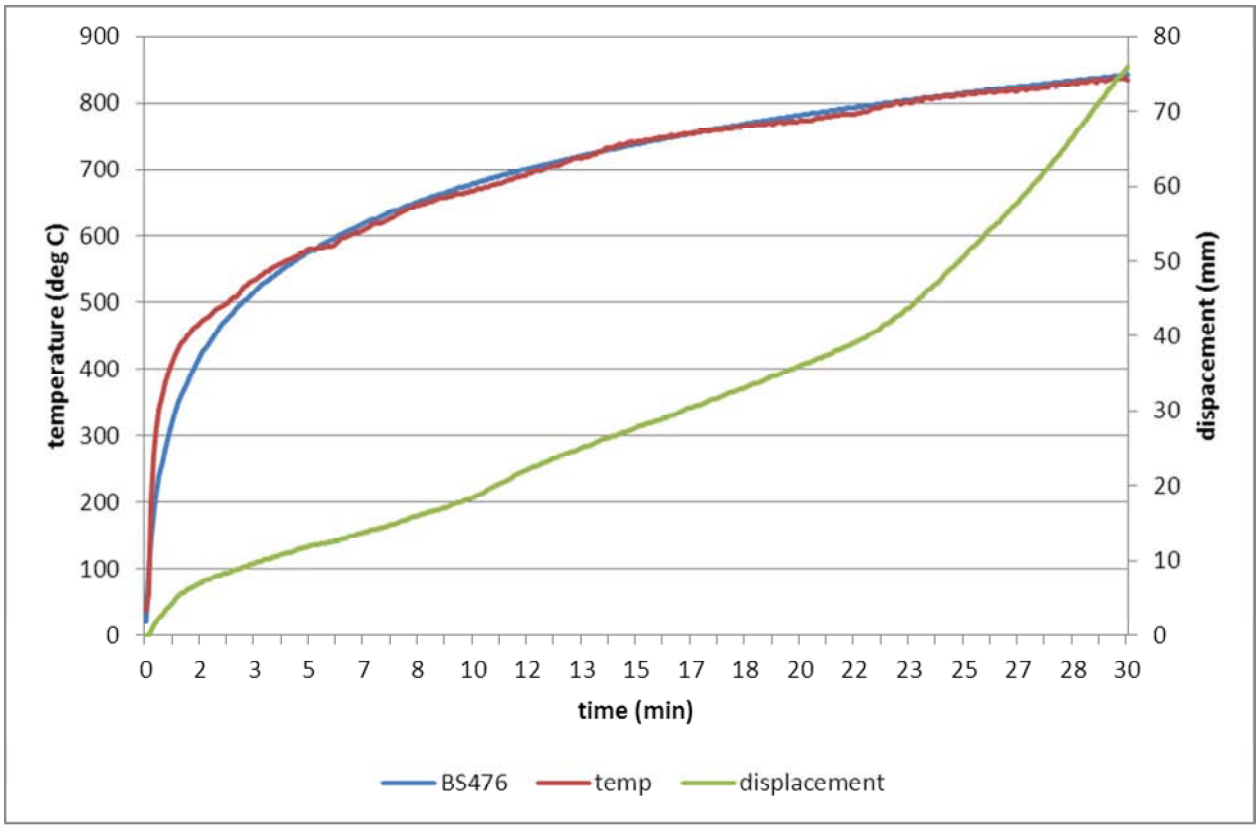


Figure 8 Results from Group 1 test 2

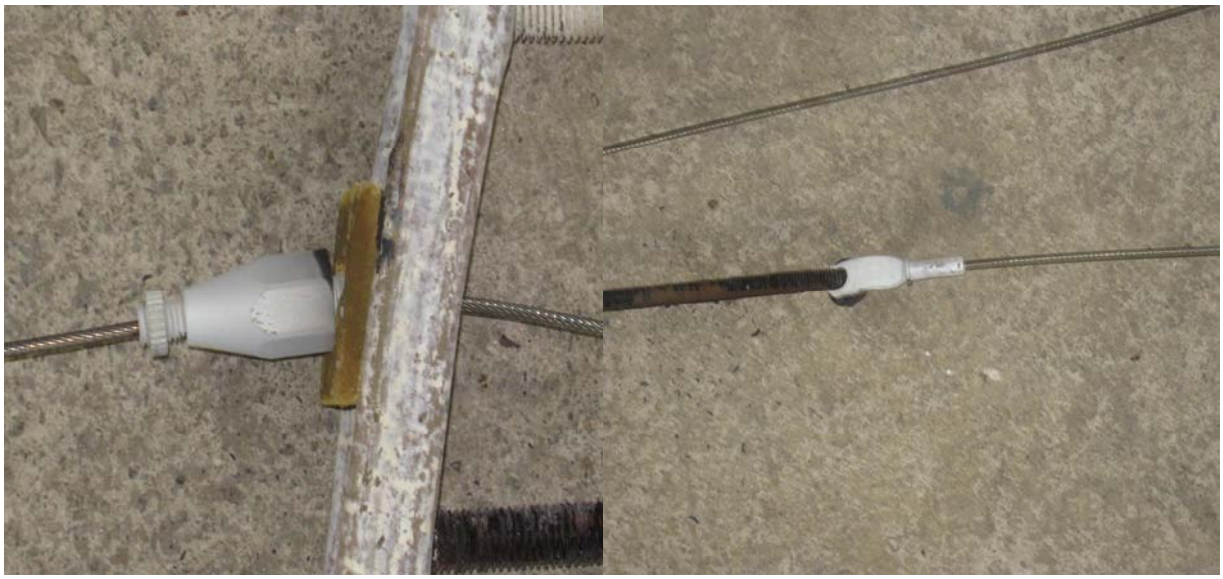


Figure 9 Fixings on removal from the furnace

Group 1 Test 3 Gripple Trapeze Plus No. 3 unit with straight eyelet connector 45kg load 30 minutes fire exposure

The results from the third test are shown in Figure 10. The system supported the load for the duration of the test. The maximum deflection was approximately 77mm at 30 minutes. The sample is shown on removal from the furnace in Figure 11.

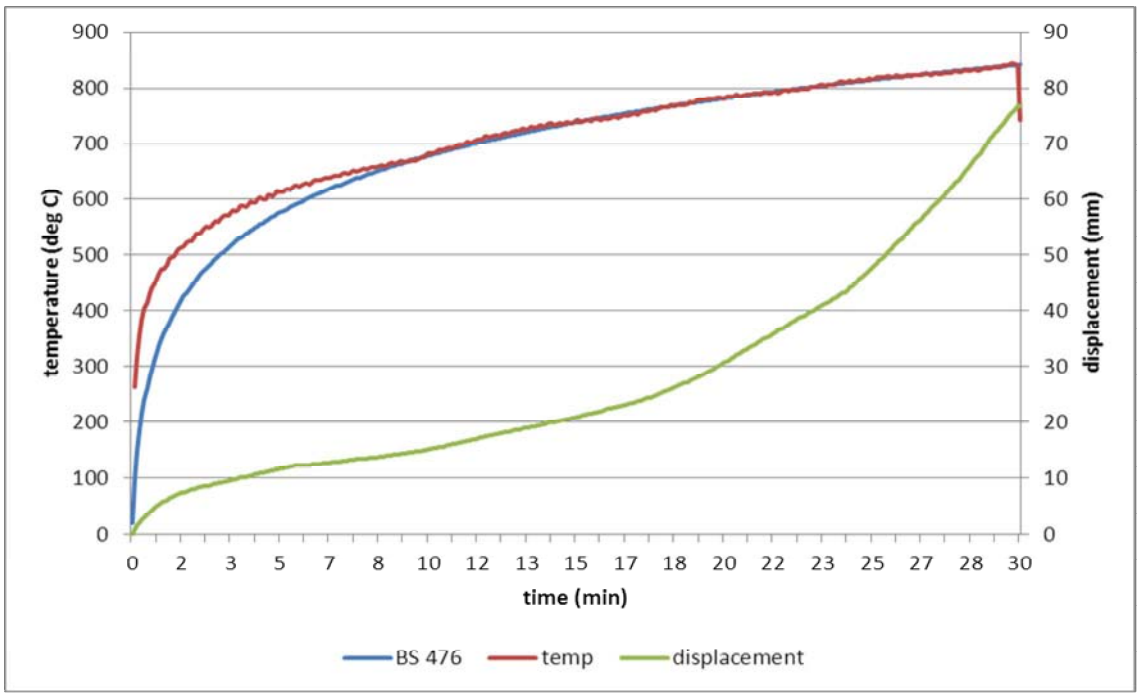


Figure 10 Results from Group 1 test 3

Figure 11 Fixings on removal from the furnace

Group 2 Test 1 Threaded connector 20kg load 60 minutes fire exposure

The results from the fourth test are summarised in Figure 12.

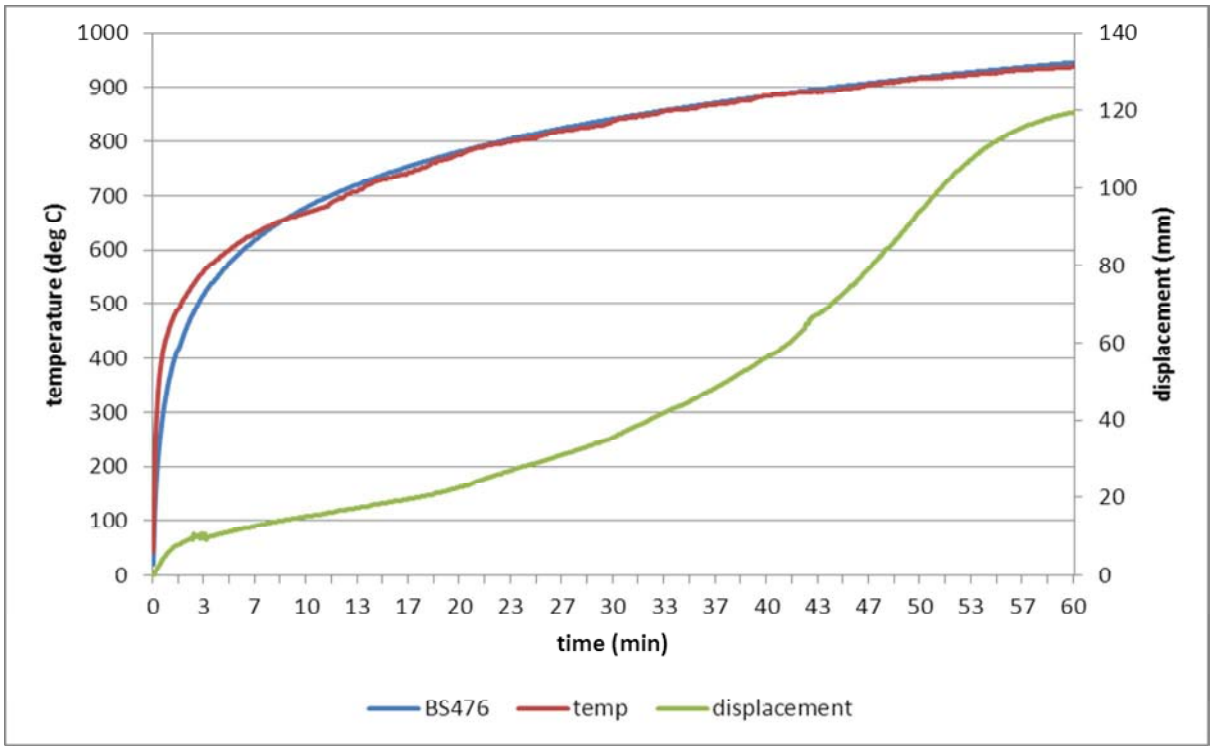


Figure 12 Results from Group 2 test 1

The system supported the load for the duration of the test. The maximum deflection was approximately 120mm at 60 minutes. The sample is shown on removal from the furnace in Figure 13.

Figure 13 Fixings on removal from the furnace

Group 2 Test 2 Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing 20kg load 60 minutes fire exposure

The results for the fifth test are summarised in Figure 14. The system supported the load for the duration of the test. The maximum deflection was approximately 118mm at 60 minutes. There is no clear reason for the increase in deflection between 48 and 49 minutes into the test although it may have been caused by deformation of the loading frame. The sample is shown on removal from the furnace in Figure 15. In this case the test was continued until failure which occurred at 69 minutes.

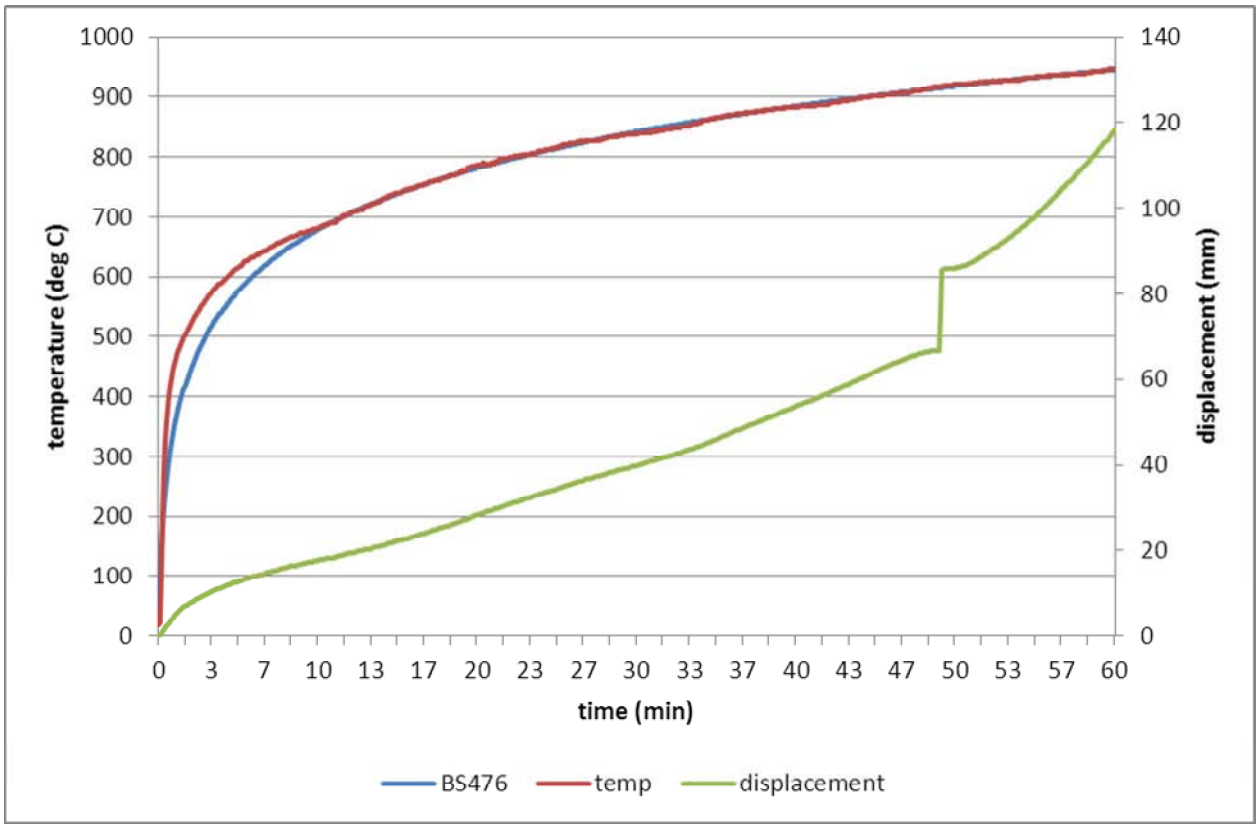


Figure 14 Results from Group 2 test 2

Figure 15 Fixings on removal from furnace

Group 2 Test 3 Gripple Trapeze Plus No. 3 unit with straight eyelet 20kg load 60 minute fire exposure

The results for the sixth test are summarised in Figure 16. There were problems with the data logging system for this test. The displacement transducer stopped recording after approximately 15 minutes and all communication with the data logging system was lost after approximately 23 minutes. The test was continued for 60 minutes. The system supported the load for the duration of the test. The sample is shown on removal from the furnace in Figure 17.

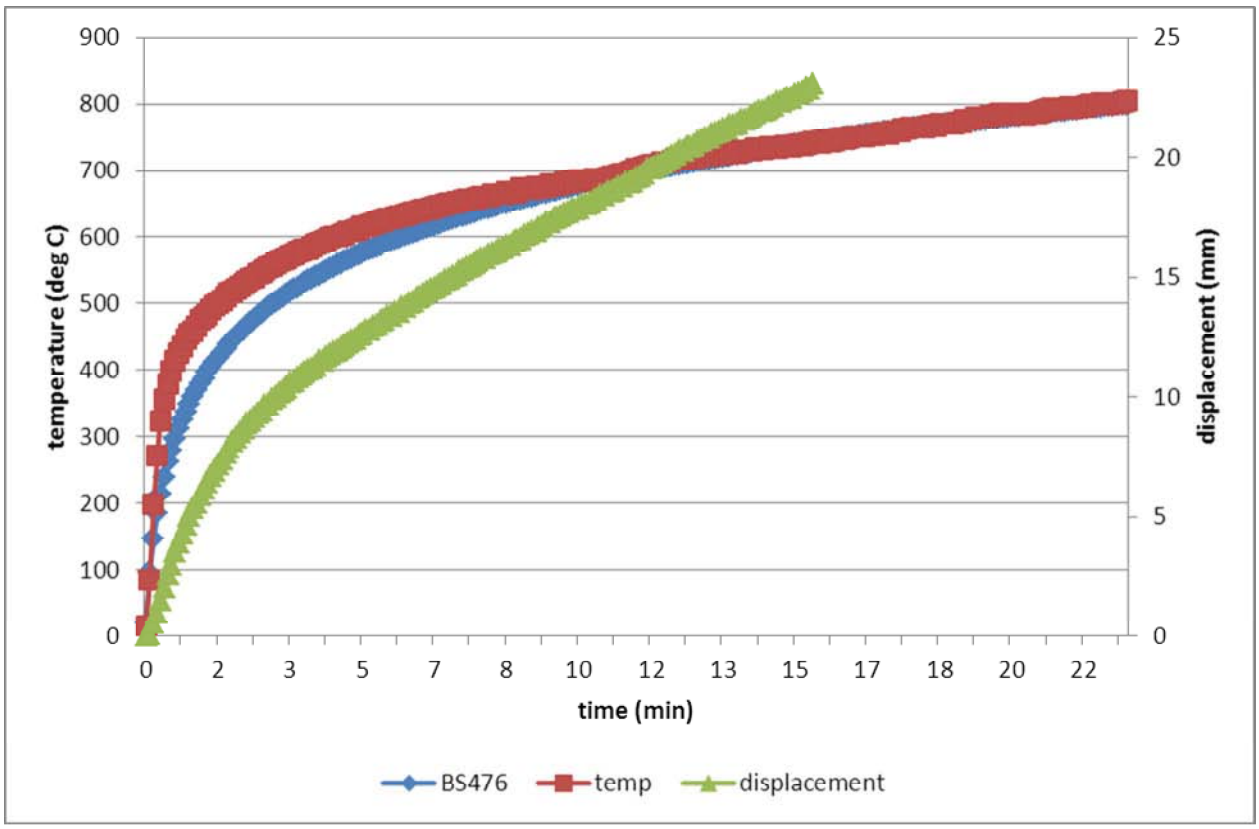


Figure 16 Results from Group 2 test 3

Figure 17 Fixings on removal from the furnace

Group 3 Test 1 Gripple Trapeze Plus No. 3 unit with M8 stud end fixing 10kg load 90 minutes fire exposure

The results for the seventh test are summarised in Figure 18. The maximum deflection is approximately 86mm at 90 minutes. The system supported the load for the duration of the test. The sample is shown within the furnace in Figure 19.

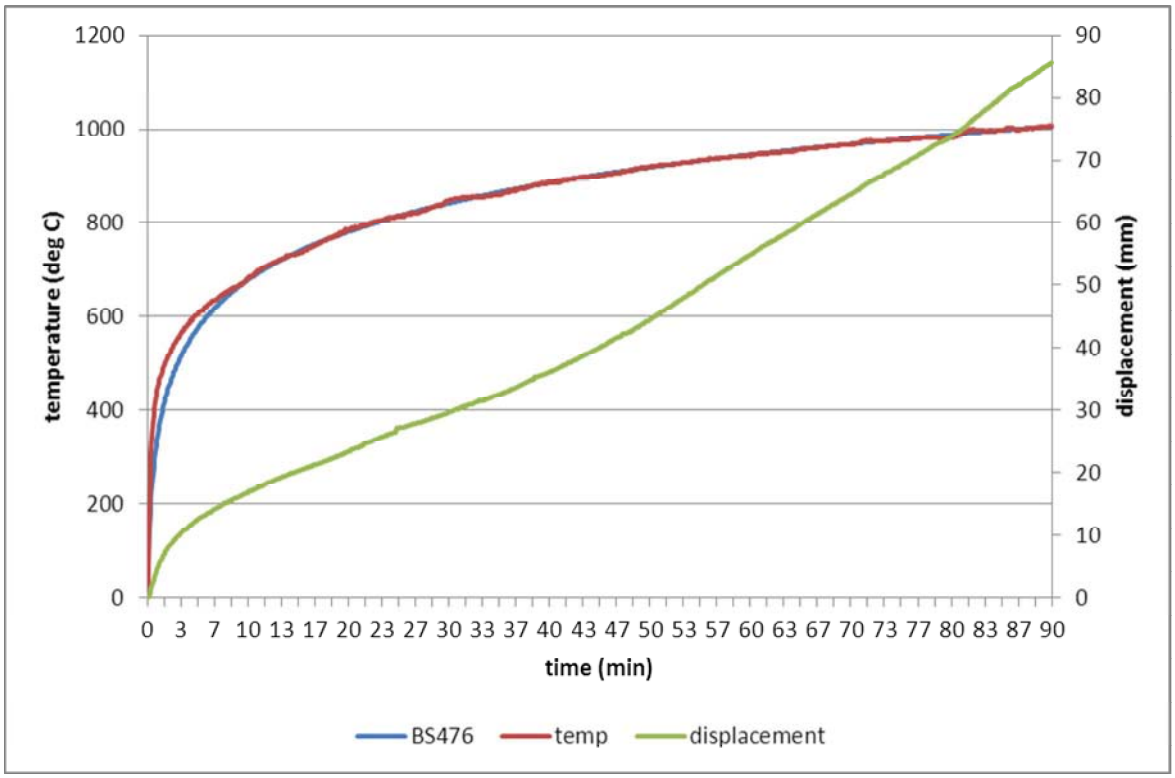


Figure 18 Results from Group 3 test 1

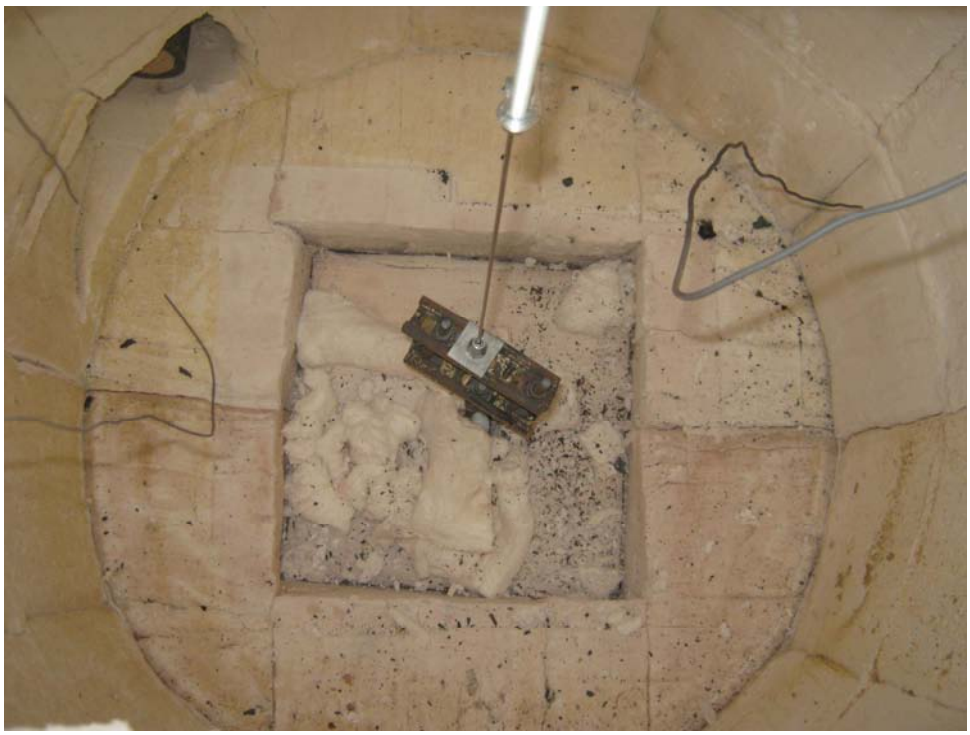


Figure 19 Sample within the furnace

Group 3 Test 2 Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing 10kg load 90 minutes fire exposure

The results from the eighth test are summarised in Figure 20. The system supported the load for the duration of the test. The maximum deflection was approximately 101mm at 90 minutes. The sample is shown within the furnace in figure 21.

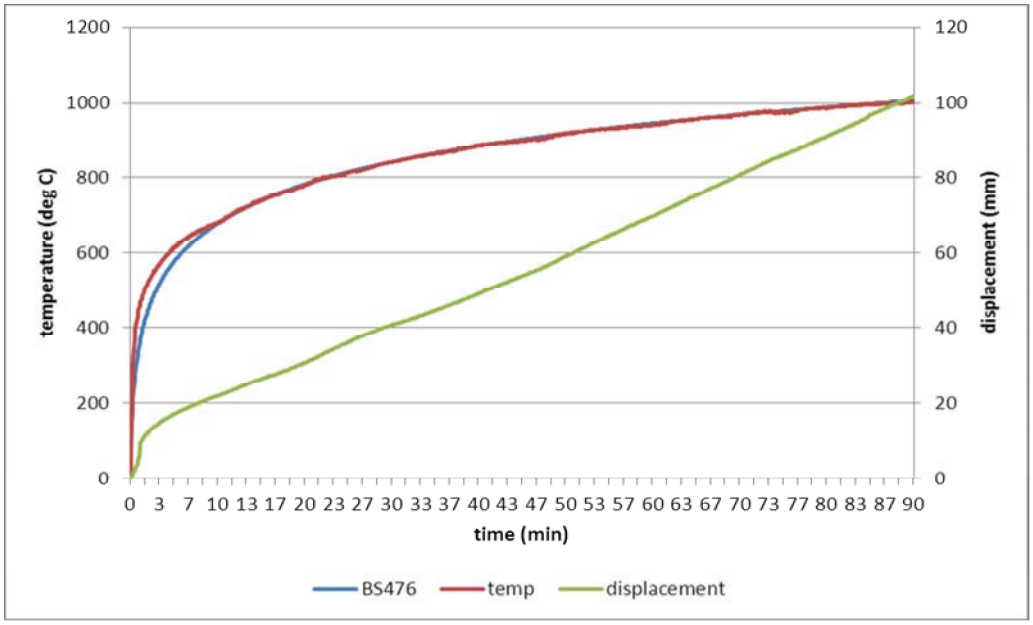


Figure 20 Results from test 8

Figure 21 Sample within the furnace

Group 3 Test 3 Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing 10kg load 90 minutes fire resistance

The results from the ninth test are summarised in Figure 22. The maximum deflection is approximately 89mm at 90 minutes. The sample is shown on removal from the furnace in Figure 23.

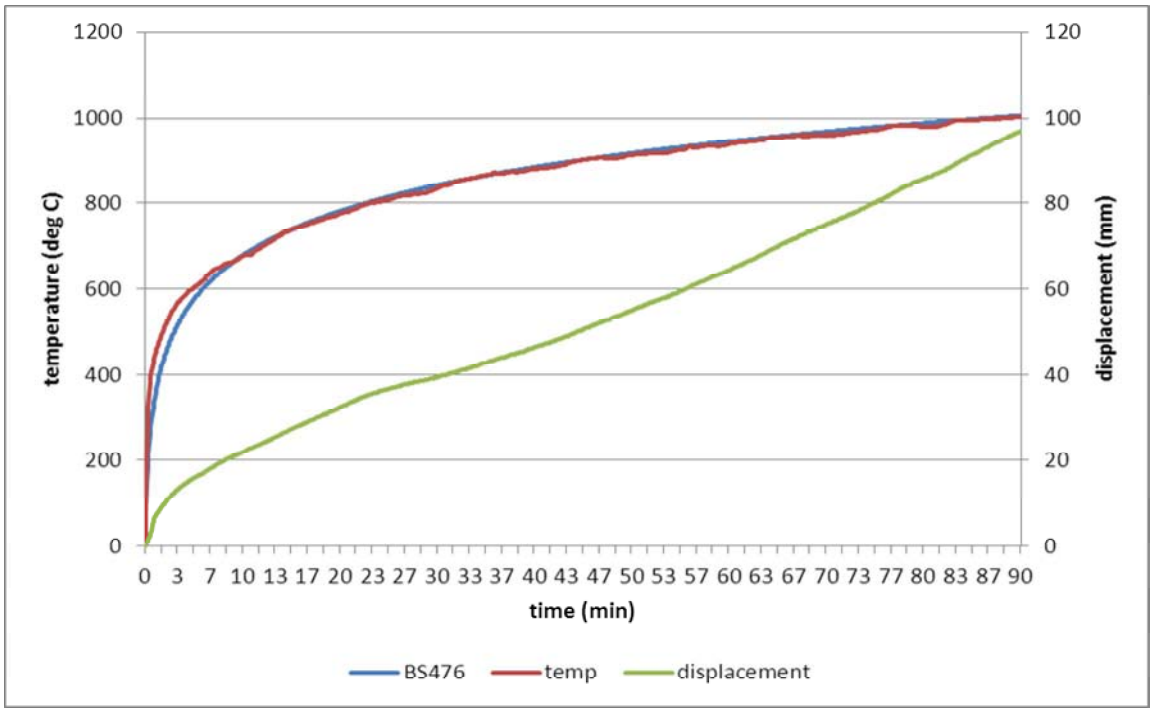


Figure 22 Results from Group 3 test 3

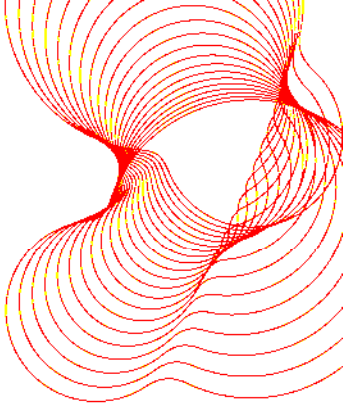
Figure 23 Fixings on removal from the furnace

Results summary

A total of nine fire tests have been undertaken on a wire rope suspension system incorporating a “gripple” connector at one end and a variety of different fixing systems at the other end. In each case the fixings, incorporating a length of wire rope, were suspended from a supporting frame, put under load and subject to a heating regime corresponding to a specified exposure to the standard fire curve. The results from the experimental programme are summarised in Table 2.

Test ref.	Description	Applied load (kg)	Maximum extension (mm)	Approximate exposed wire length (mm)	Comments
1/1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	45	29.96	750	Test terminated at 30 minutes. Load supported by furnace floor.
1/2	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	45	75.84	500	Test terminated at 30 minutes
1/3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	45	76.71	500	Test terminated at 30 minutes
2/1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	20	119.64	500	Test terminated at 60 minutes
2/2	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	20	118.3	500	Test terminated at 60 minutes
2/3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	20	-	500	Test terminated at 60 minutes
3/1	Gripple Trapeze Plus No. 3 unit with M8 stud end fixing	10	85.63	500	Test terminated at 90 minutes
3/2	Gripple Trapeze Plus No. 3 unit with 90° eyelet end fixing	10	101.86	500	Test terminated at 90 minutes
3/3	Gripple Trapeze Plus No. 3 unit with straight eyelet end fixing	10	96.97	500	Test terminated at 90 minutes

Table 2 Summary of test results



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1. British Standards Institution, BS 476-20:1987, Fire tests on building materials and structures – Part 20: Method for the determination of the fire resistance of elements of construction (general principles), BSI, London, 1987
2. DIN 4102 Part 2, Fire Behaviour of Building Materials and Components, Building components, Definitions, Requirements and Tests, Deutsche Normen, Berlin, September 1977