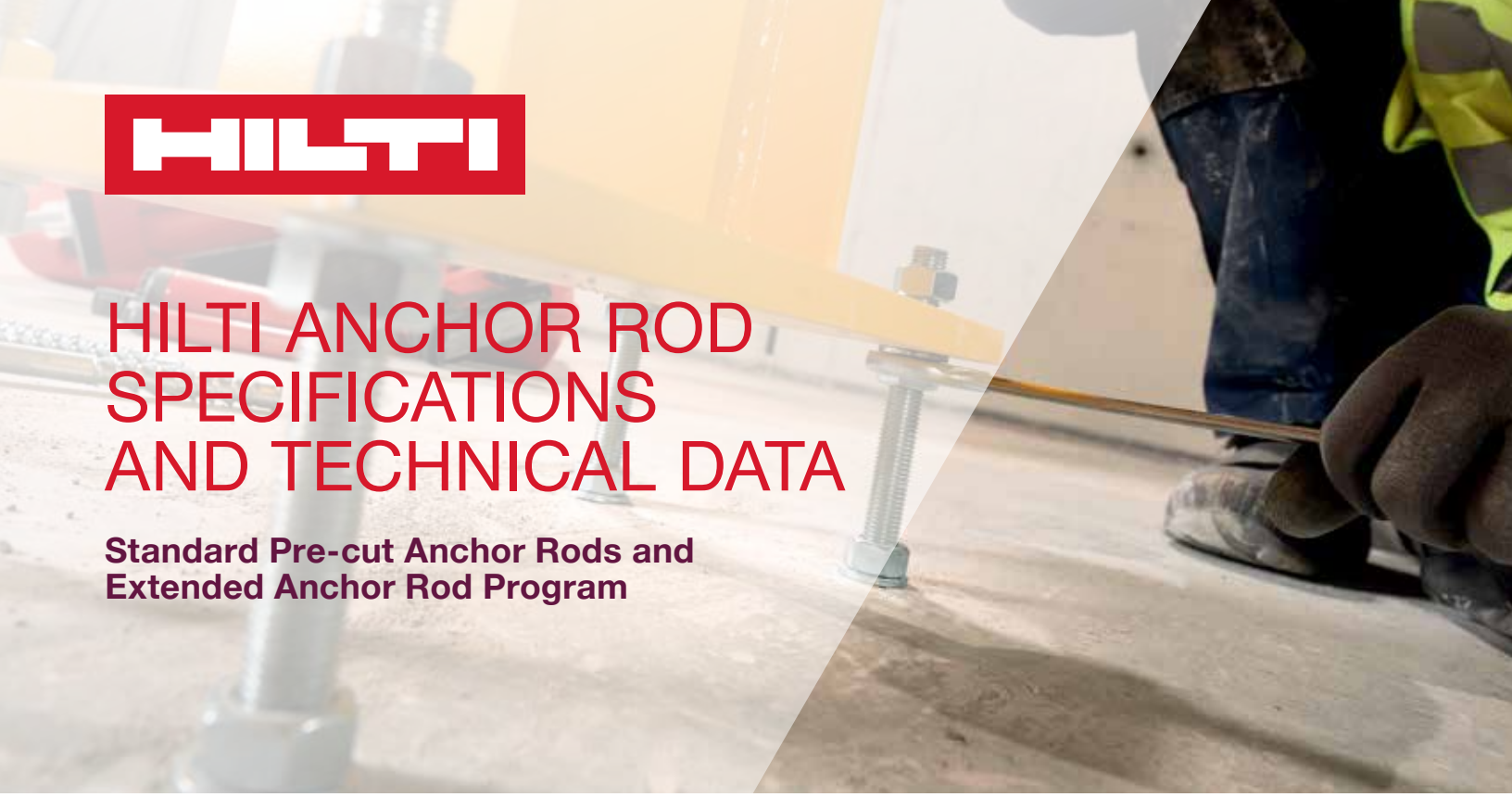

HILTI ANCHOR ROD SPECIFICATIONS AND TECHNICAL DATA

Standard Pre-cut Anchor Rods and Extended Anchor Rod Program

As global leaders in chemical anchoring systems, Hilti has provided threaded rod for anchoring applications in materials such as concrete and masonry for many years.

As your partner, we offer a broad portfolio of high quality pre-cut Hilti anchor rods that in conjunction with the Hilti injectable mortars and adhesive capsules provide reliable and high performing fastening points, and enable the installer to complete chemical anchoring applications efficiently, hassle-free, without compromising the budget.

Hilti HIT-Z Anchor rod (SafeSet™)

For use with Hilti HIT-HY 200 Injectable mortar, the Hilti HIT-Z Anchor rod provides the ultimate in safety and load capacity combined with up to 60% faster installation due to zero-cleaning SafeSet™ Technology*

* Zero-cleaning with SafeSet™ Technology with the Hilti HIT-Z Anchor rod is currently for use at a base material temperature above 41 °F (+5 °C). For use below 41 °F (+5 °C) and for full installation procedures refer to the product instructions for use on the product packaging or contact Hilti.

Hilti HAS Threaded rod

Broad portfolio including high-strength, hot-dipped galvanized, and stainless steel for the demand of increased performance and usability with capsule systems

Hilti HIT-V Threaded rod

Reliable Hilti quality to fulfill the basic needs of chemical anchoring applications in conjunction with injectable adhesive systems

DBS • 02/18

Hilti, Inc. (U.S.) 1-800-879-8000
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Hilti (Canada) Corporation 1-800-363-4458
www.hilti.ca

HIT-V, HAS AND HIT-Z ANCHOR RODS

The following technical data is for standard length threaded rods as shown on page 9, and for HIT-Z anchor rods. For new custom length and larger diameter threaded rod and large diameter options see page 10.

Specifications and physical properties of Hilti HIT-V, HAS, and HIT-Z threaded rods with standard lengths

	Threaded Rod Specification	Units	Minimum Specified Ultimate Strength, f_{uta}	Minimum Specified Yield Strength 0.2% Offset, f_{ya}	f_{uta} / f_{ya}	Elongation, Min. % [9]	Reduction of Area, Min. %	Specification for Nuts and Washers
CARBON STEEL	**HIT-V** Conforms to ultimate strength of ASTM A 307 Grade A [1,10]	psi (MPa)	60,000 (414)	37,500 [(2)] (259)	1.60 [(2)]	10 [(3)]	-	Nuts: SAE J995 Grade 5 Washers: ASTM F844, HV and ANSI B18.22.1 Type A Plain
	HAS-E ISO 898-1 class 5.8 [4,10]	psi (MPa)	72,500 (500)	58,000 (400)	1.25	10 [(5)]	-	Nuts: SAE J995 Grade 5 Washers: ASTM F844, HV and ANSI B18.22.1 Type A Plain
	HAS-E-B ASTM A 193, Grade B7 [6,10] ASTM F 1554 Grade 105 [10,12,13]	psi (MPa)	125,000 [(7)] (862) [(7)]	105,000 (724)	1.19	16 (B7) 15 (Gr. 105)	50 (B7) 45 (Gr. 105)	Nuts: ASTM A 194, Grade 2H, Heavy, or ASTM A563-15 Grade C Washers: ASTM F436 Type 1 and ANSI B18.22.1 Type A Plain
	HAS-E-B HDG ASTM A 193, Grade B7 [6,11] ASTM F 1554 Grade 105[11,12,13]	psi (MPa)	125,000 [(7)] (862) [(7)]	105,000 (724)	1.19	16 (B7) 15 (Gr. 105)	50 (B7) 45 (Gr. 105)	Nuts: ASTM A 194, Grade 2H, Heavy, or ASTM A563-15 Grade C Washers: ASTM F436 Type 1 and ANSI B18.22.1 Type A Plain
	HIT-Z Anchor rod (HIT-HY 200 only) Unalloyed carbon steel [10]	psi (MPa)	94,200 (650)	75,300 (519)	1.25	8	20	Nuts: ASTM A 563 Grade A Washers: ASTM F844, HV and ANSI B18.22.1 Type A Plain
STAINLESS STEEL	**HAS-R 304 / 316** 3/8-in. to 5/8-in. AISI Type 304 / 316 ASTM F 593 CW1 [8]	psi (MPa)	100,000 (690)	65,000 (448)	1.54	20	-	Nuts: ASTM F 594 Washers: ASTM A 240 and ANSI B18.22.1 Type A Plain
	HAS-R 304 / 316 3/4-in. to 1-in. AISI Type 304 / 316 ASTM F 593 CW2 [8]	psi (MPa)	85,000 (586)	45,000 (310)	1.89	25	-	
	HIT-Z-R Anchor rod (HIT-HY 200 only) Grade 316	psi (MPa)	94,200 (650)	75,300 (519)	1.25	8	20	Nuts: ASTM F 594 Washers: ASTM A 240 and ANSI B18.22.1 Type A Plain

1 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
2 ASTM A 307 does not have a minimum specified yield strength. Published yield strength is based on Hilti manufacturer specifications and maximum value of f_{uta} / f_y = 1.6 as specified in ACI 318-14 section R17.4.1.2.
3 Hilti HIT-V threaded rods do not meet the minimum elongation requirements for ASTM A 307. HIT-V needs to be considered a brittle steel element.
4 Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs
5 HAS-E needs to be considered a brittle steel element.
6 Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
7 For designs according to CSA A23.3-14 Annex D, the maximum value of f_{uta} is 860 MPa (124,700 psi) per clause D.6.1.2.
8 Standard Steel Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
9 Based on 2-in. (50 mm) gauge length except for A 193, which are based on a gauge length of 4d and ISO 898-1, which is based on 5d elongation after fracture A_t.
10 All carbon steel threaded rods are zinc plated in accordance with ASTM F1941 Fe/Zn 5 AN, with nuts and washers zinc plated in accordance with ASTM B633 SC 1 Type III.
11 HAS-E-B HDG rods hot-dip galvanized in accordance with ASTM A 153.
12 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
13 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

STRENGTH DESIGN ACCORDING TO ACI 318 CHAPTER 17 (APPENDIX D)

The following steel design information is for Hilti standard threaded rod lengths and HIT-Z anchor rods according to the material specifications on page 2, used in conjunction with Hilti adhesive anchors designed in accordance with ACI 318 Chapter 17. This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE.

Steel design information for Hilti HIT-V and HAS threaded rods and Hilti HIT-Z Anchor rods for use with ACI 318 Chapter 17

Design Information		Symbol	Units	Nominal Rod Diameter (in.)						
				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Rod O.D.		d	in.	0.375	0.5	0.625	0.75	.875	1.0	1.25
			(mm)	(9.5)	(12.7)	(15.9)	19.1)	(22.2)	(25.4)	(31.8)
Rod effective cross-sectional area		A_{se}	$in.^2$	0.0775	0.1419	0.2260	0.3345	0.4617	0.6057	0.9691
			(mm^2)	(50)	(92)	(146)	(216)	(298)	(391)	(625)
HIT-V ASTM A307 Grade A[1,2]	Nominal strength as governed by steel strength	N_{sa}	lb	4,650	8,515	13,560	20,070	-	36,340	-
			(kN)	(20.7)	(37.9)	(60.3)	(89.3)	-	(161.6)	-
		V_{sa}	lb	2,790	5,110	8,135	12,040	-	21,805	-
			(kN)	(12.4)	(22.7)	(36.2)	(53.6)	-	(97.0)	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7						
	Steel strength reduction factor Φ for tension [3]	Φ	-	0.65						
	Steel strength reduction factor Φ for shear [3]	Φ	-	0.60						
HAS-E ISO 898-1 Class 5.8[1]	Nominal strength as governed by steel strength	N_{sa}	lb	5,620	10,290	16,385	24,250	33,475	43,915	70,260
			(kN)	(25.0)	(45.8)	(72.9)	(107.9)	(148.9)	(195.3)	(312.5)
		V_{sa}	lb	3,370	6,175	9,830	14,550	20,085	26,350	42,155
			(kN)	(15.0)	(27.5)	(43.7)	(64.7)	(89.3)	(117.2)	(187.5)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7[4]						
	Steel strength reduction factor Φ for tension [3]	Φ	-	0.65						
	Steel strength reduction factor Φ for shear [3]	Φ	-	0.60						
HAS-E-B and HAS-E-B HDG ASTM A 193 B7[1] and ASTM F 1554 Gr. 105[5]	Nominal strength as governed by steel strength	N_{sa}	lb	9,690	17,740	28,250	41,815	57,715	75,715	121,135
			(kN)	(43.1)	(78.9)	(125.7)	(186.0)	(256.7)	(336.8)	(538.8)
		V_{sa}	lb	5,815	10,645	16,950	25,090	34,630	45,430	72,680
			(kN)	(25.9)	(47.4)	(75.4)	(111.6)	(154.0)	(202.1)	(323.3)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7[4]						
	Steel strength reduction factor Φ for tension [3]	Φ	-	0.75						
	Steel strength reduction factor Φ for shear [3]	Φ	-	0.65						
HIT-Z Anchor rod (HIT-HY 200 only) AISI 1038 or 18MnV5[1]	Nominal strength as governed by steel strength	N_{sa}	lb	7,305	13,375	21,305	31,470	-	-	-
			(kN)	(32.5)	(59.5)	(94.8)	(140.0)	-	-	-
		V_{sa}	lb	3,215	5,885	9,375	13,850	-	-	-
			(kN)	(14.3)	(26.2)	(41.7)	(61.6)	-	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	1.0	0.65			-		
	Steel strength reduction factor Φ for tension [3]	Φ	-	0.65				-		
	Steel strength reduction factor Φ for shear [3]	Φ	-	0.60				-		
HAS-R ASTM F 593, CW Stainless Steel[1]	Nominal strength as governed by steel strength	N_{sa}	lb	7,750	14,190	22,600	28,435	39,245	51,485	-
			(kN)	(34.5)	(63.1)	(100.5)	(126.5)	(174.6)	(229.0)	-
		V_{sa}	lb	4,650	8,515	13,560	17,060	23,545	30,890	-
			(kN)	(20.7)	(37.9)	(60.3)	(75.9)	(104.7)	(137.4)	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7[4]						
	Steel strength reduction factor Φ for tension [3]	Φ	-	0.65						
	Steel strength reduction factor Φ for shear [3]	Φ	-	0.60						
HIT-Z-R Anchor rod (HIT-HY 200 only) Stainless Steel[1]	Nominal strength as governed by steel strength	N_{sa}	lb	7,305	13,375	21,305	31,470	-	-	-
			(kN)	(32.5)	(59.5)	(94.8)	(140.0)	-	-	-
		V_{sa}	lb	4,385	8,025	12,785	18,885	-	-	-
			(kN)	(19.5)	(35.7)	(56.9)	(84.0)	-	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	1.0	0.75	0.65		-		
	Steel strength reduction factor Φ for tension [3]	Φ	-	0.65				-		
	Steel strength reduction factor Φ for shear [3]	Φ	-	0.60				-		

1 Values provided for Hilti threaded rod materials based on published strengths and calculated in accordance with ACI 318-14 Chapter 17 Eq. 17.4.1.2 and Eq. 17.5.1.2b. Nuts and washers must be appropriate for rod strength.
2 HIT-V does not comply with % elongation requirements of ASTM A 307 Grade A steel.
3 For use with the load combinations of IBC Section 1605.2, ACI 318-14 5.3, or ACI 318-11 D.4.3, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318 D.4.4.
4 For HIT-RE 500 V3, the value of $\alpha_{v,seis}$ can be increased. Refer to ICC-ES ESR-3814 or contact Hilti.
5 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

STRENGTH DESIGN ACCORDING TO ACI 318 CHAPTER 17 (APPENDIX D)

The following are strength design values calculated from data on the previous page. This is intended for adhesive anchors designed in accordance with ACI 318-14 Chapter 17 (and Appendix D for earlier editions of ACI 318) and can be used in conjunction with the Hilti Simplified Strength Design Tables (refer to Section 3.1.8 of the 2016 and 2017 Hilti Anchor Fastening Technical Guide for more information on the Hilti Simplified Tables). This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE.

Steel design strength for carbon steel Hilti HIT-V and HAS threaded rods and Hilti HIT-Z Anchor rods according to ACI 318-14 Chapter 17

Nominal anchor diameter in.	HIT-V ASTM A307 Grade A [4]			HAS-E ISO 898 Class 5.8 [4]			HAS-E-B and HAS-E-B HDG ASTM A193 B7 [5] and ASTM F 1554 Gr. 105 [7]			HIT-Z (HIT-HY 200 only) AISI 1038 or 18MnV5 [4]		
	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[6] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)
3/8	3,025 (13.5)	1,675 (7.5)	1,175 (5.2)	3,655 (16.3)	2,020 (9.0)	1,415 (6.3)	7,265 (32.3)	3,780 (16.8)	2,645 (11.8)	4,750 (21.1)	1,930 (8.6)	1,930 (8.6)
1/2	5,535 (24.6)	3,065 (13.6)	2,145 (9.5)	6,690 (29.8)	3,705 (16.5)	2,595 (11.5)	13,300 (59.2)	6,915 (30.8)	4,840 (21.5)	8,685 (38.6)	3,530 (15.7)	2,295 (10.2)
5/8	8,815 (39.2)	4,880 (21.7)	3,415 (15.2)	10,650 (47.4)	5,900 (26.2)	4,130 (18.4)	21,190 (94.3)	11,020 (49.0)	7,715 (34.3)	13,840 (61.6)	5,625 (25.0)	3,655 (16.3)
3/4	13,045 (58.0)	7,225 (32.1)	5,060 (22.5)	15,765 (70.1)	8,730 (38.8)	6,110 (27.2)	31,360 (139.5)	16,305 (72.5)	11,415 (50.8)	20,480 (91.1)	8,310 (37.0)	5,400 (24.0)
7/8	- -	- -	- -	21,755 (96.8)	12,050 (53.6)	8,435 (37.5)	43,285 (192.5)	22,505 (100.1)	15,755 (70.1)	- -	- -	- -
1	23,620 (105.1)	13,085 (58.2)	9,160 (40.7)	28,540 (127.0)	15,805 (70.3)	11,065 (49.2)	56,785 (252.6)	29,525 (131.3)	20,670 (91.9)	- -	- -	- -
1-1/4	- -	- -	- -	45,670 (203.1)	25,295 (112.5)	17,705 (78.8)	90,850 (404.1)	47,240 (210.1)	33,070 (147.1)	- -	- -	- -

1 Tensile = $\Phi A_{se,N} f_{uta}$ as noted in ACI 318 -14 17.4.1.2
2 Shear = Φ 0.60 $A_{se,V} f_{uta}$ as noted in ACI 318-14 17.5.1.2b
3 Seismic Shear = $\alpha_{V,seis} \Phi V_{sa}$: Reduction factor for seismic shear only. See ACI 318 for additional information on seismic applications. Seismic shear for HIT-RE 500 V3 may be increased for HAS-E, HAS-E B7, and HAS-E B7 HDG rods. Refer to ESR-3814.
4 HIT-V and HAS-E threaded rods and HIT-Z Anchor Rods are considered brittle steel elements. HIT-V does not comply with % elongation requirements of ASTM A307 Grade A steel.
5 HAS-E-B and HAS-E-B HDG rods are considered ductile steel elements.
6 Shear value for HIT-Z Anchor Rod is based on static shear testing with $\Phi V_{sa} \leq \Phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318-14 17.5.1.2b.
7 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

Steel design strength for stainless steel Hilti HAS-R threaded rods and stainless steel Hilti HIT-Z-R Anchor rods according to ACI 318 Appendix D

Nominal anchor diameter in.	HAS-R Stainless Steel ASTM F 593 - AISI 304/316 SS CW1 and CW2 [4]			HIT-Z-R (HIT-HY 200 only) Stainless Steel [4]		
	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[5] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)
3/8	5,040 (22.4)	2,790 (12.4)	1,955 (8.7)	4,750 (21.1)	2,630 (11.7)	2,630 (11.7)
1/2	9,225 (41.0)	5,110 (22.7)	3,575 (15.9)	8,695 (38.7)	4,815 (21.4)	3,610 (16.1)
5/8	14,690 (65.3)	8,135 (36.2)	5,695 (25.3)	13,850 (61.6)	7,670 (34.1)	4,985 (22.2)
3/4	18,480 (82.2)	10,235 (45.5)	7,165 (31.9)	20,455 (91.0)	11,330 (50.4)	7,365 (32.8)
7/8	25,510 (113.5)	14,125 (62.8)	9,890 (44.0)	- -	- -	- -
1	33,465 (148.9)	18,535 (82.4)	12,975 (57.7)	- -	- -	- -

1 Tensile = $\Phi A_{se,N} f_{uta}$ as noted in ACI 318-14 17.4.1.2
2 Shear = Φ 0.60 $A_{se,V} f_{uta}$ as noted in ACI 318-14 17.5.1.2b
3 Seismic Shear = $\alpha_{V,seis} \Phi V_{sa}$: Reduction factor for seismic shear only. See ACI 318 for additional information on seismic applications. Seismic shear for HIT-RE 500 V3 may be increased for HAS-R rods. Refer to ESR-3814.
4 HAS-R Stainless Steel Threaded rods and HIT-Z-R Anchor rods are considered brittle steel elements.
5 Shear value for HIT-Z-R Anchor rod is based on static shear testing with $\Phi V_{sa} < \Phi$ 0.60 $A_{se,V} f_{uta}$ as noted in ACI 318-14 17.5.1.2b.

LIMIT STATES DESIGN ACCORDING TO CSA A23.3-14 ANNEX D

The following steel design information is for Hilti standard threaded rod lengths and HIT-Z anchor rods according to the material specifications on page 2, used in conjunction with Hilti adhesive anchors designed in accordance with CSA A23.3-14 Annex D. This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE.

Steel design information for Hilti HIT-V and HAS threaded rods and Hilti HIT-Z Anchor rods for use with CSA A23.3-14 Annex D

Design Information		Symbol	Units	Nominal Rod Diameter (in.)						
				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Rod O.D.		d	in. (mm)	0.375 (9.5)	0.5 (12.7)	0.625 (15.9)	0.75 (19.1)	0.875 (22.2)	1 (25.4)	1.25 (31.8)
Rod effective cross-sectional area		A_{se}	in.^{2} (mm^2)	0.0775 (50)	0.1419 (92)	0.226 (146)	0.3345 (216)	0.4617 (298)	0.6057 (391)	0.9691 (625)
HIT-V ASTM A307 Grade A[1,2]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	4,650 (20.7)	8,515 (37.9)	13,560 (60.3)	20,070 (89.3)	- -	36,340 (161.6)	- -
		V_{sa}	lb (kN)	2,790 (12.4)	5,110 (22.7)	8,135 (36.2)	12,040 (53.6)	- -	21,805 (97.0)	- -
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7						
	Steel strength reduction factor R for tension [3]	R	-	0.70						
	Steel strength reduction factor R for shear [3]	R	-	0.65						
HAS-E ISO 898-1 Class 5.8[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	5,620 (25.0)	10,290 (45.8)	16,385 (72.9)	24,250 (107.9)	33,475 (148.9)	43,915 (195.3)	70,260 (312.5)
		V_{sa}	lb (kN)	3,370 (15.0)	6,175 (27.5)	9,830 (43.7)	14,550 (64.7)	20,085 (89.3)	26,350 (117.2)	42,155 (187.5)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7[4]						
	Steel strength reduction factor R for tension [3]	R	-	0.70						
	Steel strength reduction factor R for shear [3]	R	-	0.65						
HAS-E-B and HAS-E-B HDG ASTM A 193 B7 and ASTM F 1554 Gr. 105[5]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	9,665 (43.0)	17,695 (78.7)	28,180 (125.4)	41,710 (185.5)	57,575 (256.1)	75,530 (336.0)	120,845 (537.5)
		V_{sa}	lb (kN)	5,800 (25.8)	10,615 (47.2)	16,910 (75.2)	25,025 (111.3)	34,545 (153.7)	45,320 (201.6)	72,505 (322.5)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7[4]						
	Steel strength reduction factor R for tension [3]	R	-	0.80						
	Steel strength reduction factor R for shear [3]	R	-	0.75						
HIT-Z Anchor rod (HIT-HY 200 only) AISI 1038 or 18MnV5[1]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	7,305 (32.5)	13,375 (59.5)	21,305 (94.8)	31,470 (140.0)	- -	- -	- -
		V_{sa}	lb (kN)	3,215 (14.3)	5,885 (26.2)	9,375 (41.7)	13,850 (61.6)	- -	- -	- -
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	1	0.65			-		
	Steel strength reduction factor R for tension [3]	R	-	0.70				-		
	Steel strength reduction factor R for shear [3]	R	-	0.65				-		
HAS-R ASTM F 593, CW Stainless Steel[1]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	7,750 (34.5)	14,190 (63.1)	22,600 (100.5)	28,435 (126.5)	39,245 (174.6)	51,485 (229.0)	- -
		V_{sa}	lb (kN)	4,650 (20.7)	8,515 (37.9)	13,560 (60.3)	17,060 (75.9)	23,545 (104.7)	30,890 (137.4)	- -
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7[4]						
	Steel strength reduction factor R for tension [3]	R	-	0.70						
	Steel strength reduction factor R for shear [3]	R	-	0.65						
HIT-Z-R Anchor rod (HIT-HY 200 only) Stainless Steel[1]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	7,305 (32.5)	13,375 (59.5)	21,305 (94.8)	31,470 (140.0)	- -	- -	- -
		V_{sa}	lb (kN)	4,385 (19.5)	8,025 (35.7)	12,785 (56.9)	18,885 (84.0)	- -	- -	- -
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	1	0.75	0.65		-		
	Steel strength reduction factor R for tension [3]	R	-	0.70				-		
	Steel strength reduction factor R for shear [3]	R	-	0.65				-		

1 Values provided for Hilti threaded rod materials based on published strengths and calculated in accordance with CSA A23.3-14 Annex D Eq. (D.2) and Eq. (D.31). Nuts and washers must be appropriate for rod strength.
2 HIT-V does not comply with % elongation requirements of ASTM A 307 Grade A steel.
3 For use with the load combinations of CSA A23.3-14 Clause 8.
4 For HIT-RE 500 V3, the value of $\alpha_{v,seis}$ can be increased. Refer to ICC-ES ESR-3814 or contact Hilti.
5 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

LIMIT STATES DESIGN ACCORDING TO CSA A23.3-14 ANNEX D

The following are strength design values calculated from data on the previous page. This is intended for adhesive anchors designed in accordance with CSA A23.3-14 Annex D and can be used in conjunction with the Hilti Simplified Strength Design Tables (refer to Section 3.1.8 of the 2016 and 2017 Hilti Anchor Fastening Technical Guide for more information on the Hilti Simplified Tables). This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE.

Steel factored resistance for carbon steel Hilti HIT-V and HAS threaded rods and Hilti HIT-Z Anchor rods according to CSA A23.3-14 Annex D

Nominal anchor diameter in.	HIT-V ASTM A307 Grade A [4]			HAS-E ISO 898 Class 5.8 [4]			HAS-E-B and HAS-E-B HDG ASTM A193 B7 [5] and ASTM F 1554 Gr. 105 [7]			HIT-Z (HIT-HY 200 only) AISI 1038 or 18MnV5 [4]		
	Tensile[1] N_{sar} lb (kN)	Shear[2] V_{sar} lb (kN)	Seismic Shear[3] $V_{sar,eq}$ lb (kN)	Tensile[1] N_{sar} lb (kN)	Shear[2] V_{sar} lb (kN)	Seismic Shear[3] $V_{sar,eq}$ lb (kN)	Tensile[1] N_{sar} lb (kN)	Shear[2] V_{sar} lb (kN)	Seismic Shear[3] $V_{sar,eq}$ lb (kN)	Tensile[1] N_{sar} lb (kN)	Shear[6] V_{sar} lb (kN)	Seismic Shear[3] $V_{sar,eq}$ lb (kN)
3/8	2,765 (12.3)	1,540 (6.9)	1,080 (4.8)	3,345 (14.9)	1,860 (8.3)	1,300 (5.8)	6,570 (29.2)	3,695 (16.4)	2,585 (11.5)	4,345 (19.3)	1,775 (7.9)	1,775 (7.9)
1/2	5,065 (22.5)	2,825 (12.6)	1,975 (8.8)	6,125 (27.2)	3,410 (15.2)	2,385 (10.6)	12,035 (53.5)	6,765 (30.1)	4,735 (21.1)	7,960 (35.4)	3,250 (14.5)	2,115 (9.4)
5/8	8,070 (35.9)	4,495 (20.0)	3,145 (14.0)	9,750 (43.4)	5,430 (24.2)	3,800 (16.9)	19,160 (85.2)	10,780 (48.0)	7,545 (33.6)	12,675 (56.4)	5,180 (23.0)	3,365 (15.0)
3/4	11,940 (53.1)	6,650 (29.6)	4,655 (20.7)	14,430 (64.2)	8,040 (35.8)	5,630 (25.0)	28,365 (126.2)	15,955 (71.0)	11,170 (49.7)	18,725 (83.3)	7,650 (34.0)	4,975 (22.1)
7/8	- -	- -	- -	19,915 (88.6)	11,095 (49.4)	7,765 (34.5)	39,150 (174.1)	22,020 (97.9)	15,415 (68.6)	- -	- -	- -
1	21,620 (96.2)	12,045 (53.6)	8,430 (37.5)	26,125 (116.2)	14,555 (64.7)	10,190 (45.3)	51,360 (228.5)	28,890 (128.5)	20,225 (90.0)	- -	- -	- -
1-1/4	- -	- -	- -	41,805 (186.0)	23,290 (103.6)	16,305 (72.5)	82,175 (365.5)	46,220 (205.6)	32,355 (143.9)	- -	- -	- -

1 Tensile = $A_{se,N}\ \Phi_s\ f_{uta}$ R as noted in CSA A23.3-14 Eq. D.2.
2 Shear = $A_{se,V}\ \Phi_s$ 0.60 f_{uta} R as noted in CSA A23.3-14 Eq. D.31.
3 Seismic Shear = $\alpha_{V,seis} V_{sar}$: Reduction factor for seismic shear only. See CSA A23.3 Annex D for additional information on seismic applications. Seismic shear for HIT-RE 500 V3 may be increased for HAS-E, HAS-E-B, and HAS-E-B HDG rods. Refer to ESR-3814.
4 HIT-V and HAS-E threaded rods and HIT-Z Anchor Rods are considered brittle steel elements. HIT-V does not comply with % elongation requirements of ASTM A307 Grade A steel.
5 HAS-E-B and HAS-E-B HDG rods are considered ductile steel elements.
6 Shear value for HIT-Z Anchor Rod is based on static shear testing with $V_{sar} < A_{se,V}\ \Phi_s$ 0.60 f_{uta} R as noted in CSA A23.3-14 Eq. D.31.
7 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

Steel factored resistance for stainless steel Hilti HAS-R threaded rods and stainless steel Hilti HIT-Z-R Anchor rods according to CSA A23.3-14 Annex D

Nominal anchor diameter in.	HAS-R Stainless Steel ASTM F 593 AISI 304/316 SS CW1 and CW2 [4]			HIT-Z-R (HIT-HY 200 only) Stainless Steel [4]		
	Tensile[1] N_{sar} lb (kN)	Shear[2] V_{sar} lb (kN)	Seismic Shear[3] $V_{sar,eq}$ lb (kN)	Tensile[1] N_{sar} lb (kN)	Shear[5] V_{sar} lb (kN)	Seismic Shear[3] $V_{sar,eq}$ lb (kN)
3/8	4,610 (20.5)	2,570 (11.4)	1,800 (8.0)	4,345 (19.3)	2,420 (10.8)	2,420 (10.8)
1/2	8,445 (37.6)	4,705 (20.9)	3,295 (14.7)	7,960 (35.4)	4,435 (19.7)	3,325 (14.8)
5/8	13,445 (59.8)	7,490 (33.3)	5,245 (23.3)	12,675 (56.4)	7,065 (31.4)	4,590 (20.4)
3/4	16,915 (75.2)	9,425 (41.9)	6,600 (29.4)	18,725 (83.3)	10,435 (46.4)	6,785 (30.2)
7/8	23,350 (103.9)	13,010 (57.9)	9,105 (40.5)	- -	- -	- -
1	30,635 (136.3)	17,065 (75.9)	11,945 (53.1)	- -	- -	- -
1-1/4	49,010 (218.0)	27,305 (121.5)	19,115 (85.0)	- -	- -	- -

1 Tensile = $A_{se,N}\ \Phi_s\ f_{uta}$ R as noted in CSA A23.3-14 Eq. D.2.
2 Shear = $A_{se,V}\ \Phi_s$ 0.60 f_{uta} R as noted in CSA A23.3-14 Eq. D.31.
3 Seismic Shear = $\alpha_{V,seis} V_{sar}$: Reduction factor for seismic shear only. See CSA A23.3 Annex D for additional information on seismic applications. Seismic shear for HIT-RE 500 V3 may be increased for HAS-R rods. Refer to ESR-3814.
4 HAS-R Stainless Steel threaded rods and HIT-Z-R Anchor Rods are considered brittle steel elements.
5 Shear value for HIT-Z-R Anchor Rod is based on static shear testing with $V_{sar} < A_{se,V}\ \Phi_s$ 0.60 f_{uta} R as noted in CSA A23.3-14 Eq. D.31.

TECHNICAL DATA — ALLOWABLE STRESS DESIGN (ASD)

The following technical data is for adhesive anchors that will be designed in accordance with the Allowable Stress Design Method (ASD). This includes Hilti HIT-HY 70 for masonry, HIT-HY 200 for masonry, HIT-ICE, HIT-HY 10 PLUS, HIT-1, HTE 50 and HVU Capsules.

Note:
- Hilti HIT-V threaded rods are not applicable for use with Hilti HVU Capsules since the end of the rod does not have a chisel point to break and mix the capsules during installation.
- Hilti HIT-Z Anchor Rods do not have ASD load data since they are only used in conjunction with Hilti HIT-HY 200.

Allowable steel strength for Hilti HIT-V and HAS threaded rods [1]

Nominal anchor diameter in.	HIT-V ASTM A307 Grade A [2]		HAS-E ISO 898 Class 5.8 [2]		HAS-E-B and HAS-E-B HDG ASTM A193 B7 and ASTM F 1554 Gr. 105 [3]		HAS-R Stainless Steel ASTM F593 AISI 304/316 SS CW1 and CW2	
	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8	2,185 (9.7)	1,125 (5.0)	2,640 (11.7)	1,360 (6.0)	4,555 (20.3)	2,345 (10.4)	3,645 (16.2)	1,875 (8.3)
1/2	3,885 (17.3)	2,000 (8.9)	4,700 (20.9)	2,420 (10.8)	8,100 (36.0)	4,170 (18.5)	6,480 (28.8)	3,335 (14.8)
5/8	6,075 (27.0)	3,130 (13.9)	7,340 (32.6)	3,780 (16.8)	12,655 (56.3)	6,520 (29.0)	10,125 (45.0)	5,215 (23.2)
3/4	8,750 (38.9)	4,505 (20.0)	10,570 (47.0)	5,445 (24.2)	18,225 (81.1)	9,390 (41.8)	12,390 (55.1)	6,385 (28.4)
7/8	- -	- -	14,385 (64.0)	7,410 (33.0)	24,805 (110.3)	12,780 (56.8)	16,865 (75.0)	8,690 (38.7)
1	15,550 (69.2)	8,010 (35.6)	18,790 (83.6)	9,680 (43.1)	32,400 (144.1)	16,690 (74.2)	22,030 (98.0)	11,350 (50.5)
1-1/4	- -	- -	29,360 (130.6)	15,125 (67.3)	50,620 (225.2)	26,080 (116.0)	- -	- -

1 Steel strength as defined in AISC Manual of Steel Construction (ASD):
Tensile = 0.33 x F_u x Nominal Area
Shear = 0.17 x F_u x Nominal Area
2 HIT-V and HAS-E threaded rods are considered brittle steel elements. HIT-V does not comply with % elongation requirements of ASTM A307 Grade A steel.
3 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

Ultimate steel strength for Hilti HIT-V and HAS threaded rods [1]

Nominal anchor diameter in.	HIT-V ASTM A307 Grade A [2]			HAS-E ISO 898 Class 5.8 [2]			HAS-E-B and HAS-E-B HDG ASTM A193 B7 and ASTM F 1554 Gr. 105 [3]			HAS-R Stainless Steel ASTM F593 AISI 304/316 SS CW1 and CW2		
	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8	2,905 (12.9)	4,970 (22.1)	2,980 (13.3)	4,495 (20.0)	6,005 (26.7)	3,605 (16.0)	8,135 (36.2)	10,350 (46.0)	6,210 (27.6)	5,035 (22.4)	8,280 (36.8)	4,970 (22.1)
1/2	5,320 (23.7)	8,835 (39.3)	5,300 (23.6)	8,230 (36.6)	10,675 (47.5)	6,405 (28.5)	14,900 (66.3)	18,405 (81.9)	11,040 (49.1)	9,225 (41.0)	14,720 (65.5)	8,835 (39.3)
5/8	8,475 (37.7)	13,805 (61.4)	8,285 (36.9)	13,110 (58.3)	16,680 (74.2)	10,010 (44.5)	23,730 (105.6)	28,760 (127.9)	17,260 (76.8)	14,690 (65.3)	23,010 (102.4)	13,805 (61.4)
3/4	12,545 (55.8)	19,880 (88.4)	11,930 (53.1)	19,400 (86.3)	24,020 (106.8)	14,415 (64.1)	35,120 (156.2)	41,420 (184.2)	24,850 (110.5)	15,050 (66.9)	28,165 (125.3)	16,800 (74.7)
7/8	- -	- -	- -	26,780 (119.1)	32,695 (145.4)	19,620 (87.3)	48,480 (215.6)	56,370 (250.7)	33,825 (150.5)	20,775 (92.4)	38,335 (170.5)	23,000 (102.3)
1	22,715 (101.0)	35,345 (157.2)	21,205 (94.3)	35,130 (156.3)	42,705 (190.0)	25,625 (114.0)	63,600 (282.9)	73,630 (327.5)	44,180 (196.5)	27,255 (121.2)	50,070 (222.7)	30,040 (133.6)
1-1/4	- -	- -	- -	56,210 (250.0)	66,730 (296.8)	40,035 (178.1)	101,755 (452.6)	115,050 (511.8)	69,030 (307.1)	- -	- -	- -

1 Steel strength as defined in AISC Manual of Steel Construction:
Yield = F_y x Tensile stress area
Tensile = 0.75 x F_u x Nominal Area
Shear = 0.45 x F_u x Nominal Area
2 HIT-V and HAS-E threaded rods are considered brittle steel elements. HIT-V does not comply with % elongation requirements of ASTM A307 Grade A steel.
3 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

ORDERING INFORMATION

Hilti HIT-Z Anchor rods for Hilti HIT-HY 200 Anchoring system

HIT-Z Carbon Steel		HIT-Z-R 316 Stainless Steel		HIT-Z (-R) Length Code
Description	Qty	Description	Qty	
3/8" x 3-3/8"	40	**3/8" x 3-3/8"**	40	D
3/8" x 4-3/8"	40	**3/8" x 4-3/8"**	40	F
3/8"x 5-1/8"	40	**3/8"x 5-1/8"**	40	H
3/8" x 6-3/8"	40	**3/8" x 6-3/8"**	40	J
1/2" x 4-1/2"	20	**1/2" x 4-1/2"**	20	F
1/2" x 6-1/2"	20	**1/2" x 6-1/2"**	20	J
1/2" x 7-3/4"	20	**1/2" x 7-3/4"**	20	M
5/8" x 6"	12	**5/8" x 6"**	12	I
5/8" x 8"	12	**5/8" x 8"**	12	M
5/8" x 9-1/2"	12	**5/8" x 9-1/2"**	12	P
3/4" x 6-1/2"	6	**3/4" x 6-1/2"**	6	J
3/4" x 8-1/2"	6	**3/4" x 8-1/2"**	6	N
3/4" x 9-3/4"	6	**3/4" x 9-3/4"**	6	Q

Hilti Rods are now stamped on the end to show grade of steel and overall anchor length!

"/\" = HIT-Z
"J" = Length Code

"V" = HIT-V
"6 1/2" = Length

"E" = HAS-E
"6 1/2" = Length

"B" = HAS-E-B
"6 1/2" = Length

"R1" = HAS-R 304 SS
"6 1/2" = Length

"R2" = HAS-R 316 SS
"6 1/2" = Length

Overview of Hilti HIT-V and HAS standard anchor rod program for Hilti chemical anchoring systems[1]

HIT-V A307 Steel		HAS-E 5.8 Steel		HAS-E-B High Str. Steel		HAS-E-B HDG Hot-dipped galvanized High Str. Steel		HAS-R 304 Stainless Steel		HAS-R 316 Stainless Steel	
Description	Qty	Description	Qty	Description	Qty	Description	Qty	Description	Qty	Description	Qty
-	-	3/8" x 3"	10	-	-	-	-	-	-	-	-
3/8" x 4-1/2"	10	3/8" x 4-3/8"	10	-	-	-	-	-	-	-	-
3/8" x 5-1/2"	20	3/8" x 5-1/8"	20	3/8" x 5-1/8"	20	-	-	3/8" x 5-1/8"	20	3/8" x 5-1/8"	20
3/8" x 8"	10	3/8" x 8"	10	-	-	-	-	3/8" x 8"	10	3/8" x 8"	10
-	-	3/8" x 12"	10	-	-	-	-	-	-	-	-
-	-	1/2" x 3-1/8"	10	-	-	-	-	-	-	-	-
1/2" x 4-1/2"	10	1/2" x 4-1/2"	10	-	-	-	-	-	-	-	-
1/2" x 6-1/2"	20	1/2" x 6-1/2"	20	1/2" x 6-1/2"	20	-	-	1/2" x 6-1/2"	20	1/2" x 6-1/2"	20
1/2" x 8"	10	1/2" x 8"	10	-	-	1/2" x 8"	10	1/2" x 8"	10	1/2" x 8"	10
-	-	1/2" x 10"	10	-	-	-	-	1/2" x 10"	10	1/2" x 11"	10
-	-	1/2" x 12"	10	-	-	-	-	-	-	1/2" x 12"	10
5/8" x 6"	10	5/8" x 6"	10	-	-	-	-	-	-	-	-
5/8" x 8"	20	5/8" x 8"	20	5/8" x 7-5/8"	20	5/8" x 8"	20	5/8" x 7-5/8"	20	5/8" x 7-5/8"	20
5/8" x 10"	10	5/8" x 9"	10	-	-	-	-	5/8" x 10"	10	5/8" x 9"	10
5/8" x 12"	10	5/8" x 12"	10	-	-	5/8" x 12"	10	-	-	5/8" x 12"	10
-	-	5/8" x 17"	10	-	-	-	-	-	-	-	-
3/4" x 6"	10	3/4" x 6"	10	-	-	-	-	-	-	-	-
3/4" x 8"	10	3/4" x 8"	10	-	-	-	-	-	-	-	-
3/4" x 10"	10	3/4" x 10"	10	3/4" x 9-5/8"	10	3/4" x 10"	10	3/4" x 9-5/8"	10	3/4" x 9-5/8"	10
-	-	3/4" x 11"	10	-	-	-	-	-	-	3/4" x 10"	10
3/4" x 12"	10	3/4" x 12"	10	-	-	-	-	3/4" x 12"	10	-	-
-	-	3/4" x 14"	10	3/4" x 14"	10	3/4" x 14"	10	3/4" x 14"	10	-	-
3/4" x 16"	10	3/4" x 17"	10	-	-	-	-	3/4" x 16"	10	3/4" x 16"	10
-	-	3/4" x 19"	10	-	-	3/4"x20"	10	-	-	-	-
-	-	3/4" x 21"	10	-	-	-	-	-	-	-	-
-	-	3/4" x 25"	10	-	-	-	-	-	-	-	-
-	-	7/8" x 10"	10	-	-	7/8" x 10"	10	7/8" x 10"	10	7/8" x 10"	10
-	-	7/8" x 13"	10	-	-	7/8" x 12"	10	-	-	-	-
-	-	-	-	-	-	7/8" x 16"	10	-	-	7/8" x 16"	10
1" x 12"	4	1" x 12"	4	1" x 12"	4	-	-	1" x 12"	4	1" x 12"	4
-	-	1" x 14"	2	1" x 14"	2	-	-	-	-	-	-
-	-	1" x 16"	2	1" x 16"	2	1" x 16"	2	-	-	1" x 16"	2
-	-	1" x 20"	2	1" x 21"	2	1" x 21"	2	-	-	1" x 20"	2
-	-	1-1/4" x 16"	4	1-1/4" x 16"	4	1-1/4" x 16"	4	-	-	-	-
-	-	1-1/4" x 22"	4	1-1/4" x 23"	4	-	-	-	-	-	-

1 Additional diameters and lengths see extended anchor rod program on page 19.

EXTENDED HILTI ANCHOR ROD PROGRAM
CUSTOM LENGTHS AND LARGER DIAMETERS

The following technical data is for the extended Hilti anchor rod program where Hilti can supply threaded rods with custom lengths instead of the standard lengths as shown on page 9. Additionally, threaded rods with a diameter larger than 1-1/4-inch is provided in this extended rod program. Refer to page 19 for the extended rod portfolio.

Specifications and physical properties of the Hilti Extended Anchor Rod Program

	Threaded Rod Specification	Units	Specified Ultimate Strength, f_{uta}		Minimum Specified Yield Strength 0.2% Offset, f_{ya}	f_{uta} / f_{ya}	Elongation Min. %	Reduction of Area, Min. %	Specification for Nuts and Washers
			min.	max. [5]					
CARBON STEEL	**HAS-V / HAS-V HDG** ASTM F1554, Grade 36 [1,2,8,9]	psi (MPa)	58,000 (400)	80,000 (552)	36,000 (248)	1.61	23	40	**Nuts:** ASTM A194/194M or ASTM A563 **Washers:** ASTM F436 Type 1
	HAS-E / HAS-E HDG ASTM F1554, Grade 55 [1,2,8,9]	psi (MPa)	75,000 (517)	95,000 (655)	55,000 (379)	1.36	21	30 (3/8" - 2") 22 (2-1/4" - 2-1/2")	
	HAS-B / HAS-B HDG ASTM A193, Grade B7 [1,3] ASTM F1554, Grade 105 [1,2,8,9]	psi (MPa)	125,000 [6] (862) [6]	150,000 (1,034)	105,000 (724)	1.19	16 (B7) 15 (Gr. 105)	50 (B7) 45 (Gr. 105)	
STAINLESS STEEL	**HAS-R 304 /316** 3/8-in. to 5/8-in. AISI Type 304 / 316 ASTM F 593 CW1 [4]	psi (MPa)	100,000 (690)	150,000 (1,034)	65,000 (448)	1.54	20	-	**Nuts:** ASTM F594 **Washers:** ASTM A240 Type A
	HAS-R 304 /316 3/4-in. to 1-in. AISI Type 304 / 316 ASTM F 593 CW2 [4]	psi (MPa)	85,000 (586)	140,000 (966)	45,000 (310)	1.89	25	-	
	HAS-R 304 /316 1-1/8-in. to 2-in. ASTM A193 Grade 8(M), Class 1 [3]	psi (MPa)	75,000 [7] (517) [7]	NA	30,000 (207)	2.50 [7]	30	50	

1 All carbon steel threaded rods are zinc plated in accordance with ASTM F1941 Fe/Zn 5 AN, with nuts and washers zinc plated in accordance with ASTM B633 SC 1 Type III. All hot-dipped galvanized threaded rods, nuts, and washers are zinc plated in accordance with ASTM F2329.
2 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
3 Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
4 Standard Steel Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
5 Maximum specified steel strength according to ASTM standard. NA indicates that ASTM standard does not publish a maximum value.
6 For designs according to CSA A23.3-14 Annex D, the maximum value of f_{uta} is 860 MPa (124,700 psi) per clause D.6.1.2.
7 For calculating steel strength, ACI 318-14 section 17.4.1.2 and CSA A23.3-14 clause D.6.1.2 limit the ultimate strength to 1.9 f_{ya}. Thus, f_{uta} = 57,000 psi (393 MPa) for calculation purposes when determining steel strength in tension (N_{sa}) and shear (V_{sa}).
8 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.
9 Elongation taken from full sized rod per ASTM F1554. Elongation in 2-inch machined specimen is optional.

EXTENDED HILTI ANCHOR ROD PROGRAM
STRENGTH DESIGN ACCORDING TO ACI 318 CHAPTER 17 (APPENDIX D)

The following steel design information is for the Hilti extended rod program according to the material specifications on page 10, used in conjunction with Hilti adhesive anchors designed in accordance with ACI 318 Chapter 17. This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE. Bond strength design information for threaded rods larger than 1-1/4-inch diameter is currently only available for HIT-RE 500 V3.

Steel design information for the Hilti HAS Extended Anchor Rod Program for use with ACI 318 Chapter 17

Design Information		Symbol	Units	Nominal Rod Diameter (in.)					
				3/8	1/2	5/8	3/4	7/8	1
Rod O.D.		d	in.	0.375	0.5	0.625	0.75	0.875	1
Rod effective cross-sectional area		A_{se}	in.^{2} (mm^2)	0.0775 (50)	0.1419 (92)	0.226 (146)	0.3345 (216)	0.4617 (298)	0.6057 (391)
HAS-V / HAS-V HDG ASTM F1554 Gr. 36[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	4,495 (20.0)	8,230 (36.6)	13,110 (58.3)	19,400 (86.3)	26,780 (119.1)	35,130 (156.3)
		V_{sa}	lb (kN)	2,695 (12.0)	4,940 (22.0)	7,865 (35.0)	11,640 (51.8)	16,070 (71.5)	21,080 (93.8)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.6					
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75					
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65					
HAS-E / HAS-E HDG ASTM F1554 Gr. 55[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	5,815 (25.9)	10,645 (47.4)	16,950 (75.4)	25,090 (111.6)	34,630 (154.0)	45,430 (202.1)
		V_{sa}	lb (kN)	3,490 (15.5)	6,385 (28.4)	10,170 (45.2)	15,055 (67.0)	20,780 (92.4)	27,260 (121.3)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 (3)					
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75					
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65					
HAS-B / HAS-B HDG ASTM A193 B7 and ASTM F1554 Gr. 105[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	9,690 (43.1)	17,740 (78.9)	28,250 (125.7)	41,815 (186.0)	57,715 (256.7)	75,715 (336.8)
		V_{sa}	lb (kN)	5,815 (25.9)	10,645 (47.4)	16,950 (75.4)	25,090 (111.6)	34,630 (154.0)	45,430 (202.1)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 (3)					
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75					
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65					
HAS-R Stainless Steel ASTM F593, CW Stainless[1]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	7,750 (34.5)	14,190 (63.1)	22,600 (100.5)	28,435 (126.5)	39,245 (174.6)	51,485 (229.0)
		V_{sa}	lb (kN)	4,650 (20.7)	8,515 (37.9)	13,560 (60.3)	17,060 (75.9)	23,545 (104.7)	30,890 (137.4)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 (3)					
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.65					
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.60					

1 Values provided for Hilti threaded rod materials based on published strengths and calculated in accordance with ACI 318-14 Chapter 17 Eq. 17.4.1.2 and Eq. 17.5.1.2b. Nuts and washers must be appropriate for rod strength.
2 For use with the load combinations of IBC Section 1605.2, ACI 318-14 5.3, or ACI 318-11 D.4.3, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4.
3 For HIT-RE 500 V3, the value of $\alpha_{v,seis}$ can be increased. Refer to ICC-ES ESR-3814 or contact Hilti.
4 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

Steel design information for the Hilti HAS Extended Anchor Rod Program for use with ACI 318 Chapter 17 (Continued)

Design Information		Symbol	Units	Nominal Rod Diameter (in.)						
				1-1/8	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2
Rod O.D.		d	in.	1.125	1.25	1.5	1.75	2	2.25	2.5
Rod effective cross-sectional area		A_{se}	$in.^2$ (mm^2)	0.7633 (492)	0.9691 (625)	1.405 (906)	1.90 (1,226)	2.50 (1,613)	3.25 (2,097)	4.00 (2,581)
HAS-V / HAS-V HDG ASTM F1554 Gr. 36[1]	Nominal strength as governed by steel strength	N_{sa}	lb	44,270	56,210	81,490	110,200	145,000	-	-
			(kN)	(196.9)	(250.0)	(362.5)	(490.2)	(645.0)	-	-
		V_{sa}	lb	26,560	33,725	48,895	66,120	87,000	-	-
			(kN)	(118.1)	(150.0)	(217.5)	(294.1)	(387.0)	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.6					-	-
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75					-	-
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65					-	-
HAS-E / HAS-E HDG ASTM F1554 Gr. 55[1]	Nominal strength as governed by steel strength	N_{sa}	lb	57,250	72,685	105,375	142,500	187,500	-	-
			(kN)	(254.7)	(323.3)	(468.7)	(633.9)	(834.0)	-	-
		V_{sa}	lb	34,350	43,610	63,225	85,500	112,500	-	-
			(kN)	(152.8)	(194.0)	(281.2)	(380.3)	(500.4)	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 [3]					-	-
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75					-	-
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65					-	-
HAS-B / HAS-B HDG ASTM A193 B7 and ASTM F1554 Gr. 105[1]	Nominal strength as governed by steel strength	N_{sa}	lb	95,415	121,140	175,625	237,500	312,500	406,250	500,000
			(kN)	(424.4)	(538.9)	(781.2)	(1,056.4)	(1,390.1)	(1,807.1)	(2,224.1)
		V_{sa}	lb	57,250	72,685	105,375	142,500	187,500	243,750	300,000
			(kN)	(254.7)	(323.3)	(468.7)	(633.9)	(834.0)	(1,084.2)	(1,334.5)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 [3]						
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75						
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65						
HAS-R Stainless Steel ASTM A193, Gr. 8(M), Class 1[1]	Nominal strength as governed by steel strength	N_{sa}	lb	43,510	55,240	80,085	108,300	142,500	-	-
			(kN)	(193.5)	(245.7)	(356.2)	(481.7)	(633.9)	-	-
		V_{sa}	lb	26,105	33,145	48,050	64,980	85,500	-	-
			(kN)	(116.1)	(147.4)	(213.7)	(289.0)	(380.3)	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.6					-	-
	Strength reduction factor ϕ for tension[2]	ϕ	-	0.75					-	-
	Strength reduction factor ϕ for shear[2]	ϕ	-	0.65					-	-

1 Values provided for Hilti threaded rod materials based on published strengths and calculated in accordance with ACI 318-14 Chapter 17 Eq. 17.4.1.2 and Eq. 17.5.1.2b. Nuts and washers must be appropriate for rod strength.
2 For use with the load combinations of IBC Section 1605.2, ACI 318-14 5.3, or ACI 318-11 D.4.3, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4.
3 For HIT-RE 500 V3, the value of $\alpha_{v,seis}$ can be increased. Refer to ICC-ES ESR-3814 or contact Hilti.

EXTENDED HILTI ANCHOR ROD PROGRAM STRENGTH DESIGN ACCORDING TO ACI 318 CHAPTER 17 (APPENDIX D)

The following steel design information is for the Hilti extended rod program according to the material specifications on page 10. The strength design values are calculated from data on the previous page. This is intended for adhesive anchors designed in accordance with ACI 318-14 Chapter 17 (and Appendix D for earlier editions of ACI 318) and can be used in conjunction with the Hilti Simplified Strength Design Tables (refer to Section 3.1.8 of the 2016 and 2017 Hilti Anchor Fastening Technical Guide for more information on the Hilti Simplified Tables). This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE. Bond strength design information for threaded rods larger than 1-1/4-inch diameter is currently only available for HIT-RE 500 V3.

Steel design strength for Hilti HAS Extended Anchor Rod Program for use with ACI 318 Chapter 17

Nominal anchor diameter in.	HAS-V / HAS-V HDG ASTM F1554 Gr. 36 [4,6]			HAS-E / HAS-E HDG ASTM F1554 Gr. 55 [4,5,6]			HAS-B and HAS-B HDG ASTM A193 B7 and ASTM F 1554 Gr. 105 [4,6]			HAS-R Stainless Steel ASTM F593 (3/8-in to 1-in) [5] ASTM A193 (1-1/8-in to 2-in) [4]		
	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[6] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)
3/8	3,370 (15.0)	1,750 (7.8)	1,050 (4.7)	4,360 (19.4)	2,270 (10.1)	1,590 (7.1)	7,270 (32.3)	3,780 (16.8)	2,645 (11.8)	5,040 (22.4)	2,790 (12.4)	1,955 (8.7)
1/2	6,175 (27.5)	3,210 (14.3)	1,925 (8.6)	7,985 (35.5)	4,150 (18.5)	2,905 (12.9)	13,305 (59.2)	6,920 (30.8)	4,845 (21.6)	9,225 (41.0)	5,110 (22.7)	3,575 (15.9)
5/8	9,835 (43.7)	5,110 (22.7)	3,065 (13.6)	12,715 (56.6)	6,610 (29.4)	4,625 (20.6)	21,190 (94.3)	11,020 (49.0)	7,715 (34.3)	14,690 (65.3)	8,135 (36.2)	5,695 (25.3)
3/4	14,550 (64.7)	7,565 (33.7)	4,540 (20.2)	18,820 (83.7)	9,785 (43.5)	6,850 (30.5)	31,360 (139.5)	16,310 (72.6)	11,415 (50.8)	18,485 (82.2)	10,235 (45.5)	7,165 (31.9)
7/8	20,085 (89.3)	10,445 (46.5)	6,265 (27.9)	25,975 (115.5)	13,505 (60.1)	9,455 (42.1)	43,285 (192.5)	22,510 (100.1)	15,755 (70.1)	25,510 (113.5)	14,125 (62.8)	9,890 (44.0)
1	26,350 (117.2)	13,700 (60.9)	8,220 (36.6)	34,075 (151.6)	17,720 (78.8)	12,405 (55.2)	56,785 (252.6)	29,530 (131.4)	20,670 (91.9)	33,465 (148.9)	18,535 (82.4)	12,975 (57.7)
1-1/8	33,205 (147.7)	17,265 (76.8)	10,360 (46.1)	42,940 (191.0)	22,330 (99.3)	15,630 (69.5)	71,560 (318.3)	37,215 (165.5)	26,050 (115.9)	32,635 (145.2)	16,970 (75.5)	10,180 (45.3)
1-1/4	42,160 (187.5)	21,920 (97.5)	13,150 (58.5)	54,515 (242.5)	28,345 (126.1)	19,840 (88.3)	90,855 (404.1)	47,245 (210.2)	33,070 (147.1)	41,430 (184.3)	21,545 (95.8)	12,925 (57.5)
1-1/2	61,120 (271.9)	31,780 (141.4)	19,070 (84.8)	79,030 (351.5)	41,095 (182.8)	28,765 (128.0)	131,720 (585.9)	68,495 (304.7)	47,945 (213.3)	60,065 (267.2)	31,235 (138.9)	18,740 (83.4)
1-3/4	82,650 (367.6)	42,980 (191.2)	25,790 (114.7)	106,875 (475.4)	55,575 (247.2)	38,905 (173.1)	178,125 (792.3)	92,625 (412.0)	64,835 (288.4)	81,225 (361.3)	42,235 (187.9)	25,340 (112.7)
2	108,750 (483.7)	56,550 (251.5)	33,930 (150.9)	140,625 (625.5)	73,125 (325.3)	51,190 (227.7)	234,375 (1,042.5)	121,875 (542.1)	85,315 (379.5)	106,875 (475.4)	55,575 (247.2)	33,345 (148.3)
2-1/4	- -	- -	- -	- -	- -	- -	304,690 (1,355.3)	158,440 (704.8)	110,910 (493.3)	- -	- -	- -
2-1/2	- -	- -	- -	- -	- -	- -	375,000 (1,668.1)	195,000 (867.4)	136,500 (607.2)	- -	- -	- -

1 Tensile = $\Phi A_{se,N} f_{uta}$ as noted in ACI 318-14 17.4.1.2
2 Shear = Φ 0.60 $A_{se,V} f_{uta}$ as noted in ACI 318-14 17.5.1.2b
3 Seismic Shear = $\alpha_{V,seis} \Phi V_{ss}$: Reduction factor for seismic shear only. See ACI 318 for additional information on seismic applications. Seismic shear for HIT-RE 500 V3 may be increased for HAS-E, HAS-B, and HAS-R CW1 and CW2 threaded rods (including HDG rods). Refer to ESR-3814.
4 HAS-V, HAS-E (3/8-in to 2-in), HAS-B, and HAS-R (Class 1; 1-1/8-in to 2-in) threaded rods are considered ductile steel elements (included HDG rods).
5 HAS-E (2-1/4-in to 2-1/2-in) and HAS-R (CW1 and CW2; 3/8-in to 1-in) threaded rods are considered brittle steel elements (including HDG rods).
6 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

EXTENDED HILTI ANCHOR ROD PROGRAM
LIMIT STATES DESIGN ACCORDING TO CSA A23.3-14 ANNEX D

The following steel design information is for the Hilti extended rod program according to the material specifications on page 10, used in conjunction with Hilti adhesive anchors designed in accordance with CSA A23.3-14 Annex D. This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE. Bond strength design information for threaded rods larger than 1-1/4-inch diameter is currently only available for HIT-RE 500 V3.

Steel design information for the Hilti HAS Extended Anchor Rod Program for use with CSA A23.3-14 Annex D

Design Information		Symbol	Units	Nominal Rod Diameter (in.)					
				3/8	1/2	5/8	3/4	7/8	1
Rod O.D.		d	in.	0.375	0.5	0.625	0.75	0.875	1
Rod effective cross-sectional area		A_{se}	in.^{2} (mm^2)	0.0775 (50)	0.1419 (92)	0.226 (146)	0.3345 (216)	0.4617 (298)	0.6057 (391)
HAS-V / HAS-V HDG ASTM F1554 Gr. 36[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	4,495 (20.0)	8,230 (36.6)	13,110 (58.3)	19,400 (86.3)	26,780 (119.1)	35,130 (156.3)
		V_{sa}	lb (kN)	2,695 (12.0)	4,940 (22.0)	7,865 (35.0)	11,640 (51.8)	16,070 (71.5)	21,080 (93.8)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.6					
	Strength reduction factor R for tension[2]	R	-	0.80					
	Strength reduction factor R for shear[2]	R	-	0.75					
HAS-E / HAS-E HDG ASTM F1554 Gr. 55[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	5,815 (25.9)	10,645 (47.4)	16,950 (75.4)	25,090 (111.6)	34,630 (154.0)	45,430 (202.1)
		V_{sa}	lb (kN)	3,490 (15.5)	6,385 (28.4)	10,170 (45.2)	15,055 (67.0)	20,780 (92.4)	27,260 (121.3)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 [3]					
	Strength reduction factor R for tension[2]	R	-	0.80					
	Strength reduction factor R for shear[2]	R	-	0.75					
HAS-B / HAS-B HDG ASTM A193 B7 and ASTM F1554 Gr. 105[1,4]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	9,665 (43.0)	17,695 (78.7)	28,180 (125.4)	41,710 (185.5)	57,575 (256.1)	75,530 (336.0)
		V_{sa}	lb (kN)	5,800 (25.8)	10,615 (47.2)	16,910 (75.2)	25,025 (111.3)	34,545 (153.7)	45,320 (201.6)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 [3]					
	Strength reduction factor R for tension[2]	R	-	0.80					
	Strength reduction factor R for shear[2]	R	-	0.75					
HAS-R Stainless Steel ASTM F593, CW Stainless[1]	Nominal strength as governed by steel strength	N_{sa}	lb (kN)	7,750 (34.5)	14,190 (63.1)	22,600 (100.5)	28,435 (126.5)	39,245 (174.6)	51,485 (229.0)
		V_{sa}	lb (kN)	4,650 (20.7)	8,515 (37.9)	13,560 (60.3)	17,060 (75.9)	23,545 (104.7)	30,890 (137.4)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 [3]					
	Strength reduction factor R for tension[2]	R	-	0.70					
	Strength reduction factor R for shear[2]	R	-	0.65					

1 Values provided for Hilti threaded rod materials based on published strengths and calculated in accordance with CSA A23.3-14 Annex D Eq. D.2 and Eq. D.31. Nuts and washers must be appropriate for rod strength.
2 For use with the load combinations of CSA A23.3-14 Clause 8.
3 For HIT-RE 500 V3, the value of $\alpha_{v,seis}$ can be increased. Refer to ICC-ES ESR-3814 or contact Hilti.
4 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

Steel design information for the Hilti HAS Extended Anchor Rod Program for use with CSA A23.3-14 Annex D (Continued)

Design Information		Symbol	Units	Nominal Rod Diameter (in.)						
				1-1/8	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2
Rod O.D.		d	in.	1.125	1.25	1.5	1.75	2	2.25	2.5
Rod effective cross-sectional area		A_{se}	$in.^2$ (mm^2)	0.7633 (492)	0.9691 (625)	1.405 (906)	1.90 (1,226)	2.50 (1,613)	3.25 (2,097)	4.00 (2,581)
HAS-V / HAS-V HDG ASTM F1554 Gr. 36[1]	Nominal strength as governed by steel strength	N_{sa}	lb	44,270	56,210	81,490	110,200	145,000	-	-
			(kN)	(196.9)	(250.0)	(362.5)	(490.2)	(645.0)	-	-
		V_{sa}	lb	26,560	33,725	48,895	66,120	87,000	-	-
			(kN)	(118.1)	(150.0)	(217.5)	(294.1)	(387.0)	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.6					-	-
	Strength reduction factor R for tension[2]	R	-	0.80					-	-
	Strength reduction factor R for shear[2]	R	-	0.75					-	-
HAS-E / HAS-E HDG ASTM F1554 Gr. 55[1]	Nominal strength as governed by steel strength	N_{sa}	lb	57,250	72,685	105,375	142,500	187,500	-	-
			(kN)	(254.7)	(323.3)	(468.7)	(633.9)	(834.0)	-	-
		V_{sa}	lb	34,350	43,610	63,225	85,500	112,500	-	-
			(kN)	(152.8)	(194.0)	(281.2)	(380.3)	(500.4)	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 (3)					-	-
	Strength reduction factor R for tension[2]	R	-	0.80					-	-
	Strength reduction factor R for shear[2]	R	-	0.75					-	-
HAS-B / HAS-B HDG ASTM A193 B7 and ASTM F1554 Gr. 105[1]	Nominal strength as governed by steel strength	N_{sa}	lb	95,185	120,845	175,205	236,930	311,750	405,275	498,800
			(kN)	(423.4)	(537.5)	779.3)	(1,053.9)	(1,386.7)	(1,802.7)	(2,218.8)
		V_{sa}	lb	57,110	72,505	105,125	142,160	187,050	243,165	299,280
			(kN)	(254.0)	(322.5)	(467.6)	(632.4)	(832.0)	(1,081.6)	(1,331.3)
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.7 (3)						
	Strength reduction factor R for tension[2]	R	-	0.80						
	Strength reduction factor R for shear[2]	R	-	0.75						
HAS-R Stainless Steel ASTM A193, Gr. 8(M), Class 1[1]	Nominal strength as governed by steel strength	N_{sa}	lb	43,510	55,240	80,085	108,300	142,500	-	-
			(kN)	(193.5)	(245.7)	(356.2)	(481.7)	(633.9)	-	-
		V_{sa}	lb	26,105	33,145	48,050	64,980	85,500	-	-
			(kN)	(116.1)	(147.4)	(213.7)	(289.0)	(380.3)	-	-
	Reduction factor, seismic shear	$\alpha_{v,seis}$	-	0.6					-	-
	Strength reduction factor R for tension[2]	R	-	0.80					-	-
	Strength reduction factor R for shear[2]	R	-	0.75					-	-

1 Values provided for Hilti threaded rod materials based on published strengths and calculated in accordance with CSA A23.3-14 Annex D Eq. D.2 and Eq. D.31. Nuts and washers must be appropriate for rod strength.
2 For use with the load combinations of CSA A23.3-14 Clause 8.
3 For HIT-RE 500 V3, the value of $\alpha_{v,seis}$ can be increased. Refer to ICC-ES ESR-3814 or contact Hilti.

EXTENDED HILTI ANCHOR ROD PROGRAM
LIMIT STATES DESIGN ACCORDING TO CSA A23.3-14 ANNEX D

The following steel design information is for the Hilti extended rod program according to the material specifications on page 10. The values are calculated from data on the previous page. This is intended for adhesive anchors designed in accordance with CSA A23.3-14 Annex D and can be used in conjunction with the Hilti Simplified Strength Design Tables (refer to Section 3.1.8 of the 2016 and 2017 Hilti Anchor Fastening Technical Guide for more information on the Hilti Simplified Tables). This includes Hilti HIT-HY 200, HIT-RE 500 V3, HIT-RE 100, HIT-HY 100, and HIT-ICE. Bond strength design information for threaded rods larger than 1-1/4-inch diameter is currently only available for HIT-RE 500 V3.

Steel design strength for Hilti HAS Extended Anchor Rod Program for use with CSA A23.3 Annex D

Nominal anchor diameter in.	HAS-V / HAS-V HDG ASTM F1554 Gr. 36 [4,6]			HAS-E / HAS-E HDG ASTM F1554 Gr. 55 [4,5,6]			HAS-B and HAS-B HDG ASTM A193 B7 and ASTM F 1554 Gr. 105 [4,6]			HAS-R Stainless Steel ASTM F593 (3/8-in to 1-in) [5] ASTM A193 (1-1/8-in to 2-in) [4]		
	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[2] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)	Tensile[1] ΦN_{sa} lb (kN)	Shear[6] ΦV_{sa} lb (kN)	Seismic Shear[3] $\Phi V_{sa,eq}$ lb (kN)
3/8	3,055 (13.6)	1,720 (7.7)	1,030 (4.6)	3,955 (17.6)	2,225 (9.9)	1,560 (6.9)	6,570 (29.2)	3,695 (16.4)	2,585 (11.5)	4,610 (20.5)	2,570 (11.4)	1,800 (8.0)
1/2	5,595 (24.9)	3,150 (14.0)	1,890 (8.4)	7,240 (32.2)	4,070 (18.1)	2,850 (12.7)	12,035 (53.5)	6,765 (30.1)	4,735 (21.1)	8,445 (37.6)	4,705 (20.9)	3,295 (14.7)
5/8	8,915 (39.7)	5,015 (22.3)	3,010 (13.4)	11,525 (51.3)	6,485 (28.8)	4,540 (20.2)	19,160 (85.2)	10,780 (48.0)	7,545 (33.6)	13,445 (59.8)	7,490 (33.3)	5,245 (23.3)
3/4	13,190 (58.7)	7,420 (33.0)	4,450 (19.8)	17,060 (75.9)	9,600 (42.7)	6,720 (29.9)	28,365 (126.2)	15,955 (71.0)	11,170 (49.7)	16,920 (75.3)	9,425 (41.9)	6,600 (29.4)
7/8	18,210 (81.0)	10,245 (45.6)	6,145 (27.3)	23,550 (104.8)	13,245 (58.9)	9,270 (41.2)	39,150 (174.1)	22,020 (97.9)	15,415 (68.6)	23,350 (103.9)	13,010 (57.9)	9,105 (40.5)
1	23,890 (106.3)	13,440 (59.8)	8,065 (35.9)	30,890 (137.4)	17,380 (77.3)	12,165 (54.1)	51,360 (228.5)	28,890 (128.5)	20,225 (90.0)	30,635 (136.3)	17,065 (75.9)	11,945 (53.1)
1-1/8	30,105 (133.9)	16,930 (75.3)	10,160 (45.2)	38,930 (173.2)	21,900 (97.4)	15,330 (68.2)	64,725 (287.9)	36,410 (162.0)	25,485 (113.4)	29,585 (131.6)	16,640 (74.0)	9,985 (44.4)
1-1/4	38,225 (170.0)	21,500 (95.6)	12,900 (57.4)	49,425 (219.9)	27,800 (123.7)	19,460 (86.6)	82,175 (365.5)	46,220 (205.6)	32,355 (143.9)	37,565 (167.1)	21,130 (94.0)	12,680 (56.4)
1-1/2	55,415 (246.5)	31,170 (138.7)	18,700 (83.2)	71,655 (318.7)	40,305 (179.3)	28,215 (125.5)	119,140 (530.0)	67,015 (298.1)	46,910 (208.7)	54,460 (242.2)	30,630 (136.2)	18,380 (81.8)
1-3/4	74,935 (333.3)	42,150 (187.5)	25,290 (112.5)	96,900 (431.0)	54,505 (242.4)	38,155 (169.7)	161,110 (716.6)	90,625 (403.1)	63,435 (282.2)	73,645 (327.6)	41,425 (184.3)	24,855 (110.6)
2	98,600 (438.6)	55,460 (246.7)	33,275 (148.0)	127,500 (567.1)	71,720 (319.0)	50,205 (223.3)	211,990 (943.0)	119,245 (530.4)	83,470 (371.3)	96,900 (431.0)	54,505 (242.4)	32,705 (145.5)
2-1/4	- -	- -	- -	- -	- -	- -	275,585 (1,225.9)	155,020 (689.6)	108,515 (482.7)	- -	- -	- -
2-1/2	- -	- -	- -	- -	- -	- -	339,185 (1,508.8)	190,790 (848.7)	133,555 (594.1)	- -	- -	- -

1 Tensile = $A_{se,N}$ Φ_s f_{uta} R as noted in CSA A23.3-14 Eq. D.2.
2 Shear = $A_{se,V}$ Φ_s 0.60 f_{uta} R as noted in CSA A23.3-14 Eq. D.31.
3 Seismic Shear = $\alpha_{V,seis}$ ΦV_{sa} : Reduction factor for seismic shear only. See CSA A23.3 Annex D for additional information on seismic applications. Seismic shear for HIT-RE 500 V3 may be increased for HAS-E, HAS-B, and HAS-R CW1 and CW2 threaded rods (including HDG rods). Refer to ESR-3814.
4 HAS-V, HAS-E (3/8-in to 2-in), HAS-B, and HAS-R (Class 1; 1-1/8-in to 2-in) threaded rods are considered ductile steel elements (included HDG rods).
5 HAS-E (2-1/4-in to 2-1/2-in) and HAS-R (CW1 and CW2; 3/8-in to 1-in) threaded rods are considered brittle steel elements (including HDG rods).
6 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

EXTENDED HILTI ANCHOR ROD PROGRAM TECHNICAL DATA — ALLOWABLE STRESS DESIGN (ASD)

The following steel design information is for the Hilti extended rod program according to the material specifications on page 10, used in conjunction with Hilti adhesive anchors that will be designed in accordance with the Allowable Stress Design Method (ASD). This includes Hilti HIT-HY 70 for masonry, HIT-HY 200 for masonry, HIT-ICE, HIT-HY 10 PLUS, HIT-1, HTE 50 and HVU Capsules (must order threaded rods with chisel point for use with HVU Capsules).

Note: Hilti HAS-V A36 threaded rods are not applicable for use with Hilti HVU Capsules since the end of the rod is not available with a chisel point to break and mix the capsules during installation.

Allowable steel strength for the Hilti HAS Extended Anchor Rod Program [1]

Nominal anchor diameter in.	HAS-V / HAS-V HDG ASTM F1554 Gr. 36 [2]		HAS-E / HAS-E HDG ASTM F1554 Gr. 55[2]		HAS-B and HAS-B HDG ASTM A193 B7 and ASTM F 1554 Gr. 105[2]		HAS-R Stainless Steel ASTM F593 (3/8-in to 1-in) ASTM A193 (1-1/8-in to 2-in)	
	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8	2,115 (9.4)	1,090 (4.8)	2,730 (12.1)	1,410 (6.3)	4,555 (20.3)	2,345 (10.4)	3,645 (16.2)	1,875 (8.3)
1/2	3,755 (16.7)	1,935 (8.6)	4,860 (21.6)	2,505 (11.1)	8,095 (36.0)	4,170 (18.5)	6,480 (28.8)	3,335 (14.8)
5/8	5,870 (26.1)	3,025 (13.5)	7,595 (33.8)	3,910 (17.4)	12,655 (56.3)	6,520 (29.0)	10,125 (45.0)	5,215 (23.2)
3/4	8,455 (37.6)	4,355 (19.4)	10,935 (48.6)	5,635 (25.1)	18,225 (81.1)	9,390 (41.8)	12,390 (55.1)	6,385 (28.4)
7/8	11,510 (51.2)	5,930 (26.4)	14,880 (66.2)	7,665 (34.1)	24,805 (110.3)	12,780 (56.8)	16,865 (75.0)	8,690 (38.7)
1	15,035 (66.9)	7,745 (34.5)	19,440 (86.5)	10,015 (44.5)	32,400 (144.1)	16,690 (74.2)	22,030 (98.0)	11,350 (50.5)
1-1/8	19,025 (84.6)	9,800 (43.6)	24,600 (109.4)	12,675 (56.4)	41,005 (182.4)	21,125 (94.0)	18,695 (83.2)	9,630 (42.8)
1-1/4	23,490 (104.5)	12,100 (53.8)	30,375 (135.1)	15,645 (69.6)	50,620 (225.2)	26,080 (116.0)	23,085 (102.7)	11,890 (52.9)
1-1/2	33,825 (150.5)	17,425 (77.5)	43,735 (194.5)	22,530 (100.2)	72,895 (324.3)	37,550 (167.0)	33,240 (147.9)	17,125 (76.2)
1-3/4	46,035 (204.8)	23,715 (105.5)	59,530 (264.8)	30,665 (136.4)	99,220 (441.4)	51,110 (227.3)	45,245 (201.3)	23,305 (103.7)
2	60,130 (267.5)	30,975 (137.8)	77,755 (345.9)	40,055 (178.2)	129,590 (576.4)	66,760 (297.0)	59,095 (262.9)	30,440 (135.4)
2-1/4	- -	- -	- -	- -	164,015 (729.6)	84,490 (375.8)	- -	- -
2-1/2	- -	- -	- -	- -	202,485 (900.7)	104,310 (464.0)	- -	- -

1 Steel strength as defined in AISC Manual of Steel Construction (ASD):
Tensile = 0.33 x F_u x Nominal Area
Shear = 0.17 x F_u x Nominal Area

2 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

EXTENDED HILTI ANCHOR ROD PROGRAM
TECHNICAL DATA — ALLOWABLE STRESS DESIGN (ASD) - CONTINUED

The following steel design information is for the Hilti extended rod program according to the material specifications on page 10. The following technical data is for adhesive anchors that will be designed in accordance with the Allowable Stress Design Method (ASD). This includes Hilti HIT-HY 70 for masonry, HIT-HY 200 for masonry, HIT-ICE, HIT-HY 10 PLUS, HIT-1, HTE 50 and HVU Capsules (must order threaded rods with chisel point for use with HVU Capsules).

Note:Hilti HAS-V A36 threaded rods are not applicable for use with Hilti HVU Capsules since the end of the rod is not available with a chisel point to break and mix the capsules during installation.

Ultimate steel strength for the Hilti HAS Extended Anchor Rod Program [1]

Nominal anchor diameter in.	HAS-V / HAS-V HDG ASTM F1554 Gr. 36 [2]			HAS-E / HAS-E HDG ASTM F1554 Gr. 55 [2]			HAS-B and HAS-B HDG ASTM A193 B7 and ASTM F 1554 Gr. 105 [2]			HAS-R Stainless Steel ASTM F593 (3/8-in to 1-in) ASTM A193 (1-1/8-in to 2-in)		
	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8	2,790 (12.4)	4,800 (21.4)	2,880 (12.8)	4,265 (19.0)	6,210 (27.6)	3,725 (16.6)	8,140 (36.2)	10,350 (46.0)	6,210 (27.6)	5,040 (22.4)	8,280 (36.8)	4,970 (22.1)
1/2	5,110 (22.7)	8,540 (38.0)	5,125 (22.8)	7,805 (34.7)	11,040 (49.1)	6,625 (29.5)	14,900 (66.3)	18,405 (81.9)	11,040 (49.1)	9,225 (41.0)	14,725 (65.5)	8,835 (39.3)
5/8	8,135 (36.2)	13,345 (59.4)	8,005 (35.6)	12,430 (55.3)	17,260 (76.8)	10,355 (46.1)	23,730 (105.6)	28,765 (128.0)	17,260 (76.8)	14,690 (65.3)	23,010 (102.4)	13,805 (61.4)
3/4	12,040 (53.6)	19,220 (85.5)	11,530 (51.3)	18,400 (81.8)	24,850 (110.5)	14,910 (66.3)	35,125 (156.2)	41,420 (184.2)	24,850 (110.5)	15,055 (67.0)	28,165 (125.3)	16,900 (75.2)
7/8	16,620 (73.9)	26,155 (116.3)	15,695 (69.8)	25,395 (113.0)	33,825 (150.5)	20,295 (90.3)	48,480 (215.6)	56,370 (250.7)	33,825 (150.5)	20,775 (92.4)	38,335 (170.5)	23,000 (102.3)
1	21,805 (97.0)	34,165 (152.0)	20,500 (91.2)	33,315 (148.2)	44,180 (196.5)	26,505 (117.9)	63,600 (282.9)	73,630 (327.5)	44,180 (196.5)	27,255 (121.2)	50,070 (222.7)	30,040 (133.6)
1-1/8	27,480 (122.2)	43,240 (192.3)	25,945 (115.4)	41,980 (186.7)	55,915 (248.7)	33,550 (149.2)	80,145 (356.5)	93,190 (414.5)	55,915 (248.7)	22,900 (101.9)	42,495 (189.0)	25,495 (113.4)
1-1/4	34,890 (155.2)	53,385 (237.5)	32,030 (142.5)	53,300 (237.1)	69,030 (307.1)	41,420 (184.2)	101,755 (452.6)	115,050 (511.8)	69,030 (307.1)	29,075 (129.3)	52,465 (233.4)	31,480 (140.0)
1-1/2	50,590 (225.0)	76,870 (341.9)	46,125 (205.2)	77,290 (343.8)	99,400 (442.2)	59,640 (265.3)	147,550 (656.3)	165,670 (736.9)	99,400 (442.2)	42,160 (187.5)	75,545 (336.0)	45,325 (201.6)
1-3/4	68,380 (304.2)	104,630 (465.4)	62,780 (279.3)	104,470 (464.7)	135,295 (601.8)	81,180 (361.1)	199,445 (887.2)	225,495 (1,003.0)	135,295 (601.8)	56,985 (253.5)	102,825 (457.4)	61,695 (274.4)
2	89,935 (400.0)	136,660 (607.9)	81,995 (364.7)	137,400 (611.2)	176,715 (786.1)	106,030 (471.6)	262,315 (1,166.8)	294,525 (1,310.1)	176,715 (786.1)	74,945 (333.4)	134,305 (597.4)	80,580 (358.4)
2-1/4	- -	- -	- -	- -	- -	- -	341,005 (1,516.9)	372,755 (1,658.1)	223,655 (994.9)	- -	- -	- -
2-1/2	- -	- -	- -	- -	- -	- -	419,875 (1,867.7)	460,195 (2,047.0)	276,115 (1,228.2)	- -	- -	- -

1 Steel strength as defined in AISC Manual of Steel Construction (LRFD):
Yield = F_y x Tensile stress area
Tensile = 0.75 x F_u x Nominal Area
Shear = 0.45 x F_u x Nominal Area

2 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

EXTENDED HILTI ANCHOR ROD PROGRAM ORDERING INFORMATION

The following threaded rod ordering information is for the Hilti extended rod program according to the material specifications on page 10.

Extended special rods offering

Nominal anchor diameter (in.)		Min. length in.	Max. length in.	Material: Electro plated – ASTM F1554 Grade 36	Electro plated – ASTM F1554 Grade 55	Electro plated – ASTM F1554 Grade 105	Hot dip galvanized – ASTM F1554 Grade 36	Hot dip galvanized – ASTM F1554 Grade 55	Hot dip galvanized – ASTM F1554 Grade 105	Stainless steel – SS304	Stainless steel – SS316
	3/8[1]	2	144	■	■	■	■	■	■	■	■
	1/2	2	144	■	■	■	■	■	■	■	■
	5/8	3	144	■	■	■	■	■	■	■	■
	3/4	4	144	■	■	■	■	■	■	■	■
	7/8	4	144	■	■	■	■	■	■	■	■
	1	5	144	■	■	■	■	■	■	■	■
	1-1/8	6	144	■	□	■	■	□	■	□	□
	1-1/4	6	144	■	■	■	■	■	■	■	■
	1-1/2	8	144	■	□	■	■	□	■	■	■
	1-3/4	9	144	■	□	■	■	□	■	■	■
	2	11	144	■	□	■	■	□	■	■	■
	2-1/4	12	144			■			■		
	2-1/2	13	144			■			■		

■ = typical lead time 2–4 working days plus shipping [2] □ = available but longer lead time

1 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

2 up to following quantities: 3/8" to 3/4" > 250 pieces, 7/8" to 1-1/4" > 100 pieces, 1-1/2" to 2-1/2" > 50 pieces. Bigger quantities contact Hilti for lead time.

Hilti threaded rods in the Hilti Extended Anchor Rod Program are stamped on the end to show grade of steel.	
H V	HAS-V / HAS-V HDG ASTM F1554, Grade 36
H E	HAS-E / HAS-E HDG ASTM F1554, Grade 55
H B	HAS-B / HAS-B HDG ASTM A193, Grade B7 ASTM F1554, Grade 105
SS304 H R1	HAS-R 304SS 3/8-in. to 5/8-in. AISI Type 304 ASTM F593 CW1 3/4-in. to 1-in. AISI Type 304 ASTM F593 CW2 1-1/8-in. to 2-in. ASTM A193 Grade B8, Class 1
SS316 H R2	HAS-R 316SS 3/8-in. to 5/8-in. AISI Type 316 ASTM F593 CW1 3/4-in. to 1-in. AISI Type 316 ASTM F593 CW2 1-1/8-in. to 2-in. ASTM A193 Grade B8M, Class 1

TWO END CUT OPTIONS AVAILABLE

Chisel, or angle cut

Straight, or flat cut

Hilti, Inc. (U.S.) 1-800-879-8000
en español 1-800-879-5000
www.hilti.com

Hilti (Canada) Corporation 1-800-363-4458
www.hilti.ca

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