Information

ICL/TSS_RVK/INFO/COST/01/0419

About Invisible Connections

We supply the concrete construction industry with 'unseen' telescopic connection systems for stairs, 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 telescopic connection systems are endorsed by European Technical Approvals (ETAs). They comply with relevant Eurocode standards and are individually CE marked.

RVK and REDiBOX® installation

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 33% 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, cranage 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 TSS and RVK telescopic connectors; a three-fold increase in three years 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, cranage 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 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.

Invisible connections® Information

About Invisible Connections (cont)

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.

Invisible Connections is the registered trademark of Norwegian company Invisible Connections AS. In 30 years, countless telescopic connectors have been used in construction projects around the world.

RSA 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 April 2019)

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	£170.40	£340.80
B	M20 x 200 BZP through-bolt fixings (125mm minimum embedment)	12	each	£3.58	£42.96
				Total materials:	**£383.76**

Ref	*Labour*	*Hrs*	*Men*	*£/Hour**	*£/Extn*
C	Erect working platform	1.00	2	£19.34	£38.68
D	Get tools, fixings and power to work location	0.50	1	£19.34	£9.67
E	Mark out and drill 12 no. 20 dia x 125mm long holes in concrete wall	1.50	1	£19.34	£29.01
F	Blow out 12 no. drilled holes	0.25	1	£19.34	£4.84
G	Crane-handle heavy angle sections into position (85 kg each post-galv)	0.50	1	£19.34	£9.67
H	Insert 12 no. through bolts	0.25	1	£19.34	£4.84
I	Level angle sections (propped or on crane hook) before tightening nuts	0.25	2	£19.34	£9.67
J	Tighten 12 no. nuts to required torque setting	0.50	1	£19.34	£9.67
K	Shim adjustment (working below landing slab)	0.25	2	£19.34	£9.67
L	Clad angle with fireproof material and visual making-good	2.00	1	£19.34	£38.68
M	Total crane time utilisation (cost absorbed by main contractor?)	1.25	1	?	?
	**£17.50/hr plus employers NIC calculated on a 40-hr week*			**Total labour:**	**£164.41**
				Total cost of materials and labour:	**£548.17**
				Total man hours:	**9.75**

NB: Additional cost to provide robustness anchorage excluded

Invisible connections® Information

Supporting Precast Concrete Landings

Cost Comparison Study: Telescopic Connectors v Rolled Steel Angles

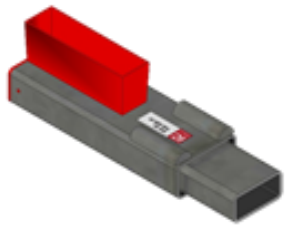
RVK Telescopic Connectors

Supplied 'black' as standard (also available galvanised on request). Sliding inner tube is deployed by a bolt mechanism, accessible via PVC hopper at landing surface. Cost-effective, rugged solution, typically for screeded landings.

RVK 101 (standard version)

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

Popular and default choice for most stair landing applications.



Other available options

TSS 41, TSS 101, TSS 102
plus REDiBOX® PRF-STD
Permanent Recess Former

Option 2: Concealed telescopic connectors cast into landing and projecting into wall pockets (all costs correct as at April 2019)

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)	4	Each	£71.40	£285.60
				Total materials:	**£335.60**

Ref	Labour	Hrs	Men	£/Hour	£/Extn
C	Mark out and nail 4 no. REDiBOX permanent recess formers to shutter face	0.25	1	£19.34	£4.84
D	Erect supporting props to wall perimeter and position PCC landing	0.50	1	£19.34	£9.67
E	Remove REDiBOX face-plates and eject telescopic inserts into 4 no. wall recesses	0.25	1	£19.34	£4.84
F	Fit foam backer-rod local (in airgap) to 4 no. connectors	0.25	1	£19.34	£4.84
G	Mix grout and pour into 4 no. wall recesses	0.50	1	£19.34	£9.67
H	Total crane time utilisation (cost absorbed by main contractor?)	0.25	1	?	?
	**£17.50/hr plus employers NIC calculated on a 40-hr week*			**Total labour:**	**£33.85**
				Total cost of materials and labour:	**£369.45**
				Total man hours:	**2.00**

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

Information

REDiBOX
Permanent 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 TSS and RVK 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	9.75	£383.76	£548.17		
RVK 101 plus REDiBOX PRF-STD	2.00	£335.60	£369.45	**£178.72**	**33%**

Conclusion

Telescopic connectors yield a saving of £178.72 in materials and labour costs, which equates to a 33% 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