18-235478 DFS 01 CO

City of Portland, Oregon - Bureau of Development Services

1900 SW Fourth Avenue · Portland, Oregon 97201 | 503-823-7300 | www.portlandoregon.gov/bds

Deferred Submittal Requirements and Application

Applicants will provide:

- ☐ A copy of this application
- ☐ Three (3) sets of plans
- ☐ Two (2) set of calculations
- ☐ Two (2) sets of product information

  Drawings and calculations must be stamped and signed by an Engineer registered in Oregon and approved by the Architect/Engineer of record for the building.

- ☐ Permit fee (paid at time of submittal)
- ☐ If the DFS includes exterior elements, plan views and elevations identifying the location(s) as approved by the Architect and Engineer of Record must be submitted.
- ☐ One (1) copy of your main building permit approved plans (NOTE: Approved plans do not need to be submitted if your project has a development liaison assigned.)

Contractor submittal information:

Contact name Scott RASCOE

Address 2905 SW FIRST AVE

City PORTLAND State OR Zip Code 97201

Phone 503-459-7890 E-mail srascoe@walshconstruction.com

Value of deferred submittal $10,000 Issued main building permit # 18-235478-000-00-CO

Job site address 2133 N. ARGYLE ST, PORTLAND, OR 97217

Description/Scope of work Hold downs & Anchors

Fees

Deferred submittal (DFS) fees are collected in addition to the standard building review fee paid on the main building permit. DFS fees cover the cost of the additional processing and review time associated with the design build element.

The DFS fee for processing and reviewing deferred plan submittals is 10 percent of the building permit fee calculated using the value of the particular deferred portion of the project.,

Minimum fee: Residential, one and two family dwelling ...$123 for DFS with valuation of less than or equal to $222,000

Commercial and all other projects .....$307 for DFS with valuation of less than or equal to $680,000

The Bureau of Development Services (BDS) fee schedule is also available on the BDS web site at ***www.portlandoregon.gov/bds*** | select the Fees tab.

Helpful Information

Bureau of Development Services
1900 SW 4th Avenue, Portland, OR 97201

Submit your plans to:
Development Services Center (DSC), First Floor, For Hours Call 503-823-7310

DEFERRED SUBMITTAL REQUIREMENTS AND APPLICATION

Important Telephone Numbers

BDS main number	503-823-7300
DSC automated information line	503-823-7310
Building code information	503-823-1456
BDS 24 hour inspection request line	503-823-7000
Residential information for one and two family dwellings	503-823-7388
City of Portland TTY	503-823-6868

Information is subject to change.

Anchor Bolt Embedment Notes

Anchor Bolt Embedment Desigr:
1. Anchor Bolt Embedment Design conforms to the 2012 IBC & OSSC 2014.
2. Required loads and system requirements are per Final Shear Wall Layout Structural Plan Set S7.06 dated 01/22/2019.
3. Concrete strength is 4,000 psi.
5. Fabrication shall meet the requirements and specifications per Structural Plan general notes.
6. Embedment Rod strengths per ATS10 Table 1h.
7. Drawing is not to scale.
8. Fabrication shall meet the requirements and specifications per Structural Plan general notes.

Anchor Bolt Installation:
1. Contractor/installer shall verify anchor bolt size, thread pitch and material for correct location per structural plans and AutoTight holdown run layout sheet(s) ATS11.
2. Anchor Bolt location relative to the end of the shear wall shall be per ATS10 Details 4 and 6.
3. Anchor bolt shall be 12" minimum above concrete slab (U.N.O.).

Holdown System Design:
1. For system design see Holdown Run Details (ATS10), Holdown Run Elevations (ATS11), and Structural Drawing S7.06.
2. Defer to Structural Plans.
3. Fabrication shall meet the requirements and specifications per structural plan general notes.

Shop Drawing Disclaimer

This design uses the construction plans and calculations provided by the Engineer of Record. No Attempt has been made on the part of Commins Manufacturing, Inc. to verify the values given in the calculations or design described by the construction drawings.

The Engineer of Record is responsible for the structural design of the building and the ability of the design to transfer load imparted to the structure by the holdown system.

Structural Engineer of Record

Josh Richards
111 SW 5th Avenue
Portland, OR 97204
Ph 503-227-3251
Josh.Richards@kpff.com

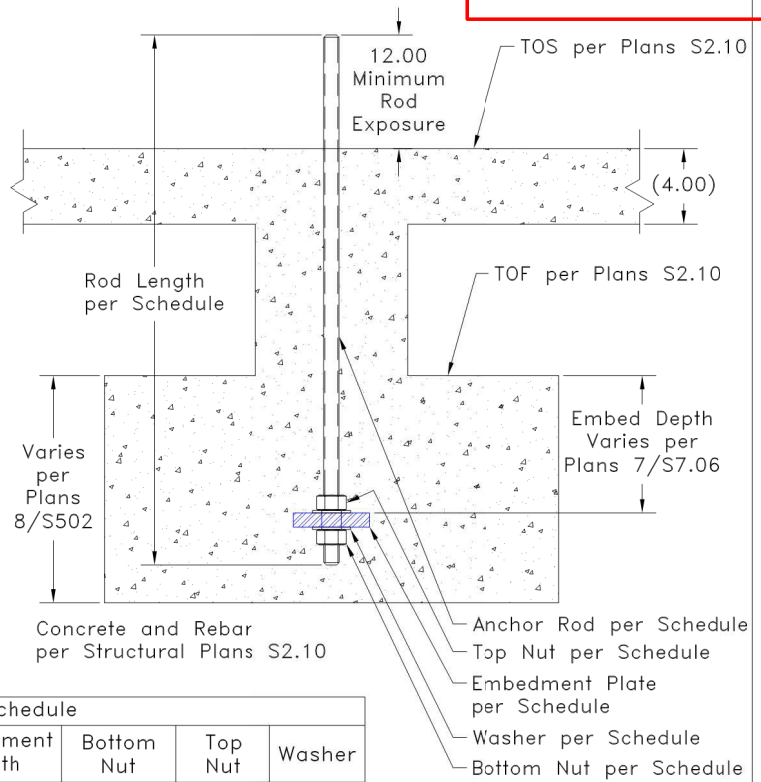
Footing Condition

☒ Reviewed ☐ Furnish as Corrected
☐ Rejected ☐ Revise and Resubmit
☐ Not Required for Review ☐ Submit Specified Item

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe and satisfactory manner.

kpff
KPFF Consulting Engineers
Date 03/18/2019
By SLC

City Of Portland
REVIEWED FOR CODE COMPLIANCE
Date: 03/19/19
Permit #: 18-235478-DFS-01-CO



AutoTight Anchor Bolt Embedment Schedule

Run Name	Rod	Embedment Plate Size	Embedment Depth	Bottom Nut	Top Nut	Washer
A	R7A307 x By Others	By Others	NA	NA	NA	NA
B	R8A307 x By Others	By Others	NA	NA	NA	NA
C	R9G55 x By Others	By Others	NA	NA	NA	NA
D	R5G55 x Per RL-2B	½"x2"x2"x$1\frac{3}{16}$" HOC	11-½"	N-5	N-5	W-5
E	R6G55 x Per RL-2B	½"x2"x2"x$1\frac{3}{16}$" HOC	11-½"	N-6	N-6	W-6
F	R8G55 x Per RL-2B	¾"x3"x3"x1-$\frac{1}{16}$" HOC	13-¼"	N-8	N-8	W-8

Notes:
1. Commins is only providing the Embeds for Building B (i.e. Run Types D, E & F). Run Types A, B & C are by Others who must match the rod size, grade & Exposure shown here and on drawing ATS11.
2. This drawing is based on S7.06 showing the arrangement of the Autotight Components. Build per Plans.
3. All concrete calculations are the responsibility of the EOR.
4. All Rods are black unfinished steel.
5. Field verify concrete depths at all locations. Consider Drop Caps, Drop Soffits, Concrete Beams etc.
6. Anchor rods are to be located by means of template. Anchor rods shall not be hand set or wet set.
7. Wire embedment securely to rebar to prevent motion during concrete pour.
8. Top of Footing Varies per S2.10.
9. OK to field cut rod to reduce lift-over. Do not violate minimum rod exposure.

AutoTight® Holdown System
www.comminsmfg.com
by Commins Manufacturing, Inc.
960B Guard St., Friday Harbor, WA 98250
T: 360.378.9484 F: 360.378.9485

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 18,519 OREGON JULY 10, 1998 MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2019

No.	Revision	Date

Drawn: TFB | Check: tbd | Date: 03/04/19

18-1871
Argyle Housing
2133 N. Argyle Street
Portland, OR 97217

Anchor Bolt Details
Not to Scale

ATS12

City Of Portland
REVIEWED FOR CODE COMPLIANCE
Date: 04/18/19
Permit #: 18-235478-DFS-01-CO

Holdown System Design:
1. Holdown system conforms to the International Building Code (IBC) 2012 per 2014 OSSC Oregon Structural Specialty Code.
2. Required loads and system requirements per structural plans, dated 01/22/2019.
3. Wood shrinkage is estimated at 1/4" per floor, based on structural plans wood specifications.
4. Drawings are not to scale. Holdown Run elevation (ATS11) drawings are for location of run components only and may not reflect the correct number of compression posts. See Compression Post Schedule.
5. Fabrication shall meet the requirements and specifications per structural plan general notes.
6. Engineer of Record is to review these drawings and upon approval the drawings will replace the holdown system per structural plans, unless noted otherwise (U.N.O.).

Compression Post Notes:
1. Compression post shall be species, grade and size per structural plans (U.N.O.).
2. Compression posts and headers shall have a maximum moisture content of 19%.
3. Compression post or loads not specified, shall be equal to or exceed the required loads on Structural plans.
4. Compression post call outs on ATS11 are each side of the rod for 4x and 6x wall per holdown run and floor/level (U.N.O.).
5. Compression post are in addition to shearwall framing members and are for overturning loads only, not gravity loads.(U.N.C.)
6. Alternate compression post may be acceptable. Consult the factory for possible alternates.
7. Floor blocking lengths for TJI joists shall be 1/16" greater than floor joist height per APA EWS Z725C figure 1d.
8. Compression post may be notched to exact thickness at steel bearing plate, if required. A plywood shim of the exact thickness of the steel bearing bearing plate may be used, instead of notching. Additional compression post with required nailing shall be added, if exact notching requirements are not possible.
9. Cutting or notching of compression post is permitted to a depth not to exceed 25% of its width per 2012 IBC – 2308.9.10 Boring of compression post is permitted for a hole not greater than 40% of the width and no nearer than 5/8" to the edge per 2012 IBC – 2308.9.11 See applicable code.

1. Contractor/installer shall verify anchor bolt size, thread pitch and material for correct location per structural plans run call outs or AutoTight holdown run layout sheet(s).
2. Anchor bolt shall be 12" minimum above concrete slab (U.N.O.).
3. AutoTight Anchor Bolt Embedments, if used, are called out on ATS12.

Shop Drawing Disclaimer

Holdown design is by Commins Manufacturing, Inc. for the holdown system described in these shop drawings only. This design uses the construction plans and calculations provided by the Engineer of Record. No attempt had been made on be part of Commins Manufacturing, Inc. to verify the values given in the calculations or design described by the construction drawings.

The Engineer of Record is responsible for the structural design of the building and the ability of the design to transfer loads imparted to the structure by the holdown system.

Structural Engineer of Record

KPFF CONSULTING ENGINEERS
Josh Richards
111 SW 5th Avenue
Portland, OR 97204
Ph 503-227-3251
Josh.Richards@kpff.com

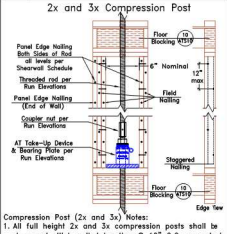
Abbreviations

A.B.	Anchor bolt per plan or schedule
Alt	Alternate option
ATXX	AutoTight Take-Up Device (installed with) 75 & 75-2.5 (1/2", 5/8" or 3/4" rod 100 (7/8" or 1" rod) 125 (1 1/8" or 1 1/4" rod)
CAT	Commins AutoTight
CN(HS)	Coupler nut (HS are notched)
CNR(HS)	Coupler nut reducer (HS are notched)
Dia	Diameter
DFL	Douglas Fir-Larch
HF	Hemlock Fir
HS	High strength
LVX	Bearing plate, 4x or 6x wall only
Min	Minimum
Max	Maximum
N(HS)-XX	Nut (HS have stamp grade ID)
O.C.	On center
R-XX(HS)	Threaded rod, (HS rod is black)
SPF	Spruce-Pine-Fir
STD	Standard strength (STD rod is zinc plated)
SYP	Southern Yellow Pine
SXX	Bearing plate, 4x or 6x wall
Typ	Typical
U.N.O.	Unless noted otherwise
W-XX	SAE Washer Rod, Nut & Washer Size

-4	1/2"	-9	1-1/8"
-5	5/8"	-10	1-1/4"
-6	3/4"	-12	1-1/2"
-7	7/8"	-14	1-3/4"
-8	1"		

8 Comp. Post Nailing

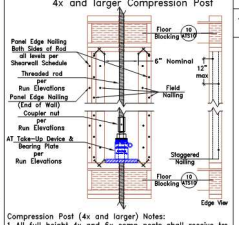
2x and 3x Compression Post



Compression Post (2x and 3x) Notes:
1. All full height 2x and 3x compression posts shall be staggered stitch nailed together @ 12" O.C., except at termination header floor/level.
2. Shear Panel nailing shall be per plans. If nails are spaced closer than 3" we recommend perimeter nails be staggered 1-1/2" to minimize wood splitting.
3. Cavity width may vary depending on field conditions.
4. Consult factory for other conditions. Too little space makes bearing plate installation difficult.

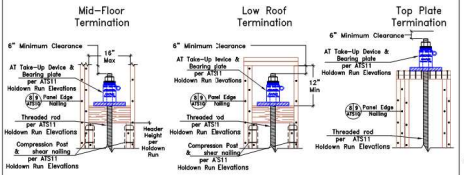
9 Comp. Post Nailing

4x and larger Compression Post



Compression Post (4x and larger) Notes:
1. All full height 4x and 6x comp posts shall receive toe nailing to top and bottom plate and panel edge nailing per structural plans.
2. Shear Panel nailing shall be per plans. If nails are spaced closer than 3" we recommend perimeter nails be staggered 1-1/2" to minimize wood splitting.
3. Panel edge nailing shall be the same as the Shearwall Schedule with additional row(s) of panel edge nailing located 3" O.C. on compression post x6 and larger.

16 Alternate Run Terminations



Alternate Run Termination Notes:
1. Refer to detail 11 for typical header installaton.
2. Refer to ATS11 Holdown Run Elevations for number of shear nails required.
3. Change of termination type will change rod length requirements.
4. Clearance above the top of the rod must be greater than wood shrinkage per floor (detail 1, note 5) times the levels of the run. Rod may require field cutting.
5. Rod clearance hole shall be 1/4" to 1/2" oversized.
6. Top Plate Termination: Stitch Top Plates within 12" of rod 2 staggered rows 16d sinkers 4" O.C. No splices within 12" of rod.

2 Threaded Rod and AT Take-Up Device Allowable Loads

Table 1h
2014 Oregon Structural Specialty Code (OSSC)

Rod Size "D"diameter (inches)"	Model	"D"diameter & Thread"	Allowable Tension (lbs) A36 or F1554 Gr 36	A307	F1554 Gr 55	A449 or A325	A108-C1045	A193-B7 or F1554 Gr 105	A354-BD
3/8	R3	3/8"-16 NC	2,400	2490	3,110	4,970	4,970	5,180	6,215
1/2	R4	1/2"-13 NC	4,270	4420	5,520	8,840	8,840	9,200	11,345
5/8	R5	5/8"-11 NC	6,670	6900	8,630	13,810	13,810	14,380	17,255
3/4	R6	3/4"-10 NC	9,610	9940	12,430	19,880	19,880	20,710	24,550
7/8	R7	7/8"-9 NC	13,080	13530	16,910	27,060	27,060	28,190	33,525
1	R8	1"- 8 NC	17,080	17670	22,090	35,340	35,340	36,820	44,180
1 1/8	R9	1-1/8"-7 NC	21,620	22,370	27,960	39,140	44,730	46,590	55,915
1 1/4	R10	1-1/4"-7 NC	26,690	27,610	34,510	48,320	55,220	57,520	69,330
1 3/8	R11	1-3/8"- 6 NC	32,300	33,410	41,760	58,470	66,820	69,600	83,530
1 1/2	R12	1-1/2"- 6 NC	38,440	39,760	49,700	69,580	79,520	82,830	99,400
1 3/4	R14	1-3/4"-5 NC	52,310	54120	67,650	81,180	108,240	112,750	135295
2	R16	2"-4.5 NC	68,330	70,960	88,360	106,030	141,370	147,240	176710

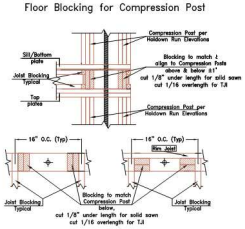
Model Number	Rod Diameter (Max.)	Mat'l.	Dimensions (inches) Dia.	H	Rated Take-Up (inches)	Allowable Load Pounds	Average Ultimate Pounds	Δr (inches) Seating Increment	ΔA (inches) Deflection at Allowable Load
AT4-1,5	1/2"	Aluminum	1-1/2"	3,00"	1,50"	6,450	24,857	0,000"	0,011
AT4-2,5				4,06"	2,50"				
AT6A-1,5	3/4"		2-1/8"	3,19"	1,50"	10,550	40,737		0,011
AT6A-2,5				4,19"	2,50"				
AT8A-1,5	1"		2-3/4"	3,50"	1,75"	20,750	66,170	0,000"	0,004
AT10A-1,5	1-1/4"		3-1/4"	3,50"	1,62"	28,050	85,767	0,000"	0,020
AT12A-1,5	1-1/2"								
AT16A-2,0	2"		4"	3,50"	2,07"	39,450	120,050	0,001"	0,011
AT 75	3/4"	Steel	2"	2,80"	1,10"	16,450	50,533	0,002"	0,024
AT 75-2,5			2"	4,00"	2,50"	15,200	54,728		0,021
AT 100	1"		2-1/4"	2,90"	1,10"	25,300	78,067		0,032
AT 125	1-1/4"		2-3/4"	2,86"	1,10"	34,500	104,683		0,016
AT 200-2,0	2"		4"	3,88"	2,18"	83,200	252,000	0,000"	0,009

Threaded Rod, Couplers, Nuts and AT Shrinkage Device Notes:
Rod Material:
1. Rod Part Name is the Rod Model followed by the abbreviate alloy name. For example R5A307 or R887
2. Alloy Strengths:
   ASTM A307 Fu = 60, Fy = 43 ksi., ASTM A36 Fu = 58, Fy = 36 ksi., ASTM F1554 Grade 36 Fu = 58, Fy = 36 ksi.
   ASTM A108-C1045 Fu = 120, Fy = 92 ASTM F1554 Grade 55 Fu = 75, Fy = 55 ksi.
   ASTM A449 (under 1"dia Fu = 120 Fy = 92 ksi)(1.12"-1.50"dia Fu = 105, Fy = 81 ksi)(1.75"dia Fu = 90, Fy = 58 ksi)
   ASTM A325 (under 1"dia Fu = 120 Fy = 92 ksi)(1.12"-1.50"dia Fu = 105, Fy = 81 ksi)(1.75"dia Fu = 90, Fy = 58 ksi)
   ASTM F1554 Grade 105, Fu = 125, Fy = 105 ksi.,
   ASTM A193-B7, Fu = 125, Fy = 105 ksi., ASTM A354-BD, Fu = 150, Fy = 130 ksi.
3. All threaded rod is Uniform National Coarse (UNC or NC) Threaded.
4. High Strength rod is usually marked with Red paint. Consult Factory for additional information.
   Standard Nuts are SAE Grade 2 or ASTM 563-Grade A
5. High Strength Nuts are SAE grade 8, ASTM 563-Grade C or A194-2H and are stamped for identification.
6. Standard couplers conform to SAE Grade 2 or ASTM A-563 grade A.
   High strength (HS) couplers conform to SAE Grade 8, ASTM A563 Grade C or ASTM A194-2H and are notched for identification.
7. Automatic (AT) Take-Up Device by Commins Manufacturing Inc. Rod and Bearing Plates are listed in ICC ES report ESR-1344 (11/1/2013).

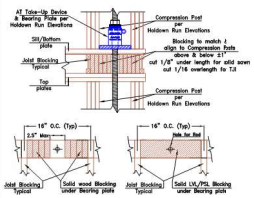
Fabrication:
1. Threaded rod lengths may be adjusted as required, but rod diameter and material type must be the same per the floor/level call out. Cutting of rod on lower levels may result in incorrect (short, top floor termination length.
2. Rod clearance holes between floors shall be 1/4" to 1/2" oversized. Silicone or caulking shall not be used at any time. A fire-rated Rockwool or a non-hardening FireStop (provided by others) shall be used, if required. Rod must move freely after assembly.
3. Recommend mount out of rod plumb for rod is 2" per 10' floor height (Detail 13) with no permanent bending of installed threaded rod.
4. Coupler nuts shall have the threaded rod visible in the sight hole(s) per Detail 7.
5. The AT Take-Up Device shall be secured with a nut and its washer finger tight. At termination level the end of the rod shall be 1/8" minimum beyond the face of the nut. A final nut tightening just prior to closure of the wall is good practice, but not required. The AT Take-Up Device MUST be activated by removing the activation screw or pin prior to wall enclosure per Detail 12.
6. Rod, couplers and AT device locations are per Holdown Run elevations on ATS11.
7. Run locations are per structural plans run call outs or AutoTight holdown run layout sheet(s).
8. Stress increase is not allowed with AISC 13th Edition capacities. (IBC 2006 & later)
9. Rod may be upgraded to higher capacity rod on a case by case basis.
10. Other AT Automatic Take-Up devices may be substituted provided:
    The alternate Take-Up is sized to accommodate the threaded rod and has sufficient expansion and load capacity.

10 Typ. Floor Blocking

Floor Blocking for Compression Post

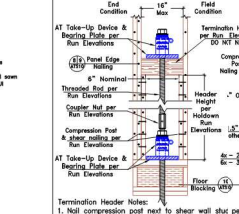


Solid Floor Blocking under Bearing Plate



Floor Blocking Notes:
1. Floor blocking shall have 1/8" vertical clearance between wall plates or floors for solid sawn joists and 1/16" vertical interference for TJI joists.
2. All floor blocking shall be installed grain vertical.
3. Parallam may be substituted for solid sawn wood. Blocking must match compression post below or be solid blocked when under a bearing plate. Rod clearance hole for rod shall be rod size plus 1/4" – 1/2" oversized. Rod must move freely through holes after assembly.

11 Typ. Term. Header Install



Termination Header Notes:
1. Nail compression post next to shear wall stud per Holdown Run Elevations ATS11 nail quantity call out min. Face (stitch) nailing per Shear Nailing Detail (4x or 6x) with 16d sinkers and no splitting of the wood.
2. Shear Panel nailing shall be per plans. If nails are spaced closer than 3" we recommend perimeter nails be staggered 1-1/2" to minimize wood splitting.
3. Contractor/installer shall verify nailing pattern.
4. Additional compression post/studs shall be stitch nailed per Detail 8.
5. Rod clearance hole shall be 1/4" to 1/2" oversized.

17

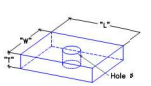
3 Bearing Plate Schedule and Allowable Loads

Table 2a Bearing Plate Allowable Loads
2018 International Building Code IBC (14th Ed, NSC & 2015 NDS)

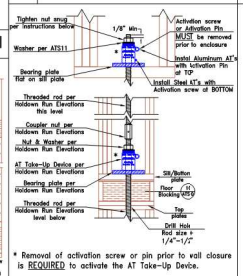
Wall Widths	Model No.	T * W * L	Max. Rod Ø	ASD Loads ASD Allowable Load (@ 0.040" CGC) DFL @ 625	LRFD Loads LRFD Load (@ 0.040" CGC) DFL @ 938
Bearing Plates					
For Walls 4X and Up	For 1/2" through 3/4" Rod				
	SS-3/4"	1/4" * 3" * 3"	3/4"	5,964	8,945
	For 1/2" through 1" Rod				
	S1-1"	3/8" * 5-1/2" * 5-1/2"	1"	7,863	11,795
	For 5/8" through 1-1/4" Rod				
	S7A-1/4"	3/8" * 5-1/2" * 5-1/2"	1-1/4"	7,540	11,311
	S5A-1/4"	3/8" * 5-1/4" * 4"		7,962	11,943
	S11-1/4"	1/2" * 5-1/2" * 5-1/2"		11,948	17,922
	S14-1/4"	3/4" * 5-1/4" * 7"		13,373	20,060
	S16-1/4"	1" * 5-1/4" * 8"		15,404	23,107
	S18-1/4"	1" * 5-1/2" * 9"		18,842	28,263
	S25-1/4"	1-1/4" * 5-1/2" * 12"		25,404	38,107
	For 1-1/4" through 1-1/2" Rod				
	S11-1-1/2"	1/2" * 5-1/2" * 5-1/2"	1-1/2"	11,571	17,357
	S14-1-1/2"	3/4" * 5-1/4" * 7"		13,020	19,530
	S16-1-1/2"	1" * 5-1/4" * 8"		15,052	22,577
	S18-1-1/2"	1" * 5-1/2" * 9"		18,489	27,734
	S25-1-1/2"	1-1/4" * 5-1/2" * 12"		25,052	37,577
	For 5/8" through 1-1/4" Rod				
For Walls 6X and Up	L18-1-1/4"	1/2" * 5-1/2" * 5-1/2"	1-1/2"	19,292	28,938
	L20-1-1/4"	5/8" * 5-1/2" * 6"		19,779	29,669
	L25-1-1/4"	3/4" * 5-1/2" * 5-1/2"		24,936	37,403
	L30-1-1/4"	1" * 5-1/2" * 9"		30,092	45,138
	L33-1-1/4"	1" * 5-1/2" * 10"		33,529	50,294
	L37-1-1/4"	1-1/4" * 5-1/2" * 11"		36,967	55,450
	L40-1-1/4"	1-1/4" * 5-1/2" * 12"		40,404	60,607
	For 1-1/4" through 1-1/2" Rod				
	L18-1-1/2"	1/2" * 5-1/2" * 5-1/2"	2"	18,915	28,373
	L20-1-1/2"	5/8" * 5-1/2" * 6"		19,427	29,140
	L25-1-1/2"	3/4" * 5-1/2" * 5-1/2"		24,583	36,874
	L30-1-1/2"	1" * 5-1/2" * 9"		29,739	44,609
	L33-1-1/2"	1" * 5-1/2" * 10"		33,177	49,765
	L37-1-1/2"	1-1/4" * 5-1/2" * 11"		36,614	54,921
	L40-1-1/2"	1-1/4" * 5-1/2" * 12"		40,052	60,077
	For 1-1/2" through 2" Rod				
	L18-2"	1/2" * 5-1/2" * 5-1/2"	2"	17,965	26,947
	L20-2"	5/8" * 5-1/2" * 6"		18,537	27,805
	L25-2"	3/4" * 5-1/2" * 5-1/2"		23,693	35,540
	L30-2"	1" * 5-1/2" * 9"		28,849	43,274
	L33-2"	1" * 5-1/2" * 10"		32,287	48,430
	L37-2"	1-1/4" * 5-1/2" * 11"		35,724	53,587
	L40-2"	1-1/4" * 5-1/2" * 12"		39,162	58,743
Sill Plate Washers	Sill Plate Washers				
	SS-3/4"	1/4" * 3" * 3"	3/4"	5,964	8,945
	S1-1"	3/8" * 5-1/2" * 5-1/2"	1"	7,863	11,795
	S7A-1-1/4"	3/8" * 5-1/2" * 5-1/2"	1-1/4"	7,540	11,311
	PW-12	1/2" * 4" * 4"	1-1/2"	9,627	14,440
	PW-14	1/2" * 4" * 4"	1-3/4"	9,174	13,761
	PW-16	1/2" * 4" * 4"	2"	8,654	12,980

AutoTight Bearing Plate Schedule Notes:
Material:
1. Steel bearing plates are ASTM A36 Steel.
2. Number signifies approximate allowable bearing capacities in kips for DFL (625 psi) perpendicular to grain.
3. The following multiplier is used o reduce allowable load for other wood species.
   Southern Pine (SYP, 565 psi)) 0.90
   Spruce-Pine-Fir (SPF, 425 psi) x 0.68
   Hemlock-Fir (HF, 405 psi) x 065
4. Additional bearing plates sizes may be used for special high load requirements

Fabrication:
1. The surface area of all bearing plates must have full contact on the supporting wood members.
2. S series plates fit 4x and 6x walls.
3. L series plates fit 6x walls only.
4. See Table for Rod Sized to math Plates.
5. Bearing plate locations per Holdown Run elevations on ATS11.
6. Plates may be upgraded to higher capacity plates on a case by case basis if they fit.



12 Typ. Take-Up Device Install

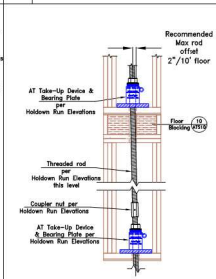


* Removal of activation screw or pin prior to wall closure is REQUIRED to activate the AT Take-Up Device.

Aluminum AT: Tighten nut finger tight, remove activation pin on Side & listen for "Quality Click".

Steel AT: Tighten nut finger tight, remove activation screw on Side.

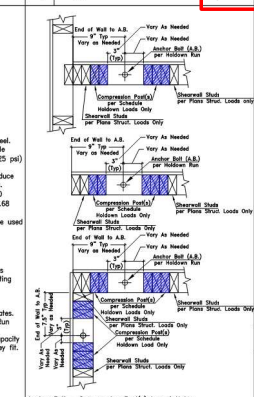
13 Allowable Rod Offset



Rod Offset Notes:
1. Rod must move freely through holes after assembly.

14

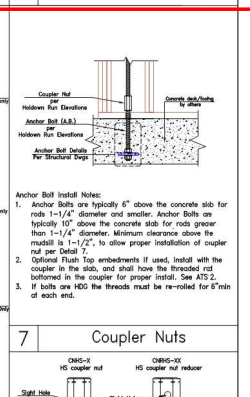
4 Typ. A. B. – Post Layout



Anchor Bolt – Compression Post(s) Layout Notes:
1. Anchor Bolt (A.B.) layouts above are typical, but may not apply to all locations. Check Structural Plans for other specific Anchor Bolt location details.
2. Details of structural stud arrangements per EOR.
3. Typical clearance between the compression post, reative to the rod i, is 3" (6" total between post).
   Minimum clearance is 1-3/4" to the rod i, (3-1/2" total between post) for 1/4" clearance around AT Take-Up Device.
   Maximum distance between posts can be up to 10' or more at the discretion of the engineer.
4. Rod clearance hole shall be 1/4" to 1/2" oversized.
5. Some levels may require a bearing plate wider than 6". Check all floor/level compression post and bearing plates layout dimensions per Holdown Run Elevations to verify Anchor Bolt location.
6. When there are 3 or more compression posts, place 2 of the end of the shearwall and the remainder between the rod and the middle of the shearwall.
7. When 6 or more 2x posts are stacked, either place some in the next bay or adjust end bay spacing to fit. See Commins Catalog.
8. Blue marked Posts are to resist Holdown Systm reaction forces Only. White marked Studs are to resist structural loads Only.

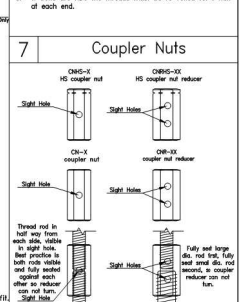
15 Steel Beam Start (SES)

6 Typ. Anchor Bolt Coupler



Anchor Bolt Install Notes:
1. Anchor Bolts are typically 6" above the concrete slab for rods 1-1/4" diameter and smaller. Anchor Bolts are typically 10" above the concrete slab for rods greater than 1-1/4" diameter. Minimum clearance above the mudsill is 1-1/2", to allow proper installation of coupler nut per Detail 7.
2. Optional Flush Top embedments if used, install with the coupler in the slab, and shall have the threaded rod bottomed in the coupler for proper install. See ATS 2.
3. If bolts are HDG the threads must be re-rolled for 6"min at each end.

7 Coupler Nuts



Coupler Nut Notes:
1. The rod shall be threaded in half way from each side and be visible in the sight hole(s).
2. "X" in part # is the size in 1/8's of an inch

18

19

20

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☐ Rejected
☐ Not Required for Review
☐ Furnish as Corrected
☐ Revise and Resubmit
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kpff KPFF Consulting Engineers
Date 03/18/2019
By SLC

AutoTight™ Holdown System
www.comminsmfg.com
by Commins Manufacturing, Inc.
960B Guard St., Friday Harbor, WA 98250
T: 360.378.9484 F: 360.378.9485

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 18,519 OREGON JULY 10, 1995 MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2019

No.	Revision	Date

Drawn:	Check:	Date:
TFB	tbd	03/04/19

18-1871
Argyle Housing
2133 N. Argyle Street
Portland, OR 97217

Holdown Run Details
Not to Scale

ATS10

\\PRISERVER\Company\Sales\Projects\18-1871 Argyle\Submittal\18-1871 Argyle Housing ATS10 Holdown Run Details 03-04-19.dwg, Oregon 2014, %<\AcVar Date "%#c">%

NOTES:

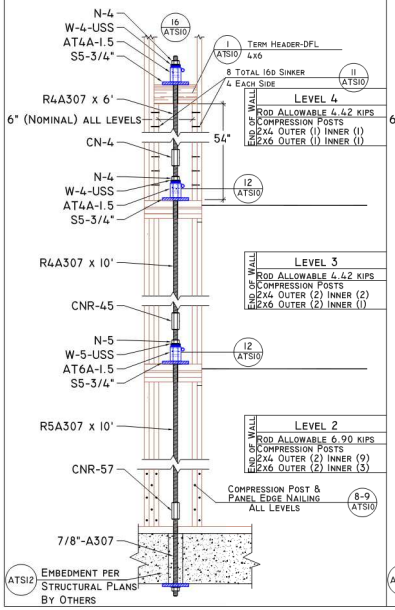
1. INSTALL ALL AT'S WITH ACTIVATION PINS, WITH ACTIVATION PIN END UP. INSTALL ALL AT'S WITH ACTIVATION SCREWS WITH THE ACTIVATION SCREW END DOWN.
2. ANY BEARING PLATE SPECIFIED MAY BE REPLACED WITH ANY BEARING PLATE THAT HAS AN EQUAL OR HIGHER LOAD RATING AND COMPATIBLE ROD DIAMETER.
3. EOR MUST VERIFY THAT ALL L TYPE (WIDE) PLATES ARE LOCATED IN 6X OR WIDER WALLS.
4. COMPRESSION POSTS ARE PER COMPRESSION LOADS ON PLANS S7.06.
5. COMPRESSION POST SIZES & COUNTS ARE FOR ALL BUILDING LOADS INCLUDING HOLDOWN SYSTEM REACTION FORCE LOADS PLUS STRUCTURAL GRAVITY LOADS
6. COMPRESSION POSTS MAY BE ARRANGED AS DESIRED BY THE BUILDER AS LONG AS:
   A. THE TOTAL POST QUANTITY IS THE SAME AS OR GREATER THAN THE QUANTITY LISTED HERE.
   B. AND THERE IS AT LEAST 1 POST ON EACH SIDE OF EACH ROD.
   C. COMPRESSION POST WOOD SPECIES & GRADE IS DFL #2 OR BETTER.
   D. COMPRESSION POST LENGTHS SHOWN IN SCHEDULE ARE FOR CALCULATION PURPOSES ONLY. FRAMER IS RESPONSIBLE FOR ACTUAL POST LENGTHS.
   E. COMPRESSION POST NAIL COUNT IS TOTAL FOR THE WHOLE LAMINATED STACK.
8. CONCRETE ANCHOR RODS SHALL EXTEND 12" MINIMUM ABOVE CONCRETE U.N.O.
9. ISOLATOR BUSHINGS ARE NOT REQUIRED IF BORATE IS USED TO PRESSURE TREAT SILL PLATES.
10. INSTALL TERM HEADER FLAT TO FILL WALL WIDTH. DO NOT NAIL. IT NEEDS TO FLOAT AS BUILDING SHRINKS AND SETTLES.
11. RODS LISTED AS G55 ARE F1554 GRADE 55. RODS LISTED AS G36 ARE F1554 GRADE 36. RODS LISTED AS G105 ARE F1554 GRADE 105.
12. IN MOST CASES EACH SHEAR WALL IS SECURED BY THE HARDWARE FROM THE FLOOR ABOVE ACTING THROUGH FLOOR PLATES AND BEARING BLOCKS.
    EXCEPTION: MID-FLOOR TERMINATIONS (OFTEN THE TOP FLOOR) IS SECURED THROUGH A TERMINATION HEADER AND NAILED TRIMMER STUDS.
13. THIS DRAWING IS NOT TO SCALE.
14. ROD DIAMETER IS DESIGNATED BY THE NUMBER AFTER R IN THE PART NAME IN 1/8TH'S OF AN INCH. I.E. R5=5/8" AND R10=1-1/4".
15. LOADS ARE DESIGNATED IN ASD

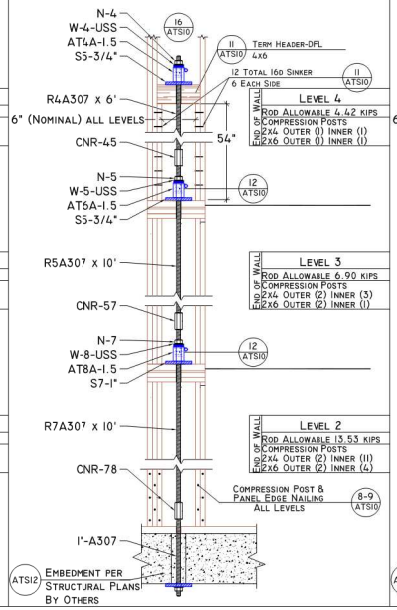
AT SUBSTITUTION NOTES:

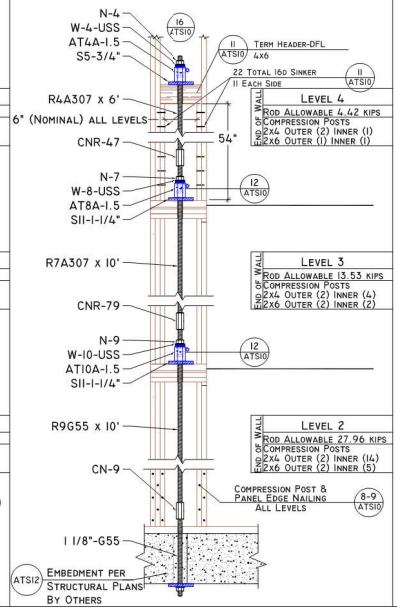
1. ANY AT SPECIFIED MAY BE REPLACED WITH ANY OTHER AT THAT HAS A LOAD RATING EQUAL TO OR HIGHER THAN THE LOAD REQUIRED, TAKE-UP TRAVEL EQUAL TO OR HIGHER THAN THE SHRINKAGE REQUIRED AND IS COMPATIBLE WITH THE ROD DIAMETER.
2. AT4A-1.5 MAY BE REPLACED WITH AT6A-1.5 OR AT 75 AT SUPPLIER'S DISCRETION.
3. AT6A-1.5 MAY BE REPLACED WITH AT 75 AT SUPPLIER'S DISCRETION.
4. AT8A MAY BE REPLACED WITH AT 100 OR AT10A AT SUPPLIER'S DISCRETION.
5. AT10A MAY BE REPLACED WITH AT12A OR AT 125 AT SUPPLIER'S DISCRETION.

City Of Portland
REVIEWED FOR CODE COMPLIANCE
Date: 04/18/19
See Approval Letter Dated 04/18/19

A	B	C







☒ Reviewed ☐ Furnish as Corrected
☐ Rejected ☐ Revise and Resubmit
☐ Not Required for Review ☐ Submit Specified Item

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kpff Consulting Engineers

Date 03/18/2019

By SLC

AutoTight® Holdown System
www.comminsmfg.com
BY COMMINS MANUFACTURING, INC.
960B GUARD ST., FRIDAY HARBOR, WA 98250
T: 360.378.9484 F: 360.373.9485

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER
18,519
OREGON
JULY 10, 1995
MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2019

No.	Revision	Date

DRAWN:	TFB	CHECK:	TBD	DATE: 3/4/19

18-1871
ARGYLE HOUSING
2133 N. ARGYLE STREET
PORTLAND, OR 97217

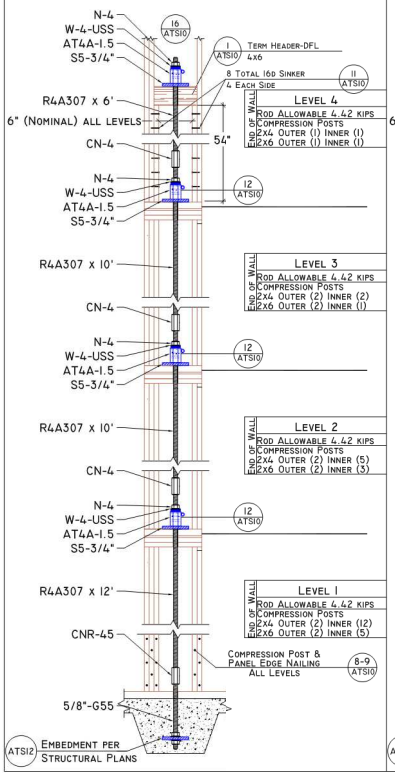
Holdown Run Elevations
Not to Scale

ATSII
SH 1

NOTES:
1. SEE SHEET 1 FOR GENERAL NOTES.

City Of Portland
REVIEWED FOR CODE COMPLIANCE
Date: 04/18/19
Permit #: 18-235478-DFS-01-CO

D



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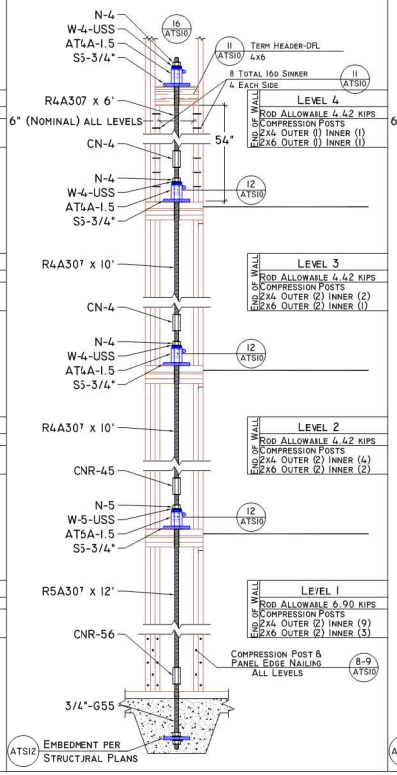

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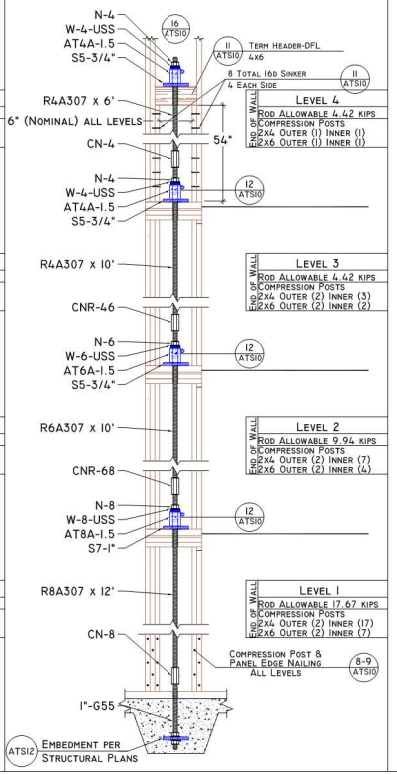

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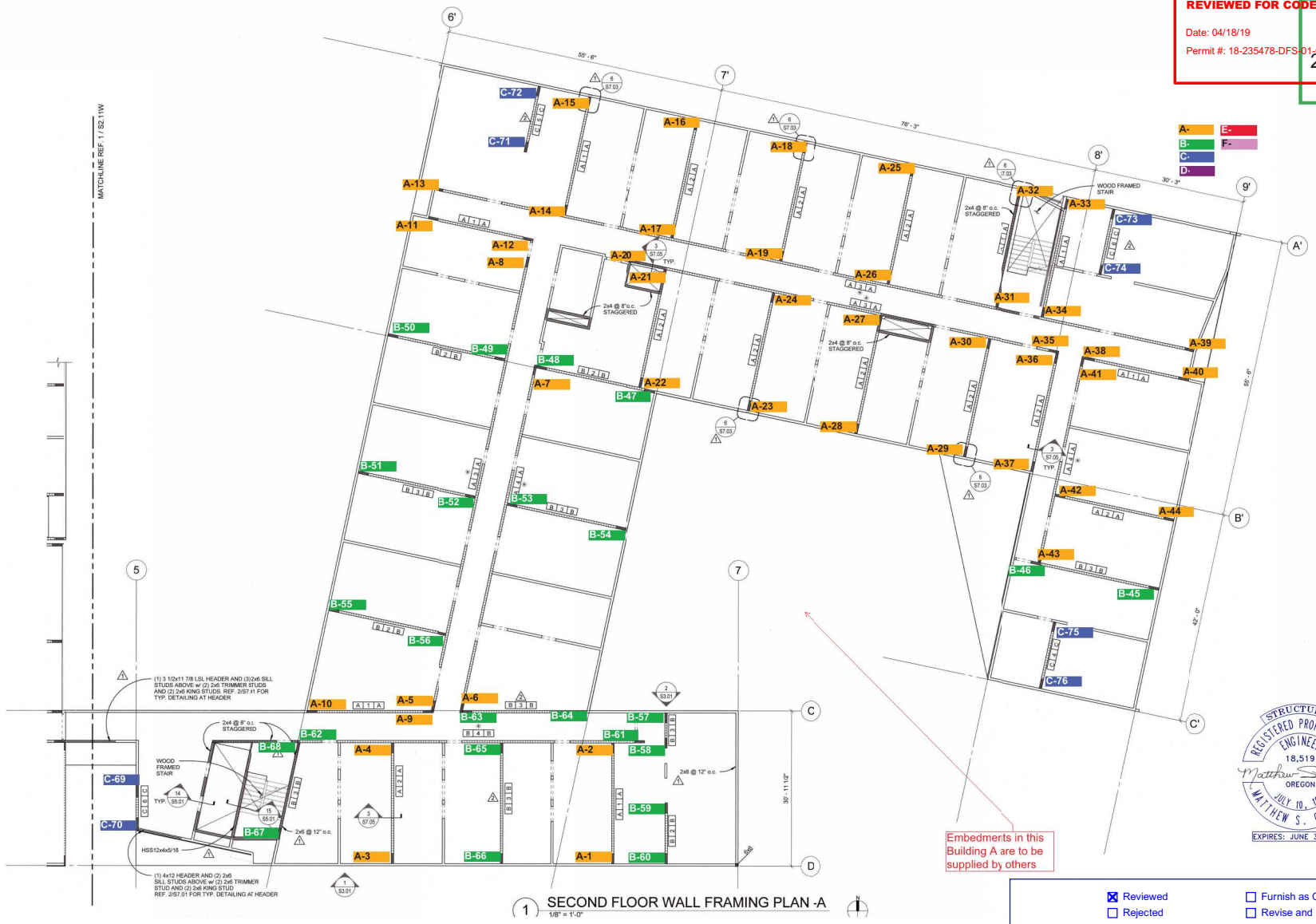
STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 18,519 OREGON JULY 10, 1998 MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2019

No.	Revision	Date

DRAWN:	TFB	CHECK:	TBD	DATE:	3/4/19

18-1871
ARGYLE HOUSING
2133 N. ARGYLE STREET
PORTLAND, OR 97217

Holdown Run Elevations
Not to Scale
ATSII
SH 2



1 SECOND FLOOR WALL FRAMING PLAN -A

1/8" = 1'-0"

City Of Portland

REVIEWED FOR CODE COMPLIANCE

Date: 04/18/19

Permit #: 18-235478-DFS-01-CO

18-1871
Argyle Housing
2133 N. Argyle Street
Portland, OR 97217

AutoTight Tie-Down System

Run Locator

Date: 03/04/19

The Run Location overlay seen on this sheet were placed by:
Commins Manufacturing, Inc.

These plans originally generated by:
KPFF

Page number of original plans for reference:
S2.01W
01/22/19

Commins Manufacturing, Inc.
9648 Guard Street
Friday Harbor, WA 98250
360-378-9484
Comminsmfg.com
Autotight@comminsmfg.com

AutoTight® by Commins Manufacturing
Continuous Rod Tie-Down System
Run Locator Sheet

RL-1A

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 18,519 OREGON JULY 10, 1995 MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2019

The Purpose of the Run Locator Sheet is to determine the tie-down Run type needed for a particular shear wall location.

The marking in the colored icons contain the run types found on the sheets AT11, and run ID numbers.

Example: 5A-123 = Run 5A..... ID number 123

This in NOT a dimensional layout to determine where the run will be located in the wall. Wall layout is the responsibility of others.

- [x] Reviewed
- [ ] Furnish as Corrected
- [ ] Rejected
- [ ] Revise and Resubmit
- [ ] Not Required for Review
- [ ] Submit Specified Item

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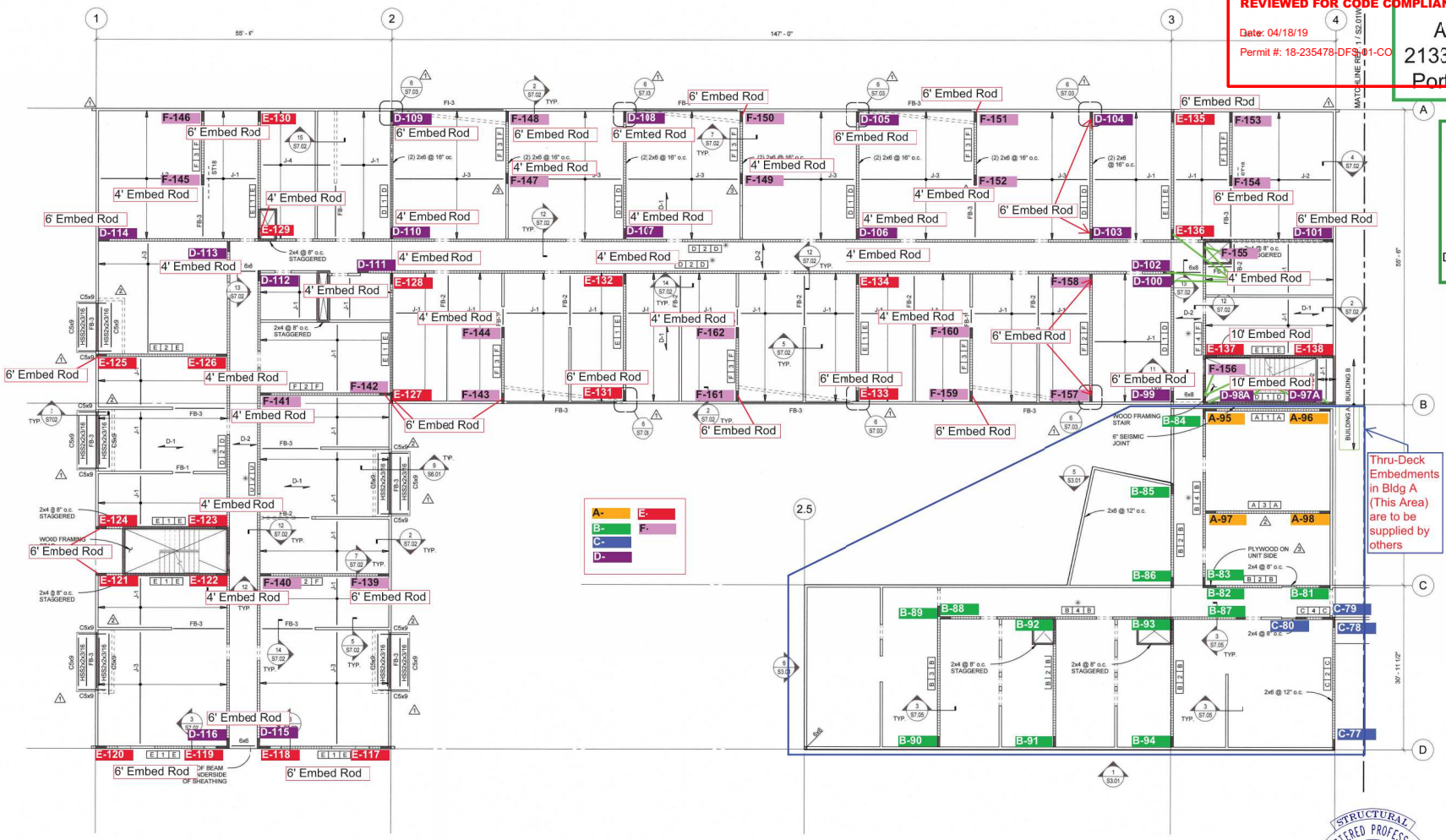
kpff

KPFF Consulting Engineers

Date 03/18/2019

By SLC



1 SECOND FLOOR PLAN - B WOOD
1/8" = 1'-0"

City Of Portland
REVIEWED FOR CODE COMPLIANCE
Date: 04/18/19
Permit #: 18-235478-DFS-01-CO

18-1871
Argyle Housing
2133 N. Argyle Street
Portland, OR 97217

AutoTight Tie-Down System
Run Locator
Date: 03/04/19

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These plans originally generated by:
KPFF
Page number of original plans for reference:
S2.11W
01/22/19

Commins Manufacturing, Inc.
960B Guard Street
Friday Harbor, WA 98250
360-378-9484
Comminsmfg.com
Autotight@comminsmfg.com

AutoTight® by Commins Manufacturing Continuous Rod Tie-Down System Run Locator Sheet

RL-2B

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 18,519 OREGON JULY 10, 1996 MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2017

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kpff
KPFF Consulting Engineers
Date 03/18/2019
By SLC

WALSH CONSTRUCTION CO.

BUILDING VALUE | www.walshconstruction.com

Submittal Sheet

111916- Argyle Apartments - Kenton

Submittal #: 061000-01
Description: Product Data-Holdowns & Anchor Bolts
Revision No:
Priority: Critical

Spec Section: 061000 - Rough Carpentry

Date Submitted: 3/11/2019
Date Due: 3/20/2019

Details: Holdown-Run details, Elevations, Anchor Bolt Details, Calculation Package, Load Table

---

Walsh Review:

Project Name: 111916- Argyle Apartments - Kenton
Submittal Package #:
Submittal ID #: 061000-01
Date Submitted: 3/11/19
Spec Section: 061000
Sub/Supplier: WMX Construction, LLC

The review by WALSH CONSTRUCTION CO/OR ("Walsh")of the above Submittal is subject to the Contract Documents and Shall not relieve the Subcontractor/Supplier from any of its obligations under the agreement with Walsh nor give rise to any claim in favor of the Subcontractor/Supplier or third parties against Walsh or Owner.

By: Scott Rascoe
WALSH CONSTRUCTION CO/OR

Architect Review:

MWA Architects
70 NW Couch Street, Suite 401
Portland, OR 97209

Other Review:

☒ Reviewed ☐ Furnish as Corrected
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kpff

KPFF Consulting Engineers
Date 03/18/2019
By SLC

Notes:

PORTLAND, OREGON
2905 SW First Ave, Portland, OR 97201
O 503.222.4375 | F 503.274.7676
ORCCB147267/WALSHCC962LD

SEATTLE, WASHINGTON
315 Fifth Ave S, Suite 600, Seattle, WA 98104
O 206.547.4008 | F 206.547.3804
WALSHCC990D1

TACOMA, WASHINGTON
301 S 28th St, Tacoma, WA 98402
O 253.572.4245
WALSHCC990D1

AutoTight Tie-Down Systems

Commins Manufacturing 360-378-9484

Submittal Cover Sheet with Latest Documents List

Cover Sheet Date:	03/04/19	Rev 0	
Project:	Argyle Housing		
Project Number:	18-1871		

Document File Name	Revision	Rev Date	Changed Today?
18-1871 Argyle Housing ATS10 Holdown Run Details 03-04-19.pdf	0	3/4/2019	New
18-1871 Argyle Housing ATS11 Holdown Run Elevations 03-04-19.dwg Sheet 1.pdf	0	3/4/2019	New
18-1871 Argyle Housing ATS11 Holdown Run Elevations 03-04-19.dwg Sheet 2.pdf	0	3/4/2019	New
18-1871 Argyle Housing ATS12 Anchor Bolt Details 03-04-19.pdf	0	3/4/2019	New
18-1871 Argyle Housing RL-1A 03-04-19.pdf	0	3/4/2019	New
18-1871 Argyle Housing RL-2B 03-04-19.pdf	0	3/4/2019	New
18-1871 Argyle Housing Calc Package 03-04-19.pdf (incl: Compression Posts, Catalog Pages, ESR-1344)	0	3/4/2019	New
18-1871 Argyle Housing Load Table 03-04-19.pdf	0	3/4/2019	New

GRALUND ENGINEERING, INC.

Digitally signed by Matthew Gralund
Reason: I have reviewed this document
Date: 2019.03.08 17:09:38-08'00'

AutoTight® Rod Holdown System

System Design for

Argyle Housing

☒ Reviewed ☐ Furnish as Corrected
☐ Rejected ☐ Revise and Resubmit
☐ Not Required for Review ☐ Submit Specified Item

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe and satisfactory manner.

kpff
KPFF Consulting Engineers
Date 03/18/2019
By SLC

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER
18,519
OREGON
JULY 10, 1996
MATTHEW S. GRALUND
EXPIRES: JUNE 30, 2019

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Prepared for

Wood Mechanix (WMX Construction)

prepared by Tom Boydston
Commins Project ID # 18-1871

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 03/04/2019

(1) Key to Calculation Table

THIS PAGE SAMPLE RUN ONLY

AutoTight® System Run Design Calc. Sheet for: (2) **Project Name**
Engineering Calcs Revision: 1 **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	

(7) (9)

	Run Specifications Required Loads:	(8) Component Commins AutoTight	(10) Description	(11) Capacity (kips)	(12) Demand (kips)	(13) D/C Ratio	(14) Elong. (in.)	
(15)	Level = 2	Component	Description	Capacity	Demand	D/C	Elong.	
(16)	Differential Load: 4.00 (kips)	AT 125	Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.10**	**0.50**	**45.5%**	-	(22)
(17)	Tension Load: 20.00 (kips)	AT 125	Shrinkage Device (1-1/4" I.D.) - Allowable Load	34.50	4.00	11.6%	-	(23)
(18)	Compression: 20.00 (kips)	-	Shrinkage Device - Deflection at Load	-	-	-	0.002	(24)
(19)	Story Height: 12.50 (ft.)	-	Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.002	(25)
(20)	Plate Height: 11.33 (ft.)	S8L	Bearing Plate at Reaction Point	7.96	4.00	50.2%	0.020	(26)
(21)	Floor Depth: 14.00 (in.)	R9	1-1/8"-A307 Tension Rod	22.37	20.00	89.4%	0.125	(27)
		-	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 Wood	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)
	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 componenent 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: **Argyle Housing**
Engineering Calcs Revision: 0 **Plan Set: Construction Set** **Plan Set Date: 01/22/2019**

Permit #							CAT ID #	18-1871		
Run Name:	**A**						Tensile Strength			Calc'd
Run Specifications Required Loads:			Component Commins AutoTight		Description		Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Level = Level 3			Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	1.00 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	1.00 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load		6.45	1.00	15.5%	-
Compression:	5.00 (kips)		-		Shrinkage Device - Deflection at Load		-	-	-	0.002
Story Height:	8.54 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	9.79 (ft.)		S5-3/4"		Bearing Plate at Reaction Point		5.96	1.00	16.8%	0.007
			R4A307		1/2"-A307 Tension Rod		4.42	1.00	22.6%	0.015
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**4.42**	**1.00**	**22.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**12.0%**	**0.024**
Compression	Outer	(1) 2x4	(1) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		6.56	5.00	76.2%	-
Wood	Posts	(1) 2x6	(1) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		10.31	5.00	48.5%	-

Level = Level 2			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	1.50 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.50"**	**33.3%**	-
Tension Load:	2.50 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	1.50	23.3%	-
Compression:	12.50 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.003
Story Height:	9.79 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	9.79 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	1.50	25.2%	0.010
			R4A307		1/2"-A307 Tension Rod	4.42	2.50	56.6%	0.068
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**2.50**	**56.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**40.5%**	**0.081**
Compression	Outer	(2) 2x4	(2) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	13.12	12.50	95.3%	-
Wood	Posts	(2) 2x6	(1) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	15.47	12.50	80.8%	-

Level = Level 1			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	4.00 (kips)		AT6A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.25"**	**16.7%**	-
Tension Load:	6.50 (kips)		AT6A-1.5		Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	10.55	4.00	37.9%	-
Compression:	25.00 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.005
Story Height:	9.79 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	12.00 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	4.00	67.1%	0.027
			R5A307		5/8"-A307 Tension Rod	6.90	6.50	94.2%	0.110
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**6.90**	**6.50**	**94.2%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**71.5%**	**0.143**
Compression	Outer	(2) 2x4	(9) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	25.59	25.00	97.7%	-
Wood	Posts	(2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	25.00	97.0%	-

Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	6.50 (kips)	R7A307	7/8"-A307 Anchor Rod	13.53	6.50	48.0%	n/a

Design Code: OSSC_2014 IBC_2012 Main/State/Local
Loads per: S7.06 01/22/2019
Loads Type: ASD
Steel Stess Increase: No
Takeup Device at Each Level: Yes — Take Off Revision: 2 Eng
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 S0.03
Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 6, Allowable load = 1.13 kips, Total load = 1.00 kips, D/C = 88.2% .

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for: **Argyle Housing**
Engineering Calcs Revision: 0 **Plan Set: Construction Set** **Plan Set Date: 01/22/2019**

Permit #							CAT ID #	18-1871		
Run Name:	**B**						Tensile Strength			Calc'd
Run Specifications		Component			Description		Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:		Commins AutoTight								
Level = Level 3		Component			Description		Capacity	Demand	D/C	Elong.
Differential Load:	2.00 (kips)	AT4A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	2.00 (kips)	AT4A-1.5			Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load		6.45	2.00	31.0%	-
Compression:	5.50 (kips)	-			Shrinkage Device - Deflection at Load		-	-	-	0.004
Story Height:	8.54 (ft.)	-			Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	9.79 (ft.)	S5-3/4"			Bearing Plate at Reaction Point		5.96	2.00	33.5%	0.013
		R4A307			1/2"-A307 Tension Rod		4.42	2.00	45.2%	0.028
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**4.42**	**2.00**	**45.2%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**23.0%**	**0.046**
Compression	Outer (1) 2x4	(1) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet		6.56	5.50	83.8%	-
Wood	Posts (1) 2x6	(1) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet		10.31	5.50	53.3%	-

Level = Level 2		Component			Description		Capacity	Demand	D/C	Elong.
Differential Load:	3.50 (kips)	AT6A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.50"**	**0.50"**	**33.3%**	-
Tension Load:	5.50 (kips)	AT6A-1.5			Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load		10.55	3.50	33.2%	-
Compression:	13.50 (kips)	-			Shrinkage Device - Deflection at Load		-	-	-	0.005
Story Height:	9.79 (ft.)	-			Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	9.79 (ft.)	S5-3/4"			Bearing Plate at Reaction Point		5.96	3.50	58.7%	0.023
		R5A307			5/8"-A307 Tension Rod		6.90	5.50	79.7%	0.092
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**6.90**	**5.50**	**79.7%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**60.5%**	**0.121**
Compression	Outer (2) 2x4	(3) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet		16.41	13.50	82.3%	-
Wood	Posts (2) 2x6	(1) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet		15.47	13.50	87.3%	-

Level = Level 1		Component			Description		Capacity	Demand	D/C	Elong.
Differential Load:	7.00 (kips)	AT8A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.75"**	**0.25"**	**14.3%**	-
Tension Load:	12.50 (kips)	AT8A-1.5			Shrinkage Device (1" I.D.) - Allowable Load		20.73	7.00	33.8%	-
Compression:	28.50 (kips)	-			Shrinkage Device - Deflection at Load		-	-	-	0.001
Story Height:	9.79 (ft.)	-			Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	12.00 (ft.)	S7-1"			Bearing Plate at Reaction Point		7.86	7.00	89.0%	0.036
		R7A307			7/8"-A307 Tension Rod		13.53	12.50	92.4%	0.107
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**13.53**	**12.50**	**92.4%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**72.0%**	**0.144**
Compression	Outer (2) 2x4	(11) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet		30.24	28.50	94.2%	-
Wood	Posts (2) 2x6	(4) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet		30.94	28.50	92.1%	-

Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	12.50 (kips)	R8A307	1"-A307 Anchor Rod	17.67	12.50	70.7%	n/a

Design Code: OSSC_2014 IBC_2012 Main/State/Local
Loads per: S7.06 01/22/2019
Loads Type: ASD
Steel Stess Increase: No
Takeup Device at Each Level: Yes — Take Off Revision: 2 Eng
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 S0.03
Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 12, Allowable load = 2.27 kips, Total load = 2.00 kips, D/C = 88.2% .

AutoTight® Holdown System

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AutoTight® System Run Design Calc. Sheet for: **Argyle Housing**
Engineering Calcs Revision: 0 **Plan Set: Construction Set** **Plan Set Date: 01/22/2019**

Permit #							CAT ID #	18-1871		
Run Name:	**C**						Tensile Strength			Calc'd
Run Specifications		Component			Description		Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:		Commins AutoTight								
Level = Level 3		Component			Description		Capacity	Demand	D/C	Elong.
Differential Load:	4.00 (kips)	AT4A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	4.00 (kips)	AT4A-1.5			Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load		6.45	4.00	62.0%	-
Compression:	7.00 (kips)	-			Shrinkage Device - Deflection at Load		-	-	-	0.009
Story Height:	8.54 (ft.)	-			Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	9.79 (ft.)	S5-3/4"			Bearing Plate at Reaction Point		5.96	4.00	67.1%	0.027
		R4A307			1/2"-A307 Tension Rod		4.42	4.00	90.5%	0.051
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**4.42**	**4.00**	**90.5%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**43.0%**	**0.086**
Compression	Outer (2) 2x4	(1) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet		9.84	7.00	71.1%	-
Wood	Posts (1) 2x6	(1) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet		10.31	7.00	67.9%	-

Level = Level 2		Component			Description		Capacity	Demand	D/C	Elong.
Differential Load:	8.00 (kips)	AT8A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.75"**	**0.50"**	**28.6%**	-
Tension Load:	12.00 (kips)	AT8A-1.5			Shrinkage Device (1" I.D.) - Allowable Load		20.73	8.00	38.6%	-
Compression:	19.00 (kips)	-			Shrinkage Device - Deflection at Load		-	-	-	0.002
Story Height:	9.79 (ft.)	-			Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	9.79 (ft.)	S11-1-1/4"			Bearing Plate at Reaction Point		11.95	8.00	67.0%	0.027
		R7A307			7/8"-A307 Tension Rod		13.53	12.00	88.7%	0.100
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**13.53**	**12.00**	**88.7%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**64.5%**	**0.129**
Compression	Outer (2) 2x4	(4) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet		19.69	19.00	96.5%	-
Wood	Posts (2) 2x6	(2) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet		20.62	19.00	92.1%	-

Level = Level 1		Component			Description		Capacity	Demand	D/C	Elong.
Differential Load:	10.50 (kips)	AT10A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.63"**	**0.25"**	**15.3%**	-
Tension Load:	22.50 (kips)	AT10A-1.5			Shrinkage Device (1-1/4" I.D.) - Allowable Load		28.07	10.50	37.4%	-
Compression:	35.00 (kips)	-			Shrinkage Device - Deflection at Load		-	-	-	0.007
Story Height:	9.79 (ft.)	-			Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	12.00 (ft.)	S11-1-1/4"			Bearing Plate at Reaction Point		11.95	10.50	87.9%	0.035
		R9G55			1 1/8"-G55 Tension Rod		27.96	22.50	80.5%	0.119
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**11.95**	**10.50**	**87.9%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**81.0%**	**0.162**
Compression	Outer (2) 2x4	(14) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet		37.22	35.00	94.0%	-
Wood	Posts (2) 2x6	(5) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet		36.09	35.00	97.0%	-

Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	22.50 (kips)	R9G55	1 1/8"-G55 Anchor Rod	27.96	22.50	80.5%	n/a

Design Code: OSSC_2014 IBC_2012 Main/State/Local
Loads per: S7.06 01/22/2019
Loads Type: ASD
Steel Stess Increase: No
Takeup Device at Each Level: Yes — Take Off Revision: 2 Eng
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 S0.03
Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 22, Allowable load = 4.16 kips, Total load = 4.00 kips, D/C = 96.2% .
Rod Alloys: G36 Rod is F1554 Grade 36, G55 Rod is F1554 Grade 55, G105 Rod is F1554 Grade 105

AutoTight® System Run Design Calc. Sheet for: **Argyle Housing**

Engineering Calcs Revision: 0 **Plan Set: Construction Set** **Plan Set Date: 01/22/2019**

Permit #							CAT ID #	18-1871		
Run Name:	**D**						Tensile Strength			Calc'd
Run Specifications			Component		Description		Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:			Commins AutoTight							
Level = Level 4			Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	1.00 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.50"**	**1.00"**	**66.7%**	
Tension Load:	1.00 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load		6.45	1.00	15.5%	-
Compression:	5.00 (kips)		-		Shrinkage Device - Deflection at Load		-	-	-	0.002
Story Height:	8.54 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	8.54 (ft.)		S5-3/4"		Bearing Plate at Reaction Point		5.96	1.00	16.8%	0.007
			R4A307		1/2"-A307 Tension Rod		4.42	1.00	22.6%	0.015
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**4.42**	**1.00**	**22.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**12.0%**	**0.024**
Compression	Outer	(1) 2x4	(1) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		6.56	5.00	76.2%	-
Wood	Posts	(1) 2x6	(1) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		10.31	5.00	48.5%	-

Level = Level 3			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	0.00 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	1.00 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	0.00	0.0%	-
Compression:	13.00 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.000
Story Height:	9.79 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	n/a
Plate Height:	9.79 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	0.00	0.0%	0.000
			R4A307		1/2"-A307 Tension Rod	4.42	1.00	22.6%	0.029
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**1.00**	**22.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**14.5%**	**0.029**
Compression	Outer	(2) 2x4	(2) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	13.12	13.00	99.1%	-
Wood	Posts	(2) 2x6	(1) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	15.47	13.00	84.0%	-

Level = Level 2			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	0.00 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.50"**	**33.3%**	-
Tension Load:	1.00 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	0.00	0.0%	-
Compression:	21.50 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.000
Story Height:	9.79 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	n/a
Plate Height:	9.79 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	0.00	0.0%	0.000
			R4A307		1/2"-A307 Tension Rod	4.42	1.00	22.6%	0.029
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**1.00**	**22.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**14.5%**	**0.029**
Compression	Outer	(2) 2x4	(5) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	22.97	21.50	93.6%	-
Wood	Posts	(2) 2x6	(3) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	25.78	21.50	83.4%	-

Level = Level 1			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	0.00 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.25"**	**16.7%**	-
Tension Load:	1.00 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	0.00	0.0%	-
Compression:	32.50 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.000
Story Height:	12.00 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	n/a
Plate Height:	12.00 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	0.00	0.0%	0.000
			R4A307		1/2"-A307 Tension Rod	4.42	1.00	22.6%	0.034
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**1.00**	**22.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**17.0%**	**0.034**
Compression	Outer	(2) 2x4	(12) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	32.56	32.50	99.8%	-
Wood	Posts	(2) 2x6	(5) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	36.09	32.50	90.1%	-

Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	1.00 (kips)	R5G55	5/8"-G55 Anchor Rod	8.63	1.00	11.6%	n/a

Design Code: OSSC_2014 IBC_2012 Main/State/Local
Loads per: S7.06 01/22/2019
Loads Type: ASD
Steel Stess Increase: No
Takeup Device at Each Level: Yes — Take Off Revision: 2 Eng
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 S0.03
Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 6, Allowable load = 1.13 kips, Total load = 1.00 kips, D/C = 88.2% .
Rod Alloys: G36 Rod is F1554 Grade 36, G55 Rod is F1554 Grade 55, G105 Rod is F1554 Grade 105

AutoTight® System Run Design Calc. Sheet for: **Argyle Housing**

Engineering Calcs Revision: 0 **Plan Set: Construction Set** **Plan Set Date: 01/22/2019**

Permit #							CAT ID #	18-1871		
Run Name:	**E**						Tensile Strength			Calc'd
Run Specifications Required Loads:			Component Commins AutoTight			Description	Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Level = Level 4			Component			Description	Capacity	Demand	D/C	Elong.
Differential Load:	1.00 (kips)		AT4A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**1.00"**	**66.7%**	
Tension Load:	1.00 (kips)		AT4A-1.5			Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	1.00	15.5%	-
Compression:	5.00 (kips)		-			Shrinkage Device - Deflection at Load	-	-	-	0.002
Story Height:	8.54 (ft.)		-			Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	8.54 (ft.)		S5-3/4"			Bearing Plate at Reaction Point	5.96	1.00	16.8%	0.007
			R4A307			1/2"-A307 Tension Rod	4.42	1.00	22.6%	0.015
						Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**1.00**	**22.6%**	-
						Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**12.0%**	**0.024**
Compression	Outer	(1) 2x4	(1) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet	6.56	5.00	76.2%	-
Wood	Posts	(1) 2x6	(1) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet	10.31	5.00	48.5%	-

Level = Level 3			Component			Description	Capacity	Demand	D/C	Elong.
Differential Load:	0.00 (kips)		AT4A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	1.00 (kips)		AT4A-1.5			Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	0.00	0.0%	-
Compression:	10.50 (kips)		-			Shrinkage Device - Deflection at Load	-	-	-	0.000
Story Height:	9.79 (ft.)		-			Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	n/a
Plate Height:	9.79 (ft.)		S5-3/4"			Bearing Plate at Reaction Point	5.96	0.00	0.0%	0.000
			R4A307			1/2"-A307 Tension Rod	4.42	1.00	22.6%	0.029
						Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**1.00**	**22.6%**	-
						Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**14.5%**	**0.029**
Compression	Outer	(2) 2x4	(2) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet	13.12	10.50	80.0%	-
Wood	Posts	(2) 2x6	(1) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet	15.47	10.50	67.9%	-

Level = Level 2			Component			Description	Capacity	Demand	D/C	Elong.
Differential Load:	1.50 (kips)		AT4A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.50"**	**33.3%**	-
Tension Load:	2.50 (kips)		AT4A-1.5			Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	1.50	23.3%	-
Compression:	16.50 (kips)		-			Shrinkage Device - Deflection at Load	-	-	-	0.003
Story Height:	9.79 (ft.)		-			Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	9.79 (ft.)		S5-3/4"			Bearing Plate at Reaction Point	5.96	1.50	25.2%	0.010
			R4A307			1/2"-A307 Tension Rod	4.42	2.50	56.6%	0.069
						Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**2.50**	**56.6%**	-
						Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**41.0%**	**0.082**
Compression	Outer	(2) 2x4	(4) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet	19.69	16.50	83.8%	-
Wood	Posts	(2) 2x6	(2) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet	20.62	16.50	80.0%	-

Level = Level 1			Component			Description	Capacity	Demand	D/C	Elong.
Differential Load:	3.00 (kips)		AT6A-1.5			Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.25"**	**16.7%**	-
Tension Load:	5.50 (kips)		AT6A-1.5			Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	10.55	3.00	28.4%	-
Compression:	25.00 (kips)		-			Shrinkage Device - Deflection at Load	-	-	-	0.004
Story Height:	12.00 (ft.)		-			Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	12.00 (ft.)		S5-3/4"			Bearing Plate at Reaction Point	5.96	3.00	50.3%	0.020
			R5A307			5/8"-A307 Tension Rod	6.90	5.50	79.7%	0.118
						Limiting Component Tension Load Capacity, Load and D/C Ratio	**6.90**	**5.50**	**79.7%**	-
						Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**71.0%**	**0.142**
Compression	Outer	(2) 2x4	(9) 2x4	Inner		4x Wall Compression Post per Comp Post Calc Sheet	25.59	25.00	97.7%	-
Wood	Posts	(2) 2x6	(3) 2x6	Posts		6x Wall Compression Post per Comp Post Calc Sheet	25.78	25.00	97.0%	-

Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	5.50 (kips)	R6G55	3/4"-G55 Anchor Rod	12.43	5.50	44.3%	n/a

Design Code: OSSC_2014 IBC_2012 Main/State/Local
Loads per: S7.06 01/22/2019
Loads Type: ASD
Steel Stess Increase: No
Takeup Device at Each Level: Yes — Take Off Revision: 2 Eng
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 S0.03
Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 6, Allowable load = 1.13 kips, Total load = 1.00 kips, D/C = 88.2% .
Rod Alloys: G36 Rod is F1554 Grade 36, G55 Rod is F1554 Grade 55, G105 Rod is F1554 Grade 105

AutoTight® System Run Design Calc. Sheet for: **Argyle Housing**

Engineering Calcs Revision: 0 **Plan Set: Construction Set** **Plan Set Date: 01/22/2019**

Permit #							CAT ID #	18-1871		
Run Name:	**F**						Tensile Strength			Calc'd
Run Specifications			Component		Description		Capacity (kips)	Demand (kips)	D/C Ratio	Elong. (in.)
Required Loads:			Commins AutoTight							
Level = Level 4			Component		Description		Capacity	Demand	D/C	Elong.
Differential Load:	1.00 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)		**1.50"**	**1.00"**	**66.7%**	
Tension Load:	1.00 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load		6.45	1.00	15.5%	-
Compression:	6.00 (kips)		-		Shrinkage Device - Deflection at Load		-	-	-	0.002
Story Height:	8.54 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR		-	-	-	0.000
Plate Height:	8.54 (ft.)		S5-3/4"		Bearing Plate at Reaction Point		5.96	1.00	16.8%	0.007
			R4A307		1/2"-A307 Tension Rod		4.42	1.00	22.6%	0.015
					Limiting Component Tension Load Capacity, Load and D/C Ratio		**4.42**	**1.00**	**22.6%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation		**0.200**	-	**12.0%**	**0.024**
Compression	Outer	(1) 2x4	(1) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet		6.56	6.00	91.5%	-
Wood	Posts	(1) 2x6	(1) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet		10.31	6.00	58.2%	-

Level = Level 3			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	2.50 (kips)		AT4A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.75"**	**50.0%**	-
Tension Load:	3.50 (kips)		AT4A-1.5		Shrinkage Device - 1.5" (1/2" I.D.) - Allowable Load	6.45	2.50	38.8%	-
Compression:	16.00 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.005
Story Height:	9.79 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	9.79 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	2.50	41.9%	0.017
			R4A307		1/2"-A307 Tension Rod	4.42	3.50	79.2%	0.093
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**4.42**	**3.50**	**79.2%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**57.5%**	**0.115**
Compression	Outer	(2) 2x4	(3) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	16.41	16.00	97.5%	-
Wood	Posts	(2) 2x6	(2) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	20.62	16.00	77.6%	-

Level = Level 2			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	4.00 (kips)		AT6A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.50"**	**0.50"**	**33.3%**	-
Tension Load:	7.50 (kips)		AT6A-1.5		Shrinkage Device - 1.5" (3/4" I.D.) - Allowable Load	10.55	4.00	37.9%	-
Compression:	27.50 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.005
Story Height:	9.79 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	9.79 (ft.)		S5-3/4"		Bearing Plate at Reaction Point	5.96	4.00	67.1%	0.027
			R6A307		3/4"-A307 Tension Rod	9.94	7.50	75.5%	0.087
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**9.94**	**7.50**	**75.5%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**59.5%**	**0.119**
Compression	Outer	(2) 2x4	(7) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	29.53	27.50	93.1%	-
Wood	Posts	(2) 2x6	(4) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	30.94	27.50	88.9%	-

Level = Level 1			Component		Description	Capacity	Demand	D/C	Elong.
Differential Load:	7.00 (kips)		AT8A-1.5		Shrinkage at Level, Shrinkage Device travel & D/C Ratio (in.)	**1.75"**	**0.25"**	**14.3%**	-
Tension Load:	14.50 (kips)		AT8A-1.5		Shrinkage Device (1" I.D.) - Allowable Load	20.73	7.00	33.8%	-
Compression:	42.50 (kips)		-		Shrinkage Device - Deflection at Load	-	-	-	0.001
Story Height:	12.00 (ft.)		-		Shrinkage Device - Travel and Seating Increment ΔR	-	-	-	0.000
Plate Height:	12.00 (ft.)		S7-1"		Bearing Plate at Reaction Point	7.86	7.00	89.0%	0.036
			R8A307		1"-A307 Tension Rod	17.67	14.50	82.1%	0.119
					Limiting Component Tension Load Capacity, Load and D/C Ratio	**7.86**	**7.00**	**89.0%**	-
					Maximum Allowed Level Elongation, D/C Ratio and Total Level Elongation	**0.200**	-	**78.0%**	**0.156**
Compression	Outer	(2) 2x4	(17) 2x4	Inner	4x Wall Compression Post per Comp Post Calc Sheet	44.19	42.50	96.2%	-
Wood	Posts	(2) 2x6	(7) 2x6	Posts	6x Wall Compression Post per Comp Post Calc Sheet	46.40	42.50	91.6%	-

Level = Footing		Component	Description	Capacity	Demand	D/C	Elong.
Tension Load:	14.50 (kips)	R8G55	1"-G55 Anchor Rod	22.09	14.50	65.6%	n/a

Design Code: OSSC_2014 IBC_2012 Main/State/Local
Loads per: S7.06 01/22/2019
Loads Type: ASD
Steel Stess Increase: No
Takeup Device at Each Level: Yes
Take Off Revision: 2 Eng
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 S0.03
Compression Post Nail Qty: Allowable per 16d Sinker in DFL = 189, Qty nails = 6, Allowable load = 1.13 kips, Total load = 1.00 kips, D/C = 88.2% .
Rod Alloys: G36 Rod is F1554 Grade 36, G55 Rod is F1554 Grade 55, G105 Rod is F1554 Grade 105

AutoTight® Mid Wall Termination Header Design Calculations for: Argyle Housing

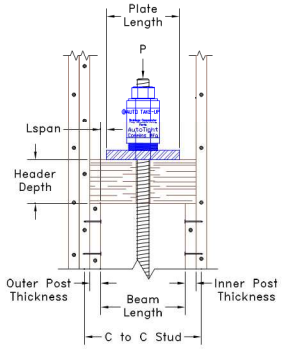
Take Off Revision: 2 Eng Calcs Revision: 0 Plan Set: Construction Set Plan Date: 01/22/2019 **CAT Project ID: 18-1871**

Code:OSSC_2014 IBC_2012 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
Run: A					S5-3/4" = Bearing Plate Name												
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	3.50	5.50	1,000	625	17.65	11,029	9.1%	4x Wall
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	5.50	3.50	1,000	625	11.23	7,018	14.2%	6x Wall
Bending above:																	
Shear:				7.00	3.00		Shear Load Fraction =		0.00	3.50	5.50	0	625	Shear	16,042	0.0%	4x Wall
Shear:				7.00	3.00		Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Compression:		1.50	1.50				Bearing Area per end =		10.50	3.50		1,000	625	Comp.	6,563	15.2%	4x Wall
Compression:		1.50	1.50				Bearing Area per end =		16.50	5.50		1,000	625	Comp.	10,313	9.7%	6x Wall
Run: B					S5-3/4" = Bearing Plate Name												
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	3.50	5.50	2,000	625	17.65	11,029	18.1%	4x Wall
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	5.50	3.50	2,000	625	11.23	7,018	28.5%	6x Wall
Bending above:																	
Shear:				7.00	3.00		Shear Load Fraction =		0.00	3.50	5.50	0	625	Shear	16,042	0.0%	4x Wall
Shear:				7.00	3.00		Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Compression:		1.50	1.50				Bearing Area per end =		10.50	3.50		2,000	625	Comp.	6,563	30.5%	4x Wall
Compression:		1.50	1.50				Bearing Area per end =		16.50	5.50		2,000	625	Comp.	10,313	19.4%	6x Wall
Run: C					S5-3/4" = Bearing Plate Name												
16.00	7.25	3.00	1.50	7.00	3.00	1.50	2.00	DFL	4x6	3.50	5.50	4,000	625	17.65	11,029	36.3%	4x Wall
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	5.50	3.50	4,000	625	11.23	7,018	57.0%	6x Wall
Bending above:																	
Shear:				7.00	3.00		Shear Load Fraction =		0.00	3.50	5.50	0	625	Shear	16,042	0.0%	4x Wall
Shear:				7.00	3.00		Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Compression:		3.00	1.50				Bearing Area per end =		15.75	3.50		4,000	625	Comp.	9,844	40.6%	4x Wall
Compression:		1.50	1.50				Bearing Area per end =		16.50	5.50		4,000	625	Comp.	10,313	38.8%	6x Wall
Run: D					S5-3/4" = Bearing Plate Name												
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	3.50	5.50	1,000	625	17.65	11,029	9.1%	4x Wall
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	5.50	3.50	1,000	625	11.23	7,018	14.2%	6x Wall
Bending above:																	
Shear:				7.00	3.00		Shear Load Fraction =		0.00	3.50	5.50	0	625	Shear	16,042	0.0%	4x Wall
Shear:				7.00	3.00		Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Compression:		1.50	1.50				Bearing Area per end =		10.50	3.50		1,000	625	Comp.	6,563	15.2%	4x Wall
Compression:		1.50	1.50				Bearing Area per end =		16.50	5.50		1,000	625	Comp.	10,313	9.7%	6x Wall
Run: E					S5-3/4" = Bearing Plate Name												
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	3.50	5.50	1,000	625	17.65	11,029	9.1%	4x Wall
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	5.50	3.50	1,000	625	11.23	7,018	14.2%	6x Wall
Bending above:																	
Shear:				7.00	3.00		Shear Load Fraction =		0.00	3.50	5.50	0	625	Shear	16,042	0.0%	4x Wall
Shear:				7.00	3.00		Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Compression:		1.50	1.50				Bearing Area per end =		10.50	3.50		1,000	625	Comp.	6,563	15.2%	4x Wall
Compression:		1.50	1.50				Bearing Area per end =		16.50	5.50		1,000	625	Comp.	10,313	9.7%	6x Wall
Run: F					S5-3/4" = Bearing Plate Name												
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	3.50	5.50	1,000	625	17.65	11,029	9.1%	4x Wall
16.00	7.25	1.50	1.50	7.00	3.00	1.50	2.00	DFL	4x6	5.50	3.50	1,000	625	11.23	7,018	14.2%	6x Wall
Bending above:																	
Shear:				7.00	3.00		Shear Load Fraction =		0.00	3.50	5.50	0	625	Shear	16,042	0.0%	4x Wall
Shear:				7.00	3.00		Shear Load Fraction =		0.00	5.50	3.50	0	625	Shear	16,042	0.0%	6x Wall
Compression:		1.50	1.50				Bearing Area per end =		10.50	3.50		1,000	625	Comp.	6,563	15.2%	4x Wall
Compression:		1.50	1.50				Bearing Area per end =		16.50	5.50		1,000	625	Comp.	10,313	9.7%	6x 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*a/∠
   where a= Lspan & 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."
   fv=3*V/2*b*d where fv=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

Argyle Housing

18-1871

Level Name	Run Name	A		B		C		D		E		F	
	Wall Size	4x Wall		4x Wall		4x Wall		4x Wall		4x Wall		4x Wall	
	Post Location	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner
Level 4	Post Size							2x4	2x4	2x4	2x4	2x4	2x4
	Post Qty							1	1	1	1	1	1
	Post Length inches							54.00		54.00		54.00	
	Required Load kips							5.00		5.00		6.00	
	Allowable Load kips							6.56		6.56		6.56	
	Limiting Failure Mode							Crushing		Crushing		Crushing	
Level 3	Post Size	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
	Post Qty	1	1	1	1	2	1	2	2	2	2	2	3
	Post Length inches	54.00		54.00		54.00		112.25		112.25		112.25	
	Required Load kips	5.00		5.50		7.00		13.00		10.50		16.00	
	Allowable Load kips	6.56		6.56		9.84		13.12		13.12		16.41	
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	
Level 2	Post Size	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
	Post Qty	2	2	2	3	2	4	2	5	2	4	2	7
	Post Length inches	112.25		112.25		112.25		112.25		112.25		112.25	
	Required Load kips	12.50		13.50		19.00		21.50		16.50		27.50	
	Allowable Load kips	13.12		16.41		19.69		22.97		19.69		29.53	
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	
Level 1	Post Size	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
	Post Qty	2	9	2	11	2	14	2	12	2	9	2	17
	Post Length inches	137.75		137.75		137.75		137.75		137.75		137.75	
	Required Load kips	25.00		28.50		35.00		32.50		25.00		42.50	
	Allowable Load kips	25.59		30.24		37.22		32.56		25.59		44.19	
	Limiting Failure Mode	Buckling		Buckling		Buckling		Buckling		Buckling		Buckling	

Notes:

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

Office: 360-378-9484

AutoTight® Holdown Systems

by Commins Manufacturing

Compression Post Schedule 6x Wall

Argyle Housing

18-1871

Level Name	Run Name	A		B		C		D		E		F	
	Wall Size	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
Level 4	Post Size							2x6	2x6	2x6	2x6	2x6	2x6
	Post Qty							1	1	1	1	1	1
	Post Length inches							54.00		54.00		54.00	
	Required Load kips							5.00		5.00		6.00	
	Allowable Load kips							10.31		10.31		10.31	
	Limiting Failure Mode							Crushing		Crushing		Crushing	
Level 3	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
	Post Qty	1	1	1	1	1	1	2	1	2	1	2	2
	Post Length inches	54.00		54.00		54.00		112.25		112.25		112.25	
	Required Load kips	5.00		5.50		7.00		13.00		10.50		16.00	
	Allowable Load kips	10.31		10.31		10.31		15.47		15.47		20.62	
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	
Level 2	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
	Post Qty	2	1	2	1	2	2	2	3	2	2	2	4
	Post Length inches	112.25		112.25		112.25		112.25		112.25		112.25	
	Required Load kips	12.50		13.50		19.00		21.50		16.50		27.50	
	Allowable Load kips	15.47		15.47		20.62		25.78		20.62		30.94	
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	
Level 1	Post Size	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
	Post Qty	2	3	2	4	2	5	2	5	2	3	2	7
	Post Length inches	137.75		137.75		137.75		137.75		137.75		137.75	
	Required Load kips	25.00		28.50		35.00		32.50		25.00		42.50	
	Allowable Load kips	25.78		30.94		36.09		36.09		25.78		46.40	
	Limiting Failure Mode	Crushing		Crushing		Crushing		Crushing		Crushing		Crushing	

Notes:

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

Office: 360-378-9484

AutoTight® Holdown Systems

by Commins Manufacturing

AutoTight® Component Hardware

Section 3: Tie-Down System Components:

Threaded Rod, Bearing plates, TUDs, Couplers, Nuts & Washers.

"Tighter Connections, Stronger Buildings"

Since 2000

Threaded rod, Bearing Plates and TUDs (Take-Up Devices) are separated into ASD & LRFD Load capacities for the convenience of designers.
Nuts & Couplers are industry standard to match rods and apply to both ASD & LRFD.

06-18-18

Components: AutoTight® Rod

Rod Holdown systems use continuous threaded rod. Typical lengths 2', 3', 4', 6', 10', and 12'.

Rod is specified by diameter, in 1/8" increments, grade, and length.

Examples:

R5-A307 X 10' =
Rod, 5/8" Dia., Grade A307, 10' (120").

R9-B7 X 12' =
Rod, 1-1/8" Dia., ASTM A193-B7, 12' (144").

Finish: Standard Black or zinc plated.
Optional Hot Dip Galvanized (HDG)
Note: HDG rod thread must be chased to fit standard nuts & couplers or modified couplers used.

Standard Thread is Unified National Coarse (UNC). Rod is available from 3/8" (R3) to 2" (R16) diameter.

Strength: AISC 360, 14th ed. and ICC AC 391-3.2.1.1.

Code Acceptance: Tensile Values per IBC 2015, IBC 2012, IBC 2009, as specified in AISC 360 14th edition.

Note: ICC ES AC 391-3.2.1.1 recognizes the increased elongation fully threaded rod (rolled threads) provides compared to solid rod with cut threads. See Rod Table note 3.

Rod Grade Identification

Calculating Elongation

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

When using a rod table:
1. Select rod for strength;
2. Calculate rod elongation at required load & rod length.
3. Compare the elongation to requirements.
4. Increase rod diameter to reduce elongation.

Special Note: Rod elongation.
Per AC391, 3.2.1.1, rod elongation is calculated:

Δ Rod = PL/AnE where:

P=Load, L=length,
An=0.7854 (D-0.9743/n)^2,
(An is precalculated in tables)
D = nominal rod dia. n = threads per inch,
E = elastic modulus = 29,000,000.

Note: the code required formula is identical to the AISC calculation, PL/AE, **except** AISC didn't include material lost through threading. But almost all threaded rod is rolled from a reduced diameter blank rod. Both "All Thread" or "Smooth Shank" rod have the same net diameter, net area and same elongation. Using the full diameter verses actual area in calculations vs can understate drift by 26 to 38%.
Exception: If full diameter rod is used and the threads are cut then elongation for full area rod can be used for 60% to 75% of the rod length. HS rod is not stiffer than standard strength.

High Strength rod is identified with a stamp on the rod end as follows:
Plain for A307, A36 & F1554G36
"55" for F1554G55,
"105" for F1554G105,
"B7" for A193-B7 and F1554 Gr. 105

ASD

	Diameter & Thread	Rod ID	A307		Rod Area
		Model	ASD Allowable Tension (lb)	Elongation (in. per 10' at full load)	Stress Area (for Elongation)
Standard Strength	1/2"-13 UNC	R4-A307	4,418	0.129	0.142
	5/8"-11 UNC	R5-A307	6,903	0.126	0.226
	3/4"-10 UNC	R6-A307	9,940	0.123	0.334
	7/8"-9 UNC	R7-A307	13,530	0.121	0.462
	1"-8 UNC	R8-A307	17,671	0.121	0.606
	1-1/8"-7 UNC	R9-A307	22,365	0.121	0.763
	1-1/4"-7 UNC	R10-A307	27,612	0.118	0.969
	1-3/8"-6 UNC	R11-A307	33,410	0.120	1.155
	1-1/2"-6 UNC	R12-A307	39,761	0.117	1.405
	1-3/4"-5 UNC	R14-A307	54,119	0.118	1.899
	2"-4.5 UNC	R16-A307	70,686	0.117	2.498

	Diameter & Thread	Rod ID	F1554 Grade 55		Rod Area
		Model	ASD Allowable Tension (lb)	Elongation (in. per 10' at full load)	Stress Area (for Elongation)
Standard Strength +	1/2"-13 UNC	R4-G55	5,522	0.161	0.142
	5/8"-11 UNC	R5-G55	8,629	0.158	0.226
	3/4"-10 UNC	R6-G55	12,425	0.154	0.334
	7/8"-9 UNC	R7-G55	16,912	0.152	0.462
	1"-8 UNC	R8-G55	22,089	0.151	0.606
	1-1/8"-7 UNC	R9-G55	27,957	0.152	0.763
	1-1/4"-7 UNC	R10-G55	34,515	0.147	0.969
	1-3/8"-6 UNC	R11-G55	41,763	0.150	1.155
	1-1/2"-6 UNC	R12-G55	49,701	0.146	1.405
	1-3/4"-5 UNC	R14-G55	67,649	0.147	1.899
	2"-4.5 UNC	R16-G55	88,357	0.146	2.498

	Diameter & Thread	Rod ID	A193-B7		Rod Area
		Model	ASD Allowable Tension (lb)	Elongation (in. per 10' at full load)	Stress Area (for Elongation)
High Strength	1/2"-13 UNC	R4-B7	9,204	0.268	0.142
	5/8"-11 UNC	R5-B7	14,381	0.263	0.226
	3/4"-10 UNC	R6-B7	20,709	0.256	0.334
	7/8"-9 UNC	R7-B7	28,187	0.253	0.462
	1"-8 UNC	R8-B7	36,816	0.251	0.606
	1-1/8"-7 UNC	R9-B7	46,595	0.253	0.763
	1-1/4"-7 UNC	R10-B7	57,524	0.246	0.969
	1-3/8"-6 UNC	R11-B7	69,604	0.249	1.155
	1-1/2"-6 UNC	R12-B7	82,835	0.244	1.405
	1-3/4"-5 UNC	R14-B7	112,748	0.246	1.899
	2"-4.5 UNC	R16-B7	147,262	0.244	2.498

Material Properties:

1. ASTM A307 Fu = 60, Fy =43 ksi.
   ASTM F1554 Gr.55 Fu = 75, Fy =55 ksi.
   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.

2. ASD Allowable = P asd = 0.75 x Fu x Ag/2
   Per AISC 360 14th ed. Table 7.2 p.7-23,
   Table J3.2 p.16.1-120 &. J3-1 p.16.1-124
   LRFD Strength = P lrfd = 0.75 x 0.75 x Fu x Ag
   Per AISC 360 14th ed Tables 7.2 p.7-23
   & J3.2 p.16.1-120 & Eqn. J3-1p.16.1-124
   Where Ag = Nominal Area (Area of Nominal Thread Dia.) & Fu=ultimate Tensile Strength.
   Stress increase not allowed with AISC 14th.

3. Rod elongation is calculated per AC391 3.2.1.1 as follows:
   Δ Rod = PL/AnE where: P=Load, L=length, An=0.7854 (D-0.9743/n)^2, D = nominal rod dia, n = threads per inch,
   E = modulus = 29e6.
   Almost without exception threaded rod is rolled from the same diameter "coil" rod whether it is made as all-thread rod or as threaded ends only. The result is identical elongation for both all thread rod and threaded ends only.

4. Table elong. is for 120" at full rod load.

5. High Strength Rods are marked.

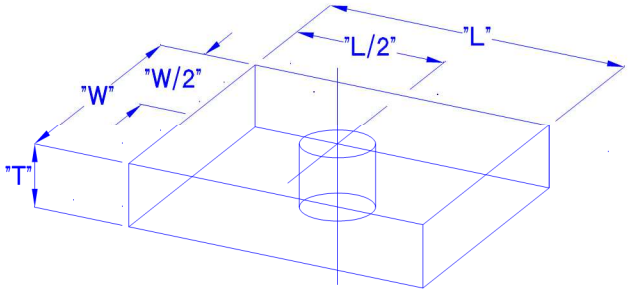
6. If you order A36 we will send A307, which is slightly stronger.

7. F1554 Gr. 105 which is identical to A193-B7.

Bearing Plates

Bearing plates distribute uplift loads into the structure at reaction points. AutoTight plates exceed the flexural requirements of AISC 360 (14th ed.) and wood bearing requirements of the 2015 NDS. (ICC ES AC391 Section 1.4.6, March 1, 2015)

Per the 2015 NDS, plate design deflection is 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 their rated capacity.
To select:
1. Determine the reaction load.
2. Select the smallest plate that can carry the reaction load.

Check that plates Fit: Rod dia. & Wall Width
(4X or 6X Wall)

Adjust for Actual Deformation
Wood deformation at the design load is linear. The load-deformation at the design load

$$\Delta = 0.040" * \text{design load} / \text{rated load}.$$

Example:
Reaction is 11,000 pounds on Douglas Fir.
Rod is 1-1/8" Ø.

Select an S11-1-1/4" bearing plate, rated capacity 11,948 pounds.

$$\Delta = 0.040 * 11{,}000 / 11{,}948 = 0.037"$$

For system deformation add the 0.037" to the rod and shrinkage compensator deformation plus Δr. (per AC 391, section 3.2.1.2)

Minimizing Total Deformation

To lower system deformation increase the size of the bearing plate.

Example:
If the reaction load is 11,000 pounds on Douglas Fir. (previous example) and an L20-1-1#4" plate is selected, plate deformation lowers to:

$$\Delta = 0.040" * 11{,}000 / 21{,}016 = 0.021"$$

Along with changing rod size, changing the bearing plate is the other method that lets you adjust total system deflection (elongation) to achieve a tight system.

The AutoTight Software uses drop down menus. This allows for a fast, easy change of rod, bearing plates or shrinkage compensators to achieve 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 A 36

Finish: S5 and S7 are HDG. Others are black steel

Bearing Plates				Allowable ASD Loads			
Wall Width	Model No.	T * W * L	Max. Rod Ø	ASD Allowable Load (@ 0.040" Cross Grain Crushing) DFL @ 625	HF @ 425	SYP @ 565	SPF @ 405
For Walls 4X and Up	S5 -3/4"	1/4" * 3" * 3"	3/4"	5,964	3,864	5,391	4,055
	For 1/2" through 1" Rod						
	S7 -1"	3/8" * 3-1/2" * 3-1/2"	1"	7,863	5,095	7,108	5,347
	For 3/4" through 1-1/4" Rod						
	S7 -1-1/4"	3/8" * 3-1/2" * 3-1/2"	1-1/4"	7,540	4,886	6,816	5,127
	S11 -1-1/4"	1/2" * 3-1/2" * 5-1/2"		11,948	7,742	10,801	8,125
	S16 -1-1/4"	1" * 3-1/4" * 8"		15,404	9,982	13,926	10,475
For Walls 6X and Up	L18 -1-1/4"	1/2" * 5-1/2" * 5-1/2"		19,292	12,501	17,440	13,119
	L20 -1-1/4"	5/8" * 5-1/2" * 6"		21,016	13,618	18,998	14,291
	L25 -1-1/4"	3/4" * 5-1/2" * 7-1/2"		24,936	16,158	22,542	16,956
	L30 -1-1/4"	1" * 5-1/2" * 9"		30,092	19,500	27,203	20,462
	L33 -1-1/4"	1" * 5-1/2" * 10"		33,529	21,727	30,311	22,800
	L37 -1-1/4"	1-1/4" * 5-1/2" * 11"		36,967	23,955	33,418	25,137
	L40 -1-1/4"	1-1/4" * 5-1/2" * 12"		40,404	26,182	36,526	27,475
	For 1-1/2" Rod						
	L18 -1-1/2"	1/2" * 5-1/2" * 5-1/2"	1-1/2"	18,915	12,257	17,099	12,862
	L20 -1-1/2"	5/8" * 5-1/2" * 6"		20,641	13,375	18,659	14,036
	L25 -1-1/2"	3/4" * 5-1/2" * 7-1/2"		24,583	15,930	22,223	16,716
	L30 -1-1/2"	1" * 5-1/2" * 9"		29,739	19,271	26,884	20,223
	L33 -1-1/2"	1" * 5-1/2" * 10"		33,177	21,498	29,992	22,560
	L37 -1-1/2"	1-1/4" * 5-1/2" * 11"		36,614	23,726	33,099	24,898
	L40 -1-1/2"	1-1/4" * 5-1/2" * 12"		40,052	25,953	36,207	27,235
	For 1-3/4" through 2" Rod						
	L18 -2"	1/2" * 5-1/2" * 5-1/2"	2"	17,965	11,641	16,240	12,216
	L20 -2"	5/8" * 5-1/2" * 6"		19,695	12,763	17,805	13,393
	L25 -2"	3/4" * 5-1/2" * 7-1/2"		23,693	15,353	21,419	16,111
	L30 -2"	1" * 5-1/2" * 9"		28,849	18,694	26,080	19,618
	L33 -2"	1" * 5-1/2" * 10"		32,287	20,922	29,187	21,955
	L37 -2"	1-1/4" * 5-1/2" * 11"		35,724	23,149	32,295	24,293
	L40 -2"	1-1/4" * 5-1/2" * 12"		39,162	25,377	35,402	26,630

Notes:
Plate ID includes maximum rod diameter. All rod clearance holes are 1/16" oversize.
Wood Bearing Capacity ASD per NDS 2015: DFL = 625, HF = 405, SPF = 425 psi. (Fc perp)
Wood Bearing Strength LRFD per NDS 2015: DFL = 939, HF = 608, SPF = 638 PSI (Fc perp lrfd) Table 4.3.1

Plate ASD Allowable Capacity = (Fc perp) * Bearing Area (per AC 391 3.2.1.2) at a deflection of 0.040".
Plate LRFD Strength=(Fc perp of the wood in LRFD)*Bearing Area (per AC 391 3.2.1.2) @ 0.040" deflection.
Bearing area factor, Cb, included in listed capacities. Deflection is 0.040" at Allowable Load. Bearing Plate bending based on ASTM A36 Steel, Fy = 36 ksi. per AISC 14th ed.

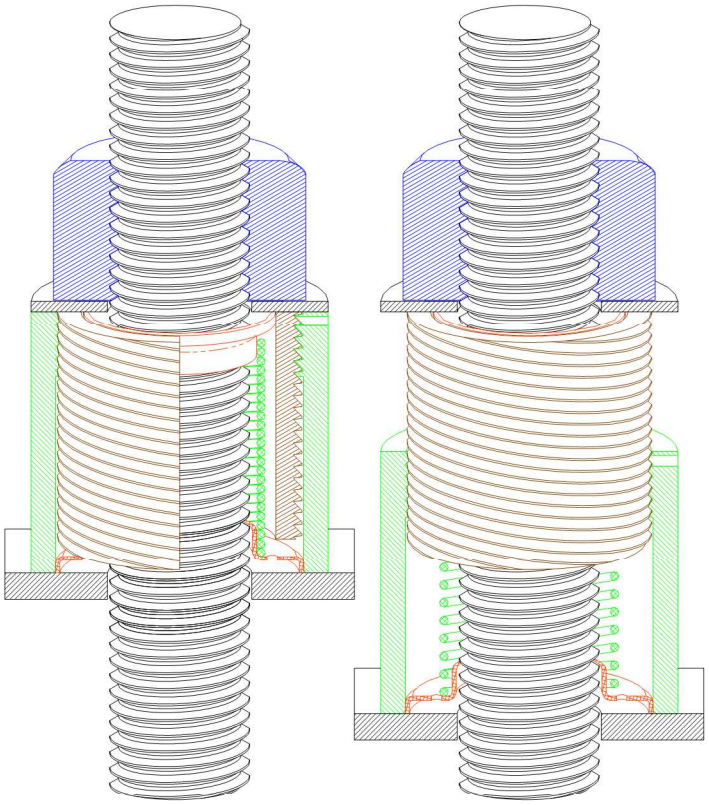
TUD's Take-Up Devices or
Shrinkage compensators require evaluation for: fit, strength, expansion and deflection.
Two code defined deflections **(ΔA)** and **(ΔR)** are required.

Load-deflection
(ΔA) = design load/actual load * Rated ΔA.
Delta R (ΔR) is always added in full to system deflection. Delta R is the internal slack.

Example: Reaction Load = 11,000 pounds

TUD = AT 100 (Select based on the rod size)
Rated Capacity: 25,300 pounds.
Deflection: ΔA = 0.032", ΔR = 0.002"
Expansion 1.2" (ICC ESR 1344)

Load/Deflection
(ΔA) = 0.032 * 11,000/25,300 = 0.014"
(ΔR) (From Table) = 0.002"
Total Deformation = 0.016"
Add total to the system elongation per AC 316 & AC 391 section 3.1.1.



US Patents 6,390747 & 6,585,469.
Other Patents foreign and domestic, pending.

AutoTight:

Tighter Systems
Better Performance

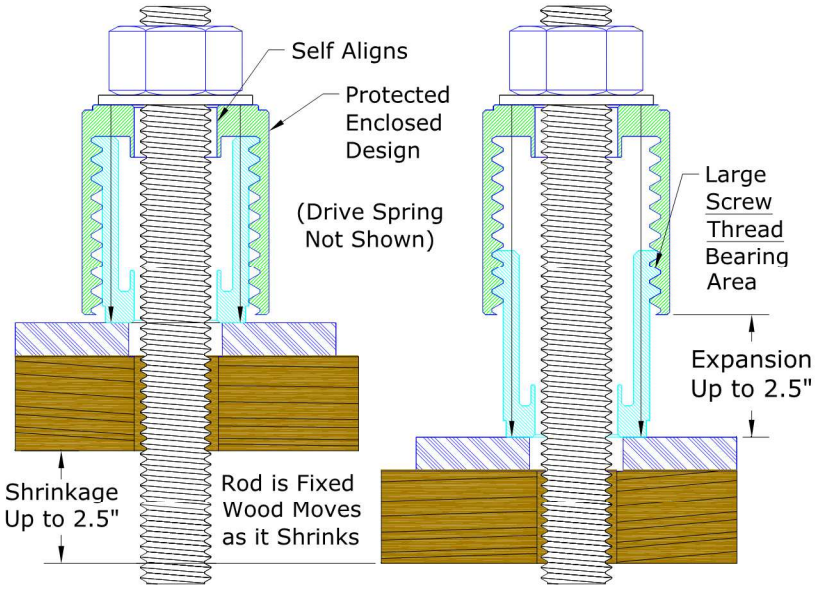
Rod Sizes up to 2" Ø

Robust,
Precise,
Protected
Mechanism

AutoTight® Component Hardware ASD

The AutoTight shrinkage compensator automatically expands, eliminates looseness.
Threaded Mechanism = NO Backlash (Δr) = No Looseness!

Code Listed:
ICC ESR-1344, COLA RR-25480, Tested to AC 316 & AC 391, IBC 2018 Rated



	Model Number	Rod Diameter (Max.)	Matl.	Dimensions (Inches) O.D.	Dimensions (Inches) H	Rated Take-Up (Inches)	Allowable Load Pounds	Δ_R (inches) Seating Increment	Δ_A (inches) Deflection at Allowable Load
	AT4A-1.5	1/2"	Aluminum	1-1/2	3.00	1.50	6,450	0.000*	0.011
	AT4A-2.5				4.06	2.50			
	AT6A-1.5	3/4"		2-1/8	3.19	1.50	10,550		0.011
	AT6A-2.5				4.19	2.50			
New	AT8A-1.5	1"		2-3/4	3.50	1.75	20,750	0.000*	0.004
New	AT10A-1.5	1-1/4"		3-1/4	3.50	1.62	28,050	0.000*	0.021
New	AT12A-1.5	1-1/2"		3-1/4	3.50	1.62	28,050	0.000*	0.021
New	AT16A-2.0	2"		4	3.50	2.07	39,450	0.001*	0.011
	AT 75	3/4"	Steel	2	2.80	1.10	16,450	0.002	0.024
	AT 75-2.5				4.00	2.50	15,200		0.021
	AT 100	1"		2-1/4	2.90	1.10	25,300		0.032
	AT 125	1-1/4"		2-3/4	2.86	1.10	34,500		0.016
New	AT 200-2.0	2"		4	3.88	2.18	83,200	0.000*	0.009

Note: ΔR= Average Travel and Seating Increment is the "Lost Motion" with device direction change from advancing to load resistance. This is sometimes called "Backlash".
*AutoTight Shrinkage Compensators shown as 0.000" have less than 0.0005" (Δr.)

Components: AutoTight® Rod

Rod Holdown systems use continuous threaded rod. Typical lengths 2', 3', 4', 6', 10', and 12'.

Rod is specified by diameter, in 1/8" increments, grade, and length. **Examples**:

R5-A307 X 10' =
Rod, 5/8" Dia., Grade A307, 10' (120").

R9-B7 X 12' =
Rod, 1-1/8" Dia., ASTM A193-B7, 12' (144").

Finish: Standard Black or zinc plated.
Optional Hot Dip Galvanized (HDG)
Note: HDG rod thread must be chased to fit standard nuts & couplers or modified couplers used.

Standard Thread is Unified National Coarse (UNC). Rod is available from 3/8" (R3) to 2" (R16) diameter.

Strength: AISC 360, 14th ed. and ICC AC 391-3.2.1.1.

Code Acceptance: Tensile Values per IBC 2015, IBC 2012, IBC 2009, as specified in AISC 360 14th edition.

Note: ICC ES AC 391-3.2.1.1 recognizes the increased elongation fully threaded rod (rolled threads) provides compared to solid rod with cut threads. See Rod Table note 3.

Rod Grade Identification

Calculating Elongation

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

When using a rod table:
1. Select rod for strength;
2. Calculate rod elongation at required load & rod length.
3. Compare the elongation to requirements.
4. Increase rod diameter to reduce elongation.

Special Note: Rod elongation.
Per AC391, 3.2.1.1, rod elongation is calculated:

Δ Rod = PL/AnE where:

P=Load, L=length,
An=0.7854 (D-0.9743/n)^2, (An is precalculated in tables)
D = nominal rod dia, n = threads per inch,
E = elastic modulus = 29,000,000.

Note: the code required formula is identical to the AISC calculation, PL/AE, **except** AISC didn't include material lost through threading. But almost all threaded rod is rolled from a reduced diameter blank rod. Both "All Thread" or "Smooth Shank" rod have the same net diameter, net area and same elongation. Using the full diameter verses actual area in calculations vs can understate drift by 26 to 38%.
Exception: If full diameter rod is used and the threads are cut then elongation for full area rod can be used for 60% to 75% of the rod length. HS rod is not stiffer than standard strength.

High Strength rod is identified with a stamp on the rod end as follows:

Plain for A307, A36 & F1554G36
"55" for F1554G55,
"105" for F1554G105,
"B7" for A193-B7 and F1554 Gr. 105

LRFD

	Diameter & Thread	Rod ID Model	A307 LRFD Load Tension (lb)	A307 Elongation (in. per 10' at full load)	Rod Area Net Tensile Stress Area
Standard Strength	1/2"-13 UNC	R4-A307	6,627	0.193	0.142
	5/8"-11 UNC	R5-A307	10,354	0.190	0.226
	3/4"-10 UNC	R6-A307	14,910	0.184	0.334
	7/8"-9 UNC	R7-A307	20,295	0.182	0.462
	1"-8 UNC	R8-A307	26,507	0.181	0.606
	1-1/8"-7 UNC	R9-A307	33,548	0.182	0.763
	1-1/4"-7 UNC	R10-A307	41,417	0.177	0.969
	1-3/8"-6 UNC	R11-A307	50,115	0.180	1.155
	1-1/2"-6 UNC	R12-A307	59,641	0.176	1.405
	1-3/4"-5 UNC	R14-A307	81,178	0.177	1.899
	2"-4.5 UNC	R16-A307	106,029	0.176	2.498

	Diameter & Thread	Rod ID Model	F1554 Grade 55 LRFD Load Tension (lb)	F1554 Grade 55 Elongation (in. per 10' at full load)	Rod Area Net Tensile Stress Area
Standard Strength +	1/2"-13 UNC	R4-G55	8,283	0.242	0.142
	5/8"-11 UNC	R5-G55	12,943	0.237	0.226
	3/4"-10 UNC	R6-G55	18,638	0.231	0.334
	7/8"-9 UNC	R7-G55	25,368	0.227	0.462
	1"-8 UNC	R8-G55	33,134	0.226	0.606
	1-1/8"-7 UNC	R9-G55	41,935	0.227	0.763
	1-1/4"-7 UNC	R10-G55	51,772	0.221	0.969
	1-3/8"-6 UNC	R11-G55	62,644	0.224	1.155
	1-1/2"-6 UNC	R12-G55	74,551	0.220	1.405
	1-3/4"-5 UNC	R14-G55	101,473	0.221	1.899
	2"-4.5 UNC	R16-G55	132,536	0.220	2.498

	Diameter & Thread	Rod ID Model	A193-B7[1] LRFD Load Tension (lb)	A193-B7[1] Elongation (in. per 10' at full load)	Rod Area Net Tensile Stress Area
High Strength	1/2"-13 UNC	R4-B7	13,806	0.403	0.142
	5/8"-11 UNC	R5-B7	21,572	0.395	0.226
	3/4"-10 UNC	R6-B7	31,063	0.384	0.334
	7/8"-9 UNC	R7-B7	42,280	0.379	0.462
	1"-8 UNC	R8-B7	55,223	0.377	0.606
	1-1/8"-7 UNC	R9-B7	69,892	0.379	0.763
	1-1/4"-7 UNC	R10-B7	86,286	0.368	0.969
	1-3/8"-6 UNC	R11-B7	104,407	0.374	1.155
	1-1/2"-6 UNC	R12-B7	124,252	0.366	1.405
	1-3/4"-5 UNC	R14-B7	169,121	0.368	1.899
	2"-4.5 UNC	R16-B7	220,893	0.366	2.498

Material Properties:

1. ASTM A307 Fu = 60, Fy = 43 ksi.,
   ASTM F1554 Gr.55 Fu = 75, Fy = 55,
   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.

2. ASD Allowable = P asd = 0.75 x Fu x Ag/2
   Per AISC 360 14th ed. Table 7.2 p.7-23,
   Table J3.2 p.16.1-120 &. J3-1 p.16.1-124
   LRFD Strength = P lrfd = 0.75 x 0.75 x Fu x Ag
   Per AISC 360 14th ed Tables 7.2 p.7-23
   & J3.2 p.16.1-120 & Eqn. J3-1p.16.1-124
   Where Ag = Nominal Area (Area of Nominal Thread Dia.) & Fu=ultimate Tensile Strength.
   Stress increase not allowed with AISC 14th.

3. Rod elongation is calculated per AC391 3.2.1.1 as follows:
   Δ Rod = PL/AnE where: P=Load, L=length, An=0.7854 (D-0.9743/n)^2, D = nominal rod dia, n = threads per inch,
   E = modulus = 29e6.
   Almost without exception threaded rod is rolled from the same diameter "coil" rod whether it is made as all-thread rod or as threaded ends only. The result is identical elongation for both all thread rod and threaded ends only.

4. Table elong. is for 120" at full rod load.

5. High Strength Rods are marked.

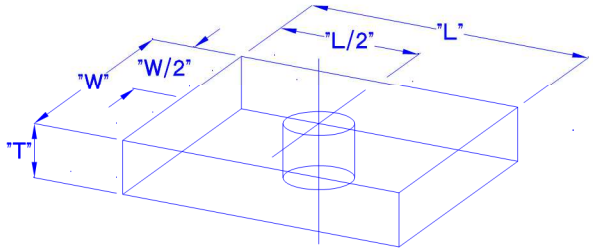
6. If you order A36 we will send A307, which is slightly stronger.

7. F1554 Gr. 105 which is identical to A193-B7.

Bearing Plates

Bearing plates distribute uplift loads into the structure at reaction points. AutoTight plates exceed the flexural requirements of AISC 360 (14th ed.) and wood bearing requirements of the 2015 NDS. (ICC ES AC391 Section 1.4.6, March 1, 2015)

Per the 2015 NDS, plate design deflection is 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 their rated capacity.
To select: 1. Determine the reaction load.
2. Select the smallest plate that can carry the reaction load.

Check that plates Fit: Rod dia. & Wall Width
(4X or 6X Wall)

Adjust for Actual Deformation
Wood deformation at the design load is linear. The load-deformation at the design load

= 0.040" * design load / rated load.

Example:
Reaction is 11,000 pounds on Douglas Fir.
Rod is 1-1/8" Ø.

Select an S11-1-1/4" bearing plate rated capacity 11,948 pounds.

Actual deformation (per AC 391, section 3.2.1.2)

= 0.040 * 11,000 / 11,948 = 0.037"

or system deformation add the 0.037" to the rod and shrinkage compensator deformation plus Δr. (per AC 391, section 3.2.1.2)

Minimizing Total Deformation

To lower system deformation increase the size of the bearing plate.

Example:
If the reaction load is 11,000 pounds on Douglas Fir. (previous example) and an L20-1-1#4" plate is selected, plate deformation lowers to:

Δ = 0.040" * 11,000 / 21,016 = 0.021"

Along with changing rod size, changing the bearing plate is the other method that lets you adjust total system deflection (elongation) to achieve a tight system.

The AutoTight Software uses drop down menus. This allows for a fast, easy change of rod, bearing plates or shrinkage compensators to achieve 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.

Identification:
Plates or boxes marked with Part #.
Efficiency tip: Minimize the number of sizes used on any single job, i.e. Keep it Simple.
"S" Plates fit 4x & Larger walls,
"L" plates fit 6x & Larger walls.

Material: Complies with ASTM A36

Bearing Plates				LRFD Strength			
Wall Width	Model No.	T * W * L	Max. Rod Ø	LRFD Load (@ 0.040" Cross Grain Crushing)			
				DFL @ 938	HF @ 608	SYP @ 848	SPF @ 638
For Walls 4X and Up	S5 -3/4"	1/4" * 3" * 3"	3/4"	8,945	5,797	8,087	6,083
	For 1/2" through 1" Rod						
	S7 -1"	3/8" * 3-1/2" * 3-1/2"	1"	11,795	7,643	10,662	8,020
	For 3/4" through 1-1/4" Rod						
	S7 -1-1/4"	3/8" * 3-1/2" * 3-1/2"	1-1/4"	11,311	7,329	10,225	7,691
	S11 -1-1/4"	1/2" * 3-1/2" * 5-1/2"		17,922	11,614	16,202	12,187
	S16 -1-1/4"	1" * 3-1/4" * 8"		23,107	14,973	20,888	15,712
For Walls 6X and Up	L18 -1-1/4"	1/2" * 5-1/2" * 5-1/2"		28,938	18,752	26,160	19,678
	L20 -1-1/4"	5/8" * 5-1/2" * 6"		31,523	20,427	28,497	21,436
	L25 -1-1/4"	3/4" * 5-1/2" * 7-1/2"		37,403	24,237	33,813	25,434
	L30 -1-1/4"	1" * 5-1/2" * 9"		45,138	29,249	40,805	30,694
	L33 -1-1/4"	1-1/8" * 5-1/2" * 10"		50,294	32,591	45,466	34,200
	L37 -1-1/4"	1-1/4" * 5-1/2" * 11"		55,450	35,932	50,127	37,706
	L40 -1-1/4"	1-1/2" * 5-1/2" * 12"		64,357	41,703	58,178	43,762
	For 1-1/2" through 2" Rod						
	L18 -2"	1/2" * 5-1/2" * 5-1/2"	2"	26,947	17,462	24,360	18,324
	L20 -2"	5/8" * 5-1/2" * 6"		29,543	19,144	26,707	20,089
	L25 -2"	3/4" * 5-1/2" * 7-1/2"		35,540	23,030	32,128	24,167
	L30 -2"	1" * 5-1/2" * 9"		43,274	28,042	39,120	29,426
	L33 -2"	1-1/8" * 5-1/2" * 10"		48,430	31,383	43,781	32,933
	L37 -2"	1-1/4" * 5-1/2" * 11"		53,587	34,724	48,442	36,439
	L40 -2"	1-1/2" * 5-1/2" * 12"		62,493	40,495	56,493	42,495

Notes:
Plate ID includes maximum rod diameter. All rod clearance holes are 1/16" oversize.
Wood Bearing Capacity ASD per NDS 2015: DFL = 625, HF = 405, SPF = 425 psi. (Fc perp)

Wood Bearing Strength LRFD per NDS 2015:
DFL = 939, HF = 608, SPF = 638 PSI
(Fc perp lrfd) Table 4.3.1
Plate ASD Allowable Capacity = (Fc perp) * Bearing Area (per AC 391 3.2.1.2) at a deflection of 0.040".

Plate LRFD Strength=(Fc perp of the wood in LRFD)*Bearing Area (per AC 391 3.2.1.2) @ 0.040" deflection.
Bearing area factor, Cb, included in listed capacities. Deflection is 0.040" at Allowable Load.
Bearing Plate bending based on ASTM A36 Steel, Fy = 36 ksi. per AISC 14th ed.

Finish: S5, S7, L11 and L18, S5, S7-1" and S7-1-1/4" plates are HDG and may be used on the first floor mudsill for end of wall connections. All others are black steel.

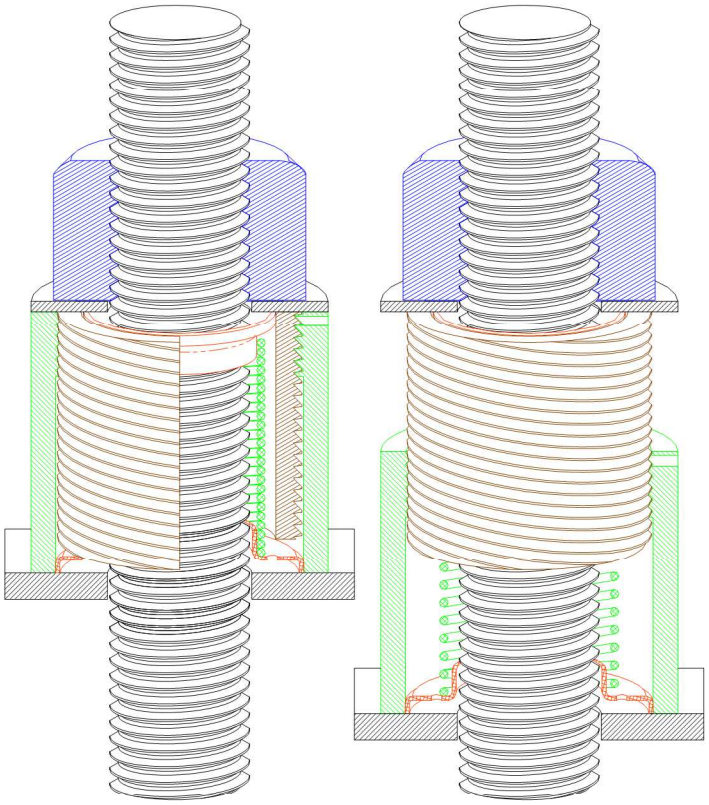
TUD's TakeUp Devices or
Shrinkage compensators require evaluation for: fit, strength, expansion and deflection.
Two code defined deflections **(ΔA)** and **(ΔR)** are required.

Load-deflection
(ΔA) = design load/actual load * Rated ΔA.
Delta R (ΔR) is always added in full to system deflection. Delta R is the internal slack.

Example: Reaction Load = 11,000 pounds

TUD = AT 100 (Select based on the rod size)
Rated Capacity: 25,300 pounds.
Deflection: ΔA = 0.032", ΔR = 0.002"
Expansion 1.2" (ICC ESR 1344)

Load/Deflection
(ΔA) = 0.032 * 11,000/25,300 = 0.014"
(ΔR) (From Table = 0.002"
Total Deformation = 0.016"
Add total to the system elongation per AC 316 & AC 391 section 3.1.1.



US Patents 6,390747 & 6,585,469.
Other Patents foreign and domestic, pending.

AutoTight:

Tighter Systems
Better Performance

Rod Sizes up to 2" Ø

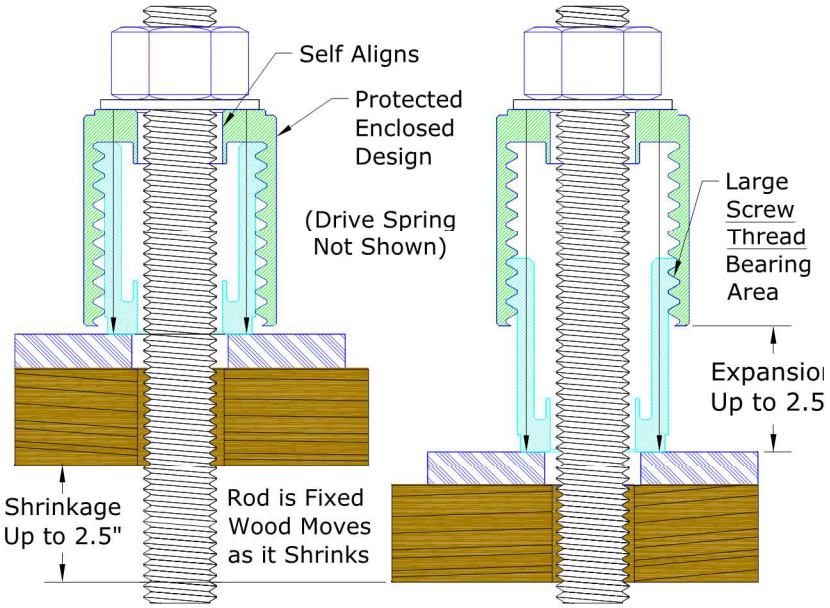
Robust,
Precise,
Protected
Mechanism

AutoTight® Component Hardware

LRFD

The AutoTight shrinkage compensator automatically expands, eliminates looseness.
Threaded Mechanism = NO Backlash (Δr) = No Looseness!

Code Listed: ICC ESR-1344, COLA RR-25480, Tested to AC 316 & AC 391, IBC 2018 Rated



No Backlash with AutoTight = Much Better Shear Wall Performance

	Model Number	Rod Diameter (Max.)	Matl.	Dimensions (Inches) O.D.	Dimensions (Inches) H	Rated Take-Up (Inches)	LRFD Load Pounds	Δ_R (inches) Seating Increment	Δ_A (inches) Deflection at LRFD Load
	AT4A-1.5	1/2"	Aluminum	1-1/2	3.00	1.50	9,675	0.000*	0.017
	AT4A-2.5				4.06	2.50			
	AT6A-1.5	3/4"		2-1/8	3.19	1.50	15,825		0.017
	AT6A-2.5				4.19	2.50			
New	AT8A-1.5	1"		2-3/4	3.50	1.75	31,125	0.000*	0.007
New	AT10A-1.5	1-1/4"		3-1/4	3.50	1.62	42,075	0.000*	0.031
New	AT12A-1.5	1-1/2"		3-1/4	3.50	1.62	42,075	0.000*	0.031
New	AT16A-2.0	2"		4	3.50	2.07	59,175	0.001*	0.016
	AT 75	3/4"	Steel	2	2.80	1.10	24,675	0.002	0.036
	AT 75-2.5				4.00	2.50	22,800		0.032
	AT 100	1"		2-1/4	2.90	1.10	37,950		0.048
	AT 125	1-1/4"		2-3/4	2.86	1.10	51,750		0.024
New	AT 200-2.0	2"		4	3.88	2.18	124,800	0.000*	0.013

Note: ΔR= Average Travel and Seating Increment is the "Lost Motion" with device direction change from advancing to load resistance. This is sometimes called "Backlash".
*AutoTight Shrinkage Compensators shown as 0.000" have less than 0.0005" (Δr.)

AutoTight® Take-Up:
Installation, Activation, Inspection

A. Review Plans:

Verify materials required at each reaction point.

Verify: wood hole size is proper diameter (Ø). **Recommended** wood plate hole Ø is **Rod Ø + 1/4".**
Example : a 1" Ø rod uses a 1-1/4 Ø hole

The 1/4" clearance allows the rod to move vertically as the building shrinks and settles.

Verify the hole is **in the center of the wood plate**. (The bearing plate must be fully supported.)

B. Install components in the following order:

1. **Bearing Plate: Verify Size**. Note: plates **wider** than 3-1/2" will **NOT** fit a 4X wall.

2. Place **AutoTight® TUD** over the rod.
   Aluminum TUDs (Shown) have Activation pin positioned on the top. (see photo)
   Steel TUDs have the activation screw at bottom.

3. **Washer:** Install the washer (See chart). The washer helps keep jobsite sawdust out of the TUD! Steel AT 75, 100 and 125 use SAE washers. All others use SS washers.

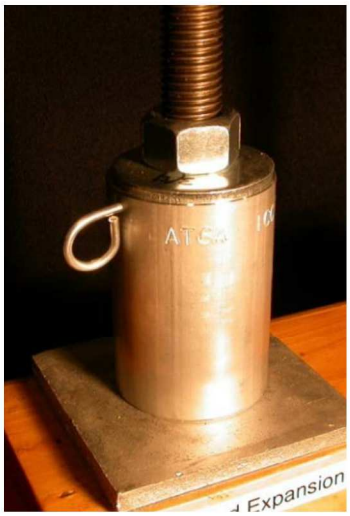
4. Install the specified **nut**. (See photo next page)

Washers for Steel Tuds				
Steel Tud	Rod Ø	Model Number	ID Inside Ø	OD Outside Ø
AT 75	5/8	W-5	0.656	1.312
	3/4	W-6	0.938	1.469
AT 100	7/8	W-7	1.062	1.750
	1	W-8	1.062	2.000
AT 125	1 1/8	W-9	1.250	2.250
	1 1/4	W-10	1.375	2.500
AT 200	1 3/4	W-13-USS	1.750	3.750
	2	W-15-USS	2.000	4.250

Washers for Aluminum Tuds				
Aluminum Tud	Rod Ø	Model Number	ID Inside Ø	OD Outside Ø
AT4A	1/2	W-4-USS	0.562	1.375
AT6A	5/8	W-5-USS	0.688	1.750
	3/4	W-6-USS	0.812	2.000
AT8A	7/8	W-8-USS	1.062	2.500
	1	W-8-USS	1.062	2.500
AT10A	1 1/8	W-10-USS	1.375	3.000
	1 1/4	W-10-USS	1.375	3.000
AT12A	1 1/2	W-11-USS	1.500	3.250
AT16	1 3/4	W-13-USS	1.750	3.750
	2	W-15-USS	2.000	4.250

Do **NOT** Activate now.
Activation begins just before enclosing the walls.

C. Activating the AutoTight® TUD.



TUD initial installation.
Ready to activate.

Wait to Activate TUDs until just before the walls are enclosed. This can take 6 months or more.

Retighten before Activation
The Gap under the Nut shows the Shrinkage of the buildng.

Activating the AutoTight® TUD.

Start on the **lowest** level. Activate **All** TUDs at each level before proceeding up to the next level. Or Activate TUDs from the lowest to the highest in any given run.

When activating, remove the pin (or screw). The activated TUD will "come alive", move and sometimes rotate. You, the installer, will know it is fully active and working. This is the final inspection as the TUD is placed in service.

Properly installed
Ready to Expand

If you could look into The wall several months later you would see the

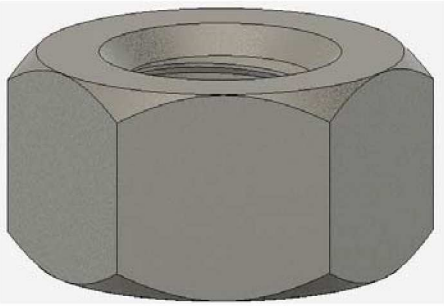
expanded **AutoTight® TUD** working to keep the building tight.

AutoTight®
Tighter Connections, Better Performance™

Nuts

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-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-12	1-1/2"-6 NC
NHS-14	1-3/4"-5 NC
NHS-16	2"-4.5 NC



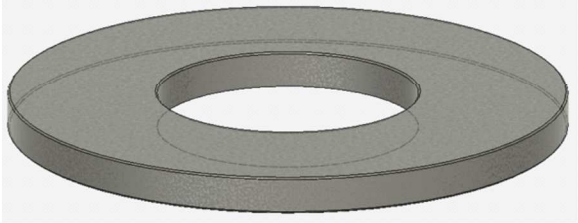
Nuts are Unified National Coarse thread (UNC or NC).
Standard Nuts are SAE Grade 2 or ASTM 563-Grade A
High Strength Nuts are SAE grade 5, ASTM 563-Grade C or A194-2H to match rod requirements.

Washers

Washers for Steel Tuds				
Steel Tud	Rod Ø	Model Number	Nominal Diameter	Outside Diameter
AT 75	1/2	W-4	1/2"	1-1/16"
	5/8	W-5	5/8"	1-5/16"
	3/4	W-6	3/4"	1-1/2"
AT 100	7/8	W-7	7/8"	1-3/4"
	1	W-8	1"	2"
AT 125	1 1/8	W-9	1-1/8"	2-1/4"
	1 1/4	W-10	1-1/4"	2-1/2"
AT 200	1 1/2	W-12	1-1/2"	3-1/2"
	1 3/4	W-14	1-3/4"	3-3/8"
	2	W-16	2"	3-3/4"

Washers for Aluminum Tuds				
Aluminum Tud	Rod Ø	Model Number	ID Inside Ø	OD Outside Ø
AT4A	3/8	W-3-1.5 OD	0.406	1.500
	1/2	W-4-USS	0.562	1.375
AT6A	5/8	W-5-USS	0.688	1.750
	3/4	W-6-USS	0.812	2.000
AT8A	7/8	W-8-USS	1.062	2.500
	1	W-8-USS	1.062	2.500
AT10A	1 1/8	W-10-USS	1.375	3.000
	1 1/4	W-10-USS	1.375	3.000
AT12A	1 1/2	W-11-USS	1.500	3.250
AT16	1 3/4	W-13-USS	1.750	3.750
	2	W-15-USS	2.000	4.250

SAE washers are used for steel TUDs up to AT125.
USS (Common) Washers are used for all other TUDs.
These washers distribute load into the Tud and help keep jobsite debris out of the Tud mechanism.
Washer sizes are not always the nominal size of the Rod or the TUD.

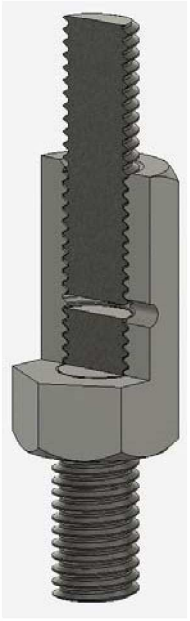


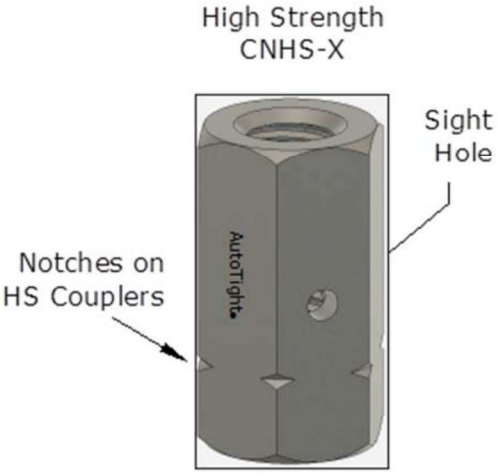
Straight Coupler Nuts

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.





Straight Couplers Standard Strength	
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"

Straight Couplers High Strength	
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-12	1-1/2"
CNHS-14	1-3/4"
CNHS-16	2"

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 thin nail inserted into the sight hole can be used for a temporary stop. Position Coupler so Inspector can see both rod ends.
Note: Full strength is achieved with thread engagement equal to a standard nut. This is typically one rod diameter.

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

Grade: Standard Coupler Nuts are ASTM A563 Grade A (Grade 2)
High Strength Couplers are ASTM A563 Grade C (Grade 8)
Over 1-1/4" are ASTM A563 Grade B (Grade 5)
Sighted couplers have holes drilled to aid installation.

Options:

Oversized threads with reduced strength in coupler nuts for use with galvanized rod are available. Contact factory for details.

Coupler Nut Reducer Use coupler nut reducers to change rod size.

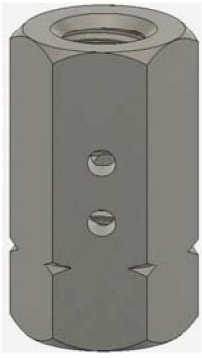
Coupler Nut Reducer Identification: Example: CNR-610: CNR = Coupler Nut Reducer, 610 = 3/4" NC to 1-1/4" - 7 NC Thread.

Grade: Standard Coupler Nuts are ASTM A563 Grade A (Grade 2). High strength Couplers are ASTM A563 Grade C (Grade 8). Sizes over 1-1/4" at the large end ASTM A563 Grade B (Grade 5) is supplied.

All reducer couplers have sight holes.

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

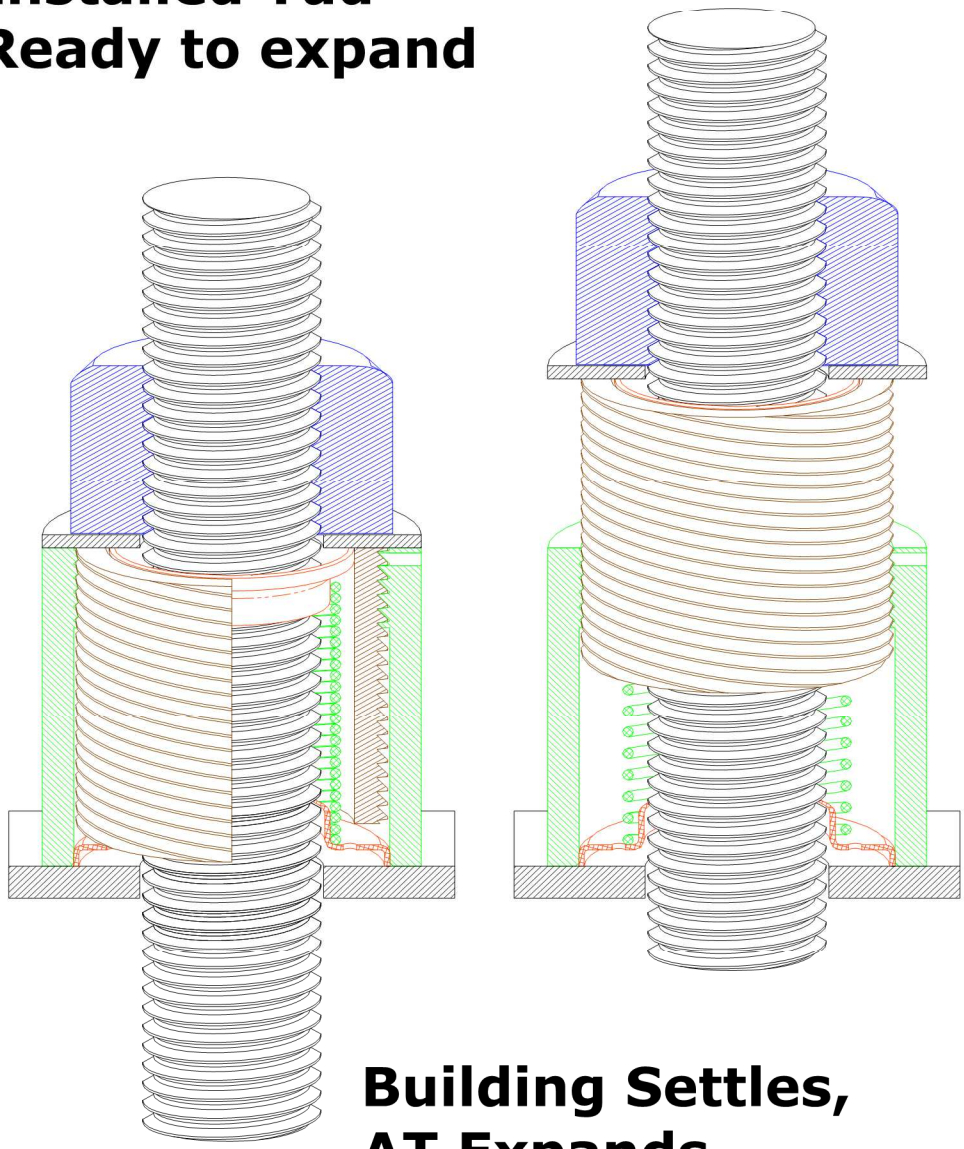
Grade 2 coupler do not have notches.



High Strength Couplers (Grade 8) have notches on the small ends.

Coupler Nut Reducers High Strength		
Model Number	Rod Ø	
	Small	Large
CNRHS-56	5/8"	3/4"
CNRHS-57		7/8"
CNRHS-58		1"
CNRHS-59		1-1/8"
CNRHS-67	3/4"	7/8"
CNRHS-68		1"
CNRHS-69		1-1/8"
CNRHS-610		1-1/4"
CNRHS-78	7/8"	1"
CNRHS-79		1-1/8"
CNRHS-710		1-1/4"
CNRHS-89	1"	1-1/8"
CNRHS-810		1-1/4"
CNRHS-812		1-1/2"
CNRHS-910	1-1/8"	1-1/4"
CNRHS-912		1-1/2"
CNRHS-1012	1-1/4"	1-1/2"
CNRHS-1014		1-3/4"
CNRHS-1016		2"
CNRHS-1214	1-1/2"	1-3/4"
CNRHS-1216		2"
CNRHS-1416	1-3/4"	2"

Installed Tud
Ready to expand



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AT Expands
Connection is Tight
Building Performs

"Tighter Connections, Stronger Buildings"™

Notes:

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ESR-1344

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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 (Commins 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.

[1]Listed 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.

[2]The 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: $\Delta_T = \Delta_R + \Delta_A(P_D/P_A)$.

[3]LRFD resistance capacity = ASD allowable load x 1.5.

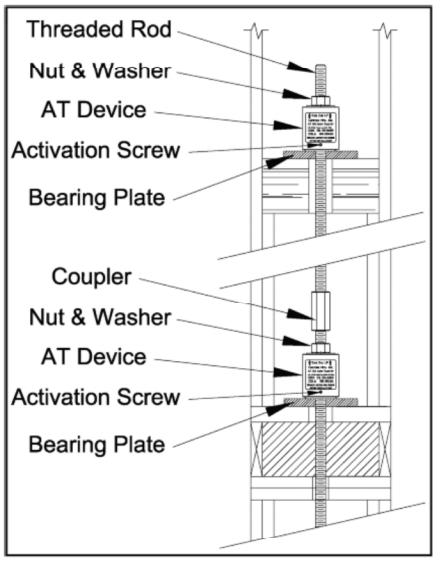

FIGURE 1—TYPICAL INSTALLATION

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

REPORT HOLDER:

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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.

CONTINUOUS TIEDOWN SYSTEM SCHEDULE

SUPPORTING LEVEL	TIEDOWN SYMBOL											
	A		B		C		D		E		F	
	T	C	T	C	T	C	T	C	T	C	T	C
ROOF	1.0	5.0	2.0	5.5	4.0	7.0	1.0	5.0	1.0	5.0	1.0	6.0
4	2.5	12.5	5.5	13.5	12.0	19.0	1.0	13.0	1.0	10.5	3.5	16.0
3	6.5	25.0	12.5	28.5 /2\	22.5	35.0	1.0	21.5	2.5	16.5	7.5	27.5
2	-	-	-	-	-	-	1.0	32.5	5.5	25.0	14.5	42.5
BASE ANCHORAGE AT CONCRETE												
DETAIL	4/S7.06		4/S7.06		5/S7.06		6/S7.06		6/S7.06		6/S7.06	
TENDOWN ANCHOR	7/8"Ø		1" Ø		1 1/8" Ø		5/8" Ø		3/4" Ø		1" Ø	
	ASTM F1554 GR. 36		ASTM F1554 GR. 36		ASTM F1554 GR. 55		ASTM F1554 GR. 55		ASTM F1554 GR. 55		ASTM F1554 GR. 55	
UPLIFT PL SIZE	5/8"x2"x0'-2"		3/4"x2"x0'-2"		1"x5"x0'-5"		3/8"x2"x0'-2"		1/2"x2"x0'-2"		3/4"x3"x0'-3"	
	GRADE 50		GRADE 50		GRADE 50		GRADE 50		GRADE 50		GRADE 50	
MIN. EMBEDMENT	11 1/2"		11 1/2"		N/A		11 1/2"		11 1/2'		13 1/4"	
WELD, tw	7/16"		1/2"		5/16" REF. 5/S7.06		N/A		N/A		N/A	
MIN. DIST. TO SLAB EDGE	8"		10"		2 1/2"		4"		6"		10"	
LOCATION	BUILDING A		BUILDING A		BUILDING A		BUILDING B		BUILDING B		BUILDING B	

NOTES:

1. REF. PLANS FOR TIEDOWN LOCATIONS.
2. T INDICATES TENSION LOAD (ASD) IN KIPS AT EACH TIEDOWN ROD.
3. C INDICATES COMPRESSION LOAD (ASD) IN COMPRESSION POSTS AT EACH TIEDOWN ROD.
4. REF. GENERAL STRUCTURAL NOTES FOR ALL TIEDOWN SYSTEM DESIGNER RESPONSIBILITIES.
5. WHERE TIEDOWN ROD IS TOO CLOSE TO SLAB EDGE OR TYPE C OR D ANCHORS ARE LOCATED DIRECTLY ABOVE A CONCRETE COLUMN OR SHEAR WALL LAP 1 1/4"Ø ASTM F1554 GR. 55 THREADED ROD 60" INTO COLUMN OR SHEAR WALL.

Load Table

Argyle
S7.06

7 CONTINUOUS TIEDOWN SYSTEM SCHEDULE

1" = 1'-0"