

Introduction

SEISMIC ANCHORS - COMPOSITE FLOORING APPLICATION



AnkaScrew™ & TruBolt™ Xtrem™

Anchoring Solutions for
Composite Flooring Application



MULTI
DIRECTIONAL
APPLICATION



Seismic Anchors - Composite Flooring Application



Composite steel floor decking system (such as ComFlor®) is highly popular due to its performance, simplicity & Efficiency. Ramset™ had conducted testing on a range of seismic mechanical anchors, installed on the ComFlor® system to determine their performance and enable Engineers to design these anchors into their projects.

The anchors included in this technical datasheet are TruBolt™ Xtrem™ and AnkaScrew™ Xtrem Range. The data presented has been analysed and interpreted in alignment with the ACI355.2, ACI193, NZS4219 and the European Technical Assessment (ETA) documents of the products.

Anchor Design

Scan for more information

Specifiers
Anchoring
Resource Book



AnkaScrew™ Xtrem™

SEISMIC - MECHANICAL SCREW-IN ANCHORS COMPOSITE FLOORING APPLICATION



Seismic Anchors - AnkaScrew™ Xtrem™

Installation and Seismic Performance Details for Composite Flooring System

Anchor Designation		Installation details						Optimum dimensions*		Composite Metal Deck Detail (ComFlor® 60 & ComFlor® 80)				
Anchor Size, d _a (mm)	Anchor Location	Drilled hole diam., d _h (mm)	Fixture hole diameter, d _f (mm)	Max. Fixture Thickness, t _{max} (mm)	Anchor effective depth, h _{ef} (mm)	Drill hole depth, h _d (mm)	Tight'g torque, T (Nm)	***Edge distance, e _c (mm)	***Anchor spacing, a _c (mm)	Section Dimensions				
										Min. Steel gauge thk (mm)	Min. concrete thickness h _{min,deck} (mm)	Max. Offset from Centre of lower flute (mm)	Max. depth of lower flute, h _{fl,max} (mm)	Min. width of lower flute, W _{min} (mm)
6	Upper Flute	6	8	9	31	45	10	47	93	0.9	90	N/A	N/A	N/A
	Lower Flute										N/A	10	80	120
8	Upper Flute	8	12	14	52	75	20	78	156	0.9	90	N/A	N/A	N/A
	Lower Flute										N/A	10	80	120
10	Upper Flute	10	14	4	43	65	40	65	129	0.9	90	N/A	N/A	N/A
	Lower Flute										N/A	10	80	120

Anchor Designation		Seismic CI Cracked Concrete reduced characteristic capacity (per anchor) #									
Anchor Size, d _a (mm)	Anchor Location	Tension, N _{Rd,deck,seis} (kN)						Shear PARALLEL to deck, V _{Rd,deck,seis,PAR.} (kN) **		Shear PERPENDICULAR to deck, V _{Rd,deck,seis,PERP.} (kN) **	
		Concrete compressive strength, f'c						Concrete compressive strength, f'c		Concrete compressive strength, f'c	
		30 MPa		35 MPa		40 MPa		≥ 30 MPa		≥ 30 MPa	
		Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group
6	Upper Flute	2.6	2.2	2.8	2.4	3.0	2.5	3.8	3.2	3.8	3.2
	Lower Flute	3.5	3.1	3.8	3.4	4.1	3.6	3.8	3.2	3.8	3.2
8	Upper Flute	18.0						6.8	5.8	6.8	5.8
	Lower Flute	18.0						6.8	5.8	6.8	5.8
10	Upper Flute	7.6	6.5	8.2	7.0	8.8	7.5	10.8	9.2	10.8	9.2
	Lower Flute	5.4	4.7	5.8	5.1	6.2	5.5	11.8	10.0	11.8	10.0

NOTE: Performance Data is based on test program in accordance with ACI 355.2 and conducted at University of Auckland in June 2021. Refer to report FTA-21/0005 for the Fastener Technical Assessment of the test results.

* Where optimum dimensions are not achievable please contact Ramset to verify capacities.

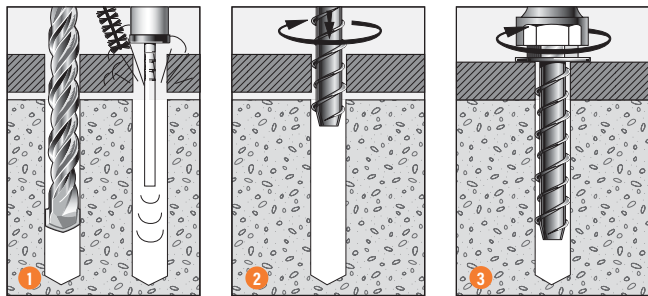
** For applications where the annular gap between the fastener and the fixture cannot be eliminated, multiply V_{Rd,deck,seis} x 0.5

*** Optimum dimensions for the lower flute are along the longitudinal direction where anchors are located within the Maximum Offset from the centre of the lower flute.

Note 1. N_{Rd,deck,seis} = α_{seis} * N_{Rk,seis} / γ_{1a} where N_{Rk,seis} is the basic characteristic seismic resistance for a given tensile failure mode and α_{seis} is the seismic reduction factor associated with cracking of concrete cone resistance for single anchors and groups of anchors. Furthermore γ_{1a} is the partial safety factor relevant for the tensile failure mode.

Note 2. V_{Rd,deck,seis} = α_{seis} * V_{Rk,seis} / γ_{1a} where V_{Rk,seis} is the basic characteristic seismic resistance for a given shear failure mode and α_{seis} is the seismic reduction factor associated with cracking of concrete cone resistance for single anchors and groups of anchors. Furthermore γ_{1a} is the partial safety factor relevant for the shear failure mode.

Installation

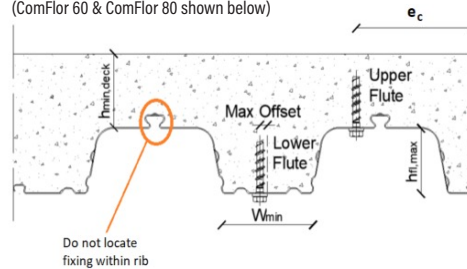


1. Drill hole to correct diameter and depth. Important: Use **Ramset™ Dustless Drilling System** to ensure holes are clean. Alternatively, clean clean thoroughly with brush and remove debris by way of vacuum or hand pump, compressed air etc.
2. Using a socket wrench, screw the **AnkaScrew™ Xtrem™** into the hole using slight pressure until the self tapping action starts.
3. Tighten the **AnkaScrew™ Xtrem™** until flush with fixture.
If resistance is experienced when tightening, unscrew anchor one turn and re-tighten. Ensure not to over tighten. Refer to tightening torque for limitations.

AnkaScrew™ Xtrem™

Anchor fixing location to composite/metal deck slab soffit

(ComFlor 60 & ComFlor 80 shown below)



Anchor Size d _a (mm)	Drilled hole diam., d _h (mm)	Effective Length, L _e (mm)	Max. Fixture Thickness, t _{max} (mm)	Min. Steel Gauge thk for Steel Deck t _{sd} (mm)	AnkaScrew™ Xtrem™ Description	Part Number
6	6	41	9	0.9	6mm x 50mm zinc	AS06050X
8	8	67	14	0.9	8mm x 80mm zinc	AS08080X
10	10	48	4	0.9	10mm x 60mm zinc	AS10060X

Effective depth h_{ef} (mm)

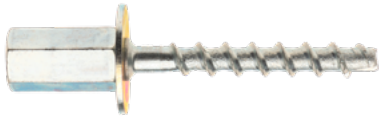
$$h_{ef} = L_e - t$$

t = total thickness of material(s) being fixed (t_{max} + t_{sd})

AnkaScrew™ Xtrem™ Rod Holder

SEISMIC - MECHANICAL SCREW-IN ANCHORS COMPOSITE FLOORING APPLICATION

Seismic Anchors - AnkaScrew™ Xtrem™ Rod Holder



Installation and Seismic Performance Details for Composite Flooring System

Anchor Designation		Installation details					Optimum dimensions*		Composite Metal Deck Detail (ComFlor™ 60 & ComFlor™ 80)				
Anchor Size, d _s (mm)	Anchor Location	Drilled hole diam., d _h (mm)	**Metric Threads suitable for Rod Hanger Fixing	Anchor effective depth, h _{ef} (mm)	Drill hole depth, h _t (mm)	Tight'g torque, T _t (Nm)	***Edge distance, e _c (mm)	***Anchor spacing, a _c (mm)	Section Dimensions				
									Min. Steel Gauge thk (mm)	Min. concrete thickness h _{min,deck} (mm)	Max. Offset from Centre of lower flute (mm)	Max. depth of lower flute, h _{l,max} (mm)	Min. width of lower flute, W _{min} (mm)
6	Upper Flute	6	M8 and M10	44	60	10	66	132	0.9	90	N/A	N/A	N/A
	Lower Flute									N/A	10	80	120

Anchor Designation		Seismic CI Cracked Concrete reduced characteristic capacity (per anchor) #					
Anchor Size, d _s (mm)	Anchor Location	Tension, N _{Rd,deck,seis} (kN)		Shear PARALLEL to deck, V _{Rd,deck,seis,PAR.} (kN)		Shear PERPENDICULAR to deck, V _{Rd,deck,seis,PERP.} (kN)	
		Concrete compressive strength, f _c		Concrete compressive strength, f _c		Concrete compressive strength, f _c	
		≥ 30 MPa		≥ 30 MPa		≥ 30 MPa	
		Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group
6	Upper Flute	9.3	9.3	4.4	3.7	4.4	3.7
	Lower Flute	9.3	9.3	4.4	3.7	4.4	3.7

NOTE: Performance Data is based on test program in accordance with ACI 355.2 and conducted at University of Auckland in June 2021. Refer to report FTA-21/0005 for the Fastener Technical Assessment of the test results.

* Where optimum dimensions are not achievable please contact Ramset to verify capacities

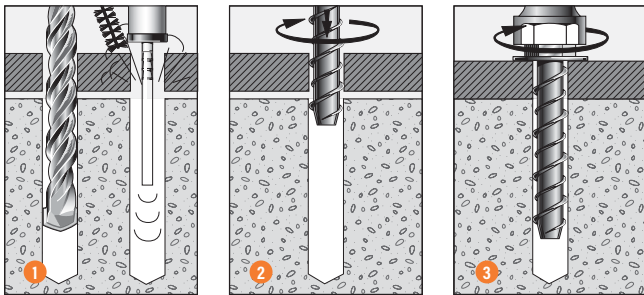
** Metric Threaded Rod Steel Tensile and Shear Capacities need to be checked against the AnkaScrew Rod Hanger Tensile and Shear Capacities and use the Minimum value of the two.

*** Optimum dimensions for the lower flute are along the longitudinal direction where anchors are located within the Maximum Offset from the centre of the lower flute

Note 1. $N_{Rd,deck,seis} = \alpha_{seis} * N_{Rd,seis} / \gamma_{Rd}$ where $N_{Rd,seis}$ is the basic characteristic seismic resistance for a given tensile failure mode and α_{seis} is the seismic reduction factor associated with cracking of concrete cone resistance for single anchors and groups of anchors. Furthermore γ_{Rd} is the partial safety factor relevant for the tensile failure mode.

Note 2. $V_{Rd,deck,seis} = \alpha_{seis} * V_{Rd,seis} / \gamma_{Rd}$ where $V_{Rd,seis}$ is the basic characteristic seismic resistance for a given shear failure mode and α_{seis} is the seismic reduction factor associated with cracking of concrete cone resistance for single anchors and groups of anchors. Furthermore γ_{Rd} is the partial safety factor relevant for the shear failure mode.

Installation

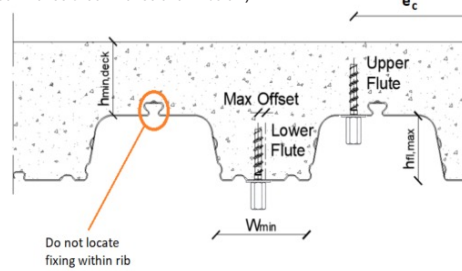


1. Drill hole to correct diameter and depth. Important: Use Ramset™ Dustless Drilling System to ensure holes are clean. Alternatively, clean clean thoroughly with brush and remove debris by way of vacuum or hand pump, compressed air etc.
2. Using a socket wrench, screw the AnkaScrew™ Xtrem™ into the hole using slight pressure until the self tapping action starts.
3. Tighten the AnkaScrew™ Xtrem™ until flush with fixture.
If resistance is experienced when tightening, unscrew anchor one turn and re-tighten. Ensure not to over tighten. Refer to tightening torque for limitations.

AnkaScrew™ Xtrem™ Rod Holder

Anchor fixing location to composite/metal deck slab soffit

(ComFlor 60 & ComFlor 80 shown below)



Description and Part Numbers

Anchor Size d _s (mm)	Drilled hole diam., d _h (mm)	Metric Threads suitable for Rod Holder Fixing	AnkaScrew™ Xtrem™ Rod Holder Description	Part Number
6	6	M8 and M10	6mm x 55mm zinc	AS06055XM810

TruBolt™ Xtrem™

SEISMIC - MECHANICAL ANCHORS COMPOSITE FLOORING APPLICATION



Seismic Anchors - TruBolt™ Xtrem™

Installation and Seismic Performance Details for Composite Flooring System

Anchor Designation		Installation details						Optimum dimensions*		Composite Metal Deck Detail (ComFlor® 60 & ComFlor® 80)				
Anchor Size, d _s (mm)	Anchor Location	Drilled hole diam., d _h (mm)	Fixture hole diameter, d _f (mm)	Max. Fixture Thickness, t _{max} (mm)	Anchor effective depth, h _{ef} (mm)	Drill hole depth, h _i (mm)	Tight'g torque, T _r (Nm)	***Edge distance, e _c (mm)	***Anchor spacing, a _c (mm)	Section Dimensions				
										Min. Steel Gauge thk (mm)	Min. concrete thickness h _{min,deck} (mm)	Max. Offset from Centre of lower flute (mm)	Max. depth of lower flute, h _{l,max} (mm)	Min. width of lower flute, W _{min} (mm)
M10	Upper Flute	10	12	Refer Description Part No. Table	60	75	45	90	180	0.9	100	N/A	N/A	N/A
	Lower Flute										N/A	No offset tested	80	120
M12	Upper Flute	12	14	Refer Description Part No. Table	70	90	60	105	210	0.9	100	N/A	N/A	N/A
	Lower Flute										N/A	No offset tested	80	120

Anchor Designation		Seismic CI Cracked Concrete reduced characteristic capacity (per anchor) #																	
Anchor Size, d _s (mm)	Anchor Location	Tension, N _{Rd,deck,seis} (kN)						Shear PARALLEL to deck, V _{Rd,deck,seis,PAR} (kN) **						Shear PERPENDICULAR to deck, V _{Rd,deck,seis,PERP} (kN)**					
		Concrete compressive strength, f _c						Concrete compressive strength, f _c						Concrete compressive strength, f _c					
		30 MPa		35 MPa		40 MPa		30 MPa		35 MPa		40 MPa		30 MPa		35 MPa		40 MPa	
		Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group	Single Anchor	Anchor Group
M10	Upper Flute	2.1	1.8	2.3	2.0	2.5	2.1	12.6	10.7	12.6	10.7	12.6	10.7	12.6	10.7	12.6	10.7	12.6	10.7
	Lower Flute	3.8	3.3	3.9	3.5	4.0	3.5	3.2	2.7	3.3	2.8	3.4	2.9	6.8	5.8	7.1	6.0	7.2	6.1
M12	Upper Flute	8.8	7.5	9.5	8.0	10.1	8.6	18.1	15.4	18.1	15.4	18.1	15.4	18.1	15.4	18.1	15.4	18.1	15.4
	Lower Flute	5.1	4.5	5.3	4.7	5.4	4.8	7.2	6.1	7.4	6.3	7.6	6.5	5.8	4.9	6.0	5.1	6.1	5.2

NOTE: Performance Data is based on test program in accordance with ACI 355.2 and conducted at University of Auckland in October 2017. Refer to report FTA-21/0005 for the Fastener Technical Assessment of the test results.

* Where optimum dimensions are not achievable please contact Ramset to verify capacities.

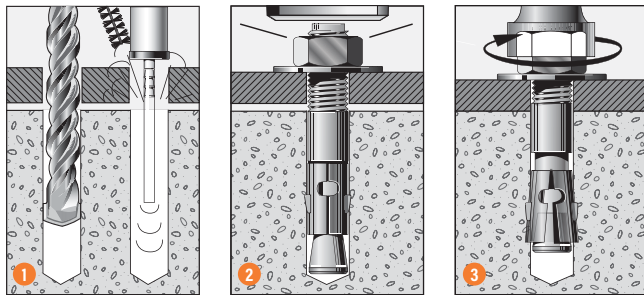
** For applications where the annular gap between the fastener and the fixture cannot be eliminated, multiply V_{Rd,deck,seis} x 0.5

*** Optimum dimensions for the lower flute are along the longitudinal direction where anchors are located within the Maximum Offset from the centre of the lower flute.

Note 1. N_{Rd,deck,seis} = α_{seis} N_{Rk,seis} / γ_M where N_{Rk,seis} is the basic characteristic seismic resistance for a given tensile failure mode and α_{seis} is the seismic reduction factor associated with cracking of concrete cone resistance for single anchors and groups of anchors. Furthermore γ_M is the partial safety factor relevant for the tensile failure mode.

Note 2. V_{Rd,deck,seis} = α_{seis} V_{Rk,seis} / γ_M where V_{Rk,seis} is the basic characteristic seismic resistance for a given shear failure mode and α_{seis} is the seismic reduction factor associated with cracking of concrete cone resistance for single anchors and groups of anchors. Furthermore γ_M is the partial safety factor relevant for the shear failure mode.

Installation

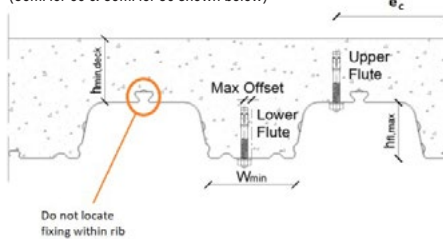


1. Drill hole to correct diameter and depth. Important: Use Ramset™ Dustless Drilling System to ensure holes are clean. Alternatively, clean thoroughly with brush and remove debris by way of vacuum or hand pump, compressed air etc.
2. Insert the TruBolt™ Xtrem™ through the fixture and drive with a hammer until washer contacts the fixture.
3. Tighten the TruBolt™ Xtrem™ nut with a torque wrench to specified assembly torque.

TruBolt™ Xtrem™

Anchor fixing location to composite/metal deck slab soffit

(ComFlor 60 & ComFlor 80 shown below)



Anchor Size d _s (mm)	Drilled hole diam., d _h (mm)	Effective Length, L _e (mm)	Max. Fixture Thickness, t _{max} (mm)	Min. Steel Gauge thk for Steel Deck t _{sd} (mm)	TruBolt™ Xtrem™ Description	Part Number
M10	10	65	4	0.9	10mm x 85mm zinc	T10085X
		80	19		10mm x 100mm zinc	T10100X
M12	12	80	9	0.9	12mm x 105mm zinc	T12105X
		90	19		12mm x 115mm zinc	T12115X

Effective depth h_{ef} (mm)

$$h_{ef} = L_e - t$$

t = total thickness of material(s) being fixed (t_{max} + t_{sd})