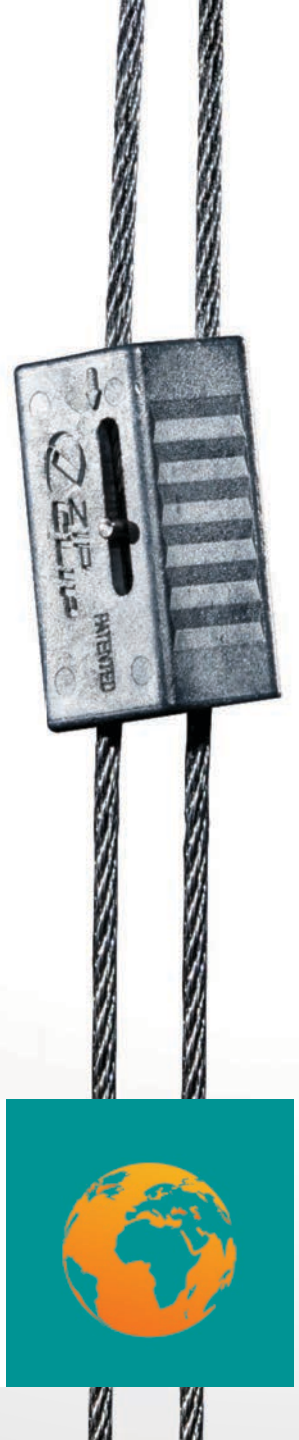
THE GLOBAL SPECIALIST IN WIRE SUSPENSION SYSTEMS

CIBSE CPD



ZIP CLIP

Wire Support Solutions “The alternative to threaded rod – Innovate don’t Replicate”

THE QUEEN’S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2019

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- Introduction to Zip-Clip
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- BIM

Zip-Clip – the international manufacturer of complete **wire suspension** systems and **bracing** solutions since 2004.

16 years experience serving the worldwide construction industry.

Zip-Clip expertise originated in the **UK** and now stretches from **Europe** to **Australia**.

ZIP CLIP

GLOBAL SPECIALIST

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2019

Objectives

To provide attendees with sufficient information to confidently specify or install wire suspension systems as an alternative to threaded rod by:

Considering all aspect of the first fix element;

- The Substrate
- The length of the suspension
- The load weight
- The fixing centres – Considering IEC61537 & DW144
- The material selection
- The environmental impact
- BS7671 18th Edition

It is the manufacturers responsibility to ensure that innovation and new methods of installation are offered as alternatives to traditional methods and that their use and the benefits thereof are fully understood

Testing, Compliance and Accreditation

BS EN 12385 – The manufacture and testing of steel wire ropes.

BS 8539:2012 – The standard which covers the selection and installation of post-installed anchors in concrete and masonry.

All our products are independently tested by TUV, MELBTEST, SATRA, Lloyds British, UKAS and Apave and all Rize locking devices are UL certificated

For copies of our test certificates, please contact our offices

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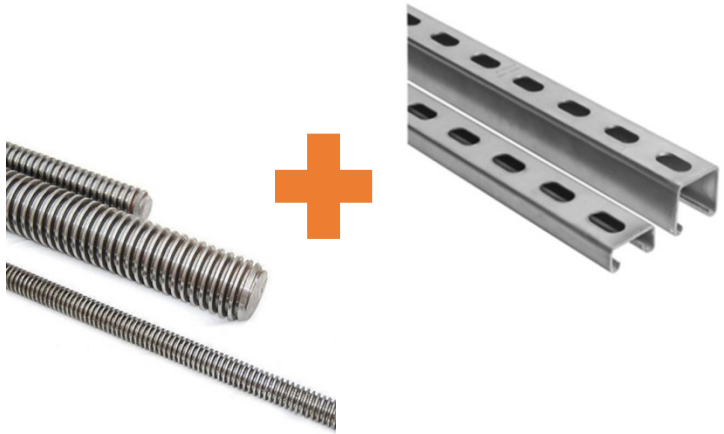
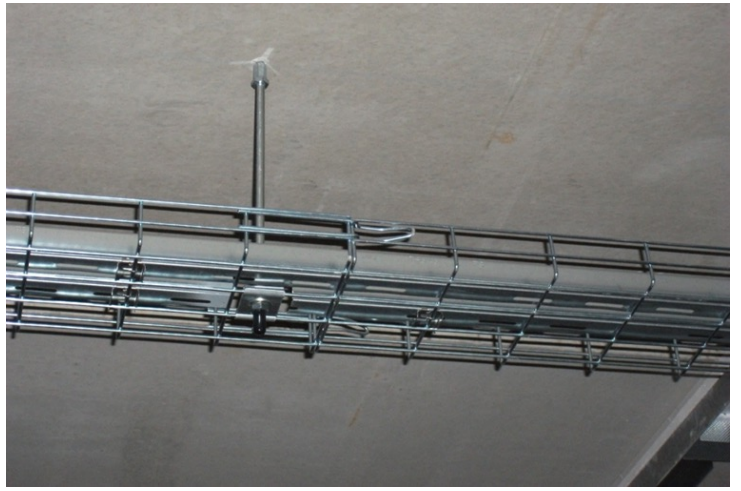
2019 Awarded the Queens Award For Enterprise

Traditional Suspension Methods

Trapeze Bracket



Pendant Bracket



The Bracket Solution – 3 Components

1. **The anchor or ceiling fixing**

2. **The method of suspension rod or wire**

3. **The platform, channel or proprietary bracket**

2 Significant standards to apply

1. **DW144 – Ductwork Specification**

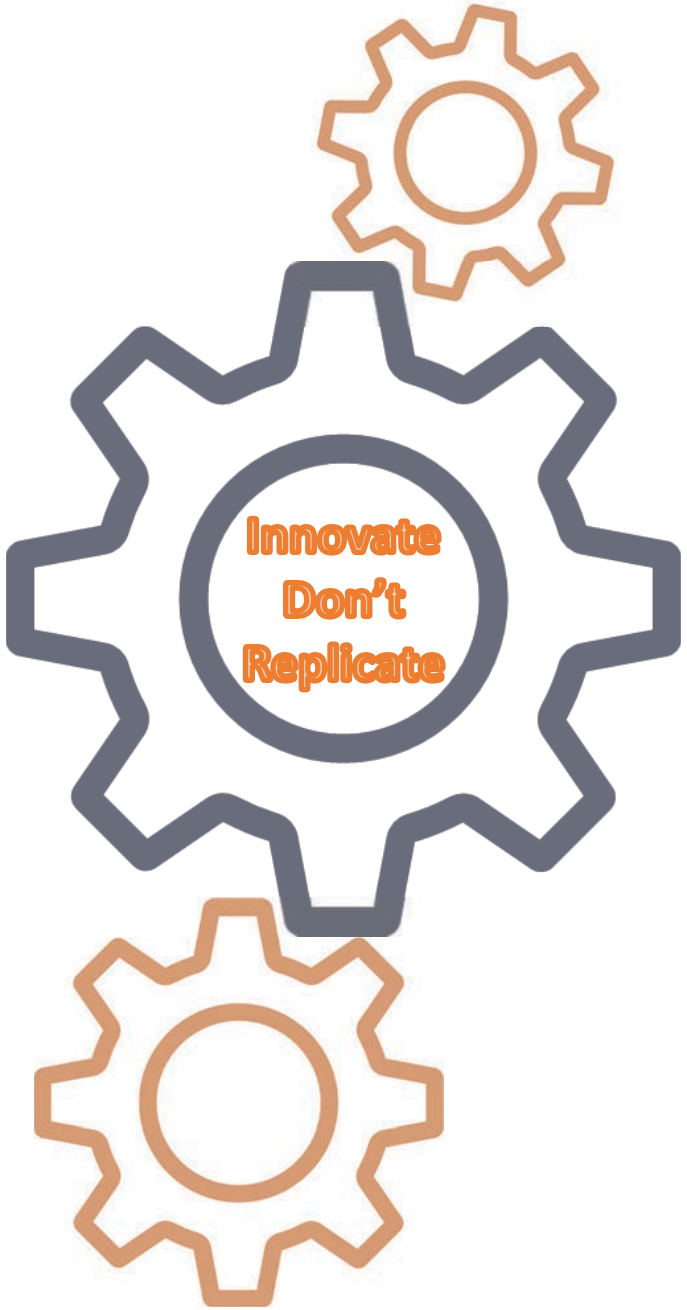
2. **EIC 61537 – Tray and Ladder Standard**

The Decision Making Process

1. What type of fixing platform is there – Concrete, steel frame, metal deck, wood?
2. What services are to be supported?
3. What is the combined weight of services including bracket components, cables, water, accessories?
4. What is the size of the services corridor?
5. What is the position of the services, how far are they suspended from the ceiling, how far from the walls?
6. What are the ambient conditions, dry indoor, external, aggressive environment?
7. What fixing centres are required?
8. What is the programme for first fixing services?
9. How can we achieve this? What are the options?

Options for Consideration

1. Reduce the amount of material to be suspended
2. Multi compartment in place of multiple runs of containment.
3. Medium or light duty tray and basket where possible
4. Basket in place of tray and possibly ladder where appropriate
5. Maximise bracket spacing according to manufacturers loading information.
6. Reducing the “trapeze” by leaving the open side for the containment with highest density of cabling.
7. Replace threaded rod with wire suspension
8. Use the containment as the bracket if possible



Selecting the Correct Materials for your Suspension Solution

- Pre-Galvanised or Electro-zinc products should be used in dry indoor conditions. The level of protection to the base metal is 8 – 12 microns which will provide 6 – 8 years protection at normal atmospheric degradation rates.

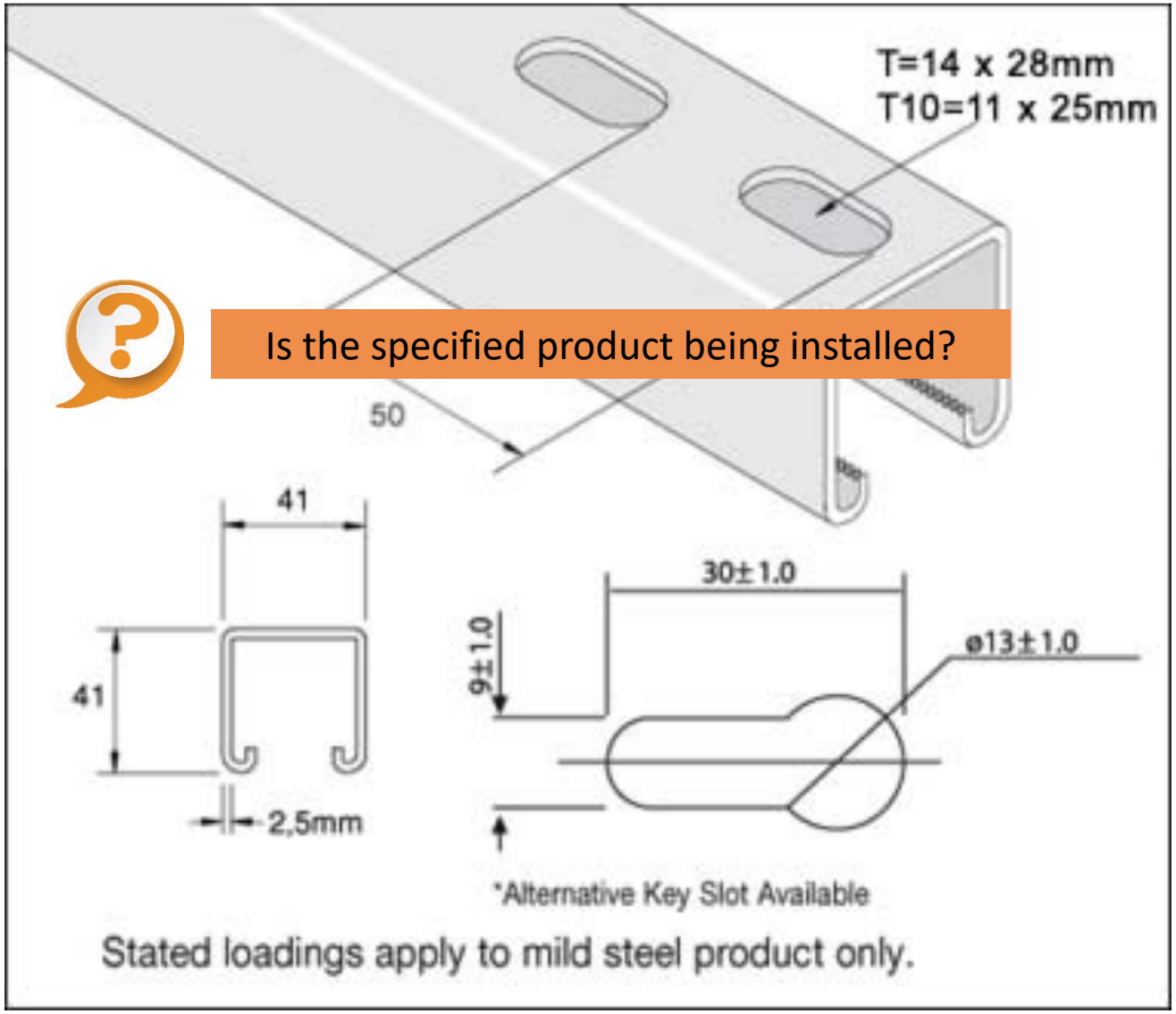
- Hot Dipped Galvanised (BS1461) products should be used in external situations or where the ambient environment has a high moisture content. 55 – 85 Microns of protection should give a lifespan of 40 – 50 years at normal atmospheric degradation rates

- Stainless Steel 304L should be used in food preparation areas and areas where there may be a mildly aggressive atmosphere.

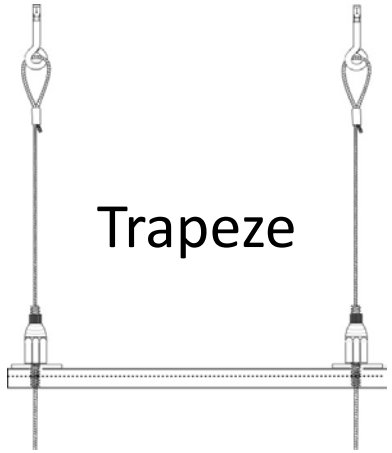
- Stainless Steel 316L (Marine Grade) can be used in coastal environments where there may be a high saline content in the atmosphere

- For projects that require longer periods of operation, steels with a higher silicon content should be used as they will attract more zinc to the base metal in the galvanising process.

Accountability and Traceability



Wire Rope Suspension Methods

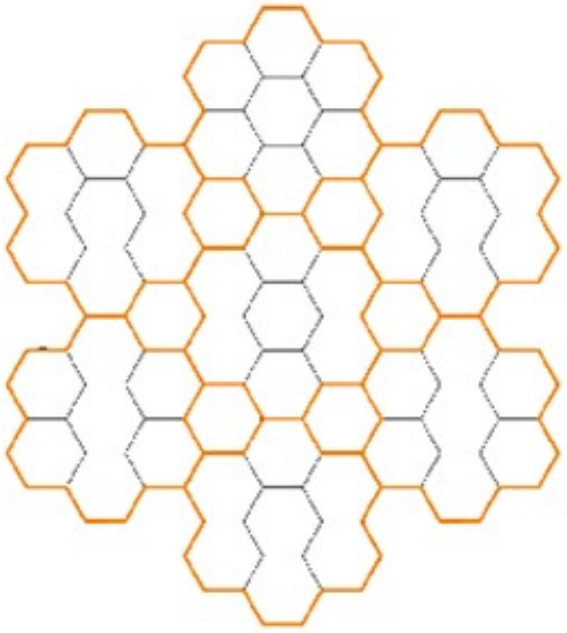


Trapeze

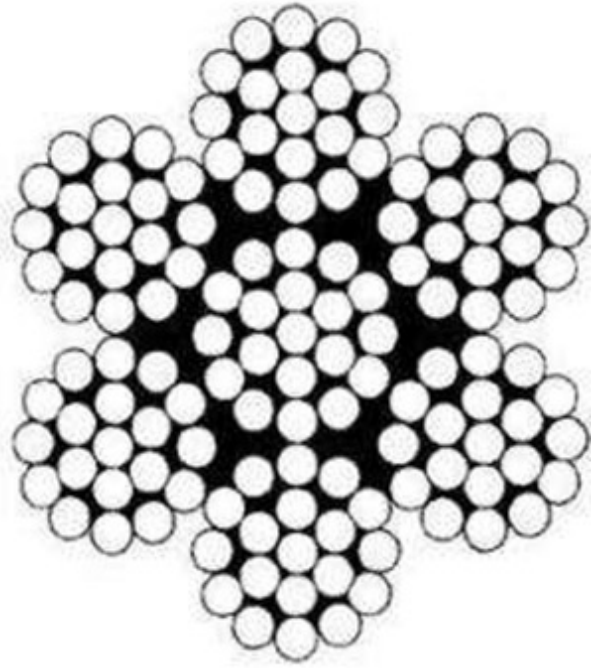
Wire Rope – The Rod Alternative – BS EN 12385

There are many permutations possible in the construction of a wire rope. In selecting a wire that would be used for replacing steel a major factor is a high tensile strength. Manufacturers supply wires with a range of tensile strengths. 1550N/mm2 being at the lower end of the spectrum up to 1960N/mm2 for the premium wires.

Wire rope is manufactured from pre-galvanised or stainless steel.



7 x 7



7 x 19

The Performance Characteristics of Premium Wire

Galvanised Wire

5:1 Safety Factor

WIRE CODE	SWL OF WIRE	CONSTRUCTION	TENSILE STRENGTH
G	15kg	7x7 (6/1) RHRL	1960N/mm²
S	50kg	7x7 (6/1) RHRL	1960N/mm²
Y	120kg	7x7 (6/1) RHRL	1960N/mm²
P	300kg	7x19 (6/1) RHRL	1960N/mm²
N	500kg	7x19 (6/1) RHRL	1960N/mm²

Angular Performance

This table shows the effect of the Safe Working Load when working at an angel from the vertical

5:1 Safety Factor

WIRE CODE	VERTICAL	15°	30°	45°	60°
G	15kg	14.40kg	12.90kg	10.50kg	7.50kg
S	50kg	48kg	43kg	35kg	25kg
Y	120kg	115.2kg	103.2kg	84kg	60kg
P	300kg	288kg	258kg	210kg	150kg
N	500kg	480kg	430kg	350kg	250kg
LOAD	100%	96%	86%	70%	50%

The Clip

In addition to the wire rope, the clutch mechanism is the other key component of a wire rope system. Each manufacturer has a solution, which although specific to them, is similar to others.

PHYSICAL PROPERTIES		
Density	6.700 kg/m^2 at 21°C	
Solidification Shrinkage	1.17%	
Casting Shrinkage	0.6% (pressure die cast)	
Freezing Range	-381 to -387°C	
Melting Point	400 to 420°C	
Specific Heat Capacity	418.7J/kg/°C at 20 to 100°C	
Thermal Expansion	27 x 10 (-6) linear per °C at 20 to 100°C	
Thermal Conductivity	108.9 W/m/hr/m^2/°C at 70 to 140°C	
Electrical Conductivity	26% IACS	
Electrical Resistivity	6.5359 um ohm at 20°C	
MECHANICAL PROPERTIES	AS CAST	AGED
Tensile Strength (Mpa)	328	26900.0%
Shear Strength (Mpa)	262	
Elongation (% in51mm)	7	13
Hardness (Brinell-500kg)	91	80
Impact Strength (Energy, Joules)	65.1	84.2
Fatigue Strength	56.5	

Where is Wire Rope Used.....

Multiple building services

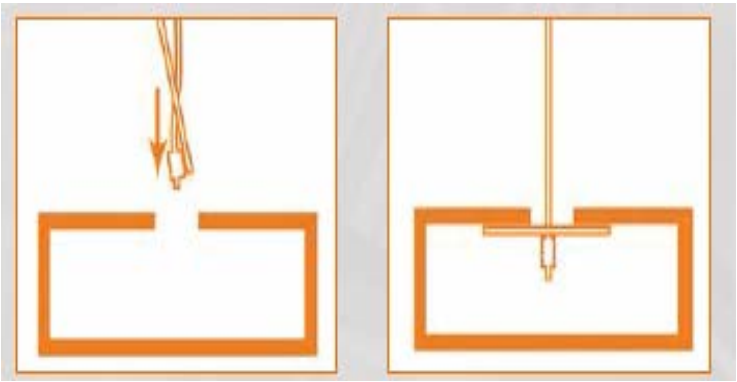
Electrical Services

Ductwork

Discontinuous Secondary Ceilings

Signage

Primary and Secondary Light supports



Wire rope used as a secondary support to the high level inverted cable basket lid

The Benefits of Wire Rope

Using a wire rope suspension system provides many advantages:

- Faster installation times. Approx. 6 times faster to install than traditional systems
- Guaranteed weight loadings from 10kg to 500kg per support
- Fully tested system offering 5:1 Safety Factor
- Requires less materials, system comes complete
- Easier to store and transport
- 100 metre coil of wire is equivalent to 33 x 3 metres of threaded rod
- Improved aesthetics, low visual impact.
- Health and Safety reduced risk of injury, no hot works permit required
- Reduced purchases of individual components
- Reduces impact on the environment

Case Study – Bristol Distillery

Main Contractor – Kier
Electrical Contractor – Totus
Electrical containment

Pre-fabricated brackets with concrete anchor
Holes drilled, anchors knocked in, bracket completed
No hot works, no finishing threads, site storage reduced.
Installation time reduced.

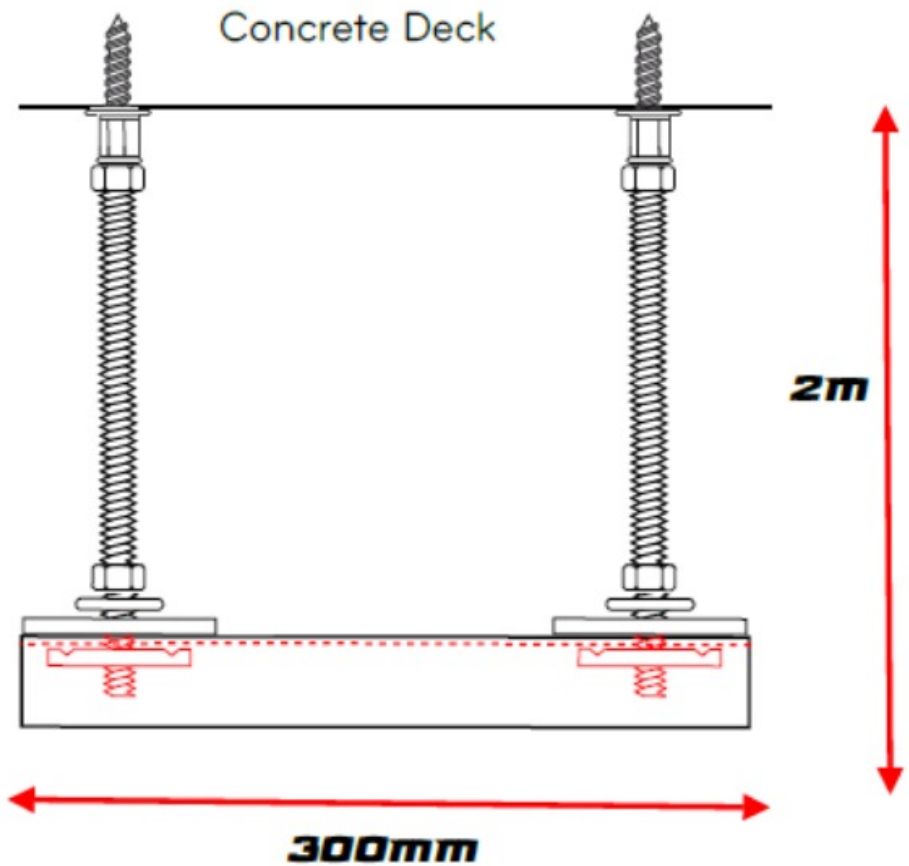
Case Studies

American Embassy - Certification required for all products, as a result Zip-Clip used for all building service

Ferrari World – Pre-fabricated lighting suspension kits provided on a call off basis to meet the strict site delivery requirements

Rolls-Royce -Throughout the manufacturing facilities of this giant industrial site, Zip-Clip systems securely suspend lighting, trunking, baskets and trays. And, as well as insisting on functionality, the engineers were looking for clean lines to give an impression of a floating system

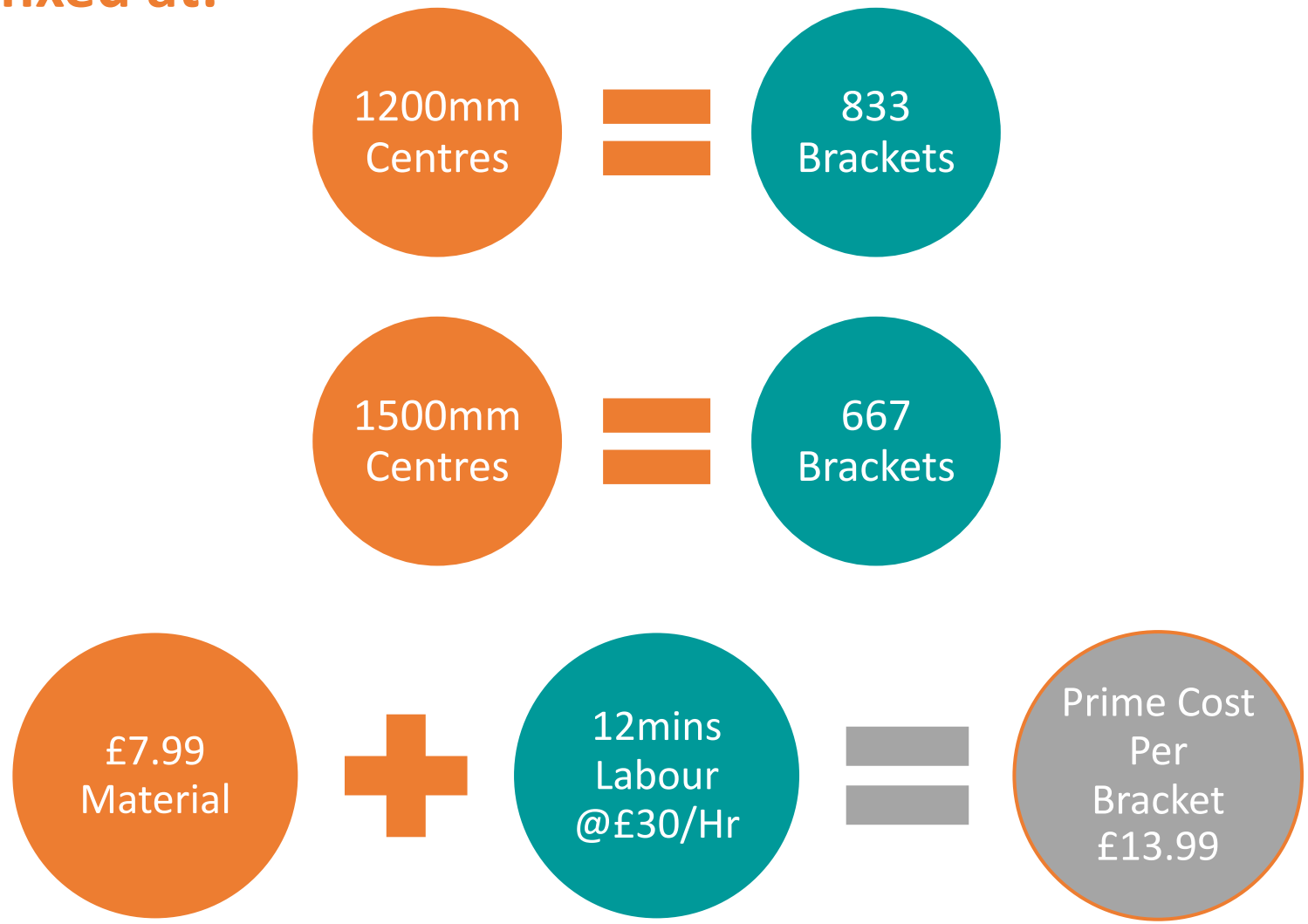
Jaguar Land Rover - has used the Zip-Clip range across several of its manufacturing and operating sites, as well as its network of UK dealerships



TRADITIONAL ROD SUMMARY:

Installation time (Approx)	12 Minutes
Material cost for 2 complete rods	6.96 GBP
Profile channel cost 300m length	1.03 GBP
Labour cost at £30 / hr	6.00 GBP
Total cost per bracket	£13.99 GBP

1000m of containment fixed at:



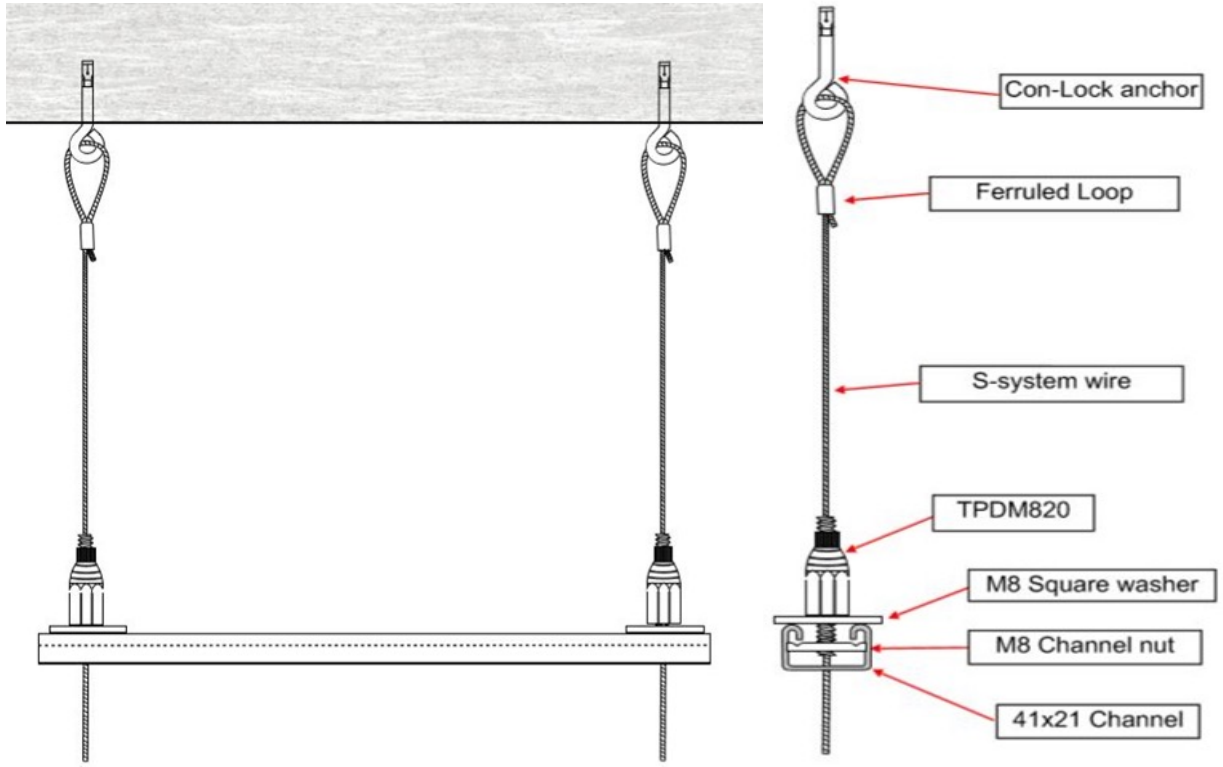
1500mm Centres = 667 brackets

Equates to a saving of £2.32 per meter

2000mm Centres = 500 brackets

Equates to a saving of £4.66 per meter

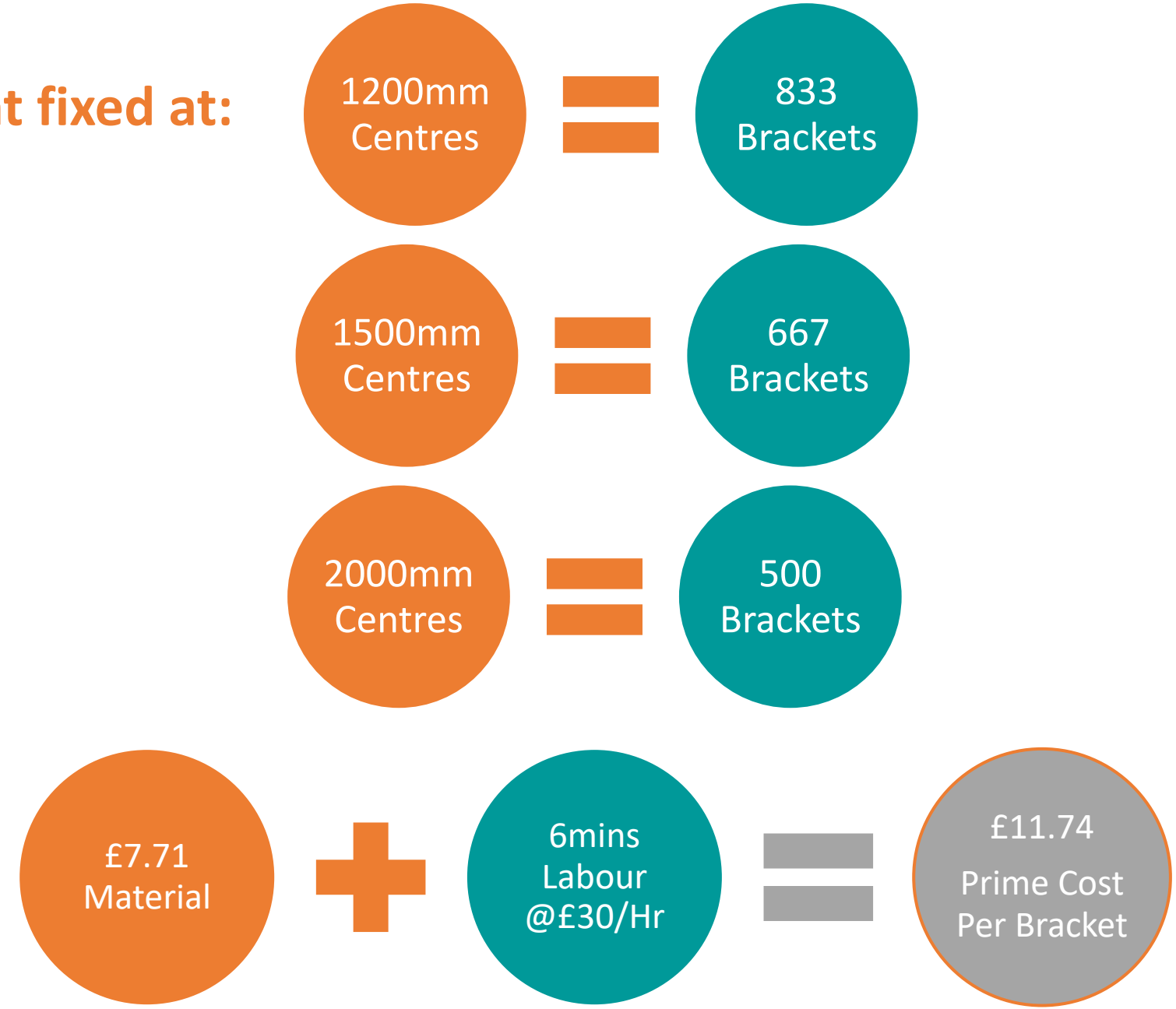
Wire Trapeze Summary;



Wire rope components	£7.71
Channel	£1.03
Labour 10 mins (£30/Hr)	£3.00
Total	£11.74
Prime Cost Saving per bracket	**£2.25**

50% less components – 500g less weight

1000m of containment fixed at:



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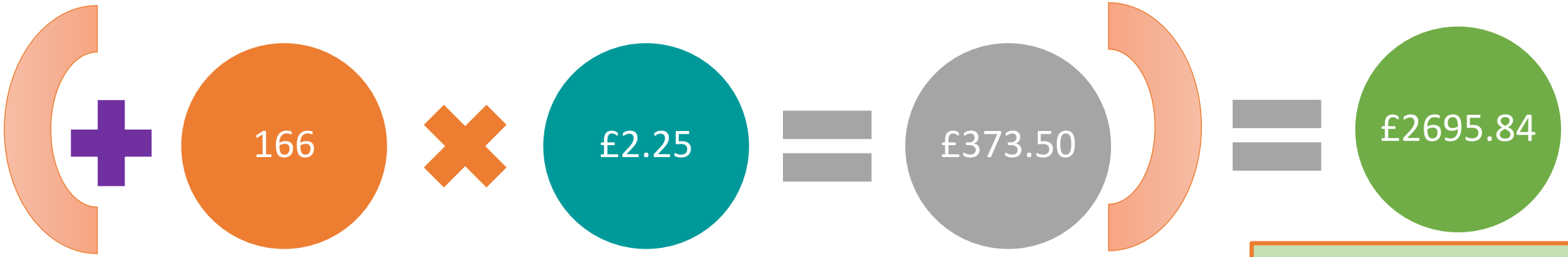
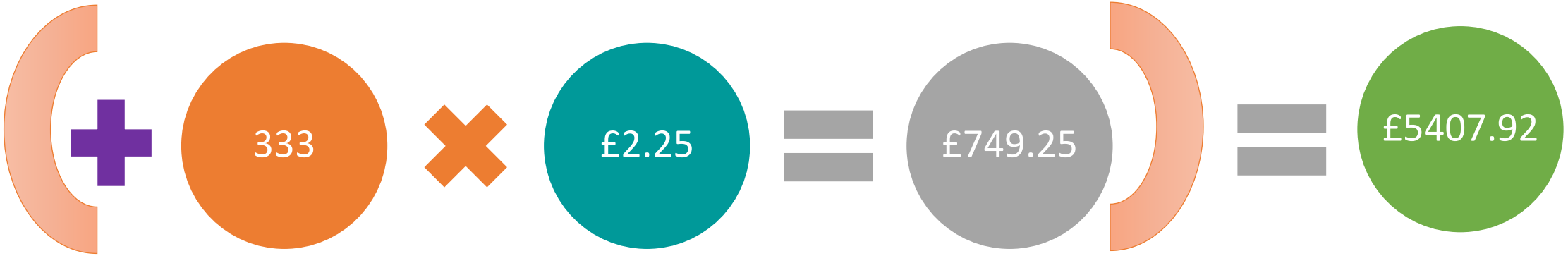


Equates to a saving of £2.69 per meter

2000mm Centres = 500 brackets

Equates to a saving of £4.66 per meter



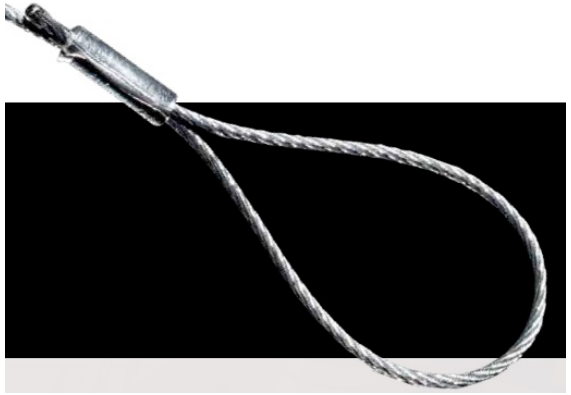
Equates to a saving of £5.41 per meter

Wrap around solutions

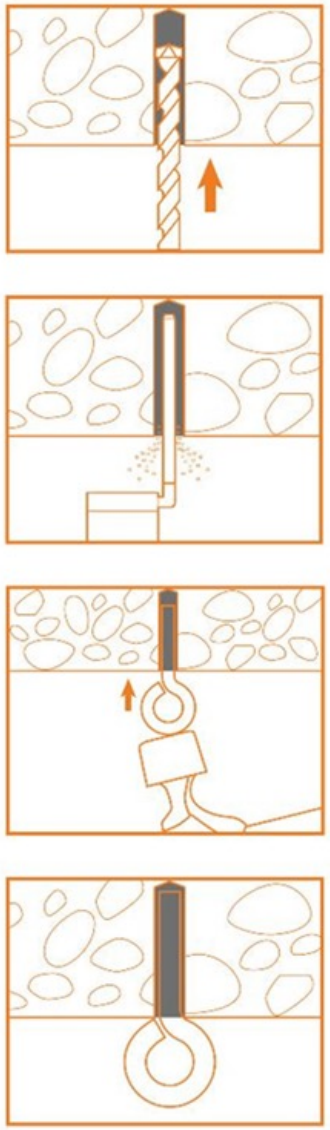
The quickest and simplest form of suspension.

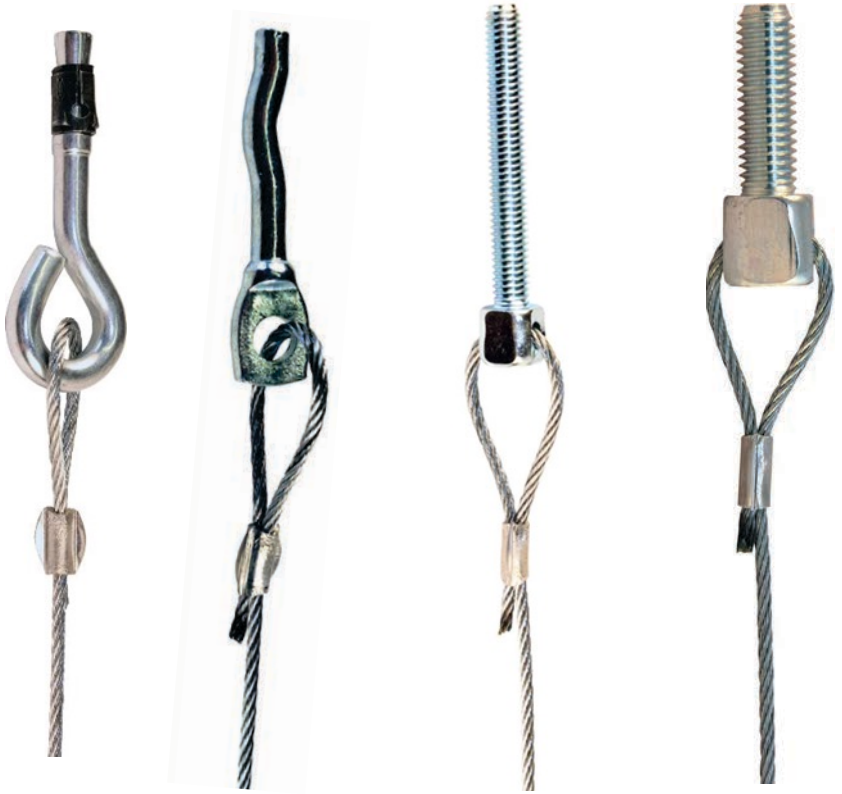
Always seek approval from the structural engineer before using this method.

The metal loop provides a friction free passage for the wire



Concrete Ceilings





A B C D

Fixing into concrete requires the correct diametre hole to be drilled.

A & B are driven into a pre-drilled hole

C & D are secured into a pre-drilled hole by means of a Drop in anchor

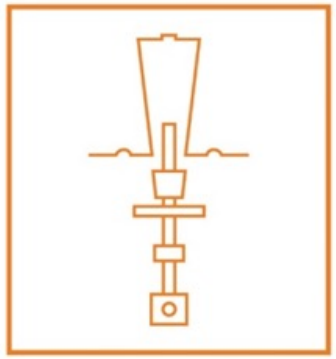
Certificated (CFA) pull tests can be provided at each site where fixing to concrete is to be carried out

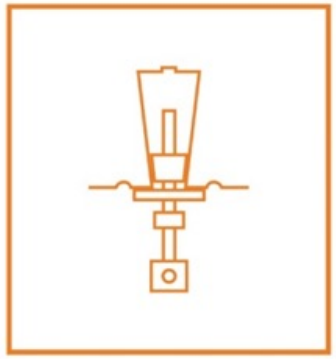
BS 8539:2012

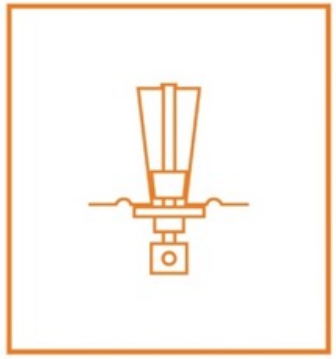
- This standard applies to the selection and installation of post installed anchors in concrete and masonry.
- Incorrectly selected or installed anchors may not be able to carry the load they were designed to.
- Manufacturers of wire rope suspension systems that use this type of fixing within their system will have CFA (Construction Fixings Association) certificated testers who can confirm the stability of fixings on site.
- This testing must be carried out before any load is applied to the fixing.

Metal Decking solutions

Suitable for Kingspan, SMD and other steel deck manufacturers (see below) and concrete over metal rib-deck

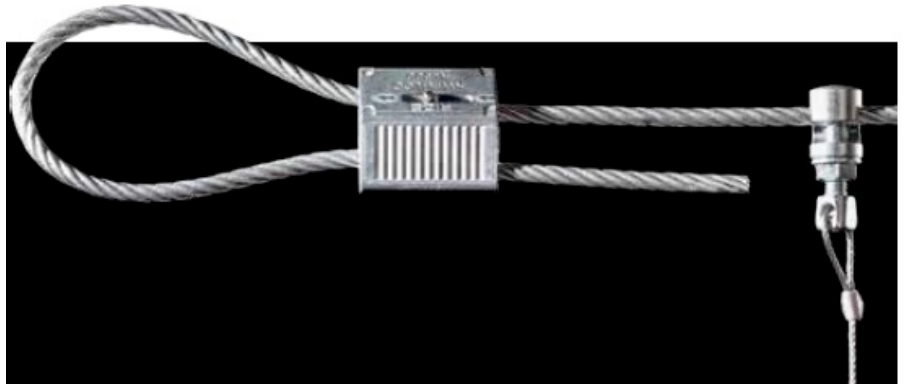


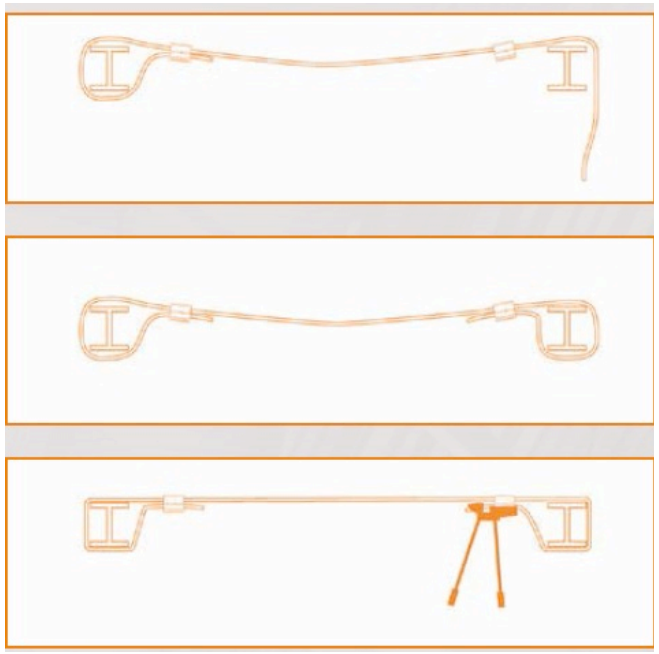




Decking Type	Standard Wedge: Size: 25mm (Top of wedge) x 18mm (Base of wedge) x 12mm (Width)	Mini Wedge: Size: 19mm (Top of wedge) x 12mm (Base of wedge) x 9.5mm (Width)	Mini Mini Wedge: Size: 18.5mm (Top of wedge) x 10mm (Base of wedge) x 9.5mm (Width)
Richard Lees Holrib	*		
Richard Lees Super Holrib	*		
Quickspan Decking Q51	*		
Corus/Tata CF51	*		
Alpha Decking Alpharib	*		
SMD R51	*		
Ward Multideck 50	*		
Corus/Tata NSD	*		
Kingspan Multideck 50-V2	*		
CMF Decking Metfloor 55	*		
Richard Lees Ribdeck 60 profile		*	
Quickspan Decking Q60		*	
Richard Lees Ridbeck 80 profile			*
PMF Decking CF70			*

Catenary Wire Solutions





The perfect solution for traversing large spans whilst reducing the volume of secondary steel required.
Catenary systems offer a flexible method, capable of carrying significant loads (100Kg+)

With reference to **521.10.202 of BS7671** the catenary solution provides a fully accountable method of supporting cables Above suspended ceilings.

ENVIRONMENTAL BENEFITS

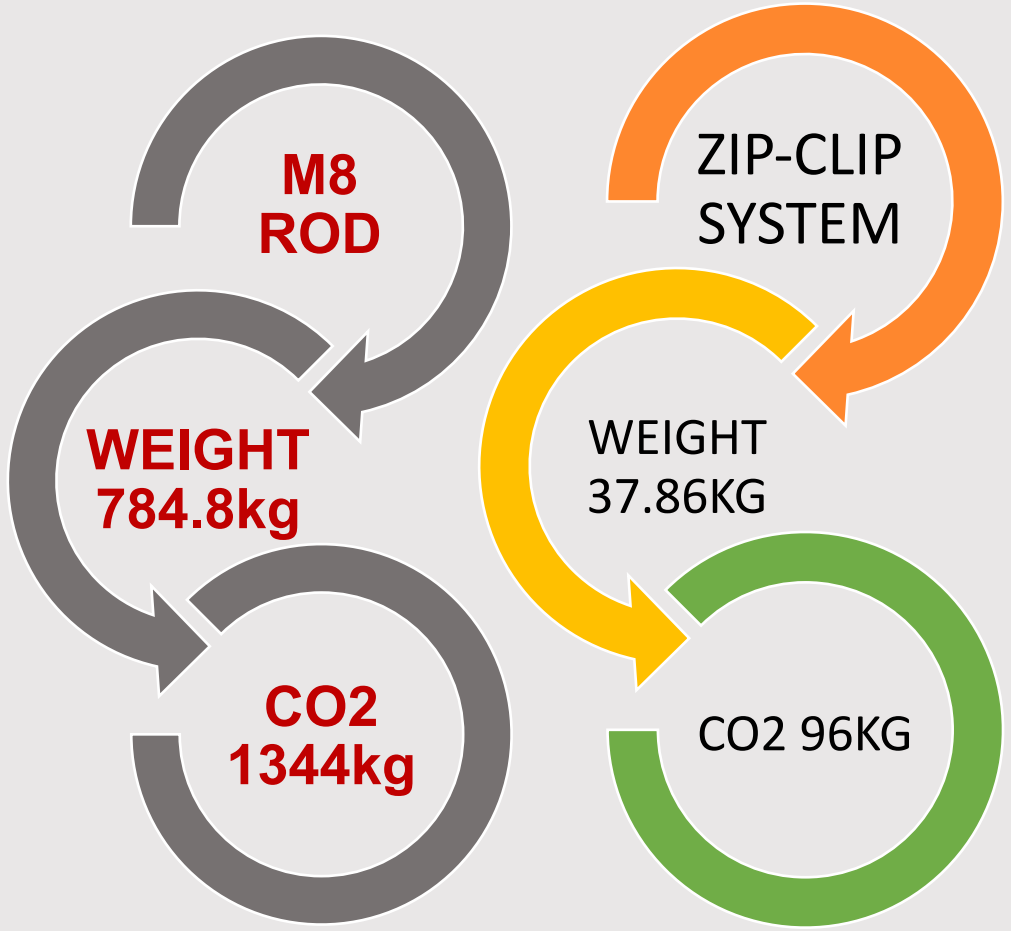
The easiest way to benefit the environment is to reduce the volume of material you use in an installation. So it makes good sense to replace rod with a wire alternative, 2mm wire = 10mm rod; Consider the example seen below;

Case Study:

A typical retail park uses approximately 1200 drops at 2m (2,400m Total)

M8 rod would weigh 784.8kg and use 1344kg of CO2 to produce the 2,400m required

Zip-Clip wire system would weigh 37.86kg and use 96kg of CO2 to produce 2,400m



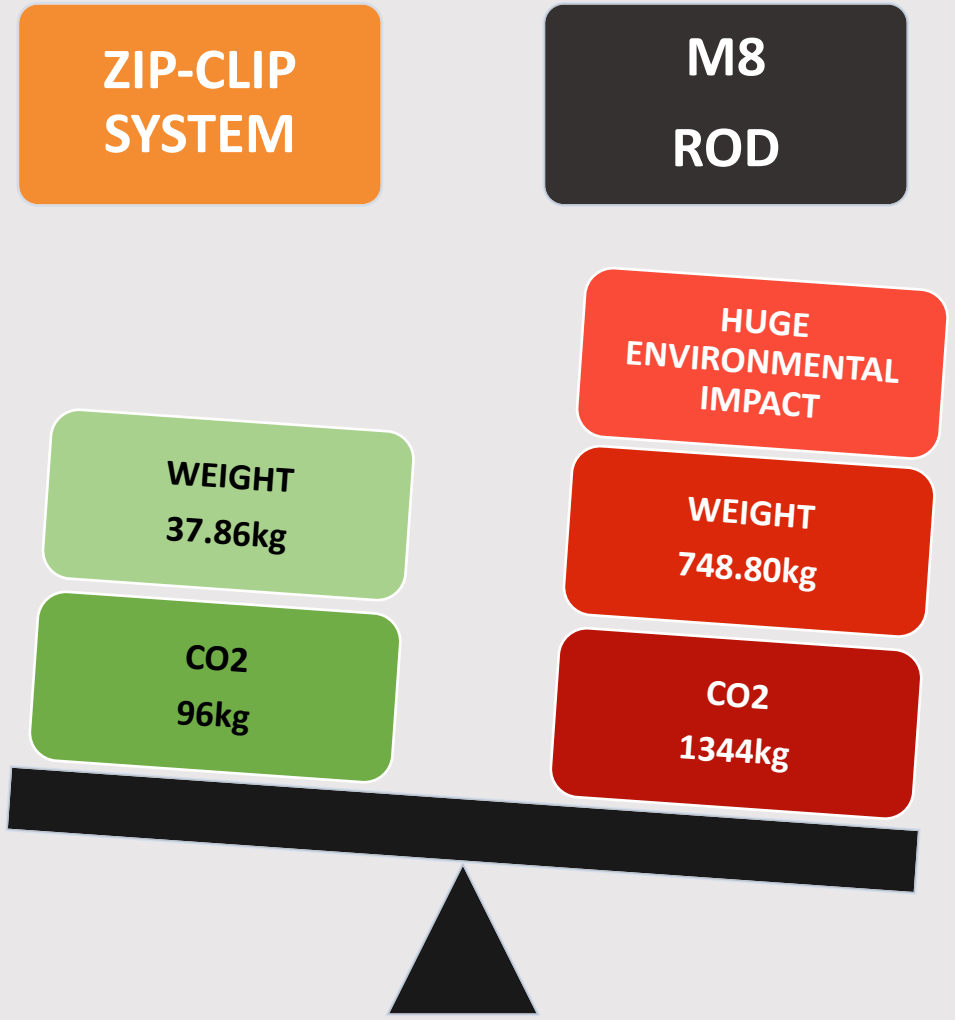
This applies to M8 rod So Imagine the difference for M10 rod

ENVIRONMENTAL BENEFITS

Save on weight: 710kg
Save on CO2: 1245kg

92.6% REDUCTION IN CO2 WHEN UTILISING A ZIP-CLIP WIRE ROPE SYSTEM

Data provided by the worldsteel life cycle inventory methodology report 1999/2000



This applies to M8 rod So Imagine the difference for M10 rod

ENVIRONMENTAL BENEFITS CONTINUED …

Threaded Rod (M10) Capacity

15,000 No – 3Metre lengths

45,000 Metres capacity

Total weight of container 22,005 Tonnes

1 No container of 2mm wire rope is equivalent to 32 No containers of 10mm threaded rod

2mm Wire Rope Capacity

721 No 2000Mtr Drums

1,442,000 Meters of 2mm Wire Rope

Total Weight of Container 22,999 Tonnes

BS7671 : 18th Edition

Chapter 52 – Selection and Erection of wiring systems

521.11.201
Which gives requirements for the methods of support of wiring systems in escape routes, has been replaced in the 18th edition by a new regulation 521.10.202 – THIS IS A SIGNIFICANT CHANGE

From 01/01/2019

. 521.10.202 requires cables to be adequately supported against their premature collapse in the event of a fire. This applies throughout the building and not just in escape routes

Fire Tested Wire Suspension

One of the first questions asked when considering the use of wire suspension is “what is the fire rating”.

Lets take a look at traditional bracket solutions and cable management systems to see what fire rating they currently have:

Cable Basket = E90 to Din 4102-12 – A cable test standard not a cable management standard.

Currently there is no standard or test criteria for cable management and support systems. Any data available will be from manufacturers independent testing.

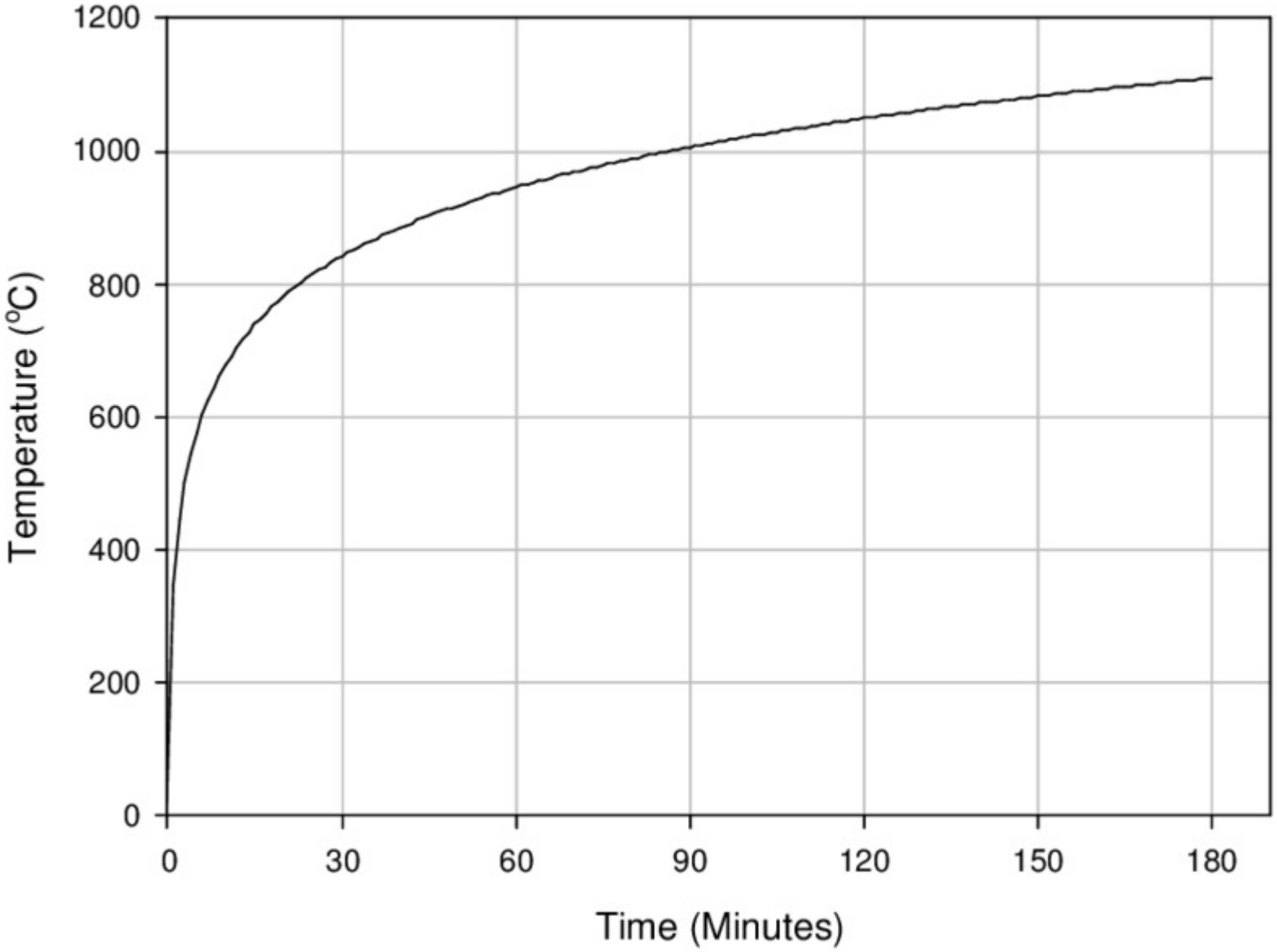
This is why so much time and effort is being expended to provide guidance on installing systems which prevent “premature collapse”.

The nature of fire has a dramatic effect on all forms of suspension. It is important to understand that the capability of cable containment and suspension decreases when exposed to fire.

Fire Tested Wire Rope Suspension

It is important to check with the manufacturer the exact performance criteria of the product being selected. Not all manufacturers have tested to the same standards.

BS476 Fire Curve



Fire Performance continued…

It is crucial to qualify what tests have been carried out to substantiate the claims of manufactures.

It is too easy for manufacturers to over promise and under deliver in their pursuit of getting their products specified and installed. There is no room for ambiguity in a fire situation when the under performance of a product could put lives at risk.

The testing carried out by BRE to BS476 states that there is no standard test method for this and as such no certification can be issued, although a copy of the test report may be viewed upon request.

The lack of mandatory testing and certification for first fix brackets and cable management is now creating a problem in the industry and needs to be addressed urgently.

What would be classed as a realistic load at 120 minutes? 10kg per fixing would provide a load at the bracket of 20kg. What does that look like as a load at 1500mm centres.

Question: How many containment systems carry much more weight than this?

Vibration Testing - Wire v Rod

Three tests were carried out for comparative purposes. Threaded rod, threaded rod supports fitted with anti vibration fixings and wire suspension supports. The testing measured the absorption of the vibration through the support method and also the transmission of vibration from one end of the support to the other. The results are as follows:

	Threaded rod	Threaded rod + anti vibration fixing	Wire rope suspension
Absorption	52%	59%	77%
Transmission	48%	41%	23%

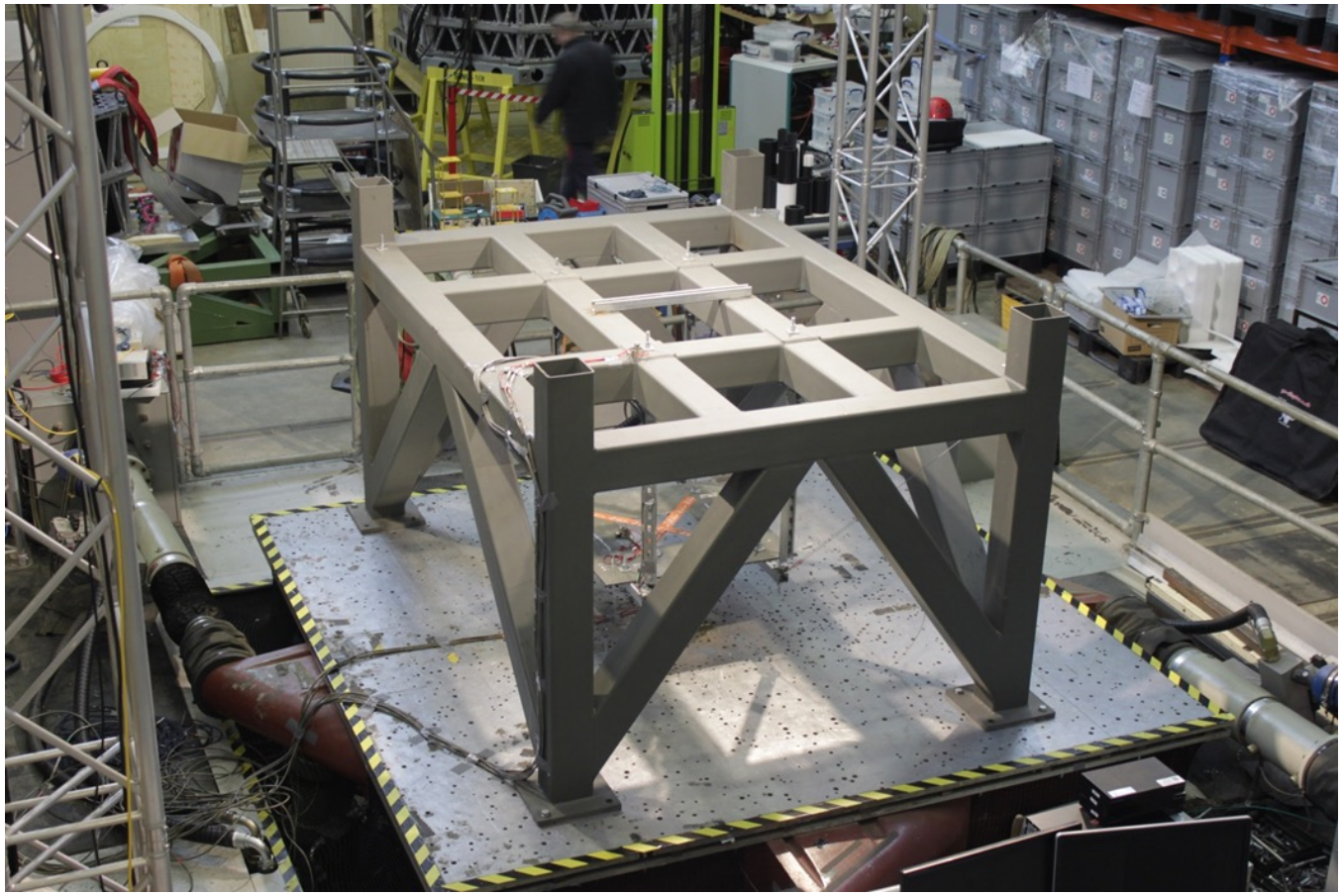
CONCLUSION:

Threaded rod has a vibration absorption of just over 50%, whereas wire rope hangers absorb vibration in excess of 75%. Therefore there will be a significant reduction on the stress of the fixing point and on any noise from vibration whilst using a wire rope suspension system.

Seismic Suitability

Seismic testing is carried out to prove the suitability of products for use on projects where the potential for earthquakes is very real or on projects where, in the unlikely event of one occurring, the product will have performed to a pre-determined level.

It is an expensive process, but one which manufacturers are being asked to carry out more frequently. The test rig used by Zip-Clip can be seen in the photograph below.



Seismic Contd.

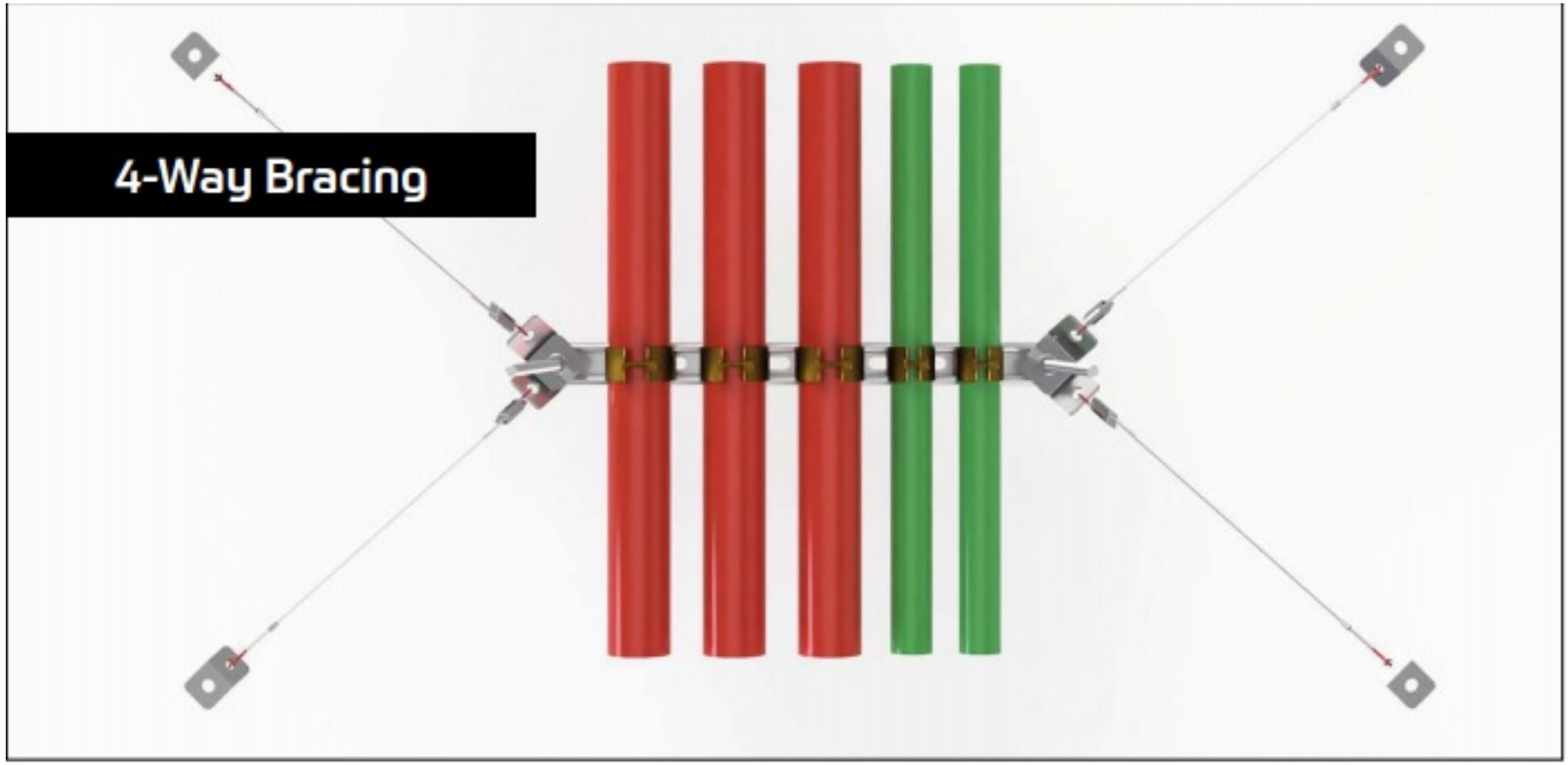
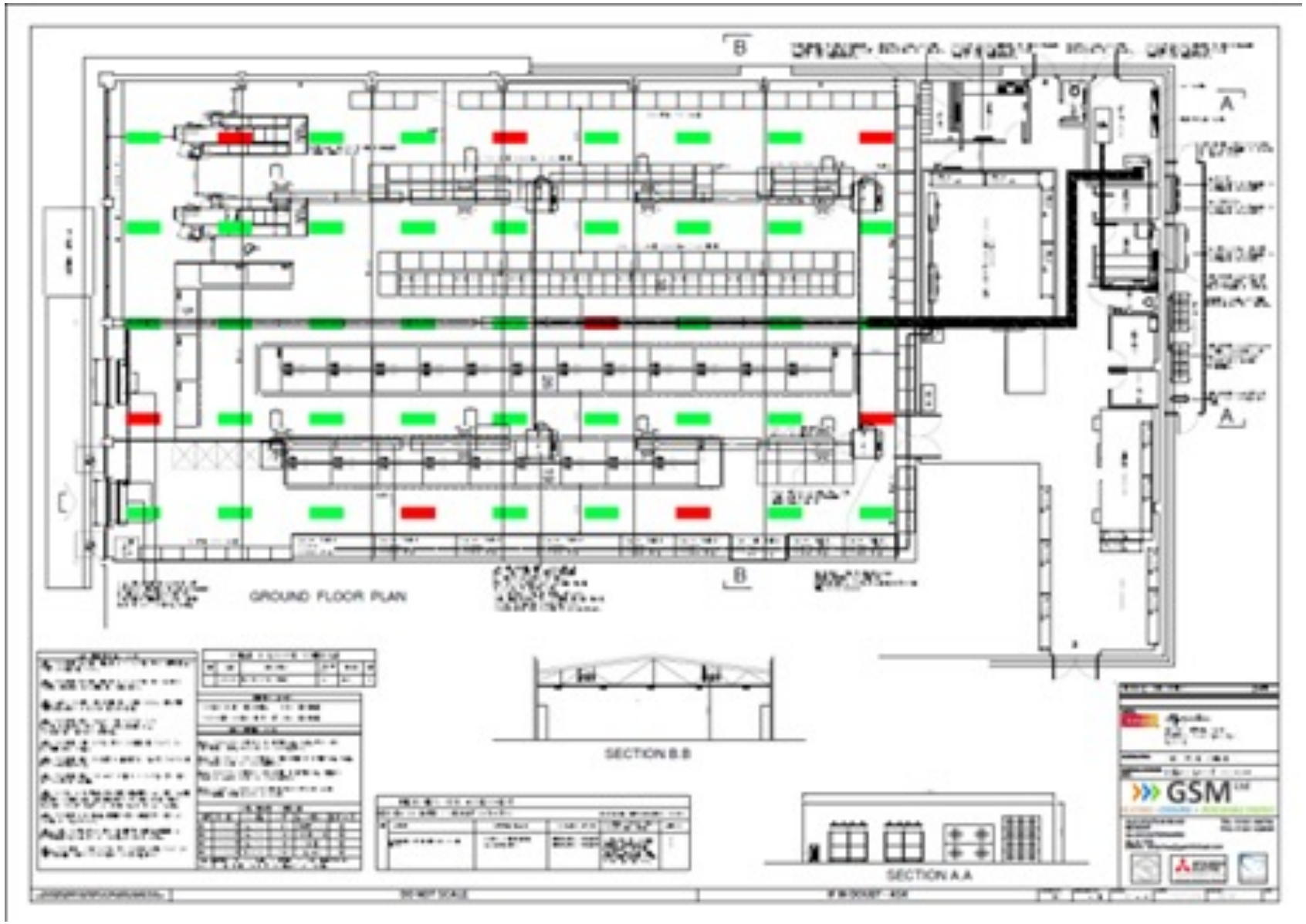


Illustration shows plan view example of pipework on trapeze bracket

Design and Calculation Service

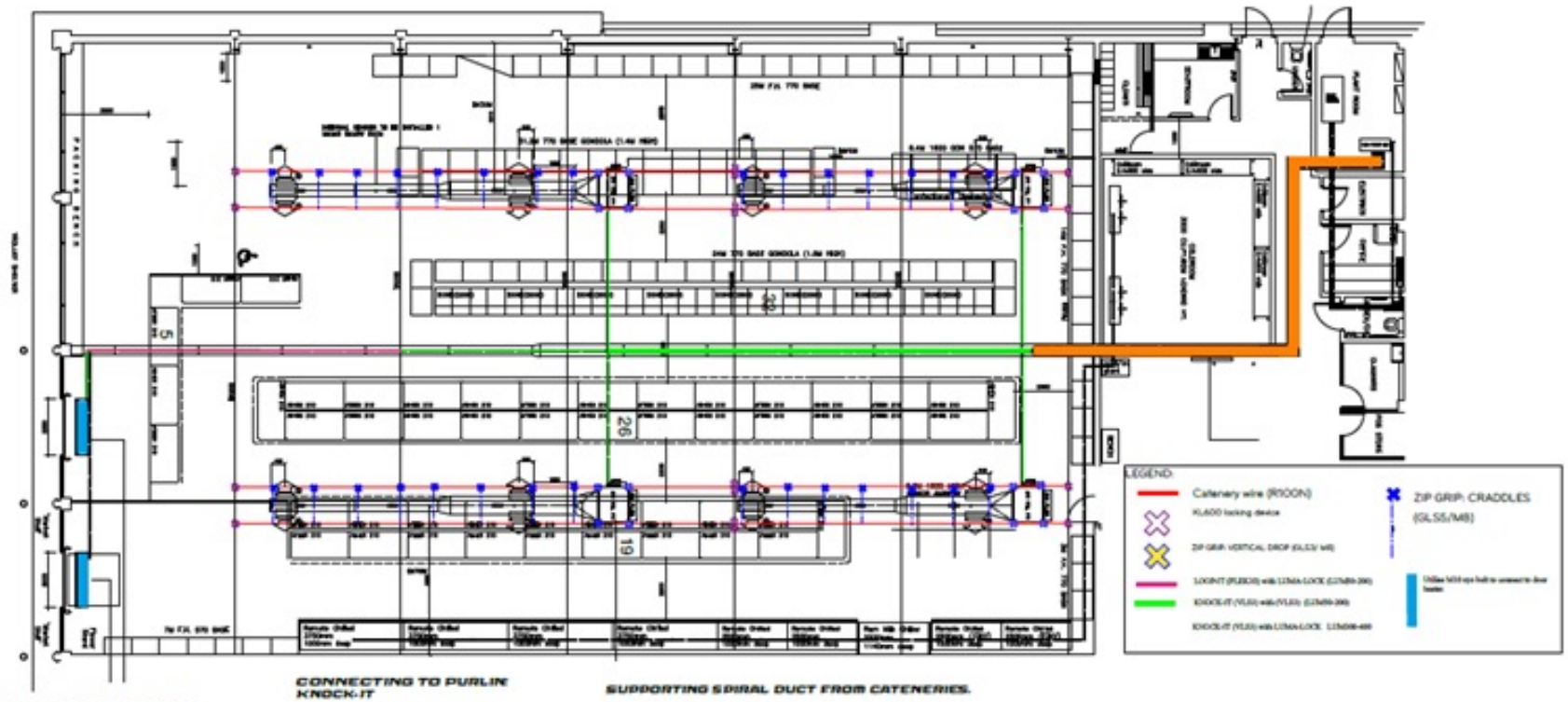


PROJECT: ICELAND - LINCOLN.
CLIENT: GSM LTD
TITLE: ZIP CLIP HVAC INSTALL PLAN.

PROPOSED METHODS:

Spiral duct work Install double catenery wires side by side (train track method). Use ZIP-GRIP wire suspensions to support spiral to catenery wires. Utilise cradle method. See below.

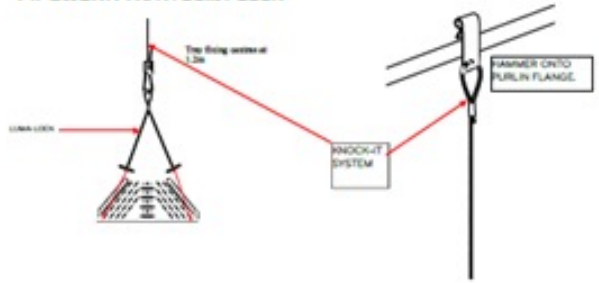
Pipe work tray Install KNOCK-IT wire support onto purlin. Install LUMA LOCK onto pipe work tray. Joining KNOCK-IT & LUMA +LOCK together using Zip Clip locking device. See below.

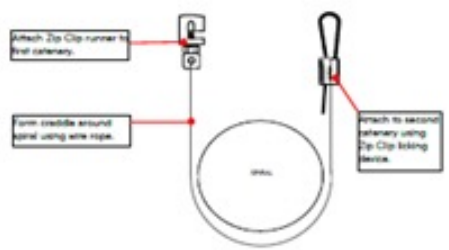


CONNECTING TO PURLIN KNOCK-IT

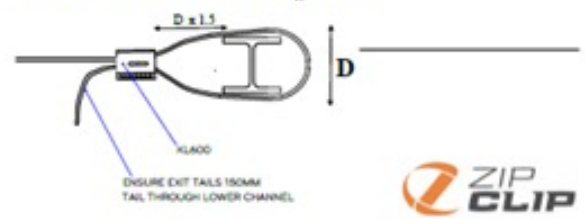
SUPPORTING SPIRAL DUCT FROM CATENERIES.

CONNECTING TO THE PIPEWORK TRAY: LUMA- LOCK





ATTACHING CATENERY TO STEEL WORK:



ZIP CLIP

Technical Support

Full technical support is provided from the first enquiry to the provision of information for O&M manuals.

Site surveys, product selection, future proofing, design layout drawings, scheduled bill of materials, certificated pull tests for fixings. Robot Software for calculating catenary solutions

There is nothing to prevent an engineer, installer or fabricator from replacing threaded rod with wire rope.

Fully accountable and fire tested, which as has been mentioned previously, threaded rod is not.

Wire rope for complete peace of mind.

BIM - Building Information Modelling

a. Currently companies are working towards compliance with BIM level 2 to provide information in a digital format.

b. BIM level 2 does not require a full suite of product images, however many companies have invested in making product images available to designers and specifiers to make their products easier to incorporate in designs.

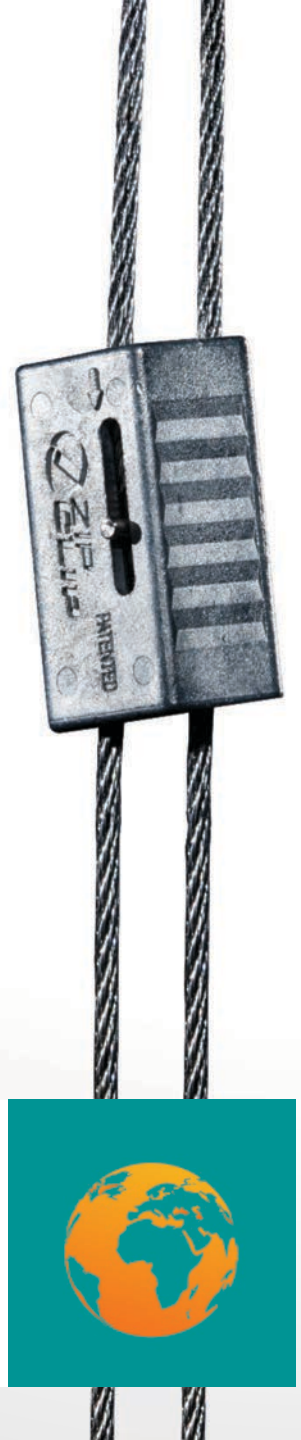
c. Predominantly for building services, Revitt MEP is the preferred system being used but other systems, Arriva, Bentley are also being used successfully.

d. BIM is the perfect opportunity to update design processes and incorporate the testing and accountability that manufacturers spend thousands of pound on carrying out.

e. By applying the relevant standards to the BIM process time and money can be saved and a more user friendly design can be delivered.

THANK YOU!

ANY QUESTIONS



ZIP CLIP

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