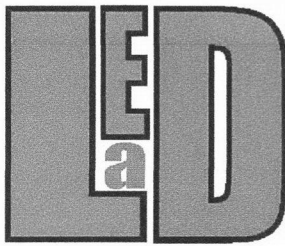


AutoTight® Rod Holdown System

System Design for
Tree Farm



LYVER ENGINEERING AND DESIGN

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Prepared for
ProTeck

prepared by Tom Boydston
Commins Project ID # 18-1789

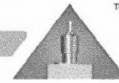
Includes ICC ES 1344 Code Report,

http://www.icc-es.org/reports/pdf_files/ICC-ES/ESR-1344.pdf#view=fit

and applicable catalog pages.

Engineering Calculations Revision: 1 AutoDesign Revision: 4 Eng

Calcs Date 09/17/2018



(1) Key to Calculation Table

THIS PAGE SAMPLE RUN ONLY

AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

(2) Project Name
Plan Set: BID SET Plan Set Date: mm/dd/yyyy

Project Number:	(6)	(3)	(4)	CAT ID #	##-###	(5)
Run Name:	1	Run Qty:	4	Tensile Strength	Calc'd	

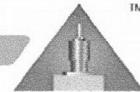
(8)		(10)		(11)		(12)	(13)	(14)			
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.		
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)		
Level = 2		Component		Description		Capacity	Demand	D/C	Elong.		
(15)	Differential Load:	4.00 (kips)	AT 125	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.10	0.50	45.5%	-	(22)	
(16)	Tension Load:	20.00 (kips)	AT 125	Shrinkage Device (1-1/4" I.D.) - Allowable Load		34.50	4.00	11.6%	-	(23)	
(17)	Compression:	20.00 (kips)	-	Shrinkage Device - Deflection at Load		-	-	-	0.002	(24)	
(18)	Story Height:	12.50 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.002	(25)	
(19)	Plate Height:	11.33 (ft.)	S8L	Bearing Plate at Reaction Point		7.96	4.00	50.2%	0.020	(26)	
(20)	Floor Depth:	14.00 (in.)	R9	1-1/8"-A307 Tension Rod		22.37	20.00	89.4%	0.125	(27)	
(21)			-	No Stretch Rod		#N/A	20.00	0.0%	n/a	(28)	
			-	Wood Beam Start Bearing Plate		n/a	n/a	0.00	n/a	(29)	
			-	Steel Beam Start in Tension		n/a	n/a	0.00	n/a	(30)	
				Limiting Component Tension Load Capacity, Load and D/C Ratio		22.37	20.00	89.4%	-	(31)	
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		0.200	-	74.5%	0.149	(32)	
	Compression	Outer	(1) 4x8	(1) 4x8	Inner	4x Wall Post per Side of Rod-Enter by Hand as Needed	32.08	20.00	62.3%	-	(33)
	Wood	Posts	(3) 2x6	(3) 2x6	Posts	6x Wall Post per Side of Rod-Enter by Hand as Needed	30.93	20.00	64.7%	-	(34)
	Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.	
	Tension Load:	20.00 (kips)	R9		1-1/8"-A307 Anchor Rod		22.37	20.00	89.4%	n/a	(35) (36)

Notes:

- (1) All these cells are filled with data from the AutoTight Run Designer spreadsheet's Project Info page and Load Justification Table page.
- (2) The Builder's Name of the project.
- (3) The revision level of the plan set.
- (4) The Bid Date.
- (5) The Commins Mfg. project number.
- (6) The Builder's number for the project.
- (7) The name of this run.
- (8) Commins AutoTight part number.
- (9) The quantity of this type of run.
- (10) This column is the description of the component shown on each row
- (11) This column of the table is the Load Capacities of the various components.
- (12) This column of the table is the Load placed on the various components.
- (13) This column of the table is the Demand / Capacity ratio for each component.
- (14) This column is the contribution of each component to the total elongation for this level, and the total elongation for the level.
Elongation numbers are in blue text.
- (15) The name of this level.
- (16) Differential Load applied by this level.
- (17) Total tension in rod at this level.
- (18) Compression load on the compression posts at this level.
- (19) Story Height carpet to carpet.
- (20) Top of Sill Plate to Top of Sill Plate height of this level.
- (21) Depth of floor beams.
- (22) This row compares the total shrinkage at this level with the capacity of the AT's to take up this shrinkage.
- (23) This row compares the load capacity of the AT device to the load applied to it. Per AC316 Sec. 1.4.5
- (24) This row shows the deflection of the AT device(s) under the applied load. Per AC316 Sec. 1.4.8
- (25) This row shows the ΔR=Travel and Seating increment of the AT Device(s). Per AC316 Sec. 1.4.7
- (26) This row shows Bearing Plate Load Capacity and compares to its Load also its deflection's contribution to the total Elongation.
(unless the calcs call for rod stretch only.) (It sees only the differential load.) Per AF&PA NDS Tbl 4A, 4B incl Cf factor.
- (27) This row shows Tension Rod Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. Per AISC 360-05
- (28) This row shows Stretch Rod Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. Only if Stretch Rod is used.
- (29) This row shows the Wood Beam Start's Bearing Plate Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation.
(Only if a Wood Beam Start is used.) (It sees the tension load.) Per AF&PA-NDS Tbl 4A, 4B incl Cf factor.
- (30) This row shows the Steel Beam Start's Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation.
(Only if a Steel Beam Start is used.) (It sees the tension load.) The rod seats on the steel beam and the weld cross section is greater than the rod cross section so the Steel Beam Start elongation is included in rod elongation. Per ICC ES-1344 & 5889
- (31) This row shows worst case component's Load and compares to its Load Capacity.
- (32) This row shows the maximum allowed Elongation and the total Elongation calculated for this level.
- (33) This row shows the inner and outer compression post required, their load capacities and loads if the wall is 4x.
It is used only if Commins Mfg specifies the Compression Posts and is filled in manually. If line is not shown posting is per structural drawing.
- (34) This row shows the inner and outer compression post required, their load capacities and loads if the wall is 6x.
It is used only if Commins Mfg specifies the Compression Posts and is filled in manually. If line is not shown posting is per structural drawing.
- (35) This row shows the load capacity of the Anchor Rod embedded in the concrete and compares to its load, if used. (Not the concrete strength)
- (36) Anchor bolt elongation is included in the length of the tension rods.
- (37) Nuts, Coupler Nuts and Reducing Coupler Nuts are not listed individually because they are grade compatible with the Tension Rod.
- (38) Nuts, Coupler Nuts and Reducing Coupler Nuts calculated contribution to elongation is 0.0005 inch or less.
- (39) Revision level of this document

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID # 18-1789			
Run Name:		EW2ab				Tensile Strength			Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	19.86 (kips)	AT10A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)			1.63"	0.50"	30.7%	-
Tension Load:	19.86 (kips)	AT10A-1.5	Shrinkage Device (1-1/4" I.D.) - Allowable Load			28.07	19.86	70.8%	-
Compression:	33.08 (kips)	-	Shrinkage Device - Deflection at Load			-	-	-	0.014
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR			-	-	-	0.000
Plate Height:	11.95 (ft.)	L21-1-1/4"	Bearing Plate at Reaction Point			21.03	19.86	94.4%	0.038
Floor Depth:	12.63 (in.)	R9A307	1 1/8"-A307 Tension Rod			22.37	19.86	88.8%	0.054
Limiting Component Tension Load Capacity, Load and D/C Ratio						21.03	19.86	94.4%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	53.0%	0.106
Compression	Outer		Inner						
Wood	Posts (2) 2x6	(5) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		36.09	33.08	91.7%	-
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	13.76 (kips)	AT12A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)			1.63"	0.25"	15.3%	-
Tension Load:	33.62 (kips)	AT12A-1.5	Shrinkage Device (1-1/2" I.D.) - Allowable Load			28.07	13.76	49.0%	-
Compression:	50.26 (kips)	-	Shrinkage Device - Deflection at Load			-	-	-	0.010
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR			-	-	-	0.000
Plate Height:	11.95 (ft.)	L18-1-1/2"	Bearing Plate at Reaction Point			18.92	13.76	72.7%	0.029
Floor Depth:	12.63 (in.)	R12A307	1 1/2"-A307 Tension Rod			39.76	33.62	84.6%	0.129
Limiting Component Tension Load Capacity, Load and D/C Ratio						39.76	33.62	84.6%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	84.0%	0.168
Compression	Outer		Inner						
Wood	Posts (2) 2x6	(8) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		51.56	50.26	97.5%	-
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	33.62 (kips)	R12A307	1 1/2"-A307 Anchor Rod			39.76	33.62	84.6%	n/a

Design Code: OSSC_2014 Main/State/Local

Loads per: S702 10/10/2018

Loads Type: ASD

Steel Stress Increase: No

Takeup Device at Each Level: Yes

Elongation Limit Required: Yes

Elongation Limit per Connection: 0.200 (inch) between load reaction points.

Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.

Shrinkage: 0.250 inch per floor

Shearwall Plates Wood Species: DFL Douglas Fir-Larch

Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)

Compression Post Wood Species: DFL Douglas Fir-Larch

Compression Post Wood Capacity (Parallel to Grain): 1350 psi

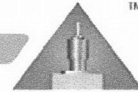
Compression Post Design: per AutoTight

Compression Post Species: per Structural Plans S001

Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 106, Allowable load = 20.03 kips, Total load = 19.86 kips, D/C = 99.1% .

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID #	18-1789		
Run Name:	EW6					Tensile Strength			Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	29.81 (kips)	AT16A-2		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		2.07"	0.50"	24.2%	-
Tension Load:	29.81 (kips)	AT16A-2		Shrinkage Device (2" I.D.) - Allowable Load		39.45	29.81	75.6%	-
Compression:	47.32 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.008
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.001
Plate Height:	11.95 (ft.)	L33-1-1/2"		Bearing Plate at Reaction Point		33.18	29.81	89.9%	0.036
Floor Depth:	12.63 (in.)	R12A307		1 1/2"-A307 Tension Rod		39.76	29.81	75.0%	0.056
Limiting Component Tension Load Capacity, Load and D/C Ratio						33.18	29.81	89.9%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	50.5%	0.101
Compression	Outer			Inner					
Wood	Posts	(2) 2x6	(8) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	51.56	47.32	91.8%	-
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	18.23 (kips)	AT16A-2		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		2.07"	0.25"	12.1%	-
Tension Load:	48.04 (kips)	AT16A-2		Shrinkage Device (2" I.D.) - Allowable Load		39.45	18.23	46.2%	-
Compression:	70.14 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.005
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.001
Plate Height:	11.95 (ft.)	L20-2"		Bearing Plate at Reaction Point		18.54	18.23	98.3%	0.039
Floor Depth:	12.63 (in.)	R14A307		1 3/4"-A307 Tension Rod		54.12	48.04	88.8%	0.144
Limiting Component Tension Load Capacity, Load and D/C Ratio						18.54	18.23	98.3%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	94.5%	0.189
Compression	Outer			Inner					
Wood	Posts	(2) 2x6	(12) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	72.18	70.14	97.2%	-
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	48.04 (kips)	R10G105		1 1/4"-G105 Anchor Rod		57.52	48.04	83.5%	n/a

Design Code: OSSC_2014 Main/State/Local

Loads per: S702 10/10/2018

Loads Type: ASD

Steel Stress Increase: No

Takeup Device at Each Level: Yes

Elongation Limit Required: Yes

Elongation Limit per Connection: 0.200 (inch) between load reaction points.

Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.

Shrinkage: 0.250 inch per floor

Shearwall Plates Wood Species: DFL Douglas Fir-Larch

Compression Post Wood Species: DFL Douglas Fir-Larch

Compression Post Design: per AutoTight

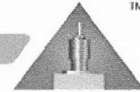
Compression Post Species: per Structural Plans S001

Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 158, Allowable load = 29.86 kips, Total load = 29.81 kips, D/C = 99.8% .

Take Off Revision: 4 Eng

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID #	18-1789
Run Name:	EW6.5					Tensile Strength	Calc'd
Run Specifications	Component			Description	Capacity	Demand	D/C Ratio
Required Loads:	Commins AutoTight				(kips)	(kips)	(in.)
Level = Level 3	Component			Description	Capacity	Demand	D/C
Differential Load:	22.44 (kips)	AT10A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.50"	30.7%
Tension Load:	22.44 (kips)	AT10A-1.5		Shrinkage Device (1-1/4" I.D.) - Allowable Load	28.07	22.44	80.0%
Compression:	25.75 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-
Plate Height:	11.95 (ft.)	L25-1-1/4"		Bearing Plate at Reaction Point	24.94	22.44	90.0%
Floor Depth:	12.63 (in.)	R10A307		1 1/4"-A307 Tension Rod	27.61	22.44	81.3%
				Limiting Component Tension Load Capacity, Load and D/C Ratio	24.94	22.44	90.0%
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	0.200	-	53.5%
Compression	Outer		Inner				
Wood	Posts (2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	25.75	99.9%
Level = Level 2	Component			Description	Capacity	Demand	D/C
Differential Load:	12.55 (kips)	AT12A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.25"	15.3%
Tension Load:	34.99 (kips)	AT12A-1.5		Shrinkage Device (1-1/2" I.D.) - Allowable Load	28.07	12.55	44.7%
Compression:	39.12 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-
Plate Height:	11.95 (ft.)	L18-1-1/2"		Bearing Plate at Reaction Point	18.92	12.55	66.3%
Floor Depth:	12.63 (in.)	R12A307		1 1/2"-A307 Tension Rod	39.76	34.99	88.0%
				Limiting Component Tension Load Capacity, Load and D/C Ratio	39.76	34.99	88.0%
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	0.200	-	88.5%
Compression	Outer		Inner				
Wood	Posts (2) 2x6	(6) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	41.25	39.12	94.8%
Level = Footing	Component			Description	Capacity	Demand	D/C
Tension Load:	34.99 (kips)	R9G105		1 1/8"-G105 Anchor Rod	46.59	34.99	75.1%

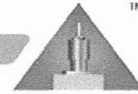
Design Code: OSSC_2014 Main/State/Local
 Loads per: S702 10/10/2018
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch
 Compression Post Wood Species: DFL Douglas Fir-Larch
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 120, Allowable load = 22.68 kips, Total load = 22.44 kips, D/C = 98.9% .

Take Off Revision: 4 Eng

Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Capacity (Parallel to Grain): 1350 psi

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #					CAT ID #	18-1789	
Run Name:	NSB1				Tensile Strength		Calc'd
Run Specifications	Component			Description	Capacity (kips)	Demand (kips)	D/C Ratio
Required Loads:	Commins AutoTight						Elong. (in.)
Level = Level 3	Component			Description	Capacity	Demand	D/C
Differential Load:	23.23 (kips)	AT10A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.50"	30.7%
Tension Load:	23.23 (kips)	AT10A-1.5		Shrinkage Device (1-1/4" I.D.) - Allowable Load	28.07	23.23	82.8%
Compression:	26.48 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-
Plate Height:	11.95 (ft.)	L25-1-1/4"		Bearing Plate at Reaction Point	24.94	23.23	93.2%
Floor Depth:	12.63 (in.)	R10A307		1 1/4"-A307 Tension Rod	27.61	23.23	84.1%
Limiting Component Tension Load Capacity, Load and D/C Ratio					24.94	23.23	93.2%
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	55.0%
Compression Wood	Outer Posts (2) 2x6	(4) 2x6	Inner Posts	6x Wall Compression Post per Comp Post Calc Sheet	30.94	26.48	85.6%
Level = Level 2	Component			Description	Capacity	Demand	D/C
Differential Load:	12.94 (kips)	AT12A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.25"	15.3%
Tension Load:	36.17 (kips)	AT12A-1.5		Shrinkage Device (1-1/2" I.D.) - Allowable Load	28.07	12.94	46.1%
Compression:	40.23 (kips)	-		Shrinkage Device - Deflection at Load	-	-	-
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-
Plate Height:	11.95 (ft.)	L18-1-1/2"		Bearing Plate at Reaction Point	18.92	12.94	68.4%
Floor Depth:	12.63 (in.)	R12A307		1 1/2"-A307 Tension Rod	39.76	36.17	91.0%
Limiting Component Tension Load Capacity, Load and D/C Ratio					39.76	36.17	91.0%
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	91.5%
Compression Wood	Outer Posts (2) 2x6	(6) 2x6	Inner Posts	6x Wall Compression Post per Comp Post Calc Sheet	41.25	40.23	97.5%
Level = Footing	Component			Description	Capacity	Demand	D/C
Tension Load:	36.17 (kips)	R9G105		1 1/8"-G105 Anchor Rod	46.59	36.17	77.6%

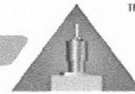
Design Code: OSSC_2014 Main/State/Local
 Loads per: S702 10/10/2018
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch
 Compression Post Wood Species: DFL Douglas Fir-Larch
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 124, Allowable load = 23.44 kips, Total load = 23.23 kips, D/C = 99.1% .

Take Off Revision: 4 Eng

Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Capacity (Parallel to Grain): 1350 psi

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID # 18-1789			
Run Name:		NSC1				Tensile Strength			Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	22.38 (kips)	AT10A-1.5		Shrinkage at Level. Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.50"	30.7%	-
Tension Load:	22.38 (kips)	AT10A-1.5		Shrinkage Device (1-1/4" I.D.) - Allowable Load		28.07	22.38	79.7%	-
Compression:	23.99 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.016
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	11.95 (ft.)	L25-1-1/4"		Bearing Plate at Reaction Point		24.94	22.38	89.8%	0.036
Floor Depth:	12.63 (in.)	R10A307		1 1/4"-A307 Tension Rod		27.61	22.38	81.1%	0.054
Limiting Component Tension Load Capacity, Load and D/C Ratio						24.94	22.38	89.8%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	53.0%	0.106
Compression	Outer			Inner					
Wood	Posts	(2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	23.99	93.1%	-
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	12.06 (kips)	AT12A-1.5		Shrinkage at Level. Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.25"	15.3%	-
Tension Load:	34.44 (kips)	AT12A-1.5		Shrinkage Device (1-1/2" I.D.) - Allowable Load		28.07	12.06	43.0%	-
Compression:	36.46 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.009
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	11.95 (ft.)	L18-1-1/2"		Bearing Plate at Reaction Point		18.92	12.06	63.8%	0.026
Floor Depth:	12.63 (in.)	R12A307		1 1/2"-A307 Tension Rod		39.76	34.44	86.6%	0.139
Limiting Component Tension Load Capacity, Load and D/C Ratio						39.76	34.44	86.6%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	86.5%	0.173
Compression	Outer			Inner					
Wood	Posts	(2) 2x6	(6) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	41.25	36.46	88.4%	-
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	34.44 (kips)	R9G105		1 1/8"-G105 Anchor Rod		46.59	34.44	73.9%	n/a

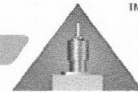
Design Code: OSSC_2014 Main/State/Local
 Loads per: S702 10/10/2018
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch
 Compression Post Wood Species: DFL Douglas Fir-Larch
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 120, Allowable load = 22.68 kips, Total load = 22.38 kips, D/C = 98.7% .

Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Capacity (Parallel to Grain): 1350 psi

Take Off Revision: 4 Eng

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #					CAT ID # 18-1789				
Run Name:		NSC2		Tensile Strength					Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	20.42 (kips)	AT10A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.50"	30.7%	-	
Tension Load:	20.42 (kips)	AT10A-1.5	Shrinkage Device (1-1/4" I.D.) - Allowable Load		28.07	20.42	72.8%	-	
Compression:	22.99 (kips)	-	Shrinkage Device - Deflection at Load		-	-	-	0.014	
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000	
Plate Height:	11.95 (ft.)	L21-1-1/4"	Bearing Plate at Reaction Point		21.03	20.42	97.1%	0.039	
Floor Depth:	12.63 (in.)	R9A307	1 1/8"-A307 Tension Rod		22.37	20.42	91.3%	0.056	
Limiting Component Tension Load Capacity, Load and D/C Ratio					21.03	20.42	97.1%	-	
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	54.5%	0.109	
Compression	Outer		Inner						
Wood	Posts (2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	22.99	89.2%	-	
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	11.30 (kips)	AT12A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.25"	15.3%	-	
Tension Load:	31.72 (kips)	AT12A-1.5	Shrinkage Device (1-1/2" I.D.) - Allowable Load		28.07	11.30	40.3%	-	
Compression:	34.94 (kips)	-	Shrinkage Device - Deflection at Load		-	-	-	0.008	
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000	
Plate Height:	11.95 (ft.)	L18-1-1/2"	Bearing Plate at Reaction Point		18.92	11.30	59.7%	0.024	
Floor Depth:	12.63 (in.)	R12A307	1 1/2"-A307 Tension Rod		39.76	31.72	79.8%	0.121	
Limiting Component Tension Load Capacity, Load and D/C Ratio					39.76	31.72	79.8%	-	
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	76.5%	0.153	
Compression	Outer		Inner						
Wood	Posts (2) 2x6	(5) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	36.09	34.94	96.8%	-	
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	31.72 (kips)	R12A307	1 1/2"-A307 Anchor Rod		39.76	31.72	79.8%	n/a	

Design Code: OSSC_2014 Main/State/Local

Loads per: S702 10/10/2018

Loads Type: ASD

Steel Stress Increase: No

Takeup Device at Each Level: Yes

Elongation Limit Required: Yes

Elongation Limit per Connection: 0.200 (inch) between load reaction points.

Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.

Shrinkage: 0.250 inch per floor

Shearwall Plates Wood Species: DFL Douglas Fir-Larch

Compression Post Wood Species: DFL Douglas Fir-Larch

Compression Post Design: per AutoTight

Compression Post Species: per Structural Plans S001

Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 110, Allowable load = 20.79 kips, Total load = 20.42 kips, D/C = 98.2% .

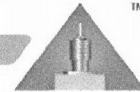
Take Off Revision: 4 Eng

Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)

Compression Post Wood Capacity (Parallel to Grain): 1350 psi

AutoTight[®] Holdown System

www.comminsmfg.com



AutoTight[®] System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

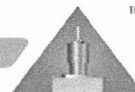
Permit #				CAT ID #	18-1789		
Run Name:	NSD			Tensile Strength		Calc'd	
Run Specifications		Component	Description	Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:		Commins AutoTight					
Level = Level 2		Component	Description	Capacity	Demand	D/C	Elong.
Differential Load:	26.23 (kips)	AT10A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.25"	15.3%	-
Tension Load:	26.23 (kips)	AT10A-1.5	Shrinkage Device (1-1/4" I.D.) - Allowable Load	28.07	26.23	93.5%	-
Compression:	30.43 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-	0.019
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	11.95 (ft.)	L28-1-1/4"	Bearing Plate at Reaction Point	27.28	26.23	96.2%	0.038
Floor Depth:	12.63 (in.)	R10A307	1 1/4"-A307 Tension Rod	27.61	26.23	95.0%	0.073
Limiting Component Tension Load Capacity, Load and D/C Ratio				27.28	26.23	96.2%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation				0.200	-	65.0%	0.130
Compression Wood	Outer Posts (2) 2x6	Inner Posts (4) 2x6	6x Wall Compression Post per Comp Post Calc Sheet	30.94	30.43	98.4%	-
Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	26.23 (kips)	R9G105	1 1/8"-G105 Anchor Rod	46.59	26.23	56.3%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: S702 10/10/2018
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 140, Allowable load = 26.46 kips, Total load = 26.23 kips, D/C = 99.1% .

Take Off Revision: 4 Eng

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm

Plan Set: Plan Check 2

Plan Set Date: 03/23/2018

Permit #					CAT ID #	18-1789
Run Name:	NSE				Tensile Strength	
Run Specifications	Component	Description		Capacity	Demand	D/C
Required Loads:	Commins AutoTight			(kips)	(kips)	Ratio
Level = Level 3	Component	Description		Capacity	Demand	D/C
Differential Load:	27.20 (kips)	AT10A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.50"	30.7%
Tension Load:	27.20 (kips)	AT10A-1.5	Shrinkage Device (1-1/4" I.D.) - Allowable Load	28.07	27.20	96.9%
Compression:	56.01 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-
Plate Height:	11.95 (ft.)	L28-1-1/4"	Bearing Plate at Reaction Point	27.28	27.20	99.7%
Floor Depth:	12.63 (in.)	R10A307	1 1/4"-A307 Tension Rod	27.61	27.20	98.5%
Limiting Component Tension Load Capacity, Load and D/C Ratio				27.28	27.20	99.7%
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation				0.200	-	61.0%
Compression	Outer	Inner				
Wood	Posts	(2) 2x6	(9) 2x6	6x Wall Compression Post per Comp Post Calc Sheet	56.72	56.01
					98.7%	-
Level = Level 2	Component	Description		Capacity	Demand	D/C
Differential Load:	17.37 (kips)	AT16A-2	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	2.07"	0.25"	12.1%
Tension Load:	44.57 (kips)	AT16A-2	Shrinkage Device (2" I.D.) - Allowable Load	39.45	17.37	44.0%
Compression:	80.97 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-
Plate Height:	11.95 (ft.)	L18-2"	Bearing Plate at Reaction Point	17.96	17.37	96.7%
Floor Depth:	12.63 (in.)	R14A307	1 3/4"-A307 Tension Rod	54.12	44.57	82.4%
Limiting Component Tension Load Capacity, Load and D/C Ratio				17.96	17.37	96.7%
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation				0.200	-	85.0%
Compression	Outer	Inner				
Wood	Posts	(2) 2x6	(14) 2x6	6x Wall Compression Post per Comp Post Calc Sheet	82.50	80.97
					98.1%	-
Level = Footing	Component	Description		Capacity	Demand	D/C
Tension Load:	44.57 (kips)	R14A307	1 3/4"-A307 Anchor Rod	54.12	44.57	82.4%
					n/a	

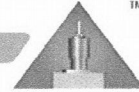
Design Code: OSSC_2014 Main/State/Local
 Loads per: S702 10/10/2018
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch
 Compression Post Wood Species: DFL Douglas Fir-Larch
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 144, Allowable load = 27.22 kips, Total load = 27.20 kips, D/C = 99.9% .

Take Off Revision: 4 Eng

Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Capacity (Parallel to Grain): 1350 psi

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 1

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #					CAT ID #		18-1789		
Run Name:		NSC.3		Tensile Strength			Calc'd		
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:		14.55 (kips)	AT8A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.75"	0.25"	14.3%	-
Tension Load:		14.55 (kips)	AT8A-1.5	Shrinkage Device (1" I.D.) - Allowable Load		20.73	14.55	70.2%	-
Compression:		21.10 (kips)	-	Shrinkage Device - Deflection at Load		-	-	-	0.003
Story Height:		13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:		11.95 (ft.)	L18-1-1/4"	Bearing Plate at Reaction Point		19.29	14.55	75.4%	0.030
Floor Depth:		12.63 (in.)	R8A307	1"-A307 Tension Rod		17.67	14.55	82.3%	0.053
Limiting Component Tension Load Capacity, Load and D/C Ratio						17.67	14.55	82.3%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	43.5%	0.087
Compression Wood		Outer Posts (2) 2x6	(3) 2x6	Inner Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	21.10	81.8%	-
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:		14.55 (kips)	R8A307	1"-A307 Anchor Rod		17.67	14.55	82.3%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: S702 10/10/2018
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 78, Allowable load = 14.74 kips, Total load = 14.55 kips, D/C = 98.7% .

Take Off Revision: 4 Eng



AutoTight® Mid Wall Termination Header Design Calculations for:

Tree Farm

Take Off Revision: 4 Eng

Calcs Revision: 1

Plan Set: Plan Check 2

Plan Date: 03/23/2018

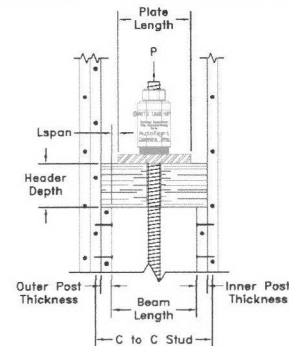
CAT Project ID: 18-1789

Code:OSSC_2014 Main/State/Local (2005 NDS)

C to C Stud	Bay Width/2	Outer Post Thickness	Inner Post Thickness	Beam Length	Bearing Plate Length, L	Bearing Plate L / 2 (in)	L-span	Term Header Species	Header Min Size	Header Width	Header Depth	Applied Load Compression P (lbs)	Allowable Capacity psi DFL	section modulus Z	Allowable Capacity (lb)	Demand/ Capacity Ratio D/C	Wall Thickness
(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)		(Nominal)	(in)	(in)						
Run: EW2ab L21-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	7.50	7.00	7.00	3.50	0.00	DFL	4x6	5.50	3.50	19,860	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	7.00	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	7.50	Bearing Area per end =		57.75	5.50		19,860	625	Comp.	36,094	55.0%	6x Wall	
Run: EW6 L33-1-1/2" = Bearing Plate Name																	
16.00	7.25	3.00	12.00	7.00	10.00	5.00	-1.50	DFL	4x6	5.50	3.50	29,810	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	10.00	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	12.00	Bearing Area per end =		82.50	5.50		29,810	625	Comp.	51,563	57.8%	6x Wall	
Run: EW6.5 L25-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	4.50	7.00	7.50	3.75	-0.25	DFL	4x6	5.50	3.50	22,440	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	7.50	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	4.50	Bearing Area per end =		41.25	5.50		22,440	625	Comp.	25,781	87.0%	6x Wall	
Run: NSB1 L25-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	6.00	7.00	7.50	3.75	-0.25	DFL	4x6	5.50	3.50	23,230	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	7.50	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	6.00	Bearing Area per end =		49.50	5.50		23,230	625	Comp.	30,938	75.1%	6x Wall	
Run: NSC1 L25-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	4.50	7.00	7.50	3.75	-0.25	DFL	4x6	5.50	3.50	22,380	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	7.50	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	4.50	Bearing Area per end =		41.25	5.50		22,380	625	Comp.	25,781	86.8%	6x Wall	
Run: NSC2 L21-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	4.50	7.00	7.00	3.50	0.00	DFL	4x6	5.50	3.50	20,420	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	7.00	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	4.50	Bearing Area per end =		41.25	5.50		20,420	625	Comp.	25,781	79.2%	6x Wall	
Run: NSD L28-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	6.00	7.00	9.00	4.50	-1.00	DFL	4x6	5.50	3.50	26,230	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	9.00	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	6.00	Bearing Area per end =		49.50	5.50		26,230	625	Comp.	30,938	84.8%	6x Wall	
Run: NSE L28-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	13.50	7.00	9.00	4.50	-1.00	DFL	4x6	5.50	3.50	27,200	625	11.23	NA>Shear	NA>Shear	6x Wall
Bending above:																	
Shear:				7.00	9.00	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	13.50	Bearing Area per end =		90.75	5.50		27,200	625	Comp.	56,719	48.0%	6x Wall	
Run: NSC.3 L18-1-1/4" = Bearing Plate Name																	
16.00	7.25	3.00	4.50	7.00	5.50	2.75	0.75	DFL	4x6	5.50	3.50	14,550	625	11.23	18,715	77.7%	6x Wall
Bending above:																	
Shear:				7.00	5.50	Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall	
Compression:				3.00	4.50	Bearing Area per end =		41.25	5.50		14,550	625	Comp.	25,781	56.4%	6x Wall	

Header Design Notes:

- Bearing Plate spreads load.
- Point Load (P) location transfer of combined termination tension.
- Beam supported at both ends 2 equal symmetrical loads max stress= $W \cdot a / Z$ where $a = L_{span} \& W = P/2$ & Z =section modulus of beam
- Shear calculated per NDS 2005 eqn 3.4-2 & sec 3.4.3 which says:
"...uniformly distributed loads within a distance from supports equal to the depth of the bending member, d, shall be permitted to be ignored."
 $f_v = 3 \cdot V / 2 \cdot b \cdot d$ where f_v =actual stress=species capacity, V =shear load=allowable, b =breadth, d =depth
- When the plate overlaps the post or gets too close to the post the beam equation does not apply, see shear instead.



Compression Post Schedule 6x Wall

Tree Farm

18-1789

Level Name	Run Name	EW2ab		EW6		EW6.5		NSB1		NSC1		NSC2		NSD		NSE		NSC.3	
		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall	
Level 3	Post Location	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner
	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6			2x6	2x6		
Level 3	Post Qty	2	5	2	8	2	3	2	4	2	3	2	3			2	9		
	Post Length inches	54.00		54.00		54.00		54.00		54.00		54.00				54.00			
	Required Load kips	33.08		47.32		25.75		26.48		23.99		22.99				56.01			
	Allowable Load kips	36.09		51.56		25.78		30.94		25.78		25.78				56.72			
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing				Crushing			
Level 2	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
	Post Qty	2	8	2	12	2	6	2	6	2	6	2	5	2	4	2	14	2	3
	Post Length inches	137.88		137.88		137.88		137.88		137.88		137.88		54.00		137.88		54.00	
	Required Load kips	50.26		70.14		39.12		40.23		36.46		34.94		30.43		80.97		21.10	
	Allowable Load kips	51.56		72.18		41.25		41.25		41.25		36.09		30.94		82.50		25.78	
Level 2	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	

Notes:

- Posts may be arranged as desired by the builder as long as:
 - The total post quantity is the same as or greater than the quantity listed here.
 - And there is at least 1 post on each side of each rod.
 - Compression post lengths shown in schedule are for calculation purposes only.
- Framer is responsible for actual post lengths.
- These Posts are in addition to post counts on Plans.
- Sill Plates are Douglas Fir-Larch Grade #2 or better.
- Compression Posts are Douglas Fir-Larch Grade #2 or better.

Office: 360-378-9484

Fax: 360-378-9485

AutoTight® Holdown Systems

by Commins Manufacturing



Structural • Civil Engineers

Submittal Transmittal

To: Guerrilla Development
2500 NE Sandy Blvd, Suite C
Portland, OR 97232
Attn: Kevin Cavanaugh
cc: Ben Carr, BSA

From: Brynn Adkins
Date: August 6, 2018
Job Name: Tree Farm
Job No.: 17001.40
File: 17001 trans submit take up 2.docx

Attached are 1 copies of shop drawings as follows:

Submittal No.: 03
Submitted item: Auto Tight Tie Down
Fabricator / Manufacturer: Commings Manufacturing, Inc.
Date received: 08/06/2018

Reviewed as checked below:

☒ Reviewed as noted ☐ Contains items not reviewed
☐ Revise & resubmit ☐ Submit add'l/specified items

Sheet numbers reviewed: ATS10, ATS11 Sh1, ATS11 Sh2, ATS12, RL-1, Calcs

Returned via: ☒ E-mail 40 pages incl. trans ☐ Messenger ☐ Mail ☐ Express Delivery

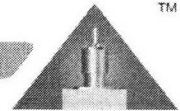
Remarks:

☒ No Exception Taken ☐ Make Corrections Noted
☐ Submit Additional/ Specified Items ☐ Revise and Resubmit

Checking by WDY is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. The general contractor is responsible for: Dimensions which shall be confirmed at the jobsite; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

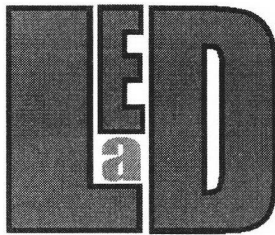
WDY, Inc.

Date: 08-06-2018
By: Brynn Adkins



AutoTight® Rod Holdown System

System Design for
Tree Farm



LYVER ENGINEERING AND DESIGN

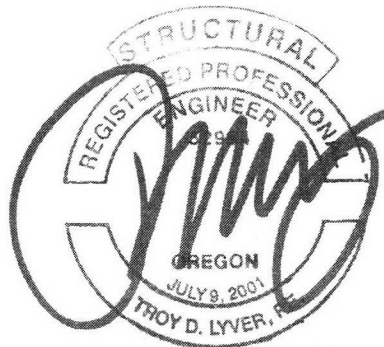
7950 SE 106th, Portland, Oregon 97266

Ph: 503.705.5283

Fax: 503.482.7449

TroyL@Lyver-EAD.com

www.Lyver-EAD.com



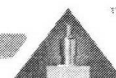
Prepared for
ProTeck

prepared by Tom Boydston
Commins Project ID # 18-1789

Includes ICC ES 1344 Code Report,
http://www.icc-es.org/reports/pdf_files/ICC-ES/ESR-1344.pdf#view=fit
and applicable catalog pages.

Engineering Calculations Revision: 0 AutoDesign Revision: 2 Eng

Calcs Date 06/13/2018



(1) Key to Calculation Table

THIS PAGE SAMPLE RUN ONLY

 AutoTight® System Run Design Calc. Sheet for:
 Engineering Calcs Revision: 1

 (2) Project Name
 Plan Set: BID SET Plan Set Date: mm/dd/yyyy

Project Number: (6)	(3)	(4)	CAT ID # ##-####
Run Name: 1	Run Qty: 4		Tensile Strength Calc'd

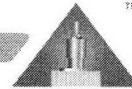
Run Specifications	Component	Description	Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:	Commins AutoTight					
Level = 2	Component	Description	Capacity	Demand	D/C	Elong.
Differential Load: 4.00 (kips)	AT 125	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.10	0.50	45.5%	-
Tension Load: 20.00 (kips)	AT 125	Shrinkage Device (1-1/4" I.D.) - Allowable Load	34.50	4.00	11.6%	-
Compression: 20.00 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-	0.002
Story Height: 12.50 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.002
Plate Height: 11.33 (ft.)	S8L	Bearing Plate at Reaction Point	7.96	4.00	50.2%	0.020
Floor Depth: 14.00 (in.)	R9	1-1/8"-A307 Tension Rod	22.37	20.00	89.4%	0.125
	-	No Stretch Rod	#N/A	20.00	0.0%	n/a
	-	Wood Beam Start Bearing Plate	n/a	n/a	0.0%	n/a
	-	Steel Beam Start in Tension	n/a	n/a	0.0%	n/a
Limiting Component Tension Load Capacity, Load and D/C Ratio			22.37	20.00	89.4%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation			0.200	-	74.5%	0.149
Compression	Outer (1) 4x8	Inner 4x Wall Post per Side of Rod-Enter by Hand as Needed	32.08	20.00	62.3%	-
Wood	Posts (3) 2x6	6x Wall Post per Side of Rod-Enter by Hand as Needed	30.93	20.00	64.7%	-
Level = Footing	Component	Description	Capacity	Demand	D/C	Elong.
Tension Load: 20.00 (kips)	R9	1-1/8"-A307 Anchor Rod	22.37	20.00	89.4%	n/a

Notes:

- (1) All these cells are filled with data from the AutoTight Run Designer spreadsheet's Project Info page and Load Justification Table page.
- (2) The Builder's Name of the project.
- (3) The revision level of the plan set.
- (4) The Bid Date.
- (5) The Commins Mfg. project number.
- (6) The Builder's number for the project.
- (7) The name of this run.
- (8) Commins AutoTight part number.
- (9) The quantity of this type of run.
- (10) This column is the description of the component shown on each row
- (11) This column of the table is the Load Capacities of the various components.
- (12) This column of the table is the Load placed on the various components.
- (13) This column of the table is the Demand / Capacity ratio for each component.
- (14) This column is the contribution of each component to the total elongation for this level, and the total elongation for the level. Elongation numbers are in blue text.
- (15) The name of this level.
- (16) Differential Load applied by this level.
- (17) Total tension in rod at this level.
- (18) Compression load on the compression posts at this level.
- (19) Story Height carpet to carpet.
- (20) Top of Sill Plate to Top of Sill Plate height of this level.
- (21) Depth of floor beams.
- (22) This row compares the total shrinkage at this level with the capacity of the AT's to take up this shrinkage.
- (23) This row compares the load capacity of the AT device to the load applied to it. Per AC308 Sec. 1.4.5
- (24) This row shows the deflection of the AT device(s) under the applied load. Per AC308 Sec. 1.4.8
- (25) This row shows the ΔR=Travel and Seating increment of the AT Device(s). Per AC308 Sec. 1.4.7
- (26) This row shows Bearing Plate Load Capacity and compares to its Load also its deflection's contribution to the total Elongation. (unless the calcs call for rod stretch only.) (It sees only the differential load.) Per AF&PA NDS Tbl 4A, 4B incl Cf factor.
- (27) This row shows Tension Rod Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. Per AISC 360-05
- (28) This row shows Stretch Rod Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. Only if Stretch Rod is used.
- (29) This row shows the Wood Beam Start's Bearing Plate Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. (Only if a Wood Beam Start is used.) (It sees the tension load.) Per AF&PA-NDS Tbl 4A, 4B incl Cf factor.
- (30) This row shows the Steel Beam Start's Load Capacity and compares to its Load, also its deflection's contribution to the total Elongation. (Only if a Steel Beam Start is used.) (It sees the tension load.) The rod seats on the steel beam and the weld cross section is greater than the rod cross section so the Steel Beam Start elongation is included in rod elongation. Per ICC ES-1344 & 5889
- (31) This row shows worst case component's Load and compares to its Load Capacity.
- (32) This row shows the maximum allowed Elongation and the total Elongation calculated for this level.
- (33) This row shows the inner and outer compression post required, their load capacities and loads if the wall is 4x. It is used only if Commins Mfg specifies the Compression Posts and is filled in manually. If line is not shown posting is per structural drawing.
- (34) This row shows the inner and outer compression post required, their load capacities and loads if the wall is 6x. It is used only if Commins Mfg specifies the Compression Posts and is filled in manually. If line is not shown posting is per structural drawing.
- (35) This row shows the load capacity of the Anchor Rod embedded in the concrete and compares to its load, if used. (Not the concrete strength)
- (36) Anchor bolt elongation is included in the length of the tension rods.
- (37) Nuts, Coupler Nuts and Reducing Coupler Nuts are not listed individually because they are grade compatible with the Tension Rod.
- (38) Nuts, Coupler Nuts and Reducing Coupler Nuts calculated contribution to elongation is 0.0005 inch or less.
- (39) Revision level of this document

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID #		18-1789	
Run Name:		EW2ab				Tensile Strength		Calc'd	
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	20.30 (kips)	AT10A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.50"	30.7%	-
Tension Load:	20.30 (kips)	AT10A-1.5		Shrinkage Device (1-1/4" I.D.) - Allowable Load		28.07	20.30	72.3%	-
Compression:	33.80 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.014
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	13.00 (ft.)	L21-1-1/4"		Bearing Plate at Reaction Point		21.03	20.30	96.5%	0.039
		R9A307		1 1/8"-A307 Tension Rod		22.37	20.30	90.7%	0.057
Limiting Component Tension Load Capacity, Load and D/C Ratio						21.03	20.30	96.5%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	55.0%	0.110
Compression	Outer	(2) 2x4	(9) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	36.09	33.80	93.7%	-
Wood	Posts	(2) 2x6	(5) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	36.09	33.80	93.7%	-

Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	14.21 (kips)	AT12A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.25"	15.3%	-
Tension Load:	34.51 (kips)	AT12A-1.5		Shrinkage Device (1-1/2" I.D.) - Allowable Load		28.07	14.21	50.6%	-
Compression:	51.52 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.010
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	11.95 (ft.)	L18-1-1/2"		Bearing Plate at Reaction Point		18.92	14.21	75.1%	0.030
Floor Depth:	12.63 (in.)	R12A307		1 1/2"-A307 Tension Rod		39.76	34.51	86.8%	0.132
Limiting Component Tension Load Capacity, Load and D/C Ratio						39.76	34.51	86.8%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	86.0%	0.172
Compression	Outer	(2) 2x4	(21) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	53.41	51.52	96.5%	-
Wood	Posts	(2) 2x6	(8) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	51.56	51.52	99.9%	-

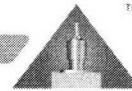
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	34.51 (kips)	R12A307		1 1/2"-A307 Anchor Rod		39.76	34.51	86.8%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 108, Allowable load = 20.41 kips, Total load = 20.30 kips, D/C = 99.5%.

Take Off Revision: 2 Eng

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm

Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID #		18-1789	
Run Name:		EW6				Tensile Strength		Calc'd	
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	30.83 (kips)	AT16A-2		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		2.07"	0.50"	24.2%	-
Tension Load:	30.83 (kips)	AT16A-2		Shrinkage Device (2" I.D.) - Allowable Load		39.45	30.83	78.1%	-
Compression:	48.54 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.008
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.001
Plate Height:	13.00 (ft.)	L33-1-1/2"		Bearing Plate at Reaction Point		33.18	30.83	92.9%	0.037
		R12A307		1 1/2"-A307 Tension Rod		39.76	30.83	77.5%	0.059
Limiting Component Tension Load Capacity, Load and D/C Ratio						33.18	30.83	92.9%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	52.5%	0.105
Compression	Outer	(2) 2x4	(13) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	49.22	48.54	98.6%	-
Wood	Posts	(2) 2x6	(8) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	51.56	48.54	94.1%	-

Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	18.71 (kips)	AT16A-2		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		2.07"	0.25"	12.1%	-
Tension Load:	49.54 (kips)	AT16A-2		Shrinkage Device (2" I.D.) - Allowable Load		39.45	18.71	47.4%	-
Compression:	72.18 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-	0.005
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.001
Plate Height:	11.95 (ft.)	L25-2"		Bearing Plate at Reaction Point		23.69	18.71	79.0%	0.032
Floor Depth:	12.63 (in.)	R14A307		1 3/4"-A307 Tension Rod		54.12	49.54	91.5%	0.140
Limiting Component Tension Load Capacity, Load and D/C Ratio						54.12	49.54	91.5%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	88.5%	0.177
Compression	Outer	(2) 2x4	(30) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	74.30	72.18	97.1%	-
Wood	Posts	(2) 2x6	(12) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	72.18	72.18	100.0%	-

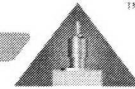
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	49.54 (kips)	R14A307		1 3/4"-A307 Anchor Rod		54.12	49.54	91.5%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 164, Allowable load = 31.00 kips, Total load = 30.83 kips, D/C = 99.5% .

Take Off Revision: 2 Eng

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

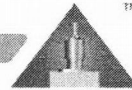
Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID # 18-1789			
Run Name: EW6.5						Tensile Strength			Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	23.16 (kips)	AT10A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.50"	30.7%	-	
Tension Load:	23.16 (kips)	AT10A-1.5	Shrinkage Device (1-1/4" I.D.) - Allowable Load		28.07	23.16	82.5%	-	
Compression:	26.57 (kips)	-	Shrinkage Device - Deflection at Load		-	-	-	0.016	
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000	
Plate Height:	13.00 (ft.)	L25-1-1/4"	Bearing Plate at Reaction Point		24.94	23.16	92.9%	0.037	
		R10A307	1 1/4"-A307 Tension Rod		27.61	23.16	83.9%	0.057	
Limiting Component Tension Load Capacity, Load and D/C Ratio					24.94	23.16	92.9%	-	
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	55.5%	0.111	
Compression	Outer (2) 2x4	(7) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		29.53	26.57	90.0%	-
Wood	Posts (2) 2x6	(4) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		30.94	26.57	85.9%	-
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	13.07 (kips)	AT12A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.25"	15.3%	-	
Tension Load:	36.23 (kips)	AT12A-1.5	Shrinkage Device (1-1/2" I.D.) - Allowable Load		28.07	13.07	46.6%	-	
Compression:	40.50 (kips)	-	Shrinkage Device - Deflection at Load		-	-	-	0.009	
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000	
Plate Height:	11.95 (ft.)	L18-1-1/2"	Bearing Plate at Reaction Point		18.92	13.07	69.1%	0.028	
Floor Depth:	12.63 (in.)	R12A307	1 1/2"-A307 Tension Rod		39.76	36.23	91.1%	0.139	
Limiting Component Tension Load Capacity, Load and D/C Ratio					39.76	36.23	91.1%	-	
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	88.0%	0.176	
Compression	Outer (2) 2x4	(16) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		41.80	40.50	96.9%	-
Wood	Posts (2) 2x6	(6) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		41.25	40.50	98.2%	-
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	36.23 (kips)	R12A307	1 1/2"-A307 Anchor Rod		39.76	36.23	91.1%	n/a	

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 124, Allowable load = 23.44 kips, Total load = 23.16 kips, D/C = 98.8% .

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

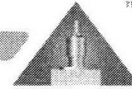
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Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 206, Allowable load = 38.93 kips, Total load = 38.82 kips, D/C = 99.7%.

Take Off Revision: 2 Eng

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

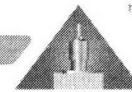
Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #				CAT ID #	18-1789		
Run Name:	NSB2			Tensile Strength			Calc'd
Run Specifications	Component			Capacity	Demand	D/C	Elong.
Required Loads:	Commins AutoTight			(kips)	(kips)	Ratio	(in.)
Level = Level 3	Component			Capacity	Demand	D/C	Elong.
Differential Load:	38.82 (kips)	AT16A-2	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	2.07"	0.50"	24.2%	-
Tension Load:	38.82 (kips)	AT16A-2	Shrinkage Device (2" I.D.) - Allowable Load	39.45	38.82	98.4%	-
Compression:	41.58 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-	0.010
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.001
Plate Height:	13.00 (ft.)	L40-1-1/2"	Bearing Plate at Reaction Point	40.05	38.82	96.9%	0.039
		R12A307	1 1/2"-A307 Tension Rod	39.76	38.82	97.6%	0.074
Limiting Component Tension Load Capacity, Load and D/C Ratio				39.45	38.82	98.4%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation				0.200	-	62.0%	0.124
Compression	Outer (2) 2x4	(11) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	42.65	41.58	97.5%
Wood	Posts (2) 2x6	(7) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	46.40	41.58	89.6%
Level = Level 2	Component			Capacity	Demand	D/C	Elong.
Differential Load:	13.49 (kips)	AT16A-2	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	2.07"	0.25"	12.1%	-
Tension Load:	52.31 (kips)	AT16A-2	Shrinkage Device (2" I.D.) - Allowable Load	39.45	13.49	34.2%	-
Compression:	55.91 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-	0.004
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.001
Plate Height:	11.95 (ft.)	L18-2"	Bearing Plate at Reaction Point	17.96	13.49	75.1%	0.030
Floor Depth:	12.63 (in.)	R14A307	1 3/4"-A307 Tension Rod	54.12	52.31	96.7%	0.148
Limiting Component Tension Load Capacity, Load and D/C Ratio				54.12	52.31	96.7%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation				0.200	-	91.0%	0.182
Compression	Outer (2) 2x4	(23) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	58.05	55.91	96.3%
Wood	Posts (2) 2x6	(9) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	56.72	55.91	98.6%
Level = Footing	Component			Capacity	Demand	D/C	Elong.
Tension Load:	52.31 (kips)	R14A307	1 3/4"-A307 Anchor Rod	54.12	52.31	96.7%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 206, Allowable load = 38.93 kips, Total load = 38.82 kips, D/C = 99.7% .

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

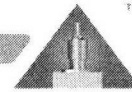
Permit #						CAT ID #		18-1789	
Run Name: NSC1						Tensile Strength			Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	25.13 (kips)	AT10A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)			1.63"	0.50"	30.7%	-
Tension Load:	25.13 (kips)	AT10A-1.5	Shrinkage Device (1-1/4" I.D.) - Allowable Load			28.07	25.13	89.5%	-
Compression:	26.95 (kips)	-	Shrinkage Device - Deflection at Load			-	-	-	0.018
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR			-	-	-	0.000
Plate Height:	13.00 (ft.)	L28-1-1/4"	Bearing Plate at Reaction Point			27.28	25.13	92.1%	0.037
		R10A307	1 1/4"-A307 Tension Rod			27.61	25.13	91.0%	0.062
Limiting Component Tension Load Capacity, Load and D/C Ratio						27.28	25.13	92.1%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	58.5%	0.117
Compression	Outer (2) 2x4	(7) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		29.53	26.95	91.3%	-
Wood	Posts (2) 2x6	(4) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		30.94	26.95	87.1%	-
Level = Level 2		Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	13.67 (kips)	AT12A-1.5	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)			1.63"	0.25"	15.3%	-
Tension Load:	38.80 (kips)	AT12A-1.5	Shrinkage Device (1-1/2" I.D.) - Allowable Load			28.07	13.67	48.7%	-
Compression:	41.07 (kips)	-	Shrinkage Device - Deflection at Load			-	-	-	0.010
Story Height:	13.00 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR			-	-	-	0.000
Plate Height:	11.95 (ft.)	L18-1-1/2"	Bearing Plate at Reaction Point			18.92	13.67	72.3%	0.029
Floor Depth:	12.63 (in.)	R12A307	1 1/2"-A307 Tension Rod			39.76	38.80	97.6%	0.149
Limiting Component Tension Load Capacity, Load and D/C Ratio						39.76	38.80	97.6%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	93.5%	0.187
Compression	Outer (2) 2x4	(16) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		41.80	41.07	98.3%	-
Wood	Posts (2) 2x6	(6) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		41.25	41.07	99.6%	-
Level = Footing		Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:	38.80 (kips)	R12A307	1 1/2"-A307 Anchor Rod			39.76	38.80	97.6%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 134, Allowable load = 25.33 kips, Total load = 25.13 kips, D/C = 99.2% .

Take Off Revision: 2 Eng

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

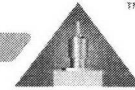
Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #					CAT ID #	18-1789		
Run Name:	NSC2				Tensile Strength			Calc'd
Run Specifications	Component				Capacity	Demand	D/C	Elong.
Required Loads:	Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3	Component				Capacity	Demand	D/C	Elong.
Differential Load: 21.80 (kips)	AT10A-1.5				Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.50"	30.7%
Tension Load: 21.80 (kips)	AT10A-1.5				Shrinkage Device (1-1/4" I.D.) - Allowable Load	28.07	21.80	77.7%
Compression: 24.55 (kips)	-				Shrinkage Device - Deflection at Load	-	-	0.015
Story Height: 13.00 (ft.)	-				Shrinkage Device - Travel and Seating Increment ΔR	-	-	0.000
Plate Height: 13.00 (ft.)	L25-1-1/4"				Bearing Plate at Reaction Point	24.94	21.80	87.4%
	R9A307				1 1/8"-A307 Tension Rod	22.37	21.80	97.5%
	Limiting Component Tension Load Capacity, Load and D/C Ratio					22.37	21.80	97.5%
	Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	56.0%
Compression	Outer (2) 2x4	(6) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	26.25	24.55	93.5%	-
Wood	Posts (2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	24.55	95.2%	-
Level = Level 2	Component				Capacity	Demand	D/C	Elong.
Differential Load: 12.19 (kips)	AT12A-1.5				Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	1.63"	0.25"	15.3%
Tension Load: 33.99 (kips)	AT12A-1.5				Shrinkage Device (1-1/2" I.D.) - Allowable Load	28.07	12.19	43.4%
Compression: 37.42 (kips)	-				Shrinkage Device - Deflection at Load	-	-	0.009
Story Height: 13.00 (ft.)	-				Shrinkage Device - Travel and Seating Increment ΔR	-	-	0.000
Plate Height: 11.95 (ft.)	L18-1-1/2"				Bearing Plate at Reaction Point	18.92	12.19	64.4%
Floor Depth: 12.63 (in.)	R12A307				1 1/2"-A307 Tension Rod	39.76	33.99	85.5%
	Limiting Component Tension Load Capacity, Load and D/C Ratio					39.76	33.99	85.5%
	Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation					0.200	-	82.5%
Compression	Outer (2) 2x4	(15) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	39.47	37.42	94.8%	-
Wood	Posts (2) 2x6	(6) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	41.25	37.42	90.7%	-
Level = Footing	Component				Capacity	Demand	D/C	Elong.
Tension Load: 33.99 (kips)	R12A307				1 1/2"-A307 Anchor Rod	39.76	33.99	85.5%
								n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 116, Allowable load = 21.92 kips, Total load = 21.80 kips, D/C = 99.4% .

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

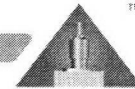
Permit #						CAT ID #	18-1789	
Run Name:	NSD					Tensile Strength		Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio
Level = Level 2		Component		Description		Capacity	Demand	D/C
Differential Load:	26.90 (kips)	AT10A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.63"	0.25"	15.3%
Tension Load:	26.90 (kips)	AT10A-1.5		Shrinkage Device (1-1/4" I.D.) - Allowable Load		28.07	26.90	95.8%
Compression:	31.19 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-
Plate Height:	11.95 (ft.)	L28-1-1/4"		Bearing Plate at Reaction Point		27.28	26.90	98.6%
Floor Depth:	12.63 (in.)	R10A307		1 1/4"-A307 Tension Rod		27.61	26.90	97.4%
Limiting Component Tension Load Capacity, Load and D/C Ratio						27.28	26.90	98.6%
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation						0.200	-	65.5%
Compression	Outer (2) 2x4	(8) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		32.81	31.19	95.1%
Wood	Posts (2) 2x6	(5) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		36.09	31.19	86.4%
Level = Footing		Component		Description		Capacity	Demand	D/C
Tension Load:	26.90 (kips)	R10A307		1 1/4"-A307 Anchor Rod		27.61	26.90	97.4%
								n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 144, Allowable load = 27.22 kips, Total load = 26.90 kips, D/C = 98.8% .

Take Off Revision: 2 Eng

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

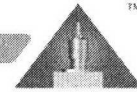
Permit #						CAT ID #		18-1789			
Run Name:		NSE				Tensile Strength		Calc'd			
Run Specifications				Component		Description		Capacity	Demand	D/C	Elong.
Required Loads:				Commins AutoTight				(kips)	(kips)	Ratio	(in.)
Level = Level 3				Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:		28.63 (kips)		AT16A-2		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		2.07"	0.50"	24.2%	-
Tension Load:		28.63 (kips)		AT16A-2		Shrinkage Device (2" I.D.) - Allowable Load		39.45	28.63	72.6%	-
Compression:		57.55 (kips)		-		Shrinkage Device - Deflection at Load		-	-	-	0.008
Story Height:		13.00 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.001
Plate Height:		13.00 (ft.)		L30-1-1/2"		Bearing Plate at Reaction Point		29.74	28.63	96.3%	0.039
				R12A307		1 1/2"-A307 Tension Rod		39.76	28.63	72.0%	0.055
Limiting Component Tension Load Capacity, Load and D/C Ratio								29.74	28.63	96.3%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation								0.200	-	50.5%	0.101
Compression		Outer	(2) 2x4	(16) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		59.06	57.55	97.4%	-
Wood		Posts	(2) 2x6	(10) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		61.87	57.55	93.0%	-
Level = Level 2				Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:		18.33 (kips)		AT16A-2		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		2.07"	0.25"	12.1%	-
Tension Load:		46.96 (kips)		AT16A-2		Shrinkage Device (2" I.D.) - Allowable Load		39.45	18.33	46.5%	-
Compression:		83.50 (kips)		-		Shrinkage Device - Deflection at Load		-	-	-	0.005
Story Height:		13.00 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.001
Plate Height:		11.95 (ft.)		L20-2"		Bearing Plate at Reaction Point		18.54	18.33	98.9%	0.040
Floor Depth:		12.63 (in.)		R14A307		1 3/4"-A307 Tension Rod		54.12	46.96	86.8%	0.133
Limiting Component Tension Load Capacity, Load and D/C Ratio								18.54	18.33	98.9%	-
Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation								0.200	-	89.0%	0.178
Compression		Outer	(2) 2x4	(34) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		83.59	83.50	99.9%	-
Wood		Posts	(2) 2x6	(15) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		87.65	83.50	95.3%	-
Level = Footing				Component		Description		Capacity	Demand	D/C	Elong.
Tension Load:		46.96 (kips)		R14A307		1 3/4"-A307 Anchor Rod		54.12	46.96	86.8%	n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stress Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 152, Allowable load = 28.73 kips, Total load = 28.63 kips, D/C = 99.7% .

Take Off Revision: 2 Eng

AutoTight® Holdown System

www.comminsmfg.com



AutoTight® System Run Design Calc. Sheet for:
Engineering Calcs Revision: 0

Tree Farm
Plan Set: Plan Check 2 Plan Set Date: 03/23/2018

Permit #						CAT ID #	18-1789	
Run Name:	NSC.3					Tensile Strength		Calc'd
Run Specifications		Component		Description		Capacity	Demand	D/C
Required Loads:		Commins AutoTight				(kips)	(kips)	Ratio
								(in.)
Level = Level 2		Component		Description		Capacity	Demand	D/C
								Elong.
Differential Load:	15.06 (kips)	AT8A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		1.75"	0.25"	14.3%
Tension Load:	15.06 (kips)	AT8A-1.5		Shrinkage Device (1" I.D.) - Allowable Load		20.73	15.06	72.7%
Compression:	21.80 (kips)	-		Shrinkage Device - Deflection at Load		-	-	-
Story Height:	13.00 (ft.)	-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-
Plate Height:	11.95 (ft.)	L18-1-1/4"		Bearing Plate at Reaction Point		19.29	15.06	78.1%
Floor Depth:	12.63 (in.)	R8A307		1"-A307 Tension Rod		17.67	15.06	85.2%
				Limiting Component Tension Load Capacity, Load and D/C Ratio		17.67	15.06	85.2%
				Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		0.200	-	45.0%
Compression	Outer (2) 2x4	(5) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		22.97	21.80	94.9%
Wood	Posts (2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		25.78	21.80	84.6%
Level = Footing		Component		Description		Capacity	Demand	D/C
								Elong.
Tension Load:	15.06 (kips)	R8A307		1"-A307 Anchor Rod		17.67	15.06	85.2%
								n/a

Design Code: OSSC_2014 Main/State/Local
 Loads per: Include Drawing Date
 Loads Type: ASD
 Steel Stess Increase: No
 Takeup Device at Each Level: Yes
 Elongation Limit Required: Yes
 Elongation Limit per Connection: 0.200 (inch) between load reaction points.
 Elongation Components: System Stretch Includes sum of: Rod, Bearing Plate, Shrinkage Device ΔA & Shrinkage Device ΔR.
 Shrinkage: 0.250 inch per floor
 Shearwall Plates Wood Species: DFL Douglas Fir-Larch Shearwall Plate Compression Capacity (Cross Grain): 625 psi (all grades)
 Compression Post Wood Species: DFL Douglas Fir-Larch Compression Post Wood Capacity (Parallel to Grain): 1350 psi
 Compression Post Design: per AutoTight
 Compression Post Species: per Structural Plans S001
 Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 80, Allowable load = 15.12 kips, Total load = 15.06 kips, D/C = 99.6% .

Take Off Revision: 2 Eng



AutoTight® Mid Wall Termination Header Design Calculations for:

Tree Farm

Take Off Revision: 2 Eng

Calcs Revision: 0

Plan Set: Plan Check 2

Plan Date: 03/23/2018

CAT Project ID: 18-1789

Code: OSSC_2014 Main/State/Local (2005 NDS)

C to C Stud (in)	Bay Width/2 (in)	Outer Post Thickness (in)	Inner Post Thickness (in)	Beam Length (in)	Bearing Plate Length, L (in)	Bearing Plate L / 2 (in)	L span (in)	Term Header Species	Header Min Size (Nominal)	Header Width (in)	Header Depth (in)	Applied Load Compression P (lbs)	Allowable Capacity psi DFL	section modulus Z	Allowable Capacity (lb)	Demand/ Capacity Ratio D/C	Wall Thickness
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Run: EW2ab				L21-1-1/4" = Bearing Plate Name													
16.00	7.25	3.00	7.50	7.00	7.00	3.50	0.00	DFL	4x6	5.50	3.50	20,300	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	13.50	7.00	7.00	3.50	0.00	DFL	4x4	3.50	3.50	20,300	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	7.00	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	7.00	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	7.50			Bearing Area per end =	57.75	5.50		20,300	625	Comp.	36,094	56.2%	6x Wall
Compression:	3.00	13.50			Bearing Area per end =	57.75	3.50		20,300	625	Comp.	36,094	56.2%	4x Wall

Run: EW6				L33-1-1/2" = Bearing Plate Name													
16.00	7.25	3.00	12.00	7.00	10.00	5.00	-1.50	DFL	4x6	5.50	3.50	30,830	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	19.50	7.00	10.00	5.00	-1.50	DFL	4x4	3.50	3.50	30,830	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	10.00	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	10.00	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	12.00			Bearing Area per end =	82.50	5.50		30,830	625	Comp.	51,563	59.8%	6x Wall
Compression:	3.00	19.50			Bearing Area per end =	78.75	3.50		30,830	625	Comp.	49,219	62.6%	4x Wall

Run: EW6.5				L25-1-1/4" = Bearing Plate Name													
16.00	7.25	3.00	6.00	7.00	7.50	3.75	-0.25	DFL	4x6	5.50	3.50	23,160	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	10.50	7.00	7.50	3.75	-0.25	DFL	4x4	3.50	3.50	23,160	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	7.50	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	7.50	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	6.00			Bearing Area per end =	49.50	5.50		23,160	625	Comp.	30,938	74.9%	6x Wall
Compression:	3.00	10.50			Bearing Area per end =	47.25	3.50		23,160	625	Comp.	29,531	78.4%	4x Wall

Run: NSB1				L40-1-1/2" = Bearing Plate Name													
16.00	7.25	3.00	9.00	7.00	12.00	6.00	-2.50	DFL	4x6	5.50	3.50	38,820	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	15.00	7.00	12.00	6.00	-2.50	DFL	4x4	3.50	3.50	38,820	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	12.00	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	12.00	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	9.00			Bearing Area per end =	66.00	5.50		38,820	625	Comp.	41,250	94.1%	6x Wall
Compression:	3.00	15.00			Bearing Area per end =	63.00	3.50		38,820	625	Comp.	39,375	98.6%	4x Wall

Run: NSB2				L40-1-1/2" = Bearing Plate Name													
16.00	7.25	3.00	10.50	7.00	12.00	6.00	-2.50	DFL	4x6	5.50	3.50	38,820	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	16.50	7.00	12.00	6.00	-2.50	DFL	4x4	3.50	3.50	38,820	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	12.00	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	12.00	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	10.50			Bearing Area per end =	74.25	5.50		38,820	625	Comp.	46,406	83.7%	6x Wall
Compression:	3.00	16.50			Bearing Area per end =	68.25	3.50		38,820	625	Comp.	42,656	91.0%	4x Wall

Run: NSC1				L28-1-1/4" = Bearing Plate Name													
16.00	7.25	3.00	6.00	7.00	9.00	4.50	-1.00	DFL	4x6	5.50	3.50	25,130	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	10.50	7.00	9.00	4.50	-1.00	DFL	4x4	3.50	3.50	25,130	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	9.00	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	9.00	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	6.00			Bearing Area per end =	49.50	5.50		25,130	625	Comp.	30,938	81.2%	6x Wall
Compression:	3.00	10.50			Bearing Area per end =	47.25	3.50		25,130	625	Comp.	29,531	85.1%	4x Wall

Run: NSC2				L25-1-1/4" = Bearing Plate Name													
16.00	7.25	3.00	4.50	7.00	7.50	3.75	-0.25	DFL	4x6	5.50	3.50	21,800	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	9.00	7.00	7.50	3.75	-0.25	DFL	4x4	3.50	3.50	21,800	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	7.50	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	7.50	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	4.50			Bearing Area per end =	41.25	5.50		21,800	625	Comp.	25,781	84.6%	6x Wall
Compression:	3.00	9.00			Bearing Area per end =	42.00	3.50		21,800	625	Comp.	26,250	83.0%	4x Wall

Run: NSD				L28-1-1/4" = Bearing Plate Name													
16.00	7.25	3.00	7.50	7.00	9.00	4.50	-1.00	DFL	4x6	5.50	3.50	26,900	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	12.00	7.00	9.00	4.50	-1.00	DFL	4x4	3.50	3.50	26,900	625	7.15	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:			7.00	9.00	Shear Load Fraction =	0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Shear:			7.00	9.00	Shear Load Fraction =	0.00	3.50	3.50	0	625	Shear	10,208	0.0%	4x Wall
Compression:	3.00	7.50			Bearing Area per end =	57.75	5.50		26,900	625	Comp.	36,094	74.5%	6x Wall
Compression:	3.00	12.00			Bearing Area per end =	52.50	3.50		26,900	625	Comp.	32,813	82.0%	4x Wall



AutoTight® Mid Wall Termination Header Design Calculations for:

Tree Farm

Take Off Revision: 2 Eng

Calcs Revision: 0

Plan Set: Plan Check 2

Plan Date: 03/23/2018

CAT Project ID: 18-1789

Code: OSSC_2014 Main/State/Local (2005 NDS)

C to C Stud	Bay Width/2	Outer Post Thickness	Inner Post Thickness	Beam Length	Bearing Plate Length, L	Bearing Plate L / 2 (in)	Lspan	Term Header Species	Header Min Size	Header Width	Header Depth	Applied Load Compression P (lbs)	Allowable Capacity psi DFL	section modulus Z	Allowable Capacity (lb)	Demand/ Capacity Ratio D/C	Wall Thickness
(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)		(Nominal)	(in)	(in)						

Run: NSE

L30-1-1/2" = Bearing Plate Name

16.00	7.25	3.00	15.00	7.00	9.00	4.50	-1.00	DFL	4x6	5.50	3.50	28,630	625	11.23	NA>Shear	NA>Shear	6x Wall
16.00	7.25	3.00	24.00	7.00	9.00	4.50	-1.00	DFL	4x6	3.50	5.50	28,630	625	17.65	NA>Shear	NA>Shear	4x Wall

Bending above:

Shear:	7.00	9.00
Shear:	7.00	9.00

Shear Load Fraction =

0.00

5.50

3.50

0

625

Shear

16,042

0.0%

6x Wall

Shear Load Fraction =

0.00

3.50

5.50

0

625

Shear

16,042

0.0%

4x Wall

Compression:

3.00 15.00

Bearing Area per end =

99.00

5.50

28,630

625

Comp.

61,875

46.3%

6x Wall

Compression:

3.00 24.00

Bearing Area per end =

94.50

3.50

28,630

625

Comp.

59,063

48.5%

4x Wall

Run: NSC.3

L18-1-1/4" = Bearing Plate Name

16.00	7.25	3.00	4.50	7.00	5.50	2.75	0.75	DFL	4x6	5.50	3.50	15,060	625	11.23	18,715	80.5%	6x Wall
16.00	7.25	3.00	7.50	7.00	5.50	2.75	0.75	DFL	4x6	3.50	5.50	15,060	625	17.65	29,410	51.2%	4x Wall

Bending above:

Shear:	7.00	5.50
Shear:	7.00	5.50

Shear Load Fraction =

0.00

5.50

3.50

0

625

Shear

16,042

0.0%

6x Wall

Shear Load Fraction =

0.00

3.50

5.50

0

625

Shear

16,042

0.0%

4x Wall

Compression:

3.00 4.50

Bearing Area per end =

41.25

5.50

15,060

625

Comp.

25,781

58.4%

6x Wall

Compression:

3.00 7.50

Bearing Area per end =

36.75

3.50

15,060

625

Comp.

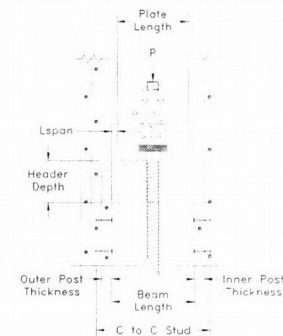
22,969

65.6%

4x Wall

Header Design Notes:

1. Bearing Plate spreads load.
2. Point Load (P) location transfer of combined termination tension.
3. Beam supported at both ends 2 equal symmetrical loads max stress = $W \cdot a / Z$
where $a = L_{span} / 2$ & $W = P / 2$ & Z = section modulus of beam
4. Shear calculated per NDS 2005 eqn 3.4-2 & sec 3.4.3 which says:
"...uniformly distributed loads within a distance from supports equal to the depth of the bending member, d, shall be permitted to be ignored."
 $f_v = 3 \cdot V / (2 \cdot b \cdot d)$ where f_v = actual stress = species capacity, V = shear load = allowable, b = breadth, d = depth
5. When the plate overlaps the post or gets too close to the post the beam equation does not apply, see shear instead.



Compression Post Schedule 4x Wall

Tree Farm

18-1789

Level Name	Run Name	EW2ab		EW6		EW6.5		NSB1		NSB2		NSC1		NSC2		NSD		NSE		NSC.3	
		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall	
Level 3	Post Location	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner
	Post Size	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4			2x4	2x4		
Level 2	Post Qty	2	9	2	13	2	7	2	10	2	11	2	7	2	6			2	16		
	Post Length inches	54.00		54.00		54.00		54.00		54.00		54.00		54.00				54.00			
Level 1	Required Load kips	33.80		48.54		26.57		38.82		41.58		26.95		24.55				57.55			
	Allowable Load kips	36.09		49.22		29.53		39.37		42.65		29.53		26.25				59.06			
Level 0	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing				Crushing			
	Post Size	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
Level 0	Post Qty	2	21	2	30	2	16	2	17	2	23	2	16	2	15	2	8	2	34	2	5
	Post Length inches	137.88		137.88		137.88		137.88		137.88		137.88		137.88		54.00		137.88		54.00	
Level 0	Required Load kips	51.52		72.18		40.50		43.29		55.91		41.07		37.42		31.19		83.50		21.80	
	Allowable Load kips	53.41		74.30		41.80		44.12		58.05		41.80		39.47		32.81		83.59		22.97	
Level 0	Limiting Failure Mode	Buckling		Buckling		Buckling		Buckling		Buckling		Buckling		Buckling		Crushing		Buckling		Crushing	

Notes:

- Posts may be arranged as desired by the builder as long as:
 - The total post quantity is the same as or greater than the quantity listed here.
 - And there is at least 1 post on each side of each rod.
 - Compression post lengths shown in schedule are for calculation purposes only.
- Framer is responsible for actual post lengths.
- These Posts are in addition to post counts on Plans.
- Sill Plates are Douglas Fir-Larch Grade #2 or better.
- Compression Posts are Douglas Fir-Larch Grade #2 or better.

Office: 360-378-9484

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AutoTight® Holdown Systems

by Commins Manufacturing

Compression Post Schedule 6x Wall

Tree Farm

18-1789

Level Name

Level Name	Run Name	EW2ab		EW6		EW6.5		NSB1		NSB2		NSC1		NSC2		NSD		NSE		NSC.3	
	Wall Size	6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall		6x Wall	
	Post Location	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner
Level 3	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6			2x6	2x6		
	Post Qty	2	5	2	8	2	4	2	6	2	7	2	4	2	3			2	10		
	Post Length inches	54.00		54.00		54.00		54.00		54.00		54.00		54.00				54.00			
	Required Load kips	33.80		48.54		26.57		38.82		41.58		26.95		24.55				57.55			
	Allowable Load kips	36.09		51.56		30.94		41.25		46.40		30.94		25.78				61.87			
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing				Crushing			
Level 2	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
	Post Qty	2	8	2	12	2	6	2	7	2	9	2	6	2	6	2	5	2	15	2	3
	Post Length inches	137.88		137.88		137.88		137.88		137.88		137.88		137.88		54.00		137.88		54.00	
	Required Load kips	51.52		72.18		40.50		43.29		55.91		41.07		37.42		31.19		83.50		21.80	
	Allowable Load kips	51.56		72.18		41.25		46.40		56.72		41.25		41.25		36.09		87.65		25.78	
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	

Notes:

- Posts may be arranged as desired by the builder as long as:
 - The total post quantity is the same as or greater than the quantity listed here.
 - And there is at least 1 post on each side of each rod.
 - Compression post lengths shown in schedule are for calculation purposes only.

Framer is responsible for actual post lengths.

- These Posts are in addition to post counts on Plans.
- Sill Plates are Douglas Fir-Larch Grade #2 or better.
- Compression Posts are Douglas Fir-Larch Grade #2 or better.

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AutoTight[®] Holdown Systems

by Commins Manufacturing

AutoTight®

By Commins Manufacturing

Materials and References

Catalog Pages for:
AT Shrinkage Compensation Device
Rod
Bearing Plates
Coupler Nuts
Reducer Couplers
Nuts and Washers

ICC - Evaluation Service Report
ESR-1344

COLA Report RR-25480

Commins Manufacturing
Comminsmfg.com
360-378-9484



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!**

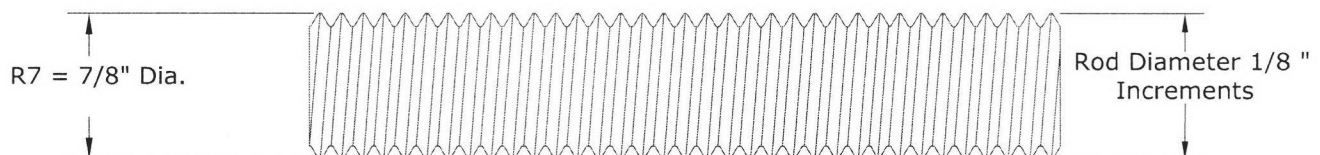
Elongation: Elongation for each (10') rod is shown at the maximum allowable tension load per ICC AC 391-3.2.1.1, Eq. 1. Adjust elongation based: on design load and distance between reaction points.

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
High Strength	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
Super Strength	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:

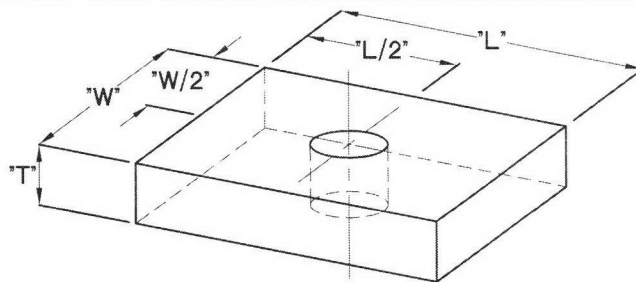
- Material Properties: (Other grades available, consult factory)
 ASTM A307 Fu = 60, Fy = 43 ksi. ASTM F1554 Gr. 55, Fu=75, Fy=55 ksi. ASTM A108-C1045 Fu = 120, Fy = 92
 ASTM A193-B7, Fu=125, Fy=105 ksi. ASTM F1554 Gr. 105, Fu=125, Fy =105 ksi. ASTM A354-BD Fu = 150, Fy = 130 ksi.
- Strength $P = 0.75 \times F_u \times \text{nominal area} / 2$ 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:
 $\Delta R_{od} = PL/AnE$ 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 = $0.040" \times \text{design load} / \text{rated load}$.

Example:

Reaction is 11,000 pounds on Douglas Fir. Rod is $1\frac{1}{8}"$ Ø.

Select an S11-1 $\frac{1}{4}$ " bearing plate with a rated capacity of 11,948 pounds.

Actual deformation (per AC 391, section 3.2.1.2) is $0.040 \times 11,000 / 11,948 = 0.037"$

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 $\frac{1}{4}$ " plate is selected, the plate deformation will be as follows:

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

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.

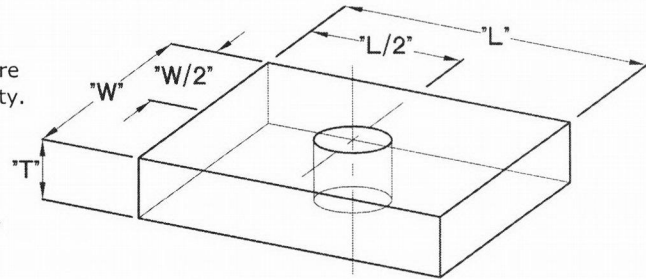
Bearing Plates

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" x11"		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" x11"		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)

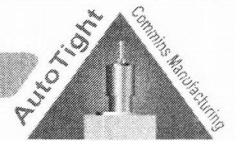
S5, S7, S10 and L18 plates may be used on the first floor mudsill for end of wall connection.

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

AutoTight Tie-Down Systems

Commins Manufacturing Inc.

360-378-9484



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.

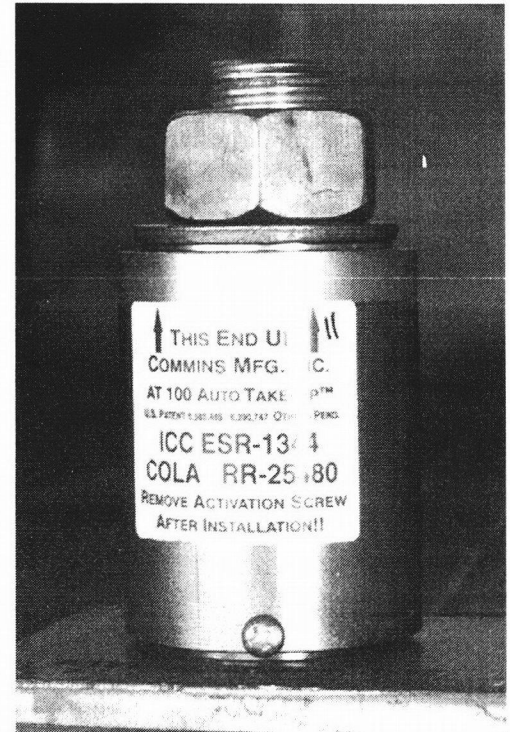
Deflection Maximum: $\Delta A = 0.032"$, $\Delta R = 0.002"$

Expansion 1.2" (ICC ESR 1344)

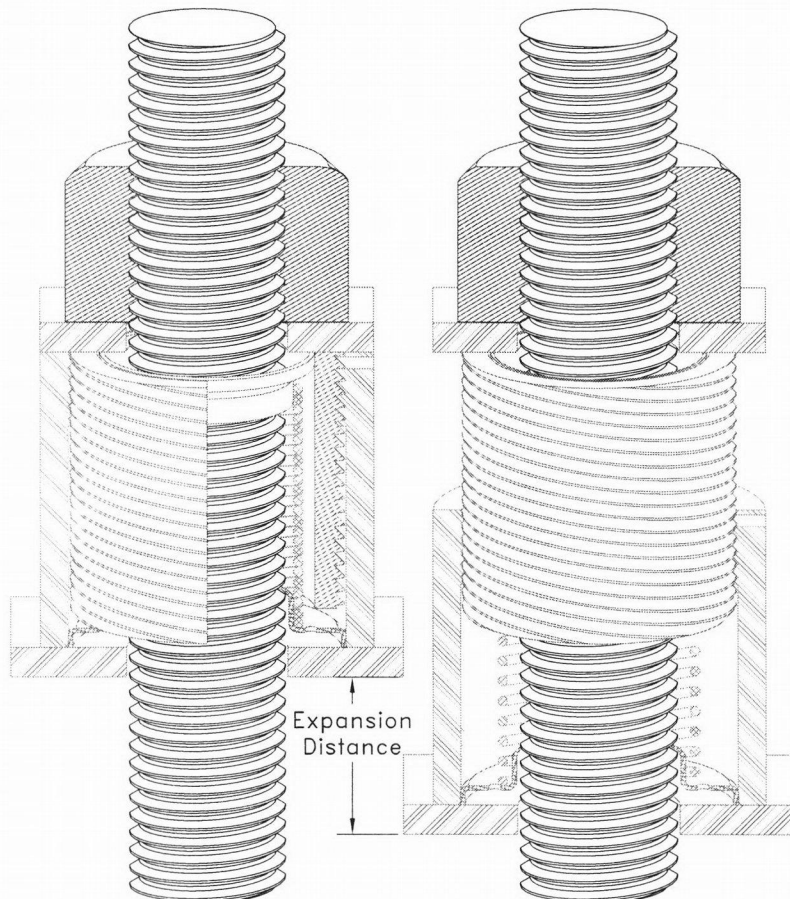
Calculate Deflection: Load Deflection = $0.032 * 11,000/25,300 = 0.014"$
Delta R (ΔR) (From Table) = $0.002"$
Total Deformation = $0.016"$

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



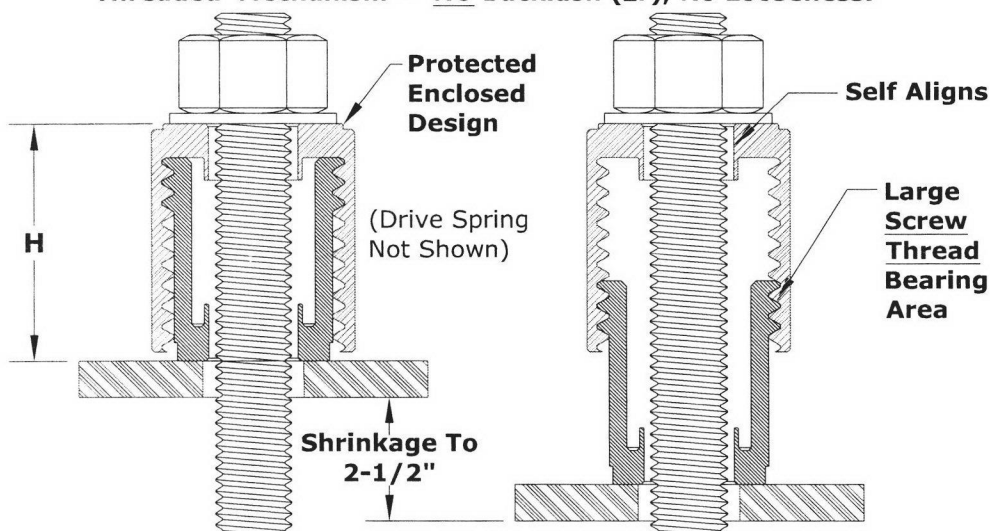
The **AutoTight shrinkage compensator** automatically expands as the building shrinks and settles. This expansion helps keep shear walls tight and performing to the code.

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

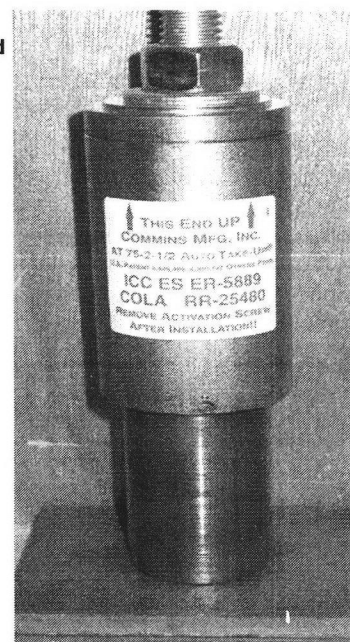
Material: Aluminum - 6061 Alloy, **Finish:** Light Oil
Steel - 12L14, **Finish:** Zinc chromate, moly disulfide lubricant.

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

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



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



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

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%.

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		0.011
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

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).

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 $\frac{9}{8}$ inch = 1- $\frac{1}{8}$ " dia.

Grade: Standard Coupler Nuts are ASTM A563 Grade A Grade 2
 High Strength Couplers are ASTM A563 Grade C
 Over 1- $\frac{3}{8}$ " 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:

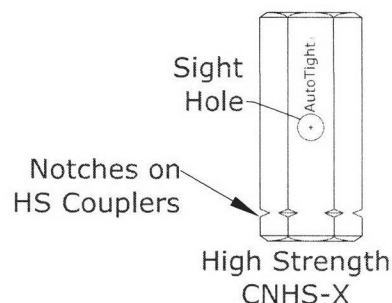
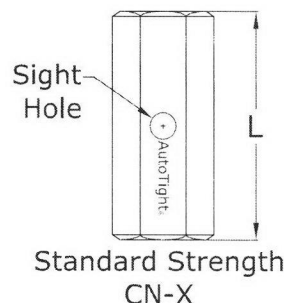
Nuts and coupler nuts shall be grade compatible and conform to ASTM A563 and IFI-128. One or two sight holes are provided to assist installation. Standard strength couplers shall be used with ASTM A307 and equivalent rod; High strength couplers shall be used with ASTM C1045, ASTM A193-B7 and other high 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.

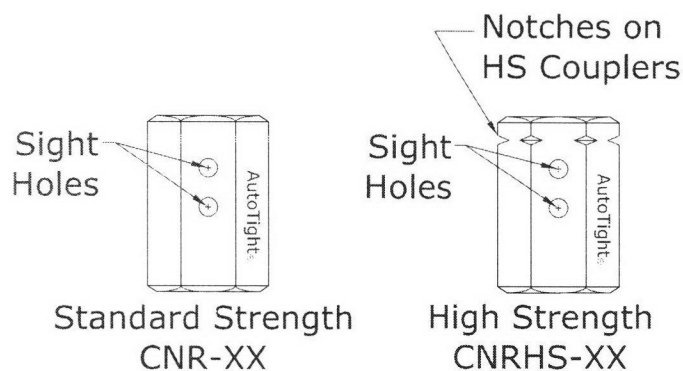
Over 1-1/4" at the big end Grade 5 is supplied

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.

Coupler Nut Reducer



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

	Model Number	Rod Ø	
		Small	Large
High Strength	CNRHS-56		3/4"
	CNRHS-57	5/8"	7/8"
	CNRHS-58		1"
	CNRHS-59		1-1/8"
	CNRHS-67		7/8"
	CNRHS-68	3/4"	1"
	CNRHS-69		1-1/8"
	CNRHS-610		1-1/4"
	CNRHS-78		1"
	CNRHS-79	7/8"	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 *		1-3/8"
	CNRHS-1012 *	1-1/4"	1-1/2"
	CNRHS-1014 *		1-3/4"
	CNRHS-1016 *		2"
	CNRHS-1112 *		1-1/2"
	CNRHS-1114 *	1-3/8"	1-3/4"
	CNRHS-1116 *		2"
	CNRHS-1214 *	1-1/2"	1-3/4"
	CNRHS-1216 *		2"
	CNRHS-1416 *	1-3/4"	2"

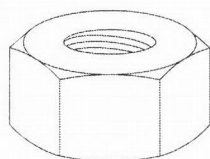
* Check with factory for availability of these sizes.

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

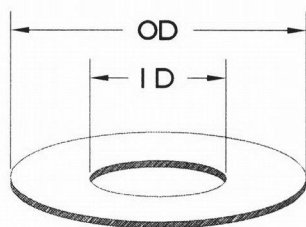
Oversize nuts to fit HDG Hot Dipped Galvanized Rod available.
Consult factory for sizes available.
Rethreading after HD Galvanizing is preferred.

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.



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ESR-1344

Reissued 12/2017

This report is subject to renewal 12/2018.

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
SECTION: 06 05 23—WOOD, PLASTIC, AND COMPOSITE FASTENINGS

REPORT HOLDER:

COMMINS MANUFACTURING, INC.

960 B GUARD STREET
FRIDAY HARBOR, WASHINGTON 98250

EVALUATION SUBJECT:

AT AUTOMATIC TAKE-UP™ SHRINKAGE COMPENSATOR



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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

COMMINS MANUFACTURING, INC.

960 B GUARD STREET

FRIDAY HARBOR, WASHINGTON 98250

(360) 378-9484

www.comminsmfg.com

EVALUATION SUBJECT:

AT AUTOMATIC TAKE-UP™ SHRINKAGE COMPENSATOR

1.0 EVALUATION SCOPE

Compliance with the following codes:

2018, 2015, and 2012 *International Building Code*® (IBC)

Property evaluated:

Structural

2.0 USES

The AT Automatic Take-Up™ Shrinkage Compensator device is used to remove slack in hold-down systems due to settlement or wood shrinkage in accordance with IBC Sections 2303.7 and 2304.3.3.

3.0 DESCRIPTION

3.1 General:

The AT Automatic Take-Up™ Shrinkage Compensator is a self-expanding washer used in connections of shearwall hold-down connectors or tension tie connectors incorporating threaded rods or threaded anchor bolts. The shrinkage compensator is available with either a steel body or an aluminum body. The devices automatically expand, axially, to eliminate any gaps between the bearing surface and the nut on the threaded rod that occur due to settlement or wood shrinkage. Sizes, rod diameters, dimensions, maximum expansion (shrinkage compensation capacity), and capacities are listed in Table 1. See Figure 1 for a typical installation.

3.2 Materials:

3.2.1 Auto Take-Up Device (AT Steel and ATA Aluminum): Steel AT's: The outer (body) component of

the device has internal threads. The inner (stud) component of the device has matching external threads. The inner components are manufactured from ASTM A108-13 Grade 12L14 steel with minimum yield and tensile strengths of 65 and 75 ksi (448 and 517 MPa), respectively. The outer components are manufactured from either ASTM A108-13 Grade 12L14 steel with minimum yield and tensile strengths of 65 and 75 ksi (448 and 517 MPa), respectively, or DOM 1020/1028 steel tubing with minimum yield and tensile strengths of 84 and 95 ksi (579 and 657 MPa), respectively, for the AT75-2.5, and 71 and 80 ksi (490 and 551 MPa), respectively, for all the other AT devices. For the AT200-2 the outer and inner components are manufactured from ASTM A513-15 Grade 1026 steel with minimum yield and tensile strengths of 75 and 85 ksi (517 and 568 MPa) respectively. A finish and lubricant, specified in the approved quality control manual, is applied to the outer and inner components to resist corrosion. The device has an internal spring manufactured from HDMB steel wire per ASTM A764-07(2017) or high-carbon steel music wire per ASTM A228-16.

3.2.2 Aluminum AT's: The outer (body) component of the device has internal threads. The inner (stud) component of the device has matching external threads. The outer and inner components are manufactured from 6061-T6 aluminum with minimum yield and tensile strengths of 40 and 45 ksi (275 and 310 MPa), respectively. A lubricant, specified in the approved quality control manual, is applied to the outer and inner components to resist corrosion. The device has an internal spring manufactured from HDMB steel wire per ASTM A764-07(2017) or high-carbon steel music wire per ASTM A228-16.

4.0 DESIGN AND INSTALLATION

4.1 Design and Allowable Loads:

The allowable compression loads for the AT Automatic Take-Up™ Shrinkage Compensator designed under allowable stress design are as shown in Table 1. The devices are to be used where the expected shrinkage does not exceed the expansion limit of the devices. Two devices may be used in-line where the expected shrinkage exceeds the expansion limit of one device.

When the devices are used in continuous rod systems that resist light-frame shear wall overturning forces, calculations must be submitted to the code official confirming that the total vertical displacement, which would include steel rod elongation and the shrinkage compensating device deflection, is less than or equal to

0.20-inch (5 mm) for each story, or between restraints, whichever is more restrictive, using allowable stress design (ASD). Shear wall drift limit calculations must consider the 0.20-inch (5 mm) vertical displacement limit. This 0.20-inch (5 mm) vertical displacement limit may be exceeded when it can be demonstrated that the shear wall story drift limit and the deformation compatibility requirements of IBC Section 1604.4 are met when considering all sources of vertical displacement.

4.2 Installation:

The AT Automatic Take-Up™ Shrinkage Compensator must only be used where there is sufficient clearance along the sides of the device to permit the device to expand. The device must be installed over the hold-down or bearing plate with the threaded rod through the axial center of the device. An SAE flat washer and steel nut must be installed on the threaded rod and tightened prior to activation of the device. Activation occurs by removal of a factory-inserted screw from the side of the device. The continuous tie-down system in which the AT Automatic Take-Up™ Shrinkage Compensator is used must be installed plumb, such that the offset angle between the top of the floor and the bottom of the top plates or bridge block above does not exceed 1.33 degrees from vertical.

5.0 CONDITIONS OF USE

The AT Automatic Take-Up™ Shrinkage Compensator described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 subject to the following conditions:

- 5.1** Calculations, demonstrating that the applied loads do not exceed the allowable loads and that the expected shrinkage does not exceed the expansion limits of the

device, must be submitted to the code official for approval. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

- 5.2** The Commins AT Automatic Take-Up™ Shrinkage Compensator must be limited to installations in dry, interior locations.
- 5.3** No increase in allowable stresses or loads for duration of load is permitted for the Commins AT Automatic Take-Up™ Shrinkage Compensator.
- 5.4** The AT Automatic Take-Up™ Shrinkage Compensator must not be used to support dead load other than its own weight.

6.0 EVIDENCE SUBMITTED

Data in accordance with ICC-ES Acceptance Criteria for Shrinkage Compensating Devices (AC316), dated June 2013 (editorially revised November 2017).

7.0 IDENTIFICATION

Each AT Automatic Take-Up™ Shrinkage Compensator must bear a label on the device or on the packaging indicating the manufacturer's name (Commings Manufacturing, Inc.), the model number, and the evaluation report number (ESR-1344).

TABLE 1—AT AUTOMATIC TAKE-UP™ SHRINKAGE COMPENSATOR DESCRIPTION AND ALLOWABLE LOADS^{1,3}

MODEL NO.	INSIDE DIAMETER (inches)	OUTSIDE DIAMETER (inches)	DEVICE LENGTH (inches)		MAXIMUM EXPANSION (inches)	SEATING INCREMENT ² Δ _R (inches)	ALLOWABLE AXIAL COMPRESSION LOAD P _A (pounds)	DEFLECTION AT ALLOWABLE LOAD ² Δ _A (inch)
			Minimum	Maximum				
Aluminum								
AT 4A-1.5	¹ / ₂	1 ¹ / ₂	3.0	4.5	1.50	0.000	6,450	0.011
AT 4A-2.5	¹ / ₂	1 ¹ / ₂	4.06	6.56	2.50	0.000	6,450	0.011
AT 6A-1.5	³ / ₄	2 ¹ / ₈	3.19	4.69	1.50	0.000	10,550	0.011
AT 6A-2.5	³ / ₄	2 ¹ / ₈	4.19	6.69	2.50	0.000	10,550	0.011
AT 8A-1.5	1	2 ³ / ₄	3.50	5.25	1.75	0.000	20,750	0.004
AT 10A-1.5	1 ¹ / ₄	3 ¹ / ₄	3.50	5.12	1.62	0.000	28,050	0.020
AT12A-1.5	1 ¹ / ₂	3 ¹ / ₄	3.50	5.12	1.62	0.000	28,050	0.020
AT16A-2.0	2	4	3.50	5.57	2.07	0.001	39,450	0.011
Steel								
AT 75	³ / ₄	2	2.80	3.90	1.10	0.002	16,450	0.024
AT 75-2.5	³ / ₄	2	4.0	6.5	2.50	0.002	15,200	0.021
AT 100	1	2 ¹ / ₄	2.90	4.00	1.10	0.002	25,300	0.032
AT 125	1 ¹ / ₄	2 ³ / ₄	2.86	3.98	1.10	0.002	34,500	0.016
AT 200-2.0	2	4	3.88	6.06	2.18	0.000	83,200	0.009

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N.

¹Listed values are for the AT Automatic Take-Up™ Shrinkage Compensator only. All other components in the system must be designed in accordance with the applicable code.

²The device average travel and seating increment, Δ_R , and deflection at allowable load, Δ_A , are additive and describe the total movement of the device at allowable load, Δ_T . For design loads, P_D , less than the allowable load, P_A , the total movement of the device, Δ_T , is calculated as follows: $\Delta_T = \Delta_R + \Delta_A(P_D/P_A)$.

³LRFD resistance capacity = ASD allowable load x 1.5.

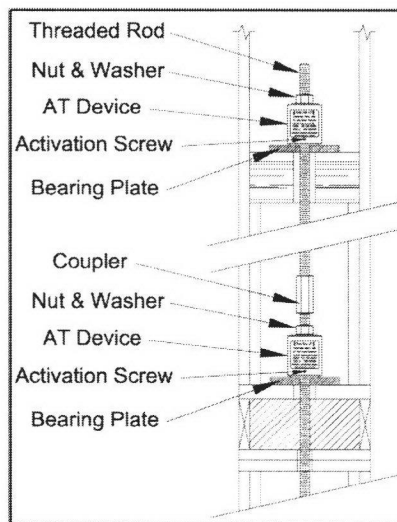


FIGURE 1—TYPICAL INSTALLATION

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ESR-1344 CBC Supplement

Reissued December 2017

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

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FRIDAY HARBOR, WASHINGTON 98250
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EVALUATION SUBJECT:

AT AUTOMATIC TAKE-UP™ SHRINKAGE COMPENSATOR

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the AT Automatic Take-Up™ Shrinkage Compensator, recognized in ICC-ES master report ESR-1344, has also been evaluated for compliance with the code noted below.

Applicable code edition:

2016 *California Building Code* (CBC)

2.0 CONCLUSIONS

The AT Automatic Take-Up™ Shrinkage Compensator, described in Sections 2.0 through 7.0 of the master evaluation report ESR-1344, complies with CBC Chapter 23, provided the design and installation are in accordance with the 2015 *International Building Code*® (IBC) provisions noted in the master report and the additional requirements of with CBC Chapters 16, 16A, 17, 17A and 23, as applicable.

This supplement expires concurrently with the master report, reissued December 2017 and revised February 2018.

Tree Farm S702

RUN START (CONCRETE,
WOOD BEAM, STEEL BEAM)

Wall or Run ID	Run Start	Anchor Diameter (in.)	Cumulative Tension Load (kips)						Cumulative Compression Load (kips)						Wall Height (ft-in)						Floor Depth (inches)					Run Termination
			6th	5th	4th	3rd	2nd	1st	6th	5th	4th	3rd	2nd	1st	6th	5th	4th	3rd	2nd	1st	6th	5th	4th	3rd	2nd	
EW 2a	Concrete Through Slab	SR12				20.3	34.51					33.8	51.52					12'-1/8"	12'-1/8"				11.88	11.88		Straps
EW 2b	Concrete Through Slab	SR12				20.3	34.51					33.8	51.52					12'-1/8"	12'-1/8"				11.88	11.88		Straps
EW 6	Concrete Through Slab	SR10H				30.83	49.84					48.54	72.18					12'-1/8"	12'-1/8"				11.88	11.88		Straps
EW 6.5	Concrete Through Slab	SR9H				23.16	36.23					26.57	40.5					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS B1	Concrete Through Slab	SR9H				38.82	39.52					29.06	43.39					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS B2	Concrete Through Slab	SR10H				38.82	52.31					41.58	55.91					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS C1	Concrete Through Slab	SR9H				25.13	38.8					26.95	41.07					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS C2	Concrete Through Slab	SR10				21.8	33.99					24.55	37.42					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS D	Concrete Through Slab	SR9					26.9						31.19					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS E	Concrete Through Slab	SR12				28.63	46.96					57.55	83.5					12'-1/8"	12'-1/8"				11.88	11.88		Straps
NS C.3	Concrete Through Slab	SR8					15.06						21.8					12'-1/8"	12'-1/8"					11.88		Straps