DASMA Door & Access Systems Manufacturers Association International
COMMERCIAL & RESIDENTIAL GARAGE DOOR DIVISION
DASMA TECHNICAL DATA SHEET
#161

1300 Sumner Avenue
Cleveland, Ohio 44115-2851
Phone: 216-241-7333 • Fax: 216-241-0105
E-mail: dasma@dasma.com

# Connecting Garage Door Jambs to Building Framing

## Introduction

The members of DASMA recognize that connecting garage doors to building framing is as important as the design of garage doors themselves. The following series of "Garage Door Frame Connection Schedules" included in this Technical Data Sheet constitutes a basic introduction to some of the concepts of garage door framing.

| Fastener Type | Schedule |
|---|---|
| • 1/4" diameter by 3" length Self Tapping Anchors | TDS-161a |
| • 3/8" diameter by 3" length Sleeve Anchors | TDS-161b |
| • 3/8" diameter by 3½" length Expansion Anchors | TDS-161c |
| • 7/16" diameter by 8" length "L-Bolt" Anchors | TDS-161d |
| • 3/8" diameter by 3" length Lag Screws | TDS-161e |
| • 16d by 3½" length Common Wire Nails | TDS-161f |
| • 0.100" x 1" Long Fillet Weld (E60xx Electrodes Min.) | TDS-161g |
| • 1/4" diameter by 3/4" length Self-Tapping Screws into steel | TDS-161h |

Rationale has also been included in the following pages, including an explanation of methods used, loads and source data, and calculation methods.

The information contained in this Technical Data Sheet is presented to provide some clarification about the requirements and limitations of some of the methods of attaching garage door jambs to structural members of various buildings. Professional engineering advice should be obtained when considering the attachment of garage door jambs to a structure and to ensure that forces resulting from wind can be withstood by the structure and the garage door while maintaining the integrity of the building envelope.

Directions on using the charts, along with other important information, can be found on the next page.

**Using The Charts**

1. Determine the door width, in feet.
2. Determine the positive wind load for a particular door. The positive wind load is the wind load that acts to push the door inward toward the garage and away from the garage door framing. This load determination can be achieved through one of these methods:
   - Use of the relevant DASMA Wind Load Guide (see TDS-155).
   - Job-specific calculation.
   - Conservative design pressure obtained from a local building department.
3. If the framing is made of wood, determine the type of lumber used. The charts include southern-pine and spruce-pine-fir.
4. Determine fastener to be used, from the alternatives listed in this Technical Data Sheet.
5. Find the appropriate Schedule to use.
6. For a given door load, door width and jamb type (if applicable), obtain the maximum fastener spacing per jamb from the appropriate Schedule.
7. Review the notes at the bottom of the Schedule used.
8. Review the detail referred to in the Schedule.

**Information for Installers**

- Establish location of reinforcements in concrete-filled masonry units, poured concrete walls, tilt-up concrete walls, etc.
- Use care to ensure that reinforcement will not interfere with jamb fasteners.
- If door jamb mounting or alternate door size cannot be accomplished without interference with reinforcement, then consult a structural engineer to determine a workable solution.
- Do not drill through or damage reinforcement.

**Existing Construction**

DASMA suggests that installers consider the following in locating reinforcement:

- *If the building has structural drawings*, obtain these drawings and have an engineer review the drawings to determine where reinforcement is located in the vicinity of the jambs. The engineer should compare the reinforcement location with where the door jamb fasteners are to be located.
- *If the building's structural plans cannot be obtained*, during the field inspection process, where existing wall opening dimensions are obtained, either drill representative "pilot holes" or use a device similar to an electronic wood stud locator to determine the steel reinforcement locations.

# Rationale

**Explanation of Methods Used**

The jamb attachment information in this document is presented in such a way as to provide clear and accurate connection schedules for wind loads from 10 PSF to 60 PSF.

The connection schedules show the maximum spacing required between anchors for a particular design wind load, as opposed to a minimum number of anchors required for a certain force applied to the jamb. The maximum spacing can be quickly determined by looking up the wind load and door width in the appropriate table for the particular anchor to be used.

All calculations used in determining the connection schedule are provided.

**Comment on Concrete Load Source Data**

For concrete anchors, information presented in this document is based on published fastener manufacturer data. The Allowable Load for these anchors were determined using the published data along with ACI-318 (-08 and -11) Appendix D computations.

All wind pressure specifications for garage door products are for allowable stress design (ASD) because they are test results with an overload factor. Therefore, the ratings in this TDS for concrete anchors are also ASD results from ACI-318 using a 1.6 load combination factor for wind load.

Concrete anchors also have specific installation requirements and / or guidelines that are too detailed to reproduce in this document. The user is expected to know and follow the manufacturer's installation instructions.

**Calculations**

General Formula for Maximum Anchor Spacing:

$$\frac{(12\ {}^{in}\!/_{ft})(F\ {}^{lb}\!/_{anchor})}{\frac{1}{2}(P\ {}^{lb}\!/_{ft^2})(W\ ft)} = S\ {}^{in}\!/_{anchor}$$

*P* = Door Design Wind Pressure (PSF)
W = Opening Width (ft.)
*F* = Allowable Load per Anchor (lb.)
*S* = Maximum Anchor Spacing (in.)

**Allowable Loads**

**TDS-161a**
1/4" **ITW Redhead Tapcon+** , 2'' embedment, 1-5/8" min edge distance
*Ref: ICC-ES Report ESR-3699, using load combination factor of 1.6 (Wind loads)*
1/4" **Powers Wedge-Bolt+**, 1-3/4" embedment, 1-5/8" min edge distance
*Ref: ICC-ES Report ESR-2526, using load combination factor of 1.6 (Wind loads)*
3/8" **Simpson TitenHD**, 2.75" embedment, 4" min edge distance
*Ref: ICC-ES Report ESR-1056, using factor of safety of 5 (ASD test result)*
*ACI 318-11 for computation of anchor loads into concrete*
*ANSI / AWC NDS-2015 for Wood Construction*

Allowable Pullout Loads
C-90 Block, grout filled: *F* = **480** lb. (TitenHD) Allowable Load
2500 psi min. concrete: *F* = 687 lb. (Tapcon+), = **556** (Wedge-Bolt+) lb. Allowable Load
3000 psi min. concrete: *F* = 753 lb. (Tapcon+), = **609** (Wedge-Bolt+) lb. Allowable Load
4000 psi min. concrete: *F* = 869 lb. (Tapcon+), = **703** (Wedge-Bolt+) lb. Allowable Load

Allowable Bearing Loads from flat washer on wood:

For 1/4” diameter anchor using 1-1/4” OD washer with 1/16” hole clearance
Bearing Area, $A = \pi(5/8 \text{ in})^2 - \pi(5/32 \text{ in})^2 = 1.15 \text{ in.}^2$
Bearing Area Factor, $C_b = 1.3$ *(NDS p. 22, [=(OD+.375)/OD]*
Allowable Load, $F_{All} = F^*C_b$ where $F = F_c^*A$; therefore $F_{All} = F_c^*A^*C_b$
Where: $F_c$ = Allowable compression (psi); $F$ = applied force (lb.)

Southern Pine ($F_c$ = 565 psi): $F_{All}$ = 565 lb/in$^2$ * 1.15 in$^2$ * 1.3 = 845 lb. Allowable Load
Spruce Pine Fir ($F_c$ = 425 psi): $F_{All}$ = 425 lb/in$^2$ * 1.15 in$^2$ * 1.3 = **636** lb. Allowable Load

For 3/8” diameter anchor using 1-1/4” OD washer with 1/16” hole clearance
Bearing Area, $A = \pi(5/8 \text{ in})^2 - \pi(7/32 \text{ in})^2 = 1.077 \text{ in.}^2$
Bearing Area Factor, $C_b = 1.3$ *(NDS p. 22, [=(OD+.375)/OD]*
Allowable Load, $F_{All} = F^*C_b$ where $F = F_c^*A$; therefore $F_{All} = F_c^*A^*C_b$
Where: $F_c$ = Allowable compression (psi); $F$ = applied force (lb.)

Southern Pine ($F_c$ = 565 psi): $F_{All}$ = 565 lb/in$^2$ * 1.077 in$^2$ * 1.3 = 791 lb. Allowable Load
Spruce Pine Fir ($F_c$ = 425 psi): $F_{All}$ = 425 lb/in$^2$ * 1.077 in$^2$ * 1.3 = 595 lb. Allowable Load

Note: Tabulated values for $F_c$ *(NDS Supplement p. 42, Table 4C)* are species group average values associated with a deformation of 0.04’’ per ASTM D2555, D245.

Overall Allowable Loads to use (for Spruce-Pine-Fir and Southern Pine)
C-90 Block, grout filled: **480** lb for SPF (Spruce-Pine-Fir), =**480** lb for SP (Southern Pine).
2500 psi min. concrete: **556** lb for SPF (Spruce-Pine-Fir), =**556** lb for SP (Southern Pine)
3000 psi min. concrete**: 609** lb.for SPF (Spruce-Pine-Fir), =**609** lb for SP (Southern Pine)
4000 psi min. concrete**: 636** lb.for SPF (Spruce-Pine-Fir), =**703** lb for SP (Southern Pine)

**TDS-161b**
1/4" ITW TruBolt, 1.75” embedment, 1-5/8” min edge distance
*Ref: ICC-ES Report ESR-2251, using load combination factor of 1.6 (Wind loads)*
1/4" Hilti KwikBolt3 into CONCRETE, 2” embedment, 2-5/8” min edge distance
*Ref: ICC-ES Report ESR-2302, using load combination factor of 1.6 (Wind loads)*
1/4" Hilti KwikBolt3 into CMU-Filled, 2” embedment, 4” min edge distance
*Ref: Hilti North American Product Tech Guide.*
*ACI 318-11 for computation of anchor loads into concrete*

*ANSI / AWC NDS-2015 for Wood Construction*

Allowable Pullout Loads
C-90 Block, grout filled: $F$ = **540** lb. (KwikBolt3) Allowable Load
2500 psi concrete: $F$ = **556** lb.(TruBolt), = 640 lb. (KwikBolt3) Allowable Load
3000 psi concrete: $F$ = **619** lb.(TruBolt), = 701 lb. (KwikBolt3) Allowable Load
4000 psi concrete: $F$ = **715** lb.(TruBolt), = 809 lb. (KwikBolt3) Allowable Load

Allowable Bearing Loads from flat washer on wood:
For 1/4" diameter anchor using 1-1/4" OD washer with 1/16" hole clearance
Bearing Area, $A = \pi(5/8 \text{ in})^2 - \pi(5/32 \text{ in})^2 = 1.15 \text{ in.}^2$
Bearing Area Factor, $C_b$ = 1.3 *(NDS p. 22, [=(OD+.375)/OD]*
Allowable Load, $F_{All} = F^*C_b$ where $F = F_c{*}A$; therefore $F_{All} = F_c{*}A^*C_b$
Where: $F_c$ = Allowable compression (psi); $F$ = applied force (lb.)

Southern Pine ($F_c$ = 565 psi): $F_{All}$ = 565 lb/in$^2$ * 1.15 in$^2$ * 1.3 = 845 lb. Allowable Load
Spruce Pine Fir ($F_c$ = 425 psi): $F_{All}$ = 425 lb/in$^2$ * 1.15 in$^2$ * 1.3 = **636** lb. Allowable Load

Note: Tabulated values for $F_c$ *(NDS Supplement p. 42, Table 4C)* are species group average values associated with a deformation of 0.04'' per ASTM D2555, D245.

Allowable Loads to use
C-90 Block, grout filled: **540** lb for SPF (Spruce-Pine-Fir), =**540** lb for SP (Southern Pine).
2500 psi concrete: **556** lb. for Spruce-Pine-Fir **556** lb. for Southern Pine
3000 psi concrete: **619** lb. for Spruce-Pine-Fir, **619** lb. for Southern Pine
4000 psi concrete: **636** lb. for Spruce-Pine-Fir, **715** lb. for Southern Pine

**TDS-161c**
3/8'' x 3-1/2'' Simpson Strong-Tie Wedge-All Expansion (Wedge) Anchors
1-3/4'' minimum embedment, 3" (8 diameters) minimum edge distance
*Ref: http://www.strongtie.com/products/anchorsystems/*
*ANSI / AWC NDS-2015 for Wood Construction*

Allowable Pullout Loads (using .90 edge distance and 1.333 short term load adjustment factors)
2000 psi concrete: $F$ = 390 lb. * .90 * 1.333 = **468** lb. Allowable Load
3000 psi concrete: $F$ = 555 lb. * .90 * 1.333 = **666** lb. Allowable Load
4000 psi concrete: $F$ = 720 lb. * .90 * 1.333 = **864** lb. Allowable Load

Note: C-90 Block is not an option for Simpson expansion anchors due to a minimum 12" edge requirement.

Allowable Bearing Loads from flat washer on wood:
For 1/4" diameter anchor using 1-1/4" OD washer with 1/16" hole clearance
Bearing Area, $A = \pi(5/8 \text{ in})^2 - \pi(5/32 \text{ in})^2 = 1.15 \text{ in.}^2$
Bearing Area Factor, $C_b$ = 1.3 *(NDS p. 22, [=(OD+.375)/OD]*
Allowable Load, $F_{All} = F^*C_b$ where $F = F_c{*}A$; therefore $F_{All} = F_c{*}A^*C_b$
Where: $F_c$ = Allowable compression (psi); $F$ = applied force (lb.)

Southern Pine ($Fc$ = 565 psi): $FAll$ = 565 lb/in2 * 1.15 in2 * 1.3 = **844** lb. Allowable Load
Spruce Pine Fir ($Fc$ = 425 psi): $FAll$ = 425 lb/in2 * 1.15 in2 * 1.3 = **635** lb. Allowable Load
Note: Tabulated values for *Fc (NDS Supplement p. 42, Table 4C)* are species group average values associated with a deformation of 0.04'' per ASTM D2555, D245.

Allowable Loads to use
2000 psi concrete: **468** lb. for Spruce-Pine-Fir, **468** lb. for Southern Pine
3000 psi concrete: **635** lb. for Spruce-Pine-Fir, **666** lb. for Southern Pine
4000 psi concrete: **635** lb. for Spruce-Pine-Fir, **844** lb. for Southern Pine

**TDS-161d**
7/16'' x 8'' Galvanized "L-Bolt" Anchors, ASTM A307, Grade C
6-1/2'' minimum embedment, 2-5/8" (6 diameters) minimum edge distance

Allowable Pullout Load (2000 psi, 3000 psi or 4000 psi concrete)
Stress area, $A$ = .1063 in.$^2$; tensile yield, $\sigma$ = 36 ksi, Safety Factor, $s$ = 4
Allowable Load, $F = \sigma^*A / s$ = (36,000 lb/in.$^2$)(.1063 in.$^2$)/4 = **957** lbs./L-bolt

Allowable Bearing Loads from flat washer on wood:
For 7/16" diameter anchor using 1-5/8" OD washer with 1/16" hole clearance
Bearing Area, $A = \pi(13/16 \text{ in.})^2 - \pi(1/4 \text{ in.})^2 = 1.878 \text{ in.}^2$

Bearing Area Factor, $C_b$ = 1.43 *(NDS p. 22)*
Allowable Load, $F_{All} = F*C_b$ where $F = F_c*A$; therefore $F_{All} = F_c*A*C_b$
Where: $F_c$ = Allowable compression (psi); $F$ = applied force (lb.)

Southern Pine ($F_c$ = 565 psi): $F_{All}$ = 565 lb/in$^2$ * 1.878 in$^2$ * 1.43 = 1517 lb. Allowable Load
Spruce Pine Fir ($F_c$ = 425 psi): $F_{All}$ = 425 lb/in$^2$ * 1.878 in$^2$ * 1.43 = 1141 lb. Allowable Load
Note: Tabulated values for $F_c$ *(NDS Supplement p. 42, Table 4C)* are species group average values associated with a deformation of 0.04'' per ASTM D2555, D245.

Allowable Loads to use (for Southern Pine or Spruce-Pine-Fir)
2000 psi concrete: **957** lb.
3000 psi concrete: **957** lb.
4000 psi concrete: **957** lb.

**TDS-161e**
3/8'' x 3'' Lag Screws
1-1/2'' minimum embedment, 1-1/2" (4 diameters) minimum edge distance
*Ref: ANSI / AWC NDS-2015 for Wood Construction*

Allowable Pullout Loads (using 5:1 safety factor)
Pullout force $W' = (W)(C_D)(C_M)(C_t)(L)$, where
$W$ = lag screw withdrawal design value (lbs./in.) *(see NDS p. 68, Table 11.2A)*
$C_D$ = load duration factor = 1.6 for wind load *( p. 9)*
$C_M$ = wet service factor for dry conditions = 1.0 *(p. 59)*
$C_t$ = temperature factor for <100$^O$F = 1.0 *(p. 9)*
$L$ = actual thread penetration = 1.5 in. nominal length - .219 in. ineffective thread = 1.281 in. *(p. 166)*
Southern Pine (Specific Gravity = 0.55):
$W'$ = (352 lb./in)(1.6)(1.0)(1.0)(1.281) = 721 lb. Allowable Load
Spruce Pine Fir (Specific Gravity = .42):
$W'$ = (235 lb./in)(1.6)(1.0)(1.0)(1.281) = **482** lb. Allowable Load

Maximum Tensile Loads

The lag screw maximum tensile load $P = (S)(A_s)/k$, where
$S$ = material tensile strength = 60,000 psi for Grade A fasteners *(ASTM A 307, Section 1)*
$k$ = safety factor = 4
$A_s$ = stress area = $0.7854[D - (0.9743/n)]^2$ *(ASTM A 307, Section 6)*, where
$D$ = nominal diameter of the screw = 0.375
$n$ = the number of threads per inch = 7 *(IFI Fastener Standards 6th Ed., p. C-18)*

$A_s = 0.7854[0.375 - (0.9743/7)]^2 = 0.0437$ in$^2$
$P$ = (60,000 psi)(0.0437 in$^2$)/4 = **655** lb Maximum Tensile Load

Allowable Bearing Loads from flat washer on wood:

For 3/8" diameter anchor using 1-1/8" OD washer with 1/16" hole clearance
Bearing Area, $A = \pi(9/16 \text{ in.})^2 - \pi(3/16 \text{ in.})^2 = .844$ in.$^2$
Bearing Area Factor, $C_b$ = 1.43 *(NDS p. 22)*
Allowable Load, $F_{All} = F^*C_b$ where $F = F_c^*A$; therefore $F_{All} = F_c^*A^*C_b$
Where: $F_c$ = Allowable compression (psi); $F$ = applied force (lb.)

Southern Pine ($F_c$ = 565 psi): $F_{All}$ = 565 lb/in$^2$ * .844 in$^2$ * 1.43 = 681 lb. Allowable Load
Spruce Pine Fir ($F_c$ = 425 psi): $F_{All}$ = 425 lb/in$^2$ * .844 in$^2$ * 1.43 = 512 lb. Allowable Load
Note: Tabulated values for $F_c$ *(NDS Supplement p. 42, Table 4C)* are species group average values associated with a deformation of 0.04'' per ASTM D2555, D245.

Allowable Loads to use

Spruce-Pine-Fir: **482** lb., Southern Pine: **655** lb.

**TDS-161f**

16d (.162'' Dia.) x 3-1/2'' Common Wire Nails (2'' Min. Embed)
*Ref: ANSI / AWC NDS-2015 for Wood Construction*

Pullout force $W' = (W)(C_D)(C_M)(C_t)(L)$, where
$W$ = nail withdrawal design value (lbs./in.) *(see NDS p. 70, Table 11.2C)*
$C_D$ = load duration factor = 1.6 for wind load *(p. 9)*
$C_M$ = wet service factor for dry conditions = 1.0 *(p. 59)*
$C_t$ = temperature factor for <100$^O$F = 1.0 *(p. 9)*
$L$ = length of embedment

Spruce Pine Fir (Specific Gravity = .42):
*W'* = (26 lb./in)(1.6)(1.0)(1.0)(2 in.) = **83** lb. Allowable Load
Southern Pine (Specific Gravity = 0.55):
*W'* = (50 lb./in)(1.6)(1.0)(1.0)(2 in.) = **160** lb. Allowable Load

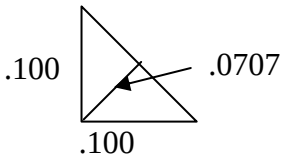
**TDS-161g**
.100" x 1" Long Fillet Weld (E60xx Electrodes Min.)
*Ref. AISC Manual of Steel Construction Allowable Stress Design (9th Edition)*
*(Note: The 14th Edition is current; ASD is "unsupported" after the 9th Edition)*

Design criteria from AISC manual:

1) The effective area of fillet welds shall be taken as the effective length times the effective throat thickness. (p. 5-67)
2) The effective length of fillet welds, except fillet welds in holes and slots, shall be the overall length of full-size fillets. (p. 5-67)
3) The effective throat thickness of a fillet weld shall be the shortest distance from the root of the joint to the face of the diagrammatic weld. (p. 5-67)
4) Maximum size of fillet weld (if welded along edge(s) of connecting parts) shall be not greater than the thickness of the material. (p. 5-67)
5) Allowable fillet weld shear stress (based on effective area) = 30% of nominal tensile strength of weld metal. (p. 5-70, Table J2.5)

Assumptions:

1) 0.100" (12 gauge) steel angle attached to steel jambs of at least greater thickness.
2) Use E60xx Electrode minimum. This electrode has a yield strength of 60 ksi.

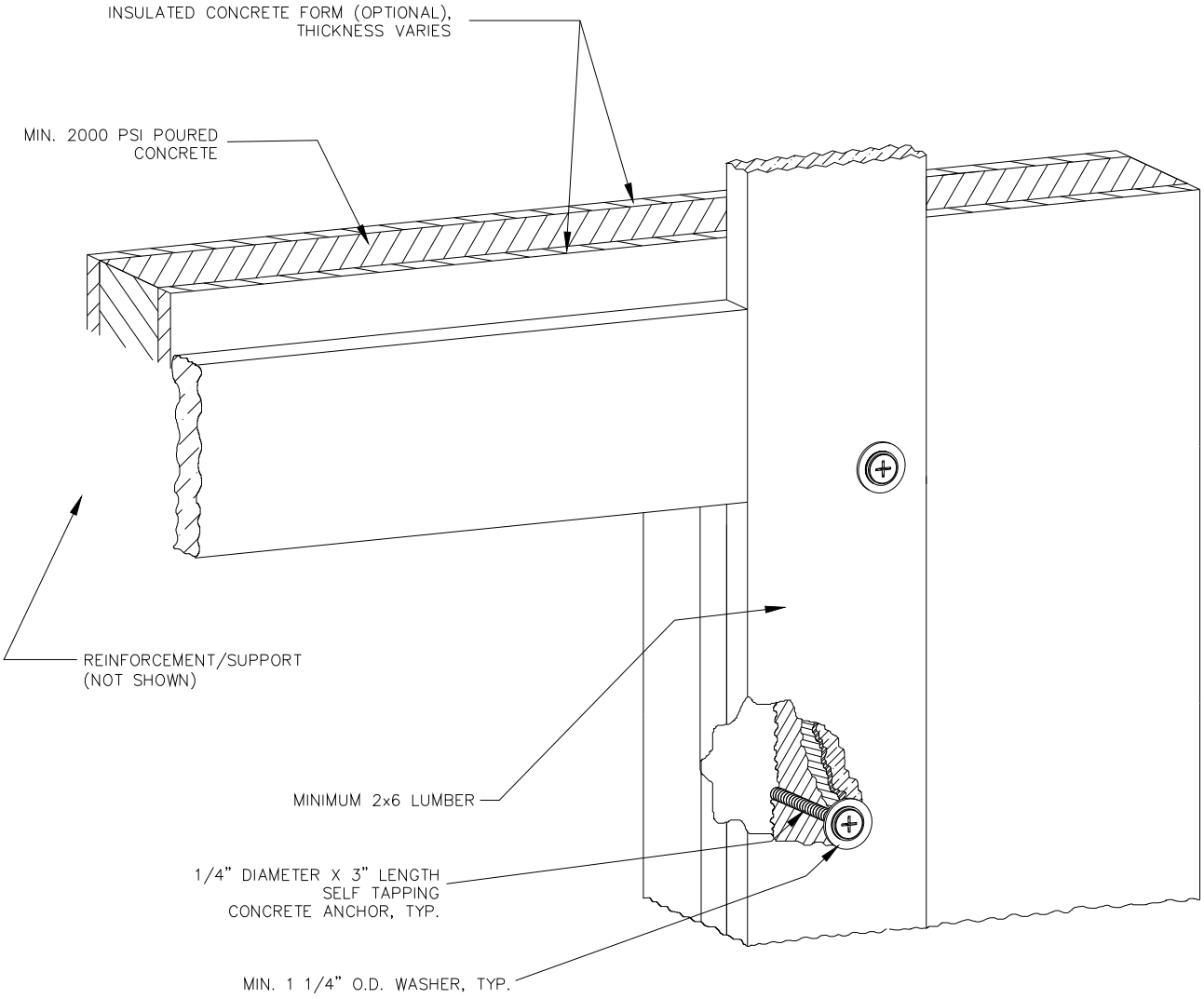


Calculation:
Effective throat thickness: $(0.100^2 + 0.100^2)^{1/2}/2 = 0.0707$ in
Effective length of fillet weld: 1.00 in
Effective area of weld: (0.0707 in)(1.00 in) = 0.0707 $in^2$
Allowable fillet weld stress: $F$ = (60,000 $lb/in^2$)(30%)(0.0707 $in^2$) = **1272** lb.

**TDS-161h**
1/4" x 3/4" self-tapping screws into 12 gauge or 3/16" steel
*Ref: http://www.itwredhead.com/screws.php*

For 1/4" self-tapping screws the ultimate pullout ranges from 1678 lb. to 1858 lb. for 12 gauge steel and from 3554 lb. to 4693 lb. for 3/16" steel. Use the least pullout value and an 8:1 safety factor.
12 gauge steel: $F$ = (1678 lb.)/8 = **209** lb. Allowable Load
3/16" steel: $F$ = (3554 lb.)/8 = **444** lb. Allowable Load

# TDS-161a
## SELF-TAPPING CONCRETE ANCHORS



Notes:

- Alternate design may be approved by a registered professional engineer.
- Alternate wall may be a Concrete Masonry Unit wall, using 3/8" diameter fasteners
- Wood jambs may be counterbored up to 3/8" deep at each self tapping concrete anchor location.
- Spring pad connection not included.

## Self Tapping Anchors into Filled CMU and Concrete

Grout-Filled CMU Block
Fasteners include:
3/8" Simpson TitenHD with 2-3/4" embed, 4" min edge dist, 8" min spacing
480 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0'' | 10'-0'' | 12'-0'' | 14'-0'' | 16'-0'' | 18'-0'' | 20'-0'' |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 23 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 35 PSF | 24 | 24 | 24 | 24 | 21 | 18 | 16 |
| 40 PSF | 24 | 24 | 24 | 21 | 18 | 16 | 14 |
| 45 PSF | 24 | 24 | 21 | 18 | 16 | 14 | 13 |
| 50 PSF | 24 | 23 | 19 | 16 | 14 | 13 | 12 |
| 55 PSF | 23 | 21 | 17 | 15 | 13 | 12 | 10 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 60 PSF | 21 | 19 | 16 | 14 | 12 | 11 | 10 |

Min. 2500 PSI Concrete
Fasteners include:
1/4" ITW Redhead Tapcon+ with 2" embed, 1-5/8" min edge dist
1/4" Powers Wedge-Bolt+ with 1-3/4" embed, 1-5/8" min edge dist
556 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 40 PSF | 24 | 24 | 24 | 24 | 21 | 19 | 17 |
| 45 PSF | 24 | 24 | 24 | 21 | 19 | 16 | 15 |
| 50 PSF | 24 | 24 | 22 | 19 | 17 | 15 | 13 |
| 55 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PS<br>F | 4 | 4 | 0 | 7 | 5 | 3 | 2 |
| 60<br>PS<br>F | 24 | 22 | 19 | 16 | 14 | 12 | 11 |

**SEE NOTES FOLLOWING THE CHARTS**

Min. 3000 PSI Concrete
Fasteners include:
1/4" ITW Redhead Tapcon+ with 2" embed, 1-5/8" min edge dist
1/4" Powers Wedge-Bolt+ with 1-3/4" embed, 1-5/8" min edge dist
609 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 23 | 21 |
| 40 PSF | 24 | 24 | 24 | 24 | 23 | 20 | 18 |
| 45 PSF | 24 | 24 | 24 | 23 | 20 | 18 | 16 |
| 50 PSF | 24 | 24 | 24 | 21 | 18 | 18 | 15 |
| 55 PSF | 24 | 24 | 22 | 19 | 17 | 15 | 13 |
| 60 PSF | 24 | 24 | 20 | 17 | 15 | 14 | 12 |

Min. 4000 PSI Concrete
Fasteners include:
1/4" ITW Redhead Tapcon+ with 2" embed, 1-5/8" min edge dist
1/4" Powers Wedge-Bolt+ with 1-3/4" embed, 1-5/8" min edge dist
636 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 40 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 45 PSF | 24 | 24 | 24 | 24 | 21 | 19 | 17 |
| 50 PSF | 24 | 24 | 24 | 22 | 19 | 17 | 15 |
| 55 PSF | 24 | 24 | 23 | 20 | 17 | 15 | 14 |
| 60 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |

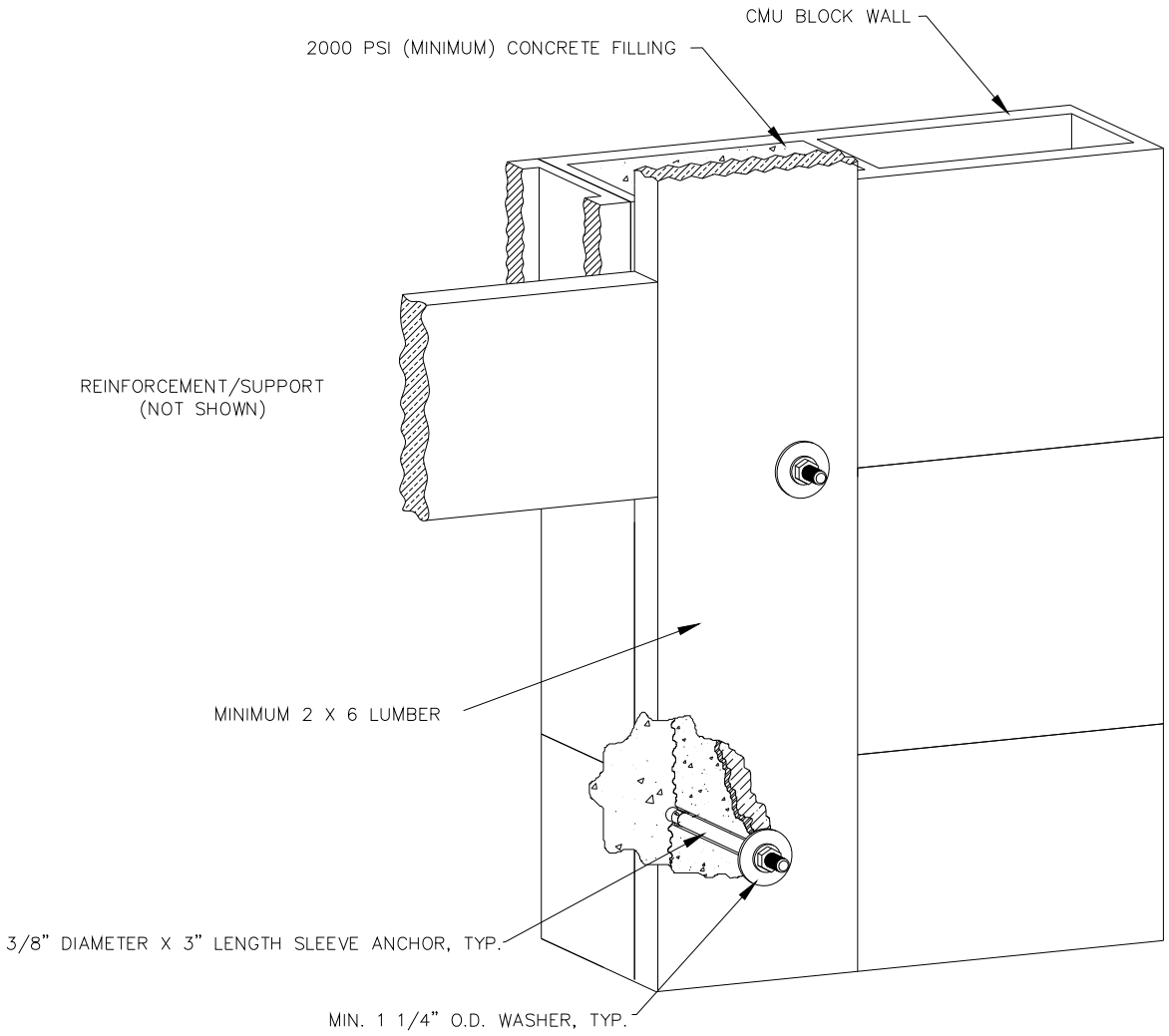
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PS<br>F | 4 | 4 | 1 | 8 | 6 | 4 | 3 |

**SEE NOTES FOLLOWING THE CHARTS**

Notes:

1. Anchors to be evenly spaced between the header and the floor.
2. First (bottom) anchor starting at no more than half of the maximum on-center distance. Highest anchor installed at least as high as the door opening.
3. Vertical jambs shall be minimum 2 x 6 lumber, free of cracks, splits and knots in the area of attachment fasteners.
4. Use with 1-1/4" min. O.D. washers.
5. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
6. Ratings determined per ACI 318 Appendix D
7. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
8. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED**

# TDS-161b
## SLEEVE ANCHORS



Notes:

- Alternate design may be approved by a registered professional engineer.
- Alternate wall may be a minimum 2000 psi poured concrete wall, with (optional) insulation
- Wood jambs may be counterbored up to 3/8” deep at each sleeve anchor location.
- Spring pad connection not included.

## Expansion Anchors into Filled CMU and Concrete

Southern Pine Jamb (Specific Gravity = 0.55), 2500 psi Min. Concrete
556 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 40 PSF | 24 | 24 | 24 | 24 | 21 | 19 | 17 |
| 45 PSF | 24 | 24 | 24 | 21 | 19 | 16 | 15 |
| 50 PSF | 24 | 24 | 22 | 19 | 17 | 15 | 13 |
| 55 PSF | 24 | 24 | 20 | 17 | 15 | 13 | 12 |
| 60 PSF | 24 | 22 | 19 | 16 | 14 | 12 | 11 |

Spruce Pine Fir Jamb (Specific Gravity = 0.42), 2500 psi Min. Concrete
556 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |

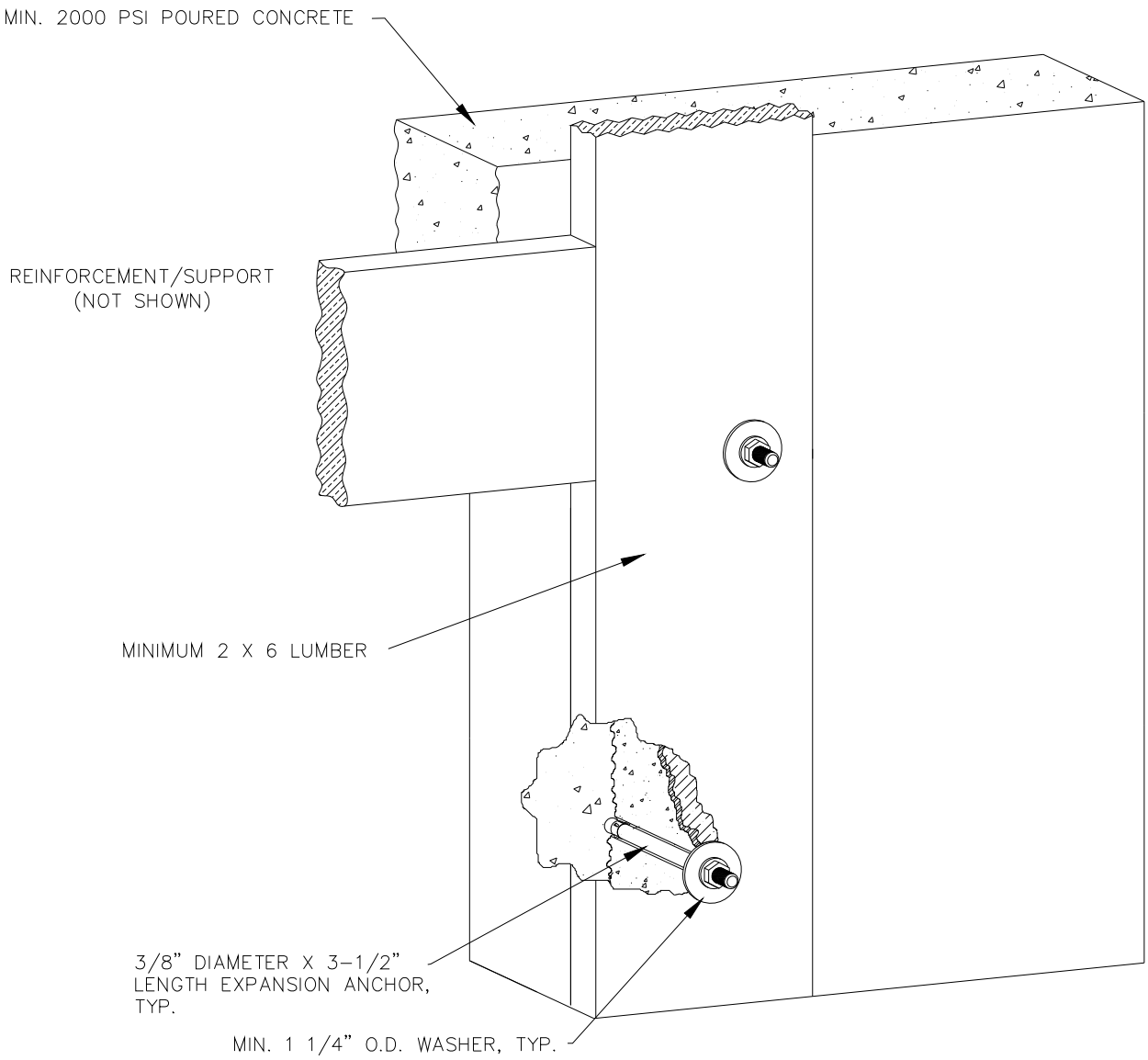
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 40 PSF | 24 | 24 | 24 | 24 | 21 | 19 | 17 |
| 45 PSF | 24 | 24 | 24 | 21 | 19 | 16 | 15 |
| 50 PSF | 24 | 24 | 22 | 19 | 17 | 15 | 13 |
| 55 PSF | 24 | 24 | 20 | 17 | 15 | 13 | 12 |
| 60 PSF | 24 | 22 | 19 | 16 | 14 | 12 | 11 |

**SEE NOTES ON FOLLOWING PAGE**

Notes:

1. Anchors to be evenly spaced between the header and the floor.
2. First (bottom) anchor starting at no more than half of the maximum on-center distance. Highest anchor installed at least as high as the door opening.
3. Anchor spacing calculated from loads per Simpson Strong-Tie online performance data and ANSI / AF&PA NDS-2005 for Wood Construction.
4. Vertical jambs shall be minimum 2 x 6 lumber, free of cracks, splits and knots in the area of attachment fasteners.
5. Use washers provided by anchor manufacturer with additional 1-1/4" flat washer.
6. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
7. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
8. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED IN CONCRETE.**
9. **SPACING LESS THAN 8 INCHES NOT ALLOWED WITH CMU.**

# TDS-161c
## EXPANSION (WEDGE) ANCHORS



Notes:

- Alternate design may be approved by a registered professional engineer.
- Alternate wall may be a Concrete Masonry Unit wall
- Wood jambs may be counterbored up to 3/8 deep at each wedge anchor location.
- Spring pad connection not included.

**3/8'' x 3-1/2'' Expansion (Wedge) Anchors (1-1/2'' Embed)**
**Reference: Simpson Strong-Tie Online Load Tables, www.simpsonanchors.com,**
**ANSI / AF&PA NDS-2005 for Wood Construction, p. 22, 28, 74**

Southern Pine Jamb (Specific Gravity = 0.55), 2000 psi Min. Concrete
468 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0'' | 10'-0'' | 12'-0'' | 14'-0'' | 16'-0'' | 18'-0'' | 20'-0'' |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 30 PSF | 24 | 24 | 24 | 24 | 23 | 21 | 19 |
| 35 PSF | 24 | 24 | 24 | 23 | 20 | 18 | 16 |
| 40 PSF | 24 | 24 | 23 | 20 | 18 | 16 | 14 |
| 45 PSF | 24 | 24 | 21 | 18 | 16 | 14 | 12 |
| 50 PSF | 24 | 22 | 19 | 16 | 14 | 12 | 11 |
| 55 PSF | 23 | 20 | 17 | 15 | 13 | 11 | 10 |
| 60 PSF | 21 | 19 | 16 | 13 | 12 | 10 | 9 |

Spruce Pine Fir Jamb (Specific Gravity = 0.42), 2000 psi Min. Concrete
468 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0'' | 10'-0'' | 12'-0'' | 14'-0'' | 16'-0'' | 18'-0'' | 20'-0'' |

**Note: Technical Data Sheets are information tools only and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific recommendations for their products and check the applicable local regulations.**

This Technical Data Sheet was prepared by the members of DASMA's Commercial & Residential Garage Door Division Technical Committee. DASMA is a trade association comprising manufacturers of rolling doors, fire doors, grilles, counter shutters, sheet doors, and related products; upward-acting residential and commercial garage doors; operating devices for garage doors and gates, sensing devices, and electronic remote controls for garage doors and gate operators; as well as companies that manufacture or supply either raw materials or significant components used in the manufacture and installation of the Active Members' products.

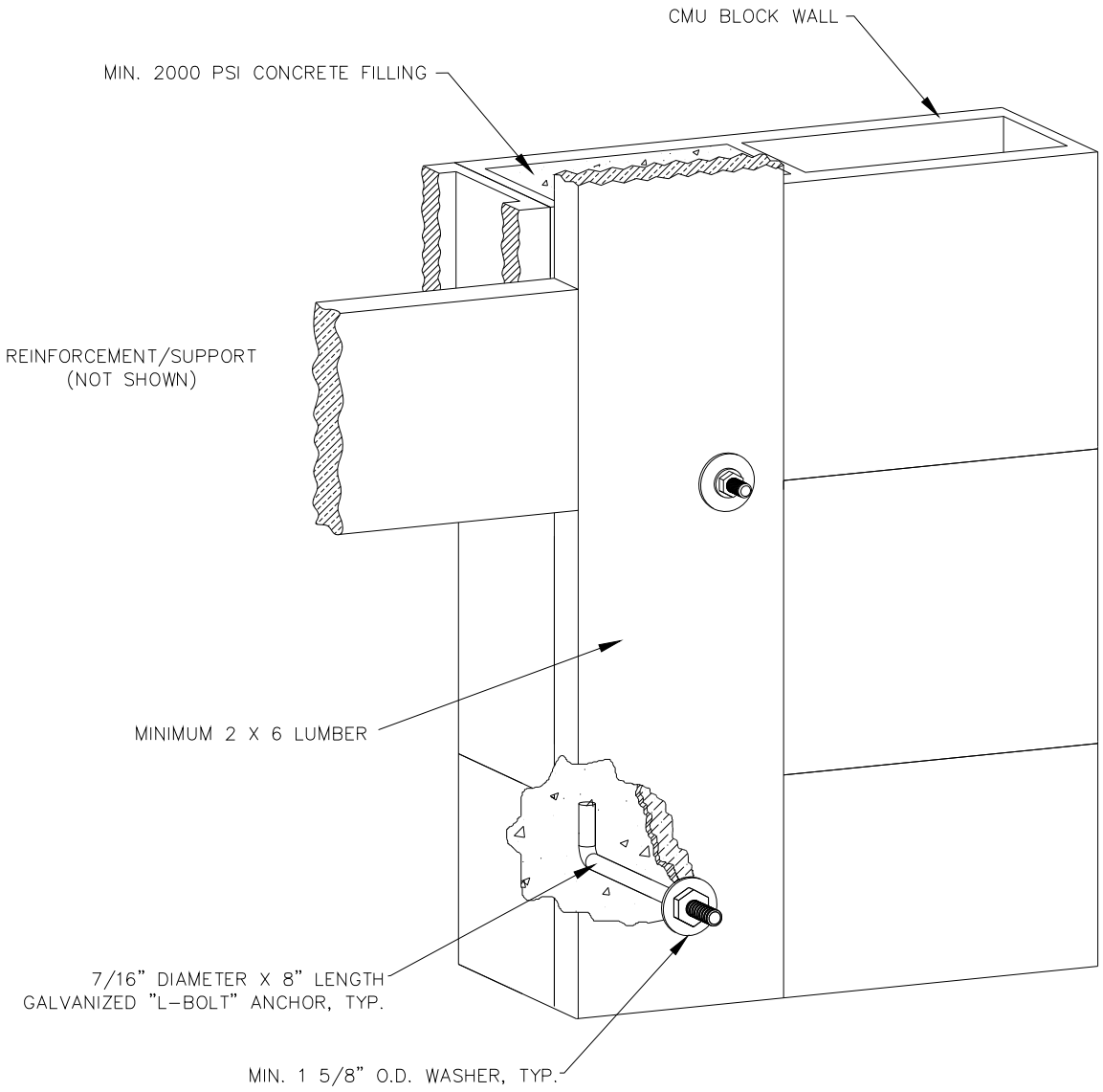
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 30 PSF | 24 | 24 | 24 | 24 | 23 | 21 | 19 |
| 35 PSF | 24 | 24 | 24 | 23 | 20 | 18 | 16 |
| 40 PSF | 24 | 24 | 23 | 20 | 18 | 16 | 14 |
| 45 PSF | 24 | 24 | 21 | 18 | 16 | 14 | 12 |
| 50 PSF | 24 | 22 | 19 | 16 | 14 | 12 | 11 |
| 55 PSF | 23 | 20 | 17 | 15 | 13 | 11 | 10 |
| 60 PSF | 21 | 19 | 16 | 13 | 12 | 10 | 9 |

**SEE NOTES ON FOLLOWING PAGE**

Notes:

1. Anchors to be evenly spaced between the header and the floor.
2. First (bottom) anchor starting at no more than half of the maximum on-center distance. Highest anchor installed at least as high as the door opening.
3. Anchor spacing calculated from loads per Simpson Strong-Tie online performance data and ANSI / AF&PA NDS-2005 for Wood Construction.
4. Vertical jambs shall be minimum 2 x 6 lumber, free of cracks, splits and knots in the area of attachment fasteners.
5. Use washers provided by anchor manufacturer with additional 1-1/4" flat washer.
6. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
7. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
8. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED.**

# TDS-161d
## GALVANIZED L-BOLT ANCHORS



Notes:

- Alternate design may be approved by a registered professional engineer.
- Alternate wall may be minimum 2000 psi poured concrete, with (optional) insulation
- Wood jambs may be counterbored up to 3/8 deep at each anchor location
- Spring pad connection not included.

**7/16'' x 8'' Galvanized L-Bolt Anchors**
**Reference:** ANSI / AF&PA **NDS for Wood Construction, p. 22, 28, 74**

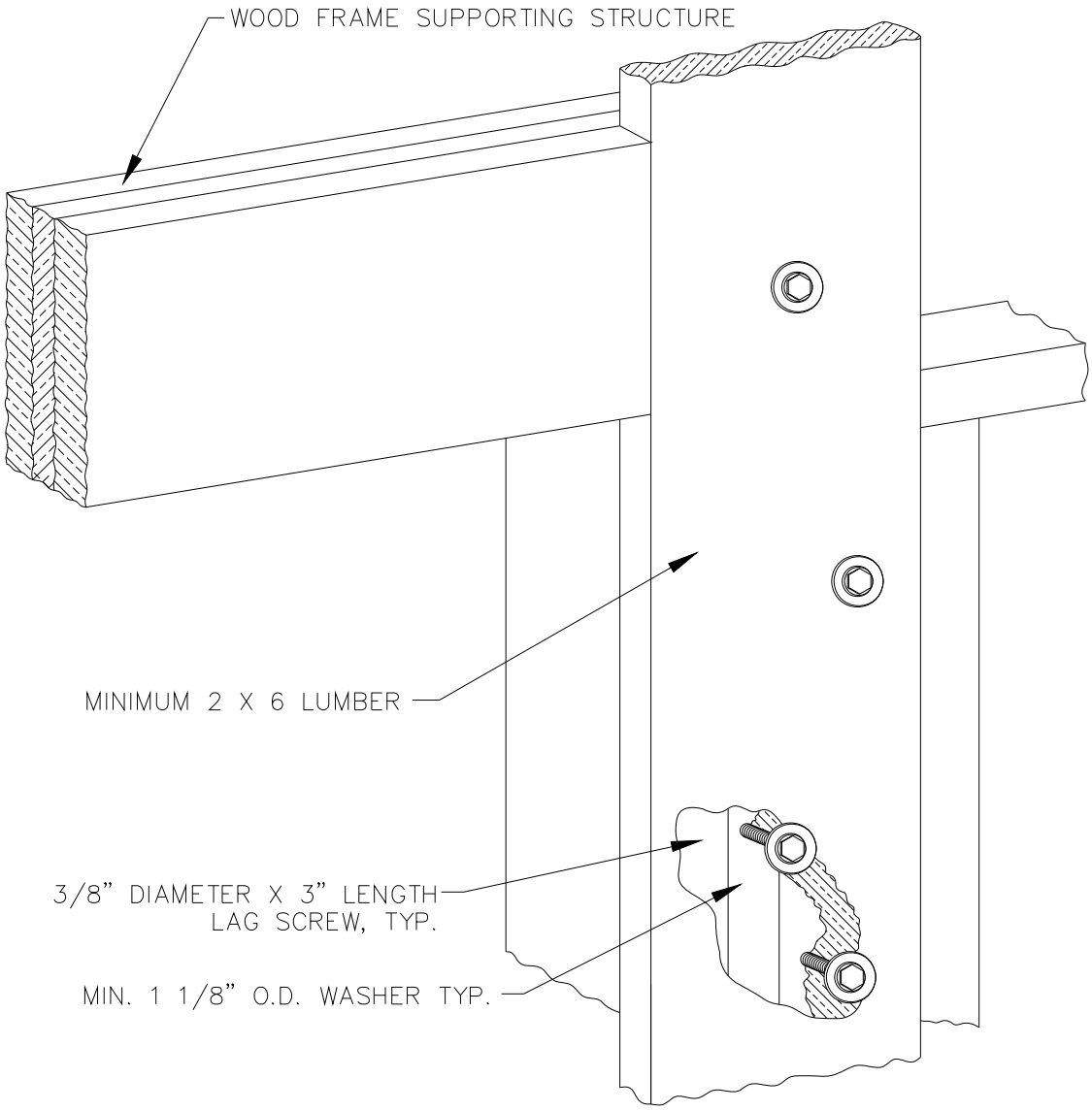
957 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0'' | 10'-0'' | 12'-0'' | 14'-0'' | 16'-0'' | 18'-0'' | 20'-0'' |
| 10 PSF | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 15 PSF | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 20 PSF | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 25 PSF | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 30 PSF | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 35 PSF | 36 | 36 | 36 | 36 | 36 | 36 | 33 |
| 40 PSF | 36 | 36 | 36 | 36 | 36 | 32 | 29 |
| 45 PSF | 36 | 36 | 36 | 36 | 32 | 28 | 26 |
| 50 PSF | 36 | 36 | 36 | 33 | 29 | 26 | 23 |
| 55 PSF | 36 | 36 | 35 | 30 | 26 | 23 | 21 |
| 60 PSF | 36 | 36 | 32 | 27 | 24 | 21 | 19 |

Notes:
1. Anchors to be evenly spaced between the header and the floor.
2. First (bottom) anchor starting at no more than half of the maximum on-center distance. Highest anchor installed at least as high as the door opening.
3. Anchor spacing calculated from loads per ASTM A307 and ANSI / AF&PA NDS-2005 for Wood Construction.
4. Vertical jambs shall be minimum 2 x 6 lumber, free of cracks, splits and knots in the area of attachment fasteners.
5. Use with 1-5/8" min. O.D. washers.

6. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
7. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
8. 7/16” diameter mounting holes to be drilled in 2 x 6 to match bolt pattern.
9. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED.**

# TDS-161e
## LAG SCREWS



Notes:

- Alternate design may be approved by a registered professional engineer.
- Wood jambs may be counterbored up to 1/2" deep at each lag screw location.
- Wood jamb width should allow connection to as many full length vertical framing members as possible.
- Lag screws should connect vertical jamb to full-height vertical framing members at door opening, and should be located away from framing member edges.
- Spring pad connection not included.

**3/8'' x 3'' Lag Screw W/ 1-1/8'' Dia. Washer (1-1/2'' Embed)**
**Reference: ANSI / AF&PA NDS-2005 for Wood Construction, p. 9, 59, 68, 74, 166**

Southern Pine, Specific Gravity = 0.55
655 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0'' | 10'-0'' | 12'-0'' | 14'-0'' | 16'-0'' | 18'-0'' | 20'-0'' |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 22 |
| 40 PSF | 24 | 24 | 24 | 24 | 24 | 22 | 20 |
| 45 PSF | 24 | 24 | 24 | 24 | 22 | 19 | 17 |
| 50 PSF | 24 | 24 | 24 | 22 | 20 | 17 | 16 |
| 55 PSF | 24 | 24 | 24 | 20 | 18 | 16 | 14 |
| 60 PSF | 24 | 24 | 22 | 19 | 16 | 15 | 13 |

Spruce Pine Fir, Specific Gravity = 0.42
482 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0'' | 10'-0'' | 12'-0'' | 14'-0'' | 16'-0'' | 18'-0'' | 20'-0'' |

**Note: Technical Data Sheets are information tools only and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific recommendations for their products and check the applicable local regulations.**

This Technical Data Sheet was prepared by the members of DASMA's Commercial & Residential Garage Door Division Technical Committee. DASMA is a trade association comprising manufacturers of rolling doors, fire doors, grilles, counter shutters, sheet doors, and related products; upward-acting residential and commercial garage doors; operating devices for garage doors and gates, sensing devices, and electronic remote controls for garage doors and gate operators; as well as companies that manufacture or supply either raw materials or significant components used in the manufacture and installation of the Active Members' products.

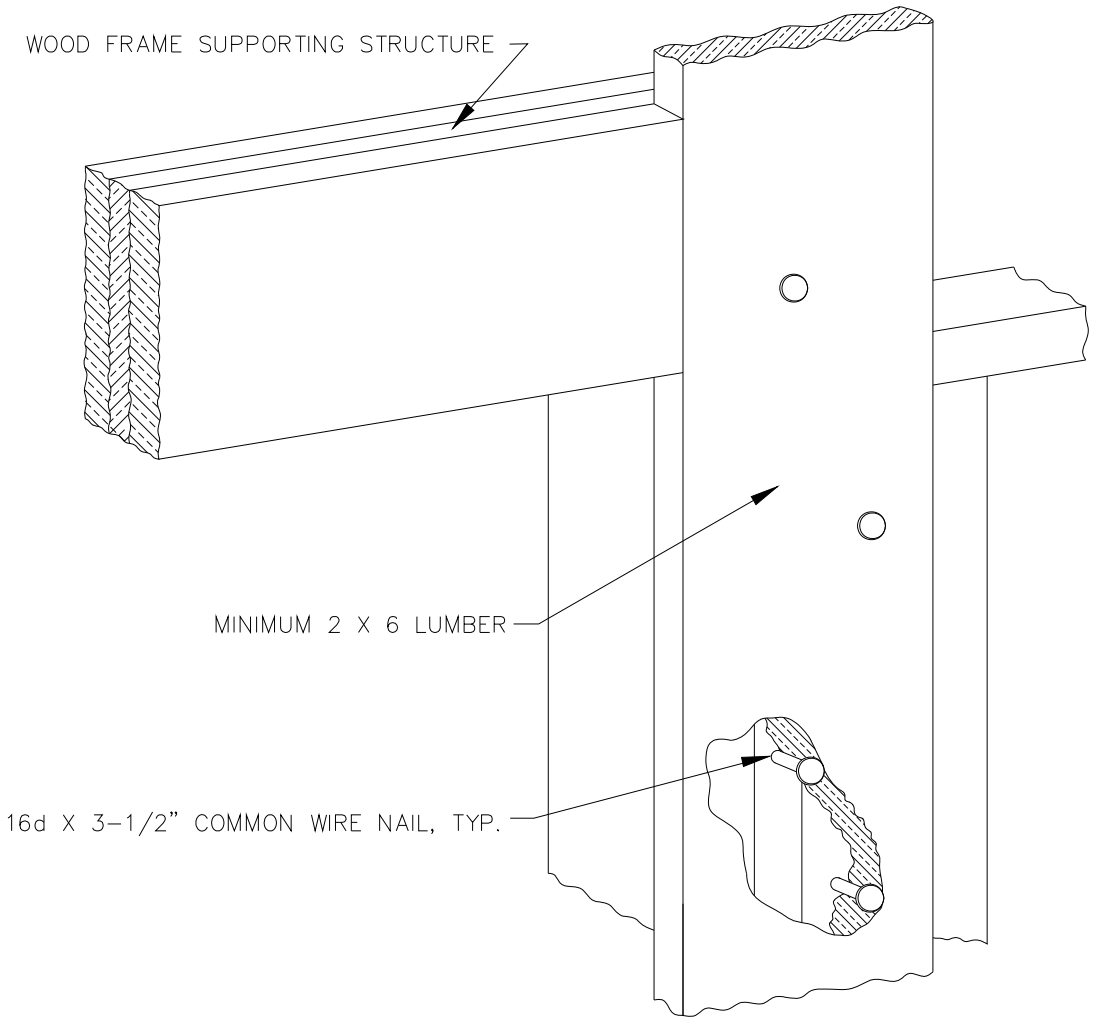
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 23 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 35 PSF | 24 | 24 | 24 | 24 | 21 | 18 | 17 |
| 40 PSF | 24 | 24 | 24 | 21 | 18 | 16 | 14 |
| 45 PSF | 24 | 24 | 21 | 18 | 16 | 14 | 13 |
| 50 PSF | 24 | 23 | 19 | 17 | 14 | 13 | 12 |
| 55 PSF | 23 | 21 | 18 | 15 | 13 | 12 | 11 |
| 60 PSF | 21 | 19 | 16 | 14 | 12 | 11 | 10 |

**SEE NOTES ON FOLLOWING PAGE**

Notes:

1. Anchors to be evenly spaced between the header and the floor.
2. First (bottom) anchor starting at no more than half of the maximum on-center distance. Highest anchor installed at least as high as the door opening.
3. Anchor spacing calculated from loads per ANSI / AF&PA NDS-2005 for Wood Construction.
4. Vertical jambs shall be minimum 2 x 6 lumber, free of cracks, splits and knots in the area of attachment fasteners.
5. Use with 1-1/8" min. O.D. washers.
6. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
7. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
8. Pre-drill 1/4" diameter holes.
9. Lag screws must conform to ANSI/ASME Standard B18.2.1.
10. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED.**

# TDS-161f
## COMMON WIRE NAILS



Notes:

- Alternate design may be approved by a registered professional engineer.
- Wood jamb width should allow connection to as many full length vertical framing members as possible
- Nails should have a minimum edge distance of 1-1/2" from alternating vertical jamb edges, for maximum holding power and to minimize jamb cross-grain bending.
- Nails should connect vertical jamb to full-height vertical framing members at door opening, and should be located away from framing member edges.
- Spring pad connection not included.

## 16d x 3-1/2" Common Wire Nails (2" Min. Embed)
## Reference: 2005 NDS-2005 for Wood Construction, p. 9, 59, 70, 74, 167)

Southern Pine, Specific Gravity = 0.55
160 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 21 | 19 |
| 15 PSF | 24 | 24 | 21 | 18 | 16 | 14 | 13 |
| 20 PSF | 21 | 19 | 16 | 14 | 12 | 11 | 10 |
| 25 PSF | 17 | 15 | 13 | 11 | 10 | 9 | 8 |
| 30 PSF | 14 | 13 | 11 | 9 | 8 | 7 | 6 |
| 35 PSF | 12 | 11 | 9 | 8 | 7 | 6 | |
| 40 PSF | 11 | 10 | 8 | 7 | 6 | | |
| 45 PSF | 9 | 9 | 7 | 6 | | | |
| 50 PSF | 9 | 8 | 6 | | | | |
| 55 PSF | 8 | 7 | 6 | | | | |
| 60 PSF | 7 | 6 | | | | | |

Spruce Pine Fir, Specific Gravity = 0.42
83 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 22 | 20 | 17 | 14 | 12 | 11 | 10 |

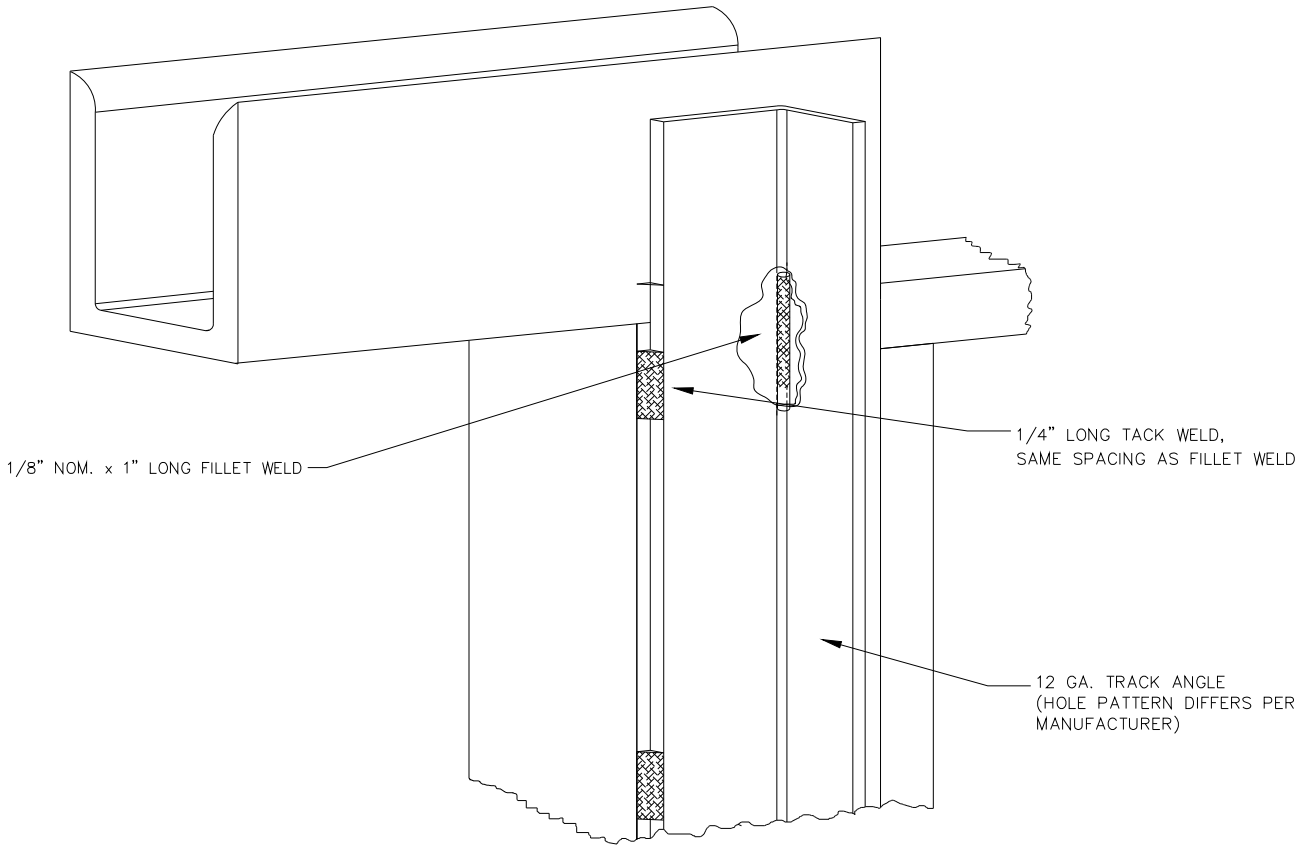
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 15 PSF | 15 | 13 | 11 | 9 | 8 | 7 | 7 |
| 20 PSF | 11 | 10 | 8 | 7 | 6 | 6 | |
| 25 PSF | 9 | 8 | 7 | 6 | | | |
| 30 PSF | 7 | 7 | 6 | | | | |
| 35 PSF | 6 | 6 | | | | | |
| 40 PSF | 6 | | | | | | |
| 45 PSF | | | | | | | |
| 50 PSF | | | | | | | |
| 55 PSF | | | | | | | |
| 60 PSF | | | | | | | |

**SEE NOTES ON FOLLOWING PAGE**

Notes:

1. Anchors to be evenly spaced between the header and the floor.
2. First (bottom) anchor starting at no more than half of the maximum on-center distance. Highest anchor installed at least as high as the door opening.
3. Anchor spacing calculated from loads per ANSI / AF&PA NDS2005 for Wood Construction.
4. Vertical jambs shall be minimum 2 x 6 lumber, free of cracks, splits and knots in the area of attachment fasteners.
5. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
6. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
7. Nails must conform to ASTM F1667.
8. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED.**

# TDS-161g
# 0.100" x 1" Long Fillet Weld (E60xx Electrodes Min.) Into 1/8" Min. Steel Jambs




Note:

- Alternate design may be approved by a registered professional engineer.
- Spring pad connection not included.

**.100" x 1" Long Fillet Weld (E60xx Electrodes Min.)**
**Reference: AISC Manual of Steel Construction Allowable Stress Design (9th Edition) p. 5-67, 5-70.**

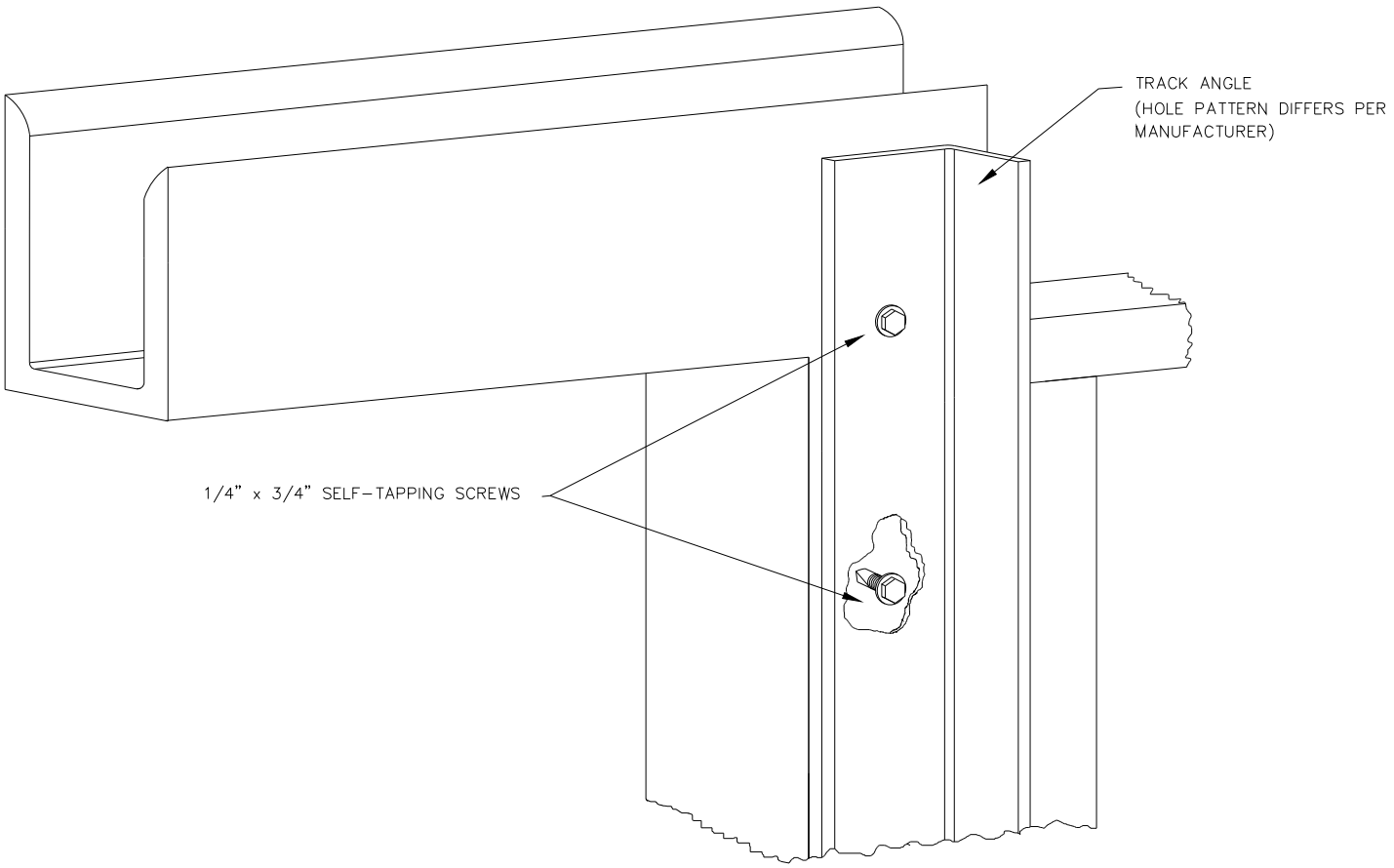
1,272 lb/anchor allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 30 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 35 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 40 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 45 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 50 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 55 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 60 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

Notes:

1. **Most garage door industry track is galvanized steel. Use all necessary precautions when welding galvanized steel.**
2. Welds to be evenly spaced between the header and the floor.
3. First (bottom) weld starting at no more than half of the maximum on-center distance. Highest weld at least as high as the door opening.
4. All welds should be performed by a Certified Welder or inspected by a Certified Welding Inspector to verify the integrity of the welds.
5. Fillet welds to have a straight or convex face surface.
6. Tack weld toe of angle at same spacing to prevent rotation of track angle.
7. Cracks and blemishes shall be ground to a smooth contour and checked to ensure soundness.
8. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
9. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.

# TDS-161h
## SELF-TAPPING SCREWS INTO STEEL




Note:

- Alternate design may be approved by a registered professional engineer.
- Spring pad connection not included.

**1/4" x 3/4" Self-Tapping Screws**
**Reference: ITW Buildex Online Performance Data, www.itwbuildex.com**
12 ga. Steel Jambs
209 lb/screw allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 21 | 19 | 17 |
| 20 PSF | 24 | 24 | 21 | 18 | 16 | 14 | 13 |
| 25 PSF | 22 | 20 | 17 | 14 | 12 | 11 | 10 |
| 30 PSF | 19 | 17 | 14 | 12 | 10 | 9 | 8 |
| 35 PSF | 16 | 14 | 12 | 10 | 9 | 8 | 7 |
| 40 PSF | 14 | 13 | 10 | 9 | 8 | 7 | 6 |
| 45 PSF | 12 | 11 | 9 | 8 | 7 | 6 | 6 |
| 50 PSF | 11 | 10 | 8 | 7 | 6 | 6 | |
| 55 PSF | 10 | 9 | 8 | 6 | 6 | | |
| 60 PSF | 9 | 8 | 7 | 6 | | | |

3/16" Steel Jambs
444 lb/screw allowable load

| | Maximum Spacing (INCHES) | | | | | | |
|---|---|---|---|---|---|---|---|
| Door Width (ft) => Design Load | 9'-0" | 10'-0" | 12'-0" | 14'-0" | 16'-0" | 18'-0" | 20'-0" |
| 10 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 15 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

**Note: Technical Data Sheets are information tools only and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific recommendations for their products and check the applicable local regulations.**

This Technical Data Sheet was prepared by the members of DASMA's Commercial & Residential Garage Door Division Technical Committee. DASMA is a trade association comprising manufacturers of rolling doors, fire doors, grilles, counter shutters, sheet doors, and related products; upward-acting residential and commercial garage doors; operating devices for garage doors and gates, sensing devices, and electronic remote controls for garage doors and gate operators; as well as companies that manufacture or supply either raw materials or significant components used in the manufacture and installation of the Active Members' products.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| 25 PSF | 24 | 24 | 24 | 24 | 24 | 24 | 21 |
| 30 PSF | 24 | 24 | 24 | 24 | 22 | 20 | 18 |
| 35 PSF | 24 | 24 | 24 | 22 | 19 | 17 | 15 |
| 40 PSF | 24 | 24 | 22 | 19 | 17 | 15 | 13 |
| 45 PSF | 24 | 24 | 20 | 17 | 15 | 13 | 12 |
| 50 PSF | 24 | 21 | 18 | 15 | 13 | 12 | 11 |
| 55 PSF | 22 | 19 | 16 | 14 | 12 | 11 | 10 |
| 60 PSF | 20 | 18 | 15 | 13 | 11 | 10 | 9 |

Notes:

1. Screws to be evenly spaced between the header and the floor.
2. First (bottom) screw starting at no more than half of the maximum on-center distance. Highest screw installed at least as high as the door opening.
3. Special requirements for garage doors with center post systems. See manufacturer instructions for details.
4. Supporting structural elements shall be designed by a registered professional engineer for wind loads in addition to other loads.
5. **SPACING LESS THAN 6 INCHES NOT RECOMMENDED.**