



AutoTight[®] Rod

AutoTight uses a continuous threaded rod. Typical lengths are 2', 3', 6', 10', and 12'. Field cut if needed. Rod may be ordered custom cut with sufficient lead time.

Material Identification: R (Rod) + Dia. (1/8's of an inch) + Alloy

Examples: R5-A307 = 5/8"-11 NC threaded rod, ASTM A307 Steel (Standard Strength)
R9-B7 = 1-1/8"-7 NC threaded rod, ASTM A193-B7 Steel (High Strength)

Finish: **Standard** Black or zinc plated. **Optional** Hot Dip Galvanized (HDG)

Note: HDG rod must be chased to fit standard nuts & couplers. Or use special nuts and couplers.

Diameter and Thread: Rod is available from 1/2" (R4) to 2" (R16) diameter. Thread is Unified National Coarse (NC or UNC). Other sizes, material and lengths are available.

Strength: Rod Strength is per AISC 360 and ICC AC 391-3.2.1.1. Rod strength and elongation are identical for all suppliers (per AISC 360). **Some suppliers overstate strength and understate elongation. Please check!**

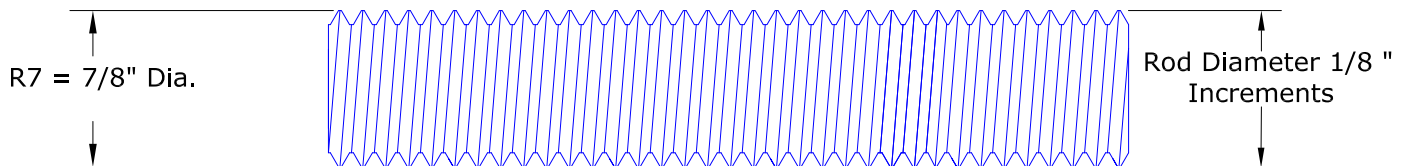
Elongation: Elongation for each (10') rod is shown at the maximum allowable tension load per ICC AC 391-3.2.1.1, Eq. 1. Adjust elongation based: on design load and distance between reaction points.

Code Acceptance: Tensile Values per IBC 2012, IBC 2009, IBC 2006 And AISC 360 13th edition.

Rod Basics

Rod is specified by grade, diameter and length.

Rod diameter is specified by the diameter in 1/8" increments. A 7/8" diameter rod is specified as R7.



Calculating Elongation

Both rod strength and elongation are critical to shear wall performance. Lower rod elongation results in lower shear wall drift and better performance. Rod is a major contributor to total system elongation. The fastest manual method of determining rod strength and elongation is to use a rod table and adjust to actual conditions.

When using a rod table: 1. select the rod for strength; 2. calculate rod elongation at the required load and rod length. 3. compare the elongation to requirements. 4. increase rod diameter to reduce elongation.

Example: Required Strength 11 kips. Floor Height (carpet-to-carpet) 11' - 4" (136").

Solution: #1 A307 Rod. Select an R7-A307 Rod from the AutoTight Rod table. This is a 7/8"Ø A307 rod with a Strength Capacity = 13,530 pounds, Elongation = 0.121" (for a 10' (120") length).
Calculated adjusted elongation: = $11,000/13,530 * 136"/120" * 0.121" = \underline{\underline{0.1115"}}$

Solution: #2 B7 Rod. Select an R5-B7 Rod from the AutoTight Rod table. This rod is 5/8"Ø- B7 rod with a Strength Capacity = 14,380 pounds, Elongation = 0.263" for a 10' (120") length.
Calculate adjusted elongation = $11,000/14,380 * 136"/120" * 0.263" = \underline{\underline{0.2280"}}$



AutoTight Rod (ASD Allowable Load per AISC 360)

Standard Strength

Diameter & Thread	Rod Size & Alloy	A307		Rod Size & Alloy	F1554 Grade 55	
	Model	Allowable Tension (lb)	Elong in per 10'	Model	Allowable Tension (lb)	Elong in per 10'
1/2"-13 UNC	R4-A307	4,418	0.129	R4-G55	5,522	0.161
5/8"-11 UNC	R5-A307	6,903	0.126	R5-G55	8,629	0.158
3/4"-10 UNC	R6-A307	9,940	0.123	R6-G55	12,425	0.154
7/8"-9 UNC	R7-A307	13,530	0.121	R7-G55	16,912	0.152
1"-8 UNC	R8-A307	17,672	0.121	R8-G55	22,089	0.151
1-1/8"-7 UNC	R9-A307	22,365	0.121	R9-G55	27,957	0.152
1-1/4"-7 UNC	R10-A307	27,612	0.118	R10-G55	34,515	0.147
1-3/8"-6 UNC	R11-A307	33,410	0.120	R11-G55	41,763	0.150
1-1/2"-6 UNC	R12-A307	39,761	0.117	R12-G55	49,701	0.146
1-3/4"-5 UNC	R14-A307	54,119	0.118	R14-G55	67,649	0.147
2"-4.5 UNC	R16-A307	70,686	0.117	R16-G55	88,357	0.146

High Strength

Diameter & Thread	Rod Size & Alloy	C1045		Rod Size & Alloy	A193-B7, F1554 Gr 105	
	Model	Allowable Tension (lb)	Elong in per 10'	Model	Allowable Tension (lb)	Elong in per 10'
1/2"-13 UNC	R4-C1045	8,836	0.258	R4-B7	9,204	0.268
5/8"-11 UNC	R5-C1045	13,806	0.253	R5-B7	14,381	0.263
3/4"-10 UNC	R6-C1045	19,880	0.246	R6-B7	20,709	0.256
7/8"-9 UNC	R7-C1045	27,059	0.242	R7-B7	28,187	0.253
1"-8 UNC	R8-C1045	35,343	0.241	R8-B7	36,816	0.251
1-1/8"-7 UNC	R9-C1045	44,731	0.242	R9-B7	46,595	0.253
1-1/4"-7 UNC	R10-C1045	55,223	0.236	R10-B7	57,524	0.246
1-3/8"-6 UNC	R11-C1045	66,820	0.239	R11-B7	69,604	0.249
1-1/2"-6 UNC	R12-C1045	79,522	0.234	R12-B7	82,835	0.244
1-3/4"-5 UNC	R14-C1045	108,238	0.236	R14-B7	112,748	0.246
2"-4.5 UNC	R16-C1045	141,372	0.234	R16-B7	147,262	0.244

Super Strength

Diameter & Thread	Rod Size & Alloy	A354 BD	
	Model	Allowable Tension (lb)	Elong in per 10'
1-1/8"-7 UNC	R9-A654BD	55,910	0.303
1-1/4"-7 UNC	R10-A654BD	69,030	0.295



High strength rod is typically identified with a high strength mark. The actual identification varies by specific supplier. Consult factory for more information.

Notes:

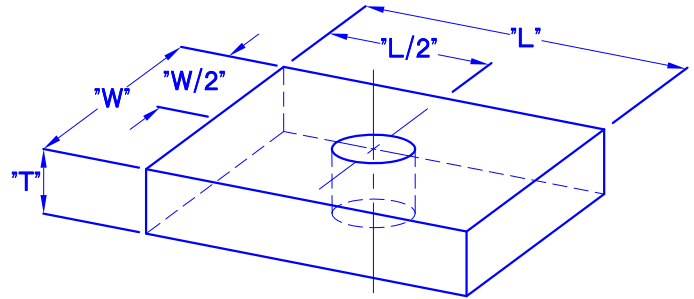
- Material Properties: (Other grades available, consult factory)
 ASTM A307 Fu = 60, Fy = 43 ksi. ASTM F1554 Gr. 55, Fu=75, Fy =55 ksi. ASTM A108-C1045 Fu = 120, Fy = 92
 ASTM A193-B7, Fu=125, Fy=105 ksi. ASTM F1554 Gr. 105, Fu=125, Fy=105 ksi. ASTM A354-BD Fu = 150, Fy = 130 ksi.
- Strength $P = 0.75 \times Fu \times \text{nominal area} / 2$ Per AISC 360 13th ed Table 7.2, pg. 7-2, P16.1-108 Eqn J3-1
- Stress increase not allowed with AISC 13th Ed capacities. (IBC 2006 & later)
- Rod stretch calculated per AC308 3.2.1.1 as follows:
 $\Delta Rod = PL/AnE$ where: P=Load, L=length, An=0.7854 (D-0.9743/n)²,
 D = nominal rod dia, n = threads per inch, E = elastic modulus = 29,000,000.
 Table elongation is 10' rod at allowable load. Depending on jurisdiction stretch limit may be 1/8", 0.179", 0.200", or not specified.
 Elongation of other length rods may be calculated from this table by length ratio.
- Large Ø rod (1-3/8" to 2" Ø) used for stretch reduction. Consult factory for advice before using.
- Tabulated allowable loads are ASD for IBC 2006, 2009 & 2012, CBC 2007 & 2010, OSSC 2007 & 2010, LABC 2008 & 2011.
- LRFD Strengths are 1.5 x ASD Allowable Loads.



Bearing Plates

Bearing plates distribute compression loads into the structure at reaction points. AutoTight plates exceed the flexural requirements of AISC 360 and the wood-bearing requirements of the 2005 NDS. (ICC ES AC391 Sect 1.4.6, July 1, 2010)

Per 2005 NDS, plates deflect 0.040 inch at the compressive design value with a linear load deformation. (ICC ES AC 391 section 3.2.1.2).



Determining Compression Deflection

AutoTight bearing plates provide a maximum deformation of 0.040" at rated the capacity.

To select:

1. Determine the reaction load.
2. Select the smallest plate that can carry the reaction load.
Check for: Bearing Capacity, Width (wall fit 4X or 6X Wall) and rod fit.
3. The wood deformation at the actual load is linear.
With the load-deformation at the design load = $0.040" * \text{design load} / \text{rated load}$.

Example:

Reaction is 11,000 pounds on Douglas Fir. Rod is $1\text{-}\frac{1}{8}" \text{ } \emptyset$.
Select an S11- $1\text{-}\frac{1}{4}"$ bearing plate with a rated capacity of 11,948 pounds.

Actual deformation (per AC 391, section 3.2.1.2) is $0.040 * 11,000 / 11,948 = 0.037"$
For system deformation add the 0.037 to the rod and shrinkage compensator deformation.

Minimizing Total Deformation

To lower deformation increase the size of the bearing plate.

Example:

Reaction load is 11,000 pounds on Douglas Fir.
If an L20- $1\text{-}\frac{1}{4}"$ plate is selected, the plate deformation will be as follows:

Actual deformation will be $0.040 * 11,000 / 21,016 = 0.021"$

Changing the bearing plate is one method to adjust the total deflection (elongation) to achieve a tight system.

This example shows how to manually adjust components to achieve a desired deflection.
The [AutoTight Software](#) allows for a fast, easy change of rod, bearing plates or shrinkage compensators to achieve the the required system deflection.



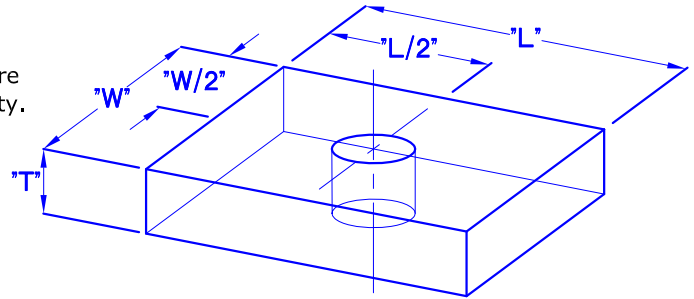
Bearing Plates

Bearing Plates load the structure at reaction points. Bearing loads are limited by wood crushing at the NDS allowable wood bearing capacity.

Material: Complies with ASTM A36

Identification: Plates or boxes marked with Part #.

Efficiency tip: Minimize the number of sizes used on any single job, i.e. Keep it Simple.



Wall Thickness	Typical Use	Bearing Plates								
		Model No.	Best Sizes	T x W x L	Max Rod Ø	Allowable Load (Cross Grain Crushing)				
						DFL @ 625	SYP @ 565	HF @ 425	SPF @ 405	
Fit 4x & 6X walls	AT 75 and AT 6A	S5 -5/8"		1/4" x 3" x 3"	5/8	5,964	5,391	4,055	3,864	
		S5 -3/4"	***	1/4" x 3" x 3"	3/4	5,964	5,391	4,055	3,864	
		For 1/2" through 1" Rod								
		S7 -1"	***	3/8" x 3-1/2" x 3-1/2"	1"	7,863	7,108	5,347	5,095	
		S10 -1"	***	1/2" x 3-1/4" x 5"		10,322	9,331	7,019	6,689	
		S11 -1"	***	1/2" x 3-1/2" x 5-1/2"		11,948	10,801	8,125	7,742	
	S14 -1"		3/4" x 3-1/4" x 7"	13,665		12,353	9,292	8,855		
	S16 -1"		1" x 3-1/4" x 8"	15,696	14,189	10,673	10,171			
	AT 100 & 125	For 3/4"- 1-1/4" Rod								
		S7 -1-1/4"	***	3/8" x 3-1/2" x 3-1/2"	1-1/4"	7,540	6,816	5,127	4,886	
		S10 -1-1/4"	***	1/2" x 3-1/4" x 5"		10,009	9,048	6,806	6,486	
		S11 -1-1/4"	***	1/2" x 3-1/2" x 5-1/2"		11,948	10,801	8,125	7,742	
S14 -1-1/4"			3/4" x 3-1/4" x 7"	13,373		12,089	9,094	8,666		
S16 -1-1/4"			1" x 3-1/4" x 8"	15,404		13,926	10,475	9,982		
Fit 6x and larger wallwalls	AT125 & AT 100	L18 -1-1/4"	***	1/2" x 5.5" x 5.5"		1-1/4"	19,292	17,440	13,119	12,501
		L20 -1-1/4"	***	5/8" x 5-1/2" x 6"	21,016		18,998	14,291	13,618	
		L25 -1-1/4"		3/4" x 5-1/2" x 7-1/2"	24,936		22,542	16,956	16,158	
		L30 -1-1/4"		1" x 5-1/2" x 9"	30,092		27,203	20,462	19,500	
		L33 -1-1/4"		1-1/8" x 5-1/2" x 10"	33,529		30,311	22,800	21,727	
		L37 -1-1/4"		1-1/4" x 5-1/2" x 11"	36,967		33,418	25,137	23,955	
	For 1-3/8", 1-1/2", 1-3/4" and 2" Rod									
	AT 200 Only	L18 -2"	***	1/2" x 5.5" x 5.5"	2"	17,965	16,240	12,216	11,641	
		L20 -2"	***	5/8" x 5-1/2" x 6"		19,695	17,805	13,393	12,763	
		L25 -2"		3/4" x 5-1/2" x 7-1/2"		23,693	21,419	16,111	15,353	
		L30 -2"		1" x 5-1/2" x 9"		28,849	26,080	19,618	18,694	
		L33 -2"		1-1/8" x 5-1/2" x 10"		32,287	29,187	21,955	20,922	
		L37 -2"		1-1/4" x 5-1/2" x 11"		35,724	32,295	24,293	23,149	

Notes: Plate ID includes maximum rod diameter. Holes are 1/16" oversize.

Bearing Plate bending based on ASTM A36 Steel, Fy = 36 ksi. per AISC 13th ed.

Bearing Capacity per NDS 2005: DFL = 625, SP = 565, HF = 405, SPF = 425 psi.

Bearing area factor, Cb, included in listed capacities.

Allowable bearing capacity is not limited by plate bending. Deflection is 0.040" at Allowable Load.

Allowable Capacity = (Fc perp) * Bearing Area * Bearing Factor (per AC 391 3.2.1.2 May 2012)

S5, S7, S10 and L18 plates may be used on the first floor mudsill for end of wall connection.

Finish: S5, S7, L11 and L18 plates are HDG. All other are black iron except as noted.



Shrinkage compensators require evaluations for: fit, strength, expansion and deflection. Two code defined deflections (ΔA) and (ΔR) are required.

Load-deflection (ΔA) design load/actual load * Rated ΔA .

Delta R (ΔR) is always added in full to system deflection. Delta R is the product internal slack.

Example:

Reaction Load = 11,000 pounds

Shrinkage Compensator AT 100 (Select based on the rod size)

Rated Capacity: 25,300 pounds.

Deflection Maximum: $\Delta A = 0.032"$, $\Delta R = 0.002"$

Expansion 1.2" (ICC ESR 1344)

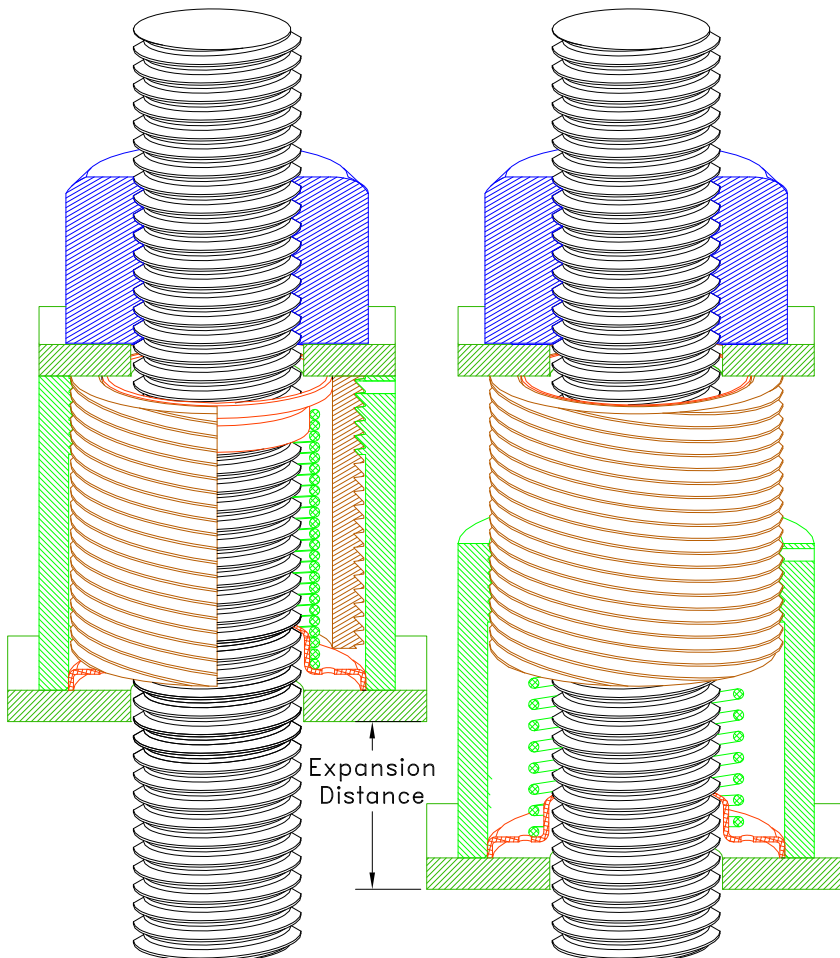
Calculate Deflection: Load Deflection = $0.032 * 11,000/25,300 = 0.014"$	
Delta R (ΔR) (From Table)	= $0.002"$
Total Deformation	= $0.016"$

Add sum to the system elongation per AC 316 and AC 391 section 3.1.1.

Want to know more? Watch a 2 minute video that explains ΔR on our website.



US Patents 6,390,747 6,585,469. Other patents foreign and domestic, pending



AutoTight:

Rod Sizes to 2" Dia!

Larger rod = Lower Deflection

Inside Spring
= Protected Mechanism

Special thread
= 60% Lower Deflection

Tightest Systems
= Shear Wall Performance

AutoTight Tie-Down Systems

Commins Manufacturing Inc.

360-378-9484



The AutoTight shrinkage compensator automatically expands as the building shrinks and settles. This expansion helps keep shear walls tight and performing to the code.

Code Listed: ICC ESR-1344, COLA RR-25480, Tested to AC 316 & AC 391, IBC 2012 Rated

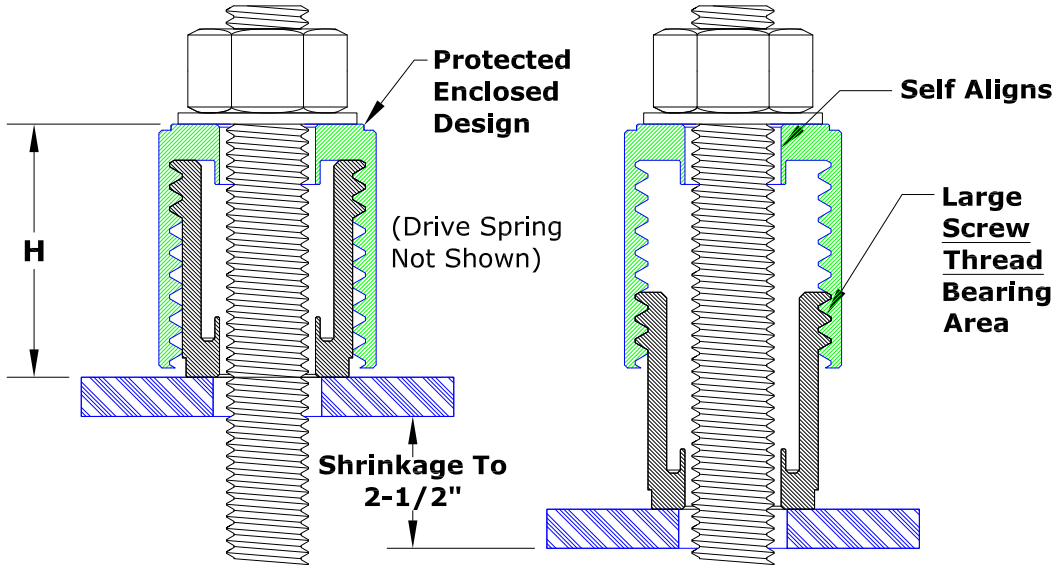
Material: Aluminum - 6061 Alloy, **Finish:** Light Oil
Steel - 12L14, **Finish:** Zinc chromate, moly disulfide lubricant.

Installation: Place a steel bearing plate over the rod and onto the wood
 Place the AT over the rod and onto the bearing plate,
 Place Washer over the rod and onto the AT, Install and tighten Nut,
 Remove the activation screw.
 Listen for release



US Patents 6,390,747 6,585,469. Other patents foreign and domestic, pending

Threaded Mechanism = NO Backlash (Δ_r), No Looseness!



No Backlash with AutoTight = Much Better Shear Wall Performance

Some shrinkage compensators use ratchets. These ratchets can introduce looseness (backlash) up to $\frac{3}{16}$ ".

This looseness can reduce the shear wall capacity by 40%.

High Capacity, NO Backlash, "Floating" Take-Up Device = Jam resistant
Tested at 3° out-of-plumb. (3° = 6-1/4" in 10 feet.)
Stackable: Doubles Expansion to 5"
Tested to 3 times rated load.

Fully functional at 2-1/2 times rated load

See Videos at www.comminsmfg.com

	Model Number	Rod Diameter	Matl.	Dimensions (Inches)		Rated Take-Up (Inches)	Allowable Load Pounds	Average Ultimate Pounds	Seating Increment Δ_R^*	Deflection at Allowable Load Δ_A "
				Dia.	H					
New	AT4A-1.5	1/2"	Aluminum	1-1/2"	3"	1-1/2"	6,450	24,857	0.000"	0.011
New	AT4A-2.5				4-1/16"	2-1/2"				
New	AT6A-1.5	3/4"		2-1/8"	3-3/16"	1-1/2"	10,550	40,737		
New	AT6A-2.5				4-3/16"	2-1/2"				
	AT 75	3/4"	Steel	2"	3"	1.10"	16,450	50,533	0.002"	0.024
	AT 75-2.5			2"	4"	2-1/2"	15,183	54,728		0.020
	AT 100	1"		2-1/4"	3-1/8"	1.10"	25,300	78,067		0.032
	AT 125	1-1/4"		2-3/4"	3-1/8"	1.12"	34,500	104,683		0.016
New	AT 200-2.0	2"		4"	3-3/4"	2.25"	50,000	150,000		0.024

Note: Δ_R = Average Travel and Seating Increment is the "Lost Motion" with device direction change from advancing to load resistance. This is sometimes called "Backlash".

*The AutoTight Aluminum Shrinkage Compensator has 0.0002" backlash (Δ_r).

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Coupler Nuts

Coupler nuts connect threaded rod to form a continuous rod system.

Straight couplers have the same thread on both ends.
Coupler Nut Reducers have different diameter threads on each end.

Thread pitch is Unified National Coarse (NC or UNC).
 Coupler nuts are available to fit rod from 1/2"-13 through 2"-4.5 NC.

Identification:

Straight Coupler: Example CN-9
 CN = Coupler Nut,
 9 = rod Size in 1/8 inch = 1-1/8" dia.

Grade: Standard Coupler Nuts are ASTM A563 Grade A Grade 2
 High Strength Couplers are ASTM A563 Grade C
 Over 1-3/8" are Grade 5

Sighted couplers have one or more holes drilled to aid installation.

Installation:

Thread coupler onto rod until the rod can be seen in the sight hole. Thread the next rod until it can also be seen through the sight hole. A nail inserted into the sight hole can be used for a temporary stop.

Note: Full strength is achieved with thread engagement equal to a standard nut. This is typically one rod diameter

Options:

Oversize threads in coupler nuts for use with galvanized rod are available. To specify add a suffix after the product. Example CN-6 FHDG. This provides an oversize end to fit HDG rod. Contact factory for details.

Code Acceptance:

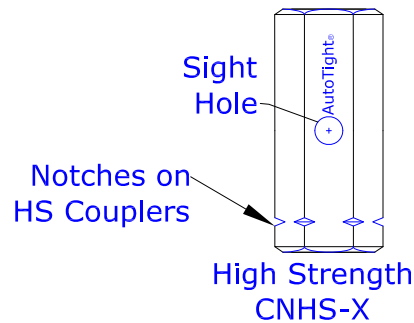
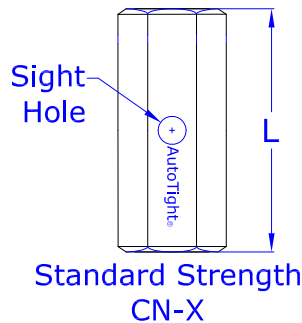
Nuts and coupler nuts shall be grade compatible and conform to ASTM A563 and IFI-128. One or two sight holes are provided to assist installation. Standard strength couplers shall be used with ASTM A307 and equivalent rod; High strength couplers shall be used with ASTM C1045, ASTM A193-B7 and other high strength rod. High strength couplers may be used with standard strength rod. See ICC ES AC 391 section 1.4.5 for additional information.

Coupler elongation is minimal and is not considered in elongation calculations.

Standard Couplers	
Model Number	Rod Ø Both Ends
CN-4	1/2"
CN-5	5/8"
CN-6	3/4"
CN-7	7/8"
CN-8	1"
CN-9	1-1/8"
CN-10	1-1/4"

High Strength Couplers	
Model Number	Rod Ø Both Ends
CNHS-5	5/8"
CNHS-6	3/4"
CNHS-7	7/8"
CNHS-8	1"
CNHS-9	1-1/8"
CNHS-10	1-1/4"
CNHS-11	1-3/8"
CNHS-12	1-1/2"
CNHS-14	1-3/4"
CNHS-16	2"

Straight Couplers



* Check with factory for availability of these sizes.



Coupler Nut Reducer

Use coupler nut reducers to change rod size. Normally rod is reduced in size. However sometimes the rod is increased from an embedment to a "run".

Identification:

Coupler Nut Reducer

Example: CNR610

CNR = Coupling Nut Reducer,

610 = 3/4" - 10 NC to 1-1/4" - 7 NC Thread.

Grade:

Standard Coupler Nuts are ASTM A563 Grade A.

High strength Couplers are ASTM A563 Grade C.

Over 1-1/4" at the big end Grade 5 is supplied

Sight holes are standard.

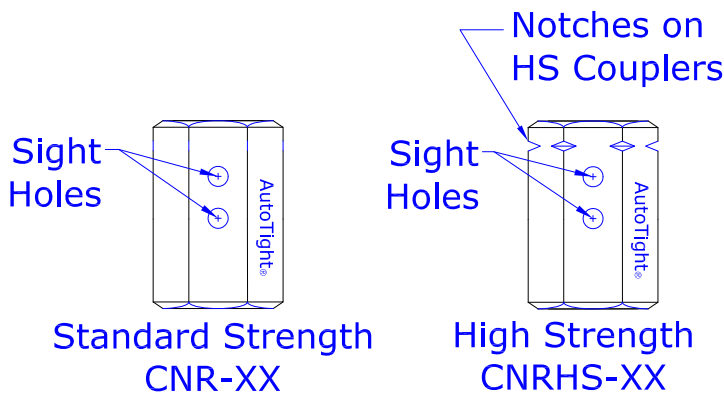
Installation

Thread coupler onto larger rod, bottom. Thread smaller rod into coupler and bottom on the larger thread. The thread bottoming in the coupler will indicate full engagement, a sight hole is not necessary.

	Model Number	Rod Ø	
		Small	Large
Standard Strength	CNR-45	1/2"	1/2"
	CNR-46		3/4"
	CNR-47		7/8"
	CN-48		1"
	CNR-56	5/8"	3/4"
	CNR-57		7/8"
	CNR-58		1"
	CNR-59		1-1/8"
	CNR-67	3/4"	7/8"
	CNR-68		1"
	CNR-69		1-1/8"
	CNR-610		1-1/4"
	CNR-78	7/8"	1"
	CNR-79		1-1/8"
	CNR-710		1-1/4"
	CNR-89		1-1/8"
	CNR-810	1"	1-1/4"
	CNR-910	1-1/8"	1-1/4"

	Model Number	Rod Ø	
		Small	Large
High Strength	CNRHS-56	5/8"	3/4"
	CNRHS-57		7/8"
	CNRHS-58		1"
	CNRHS-59		1-1/8"
	CNRHS-67	3/4"	7/8"
	CNRHS-68		1"
	CNRHS-69		1-1/8"
	CNRHS-610		1-1/4"
	CNRHS-78	7/8"	1"
	CNRHS-79		1-1/8"
	CNRHS-710		1-1/4"
	CNRHS-89		1-1/8"
	CNRHS-810	1"	1-1/4"
	CNRHS-812 *		1-1/2"
	CNRHS-814 *		1-3/4"
	CNRHS-910		1-1/4"
	CNRHS-912 *	1-1/8"	1-1/2"
	CNRHS-914 *		1-3/4"
	CNRHS-916 *		2"
	CNRHS-1011 *		1-1/4"
	CNRHS-1012 *	1-1/2"	
	CNRHS-1014 *	1-3/4"	
	CNRHS-1016 *	2"	
	CNRHS-1112 *	1-3/8"	1-1/2"
	CNRHS-1114 *		1-3/4"
	CNRHS-1116 *		2"
CNRHS-1214 *	1-1/2"		1-3/4"
CNRHS-1216 *		2"	
CNRHS-1416 *		1-3/4"	2"

Coupler Nut Reducer



* Check with factory for availability of these sizes.

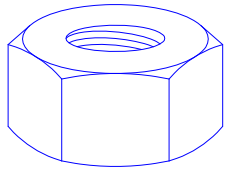


Nuts

All nuts are Unified National Coarse thread pitch (UNC or NC)

Standard Nuts are SAE Grade 2 or ASTM 563-Grade A

High Strength Nuts are SAE grade 5, ASTM 563-Grade C or A194-2H.



Nuts for HDG

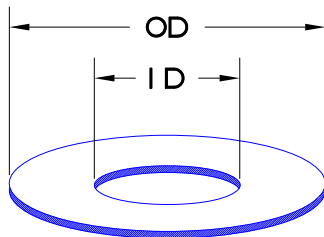
Oversize nuts to fit HDG Hot Dipped Galvanized Rod available. Consult factory for sizes available. Rethreading after HD Galvanizing is preferred.

Standard Nuts	
Model Number	Diameter & Thread
N-4	1/2"-13 NC
N-5	5/8"-11 NC
N-6	3/4"-10 NC
N-7	7/8"-9 NC
N-8	1"-8 NC
N-9	1-1/8"-7 NC
N-10	1-1/4"-7 NC
* N-11	1-3/8"-6 NC
* N-12	1-1/2"-6 NC
* N-14	1-3/4"-5 NC
* N-16	2"-4.5 NC

High Strength Nuts	
Model Number	Diameter & Thread
NHS-4	1/2"-13 NC
NHS-5	5/8"-11 NC
NHS-6	3/4"-10 NC
NHS-7	7/8"-9 NC
NHS-8	1"-8 NC
NHS-9	1-1/8"-7 NC
NHS-10	1-1/4"-7 NC
* NHS-11	1-3/8"-6 NC
* NHS-12	1-1/2"-6 NC
* NHS-14	1-3/4"-5 NC
* NHS-16	2"-4.5 NC

Washers

Washers supplied are SAE Washers. Common Washers may be substituted. W-11 thru W-16 are special 3-1/2" square washers.



Washers		
Model Number	Nominal Diameter	Outside Diameter
W-4	1/2"	1-1/16"
W-5	5/8"	1-5/16"
W-6	3/4"	1-1/2"
W-7	7/8"	1-3/4"
W-8	1"	2"
W-9	1-1/8"	2-1/4"
W-10	1-1/4"	2-1/2"
* W-11	1-3/8"	3-1/2"
* W-12	1-1/2"	3-1/2"
* W-14	1-3/4"	3-1/2"
* W-16	2"	3-1/2"

* Check with factory for availability of these sizes.