MULTI-THREAD CAST-IN ANCHOR SOLUTION FOR WOOD FORMS AND PAN JOIST DECKS

Cast-In Anchor
KCM-WF and KCM-PD
Technical Supplement

PRODUCT DESCRIPTION

KCM-WF

KCM-PD

KCM-WF/PD cast-in anchors are internally threaded cast-in anchors suitable for use with either wood (WF) or metal pan joist deck (PD) form work. The internal thread designs for the KCM-WF/PD anchors include multiple thread sizes within each anchor to allow for the installation of different diameters of anchor rods. The KCM-WF and KCM-PD are ideally suited for a variety of rod hanging applications and offer significant time savings over traditional post-installed anchor solutions.

Product features

- Application-relevant multi-thread configurations
- KCM-WF/PD have color coded perforated Foam inserts to prevent concrete intrusion
- KCM-WF have notched nails that snap off easily at the concrete surface after the wood forms are stripped.
- KCM-WF nails above the head lock the metal head to the plastic body preventing head popping off due to rebar hits
- KCM-WF nail and anchor design profile reduce the risk of anchor knock over due to accidental rebar hit
- KCM-PD has a design without nails for fastening to pan joist deck
- Wider base of the KCM-PD allows for easy fastening to pan joist deck.

Listings/Approvals

ICC-ES (International Code Council) ESR-4145
City of Los Angeles, 2018 LABC Supplement (within ESR-4145)
Florida Building Code, 2017 FBC with HVHZ Supplement (within ESR-4145)
FM (Factory Mutual) Pipe Hanger Components for Automatic Sprinkler Systems 3/8 through 3/4
UL LLC UL 203 Pipe Hanger Equipment for Fire Protection Services 3/8 through 3/4

MATERIAL SPECIFICATIONS

KCM-WF and KCM-PD 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

Table 1 - Hilti KCM-WF and KCM-PD specification table

Design Information	Symbol	Units	1/4"-3/8"	3/8"-1/2"	3/8"-1/2"-5/8"	3/8"-1/2"-5/8"-3/4"
Insert type	-	-	WF and PD	Only WF	WF and PD	WF and PD
Plastic housing color	-	-	Green	Orange	Red	Grey
Effective embedment	h_{ef}	in. (mm)	1.12 (28)	1.63 (41)	2.04 (52)	3.0 (76)
Nominal embedment	h_{nom}	in. (mm)	1.27 (32.2)	1.78 (45.3)	2.19 (55.6)	3.2 (81.2)
Minimum member thickness	h_{min}	in. (mm)	2.5 (64)	2.5 (64)	3 (76)	4 (10)
Outside diameter of anchor steel body	d_a	in. (mm)	0.50 (12.8)	0.66 (16.9)	0.87 (22.1)	1.02 (25.9)
Bearing area	A_{brg}	in.^{2} (mm^2)	0.91 (590)	1.00 (643)	1.23 (792)	2.25 (1,451)
Minimum anchor spacing[1]	s_{min}	in. (mm)	2.00 (50.8)	2.64 (67.1)	3.48 (88.4)	4.08 (103.6)

[1]Minimum anchor spacing values correspond to $4d_a$ for an un-torqued anchor as specified by ACI 318-14 17.7.1.

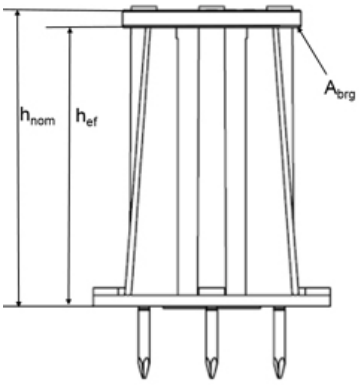


Figure 1—KCM-WF Anchor

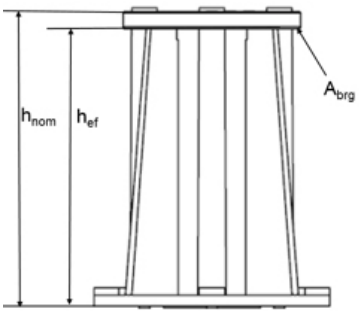
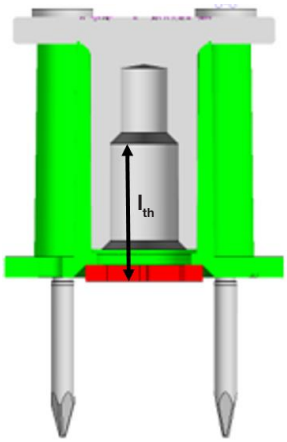


Figure 2—KCM-PD Anchor

Table 2 - Thread engagement measurements for various thread sizes

Anchor	Anchor Body	Rod Dia. [in.]	Thread Engagment Length (l_{th}) [in.] Plastic on/Metal tube on [in.]
Small	1/4" + 3/8"	1/4" 3/8"	1.1 0.7
Medium	3/8" + 1/2"	3/8" 1/2"	1.5 0.9
Standard	3/8" + 1/2" + 5/8"	3/8" 1/2" 5/8"	1.9 1.5 0.9
Heavy duty	3/8" + 1/2" + 5/8" + 3/4"	3/8" 1/2" 5/8" 3/4"	2.8 2.3 1.7 0.9



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 (US), or www.hilti.ca (Canada). 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.

DESIGN DATA IN CONCRETE PER ACI 318

ACI 318-14 Chapter 17 Design

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 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Tables, refer to section 3.1.8 of Volume 2: Anchor Fastening Technical Guide Ed. 19. 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 3 - Design strength for steel failure of KCM-WF and KCM-PD inserts[1,2,3]

DESIGN INFORMATION	1/4"-3/8"		3/8"-1/2"		3/8"-1/2"-5/8"			3/8"-1/2"-5/8"-3/4"			
Insert type	WF/PD		WF		WF/PD			WF/PD			
Nominal rod diameter (in)	1/4	3/8	3/8	1/2	3/8	1/2 [4]	5/8	3/8	1/2 [4]	5/8 [4]	3/4
Design steel strength of insert in tension, $\Phi N_{sa,insert}$ lb (kN)	5,315 (23.6)		8,775 (39.0)		10,920 (48.6)			17,795 (79.2)			
Design seismic steel strength of insert in tension, $\Phi N_{sa,insert,eq}$ lb (kN)	–	5,315 (23.6)	–	8,775 (39.0)	–	10,920 (48.6)	10,920 (48.6)	–	17,795 (79.2)	17,795 (79.2)	17,795 (79.2)
Design steel strength of insert in shear, $\Phi V_{sa,insert}$ lb (kN)	–	1,775 (7.9)	–	3,490 (15.5)	–	4,580 (20.4)	5,785 (25.7)	–	4,955 (22.0)	8,245 (36.7)	11,140 (49.6)
Design seismic steel strength of insert in shear, $\Phi V_{sa,insert,eq}$ lb (kN)	–	1,775 (7.9)	–	3,490 (15.5)	–	4,580 (20.4)	5,785 (25.7)	–	4,955 (22.0)	8,245 (36.7)	11,140 (49.6)

[1] See Hilti Product Technical Guide, Edition 2019 (PTG ED. 19), 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] Values are for the insert only. The capacity of the threaded rod must be also be determined from Table 6. The design strength of concrete must be in accordance with ACI 318-14 Chapter 17 and Tables 4 to 5 as necessary. Compare the values (threaded rod, inserts, and concrete). The lesser of the values is to be used for the design.
[4] Only threaded rods ASTM A193 Grade B7, ASTM A325, or ASTM F1554 Grade 105 are allowed to be used with the insert

Table 4 - Hilti KCM-WF and KCM-PD cast-in insert design strength with concrete/pullout failure in uncracked concrete [1,2,3,4,5,6]

Nominal anchor internal diameter	Effective embedment depth in. (mm)	Tension - φN_n				Shear - φV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.1 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.1 MPa) lb (kN)
1/4"-3/8"	1.12 (28)	1,240 (5.5)	1,355 (6.0)	1,570 (7.0)	1,920 (8.5)	1,240 (5.5)	1,355 (6.0)	1,570 (7.0)	1,920 (8.5)
3/8"-1/2"	1.63 (41)	2,180 (9.7)	2,390 (10.6)	2,760 (12.3)	3,380 (15.0)	2,180 (9.7)	2,390 (10.6)	2,760 (12.3)	3,380 (15.0)
3/8"-1/2"-5/8"	2.04 (52)	3,055 (13.6)	3,345 (14.9)	3,865 (17.2)	4,735 (21.1)	3,055 (13.6)	3,345 (14.9)	3,865 (17.2)	4,735 (21.1)
3/8"-1/2"-5/8"-3/4"	3.00 (76)	5,455 (24.3)	5,975 (26.6)	6,900 (30.7)	8,450 (37.6)	10,910 (48.5)	11,950 (53.2)	13,800 (61.4)	16,900 (75.2)

[1] See PTG Ed. 19, 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 values are for single anchor located at edge distance (c) and spacing (s) greater than 24". For anchors with edge distance or spacing less than 24" use ACI 318 to calculate load reduction factor. Compare the value to the steel values (threaded rod and inserts) in Tables 3 and 6. The lesser of the values is to be used for the design.
[4] Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.85. For all-lightweight, λ_a = 0.75.
[5] Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete.
[6] Compare tabular value to the insert steel strength values in Table 3 and threaded rod steel strength values in Table 6. The lesser of the values is to be used for the design.

Table 5 - Hilti KCM-WF and KCM-PD cast-in insert design strength with concrete / pullout failure in cracked concrete [1,2,3,4,5, 6]

Nominal anchor internal diameter	Effective embedment depth in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.1 MPa) lb (kN)	f'_c = 2,500 psi (17.2 MPa) lb (kN)	f'_c = 3,000 psi (20.7 MPa) lb (kN)	f'_c = 4,000 psi (27.6 MPa) lb (kN)	f'_c = 6,000 psi (41.1 MPa) lb (kN)
1/4"-3/8"	1.12 (28)	990 (4.4)	1,085 (4.8)	1,255 (5.6)	1,535 (6.8)	990 (4.4)	1,085 (4.8)	1,255 (5.6)	1,535 (6.8)
3/8"-1/2"	1.63 (41)	1,745 (7.8)	1,910 (8.5)	2,210 (9.8)	2,705 (12.0)	1,745 (7.8)	1,910 (8.5)	2,210 (9.8)	2,705 (12.0)
3/8"-1/2"-5/8"	2.04 (52)	2,445 (10.9)	2,675 (11.9)	3,090 (13.7)	3,785 (16.8)	2,445 (10.9)	2,675 (11.9)	3,090 (13.7)	3,785 (16.8)
3/8"-1/2"-5/8"-3/4"	3.00 (76)	4,360 (19.4)	4,780 (21.3)	5,520 (24.6)	6,760 (30.1)	8,725 (38.8)	9,560 (42.5)	11,040 (49.1)	13,520 (60.1)

1 See PTG Ed. 19, 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 values are for single anchor located at edge distance (c) and spacing (s) greater than 24". For anchors with edge distance or spacing less than 24" use ACI 318 to calculate load reduction factor. Compare the value to the steel values (threaded rod and inserts) in Tables 3 and 6. The lesser of the values is to be used for the design.
4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.85. For all-lightweight, λ_a = 0.75.
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. No reduction needed for seismic shear.
6 Compare tabular value to the insert steel strength values in Table 3 and threaded rod steel strength values in Table 6. The lesser of the values is to be used for the design.

Table 6 - Design strength for steel failure of common threaded rods[1,5]

Nominal rod diameter in.	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)	518 (2.3)
3/8	3,395 (15.1)	1,750 (7.8)	1,225 (5.4)	7,315 (32.5)	3,780 (16.8)	2,646 (11.8)	3,490 (15.5)	1,815 (8.1)	1,271 (5.7)
1/2	6,175 (27.5)	3,210 (14.3)	2,245 (10.0)	13,315 (59.2)	6,915 (30.8)	4,841 (21.5)	6,375 (28.4)	3,315 (14.7)	2,321 (10.3)
5/8	9,835 (43.7)	5,110 (22.7)	3,575 (15.9)	21,190 (94.3)	11,020 (49.0)	7,714 (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)	11,414 (50.8)	15,040 (66.9)	7,820 (34.8)	5,474 (24.3)

1 See PTG Ed. 19, 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 Values are for the threaded rod only. The capacity of the insert must be also be determined from Table 3. The design strength of concrete must be in accordance with ACI 318-14 Chapter 17 and Tables 4 to 5 as necessary. Compare the values (threaded rod, inserts, and concrete). The lesser of the values is to be used for the design.

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 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 318-14 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 Section 3.1.8 of Volume 2: Anchor Fastening Technical Guide Ed. 19. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.ca.

Table 7 - Hilti KCM-WF/PD design information in accordance with CSA A23.3-14 (R2014) Annex D [1]

Design parameter	Symbol	Units	Nominal anchor diameter											Ref A23.3-14
			1/4"-3/8"		3/8"-1/2"		3/8"-1/2"-5/8"			3/8"-1/2"-5/8"-3/4"				
Nominal rod diameter	d_a	in.	1/4	3/8	3/8	1/2	3/8	1/2 [4]	5/8	3/8	1/2 [4]	5/8 [4]	3/4	
Effective embedment	h_{ef}	in. (mm)	1.12 (28)		1.63 (41)		2.04 (52)			3 (76)				
Steel embed. material resistance factor for reinforcement	ϕ_s	-	0.85											8.4.3
Resistance modification factor for tension, steel failure modes [2]	R	-	0.70											D.5.3
Resistance modification factor for shear, steel failure modes [2]	R	-	0.65											
Factored steel resistance in tension	N_{sar}	lb (kN)	4,864 (21.6)	4,864 (21.6)	8,033 (35.7)	8,033 (35.7)	9,996 (44.4)	9,996 (44.4)	9,996 (44.4)	16,291 (72.4)	16,291 (72.4)	16,291 (72.4)	16,291 (72.4)	D.6.1.2
Factored steel resistance in tension[4]	$N_{sar,eq}$	lb (kN)	-	4,864 (21.6)	-	8,033 (35.7)	-	9,996 (44.4)	9,996 (44.4)	-	16,291 (72.4)	16,291 (72.4)	16,291 (72.4)	D.6.1.2
Factored steel resistance in shear[4]	V_{sar}	lb (kN)		1,633 (7.3)		3,216 (14.3)		4,214 (18.7)	5,326 (23.7)		4,565 (20.3)	7,595 (33.8)	10,260 (45.6)	D.7.1.2
Factored steel resistance in shear, seismic	$V_{sar,eq}$	lb (kN)		1,633 (7.3)		3,216 (14.3)		4,214 (18.7)	5,326 (23.7)		4,565 (20.3)	7,595 (33.8)	10,260 (45.6)	D.7.1.2
Coeff. for factored conc. breakout resistance, uncracked concrete	$k_{c,uncr}$	-	10											D.6.2.2
Coeff. for factored conc. breakout resistance, cracked concrete	$k_{c,cr}$	-	10											D.6.2.2
Modification factor for anchor resistance, tension, uncracked conc.	$\psi_{c,N}$	-	1.25											D.6.2.6
Modification factor for anchor resistance, tension, cracked conc.	$\psi_{c,N}$	-	1.0											D.6.2.6
Anchor category	-	-	cast-in											D.5.3 (c)
Concrete material resistance factor	ϕ_c	-	0.65											8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B [3]	R	-	1.00											D.5.3 (c)

[1] Design information in this table is taken from ICC-ES ESR-4145, and converted for use with CSA A23.3-14 (R2014) Annex D.
[2] The carbon steel KCS-WF/PD is considered a brittle steel element as defined by CSA A23.3-14 (R2014) Annex D section D.2.
[3] For use with the load combinations of CSA A23.3-14 (R2014) chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 (R2014) section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.
[3] Values are for the insert only. The capacity of the threaded rod must be also be determined from Table 10. The design strength of concrete must be in accordance with CSA A23.3-14 (R2014) and Tables 8 to 9 as necessary. Compare the values (threaded rod, inserts, and concrete). The lesser of the values is to be used for the design.
[4] Only threaded rods ASTM A193 Grade B7, ASTM A325, or ASTM F1554 Grade 105 are allowed to be used with the insert

Table 8 - Hilti KCM-WF/PD cast-in insert design strength with concrete / pullout failure in uncracked concrete [1,2,3,4,5]

Nominal anchor diameter in. (mm)	Effective embed. in. (mm)	Nominal embed. in. (mm	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4"-3/8"	1.12 (28)	1.12 (28)	1,235 (5.5)	1,380 (6.1)	1,515 (6.7)	1,750 (7.8)	1,235 (5.5)	1,380 (6.1)	1,515 (6.7)	1,750 (7.8)
3/8"-1/2"	1.63 (41)	1.63 (41)	2,175 (9.7)	2,435 (10.8)	2,665 (11.9)	3,075 (13.7)	2,175 (9.7)	2,435 (10.8)	2,665 (11.9)	3,075 (13.7)
3/8"-1/2"-5/8"	2.04 (52)	2.04 (52)	3,045 (13.6)	3,405 (15.2)	3,730 (16.6)	4,305 (19.2)	3,045 (13.6)	3,405 (15.2)	3,730 (16.6)	4,305 (19.2)
3/8"-1/2"-5/8"-3/4"	3.00 (76)	3.00 (76)	5,435 (24.2)	6,075 (27.0)	6,655 (29.6)	7,685 (34.2)	10,865 (48.3)	12,150 (54.1)	13,310 (59.2)	15,370 (68.4)

[1] See section 3.1.8.6 to convert factored resistance value to ASD value.
[2] Linear interpolation between concrete compressive strengths is not permitted.
[3] Tabular values are for single anchor located at edge distance (c) and spacing (s) greater than 24". For anchors with edge distance or spacing less than 24" use CSA A23.3 to calculate load reduction factor. Compare the value to the steel values in Tables 7 and 10. The lesser of the values is to be used for the design.
[4] Tablular values are for normal weight concrete only.
For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.85; for all-lightweight, λ_a = 0.75.
[5] Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete.

Table 9 - Hilti KCS-WF/PD cast-in insert design strength with concrete / pullout failure in cracked concrete [1,2,3,4,5]

Nominal anchor diameter in. (mm)	Effective embed. in. (mm)	Nominal embed. in. (mm	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
1/4"-3/8"	1.12 (28)	1.12 (28)	990 (4.4)	1,105 (4.9)	1,210 (5.4)	1,400 (6.2)	990 (4.4)	1,105 (4.9)	1,210 (5.4)	1,400 (6.2)
3/8"-1/2"	1.63 (41)	1.63 (41)	1,740 (7.7)	1,945 (8.7)	2,130 (9.5)	2,460 (10.9)	1,740 (7.7)	1,945 (8.7)	2,130 (9.5)	2,460 (10.9)
3/8"-1/2"-5/8"	2.04 (52)	2.04 (52)	2,435 (10.8)	2,725 (12.1)	2,985 (13.3)	3,445 (15.3)	2,435 (10.8)	2,725 (12.1)	2,985 (13.3)	3,445 (15.3)
3/8"-1/2"-5/8"-3/4"	3.00 (76)	3.00 (76)	4,345 (19.3)	4,860 (21.6)	5,325 (23.7)	6,145 (27.3)	8,695 (38.7)	9,720 (43.3)	10,650 (47.4)	12,295 (54.7)

[1] See section 3.1.8.6 to convert factored resistance value to ASD value.
[2] Linear interpolation between concrete compressive strengths is not permitted.
[3] Tabular values are for single anchor located at edge distance (c) and spacing (s) greater than 24". For anchors with edge distance or spacing less than 24" use CSA A23.3 to calculate load reduction factor. Compare the value to the steel values in Tables 7 and 10. The lesser of the values is to be used for the design.
[4] Tablular values are for normal weight concrete only.
For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.85; for all-lightweight, λ_a = 0.75.
[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. No reduction needed for seismic shear.

Table 10 - Design strength for steel failure of common threaded rods used with KCM-WF/PD cast-in inserts [1,2,3]

Nominal rod diameter in.	Grade A36 threaded rod			ASTM A 193 B7 or ASTM F1554 Gr. 105 threaded rod			ASTM A 307, Grade A threaded rod		
	Tensile[4] $\varphi N_{sa,rod}$ or $\varphi N_{sa,eq,rod}$ lb (kN)	Shear[5] $\varphi V_{sa,rod}$ lb (kN)	Seismic Shear[6] $\varphi V_{sa,eq,rod}$ lb (kN)	Tensile[4] $\varphi N_{sa,rod}$ or $\varphi N_{sa,eq,rod}$ lb (kN)	Shear[5] $\varphi V_{sa,rod}$ lb (kN)	Seismic Shear[6] $\varphi V_{sa,eq,rod}$ lb (kN)	Tensile[4] $\varphi N_{sa,rod}$ or $\varphi N_{sa,eq,rod}$ lb (kN)	Shear[5] $\varphi V_{sa,rod}$ lb (kN)	Seismic Shear[6] $\varphi V_{sa,eq,rod}$ lb (kN)
1/4	1,260 (5.6)	705 (3.1)	495 (2.2)	2,720 (12.1)	1,520 (6.8)	1,064 (4.7)	1,290 (5.7)	725 (3.2)	508 (2.3)
3/8	3,075 (13.7)	1,720 (7.7)	1,205 (5.4)	6,630 (29.5)	3,705 (16.5)	2,594 (11.5)	3,160 (14.1)	1,780 (7.9)	1,246 (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)	7,564 (33.6)	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)	11,193 (49.8)	13,635 (60.7)	7,670 (34.1)	5,369 (23.9)

1 See section 3.1.8.6 to convert design strength value to ASD value.
2 Hilti KCM-WF/PD anchors are to be considered brittle steel elements
3 See 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 11 - UL LLC and FM approvals[1,2]

Design information	1/4"-3/8"			3/8"-1/2"			3/8"-1/2"-5/8"			3/8"-1/2"-5/8"-3/4"		
	WF and PD			Only WF			WF and PD			WF and PD		
Nominal rod diameter	UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)
3/8	4	1,500	4	4	1,500	4	4	1,500	-	4	1,500	4
1/2	-	-	-	8	4,050	8	8	4,050	-	8	4,050	8
5/8	-	-	-	-	-	-	8	4,050	-	12	7,900	12
3/4	-	-	-	-	-	-	-	-	-	12	7,900	12

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.

ORDERING INFORMATION[1,2]

KCM – WF cast-in anchor for use in wood forms

Description	Sleeve color	Qty / box
KCM – WF 1/4"-3/8"	Green	250
KCM – WF 3/8"-1/2"	Orange	150
KCM – WF 3/8"-1/2"-5/8"	Red	100
KCM – WF 3/8"-1/2"-5/8"-3/4"	Grey	25

KCM – PD cast-in anchor for use in pan joist deck

Description	Sleeve color	Qty / box
KCM – PD 1/4"-3/8"	Green	250
KCM – PD 3/8"-1/2"-5/8"	Red	100
KCM – PD 3/8"-1/2"-5/8"-3/4"	Grey	25

[1] All dimensions in inches
[2] Identifies anchor size

06/19 SM

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