R-CONTROL SIPs

SIP No. 2021

Subject: SIP Fasteners

Date: November 2007

R-Control Wood Screws and R-Control Metal Fasteners are available from your R-Control SIP supplier for attachment of R-Control SIPs to wood or metal substrates. These screws were developed to provide an engineered fastener to meet the needs of R-Control SIP installation.

Please find attached engineering properties for the R-Control Wood Screw, Metal Fastener, and Light Duty Metal Fastener. The properties include withdrawal, shear, pull through, and tensile strength.

The values provided for the R-Control Screws and Fasteners are maximum values. As determined by the project architect/engineer, appropriate safety factors should be used in design.

Wood Screw

R-Control Wood Screws are used to attach R-Control SIPs to wood structural members and substrates.

Metal Fastener

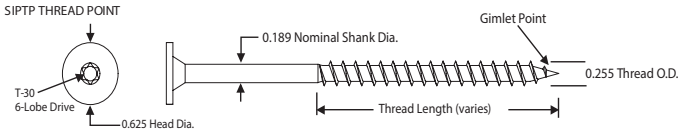
R-Control Metal Fasteners are used to attach R-Control SIPs to metal structural members and substrates. R-Control Heavy Duty Metal Fasteners can self drill into 3/16" steel without pilot hole predrilling. Installation is direct and fast - no wood nailers needed. This eliminates the need for wood nailers that would otherwise be required for the wood screw in metal building components. This results in time savings for the contractor and material savings for the building owner.

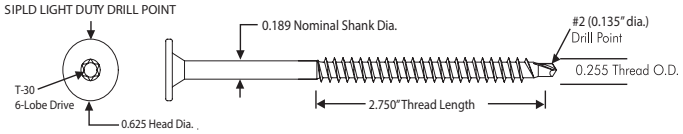
The metal fastener should be driven with a low rpm (<1500 rpm) high torque drill. Firm but not excessive pressure should be applied. This allows the drill point to engage the surface of the metal and drill through. Excessive pressure and/or rpm will dull the drill point and render the fastener ineffective.

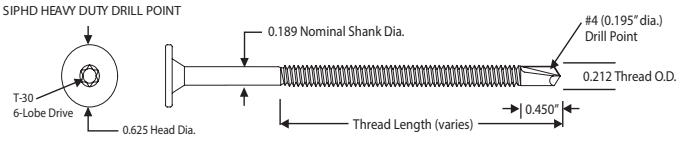
Metal Fastener - Light Duty

R-Control also supplies a Light Duty Metal Fastener.

R-Control Light Duty Metal Fasteners are used to attach R-Control SIPs to light duty (up to 18 gauge) metal substrates.







PERFORMANCE DATA

Average Ultimate Values - Fastener Properties

Fasteners	Property				Avg. Ult. Pull-Thru Values (lbs) ASTM D1761	
	Tensile (lbs) AISI S904	Shear (lbs) AISI S904	Bending Yield Strength -Fyb (psi) ASTM F1575	Corrosion Resistance ASTM D6294, ETAG 006	7/16" OSB	SIP Panel (7/16" OSB)
Wood	3555	2580	185,000	<15% Red Rust after 30 cycles	490	630
Light Duty Metal	3390	2490				
Heavy Duty Metal	3855	2625				

Average Ultimate SIPLD Pullout Values in Steel Deck (lbs)

Corrugated Steel Deck	24 ga.	22 ga.		20 ga.	18 ga.	16 ga.	
Yield Strength	36 ksi	36 ksi	85 ksi	36 ksi	36 ksi	36 ksi	100 ksi
SIPLD	250	381	435	449	694	896	1186

* Minimum 3/4" penetration of fastener through deck from underside of deck

Average Ultimate SIPHD Pullout Values in Structural Steel (lbs)

Structural Steel	16 ga.		12 ga.	1/8"	3/16"	1/4"
Yield Strength	36 ksi	100 ksi	50 ksi	36 ksi	60 ksi	60 ksi
SIPHD	491	794	1255	1454	3098	3814

* Minimum (3) threads of penetration of fastener through deck as measured from underside of steel

Average Ultimate Withdrawal Values in Lumber & Engineered Wood, Face Grain (lbs/in.)*

Wood Type (Specific Gravity)	SPF/HF (0.42)	DF/SP (0.50)	LVL (0.50)	LSL (0.50)
SIPTP	779	899	556	711
SIPLD	662	732	540	646

* Load values include fastener tip

Average Ultimate Withdrawal Values in Lumber & Engineered Wood, Edge Grain (lbs/in.)*

Wood Type (Specific Gravity)	SPF/HF (0.42)	DF/SP (0.50)	LVL (0.50)
SIPTP	36 ksi	100 ksi	50 ksi
SIPLD	491	794	1255

* Load values include fastener tip

Average Ultimate Values - Fastener Properties

Wood Type (Specific Gravity)	OSB				Plywood		
Thickness	7/16"	1/2"	19/32"	23/32"	15/32"	19/32"	23/32"
SIPTP	265	244	324	626	333	529	681
SIPLD	284	261	334	693	344	519	720

* Fastener penetrates through the full thickness of board

Average Ultimate Tension Values in Normal Weight Concrete & CMU (lbs)[1]

Comression Strength	2500 psi Concrete	5000 psi Concrete	CMU[2]
SIPTP	682	859	713
SIPLD	476	648	553

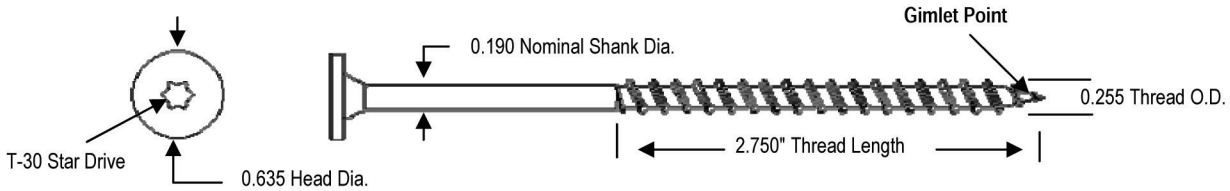
1. Fastener penetrates 1" into the concrete or CMU block, including the tip.
2. Concrete mansonry unit (CMU) conforming to ASTM C90.

Average Ultimate Lateral Load Resistance (lbs)

Fastener	Main Member	Side Member	Load
SIPTP	SPF[1]	8-1/4" SIP Panel	943
SIPLD	22 ga. Corrugated Steel Deck[2]	7-1/4" Nailbase Panel	411
SIPLD	7/16" OSB[3]	7-1/4" Nailbase Panel	112
SIPHD	1/8" Structural Steel[4]	8-1/4" SIP Panel	929

1. 1-3/4" fastener embedment into edge grain, including tip.
2. Minimum 3/4" penetration of fastener through deck as measured from underside of deck.
3. Fastener penetrates through the full thickness of board.
4. Minimum (3) threads of penetration through steel as measured from underside of steel

R-Control Wood Screws



Withdrawal	lbs./in. penetration	wood specific gravity
R-Control Wood Screw	1429	0.67
	1173	0.55
	1067	0.50
	981	0.46
	917	0.43
	768	0.36
	661	0.31

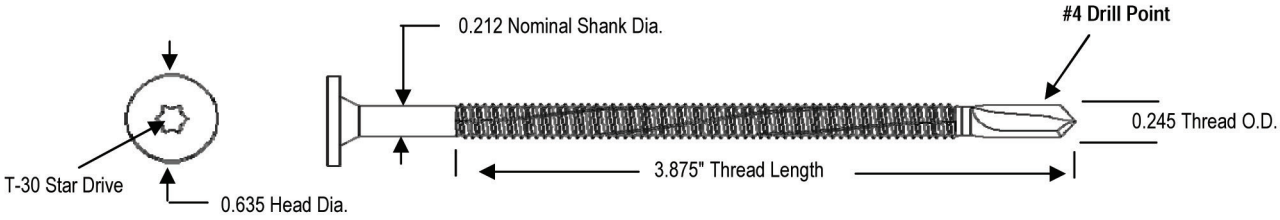
Shear	lbs.	wood specific gravity
R-Control Wood Screw / R-Control SIP assembly	790	0.64
	780	0.45
	720	0.38
R-Control Wood Screw	2900	

Pull Through	lbs.
R-Control Wood Screw / R-Control SIP assembly	630
R-Control Wood Screw / 7/16" OSB	545

Tensile Strength	lbs.
R-Control Wood Screw	3380

The values provided for the R-Control Screw Fastener are maximum values. As determined by the project architect/engineer, appropriate safety factors should be used in design.

R-Control Metal Fasteners



Withdrawal	lbs.	Steel
R-Control Metal Fastener	770	16 ga.
	1130	13 ga.
	1690	12 ga.
	3100	3/16"
	4500	1/4"

Shear	lbs.
R-Control Metal Fastener / R-Control SIP assembly	790
R-Control Metal Fastener	3400

Pull Through	lbs.
R-Control Metal Fastener / R-Control SIP assembly	630
R-Control Metal Fastener / 7/16" OSB	545

Tensile Strength	lbs.
R-Control Metal Fastener	6000

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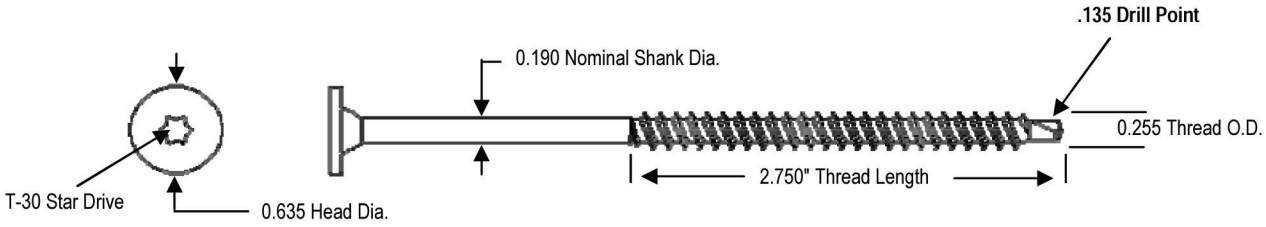
R-Control Light Duty Fasteners



Withdrawal	lbs.	Steel
R-Control Light Duty Metal Fastener	510	22 ga.
	645	20 ga.
	920	18 ga.

Shear	lbs.
R-Control Light Duty Metal Fastener	2900

Pull Through	lbs.
R-Control Light Duty Metal Fastener / R-Control SIP assembly	630
R-Control Light Duty Metal Fastener / 7/16" OSB	545

Tensile Strength	lbs.
R-Control Light Duty Metal Fastener	3380

The values provided for the R-Control Screw Fastener are maximum values. As determined by the project architect/engineer, appropriate safety factors should be used in design.

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