

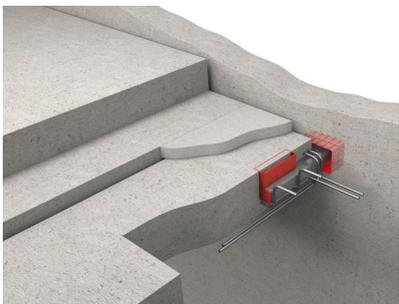
### About Invisible Connections

We supply the concrete construction industry with 'unseen' telescopic connection systems for stair landings, beams and columns. We are also specialist manufacturers of the FERBOX® reinforcement continuity system, to application requirements.

All our products meet industry demands for improved safety, construction efficiency and cost competitiveness.

Our team provides free technical and practical advice on product selection and installation. Our technical specialism, innovative approach and manufacturing agility means we're often approached to help solve a specific issue. As a result, our product range continuously evolves to meet our customers' construction challenges.

### Application



# Supporting Precast Concrete Landings

## Cost Comparison Study: Telescopic Connectors v Rolled Steel Angles

### Executive Summary

This report considers the costs of rolled steel angles (RSAs) in comparison with RVK 101 telescopic connectors to support precast concrete stair landings off core walls.

When the costs of materials and labour were calculated, findings show telescopic connectors offer:

- An 80% reduction in man hours, which contributes to a total 44% reduction in direct costs compared to using RSAs.
- Robustness anchorage is inherent to design layout, with no need for supplementary measures and expenditure typical of RSAs.

Additional benefits of using telescopic connectors instead of RSAs include reduced waste, crange and noise as well as increased safety, robustness, speed and efficiency. These value-adds are outside the scope of this theoretical cost study.

### Introduction

Two principal methods have evolved to support precast concrete stair landings off core walls:

- (i) bolting RSAs to walls or,
- (ii) using telescopic connectors which extend into wall recesses.

Meaningful analysis of either fixing method should take into account not just the cost of components, but the direct costs of labour and materials as well as indirect costs such as crane time.

Invisible Connections has seen a significant and growing take-up of RVK and TSS telescopic connectors, which suggests contractors and precasters are recognising the value of this alternative connection method to the construction process. For them, value isn't just delivering lower costs, but also generating the added value of reduced waste, crange and noise as well as increased safety, robustness, speed and efficiency. All of which contribute to bottom line savings.

### Meeting the needs for robustness

It's important to point out this cost study does not take into account the additional measures contractors must often take to ensure design requirements for structural robustness are met.

Where RSAs are used, this can include using pull-out bars or threaded couplers tied into structural toppings. Alternatively, when telescopic connectors are used, assuming connections into three sides of the landing are possible, design requirements for robustness can normally be satisfied without any additional procedures. Therefore we argue, robustness anchorage is 'free.'

Similarly, in circumstances where three-sided connection layouts aren't possible, 'pinned' versions of telescopic connectors offer a far more cost efficient robustness solution than alternative methods, even when their small cost premium is taken into account.

### RSA installation



### Telescopic connector and REDiBOX® installation



# Supporting Precast Concrete Landings

## Cost Comparison Study: Telescopic Connectors v Rolled Steel Angles

### Findings

**Option 1: RSA support secured by drilled and fixed expansion anchors (all costs correct as at February 2022)**

Ref	Principal Materials	Qty	Unit	£/Unit	£/Extn
A	RSA 200 x 150 x 15mm horizontally slotted 6 times at 350mm centres and hot dip galvanised	2	x 2m pcs	£225.00	£450.00
B	M20 x 200 BZP through-bolt fixings (125mm minimum embedment)	12	each	£3.02	£36.24
<b>Total materials:</b>					<b>£486.24</b>

Ref	Labour	Hrs	Men	£/Hour*	£/Extn
C	Erect working platform	1.00	2	£25.99	£51.97
D	Get tools, fixings and power to work location	0.50	1	£25.99	£12.99
E	Mark out and drill 12 no. 20 dia x 125mm long holes in concrete wall	1.50	1	£25.99	£38.98
F	Blow out 12 no. drilled holes	0.25	1	£25.99	£6.50
G	Crane-handle heavy angle sections into position (85 kg each post-galv)	0.50	1	£25.99	£12.99
H	Insert 12 no. through bolts	0.25	1	£25.99	£6.50
I	Level angle sections (propped or on crane hook) before tightening nuts	0.25	2	£25.99	£12.99
J	Tighten 12 no. nuts to required torque setting	0.50	1	£25.99	£12.99
K	Shim adjustment (working below landing slab)	0.25	2	£25.99	£12.99
L	Clad angle with fireproof material and visual making-good	2.00	1	£25.99	£51.97
M	Total crane time utilisation (cost absorbed by main contractor?)	1.25	1	?	?
<i>*£23.35/hr plus employers NIC calculated on a 40-hr week</i>				<b>Total labour:</b>	<b>£220.88</b>
<b>Total cost of materials and labour:</b>					<b>£707.12</b>
<b>Total man hours:</b>					<b>9.75</b>

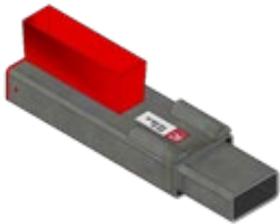
NB: Additional cost to provide robustness anchorage excluded

### RVK Telescopic Connectors

Supplied 'black' as standard (also available galvanised on request). Sliding inner tube is deployed by a bolt mechanism, accessible via hopper at landing surface.

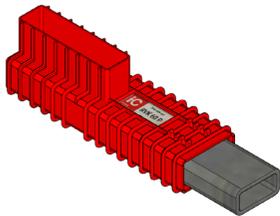
### RVK 101 STD

Connector capacity up to 80kN in a 200mm thick (min.) landing, increasing to 100kN in a 265mm thick landing.



### RVK 60P STD

Slim design enables thinner landings and stair thicknesses  $\geq 120$ mm (full capacity 170mm). Capacity up to 60kN. Recycled HDPE outer.



### Other available options

TSS 41, TSS 60P, TSS 81-30, TSS 101, TSS 102, RVK 101-30, RVK 101-30-E20

# Supporting Precast Concrete Landings

## Cost Comparison Study: Telescopic Connectors v Rolled Steel Angles

*Option 2: Concealed telescopic connectors cast into landing and projecting into wall pockets (all costs correct as at February 2022)*

Ref	Principal Materials	Qty	Unit	£/Unit	£/Extn
A	REDiBOX PRF-STD permanent recess formers	4	each	£12.50	£50.00
B	RVK 101 black telescopic connectors (excluding precaster fixing costs)	2	each	£80.67	£161.34
C	RVK60-P black telescopic connectors (excluding precaster fixing costs)	2	each	£68.66	£137.32
<b>Total materials:</b>					<b>£348.66</b>

Ref	Labour	Hrs	Men	£/Hour	£/Extn
D	Mark out and nail 4 no. REDiBOX permanent recess formers to shutter face	0.25	1	£25.99	£6.50
E	Erect supporting props to wall perimeter and position PCC landing	0.50	1	£25.99	£12.99
F	Remove REDiBOX face-plates and eject telescopic inserts into 4 no. wall recesses	0.25	1	£25.99	£6.50
G	Fit foam backer-rod local (in airgap) to 4 no. connectors	0.25	1	£25.99	£6.50
H	Mix grout and pour into 4 no. wall recesses	0.50	1	£25.99	£12.99
I	Total crane time utilisation (cost absorbed by main contractor?)	0.25	1	?	?
<i>*£23.35/hr plus employers NIC calculated on a 40-hr week</i>		<b>Total labour:</b>			<b>£45.48</b>
<b>Total cost of materials and labour:</b>					<b>£394.14</b>
<b>Total man hours:</b>					<b>2.00</b>

*NB: Robustness anchorage often 'free' (when inherent with suitable telescopic connector design layout)*

### REDiBOX

#### Permanent Wall Recess Formers

Purpose designed 'left-in' component for creating recesses simply in precast or in situ concrete walls, with features and benefits to complement the RVK and TSS range of telescopic connectors for stair landing connections (can also be used with DTS connectors).

Provides generous tolerance for installation of stair landings. In contrast to traditional methods, no digging-out of polystyrene or timber is required.

#### REDiBOX PRF-STD (standard version)



Invisible Connections Ltd

Unit 6, Thame Forty

Jane Morbey Road

Thame, Oxfordshire OX9 3RR

+44 (0)1844 266000

sales@invisibleconnections.co.uk

invisibleconnections.co.uk

## Supporting Precast Concrete Landings

### Cost Comparison Study: Telescopic Connectors v Rolled Steel Angles

#### Summary

Method	Man Hrs	Materials Cost	Total Cost	Saving £	Saving %
Rolled Steel Angles method	9.75	£486.24	£707.12		
Telescopic Connectors method	2.00	£348.66	£394.14	<b>£312.98</b>	<b>44%</b>

#### Conclusion

Telescopic connectors yield a saving of £312.98 in materials and labour costs, which equates to a 44% saving compared to using RSAs. Furthermore, robustness anchorage is often inherent without additional expenditure.

Any claim for savings between methods is open to challenge owing to site variables. However, the extent of the costs saved suggests adjustments to any of the cost elements would have to be significant to produce a result which does not favour telescopic connectors.

#### Methodology

This theoretical cost exercise was originally reviewed by both contractors and precasters. Invisible Connections invited challenges regarding the costs and timings so we could have confidence in the reasonableness of these calculations. We continue to encourage challenges so that these calculations maintain relevance and accuracy over time.

This information is presented by Invisible Connections in good faith, for customers' evaluation and comment. Errors and omissions are excluded.

For free technical and practical advice, call us  
or go to [invisibleconnections.co.uk](http://invisibleconnections.co.uk)