

Fastener Design Criteria

The following information is provided to assure that framing components you select can be fastened correctly. Your selection of fasteners or welds will depend on the members selected and the load requirements you anticipate

AISI Calculated Allowable Loads for Screw Connection

Material Thickness mils	Design Thickness in	Material Strength		#8-18 HWH Screw Dia.=0.16"		#10-16 HWH Screw Dia.=0.190"		#12-14 HWH Screw Dia.=0.21"		1/4"-14 HWH Screw Dia.=0.240"	
		Fy (ksi)	Fu (ksi)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)
33	0.0346	33	45	162	71	177	84	186	93	199	106
43	0.0451	33	45	241	92	263	109	277	121	296	138
54	0.0566	33	45	333	115	370	137	389	152	416	173
	0.0566	50	65	333	167	467	198	562	219	600	250
68	0.0713	33	45	n/a	n/a	467	173	550	191	588	218
	0.0713	50	65	n/a	n/a	467	249	625	276	849	315
97	0.1017	33	45	n/a	n/a	467	246	625	272	863	311
	0.1017	50	65	n/a	n/a	467	356	625	393	863	450
118	0.1242	33	45	n/a	n/a	n/a	n/a	625	333	863	380
	0.1242	50	65	n/a	n/a	n/a	n/a	625	480	863	549

AISI Allowable Loads for Welded Connections (lbs/inch of weld)

Material Thickness (mils)	Design Thickness (in)	Material Strength		Fillet Weld		Groove Weld	
		Fy (ksi)	Fu (ksi)	Long. (lbs)	Trans. (lbs)	Long. (lbs)	Trans. (lbs)
L= 1 inch							
43	0.0451	33	45	619	864	663	544
	0.0451	50	65	895	1247	958	785
54	0.0566	33	45	822	1084	832	682
	0.0566	50	65	1188	1566	1202	985
68	0.0713	33	45	1082	1365	1048	859
	0.0713	50	65	1563	1972	1514	1241
97	0.1017	33	45	1618	1795	1495	1226
	0.1017	50	65	2337	1944	2159	1771
118	0.1242	33	45	2015	2192	1826	1497
	0.1242	50	65	2911	2374	2637	2162
L= 2 inch							
43	0.0451	33	45	998	1727	1326	1087
	0.0451	50	65	1442	2495	1915	1570
54	0.0566	33	45	1253	2168	1664	1364
	0.0566	50	65	1809	3131	2404	1971
68	0.0713	33	45	1578	2731	2096	1719
	0.0713	50	65	2279	3944	3028	2483
97	0.1017	33	45	2884	3589	2990	2452
	0.1017	50	65	4165	3889	4319	3541
118	0.1242	33	45	3678	4384	3651	2994
	0.1242	50	65	5312	4749	5274	4325

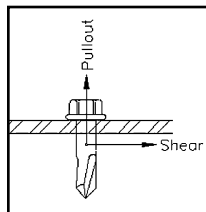
- All values were calculated using the 2001 AISI Specification
- Fxx values were based off of $F_{xx} \geq 60\text{ksi}$ and that $F_{xx} > F_u$ from the 2001 AISI Specification Code
- Values may be increased 1/3 for wind or seismic loading.
- Values include a 2.5 factor of safety.

Minimum Required Allowable Load for Screws

Design Thickness in lbs	#12-24 HWH Screw Dia.=0.21"		#1/4-28 HWH Screw Dia.=0.24"	
	Shear lbs	Tension lbs	Shear lbs	Tension lbs
0.1875	725	1042	957	1100
0.25	725	1063	957	1425

Screw table notes:

- All values were calculated using the 2001 AISI Specification
- Shear values were based on the tilting and bearing modes of failure Eq. E4.3.1-1, E.4.3.1-2
- Minimum Spacing of Screws is determined by E4.1 stating spacing shall not be less than 3d
- Edge Distance is determined by E4.2 stating that edge distance shall not be less than 3d
- Allowable loads are based on a Safety Factor of 3.0
- E4.3.2 states that the Bearing Strength $< P_{ns} = t \cdot e \cdot F_u$
- For the screws into structural steel, the shear values are for the failure of the screw itself. Look at bearing of clip to determine minimum value of shear.
- Bearing or Pullover values do not control in the above cases.



Hilti Anchors (PDF in Steel) Allowable Loads (lbs.)

Material Thickness mils	Yield Strength Fy ksi	Hilti X-EDNI (Dia.=0.145")				Hilti X-DNI (Dia.=0.145")				Hilti X-DS (Dia.=0.177")			
		3/16"		1/4"		3/16"		1/4"		3/16"		1/4"	
		Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension
33	33	203	234	203	234	203	234	203	234	248	234	248	234
43	33	265	304	265	304	265	304	265	304	323	304	323	304
54	33	332	382	332	382	332	360	332	382	406	382	406	382
	50	425	455	480	552	480	360	480	510	586	390	586	552
68	33	419	455	419	481	419	360	419	481	511	390	511	481
	50	425	455	605	695	490	360	590	510	738	390	625	620
97	33	425	455	597	686	490	360	590	510	729	390	625	620
	50	425	455	620	800	490	360	590	510	795	390	625	620
118	33	425	455	620	800	490	360	590	510	795	390	625	620
	50	425	455	620	800	490	360	590	510	795	390	625	620

Hilti Anchors (PDF in Concrete) Allowable Loads (lbs.) Hilti X-DNI (dia. = 0.145")

Material Thickness mils	Yield Strength Fy ksi	Min. Embedment 3/4"				Min. Embedment 1"							
		2000 psi		3000 psi		2000 psi		3000 psi					
		Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension				
33	33	95	70	110	90	125	110	140	90	160	120	185	155
43	33	95	70	110	90	125	110	140	90	160	120	185	155
54	33	95	70	110	90	125	110	140	90	160	120	185	155
	50	95	70	110	90	125	110	140	90	160	120	185	155
68	33	95	70	110	90	125	110	140	90	160	120	185	155
	50	95	70	110	90	125	110	140	90	160	120	185	155
97	33	95	70	110	90	125	110	140	90	160	120	185	155
	50	95	70	110	90	125	110	140	90	160	120	185	155
118	33	95	70	110	90	125	110	140	90	160	120	185	155
	50	95	70	110	90	125	110	140	90	160	120	185	155

Hilti Anchors (PDF in Concrete) Allowable Loads (lbs.) Hilti X-DNI (dia. = 0.145")

Material Thickness mils	Yield Strength Fy ksi	Min. Embedment 1-1/2"			
		2000 psi		3000 psi	
		Shear	Tension	Shear	Tension
33	33	203	165	203	190
43	33	230	165	265	190
54	33	230	165	280	190
	50	230	165	280	190
68	33	230	165	280	190
	50	230	165	280	190
97	33	230	165	280	190
	50	230	165	280	190
118	33	230	165	280	190
	50	230	165	280	190

Material	Min. Edge Distance	Min. Spacing	Min. Material Thickness
Steel	1/4"	1"	1/8"
Concrete	2"	3"	3 x Embedment

Hilti table notes:

- All values were calculated using the 2001 AISI Specification
- Shear values were based on the tilting and bearing modes of failure Eq. E4.3.1-1, E.4.3.1-2
- Allowable loads are based on a SAFETY FACTOR of 3.0
- E4.3.2 states that the BEARING STRENGTH $< P_{ns} = t \cdot e \cdot F_u$