



MULTI-THREAD CAST-IN ANCHOR SOLUTION FOR METAL DECKS

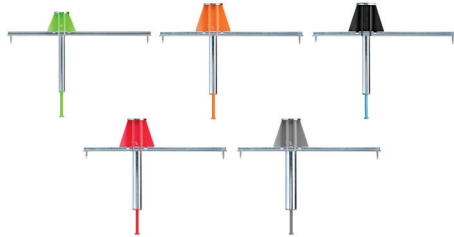
**KCM-MD Short Plate and
Long Plate cast-in anchor
technical supplement**



PRODUCT DESCRIPTION



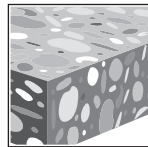
Internally threaded short plate cast-in anchors for metal deck (KCM-MD SP)



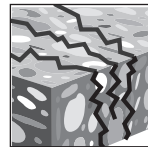
Internally threaded long plate cast-in anchors for metal deck (KCM-MD LP)

Features and Benefits

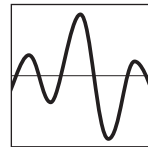
- Application-relevant multi-thread configurations
- Color-coded plastic anchor housing identifies the internal thread diameters
- Pre-installed screws increase productivity for attaching the anchor to the metal deck
- KCM-MD SP — Color-coded plastic plug prevents concrete intrusion and allows for differentiation between anchors of the same thread configuration
- KCM-MD SP — Plastic protective tube extends below the metal deck to protect the internal threads from concrete, sprayed-on fireproofing, or sprayed-on insulation
- KCM-MD LP — Multi-thread cast-in anchor, which can be installed at any location on the metal deck including in the incline.
- KCM-MD LP — Metal protective tube extends below the metal deck to protect the internal threads from concrete, sprayed-on fireproofing, or sprayed-on insulation.
- KCM-MD LP — Anchor installs to the top of the flutes of the metal deck, so anchoring point is at consistent height throughout, which is ideal for pre-fabricated hangers



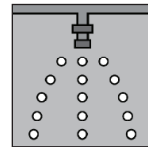
Uncracked concrete



Cracked concrete



Seismic Design Categories A-F



Fire sprinkler listings



Approvals/ Listings

ICC-ES (International Code Council) 2018 International Building Code / International Residential Code (IBC/IRC)	ESR-4145 in concrete per ACI 318-19 Ch. 17 / ICC-ES AC446
City of Los Angeles	2020 LABC Supplement (within ESR-4145)
Florida Building Code	2020 FBC with HVHZ
UL LLC (Underwriters Laboratory LLC)	Pipe Hanger Equipment for Fire Protection Services for 3/8 through 3/4 (See Tables 15A and 15B)
FM (Factory Mutual) Pipe	Hanger Components for Automatic Sprinkler Systems for 3/8 through 3/4 (See Tables 15A and 15B)

MATERIAL SPECIFICATIONS

KCM-MD short plate and long plate anchors have an insert body made from carbon steel with an engineered plastic flange. The insert body is zinc plated per ASTM B633 Fe/Zn 5 Type III.

INSTALLATION PARAMETERS

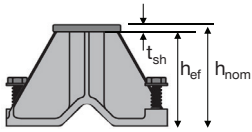


Figure 1 — KCM-MD SP

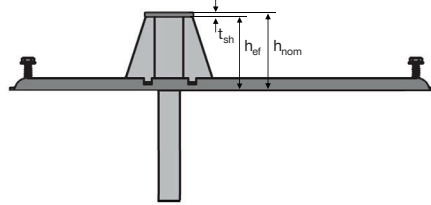


Figure 2 — KCM-MD LP

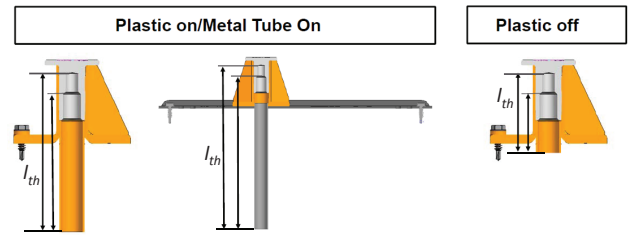


Figure 3 — KCM-MD Thread engagement measurement

Table 1A — Hilti KCM-MD Short Plate cast-in anchor installation information

Design information	Symbol	Units	Nominal anchor diameter (in.)				
			SP 1/4"-3/8"	SP 1/4"-3/8"-1/2"	SP 3/8"-1/2"	SP 3/8"-1/2"-5/8"	SP 5/8"-3/4"
Plastic section color	-	-	Green	Black	Orange	Red	Grey
Effective embedment	h_{ef}	in. (mm)	1.76 (45)	2.00 (51)	2.00 (51)	2.50 (64)	2.50 (64)
Nominal embedment	h_{nom}	in. (mm)	1.88 (48)	2.13 (54)	2.13 (54)	2.63 (67)	2.65 (67)
Hole diameter required in metal deck	d_{bit}	in.	9/16	11/16	11/16	13/16	15/16
Steel head thickness	t_{sh}	mm	3.3	3.3	3.3	3.3	3.7
Min. concrete cover over metal deck — upper flute install	$h_{upper,min}$	in. (mm)	2.50 (64)	2.50 (64)	2.50 (64)	3.25 (83)	3.25 (83)
Min. concrete cover over metal deck lower flute install	$h_{lower,min}$	in. (mm)	2.50 (64)	2.50 (64)	2.50 (64)	2.50 (64)	2.50 (64)
Min. metal deck gauge	-	-	20				
Min. anchor spacing	s_{min}	in. (mm)	5.28 (134)	6.00 (152)	6.00 (152)	7.50 (191)	7.50 (191)

Table 1B — Hilti KCM-MD Long Plate cast-in anchor installation information

Design information	Symbol	Units	Nominal anchor diameter (in.)				
			LP 1/4"-3/8"	LP 1/4"-3/8"-1/2"	LP 3/8"-1/2"	LP 3/8"-1/2"-5/8"	LP 5/8"-3/4"
Plastic section color	-	-	Green	Black	Orange	Red	Grey
Effective embedment	h_{ef}	in. (mm)	1.76 (45)	2.00 (51)	2.00 (51)	2.50 (64)	2.50 (64)
Nominal embedment	h_{nom}	in. (mm)	1.96 (50)	2.21 (56)	2.21 (56)	2.71 (69)	2.72 (69)
Hole diameter required in metal deck	d_{bit}	in.	1/2	5/8	5/8	3/4	7/8
Steel head thickness	t_{sh}	mm	3.3	3.3	3.3	3.3	3.7
Min. concrete cover over metal deck — upper flute install	$h_{lower,min}$	in. (mm)	2.50 (64)	2.50 (64)	2.50 (64)	3.25 (83)	3.25 (83)
Min. concrete cover over metal deck lower flute install	$h_{lower,max}$	in. (mm)	2.50 (64)	2.50 (64)	2.50 (64)	3.25 (83)	3.25 (83)
Min. metal deck gauge	-	-	20				
Min. anchor spacing	s_{min}	in. (mm)	5.28 (134)	6.00 (152)	6.00 (152)	7.50 (191)	7.50 (191)

Table 2 — Thread engagement length measured for various threaded sizes

Anchor	Anchor body	Plastic Section Color	Rod diameter (in.)	Thread engagement length (l_{th})	
				Plastic on/ Metal tube on (in.)	Plastic off (in.)
Short plate	1/4"-3/8"	Green	1/4"	3.9	2.2
			3/8"	3.5	1.7
	1/4"-3/8"-1/2"	Black	1/4"	4.3	2.5
			3/8"	3.9	2.1
			1/2"	3.4	1.6
	3/8"-1/2"	Orange	3/8"	4.2	2.4
			1/2"	3.5	1.7
	3/8"-1/2"-5/8"	Red	3/8"	4.7	3.0
			1/2"	4.2	2.5
			5/8"	3.5	1.7
Long Plate	1/4"-3/8"	Green	1/4"	6.4	-
			3/8"	6.0	-
	1/4"-3/8"-1/2"	Black	1/4"	6.9	-
			3/8"	6.5	-
			1/2"	6.0	-
	3/8"-1/2"	Orange	3/8"	6.8	-
			1/2"	6.1	-
	3/8"-1/2"-5/8"	Red	3/8"	7.3	-
			1/2"	6.8	-
			5/8"	6.1	-
	5/8"-3/4"	Grey	5/8"	6.9	-
			3/4"	6.1	-

DESIGN INFORMATION IN CONCRETE PER ACI 318

ACI 318-14 Chapter 17

The technical data contained in this section are Hilti Simplified Design Tables. The load values were developed using the Strength Design parameters and variables of ESR- 4145 and the equations within ACI 318-19 Chapter 17. For a detailed explanation of the Hilti Simplified Design Tables, refer to section 3.1.8 of the Hilti Product Technical Guide Volume 2 Edition 22 (PTG Ed. 22). Data tables from ESR-4145 are not contained in this section, but can be found at www.icc-es.org or at www.hilti.com.

Table 3A — Design strength for steel failure of KCM-MD Short Plate anchor^{1,2,3,4}

DESIGN INFORMATION			Symbol	Units	Insert Type										
					SP 1/4"-3/8"		SP 1/4"-3/8"-1/2"			SP 3/8"-1/2"		SP 3/8"-1/2"-5/8"			SP 5/8"-3/4"
Plastic Section Color				Green		Black			Orange		Red			Grey	
Nominal rod diameter in.				1/4	3/8	1/4	3/8	1/2	3/8	1/2	3/8	1/2	5/8	5/8	3/4
Design steel strength of insert in tension	$\Phi N_{sa,insert}$	lb (kN)	5,395 (24.0)		8,035 (35.8)			8,035 (35.8)		8,010 (35.6)			14,625 (65.1)		
Design seismic steel strength of insert in tension	$\Phi N_{sa,insert,eq}$	lb (kN)	-	5,395 (24.0)	-	8,035 (35.8)	8,035 (35.8)	8,035 (35.8)	8,035 (35.8)	-	10,920 (48.6)	10,920 (48.6)	14,625 (65.1)	14,625 (65.1)	
Installations in upper flute of metal deck (i.e. W-deck and B-deck) according to Figures 4A															
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	2,810 (12.5)	-	2,080 (9.3)	5,295 (23.6)	1,995 (8.9)	5,295 (23.6)	-	3,650 (16.2)	7,180 (32.0)	6,500 (28.9)	8,255 (36.7)	
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,810 (12.5)	-	1,250 (5.6)	5,295 (23.6)	1,200 (5.3)	5,295 (23.6)	-	2,555 (11.4)	7,180 (32.0)	3,740 (16.6)	8,255 (36.7)	
Installations in lower flute of metal deck (i.e. W-deck) according to Figures 4B															
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	2,060 (9.2)	-	1,995 (8.9)	2,510 (11.2)	1,995 (8.9)	2,510 (11.2)	-	3,180 (14.2)	3,265 (14.5)	2,815 (12.5)	3,265 (14.5)	
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,060 (9.2)	-	1,200 (5.3)	2,510 (11.2)	1,200 (5.3)	2,510 (11.2)	-	2,555 (11.4)	3,265 (14.5)	2,815 (12.5)	3,265 (14.5)	
Installations in lower flute of metal deck (i.e. B-deck) according to Figures 4C															
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	1,895 (8.4)	-	-	2,380 (10.6)	-	2,380 (10.6)	-	-	3,350 (14.9)	-		
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	1,895 (8.4)	-	-	2,380 (10.6)	-	2,380 (10.6)	-	-	3,015 (13.4)			

Table 3B — Design strength for steel failure of KCM-MD Long Plate anchor^{1,2,3,4}

DESIGN INFORMATION	Symbol	Units	Insert Type											
			LP 1/4"-3/8"		LP 1/4"-3/8"-1/2"			LP 3/8"-1/2"		LP 3/8"-1/2"-5/8"			LP 5/8"-3/4"	
Plastic Section Color			Green		Black			Orange		Red			Grey	
Nominal rod diameter in.			¼	3/8	1/4	3/8	1/2	3/8	1/2	3/8	1/2	5/8	5/8	3/4
Design steel strength of insert in tension	$\Phi N_{sa,insert}$	lb (kN)	5,395 (24.0)		8,035 (35.8)			8,035 (35.8)		8,010 (35.6)			14,625 (65.1)	
Design seismic steel strength of insert in tension	$\Phi N_{sa,insert,eq}$	lb (kN)	-	5,395 (24.0)	-	8,035 (35.8)	8,035 (35.8)	8,035 (35.8)	8,035 (35.8)	-	8,010 (35.6)	8,010 (35.6)	14,625 (65.1)	14,625 (65.1)
Installations in upper flute of metal deck (i.e. W-deck and B-deck) according to Figures 4A														
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	2,810 (12.5)	-	2,080 (9.3)	5,295 (23.6)	1,995 (8.9)	5,295 (23.6)	-	3,650 (16.2)	7,180 (32.0)	6,230 (27.7)	8,255 (36.7)
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,810 (12.5)	-	1,250 (5.6)	5,295 (23.6)	1,200 (5.3)	5,295 (23.6)	-	2,555 (11.4)	7,180 (32.0)	3,740 (16.6)	8,255 (36.7)
Installations in lower flute of metal deck (i.e. W-deck) according to Figures 4B														
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	3,515 (15.6)	-	1,995 (8.9)	3,985 (17.7)	1,995 (8.9)	3,985 (17.7)	-	2,425 (10.79)	4,625 (20.58)	2,815 (12.53)	4,625 (20.58)
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	3,515 (15.6)	-	1,200 (5.3)	3,985 (17.7)	1,200 (5.3)	4,525 (20.1)	-	2,425 (10.8)	4,625 (20.6)	2,815 (12.5)	4,625 (20.6)
Installations in lower flute of metal deck (i.e. B-deck) according to Figures 4C														
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	2,890 (12.9)	-	-	4,525 (20.1)	-	4,525 (20.1)	-	-	5,750 (25.6)	-	7,150 (31.8)
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,890 (12.9)	-	-	4,525 (20.1)	-	4,525 (20.1)	-	-	5,750 (25.6)	-	7,150 (31.8)
Installations over flute incline of metal deck (i.e. W-deck) according to Figures 4D														
Design steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	1,030 (4.6)	-	-	2,665 (11.9)	-	2,665 (11.9)	-	-	5,985 (26.6)	-	5,985 (27)
Design seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	1,030 (4.6)	-	-	2,135 (9.5)	-	2,135 (9.5)	-	-	3,370 (15.0)	-	5,685 (25)

1 See Hilti Product Technical Guide, (PTG Ed. 22), Section 3.1.8.6 to convert design strength value to ASD value.

2 Hilti KCM-MD Inserts are considered as brittle steel elements

3 Tension values are for the inserts only. The capacity of the threaded rods must be also determined from Table 8. The design strength of concrete must be obtained from Tables 4 to 7. Compare the tension values of threaded rod, inserts, and concrete. The lesser of the values is to be used for the design.

4 Shear values are for the inserts only. The capacity of the threaded rods must be also determined from Table 8. The calculation of concrete shear strength is not required. Compare the shear values of threaded rod and inserts. The lesser of the values is to be used for the design strength of the anchor in shear.

Table 4 — Hilti KCM-MD Short Plate and Long Plate tension design strength in the soffit of uncracked sand-lightweight concrete over metal deck (B profile) ^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal Embed. Depth in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4C	
			Tension - ΦN_n		Tension - ΦN_n	
			$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)	$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,910 (12.9)	3,360 (14.9)	605 (2.7)	700 (3.1)
SP 1/4"-3/8"-1/2"	Black	2.13 (54)	3,610 (16.1)	4,170 (18.5)	635 (2.8)	735 (3.3)
SP 3/8"-1/2"	Orange	2.13 (54)	3,610 (16.1)	4,170 (18.5)	635 (2.8)	735 (3.3)
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	4,580 (20.4)	5,290 (23.5)	695 (3.1)	805 (3.6)
SP 5/8"-3/4"	Grey	2.65 (67)	4,580 (20.4)	5,290 (23.5)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,910 (12.9)	3,360 (14.9)	2,910 (12.9)	3,360 (14.9)
LP 1/4"-3/8"-1/2"	Black	2.13 (54)	3,610 (16.1)	4,170 (18.5)	3,610 (16.1)	4,170 (18.5)
LP 3/8"-1/2"	Orange	2.21 (56)	3,610 (16.1)	4,170 (18.5)	3,610 (16.1)	4,170 (18.5)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	4,580 (20.4)	5,290 (23.5)	4,580 (20.4)	5,290 (23.5)
LP 5/8"-3/4"	Grey	2.72 (69)	4,580 (20.4)	5,290 (23.5)	4,580 (20.4)	5,290 (23.5)

Table 5 — Hilti KCM-MD Short Plate and Long Plate tension design strength in the soffit of cracked sand-lightweight concrete over metal deck (B profile) ^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal Embed. Depth in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4C	
			Tension - ΦN_n		Tension - ΦN_n	
			$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)	$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,325 (10.3)	2,685 (11.9)	485 (2.2)	560 (2.5)
SP 1/4"-3/8"-1/2"	Black	2.13 (54)	2,890 (12.9)	3,335 (14.8)	505 (2.2)	585 (2.6)
SP 3/8"-1/2"	Orange	2.13 (54)	2,890 (12.9)	3,335 (14.8)	505 (2.2)	585 (2.6)
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	3,660 (16.3)	4,225 (18.8)	555 (2.5)	640 (2.8)
SP 5/8"-3/4"	Grey	2.65 (67)	3,660 (16.3)	4,225 (18.8)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,325 (10.3)	2,685 (11.9)	2,325 (10.3)	2,685 (11.9)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	2,890 (12.9)	3,335 (14.8)	2,890 (12.9)	3,335 (14.8)
LP 3/8"-1/2"	Orange	2.21 (56)	2,890 (12.9)	3,335 (14.8)	2,890 (12.9)	3,335 (14.8)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	3,660 (16.3)	4,225 (18.8)	3,660 (16.3)	4,225 (18.8)
LP 5/8"-3/4"	Grey	2.72 (69)	3,660 (16.3)	4,225 (18.8)	3,660 (16.3)	4,225 (18.8)

1 See Hilti Product Technical Guide, (PTG Ed. 22), Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute.

4 Compare tabular value to the insert steel strength values in Tables 3A and 3B and threaded rod steel strength values in Table 8. The lesser of the values is to be used for the design.

5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$. See Hilti Product Technical Guide, Section 3.1.8.7 for additional information on seismic applications.

6 For Hilti KCM-MD anchors, calculation of static and seismic concrete strength in shear is not required. See Tables 3A and 3B for shear calculations.

Table 6 — Hilti KCM-MD Short Plate and Long Plate tension design strength in the soffit of uncracked sand-lightweight or normal weight concrete over metal deck (W profile with minimum 3-7/8" width)^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal Embed. Depth in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4B		Inclined per Figure 4D	
			Tension - ΦN_n		Tension - ΦN_n		Tension - ΦN_n	
			$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)	$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)	$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,910 (12.9)	3,360 (14.9)	1,400 (6.2)	1,615 (7.2)	-	-
SP 1/4"-3/8"-1/2"	Black	2.13 (54)	3,610 (16.1)	4,170 (18.5)	1,850 (8.2)	2,135 (9.5)	-	-
SP 3/8"-1/2"	Orange	2.13 (54)	3,610 (16.1)	4,170 (18.5)	1,850 (8.2)	2,135 (9.5)	-	-
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	4,580 (20.4)	5,290 (23.5)	2,120 (9.4)	2,450 (10.9)	-	-
SP 5/8"-3/4"	Grey	2.65 (67)	4,580 (20.4)	5,290 (23.5)	2,120 (9.4)	2,450 (10.9)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,910 (12.9)	3,360 (14.9)	4,895 (21.8)	5,650 (25.1)	2,910 (12.9)	3,360 (14.9)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	3,610 (16.1)	4,170 (18.5)	4,895 (21.8)	5,650 (25.1)	3,610 (16.1)	4,170 (18.5)
LP 3/8"-1/2"	Orange	2.21 (56)	3,610 (16.1)	4,170 (18.5)	4,895 (21.8)	5,650 (25.1)	3,610 (16.1)	4,170 (18.5)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	4,580 (20.4)	5,290 (23.5)	6,565 (29.2)	7,580 (33.7)	4,580 (20.4)	5,290 (23.5)
LP 5/8"-3/4"	Grey	2.72 (69)	4,580 (20.4)	5,290 (23.5)	6,565 (29.2)	7,580 (33.7)	4,580 (20.4)	5,290 (23.5)

Table 7 — Hilti KCM-MD Short Plate and Long Plate tension design strength in the soffit of cracked sand-lightweight or normal weight concrete over metal deck (W profile with minimum 3-7/8" width)^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal Embed. Depth in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4B		Inclined per Figure 4D	
			Tension - ΦN_n		Tension - ΦN_n		Tension - ΦN_n	
			$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)	$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)	$f'_c = 3000$ psi (20.7 MPa) lb (kN)	$f'_c = 4000$ psi (27.6 MPa) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,325 (10.3)	2,685 (11.9)	1,120 (5.0)	1,295 (5.8)	-	-
SP 1/4"-3/8"-1/2"	Black	2.13 (54)	2,890 (12.9)	3,335 (14.8)	1,480 (6.6)	1,710 (7.6)	-	-
SP 3/8"-1/2"	Orange	2.13 (54)	2,890 (12.9)	3,335 (14.8)	1,480 (6.6)	1,710 (7.6)	-	-
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	3,660 (16.3)	4,225 (18.8)	1,695 (7.5)	1,955 (8.7)	-	-
SP 5/8"-3/4"	Grey	2.65 (67)	3,660 (16.3)	4,225 (18.8)	1,695 (7.5)	1,955 (8.7)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,325 (10.3)	2,685 (11.9)	3,915 (17.4)	4,520 (20.1)	2,325 (10.3)	2,685 (11.9)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	2,890 (12.9)	3,335 (14.8)	3,915 (17.4)	4,520 (20.1)	2,890 (12.9)	3,335 (14.8)
LP 3/8"-1/2"	Orange	2.21 (56)	2,890 (12.9)	3,335 (14.8)	3,915 (17.4)	4,520 (20.1)	2,890 (12.9)	3,335 (14.8)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	3,660 (16.3)	4,225 (18.8)	5,250 (23.4)	6,060 (27.0)	3,660 (16.3)	4,225 (18.8)
LP 5/8"-3/4"	Grey	2.72 (69)	3,660 (16.3)	4,225 (18.8)	5,250 (23.4)	6,060 (27.0)	3,660 (16.3)	4,225 (18.8)

1 See Hilti Product Technical Guide, (PTG Ed. 22), Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute.

4 Compare tabular value to the insert steel strength values in Tables 3A and 3B and threaded rod steel strength values in Table 8. The lesser of the values is to be used for the design.

5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$. See Hilti Product Technical Guide, (PTG Ed. 22) Section 3.1.8.7 for additional information on seismic applications.

6 For Hilti KCM-MD anchors, calculation of static and seismic concrete strength in shear is not required. See Tables 3A and 3B for shear calculations.

Table 8 — Design strength for steel failure of common threaded rods^{1,5}

Nominal anchor diameter	Grade A36 threaded rod			ASTM A 193 B7 or ASTM F1554 Gr. 105 threaded rod			ASTM A 307, Grade A threaded rod		
	Tensile ² $\phi N_{sa,rod}$ or $\phi N_{sa,eq,rod}$ lb (kN)	Shear ³ $\phi V_{sa,rod}$ lb (kN)	Seismic Shear ⁴ $\phi V_{sa,eq,rod}$ lb (kN)	Tensile ² $\phi N_{sa,rod}$ or $\phi N_{sa,eq,rod}$ lb (kN)	Shear ³ $\phi V_{sa,rod}$ lb (kN)	Seismic Shear ⁴ $\phi V_{sa,eq,rod}$ lb (kN)	Tensile ² $\phi N_{sa,rod}$ or $\phi N_{sa,eq,rod}$ lb (kN)	Shear ³ $\phi V_{sa,rod}$ lb (kN)	Seismic Shear ⁴ $\phi V_{sa,eq,rod}$ lb (kN)
1/4	1,390 (6.2)	720 (3.2)	505 (2.2)	3,000 (13.3)	1,550 (6.9)	1,085 (4.8)	1,425 (6.3)	740 (3.3)	520 (2.3)
3/8	3,395 (15.1)	1,750 (7.8)	1,225 (5.4)	7,315 (32.5)	3,780 (16.8)	2,645 (11.8)	3,490 (15.5)	1,815 (8.1)	1,270 (5.7)
1/2	6,175 (27.5)	3,210 (14.3)	2,245 (10.0)	13,315 (59.2)	6,915 (30.8)	4,840 (21.5)	6,375 (28.4)	3,315 (14.7)	2,320 (10.3)
5/8	9,835 (43.7)	5,110 (22.7)	3,575 (15.9)	21,190 (94.3)	11,020 (49.0)	7,715 (34.3)	10,165 (45.2)	5,285 (23.5)	3,700 (16.5)
3/4	14,550 (64.7)	7,565 (33.7)	5,295 (23.6)	31,405 (139.7)	16,305 (72.5)	11,415 (50.8)	15,040 (66.9)	7,820 (34.8)	5,475 (24.4)

1 See Hilti Product Technical Guide, (PTG ED.22) Section 3.1.8.7 for additional information on seismic applications.

2 Tensile values determined by static tension tests with $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318-14 Chapter 17.

3 Shear values determined by static shear tests with $\phi V_{sa} = \phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318-14 Chapter 17.

4 Seismic shear values determined by seismic shear tests with $\phi V_{sa} \leq \phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318-14, Chapter 17.

5 Shear values are for the threaded rods only. The capacity of the insert must be also determined from Table 3A or 3B. The calculation of concrete shear strength is not required. Compare the shear values of threaded rod and inserts. The lesser of the values is to be used for the design strength of the anchor in shear.

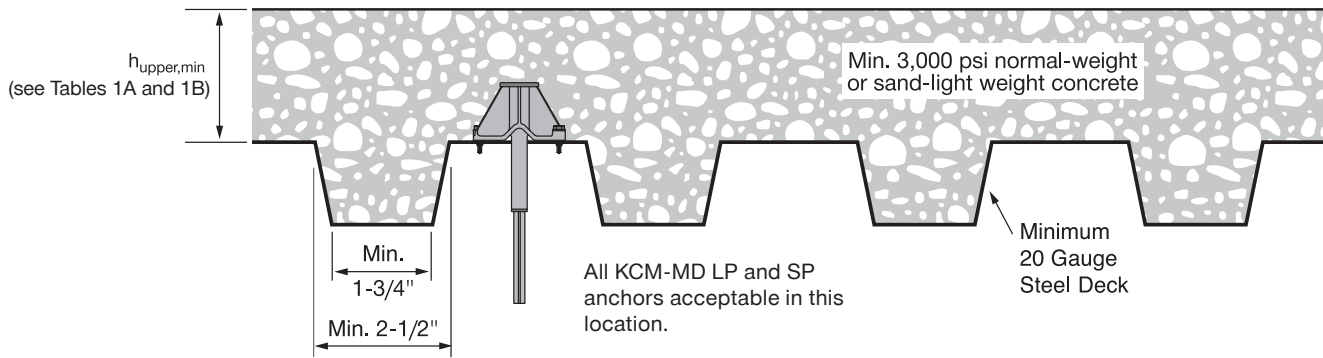


Figure 4A —Installation in the soffit of concrete filled metal deck floor and roof assemblies-over upper flute (B-deck and W-deck)

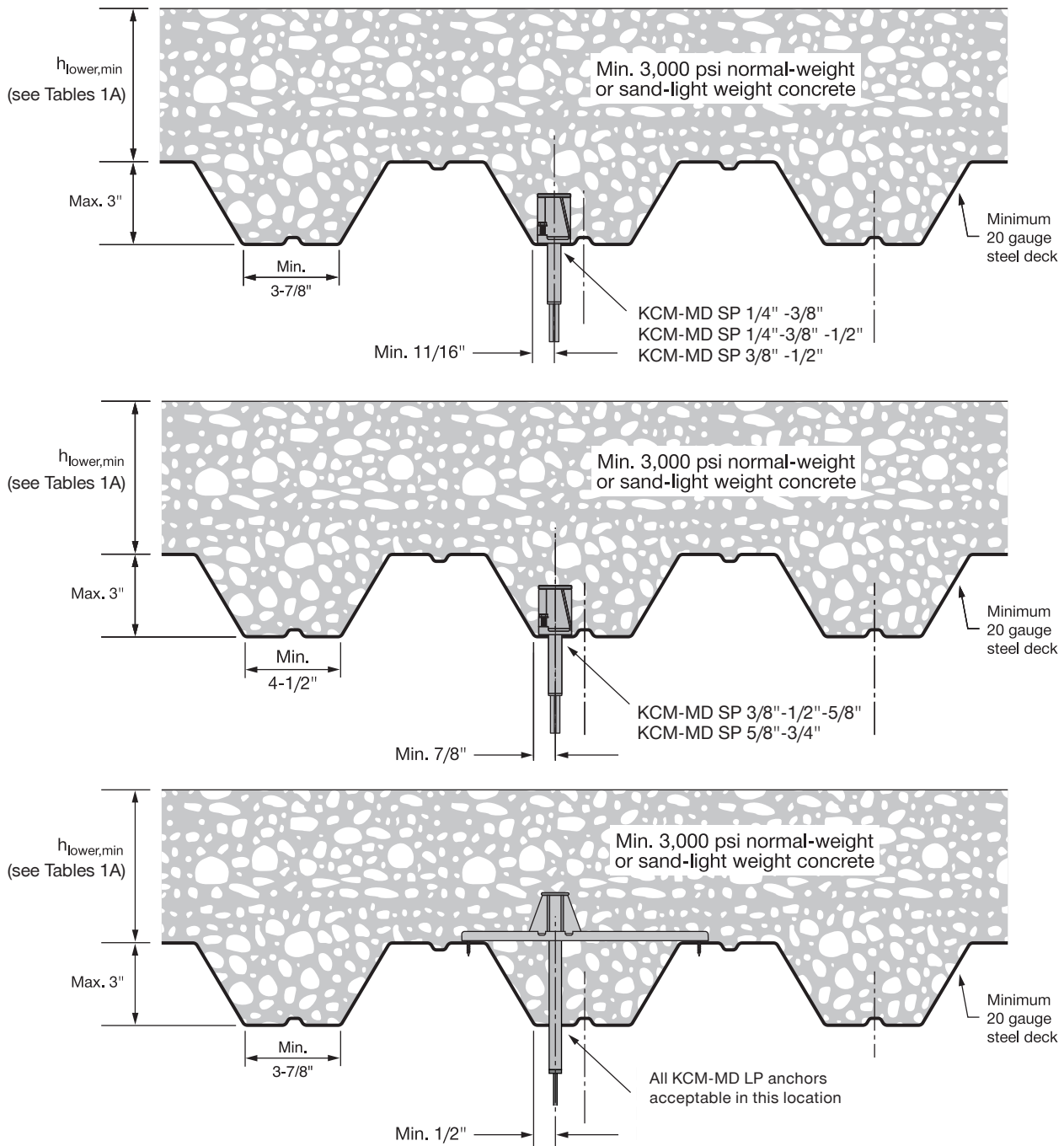


Figure 4B —Installation in the soffit of concrete filled metal deck floor and roof assemblies-over lower flute (W-deck)

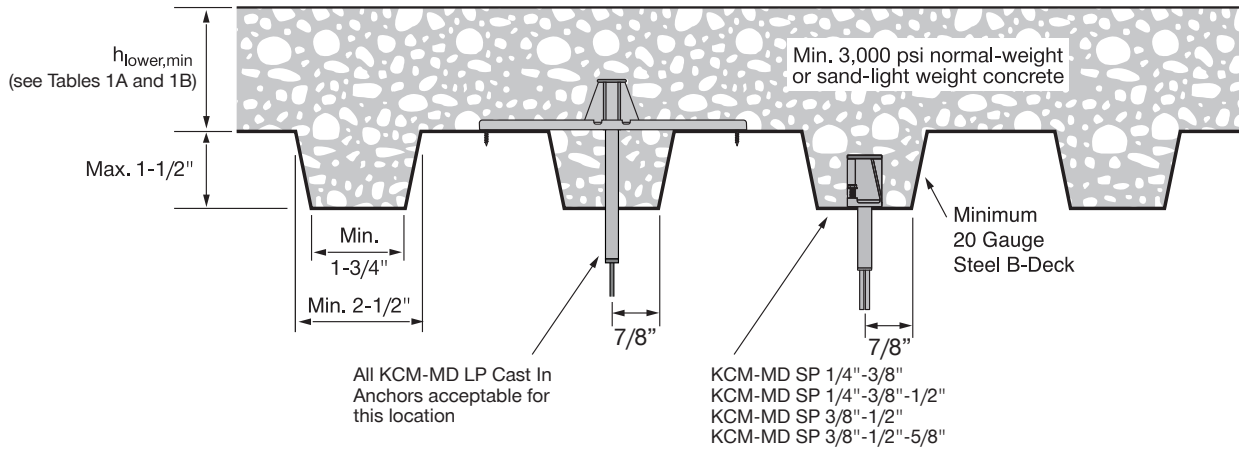


Figure 4C — Installation in the soffit of concrete filled metal deck floor and roof assemblies-over lower flute (B-deck)

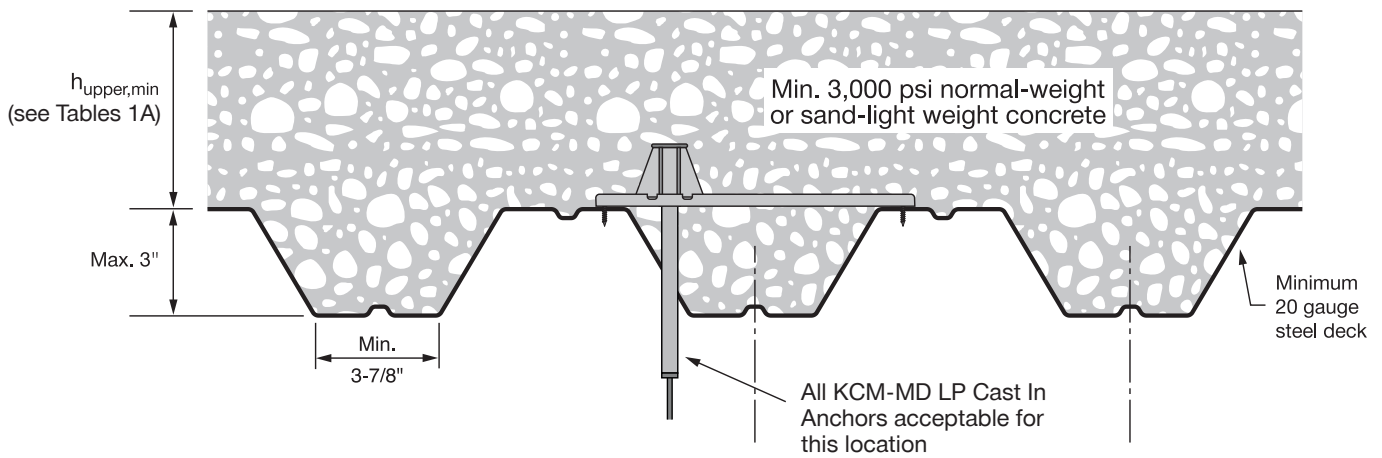


Figure 4D — Installation in the soffit of concrete filled metal deck floor and roof assemblies-over flute incline (W-deck)

DESIGN DATA IN CONCRETE PER CSA A23.3

CSA A23.3-14 Annex D Design.

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post-installed and cast in anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. This section contains the Limit State Design tables with unfactored characteristic loads that are based on the published loads in ICC Evaluation Services ESR-4145. These tables are followed by factored resistance tables. The factored resistance tables have characteristic design loads that are prefactored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-19 Chapter 17 design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to PTG ED. 19, Section 3.1.8. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.ca.



Table 9A — Design strength for steel failure of KCM-MD Short Plate anchor^{1,2,3,4}

Design information	Symbol	Units	Insert Type											
			SP		SP			SP		SP			SP	
			1/4"-3/8"		1/4"-3/8"-1/2"			3/8"-1/2"		3/8"-1/2"-5/8"			5/8"-3/4"	
Plastic Section Color			Green		Black			Orange		Red			Grey	
Nominal rod diameter	-	in.	1/4	3/8	1/4	3/8	1/2	3/8	1/2	3/8	1/2	5/8	5/8	3/4
Anchor O.D.	d _a	in (mm)	0.52 (13)		0.67 (17)			0.67 (17)		0.88 (22)			1.00 (25)	
Effective embedment	h _{ef}	in (mm)	1.76 (45)		2 (51)			2 (51)		2.5 (64)			2.5 (64)	
Min. specified ult. Strength	f _{ut}	lb (kN)	8,300 (36.9)		12,365 (55.0)			12,365 (55.0)		12,320 (54.8)			22,500 (100.1)	
Anchor category	-		Cast-In											
Concrete material resistance factor,	Φ _c	-	0.65											
Resistance modification factor for tension and shear, concrete failure modes, Condition B	R	-	1.00											
Steel embed. material resistance factor for reinforcement	Φ _s	-	0.85											
Resistance modification factor for tension, steel failure modes	R	-	0.70											
Resistance modification factor for shear, steel failure modes	R	-	0.65											
Factored steel strength of insert in tension	ΦN _{sa,insert}	lb (kN)	4,940 (22.0)		7,355 (32.7)			7,355 (32.7)		7,330 (32.6)			13,390 (59.6)	
Factored seismic steel strength of insert in tension	ΦN _{sa,insert,eq}	lb (kN)	-	4,940 (22.0)	-	7,355 (32.7)	7,355 (32.7)	7,355 (32.7)	7,355 (32.7)	-	7,330 (32.6)	7,330 (32.6)	13,390 (59.6)	13,390 (59.6)
Installations in upper flute of metal deck (i.e. W-deck and B-deck) according to Figures 4A														
Factored steel strength of insert in shear	ΦV _{sa,insert}	lb (kN)	-	2,590 (11.5)	-	1,915 (8.5)	4,875 (21.7)	1,835 (8.2)	4,875 (21.7)	-	3,360 (15.0)	6,615 (29.4)	-	7,600 (33.8)
Factored seismic steel strength of insert in shear	ΦV _{sa,insert,eq}	lb (kN)	-	2,590 (11.5)	-	1,150 (5.1)	4,875 (21.7)	1,105 (4.9)	4,875 (21.7)	-	2,355 (10.5)	6,615 (29.4)	-	7,600 (33.8)
Installations in lower flute of metal deck (i.e. W-deck) according to Figures 4B														
Factored steel strength of insert in shear	ΦV _{sa,insert}	lb (kN)	-	1,900 (8.5)	-	1,835 (8.2)	2,310 (10.3)	1,835 (8.2)	2,310 (10.3)	-	2,930 (13.0)	3,005 (13.4)	2,590 (11.5)	3,005 (13.4)
Factored seismic steel strength of insert in shear	ΦV _{sa,insert,eq}	lb (kN)	-	1,900 (8.5)	-	1,105 (4.9)	2,310 (10.3)	1,105 (4.9)	2,310 (10.3)	-	2,355 (10.5)	3,005 (13.4)	2,590 (11.5)	3,005 (13.4)
Installations in lower flute of metal deck (i.e. B-deck) according to Figures 4C														
Factored steel strength of insert in shear	ΦV _{sa,insert}	lb (kN)	-	1,900 (8.5)	-	1,835 (8.2)	2,310 (10.3)	1,835 (8.2)	2,310 (10.3)	-	2,930 (13.0)	3,005 (13.4)	2,590 (11.5)	3,005 (13.4)
Factored seismic steel strength of insert in shear	ΦV _{sa,insert,eq}	lb (kN)	-	1,900 (8.5)	-	1,105 (4.9)	2,310 (10.3)	1,105 (4.9)	2,310 (10.3)	-	2,355 (10.5)	3,005 (13.4)	2,590 (11.5)	3,005 (13.4)

¹ Design information in this table is taken from ICC-ES ESR-4145, Table 4A, and converted for use with CSA A23.3 Annex D.

² The carbon steel KCM-MD is considered a brittle steel element as defined by CSA A23.3 Annex D section D.2.

³ Tension values are for the inserts only. The capacity of the threaded rods must be also determined from Table 14. The design strength of concrete must be obtained from tables 10 to 13. Compare the tension values of threaded rod, inserts, and concrete. The lesser of the values is to be used for the design.

⁴ Shear values are for the inserts only. The capacity of the threaded rods must be also determined from Table 14. The calculation of concrete shear strength is not required. Compare the shear values of threaded rod and inserts. The lesser of the values is to be used for the design strength of the anchor in shear.

Table 9B — Design strength for steel failure of KCM-MD Long Plate anchor^{1,2,3,4}


Design information	Symbol	Units	Insert Type											
			LP		LP			LP		LP			LP	
			1/4"-3/8"		1/4"-3/8"-1/2"			3/8"-1/2"		3/8"-1/2"-5/8"			5/8"-3/4"	
Plastic Section Color			Green		Black			Orange		Red			Grey	
Nominal rod diameter	-	in.	1/4	3/8	1/4	3/8	1/2	3/8	5/8	1/2	3/8	1/2	5/8	5/8
Anchor O.D.	d_a	in (mm)	0.52 (13)		0.67 (17)			0.67 (17)			0.88 (22)			1.00 (25)
Effective embedment)	h_{ef}	in (mm)	1.76 (45)		2 (51)			2 (51)			2.5 (64)			2.5 (64)
Min. specified ult. Strength	f_{ut}	lb (kN)	8,300 (36.9)		12,365 (55.0)			12,365 (55.0)			12,320 (54.8)			22,500 (100.1)
Anchor category	-		Cast-In											
Concrete material resistance factor,	Φ_c	-	0.65											
Resistance modification factor for tension and shear, concrete failure modes, Condition B	R	-	1.00											
Steel embed. material resistance factor for reinforcement	Φ_s	-	0.85											
Resistance modification factor for tension, steel failure modes	R	-	0.70											
Resistance modification factor for shear, steel failure modes	R	-	0.65											
Factored steel strength of insert in tension	$\Phi N_{sa,insert}$	lb (kN)	4,940 (22.0)		7,355 (32.7)			7,355 (32.7)			7,330 (32.6)			13,390 (59.6)
Factored seismic steel strength of insert in tension	$\Phi N_{sa,insert,eq}$	lb (kN)	- (22.0)	4,940	- (32.7)	7,355	7,355 (32.7)	7,355 (32.7)	7,355 (32.7)	-	7,330 (32.6)	7,330 (32.6)	13,390 (59.6)	13,390 (59.6)
Installations in upper flute of metal deck (i.e. W-deck and B-deck) according to Figures 4A														
Factored steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	2,590 (11.5)		1,915 (8.5)	4,875 (21.7)	1,835 (8.2)	4,875 (21.7)	-	3,360 (15.0)	6,615 (29.4)	5,740 (25.5)	7,600 (33.8)
Factored seismic steel strength of insert in shear,	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,590 (11.5)		1,150 (5.1)	4,875 (21.7)	1,105 (4.9)	4,875 (21.7)	-	2,355 (10.5)	6,615 (29.4)	3,440 (15.3)	7,600 (33.8)
Installations in lower flute of metal deck (i.e. W-deck) according to Figures 4B														
Factored steel strength of insert in shear,	$\Phi V_{sa,insert}$	lb (kN)	-	2,985 (13.3)		1,845 (8.2)	3,670 (16.3)	1,835 (8.2)	3,670 (16.3)	-	2,230 (9.9)	4,260 (19.0)	2,590 (11.5)	4,260 (19.0)
Factored seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,985 (13.3)		1,105 (4.9)	3,670 (16.3)	1,105 (4.9)	3,670 (16.3)	-	2,230 (9.9)	4,260 (19.0)	2,590 (11.5)	4,260 (19.0)
Installations in lower flute of metal deck (i.e. B-deck) according to Figures 4C														
Factored steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	2,660 (11.8)			4,165 (18.5)	-	4,165 (18.5)	-	-	5,295 (23.6)	-	6,585 (29.3)
Factored seismic steel strength of insert in shear	$\Phi V_{sa,insert,eq}$	lb (kN)	-	2,660 (11.8)			4,165 (18.5)	-	4,165 (18.5)	-	-	5,295 (23.6)	-	6,585 (29.3)
Installations over flute incline of metal deck (i.e. W-deck) according to Figures 4D														
Factored steel strength of insert in shear	$\Phi V_{sa,insert}$	lb (kN)	-	950 (4.2)	-	-	2,455 (10.9)	-	2,455 (10.9)	-	-	5,510 (24.5)	-	5,510 (24.5)
Factored seismic steel strength of insert in shear,	$\Phi V_{sa,insert,eq}$	lb (kN)	-	950 (4.2)	-	-	1,965 (8.7)	-	1965.0 (8.7)	-	-	3,100 (13.8)	-	5,235 (23.3)

- Design information in this table is taken from ICC-ES ESR-4145, Table 4B, and converted for use with CSA A23.3 Annex D.
- The carbon steel KCM-MD is considered a brittle steel element as defined by CSA A23.3 Annex D section D.2.
- Tension values are for the inserts only. The capacity of the threaded rods must be also determined from Table 14. The design strength of concrete must be obtained from tables 10 to 13. Compare the tension values of threaded rod, inserts, and concrete. The lesser of the values is to be used for the design.
- Shear values are for the inserts only. The capacity of the threaded rods must be also determined from Table 14. The calculation of concrete shear strength is not required. Compare the shear values of threaded rod and inserts. The lesser of the values is to be used for the design strength of the anchor in shear.

Table 10 — Hilti KCM-MD Short Plate and Long Plate factored tension resistance in the soffit of uncracked sand-lightweight or normal wweight concrete over metal deck (B profile) ^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal embed. in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4C	
			Tension - N_r		Tension - N_r	
			$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)	$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,655 (11.8)	3,250 (14.5)	555 (2.5)	675 (3.0)
SP 1/4"- 3/8"-1/2"	Black	2.13 (54)	3,300 (14.7)	4,040 (18.0)	580 (2.6)	710 (3.2)
SP 3/8"-1/2"	Orange	2.13 (54)	3,300 (14.7)	4,040 (18.0)	580 (2.6)	710 (3.2)
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	4,180 (18.6)	5,120 (22.8)	635 (2.8)	775 (3.4)
SP 5/8"-3/4"	Grey	2.65 (67)	4,180 (18.6)	5,120 (22.8)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,655 (11.8)	3,250 (14.5)	2,655 (11.8)	3,250 (14.5)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	3,300 (14.7)	4,040 (18.0)	3,300 (14.7)	4,040 (18.0)
LP 3/8"-1/2"	Orange	2.21 (56)	3,300 (14.7)	4,040 (18.0)	3,300 (14.7)	4,040 (18.0)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	4,180 (18.6)	5,120 (22.8)	4,180 (18.6)	5,120 (22.8)
LP 5/8"-3/4"	Grey	2.72 (69)	4,180 (18.6)	5,120 (22.8)	4,180 (18.6)	5,120 (22.8)

Table 11 — Hilti KCM-MD Short Plate and Long Plate factored tension resistance in the soffit of cracked sand-lightweight or normal weight concrete over metal deck (B profile) ^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal embed. in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4C	
			Tension - N_r		Tension - N_r	
			$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)	$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,125 (9.5)	2,600 (11.6)	440 (2.0)	540 (2.4)
SP 1/4"- 3/8"-1/2"	Black	2.13 (54)	2,640 (11.7)	3,230 (14.4)	465 (2.1)	565 (2.5)
SP 3/8"-1/2"	Orange	2.13 (54)	2,640 (11.7)	3,230 (14.4)	465 (2.1)	565 (2.5)
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	3,345 (14.9)	4,095 (18.2)	505 (2.2)	620 (2.8)
SP 5/8"-3/4"	Grey	2.65 (67)	3,345 (14.9)	4,095 (18.2)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,125 (9.5)	2,600 (11.6)	2,125 (9.5)	2,600 (11.6)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	2,640 (11.7)	3,230 (14.4)	2,640 (11.7)	3,230 (14.4)
LP 3/8"-1/2"	Orange	2.21 (56)	2,640 (11.7)	3,230 (14.4)	2,640 (11.7)	3,230 (14.4)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	3,345 (14.9)	4,095 (18.2)	3,345 (14.9)	4,095 (18.2)
LP 5/8"-3/4"	Grey	2.72 (69)	3,345 (14.9)	4,095 (18.2)	3,345 (14.9)	4,095 (18.2)

1 See Hilti Product Technical Guide, (PTG Ed. 22), Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute.

4 Compare tabular value to the insert steel strength values in Tables 9A and 9B and threaded rod steel strength values in Table 8. The lesser of the values is to be used for the design.

5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$. See Hilti Product Technical Guide, (PTG Ed. 22)Section 3.1.8.7 for additional information on seismic applications.

6 For Hilti KCM-MD anchors, calculation of static and seismic concrete strength in shear is not required. See Tables 9A and 9B for shear calculations. on seismic applications.

Table 12 — Hilti KCM-MD Short Plate and Long Plate factored tension resistance in the soffit of uncracked sand-lightweight or normal weight concrete over metal deck (W profile with minimum 3-7/8" width) ^{1,2,3,4,5,6}



Anchor	Plastic Section Color	Nominal embed. in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4B		Inclined per Figure 4D	
			Tension - N_r		Tension - N_r		Tension - N_r	
			$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)	$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)	$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,655 (11.8)	3,250 (14.5)	1,280 (5.7)	1,565 (7.0)	-	-
SP 1/4"-3/8"-1/2"	Black	2.13 (54)	3,300 (14.7)	4,040 (18.0)	1,685 (7.5)	2,065 (9.2)	-	-
SP 3/8"-1/2"	Orange	2.13 (54)	3,300 (14.7)	4,040 (18.0)	1,685 (7.5)	2,065 (9.2)	-	-
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	4,180 (18.6)	5,120 (22.8)	1,935 (8.6)	2,370 (10.5)	-	-
SP 5/8"-3/4"	Grey	2.65 (67)	4,180 (18.6)	5,120 (22.8)	1,935 (8.6)	2,370 (10.5)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,655 (11.8)	3,250 (14.5)	4,470 (19.9)	5,475 (24.4)	2,655 (11.8)	3,250 (14.5)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	3,300 (14.7)	4,040 (18.0)	4,470 (19.9)	5,475 (24.4)	3,300 (14.7)	4,040 (18.0)
LP 3/8"-1/2"	Orange	2.21 (56)	3,300 (14.7)	4,040 (18.0)	4,470 (19.9)	5,475 (24.4)	3,300 (14.7)	4,040 (18.0)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	4,180 (18.6)	5,120 (22.8)	5,990 (26.6)	7,340 (32.6)	4,180 (18.6)	5,120 (22.8)
LP 5/8"-3/4"	Grey	2.72 (69)	4,180 (18.6)	5,120 (22.8)	5,990 (26.6)	7,340 (32.6)	4,180 (18.6)	5,120 (22.8)

Table 13 — Hilti KCM-MD Short Plate and Long Plate factored tension resistance in the soffit of cracked sand-lightweight concrete or normal weight over metal deck (W profile with minimum 3-7/8" width) ^{1,2,3,4,5,6}

Anchor	Plastic Section Color	Nominal embed. in. (mm)	Upper flute per Figure 4A		Lower flute per Figure 4B		Inclined per Figure 4D	
			Tension - N_r		Tension - N_r		Tension - N_r	
			$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)	$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)	$f'_c = 20 \text{ MPa}$ (2,900 psi) lb (kN)	$f'_c = 30 \text{ MPa}$ (4,350 psi) lb (kN)
SP 1/4"-3/8"	Green	1.88 (48)	2,125 (9.5)	2,600 (11.6)	1,025 (4.6)	1,250 (5.6)	-	-
SP 1/4"-3/8"-1/2"	Black	2.13 (54)	2,125 (9.5)	2,600 (11.6)	1,025 (4.6)	1,250 (5.6)	-	-
SP 3/8"-1/2"	Orange	2.13 (54)	2,125 (9.5)	2,600 (11.6)	1,025 (4.6)	1,250 (5.6)	-	-
SP 3/8"-1/2"-5/8"	Red	2.63 (67)	3,345 (14.9)	4,095 (18.2)	1,550 (6.9)	1,895 (8.4)	-	-
SP 5/8"-3/4"	Grey	2.65 (67)	3,345 (14.9)	4,095 (18.2)	1,550 (6.9)	1,895 (8.4)	-	-
LP 1/4"-3/8"	Green	1.96 (50)	2,125 (9.5)	2,600 (11.6)	3,575 (15.9)	4,380 (19.5)	2,125 (9.5)	2,600 (11.6)
LP 1/4"-3/8"-1/2"	Black	2.21 (56)	2,125 (9.5)	2,600 (11.6)	3,575 (15.9)	4,380 (19.5)	2,125 (9.5)	2,600 (11.6)
LP 3/8"-1/2"	Orange	2.21 (56)	2,640 (11.7)	3,230 (14.4)	3,575 (15.9)	4,380 (19.5)	2,640 (11.7)	3,230 (14.4)
LP 3/8"-1/2"-5/8"	Red	2.71 (69)	3,345 (14.9)	4,095 (18.2)	4,795 (21.3)	5,870 (26.1)	3,345 (14.9)	4,095 (18.2)
LP 5/8"-3/4"	Grey	2.72 (69)	3,345 (14.9)	4,095 (18.2)	4,795 (21.3)	5,870 (26.1)	3,345 (14.9)	4,095 (18.2)

1 See Hilti Product Technical Guide, (PTG Ed. 22), Section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute.

4 Compare tabular value to the insert steel strength values in Tables 9A or 9B and threaded rod steel strength values in Table 14. The lesser of the values is to be used for the design.

5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$. See Hilti Product Technical Guide, (PTG Ed. 22), Section 3.1.8.7 for additional information on seismic applications.

6 For Hilti KCM-MD anchors, calculation of static and seismic concrete strength in shear is not required. See Tables 9A or 9B for shear calculations.

Table 14 — Design strength for steel failure of common threaded rods used with KCM-MD cast-in anchor^{1,2,3}

Nominal anchor diameter	Grade A36 threaded rod			ASTM A 193 B7 or ASTM F1554 Gr. 105 threaded rod			ASTM A 307, Grade A threaded rod		
	Tensile ⁴ $N_{sar,rod}$ or $N_{sar,eq,rod}$ lb (kN)	Shear ⁵ $V_{sar,rod}$ lb (kN)	Seismic Shear ⁶ $V_{sar,eq,rod}$ lb (kN)	Tensile ⁴ $N_{sar,rod}$ or $N_{sar,eq,rod}$ lb (kN)	Shear ⁵ $V_{sar,rod}$ lb (kN)	Seismic Shear ⁶ $V_{sar,eq,rod}$ lb (kN)	Tensile ⁴ $N_{sar,rod}$ or $N_{sar,eq,rod}$ lb (kN)	Shear ⁵ $V_{sar,rod}$ lb (kN)	Seismic Shear ⁶ $V_{sar,eq,rod}$ lb (kN)
1/4	1,260 (5.6)	705 (3.1)	495 (2.2)	2,720 (12.1)	1,520 (6.8)	1,065 (4.7)	1,290 (5.7)	725 (3.2)	505 (2.2)
3/8	3,075 (13.7)	1,720 (7.7)	1,205 (5.4)	6,630 (29.5)	3,705 (16.5)	2,595 (11.5)	3,160 (14.1)	1,780 (7.9)	1,245 (5.5)
1/2	5,600 (24.9)	3,150 (14.0)	2,205 (9.8)	12,070 (53.7)	6,785 (30.2)	4,750 (21.1)	5,780 (25.7)	3,250 (14.5)	2,275 (10.1)
5/8	8,915 (39.7)	5,010 (22.3)	3,505 (15.6)	19,210 (85.4)	10,805 (48.1)	7,565 (33.7)	9,215 (41.0)	5,185 (23.1)	3,630 (16.1)
3/4	13,190 (58.7)	7,420 (33.0)	5,195 (23.1)	28,475 (126.7)	15,990 (71.1)	11,195 (49.8)	13,635 (60.7)	7,670 (34.1)	5,370 (23.9)

1 See Hilti Product Technical Guide, Edition 2022 (PTG ED. 22), Section 3.1.8.6 to convert design strength value to ASD value.

2 Hilti KCM-MD anchors are to be considered brittle steel elements

3 See Hilti Product Technical Guide, Edition 2022 (PTG ED. 22), Section 3.1.8.7 for additional information on seismic applications.

4 Tensile $N_{sar} = \phi_s A_{se} R f_{ut}$ as noted in CSA A23.3-14 Annex D.

5 Shear values determined by static shear tests with $V_{sar} < \phi_s 0.60 A_{se,V} f_{ut} R$ as noted in CSA A23.3-14 Annex D.

6 Seismic shear values determined by seismic shear tests with $V_{sar,eq} < \phi_s 0.60 A_{se,V} f_{ut} R$ as noted in CSA A23.3-14 Annex D.

Table 15A — UL cUL LLC and FM approvals for KCM-MD Short Plate Anchors ^{1,2}

Design information		SP 1/4"-3/8"			SP 1/4"-3/8"-1/2"			SP 3/8"-1/2"			SP 3/8"-1/2"-5/8"			SP 5/8"-3/4"		
Nominal rod diameter (in.)	Metal deck soffit	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)
3/8	Upper flute	4	1,500	4	4	1,500	4	4	1,500	4	4	1,500	4	-	-	-
	Lower flute	4	1,500	4	4	1,500	4	4	1,500	4	4	1,500	-	-	-	-
1/2	Upper flute	-	-	-	8	4,050	8	8	4,050	8	8	4,050	8	-	-	-
	Lower flute	-	-	-	8	4,050	8	8	4,050	8	8	4,050	-	-	-	-
5/8	Upper flute	-	-	-	-	-	-	-	-	-	12	7,900	12	12	7,900	12
	Lower flute	-	-	-	-	-	-	-	-	-	8	4,050	-	8	4,050	-
3/4	Upper flute	-	-	-	-	-	-	-	-	-	-	-	-	12	7,900	12
	Lower flute	-	-	-	-	-	-	-	-	-	-	-	-	8	4,050	-

Table 15B — UL cUL LLC and FM approvals for KCM-MD Long Plate Anchors ^{1,2}

Design information		LP 1/4"-3/8"			LP 1/4"-3/8"-1/2"			LP 3/8"-1/2"			LP 3/8"-1/2"-5/8"			LP 5/8"-3/4"		
Nominal rod diameter (in.)	Metal deck soffit	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	Test load (lb)	FM max pipe size (in.)
3/8	Upper flute	4	1,500	4	4	1,500	4	4	1,500	4	4	1,500	4	-	-	-
	Lower flute	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/2	Upper flute	-	-	-	8	4,050	8	8	4,050	8	8	4,050	8	-	-	-
	Lower flute	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/8	Upper flute	-	-	-	-	-	-	-	-	-	12	7,900	12	12	7,900	12
	Lower flute	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3/4	Upper flute	-	-	-	-	-	-	-	-	-	-	-	-	12	7,900	12
	Lower flute	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

¹ UL LLC Listing based on successful completion of testing in accordance with UL 203.

² FM Approval based on successful completion of testing in accordance with FM 1952.

INSTALLATION INSTRUCTIONS

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.hilti.com and www.hilti.ca. Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

ORDERING INFORMATION¹

KCM-MD Short Plate and Long Plate cast-in anchors for use in metal deck

Description	Plastic sleeve color ²	Qty / box	Hole diameter required in metal deck
KCM-MD SP 1/4"-3/8"	Green	90	9/16"
KCM-MD SP 1/4"-3/8"-1/2"	Black	75	11/16"
KCM-MD SP 3/8"-1/2"	Orange	75	11/16"
KCM-MD SP 3/8"-1/2"-5/8"	Red	45	13/16"
KCM-MD SP 5/8"-3/4"	Grey	40	15/16"
KCM-MD LP 1/4"-3/8"	Green	25	1/2"
KCM-MD LP 1/4"-3/8"-1/2"	Black	20	5/8"
KCM-MD LP 3/8"-1/2"	Orange	20	5/8"
KCM-MD LP 3/8"-1/2"-5/8"	Red	15	3/4"
KCM-MD LP 5/8"-3/4"	Grey	15	7/8"

¹ All dimensions in inches

² Identifies anchor size

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*14001 US only

The data contained in this literature was current as of the date of publication. Updates and changes may be made based on later testing. If verification is needed that the data is still current, please contact the Hilti Technical Support Specialists at 1-800-879-8000 (U.S.) or 1-800-363-4458 (Canada). All published load values contained in this literature represent the results of testing by Hilti or test organizations. Local base materials were used. Because of variations in materials, on-site testing is necessary to determine performance at any specific site.