Deutsches Institut für Bautechnik DIBt

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Europäische Technische Bewertungsstelle für Bauprodukte

Benannt gemäß Artikel 29 der Verordnung (EU) Nr. 305/2011 und Mitglied der EOTA (Europäische Organisation für Technische Bewertung)

Europäische Technische Bewertung

ETA-08/0033 vom 22. Juli 2025

Allgemeiner Teil

Technische Bewertungsstelle, die die Europäische Technische Bewertung ausstellt	Deutsches Institut für Bautechnik
Handelsname des Bauprodukts	Zahn Flachdachbefestigungselemente
Produktfamilie, zu der das Bauprodukt gehört	Befestigungselemente für Dachabdichtungssysteme
Hersteller	Harald Zahn GmbH Ludwig-Wagner-Str. 10 69168 Wiesloch DEUTSCHLAND
Herstellungsbetrieb	Werke der Harald Zahn GmbH
Diese Europäische Technische Bewertung enthält	291 Seiten, davon 286 Anhänge, die fester Bestandteil dieser Bewertung sind.
Diese Europäische Technische Bewertung wird ausgestellt gemäß der Verordnung (EU) Nr. 305/2011, auf der Grundlage von	EAD 030351-00-0402
Diese Fassung ersetzt	ETA-08/0033 vom 15. August 2022

Die Europäische Technische Bewertung wird von der Technischen Bewertungsstelle in ihrer Amtssprache ausgestellt. Übersetzungen dieser Europäischen Technischen Bewertung in andere Sprachen müssen dem Original vollständig entsprechen und müssen als solche gekennzeichnet sein.

Diese Europäische Technische Bewertung darf, auch bei elektronischer Übermittlung, nur vollständig und ungekürzt wiedergegeben werden. Nur mit schriftlicher Zustimmung der ausstellenden Technischen Bewertungsstelle kann eine teilweise Wiedergabe erfolgen. Jede teilweise Wiedergabe ist als solche zu kennzeichnen.

Die ausstellende Technische Bewertungsstelle kann diese Europäische Technische Bewertung widerrufen, insbesondere nach Unterrichtung durch die Kommission gemäß Artikel 25 Absatz 3 der Verordnung (EU) Nr. 305/2011.

Besonderer Teil

1 Technische Beschreibung des Produkts

Bei den Bauprodukten handelt es sich um mechanische Befestigungselemente.

Die Befestigungselemente bestehen aus einer Schraube aus beschichtetem oder nichtrostendem Stahl und einer Stahlschiene oder einem Halteteller aus Metall oder Kunststoff (Polyamid). Die Halteteller ohne Hülse werden aus beschichtetem Stahl oder aus Kunststoff hergestellt.

Die Halteteller aus Kunststoff weisen teilweise eine angeformte oder adaptierbare Hülse auf. In Verbindung mit der Stahlschiene wird eine Hülse, die einen Kragen besitzt, jeweils in ein im Schienenboden vorbereitetes Loch eingeführt und sitzt mit ihrem Kragen auf dem Schienenboden auf.

Die Hülse ist entweder als ein die Schraube versenkt aufnehmender Hohlschaft, aus dessen Schaftspitze die Schraube austritt, ausgebildet oder als eine von der Schraube aufspreizbare Dübelhülse. Eine solche Dübelhülse kann auch auf die als Hohlschaft ausgebildete Hülse adaptiert werden. Ebenso kann eine Dübelhülse als Hohlraumdübel (cavity anchor) ausgebildet sein.

Der Halteteller mit Hülse kann darüber hinaus aus einzelnen Modulen zusammengesetzt werden.

Die Kunststoffhalteteller werden ggf. mit einer zusätzlichen Abdichtungsplatte versehen.

Die Befestigungselemente müssen den Angaben in den Anhängen 1 bis 235 zu dieser ETA entsprechen.

Die Werkstoffeigenschaften, Abmessungen und Toleranzen, die nicht in den Anhängen 1 bis 235 angegeben sind, müssen mit den Angaben in der Technischen Dokumentation[1] zu dieser europäischen technischen Bewertung übereinstimmen.

2 Spezifizierung des Verwendungszwecks gemäß dem anwendbaren Europäischen Bewertungsdokument

Die Befestigungselemente sind für die Befestigung von Dachabdichtungsbahnen nach EAD 030351-00-0402 vorgesehen. Mögliche Unterkonstruktionen sind Stahltrapezprofile, Beton, Poren- und Leichtbeton, Holz, Dünnbleche aus Stahl und Aluminium oder Sandwichpaneele.

Von den Leistungen in Abschnitt 3 kann nur ausgegangen werden, wenn die mechanischen Befestigungselemente entsprechend den Angaben und unter den Randbedingungen nach den Anhängen zu dieser ETA verwendet werden und gemäß der Montageanweisung des Herstellers eingebaut werden.

Die Prüf- und Bewertungsmethoden, die dieser ETA zu Grunde liegen, führen zur Annahme einer Nutzungsdauer der Befestigungselemente von mindestens 10 Jahren. Die Angaben zur Nutzungsdauer können nicht als Garantie des Herstellers ausgelegt werden, sondern sind lediglich ein Hilfsmittel zur Auswahl der richtigen Produkte im Hinblick auf die erwartete wirtschaftlich angemessene Nutzungsdauer des Bauwerks.

Für die Verwendung der Befestigungselemente für mechanisch zu befestigende Dachabdichtungssysteme nach EAD 030351-00-0402 ist eine gesonderte ETA für das gesamte Dachabdichtungssystem erforderlich. Die System-ETA umfasst sowohl den Windsogwiderstand des Gesamtsystems als auch die Produkteigenschaften der Systemkomponenten.

[1] Die technische Dokumentation dieser europäischen technischen Bewertung ist beim Deutschen Institut für Bautechnik hinterlegt und, soweit diese für die Aufgaben der in das Verfahren der Konformitätsbescheinigung eingeschalteten zugelassenen Stellen bedeutsam ist, den zugelassenen Stellen auszuhändigen.

3 Leistung des Produkts und Angabe der Methoden ihrer Bewertung

3.1 Sicherheit und Barrierefreiheit bei der Nutzung (BWR 4)

Wesentliches Merkmal	Leistung
Charakteristische Zugtragfähigkeit	Siehe Anhänge 236.01 bis .15
Widerstand gegen Rückdrehen	erfüllt
Korrosionswiderstand von Befestigungselementen aus Metall	erfüllt; ≤ 15 % Oberflächenkorrosion
Stoßfestigkeit und Sprödigkeit von Befestigungselementen aus Kunststoff (vor und nach Wärmealterung)	erfüllt; Fallhöhe > 1,0 m
Anforderungen an die Ergebnisse von Charpy Versuchen an Kunststoffproben (vor und nach Wärmealterung)	erfüllt; keine wesentlichen Abweichungen im Vergleich zu Ergebnissen vor Wärmealterung

Die in den Tabellen der charakteristischen Zugtragfähigkeiten (Anhänge 236.01 bis .15) angeführten Materialstärken und –festigkeiten sind Mindestanforderungen. Die angegebenen Werte sind ebenfalls für Materialien mit höheren Stärken und Festigkeiten anwendbar. Die in den Anhängen 236.01 bis .15 angegebenen Werte der Zugtragfähigkeit wurden durch Zugversuche nach EAD 030351-00-0402 ermittelt. Für den Fall, dass der Befestigungsuntergrund unbekannt ist oder Zweifel an Tragfähigkeit des Befestigungsuntergrundes bestehen, werden Auszugversuche vor Ort empfohlen.

Die Befestigungselemente erfüllen die in EAD 030351-00-0402 festgelegten Anforderungen an das Rückdrehverhalten. Dies wurde auf der Grundlage der vorliegenden praktischen Erfahrungen der Hersteller beurteilt.

Die Anforderungen an die Dauerhaftigkeit nach EAD 030351-00-0402 (Korrosionswiderstand von Befestigungselementen aus Metall, Stoßfestigkeit und Sprödigkeit von Befestigungselementen aus Kunststoff vor und nach Wärmealterung, Anforderungen an die Ergebnisse von Charpy-Versuchen an Kunststoffproben vor und nach Wärmealterung) werden für alle Komponenten der Befestigungselemente aus beschichtetem Stahl, nichtrostendem Stahl und Polyamid erfüllt.

Sämtliche Komponenten aus beschichtetem Stahl widerstanden den 15 Zyklen des in EAD 030351-00-0402 beschriebenen Versuchs (Kesternichversuch) und wiesen maximal 15 % Oberflächenkorrosion auf.

Die Ergebnisse der Versuche zur Überprüfung der Stoßfestigkeit und Sprödigkeit der Komponenten aus Polyamid zeigten eine Fallhöhe von mehr als 1,0 m vor und nach Wärmealterung dieser Komponenten. Des Weiteren ergaben die Ergebnisse der zugehörigen Charpy-Versuche nach Wärmealterung keine wesentlichen Abweichungen im Vergleich zu den Ergebnissen vor Wärmealterung.

4 Angewandtes System zur Bewertung und Überprüfung der Leistungsbeständigkeit mit der Angabe der Rechtsgrundlage

Gemäß dem Europäischen Bewertungsdokument EAD 030351-00-0402 gilt folgende Rechtsgrundlage: 1998/143/EG.

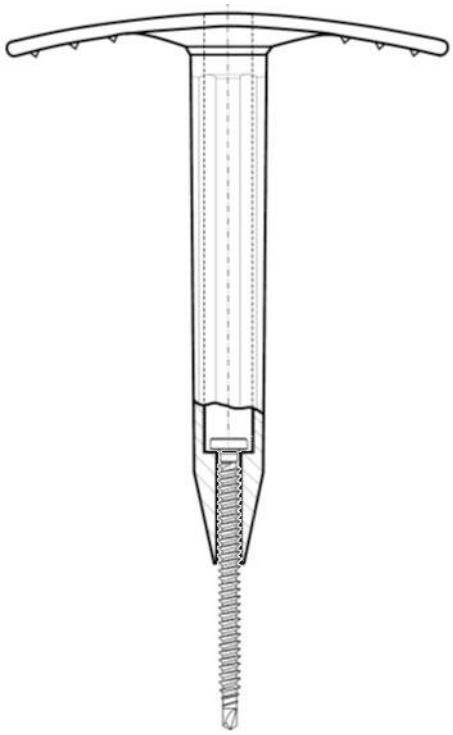
Folgendes System ist anzuwenden: 2+

5 Für die Durchführung des Systems zur Bewertung und Überprüfung der Leistungsbeständigkeit erforderliche technische Einzelheiten gemäß anwendbarem Europäischen Bewertungsdokument

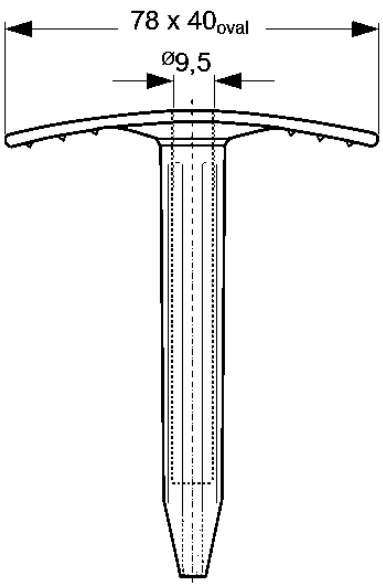
Technische Einzelheiten, die für die Durchführung des Systems zur Bewertung und Überprüfung der Leistungsbeständigkeit notwendig sind, sind Bestandteil des Prüf- und Überwachungsplans, der beim Deutschen Institut für Bautechnik hinterlegt ist.

Ausgestellt in Berlin am 22. Juli 2025 vom Deutschen Institut für Bautechnik

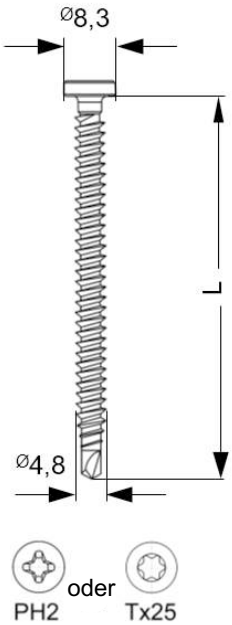
Andreas Schult	Beglaubigt
Referatsleiter	Reimuth



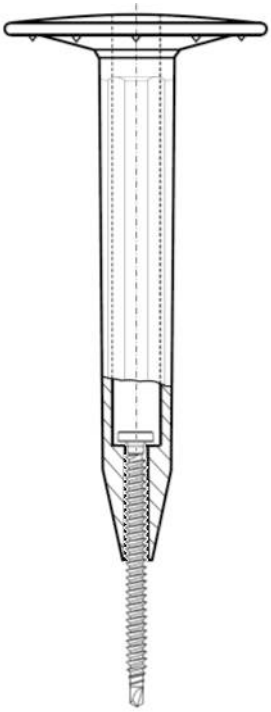
Zahn ZKSH oval



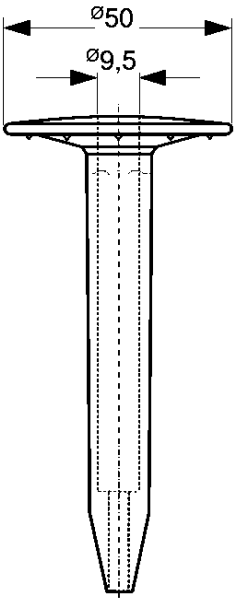
Zahn ZDBK 4,8 x L



Zahn Flachdachbefestigungselemente	Anhang 1
Kombination 1 ZKSK aus ZDBK / ZKSH oval	



Zahn ZKSH rund



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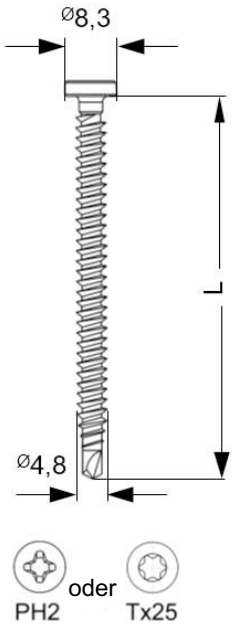
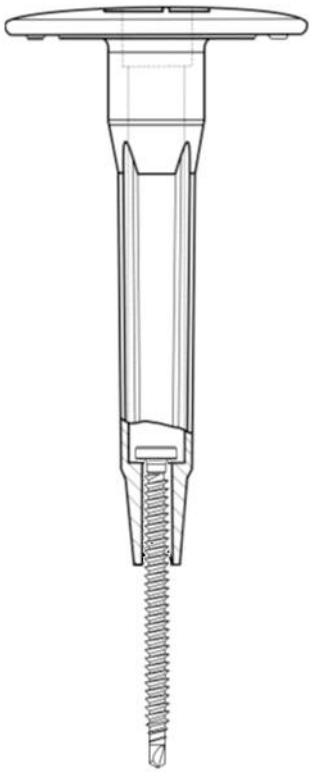
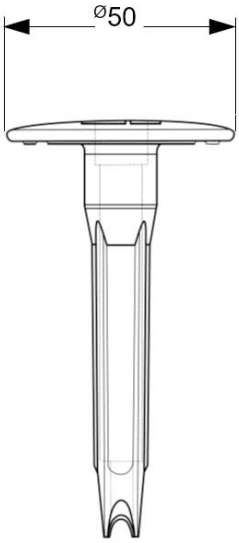


Zahn Flachdachbefestigungselemente	Anhang 2
Kombination 2 ZKSK-R aus ZDBK / ZKSH rund	



Zahn ZKSH-Rplus mit Pfahlspitze



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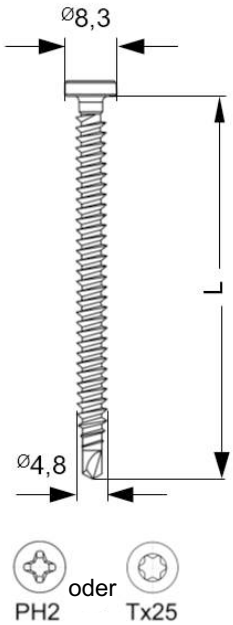
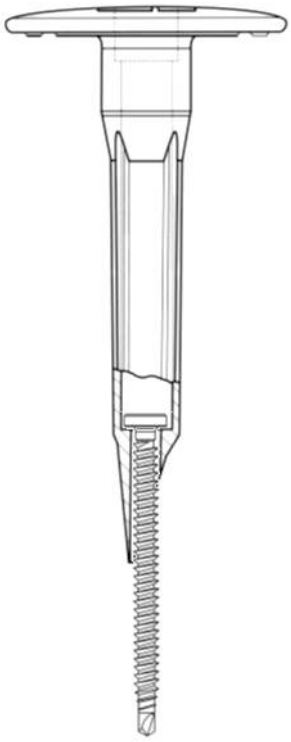
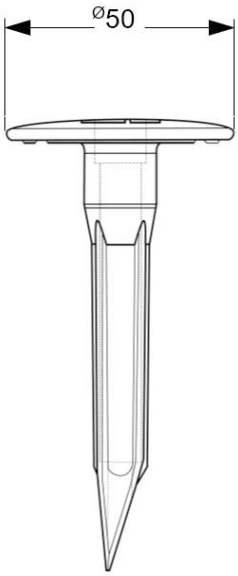


Zahn Flachdachbefestigungselemente	Anhang 3
Kombination 3 ZKSK-Rplus mit Pfahlspitze aus ZDBK / ZKSH-Rplus mit Pfahlspitze	



Zahn ZKSH-Rplus



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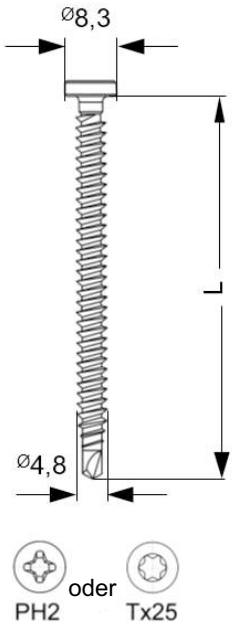
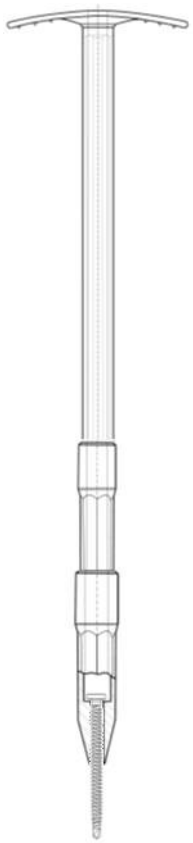
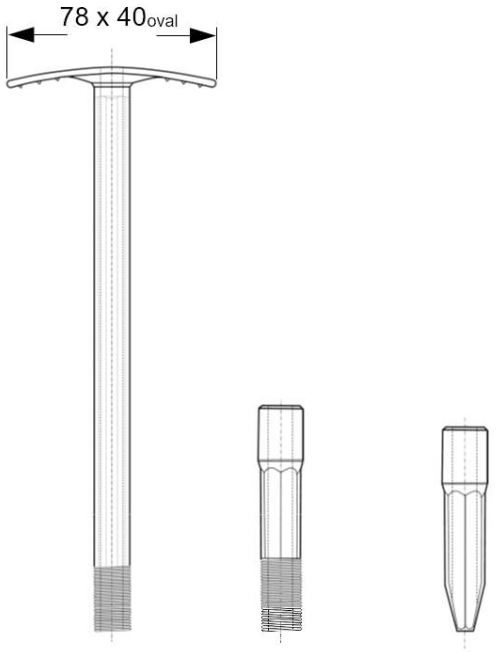


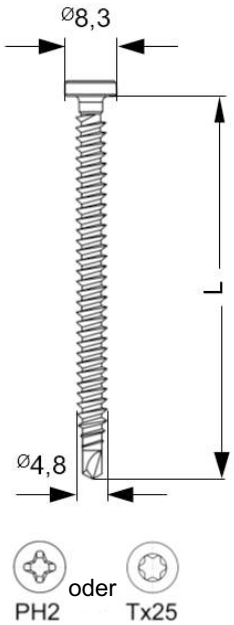
Zahn Flachdachbefestigungselemente	Anhang 4
Kombination 4 ZKSK-Rplus aus ZDBK / ZKSH-Rplus	



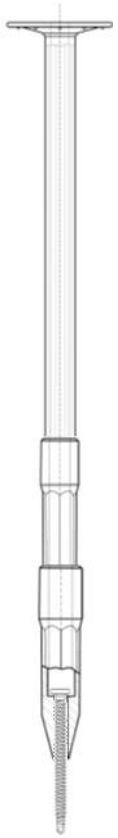
Zahn ZKSH oval Modul 4,8



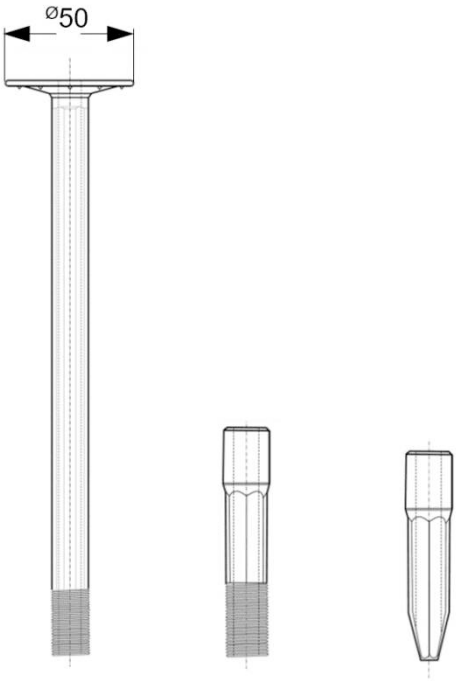
Zahn ZDBK 4,8 x L



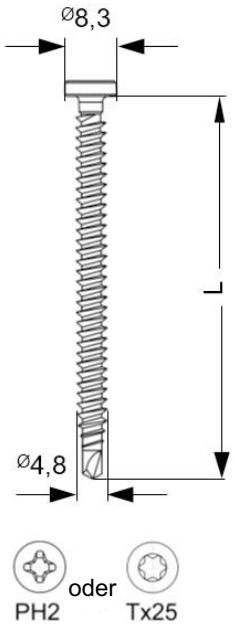
Zahn Flachdachbefestigungselemente	Anhang 5
Kombination 5 ZKSK Module aus ZDBK/ZKSH oval Module 4,8 mit modularem Mittelstück und Spitze 4,8	



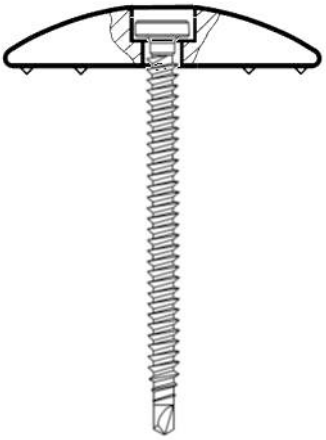
Zahn ZKSH rund Modul 4,8



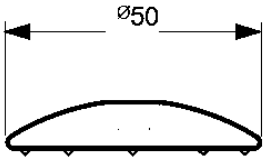
Zahn ZDBK 4,8 x L



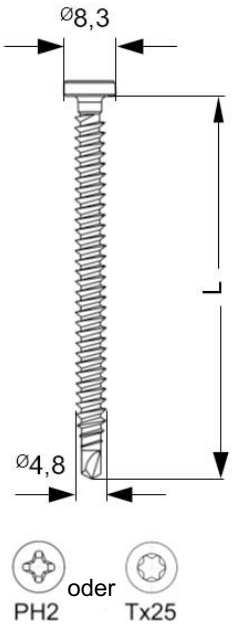
Zahn Flachdachbefestigungselemente	Anhang 6
Kombination 6 ZKSK-R-Modul aus ZDBK / ZKSH rund Modul 4,8 mit modularem Mittelstück und Spitze 4,8	



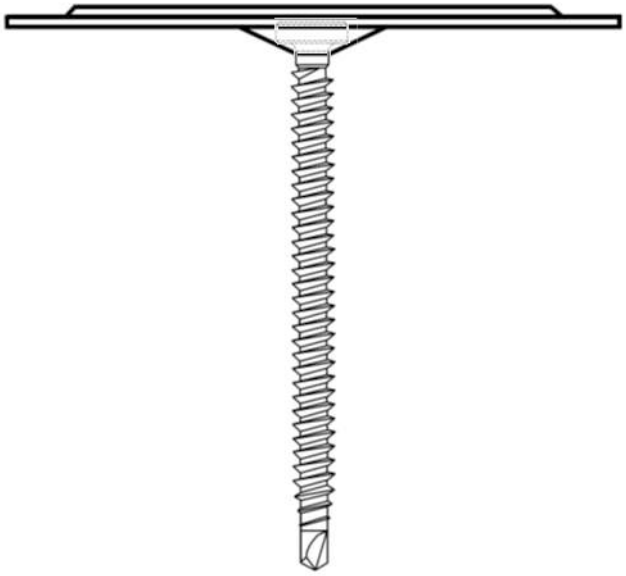
Zahn ZTSK 4,8



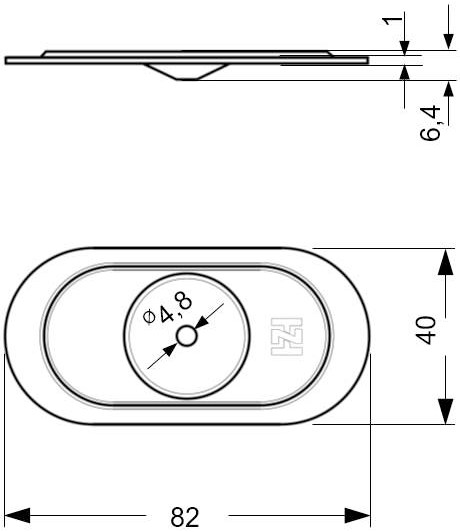
Zahn ZDBK 4,8 x L



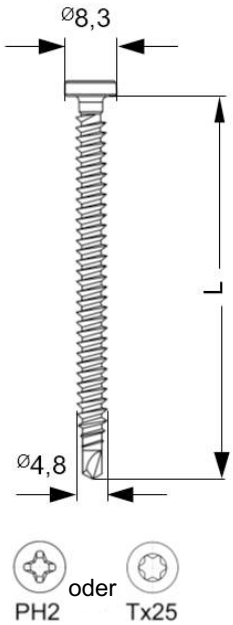
Zahn Flachdachbefestigungselemente	Anhang 7
Kombination 7 ZTSK Trapez aus ZDBK / ZTSK 4,8	



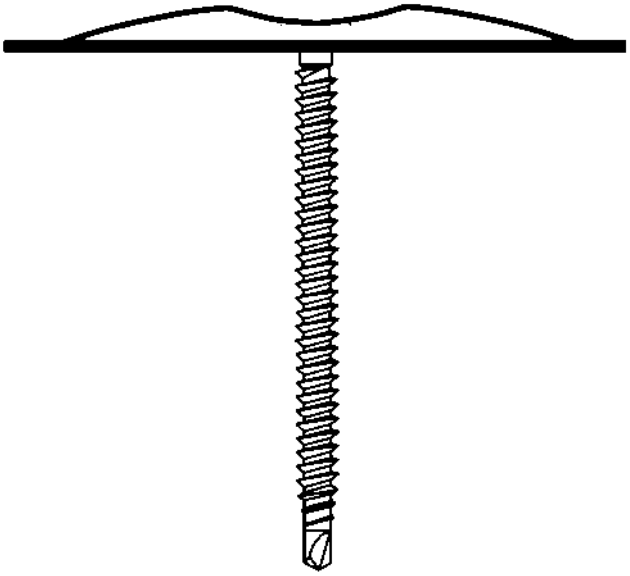
Zahn ZLVT 0001



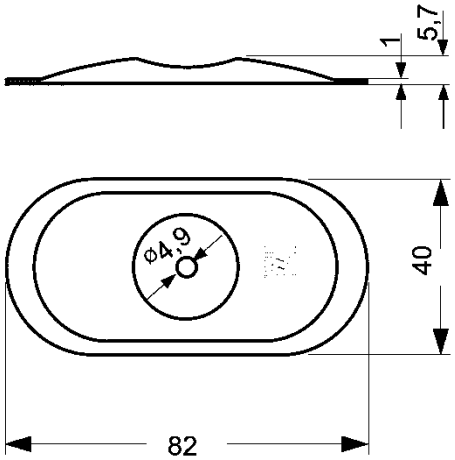
Zahn ZDBK 4,8 x L



Zahn Flachdachbefestigungselemente	Anhang 8
Kombination 8 ZDBK / ZLVT 0001	



Zahn ZLVT 0005



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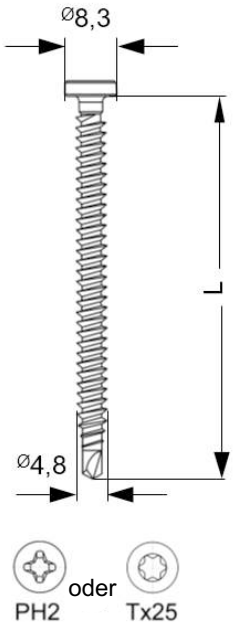
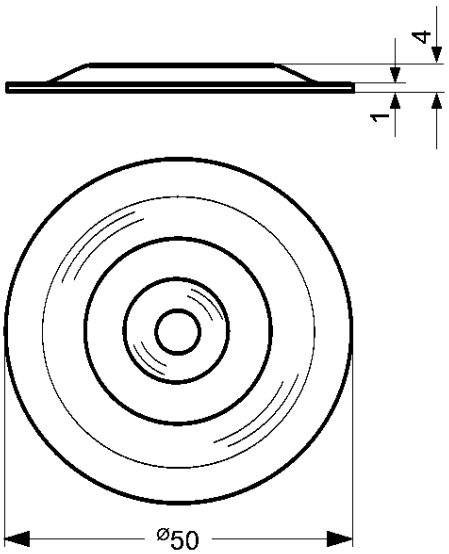
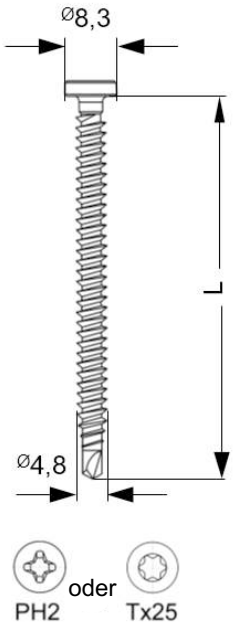


Zahn Flachdachbefestigungselemente	Anhang 9
Kombination 9 ZDBK / ZLVT 0005	

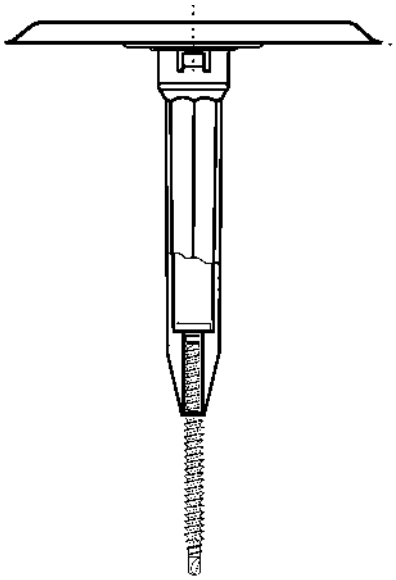
Zahn ZLVT 0015



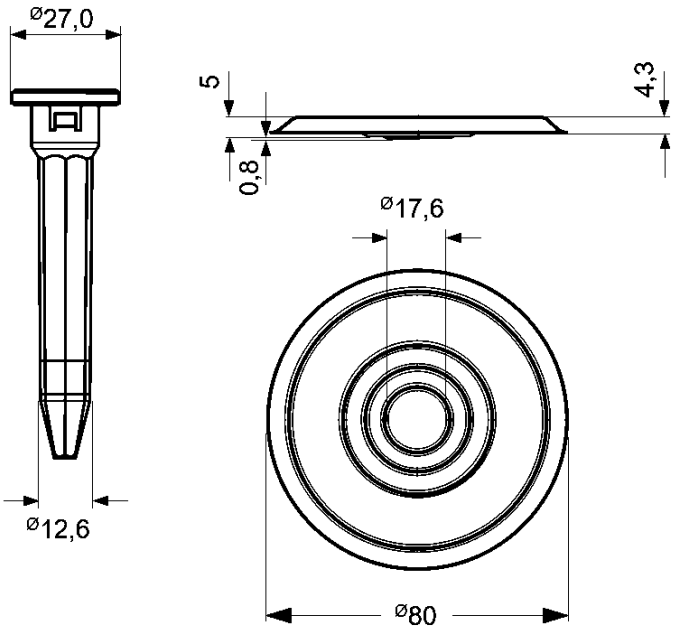
Zahn ZDBK 4,8 x L



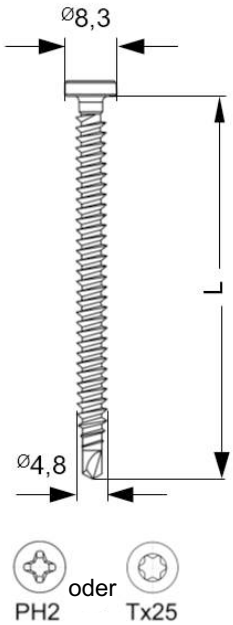
Zahn Flachdachbefestigungselemente	Anhang 10
Kombination 10 ZDBK / ZLVT 0015	



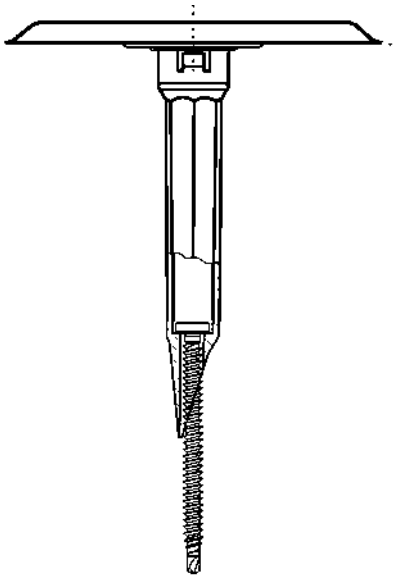
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



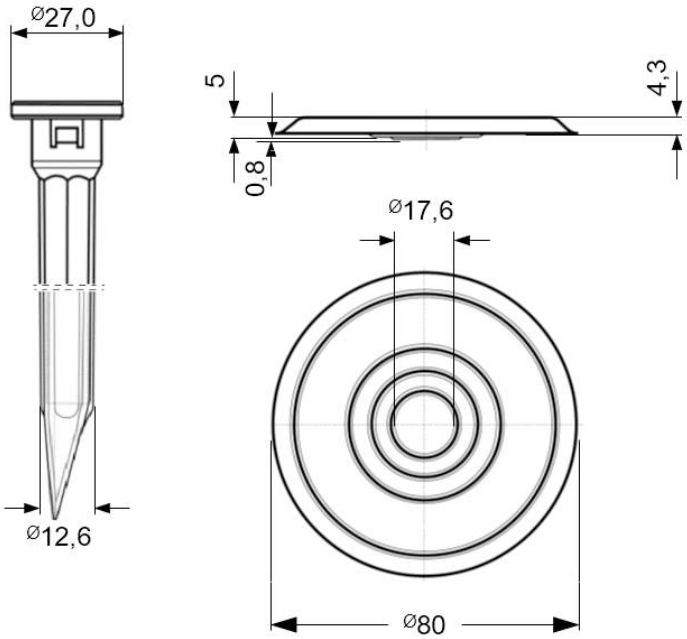
Zahn ZDBK 4,8 x L



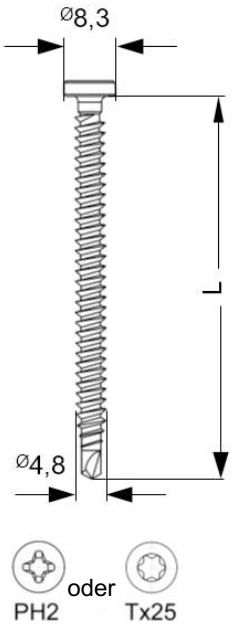
Zahn Flachdachbefestigungselemente	Anhang 10a
Kombination 10a ZCTS Trapez aus ZDBK / ZCTS-Tülle 4,8 und ZCTS-Teller	



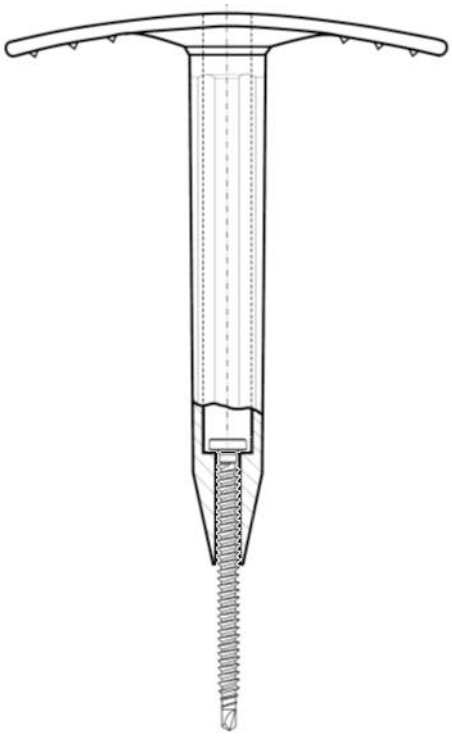
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



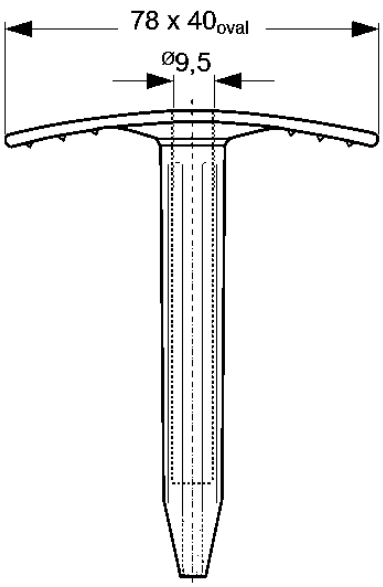
Zahn ZDBK 4,8 x L



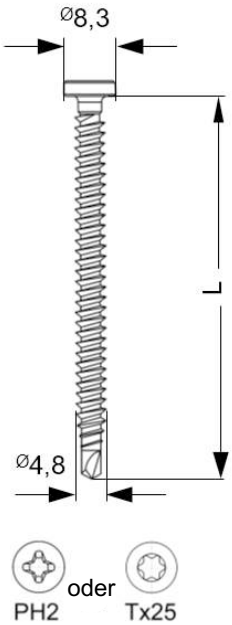
Zahn Flachdachbefestigungselemente	Anhang 10b
Kombination 10b ZCTSplus Trapez aus ZDBK / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



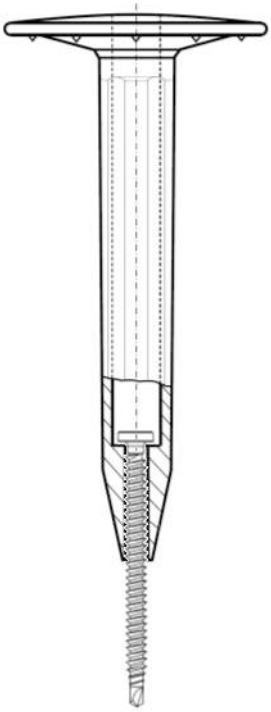
Zahn ZKSH oval



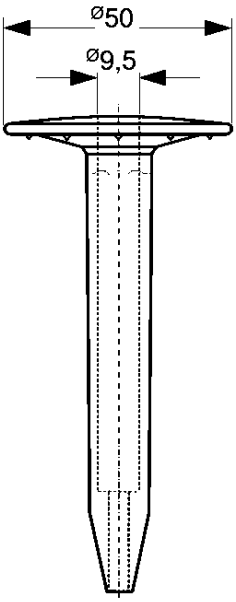
Zahn ZDBK-E 4,8 x L



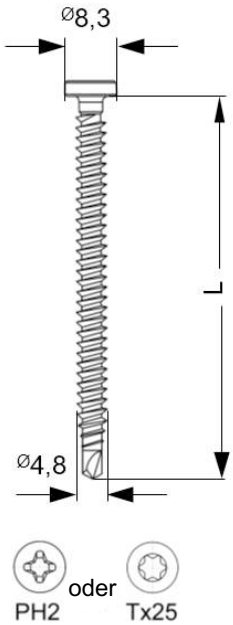
Zahn Flachdachbefestigungselemente	Anhang 11
Kombination 11 ZKSK-E aus ZDBK-E / ZKSH oval	



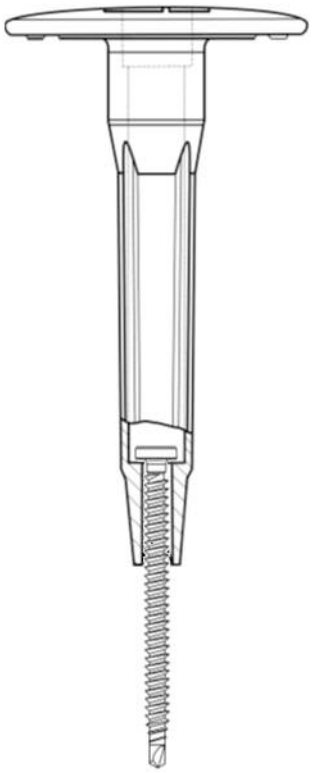
Zahn ZKSH rund



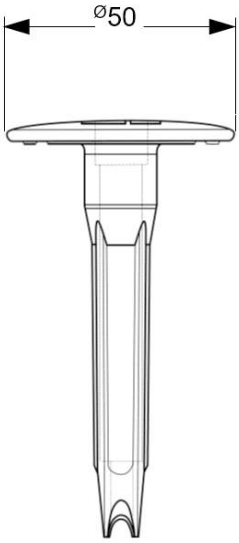
Zahn ZDBK-E 4,8 x L



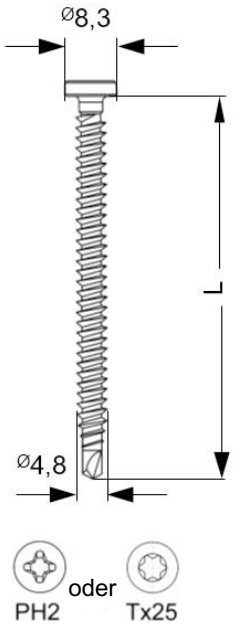
Zahn Flachdachbefestigungselemente	Anhang 12
Kombination 12 ZKSK-E/R aus ZDBK-E / ZKSH rund	



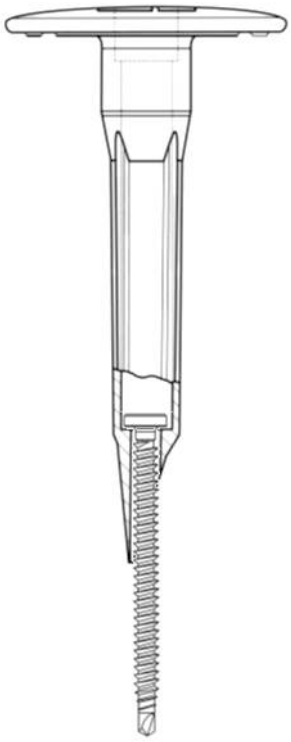
Zahn ZKSH-Rplus mit Pfahlspitze



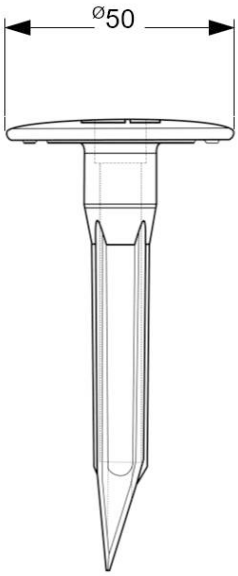
Zahn ZDBK-E 4,8 x L



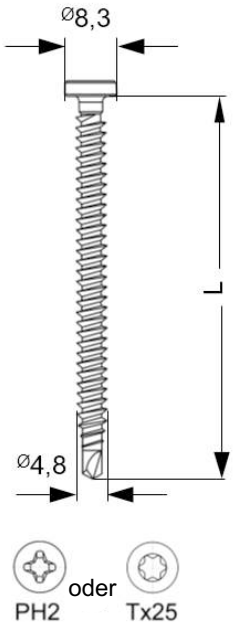
Zahn Flachdachbefestigungselemente	Anhang 13
Kombination 13 ZKSK-E/Rplus mit Pfahlspitze aus ZDBK-E / ZKSH-Rplus mit Pfahlspitze	



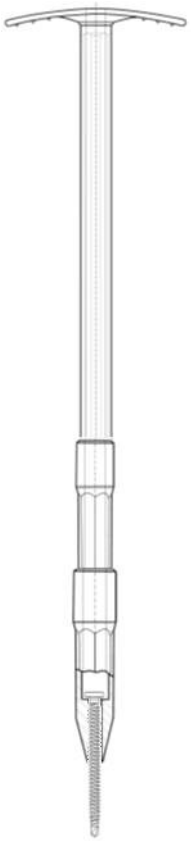
Zahn ZKSH-Rplus



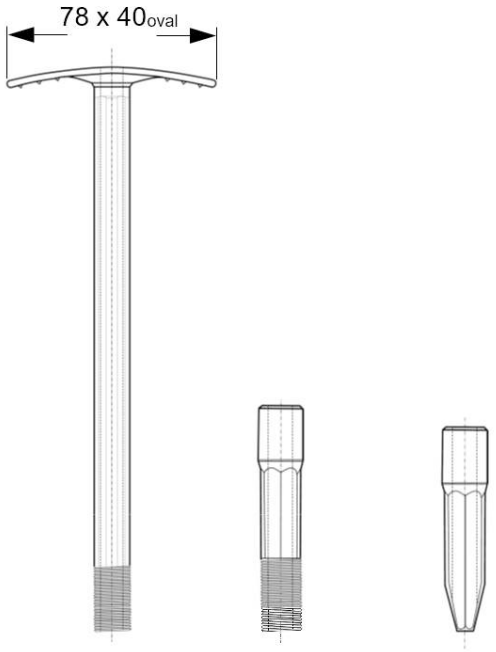
Zahn ZDBK-E 4,8 x L



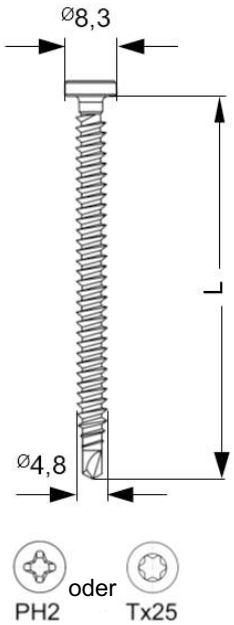
Zahn Flachdachbefestigungselemente	Anhang 14
Kombination 14 ZKSK-E/Rplus aus ZDBK-E / ZKSH-Rplus	



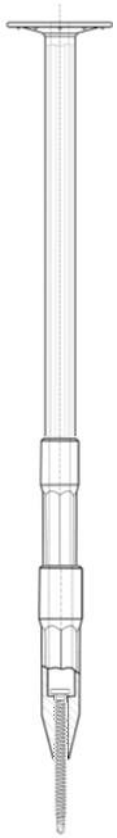
Zahn ZKSH oval Modul 4,8



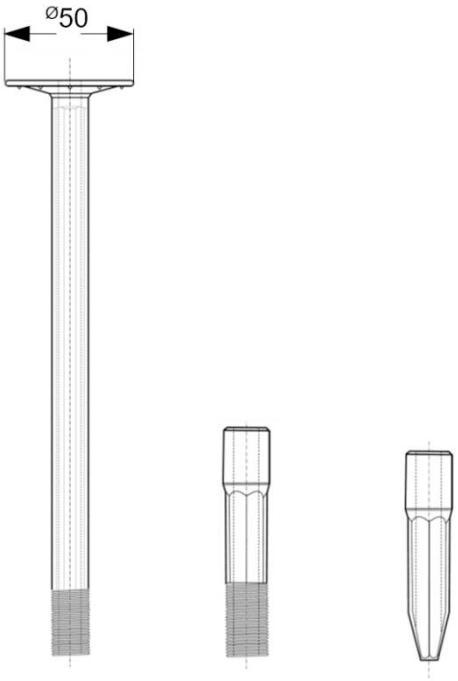
Zahn ZDBK-E 4,8 x L



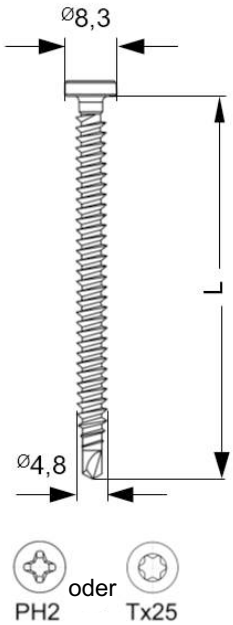
Zahn Flachdachbefestigungselemente	Anhang 15
Kombination 15 ZKSK-E-Modul aus ZDBK-E / ZKSH oval Modul 4,8 mit modularem Mittelstück und Spitze 4,8	



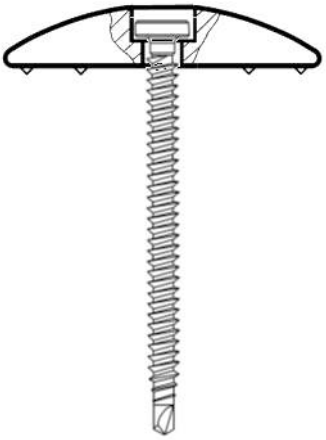
Zahn ZKSH rund Modul 4,8



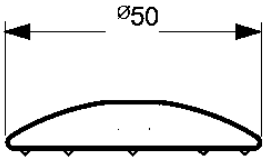
Zahn ZDBK-E 4,8 x L



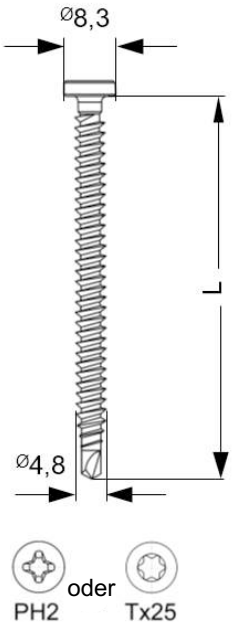
Zahn Flachdachbefestigungselemente	Anhang 16
Kombination 16 ZKSK-E/R-Modul aus ZDBK-E / ZKSH rund Modul 4,8 mit modularem Mittelstück und Spitze 4,8	



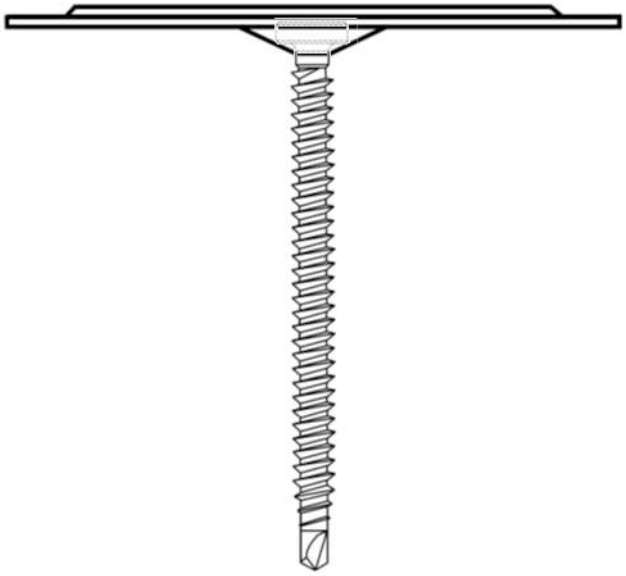
Zahn ZTSK 4,8



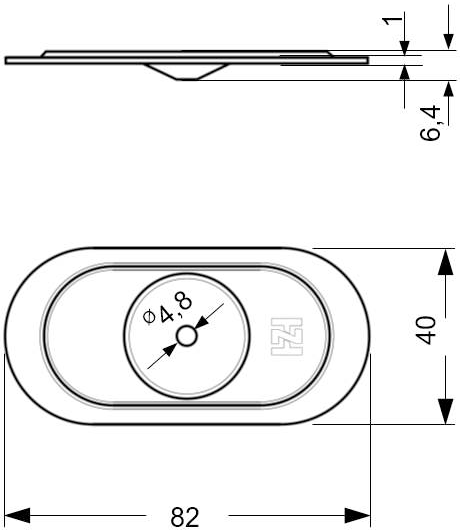
Zahn ZDBK-E 4,8 x L



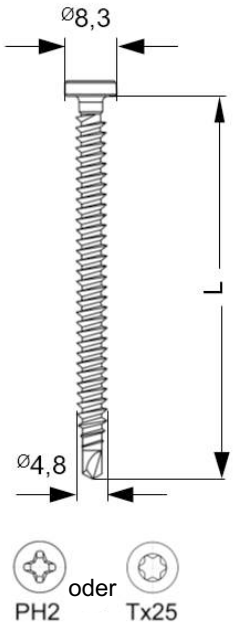
Zahn Flachdachbefestigungselemente	Anhang 17
Kombination 17 ZTSK-E Trapez aus ZDBK-E / ZTSK 4,8	



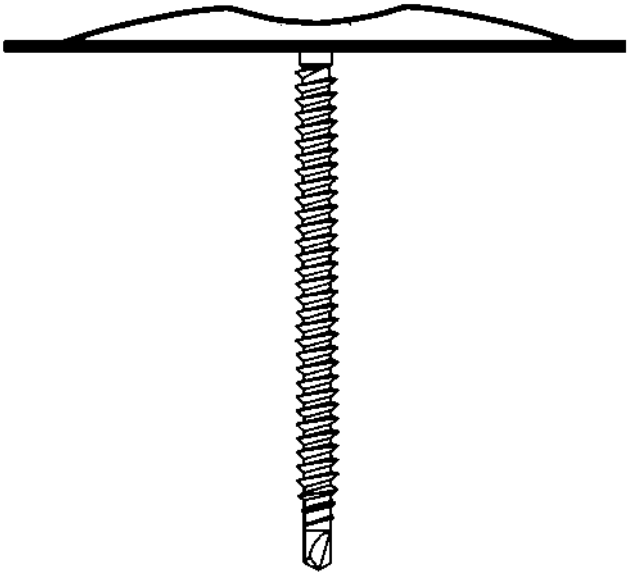
Zahn ZLVT 0001



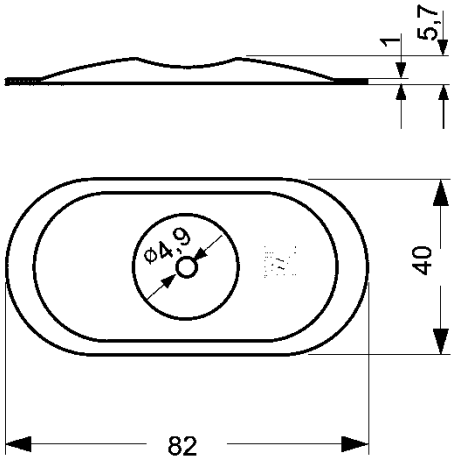
Zahn ZDBK-E 4,8 x L



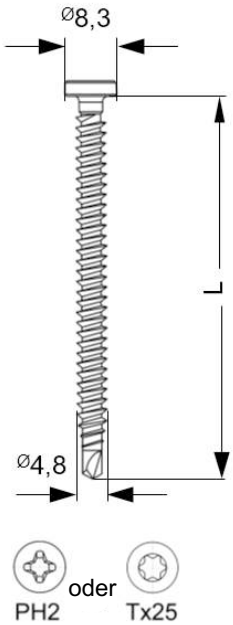
Zahn Flachdachbefestigungselemente	Anhang 18
Kombination 18 ZDBK-E / ZLVT 0001	



Zahn ZLVT 0005

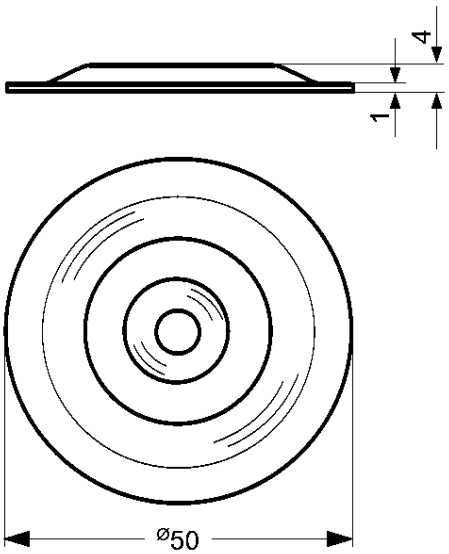


Zahn ZDBK-E 4,8 x L

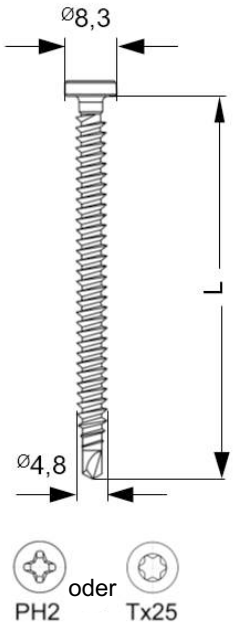


Zahn Flachdachbefestigungselemente	Anhang 19
Kombination 19 ZDBK-E / ZLVT 0005	

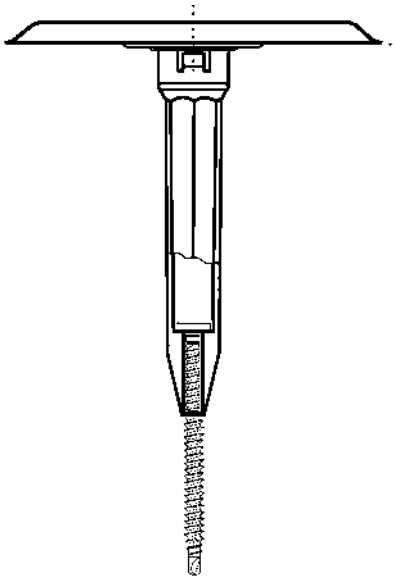
Zahn ZLVT 0015



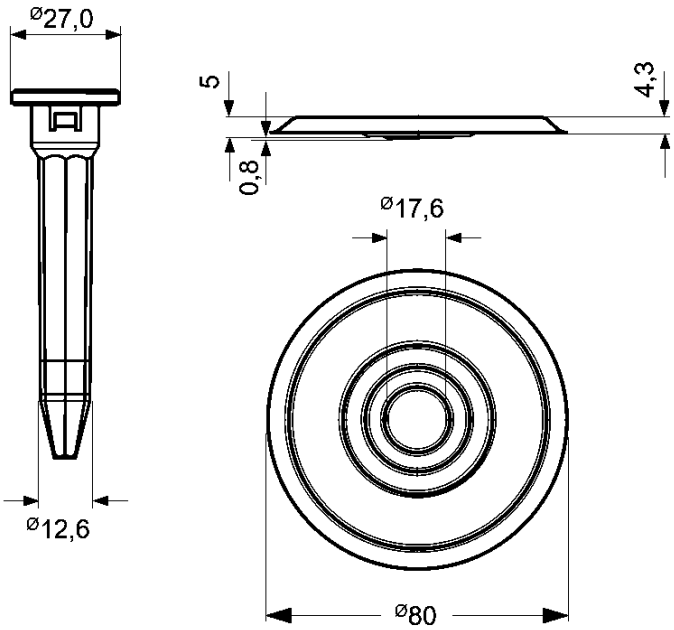
Zahn ZDBK-E 4,8 x L



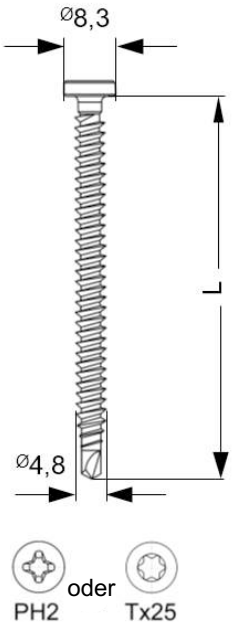
Zahn Flachdachbefestigungselemente	Anhang 20
Kombination 20 ZDBK-E / ZLVT 0015	



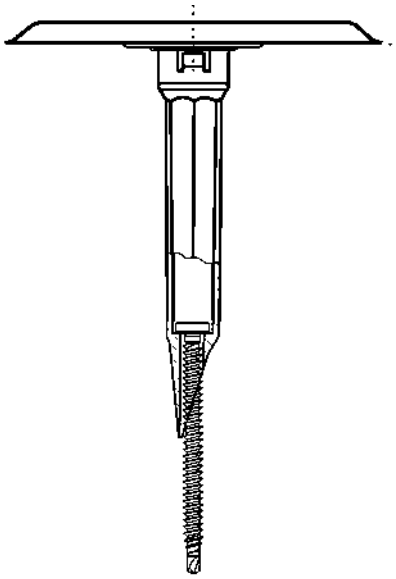
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



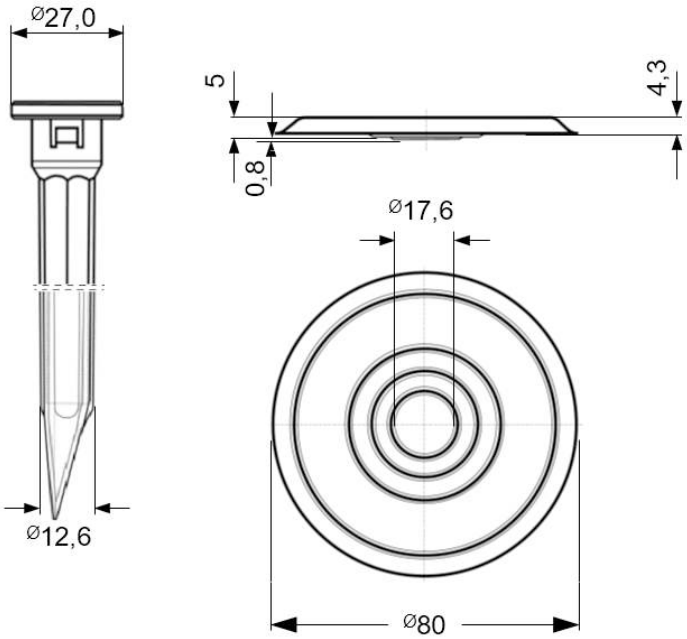
Zahn ZDBK-E 4,8 x L



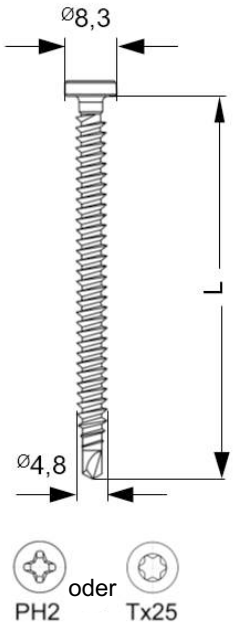
Zahn Flachdachbefestigungselemente	Anhang 20a
Kombination 20a ZCTS-E Trapez aus ZDBK-E / ZCTS-Tülle 4,8 und ZCTS-Teller	



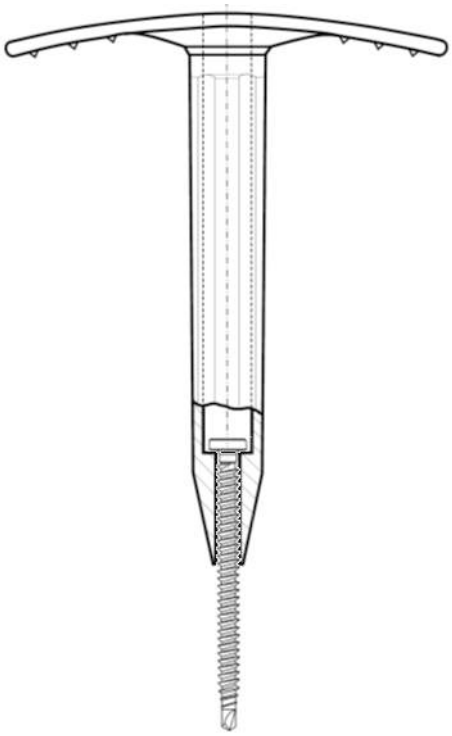
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



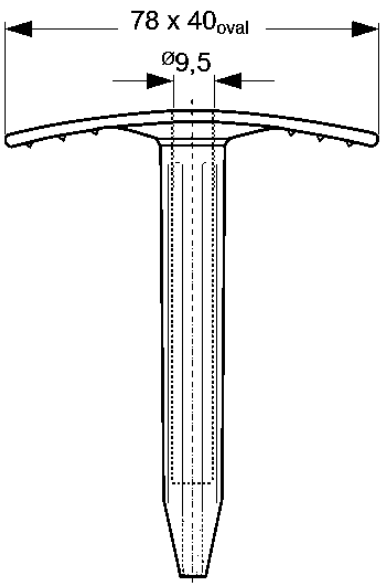
Zahn ZDBK-E 4,8 x L



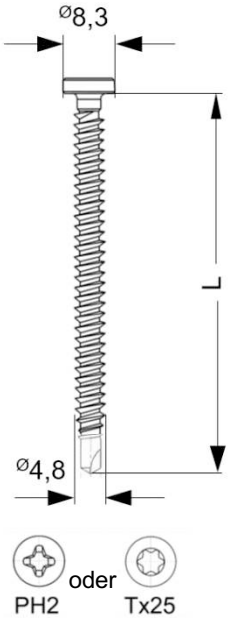
Zahn Flachdachbefestigungselemente	Anhang 20b
Kombination 20b ZCTS-Eplus Trapez aus ZDBK-E / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



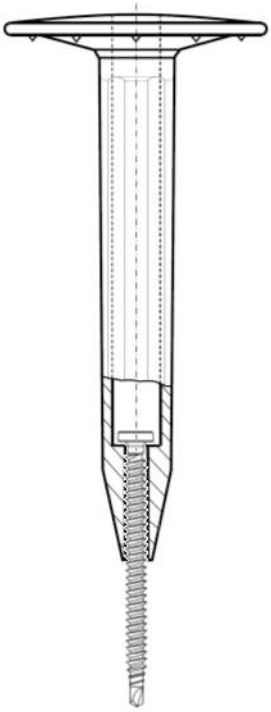
Zahn ZKSH oval



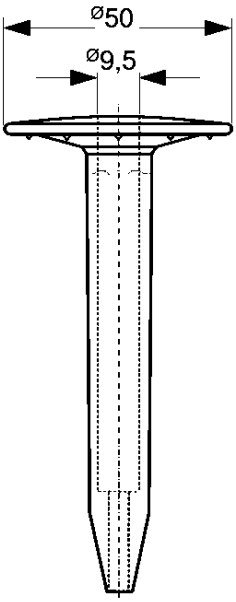
Zahn ZDBK-VB 4,8 x L



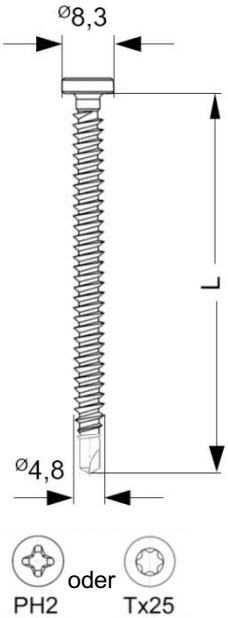
Zahn Flachdachbefestigungselemente	Anhang 21
Kombination 21 ZKSK-VB aus ZDBK-VB / ZKSH oval	



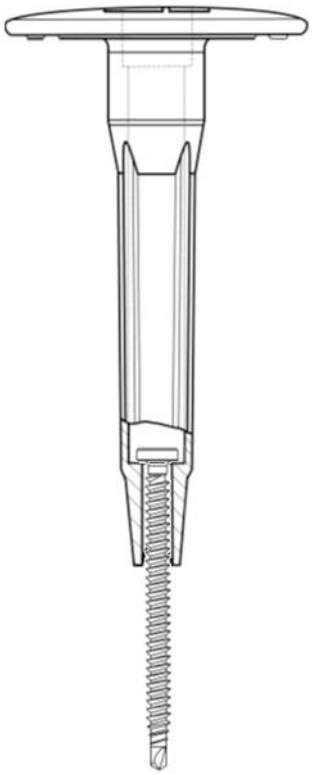
Zahn ZKSH rund



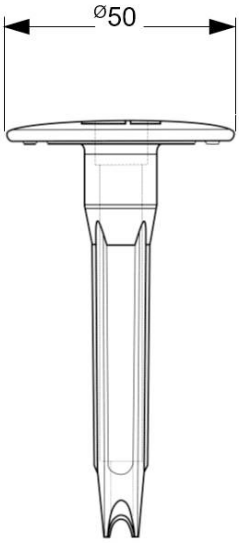
Zahn ZDBK-VB 4,8 x L



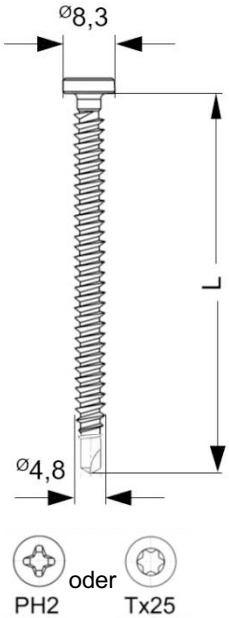
Zahn Flachdachbefestigungselemente	Anhang 22
Kombination 22 ZKSK-R/VB aus ZDBK-VB / ZKSH rund	



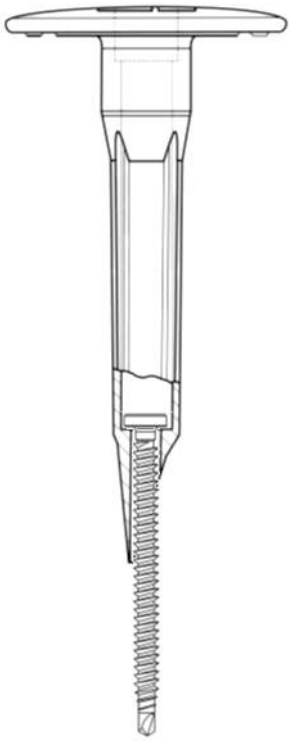
Zahn ZKSH-Rplus mit Pfahlspitze



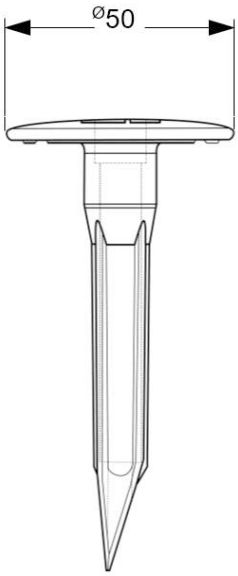
Zahn ZDBK-VB 4,8 x L



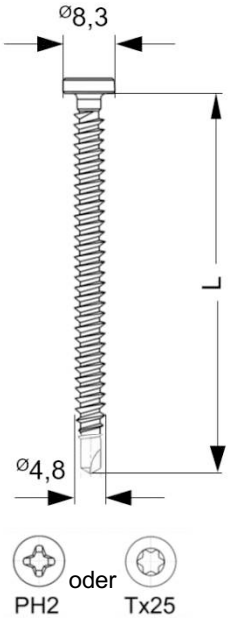
Zahn Flachdachbefestigungselemente	Anhang 23
Kombination 23 ZKSK-R/VBplus mit Pfahlspitze aus ZDBK-VB / ZKSH-Rplus mit Pfahlspitze	



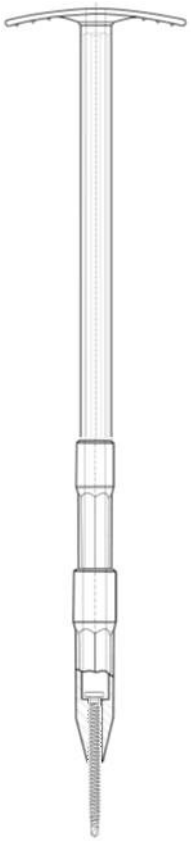
Zahn ZKSH-Rplus



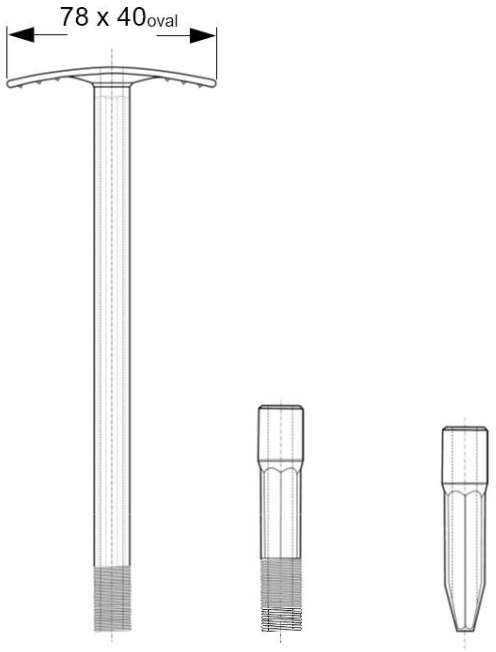
Zahn ZDBK-VB 4,8 x L



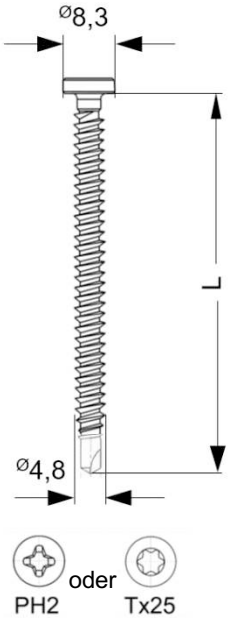
Zahn Flachdachbefestigungselemente	Anhang 24
Kombination 24 ZKSK-R/VBplus aus ZDBK-VB / ZKSH-Rplus	



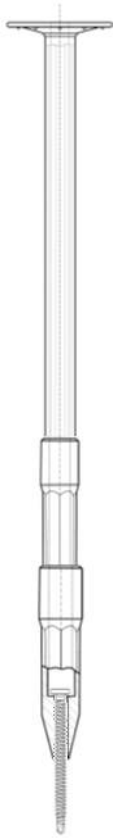
Zahn ZKSH oval Modul 4,8



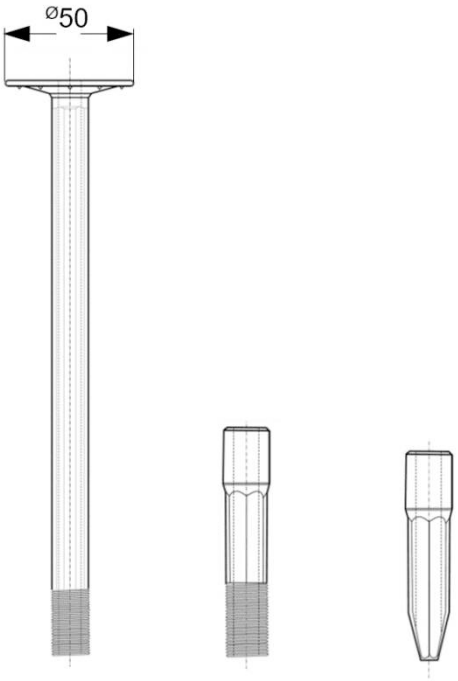
Zahn ZDBK-VB 4,8 x L



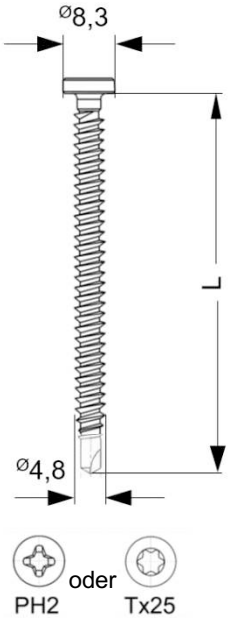
Zahn Flachdachbefestigungselemente	Anhang 25
Kombination 25 ZKSK-VB-Modul aus ZDBK-VB / ZKSH oval Modul 4,8 mit modularem Mittelstück und Spitze 4,8	



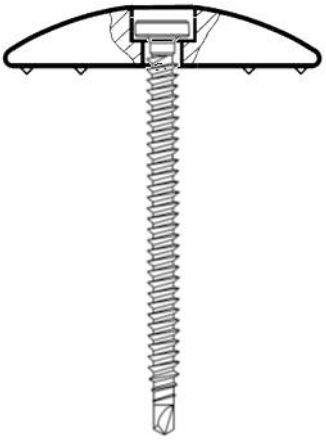
Zahn ZKSH rund Modul 4,8



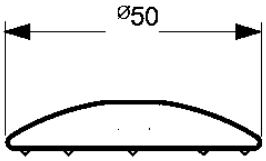
Zahn ZDBK-VB 4,8 x L



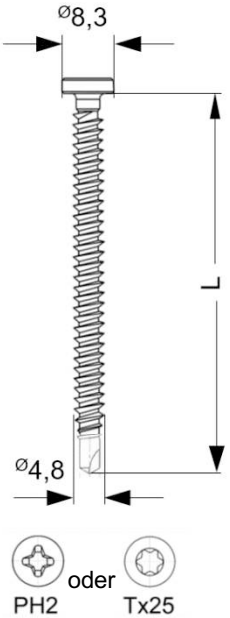
Zahn Flachdachbefestigungselemente	Anhang 26
Kombination 26 ZKSK-R/VB-Modul aus ZDBK-VB/ZKSH rund Modul 4,8 mit modularem Mittelstück und Spitze 4,8	



Zahn ZTSK 4,8



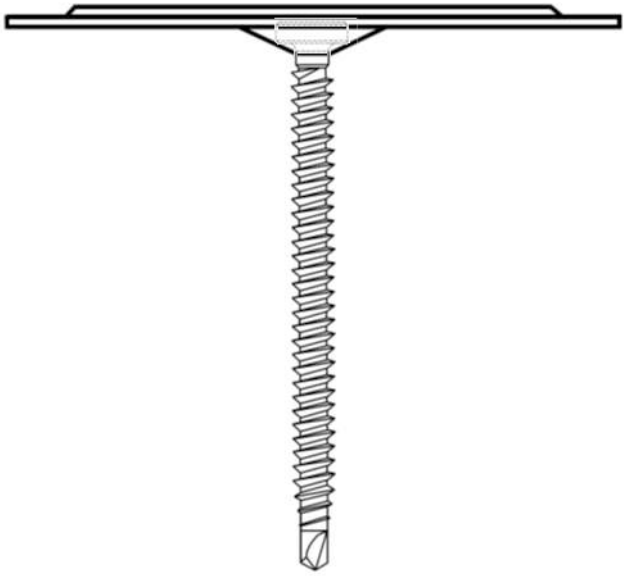
Zahn ZDBK-VB 4,8 x L



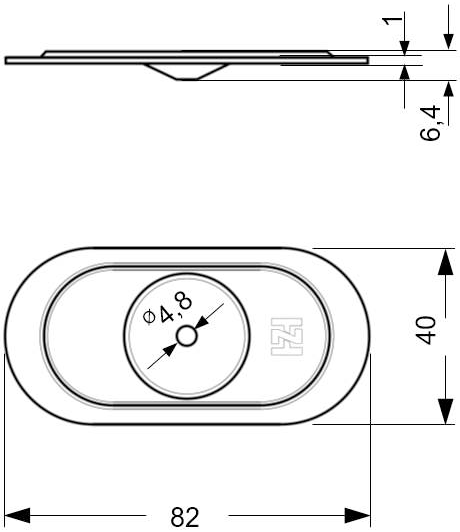
Zahn Flachdachbefestigungselemente

Kombination 27
ZTSK-VB Trapez
aus ZDBK-VB / ZTSK 4,8

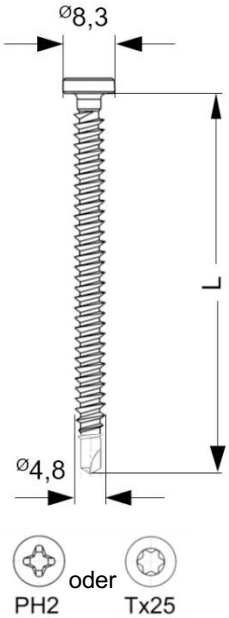
Anhang 27



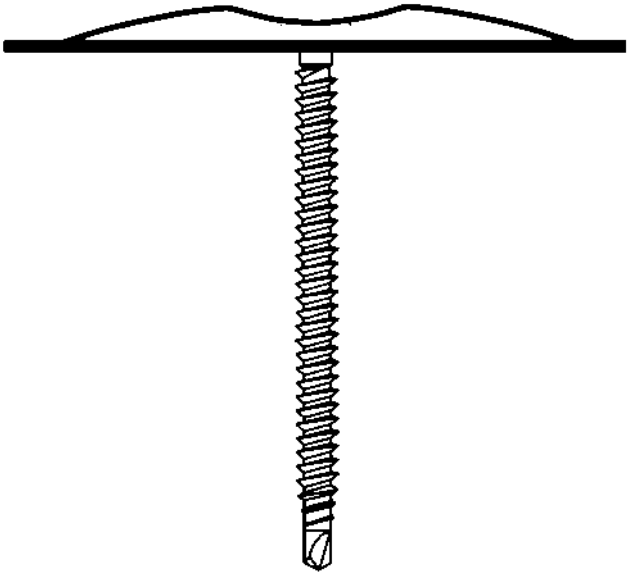
Zahn ZLVT 0001



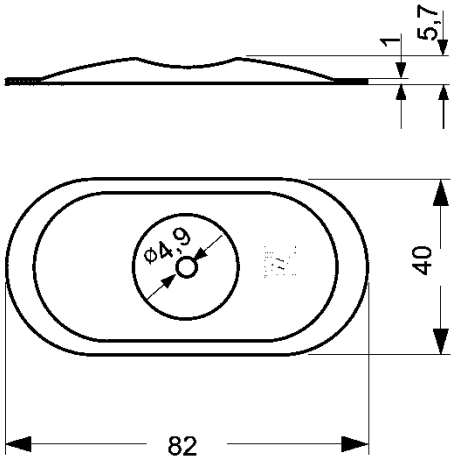
Zahn ZDBK-VB 4,8 x L



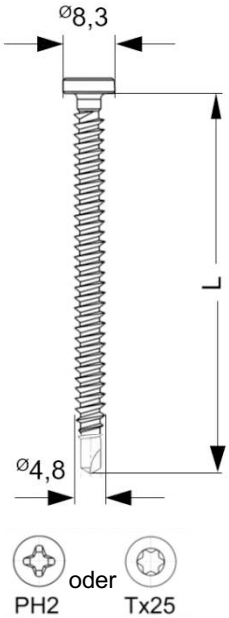
Zahn Flachdachbefestigungselemente	Anhang 28
Kombination 28 ZDBK-VB / ZLVT 0001	



Zahn ZLVT 0005

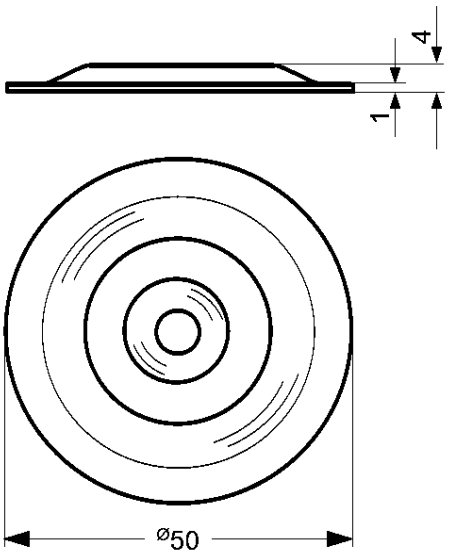


Zahn ZDBK-VB 4,8 x L

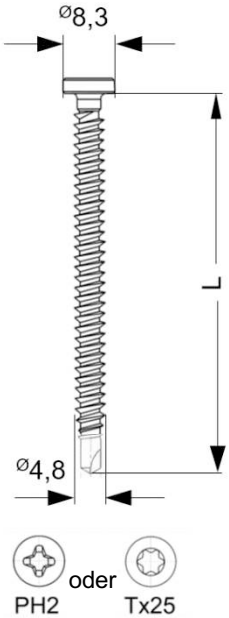


Zahn Flachdachbefestigungselemente	Anhang 29
Kombination 29 ZDBK-VB / ZLVT 0005	

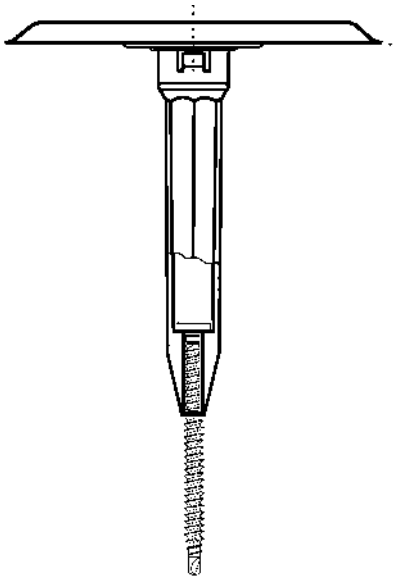
Zahn ZLVT 0015



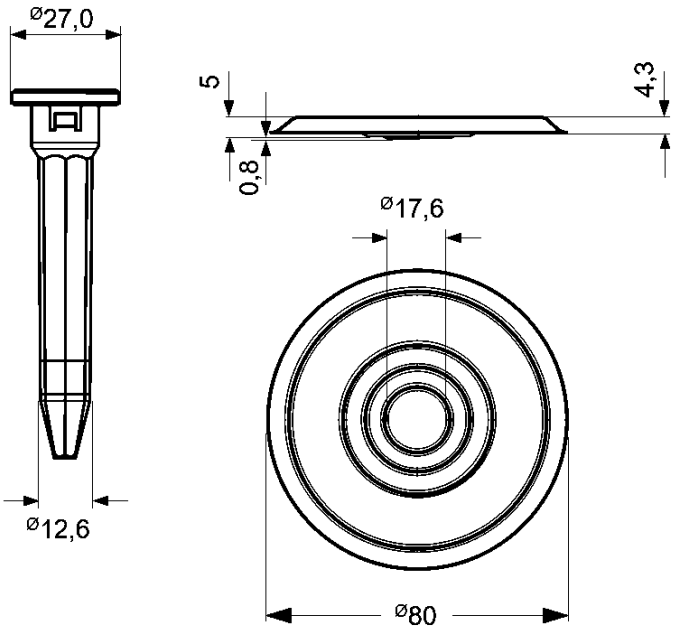
Zahn ZDBK-VB 4,8 x L



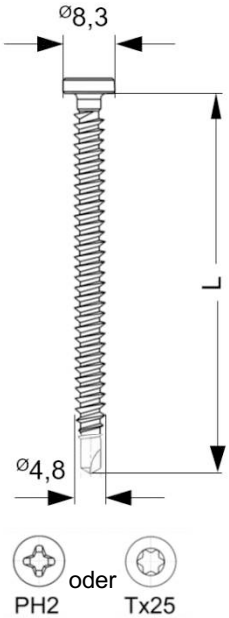
Zahn Flachdachbefestigungselemente	Anhang 30
Kombination 30 ZDBK-VB / ZLVT 0015	



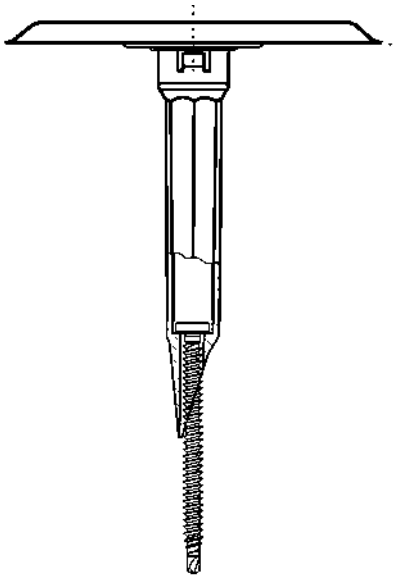
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



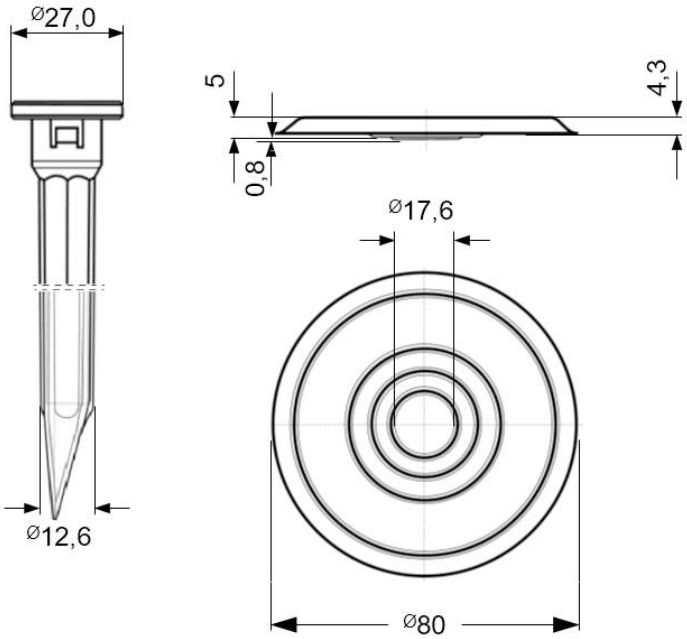
Zahn ZDBK-VB 4,8 x L



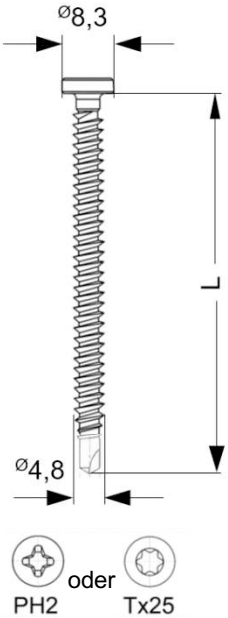
Zahn Flachdachbefestigungselemente	Anhang 30a
Kombination 30a ZCTS-VB Trapez aus ZDBK-VB / ZCTS-Tülle 4,8 und ZCTS-Teller	



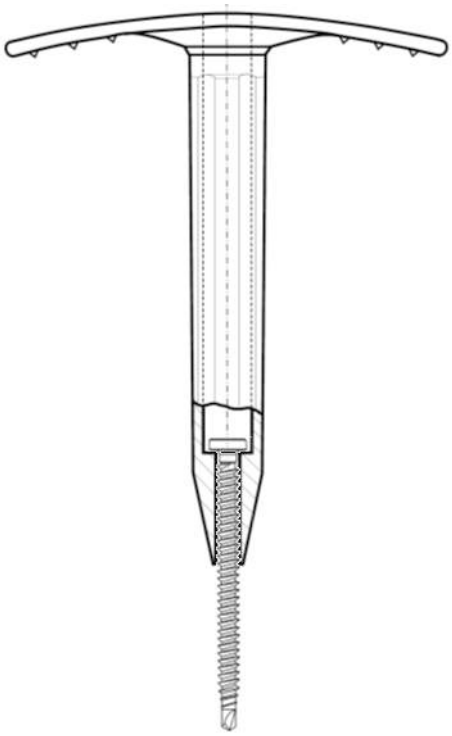
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



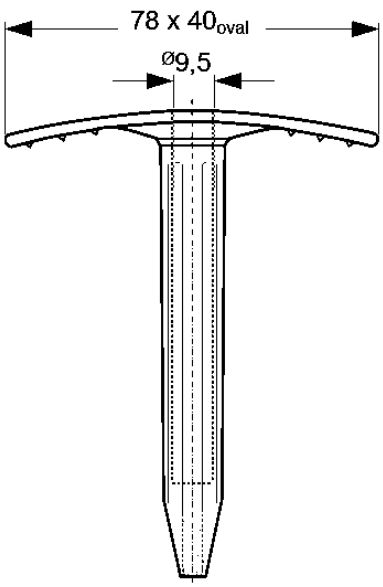
Zahn ZDBK-VB 4,8 x L



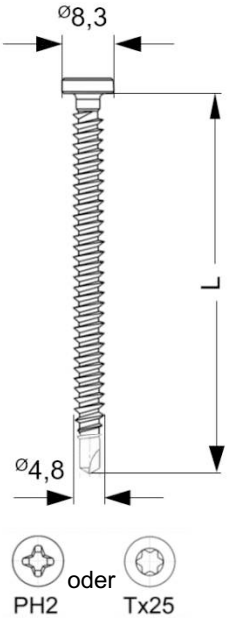
Zahn Flachdachbefestigungselemente	Anhang 30b
Kombination 30b ZCTSplus-VB Trapez aus ZDBK-VB / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



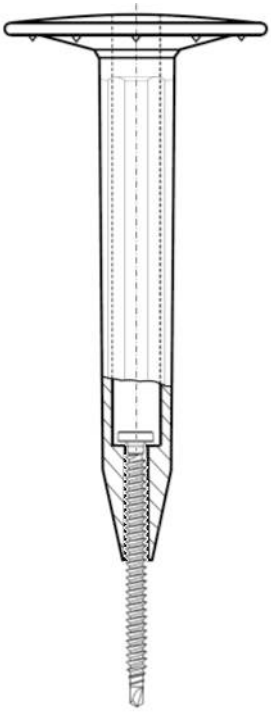
Zahn ZKSH oval



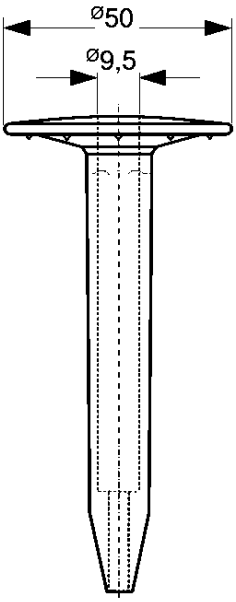
Zahn ZDBK-VB-E 4,8 x L



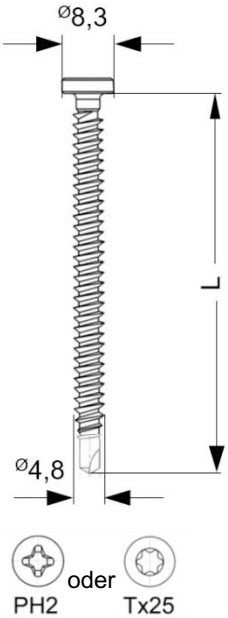
Zahn Flachdachbefestigungselemente	Anhang 31
Kombination 31 ZKSK-E/VB aus ZDBK-VB-E / ZKSH oval	



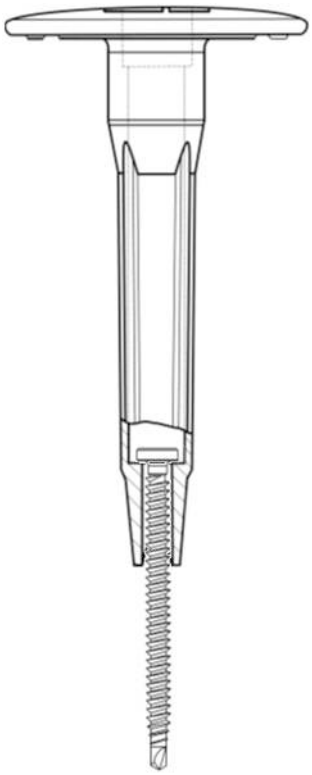
Zahn ZKSH rund



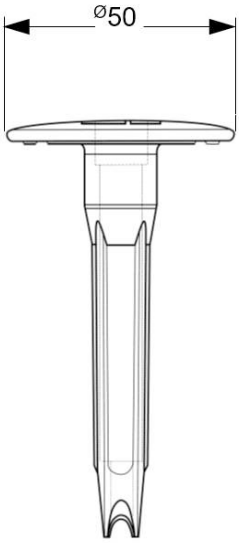
Zahn ZDBK-VB-E 4,8 x L



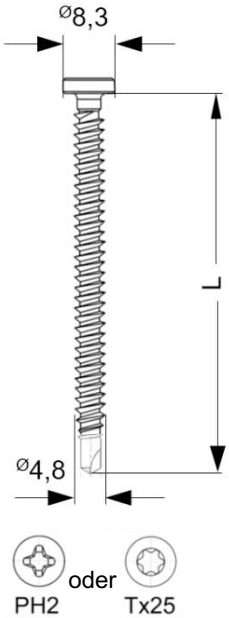
Zahn Flachdachbefestigungselemente	Anhang 32
Kombination 32 ZKSK-E/R/VB aus ZDBK-VB-E / ZKSH rund	



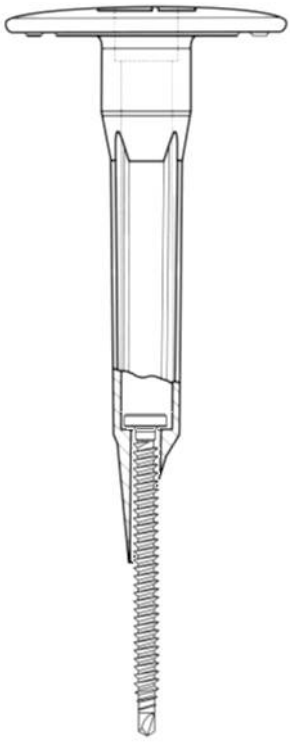
Zahn ZKSH-Rplus mit Pfahlspitze



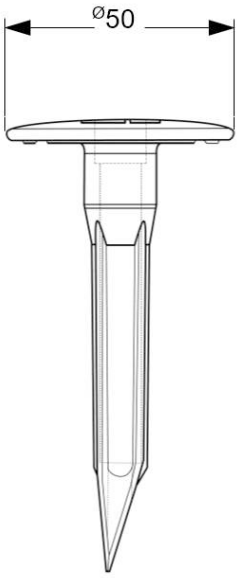
Zahn ZDBK-VB-E 4,8 x L



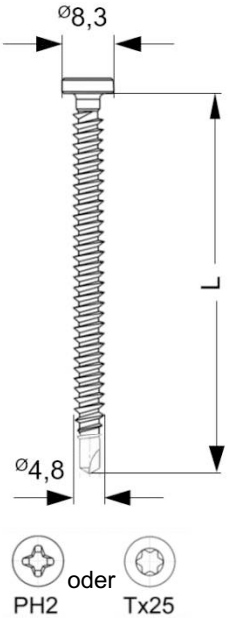
Zahn Flachdachbefestigungselemente	Anhang 33
Kombination 33 ZKSK-E/R/VBplus mit Pfahlspitze aus ZDBK-VB-E / ZKSH-Rplus mit Pfahlspitze	



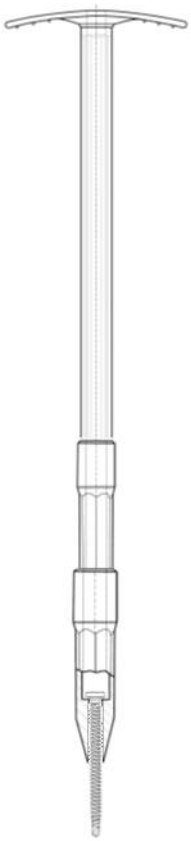
Zahn ZKSH-Rplus



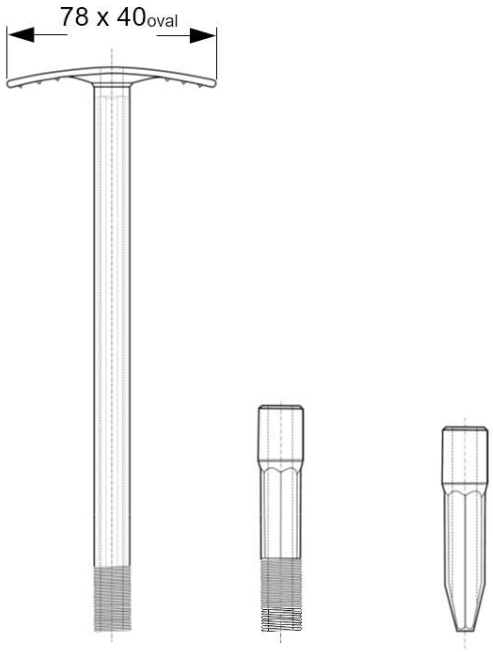
Zahn ZDBK-VB-E 4,8 x L



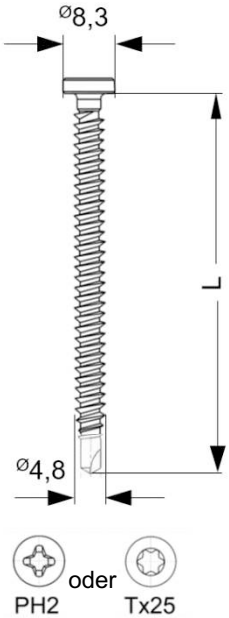
Zahn Flachdachbefestigungselemente	Anhang 34
Kombination 34 ZKSK-E/R/VBplus aus ZDBK-VB-E / ZKSH-Rplus	



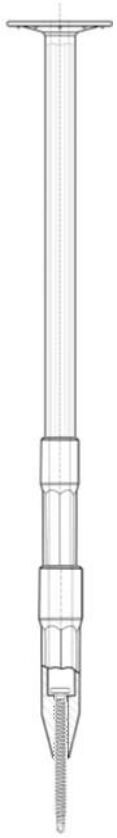
Zahn ZKSH oval Modul 4,8



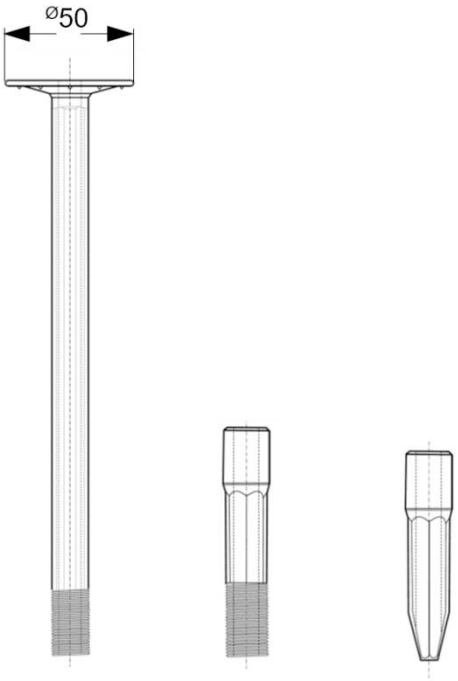
Zahn ZDBK-VB-E 4,8 x L



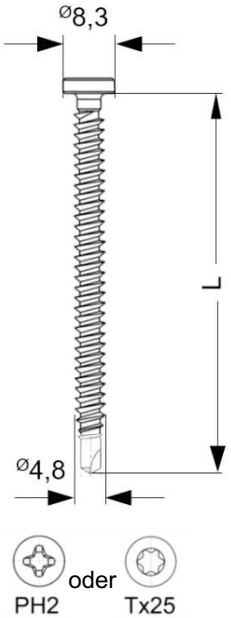
Zahn Flachdachbefestigungselemente	Anhang 35
Kombination 35 ZKSK-E/VB-Modul aus ZDBK-VB-E / ZKSH oval Modul mit modularem Mittelstück und Spitze 4,8	



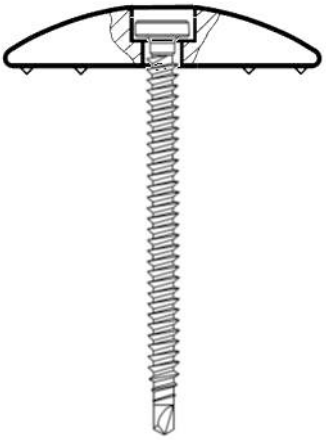
Zahn ZKSH rund Modul 4,8



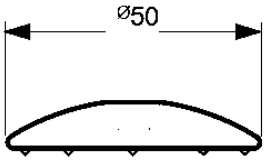
Zahn ZDBK-VB-E 4,8 x L



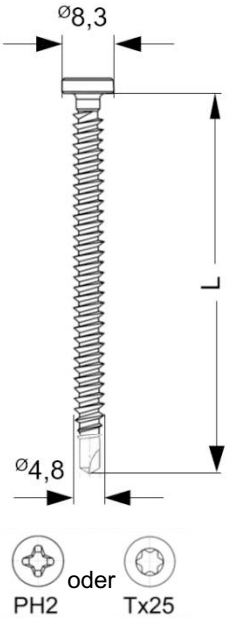
Zahn Flachdachbefestigungselemente	Anhang 36
Kombination 36 ZKSK-E/R/VB-Modul aus ZDBK-VB-E/ZKSH rund Modul mit modularem Mittelstück und Spitze 4,8	



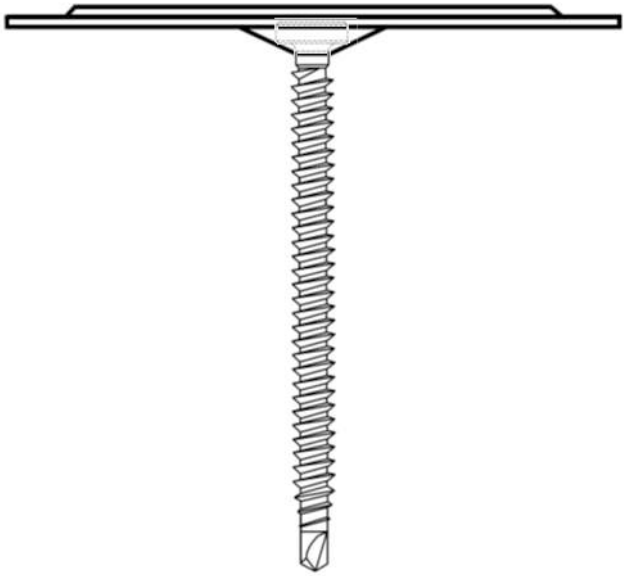
Zahn ZTSK 4,8



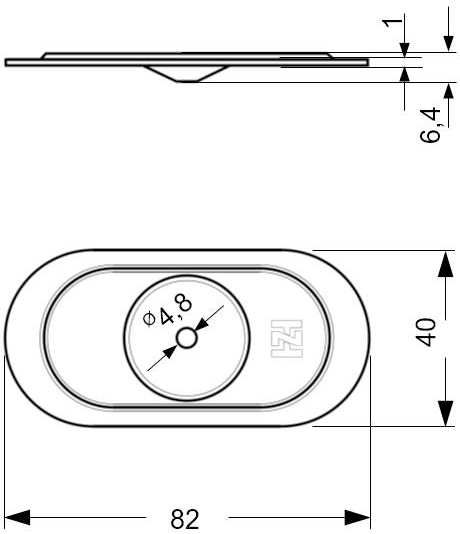
Zahn ZDBK-VB-E 4,8 x L



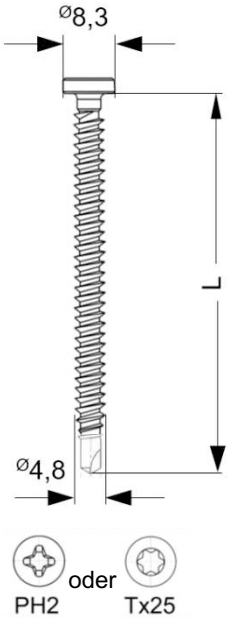
Zahn Flachdachbefestigungselemente	Anhang 37
Kombination 37 ZTSK-E/VB Trapez aus ZDBK-VB-E / ZTSK 4,8	



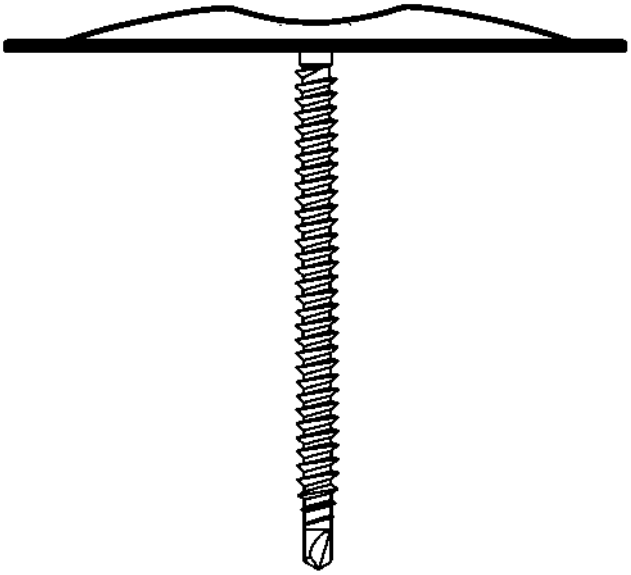
Zahn ZLVT 0001



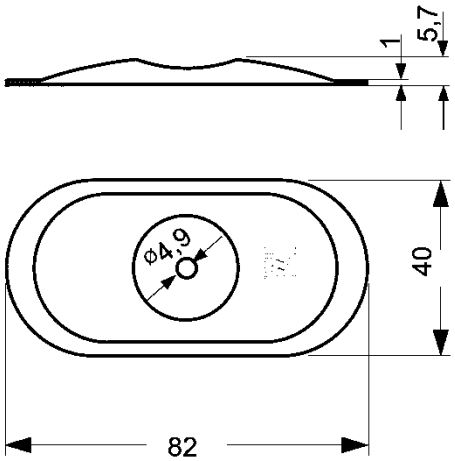
Zahn ZDBK-VB-E 4,8 x L



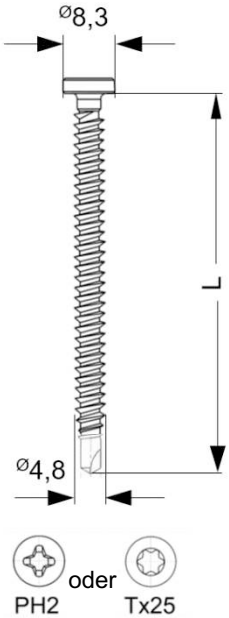
Zahn Flachdachbefestigungselemente	Anhang 38
Kombination 38 ZDBK-E/VB / ZLVT 0001	



Zahn ZLVT 0005

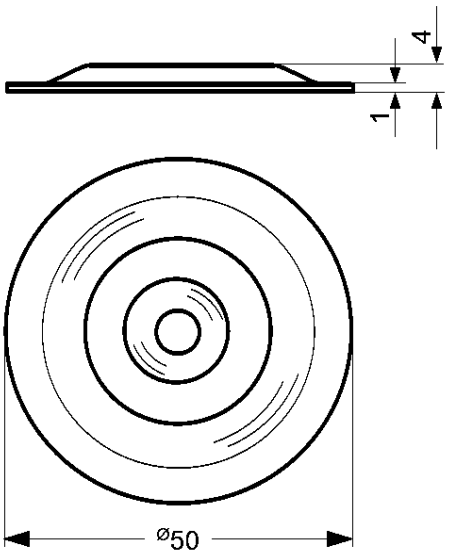


Zahn ZDBK-VB-E 4,8 x L

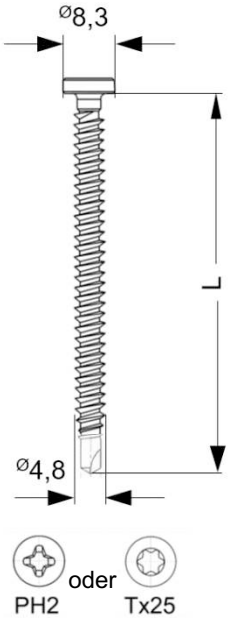


Zahn Flachdachbefestigungselemente	Anhang 39
Kombination 39 ZDBK-E/VB / ZLVT 0005	

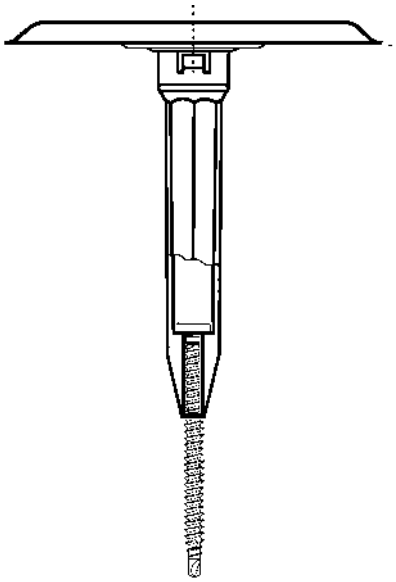
Zahn ZLVT 0015



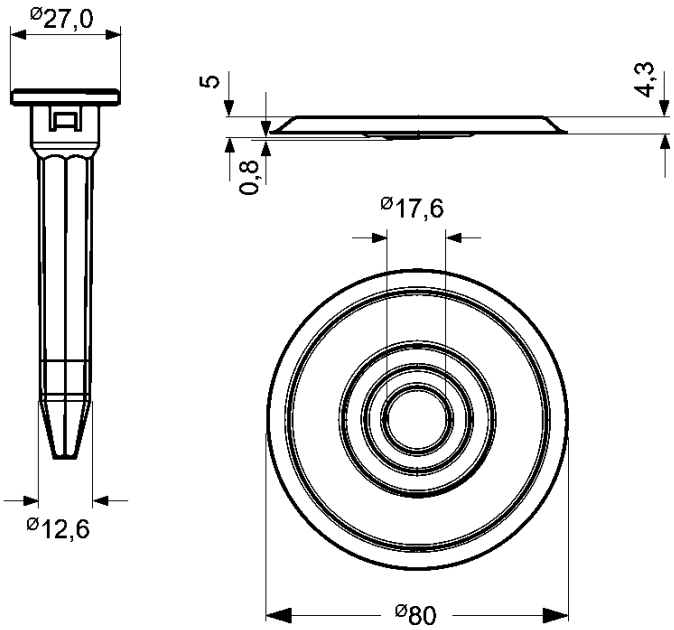
Zahn ZDBK-VB-E 4,8 x L



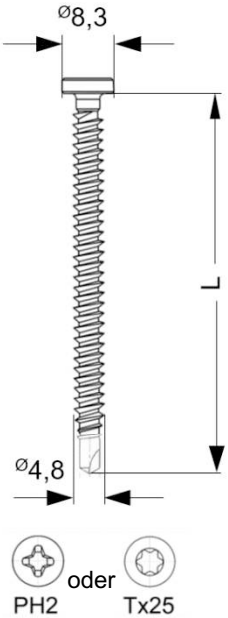
Zahn Flachdachbefestigungselemente	Anhang 40
Kombination 40 ZDBK-E/VB / ZLVT 0015	



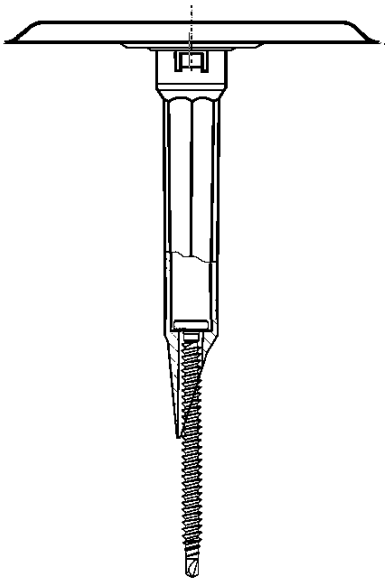
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



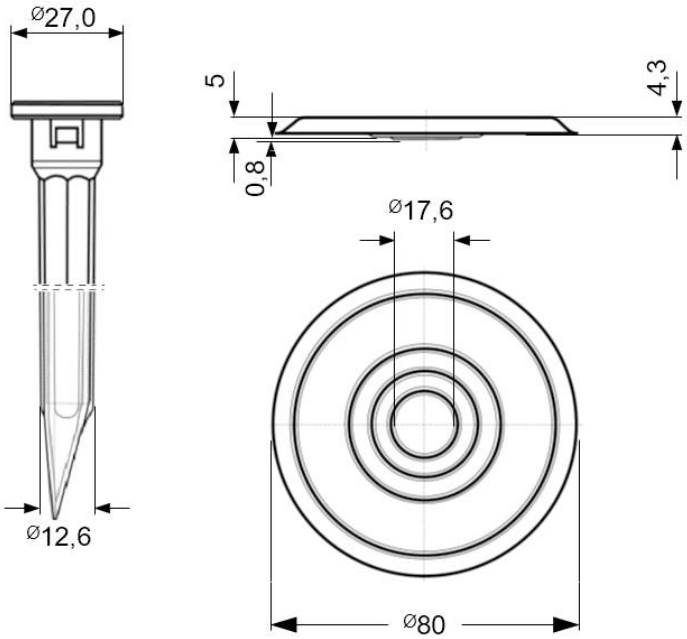
Zahn ZDBK-VB-E 4,8 x L



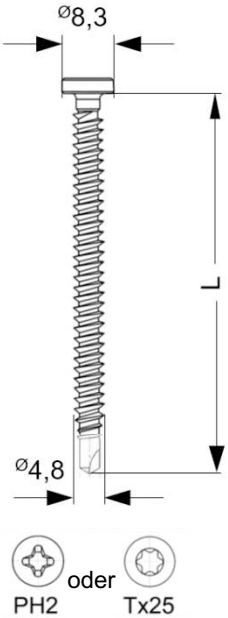
Zahn Flachdachbefestigungselemente	Anhang 40a
Kombination 40a ZCTS-E / VB Trapez aus ZDBK-VB-E / ZCTS-Tülle 4,8 und ZCTS-Teller	



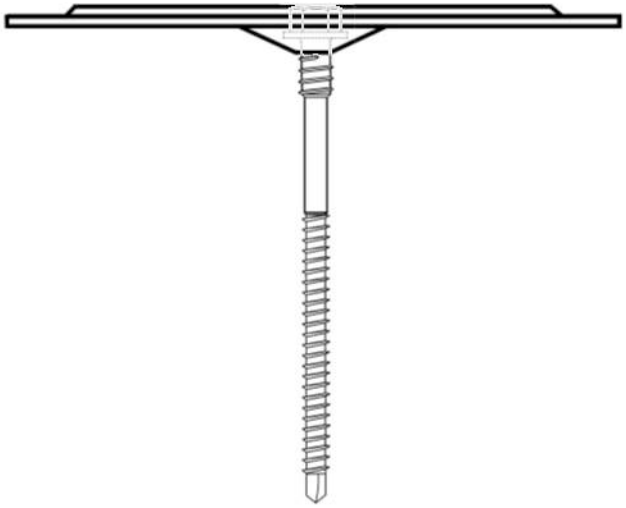
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



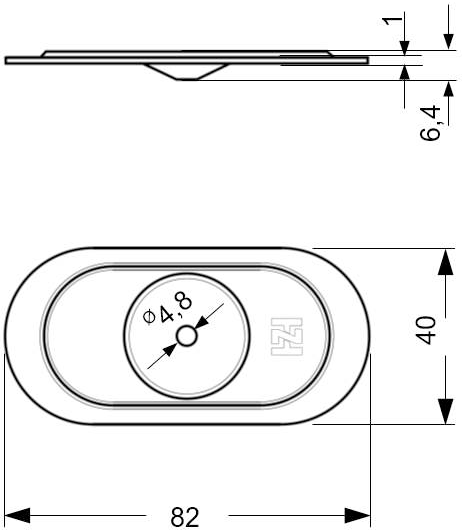
Zahn ZDBK-VB-E 4,8 x L



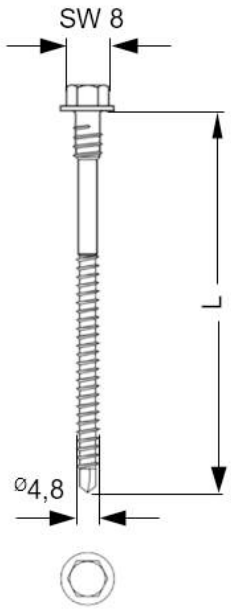
Zahn Flachdachbefestigungselemente	Anhang 40b
Kombination 40b ZCTS-Eplus / VB Trapez aus ZDBK-VB-E / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



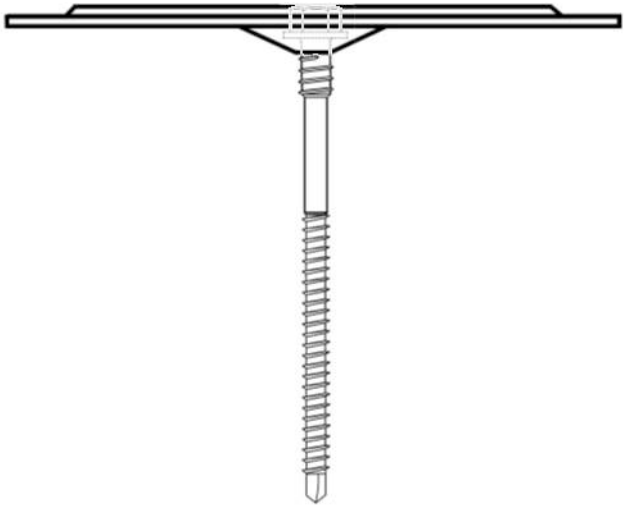
Zahn ZLVT 0001



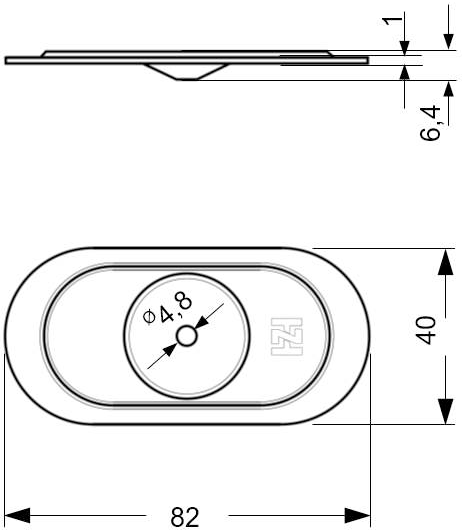
Zahn ZDBS 4,8 x L



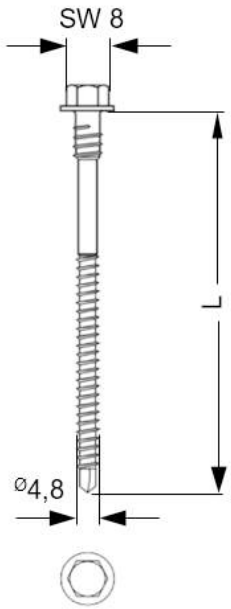
Zahn Flachdachbefestigungselemente	Anhang 41
Kombination 41 ZDBS / ZLVT 0001	



Zahn ZLVT 0001

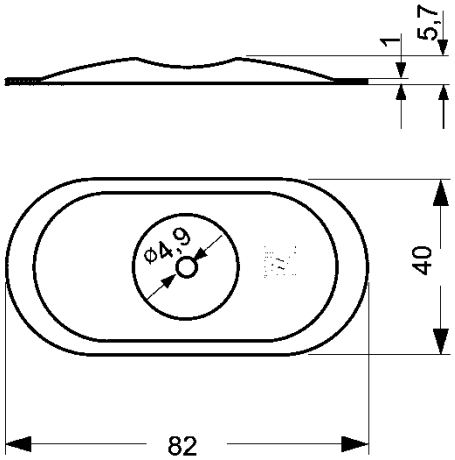


Zahn ZDBS-VB 4,8 x L

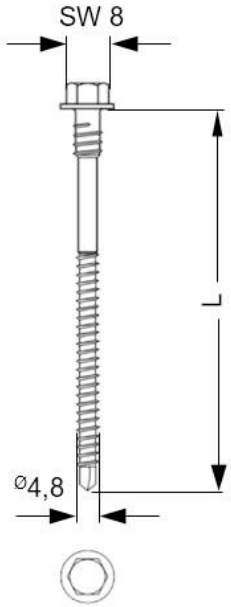


Zahn Flachdachbefestigungselemente	Anhang 41a
Kombination 41a ZDBS-VB / ZLVT 0001	

Zahn ZLVT 0005

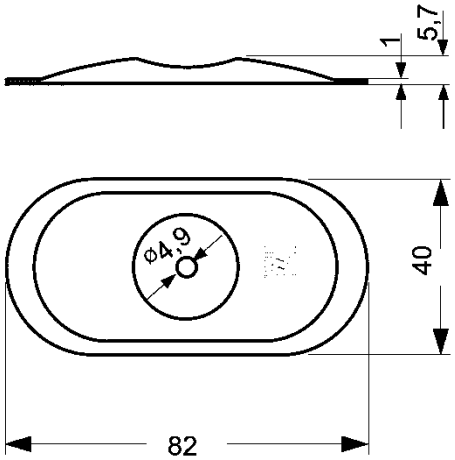


Zahn ZDBS 4,8 x L

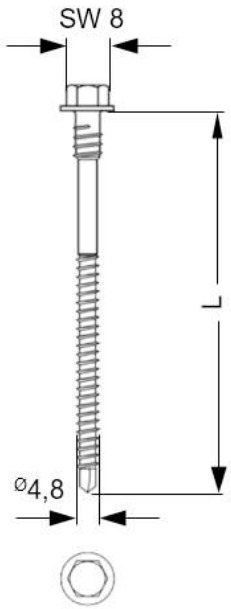


Zahn Flachdachbefestigungselemente	Anhang 42
Kombination 42 ZDBS / ZLVT 0005	

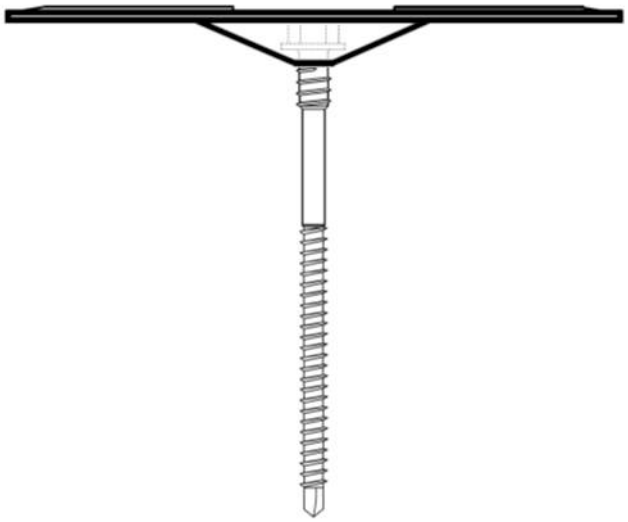
Zahn ZLVT 0005



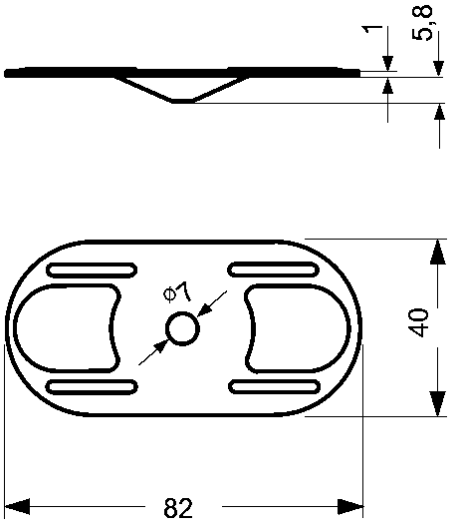
Zahn ZDBS-VB 4,8 x L



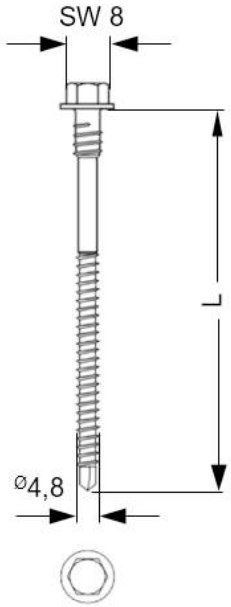
Zahn Flachdachbefestigungselemente	Anhang 42a
Kombination 42a ZDBS-VB / ZLVT 0005	



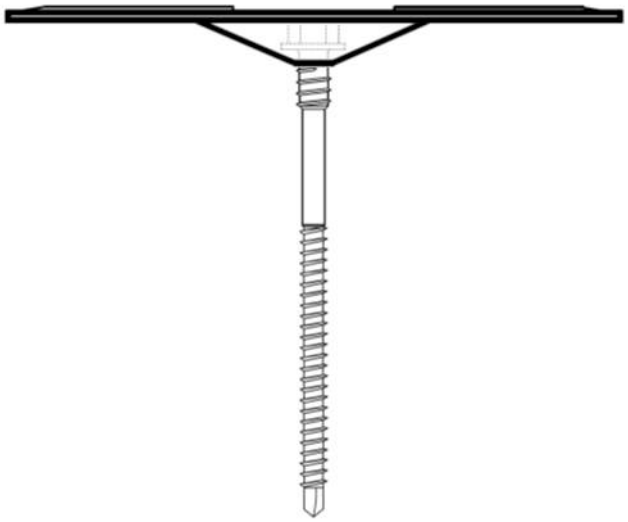
Zahn ZLVT 0012



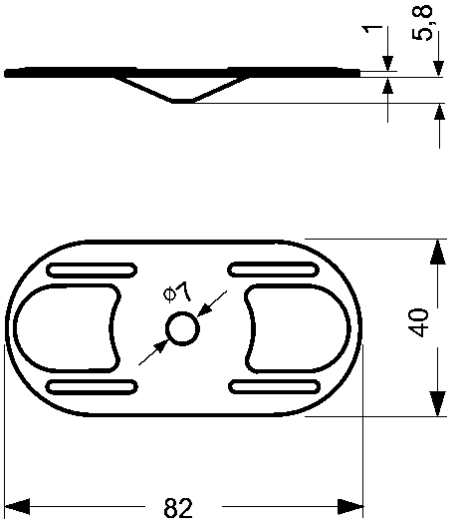
Zahn ZDBS 4,8 x L



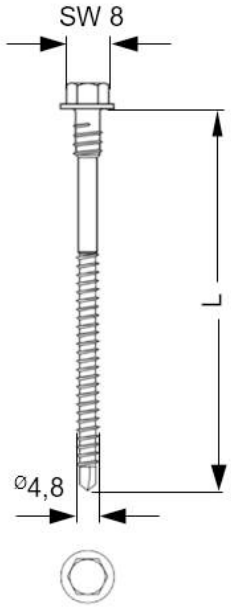
Zahn Flachdachbefestigungselemente	Anhang 43
Kombination 43 ZDBS / ZLVT 0012	



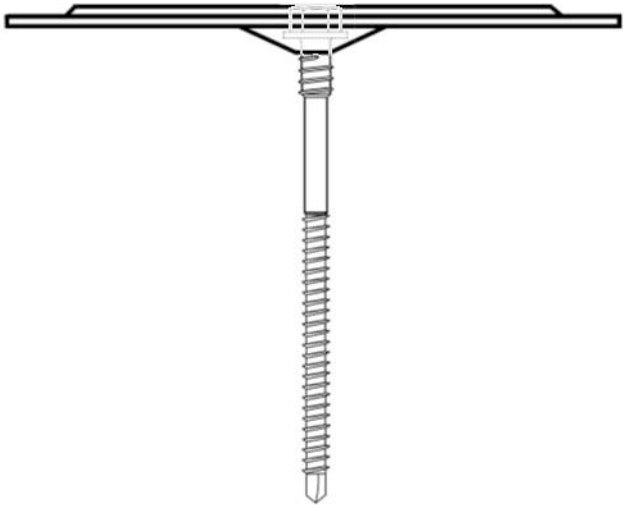
Zahn ZLVT 0012



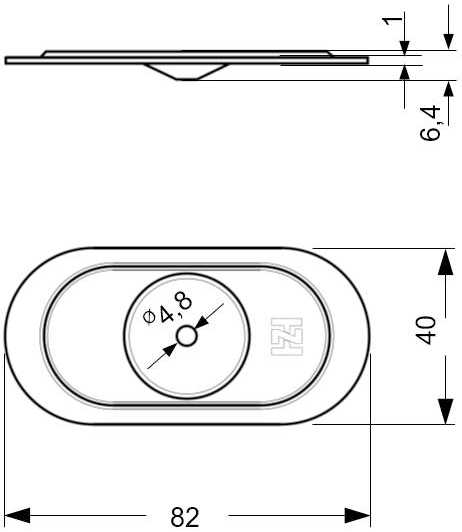
Zahn ZDBS-VB 4,8 x L



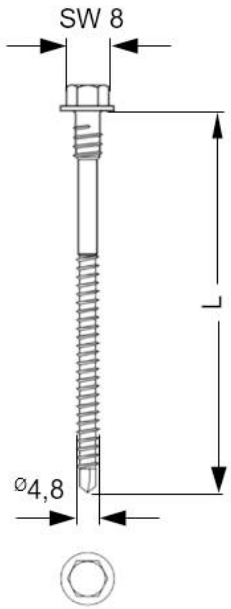
Zahn Flachdachbefestigungselemente	Anhang 43a
Kombination 43a ZDBS-VB / ZLVT 0012	



Zahn ZLVT 0001

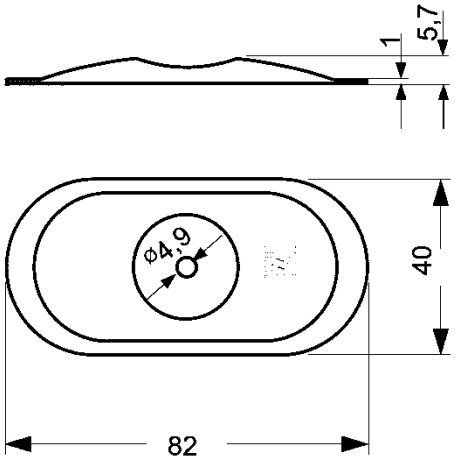


Zahn ZDBS-E 4,8 x L

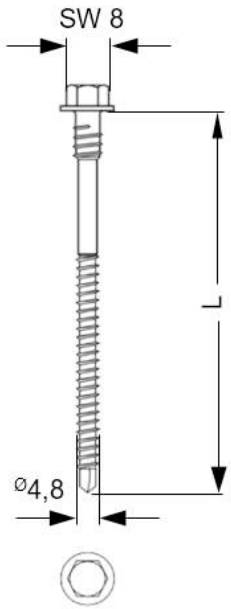


Zahn Flachdachbefestigungselemente	Anhang 44
Kombination 44 ZDBS-E / ZLVT 0001	

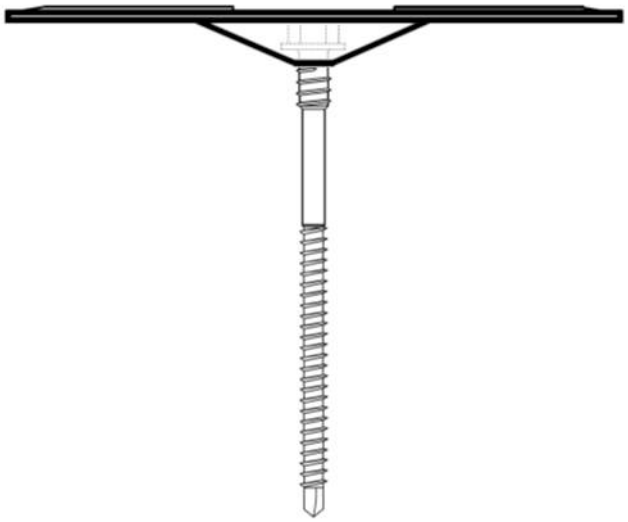
Zahn ZLVT 0005



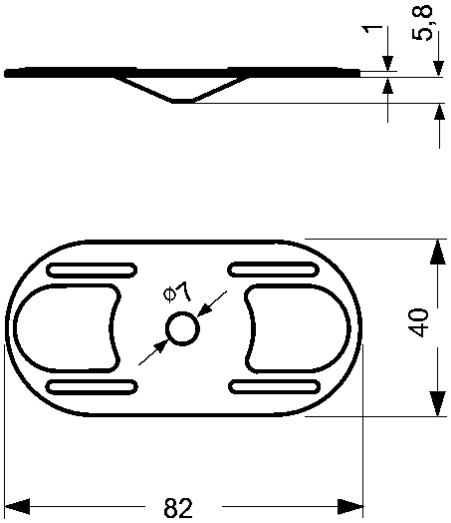
Zahn ZDBS-E 4,8 x L



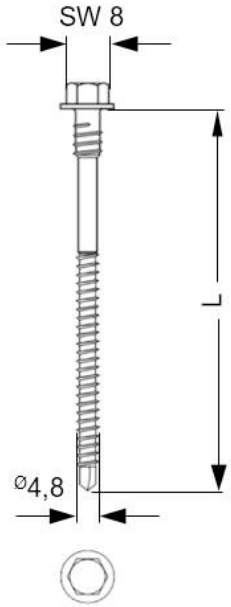
Zahn Flachdachbefestigungselemente	Anhang 45
Kombination 45 ZDBS-E / ZLVT 0005	



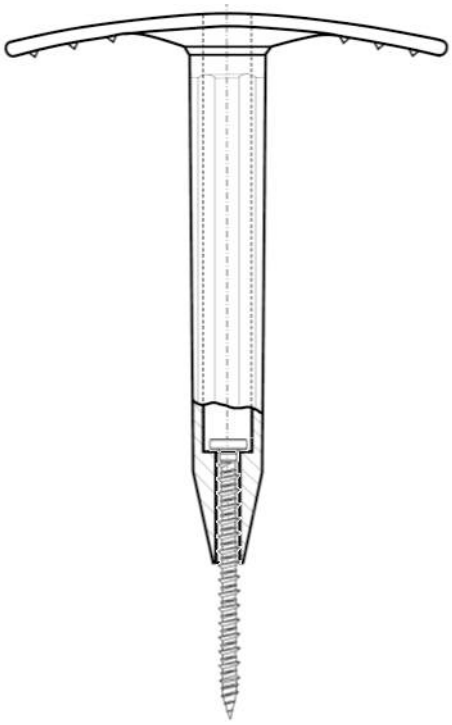
Zahn ZLVT 0012



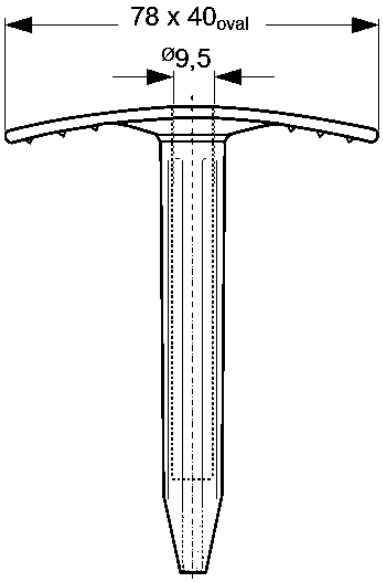
Zahn ZDBS-E 4,8 x L



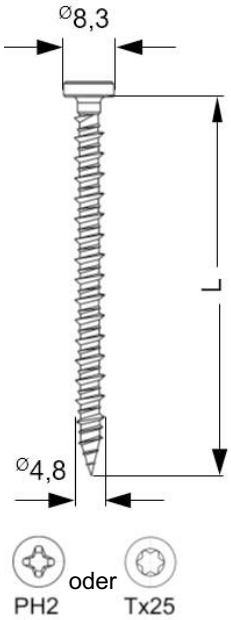
Zahn Flachdachbefestigungselemente	Anhang 46
Kombination 46 ZDBS-E / ZLVT 0012	



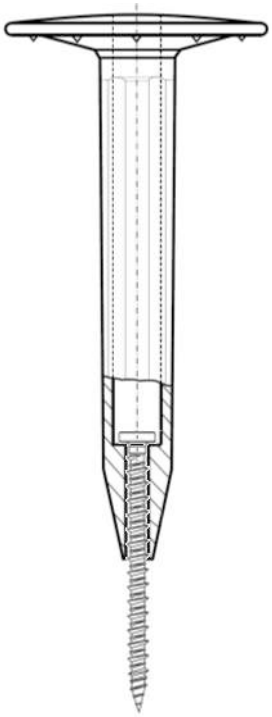
Zahn ZKSH oval



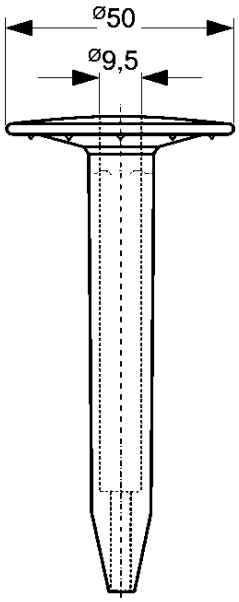
Zahn ZHBK 4,8 x L



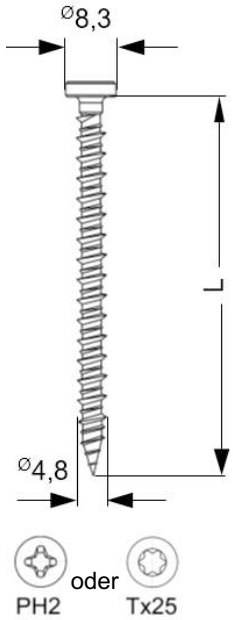
Zahn Flachdachbefestigungselemente	Anhang 47
Kombination 47 ZHSK aus ZHBK / ZKSH oval	



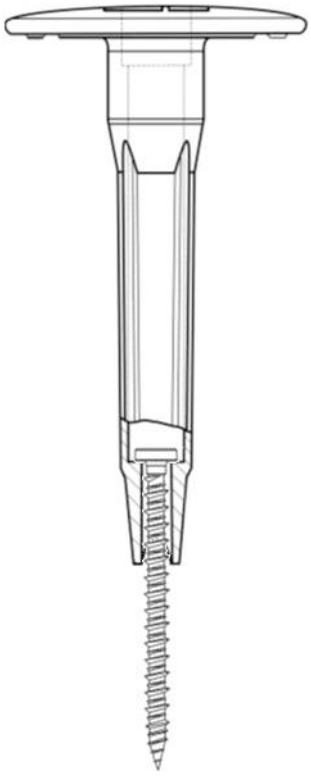
Zahn ZKSH rund



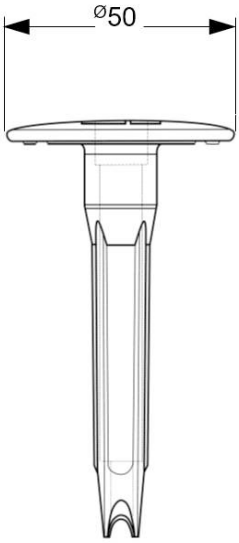
Zahn ZHBK 4,8 x L



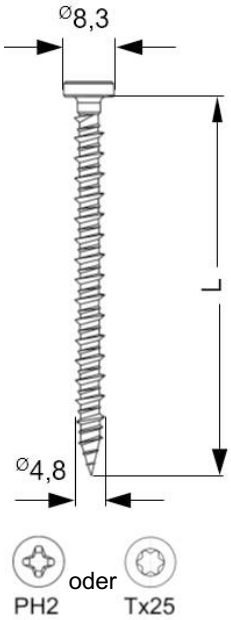
Zahn Flachdachbefestigungselemente	Anhang 48
Kombination 48 ZHSK-R aus ZHBK / ZKSH rund	



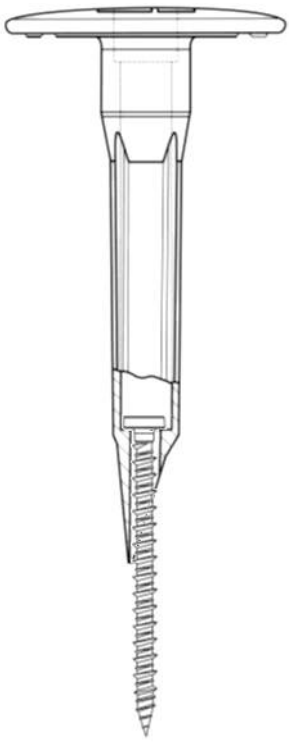
Zahn ZKSH-Rplus mit Pfahlspitze



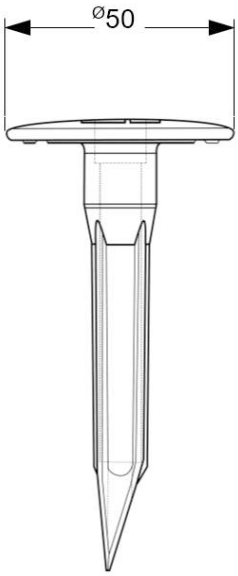
Zahn ZHBK 4,8 x L



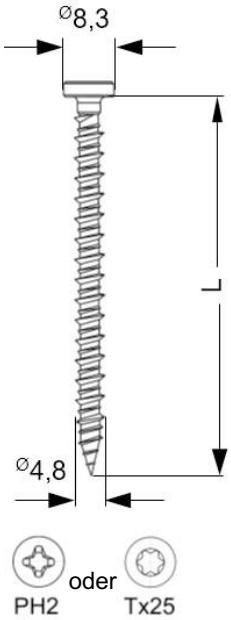
Zahn Flachdachbefestigungselemente	Anhang 49
Kombination 49 ZHSK-Rplus mit Pfahlspitze aus ZHBK / ZKSH-Rplus mit Pfahlspitze	



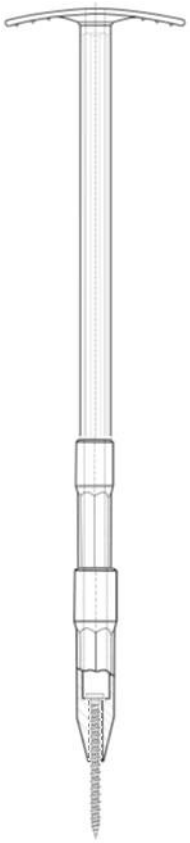
Zahn ZKSH-Rplus



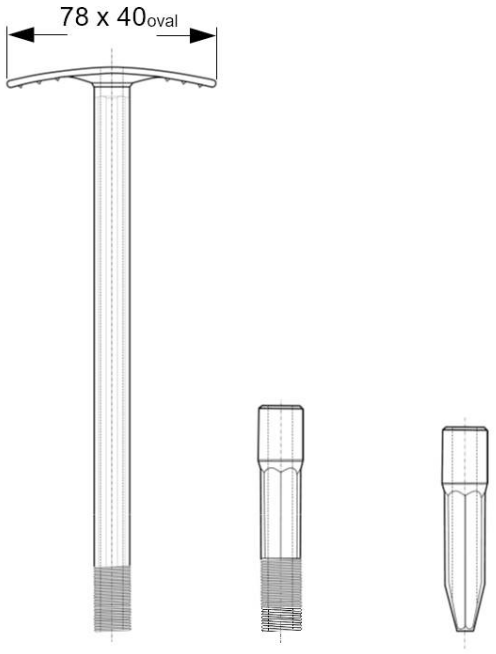
Zahn ZHBK 4,8 x L



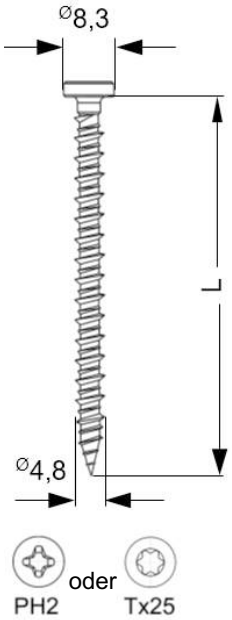
Zahn Flachdachbefestigungselemente	Anhang 50
Kombination 50 ZHSK-Rplus aus ZHBK / ZKSH-Rplus	



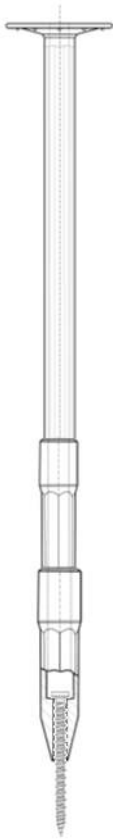
Zahn ZKSH oval Modul 4,8



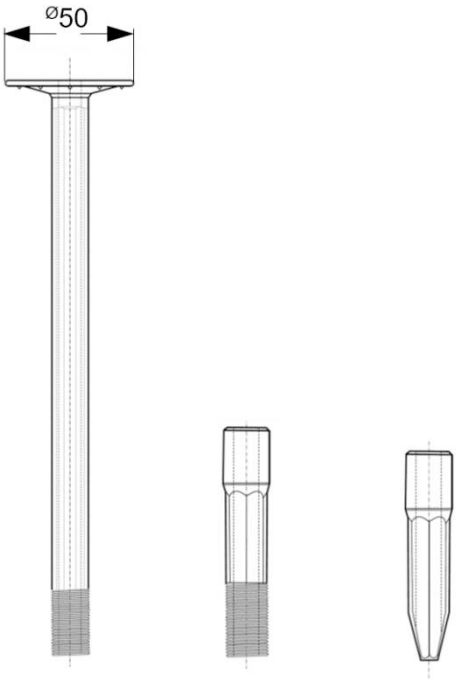
Zahn ZHBK 4,8 x L



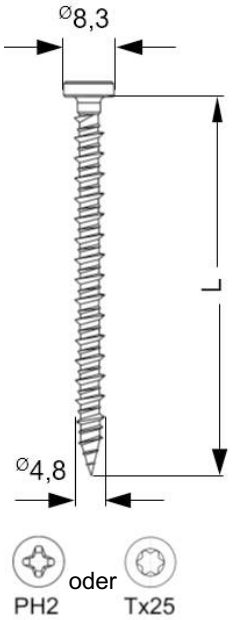
Zahn Flachdachbefestigungselemente	Anhang 51
Kombination 51 ZHSK Modul aus ZHBK / ZKSH oval Modul mit modularem Mittelstück und Spitze 4,8	



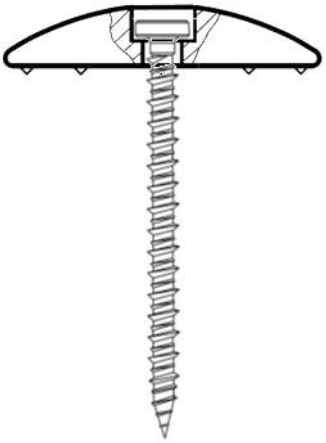
Zahn ZKSH rund Modul 4,8



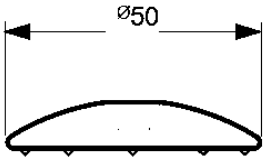
Zahn ZHBK 4,8 x L



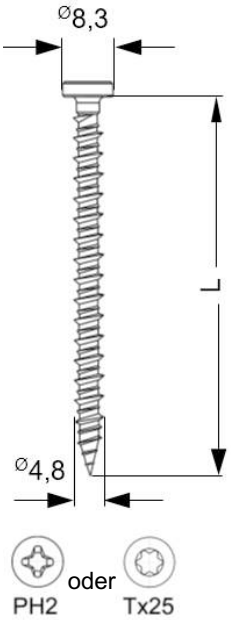
Zahn Flachdachbefestigungselemente	Anhang 52
Kombination 52 ZHSK-R-Modul aus ZHBK / ZKSH rund Modul mit modularem Mittelstück und Spitze 4,8	



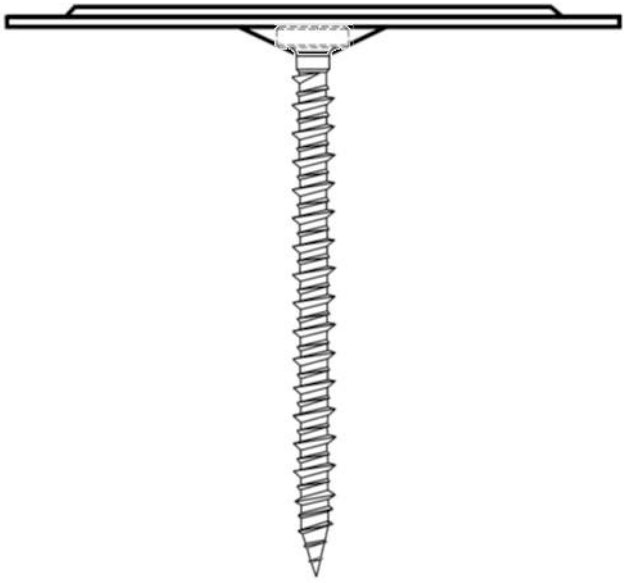
Zahn ZTSK 4,8



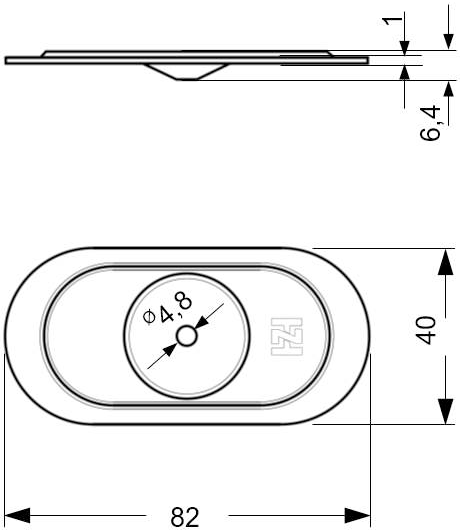
Zahn ZHBK 4,8 x L



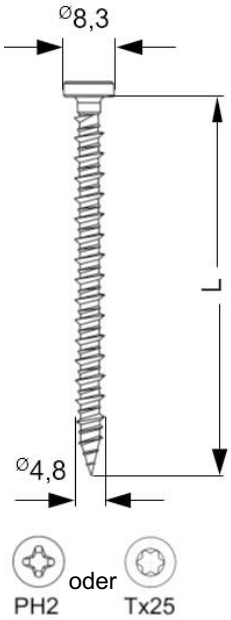
Zahn Flachdachbefestigungselemente	Anhang 53
Kombination 53 ZTSK Holz aus ZHBK / ZTSK 4,8	



Zahn ZLVT 0001

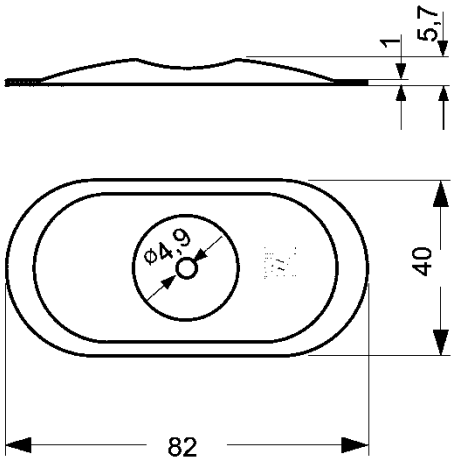


Zahn ZHBK 4,8 x L

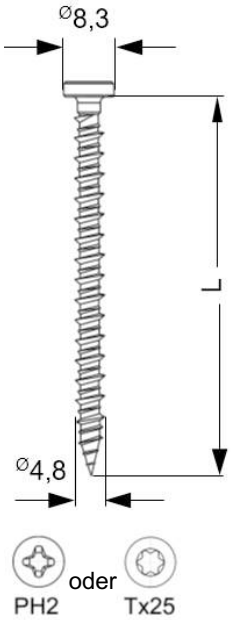


Zahn Flachdachbefestigungselemente	Anhang 54
Kombination 54 ZHBK / ZLVT 0001	

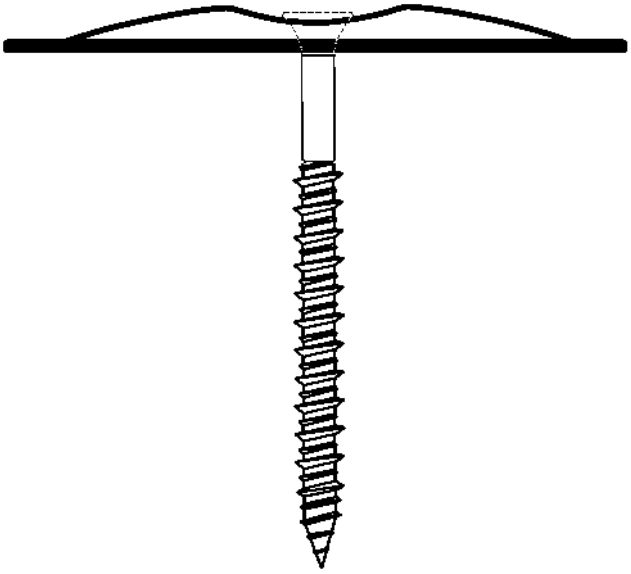
Zahn ZLVT 0005



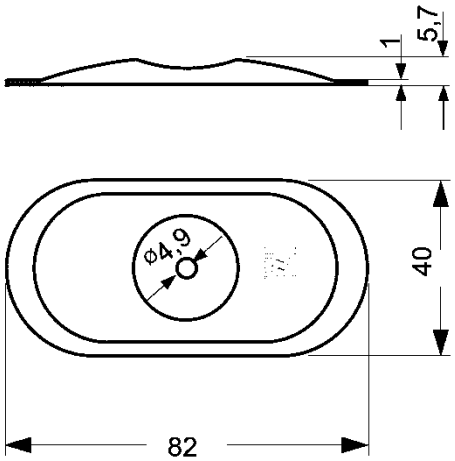
Zahn ZHBK 4,8 x L



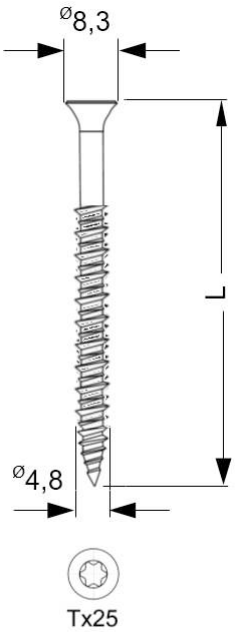
Zahn Flachdachbefestigungselemente	Anhang 55
Kombination 55 ZHBK / ZLVT 0005	



Zahn ZLVT 0005

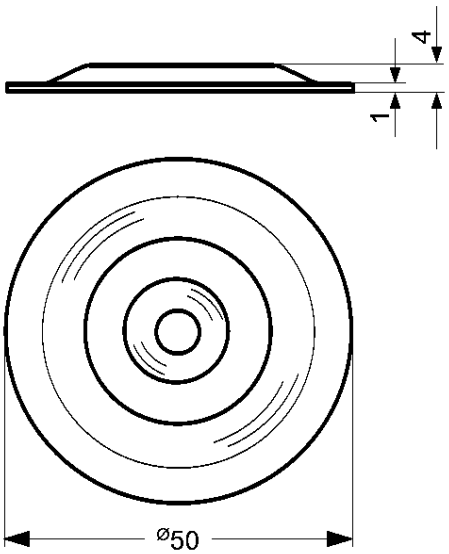


Zahn $ZHBK_{TK}$ 4,8 x L

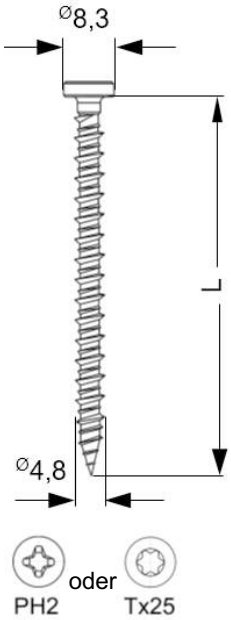


Zahn Flachdachbefestigungselemente	Anhang 55a
Kombination 55a ZHBK-TK / ZLVT 0005	

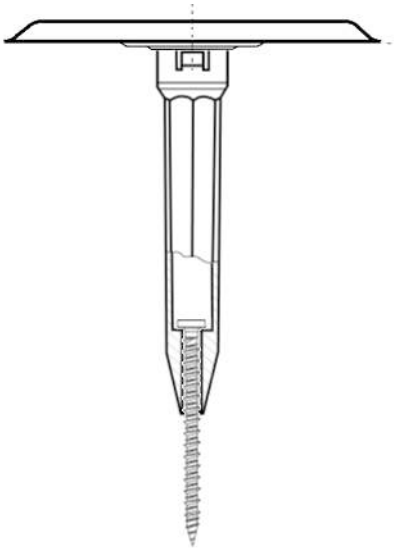
Zahn ZLVT 0015



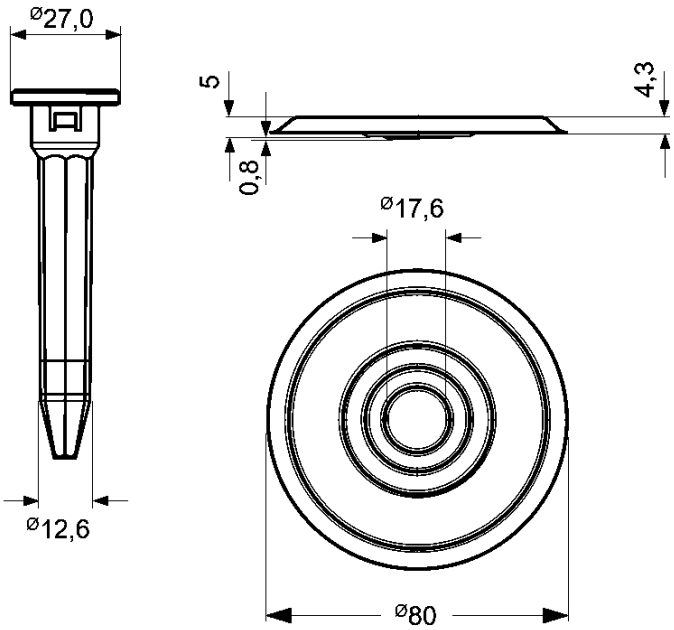
Zahn ZHBK 4,8 x L



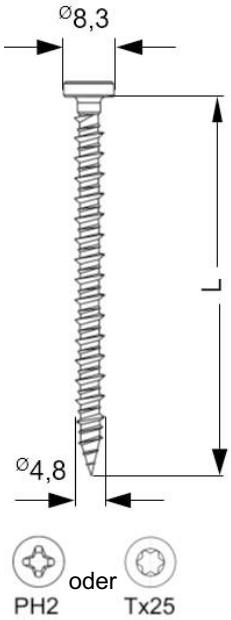
Zahn Flachdachbefestigungselemente	Anhang 56
Kombination 56 ZHBK / ZLVT 0015	



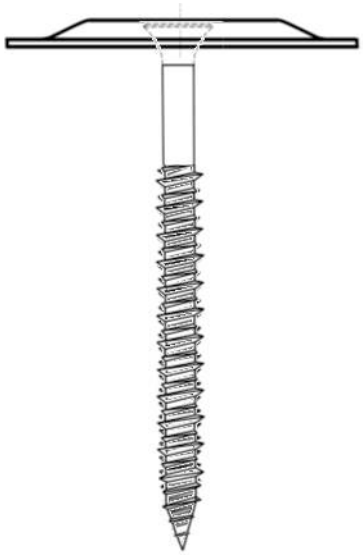
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



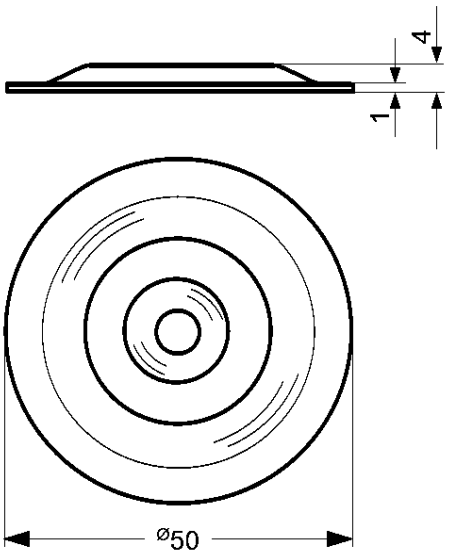
Zahn ZHBK 4,8 x L



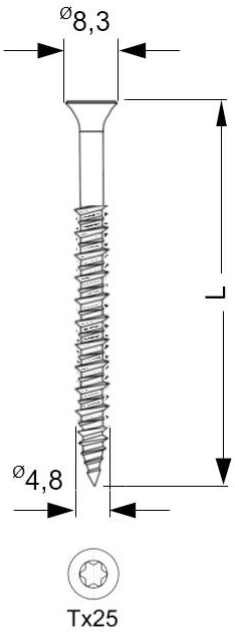
Zahn Flachdachbefestigungselemente	Anhang 56a
Kombination 56a ZCTS Holz aus ZHBK / ZCTS-Tülle 4,8 und ZCTS-Teller	



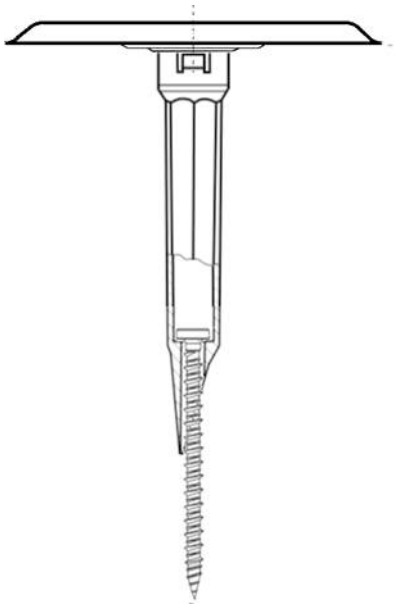
Zahn ZLVT 0015



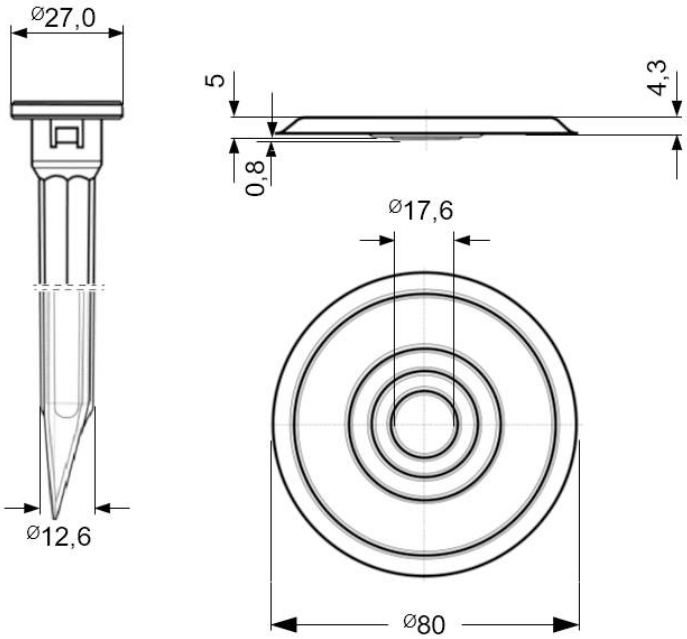
Zahn $ZHBK_{TK}$ 4,8 x L



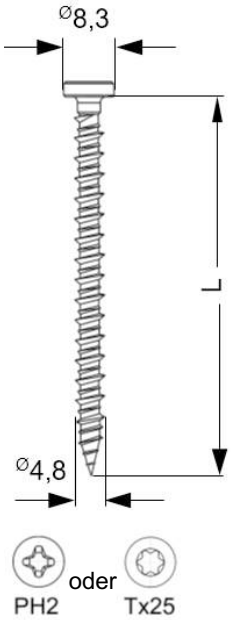
Zahn Flachdachbefestigungselemente	Anhang 56b
Kombination 56b ZHBK-TK / ZLVT 0015	



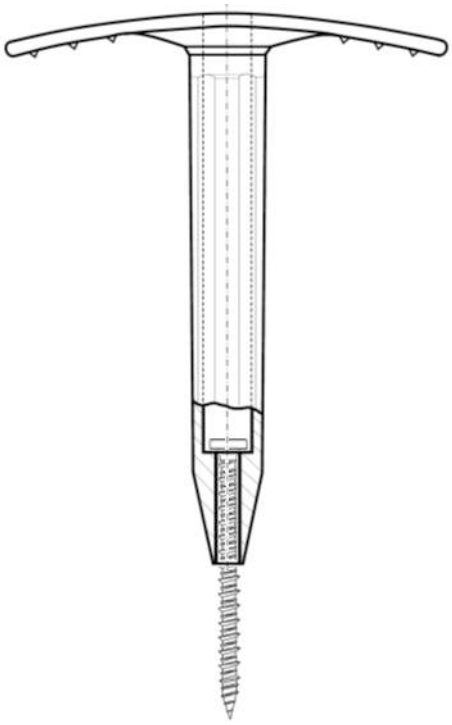
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



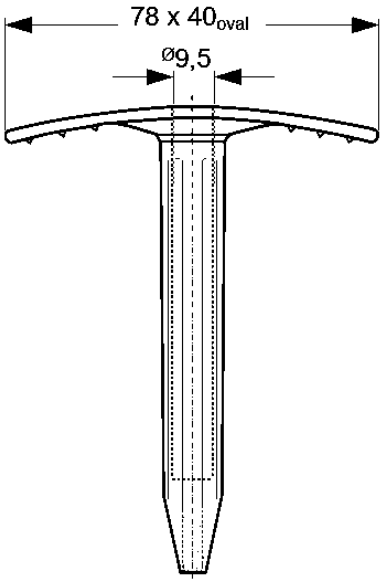
Zahn ZHBK 4,8 x L



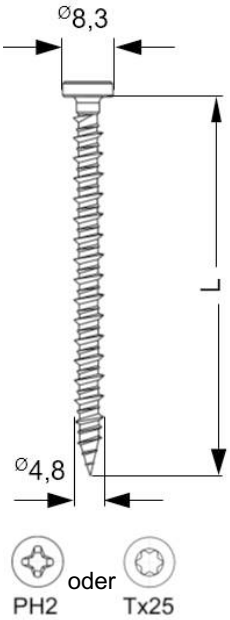
Zahn Flachdachbefestigungselemente	Anhang 56c
Kombination 56c ZCTSplus Holz aus ZHBK / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



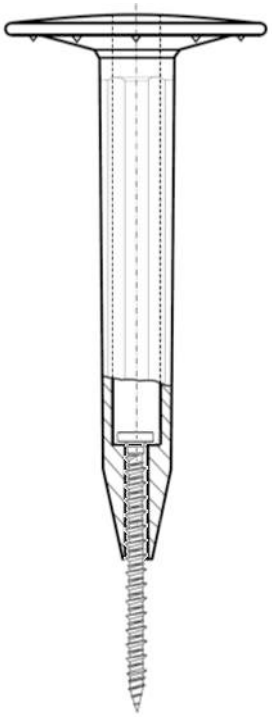
Zahn ZKSH oval



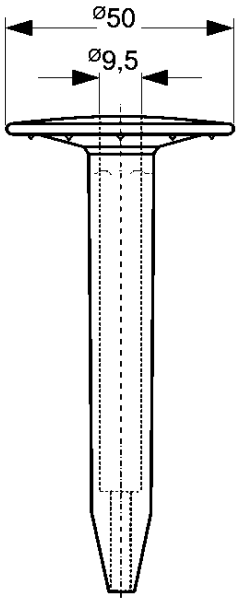
Zahn ZHBK-E 4,8 x L



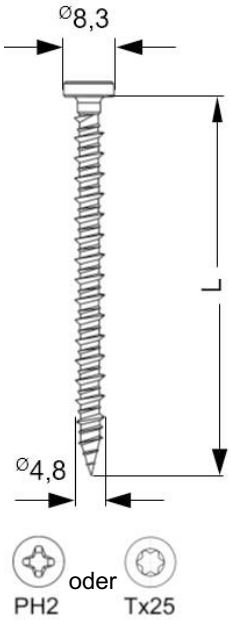
Zahn Flachdachbefestigungselemente	Anhang 57
Kombination 57 ZHSK-E aus ZHBK-E / ZKSH oval	



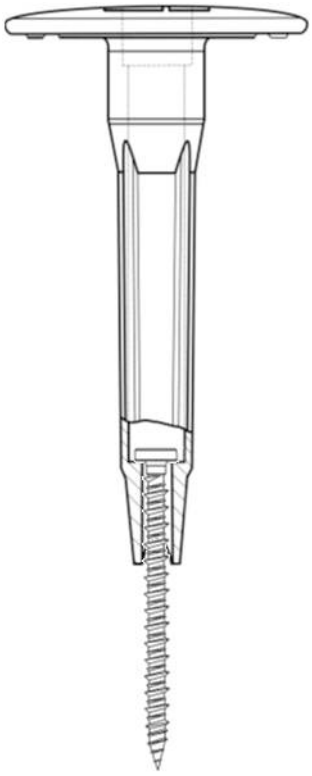
Zahn ZKSH rund



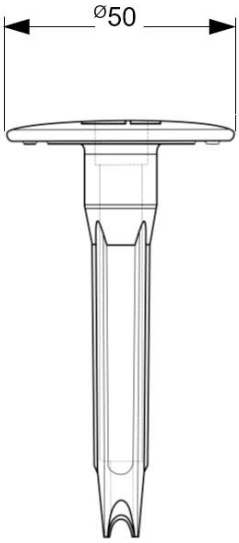
Zahn ZHBK-E 4,8 x L



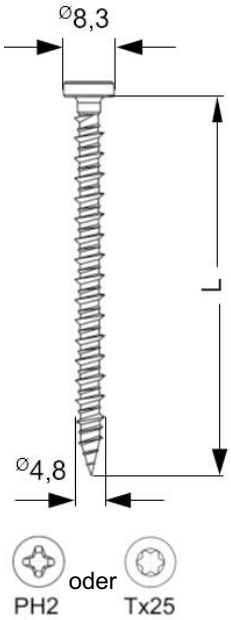
Zahn Flachdachbefestigungselemente	Anhang 58
Kombination 58 ZHSK-E/R aus ZHBK-E / ZKSH rund	



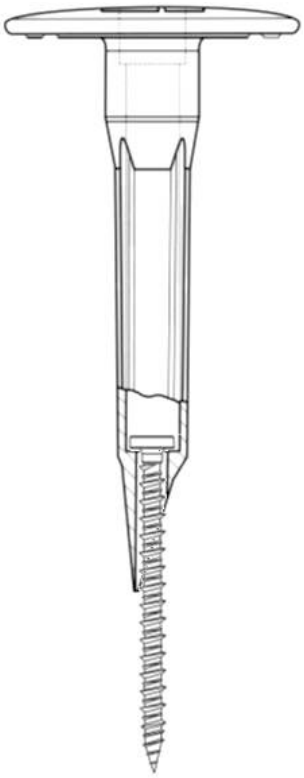
Zahn ZKSH-Rplus mit Pfahlspitze



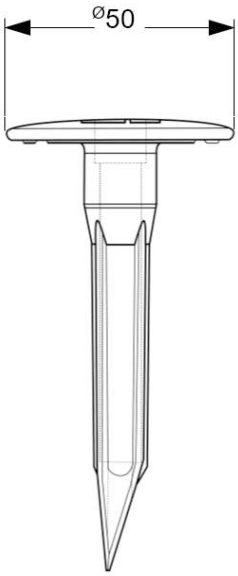
Zahn ZHBK-E 4,8 x L



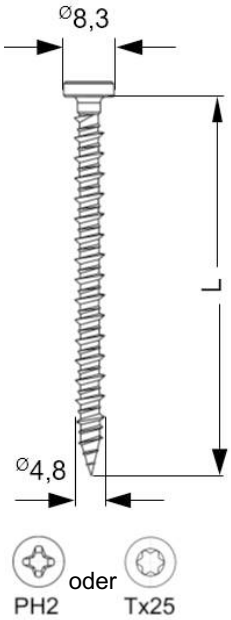
Zahn Flachdachbefestigungselemente	Anhang 59
Kombination 59 ZHSK-E/Rplus mit Pfahlspitze aus ZHBK-E / ZKSH-Rplus mit Pfahlspitze	



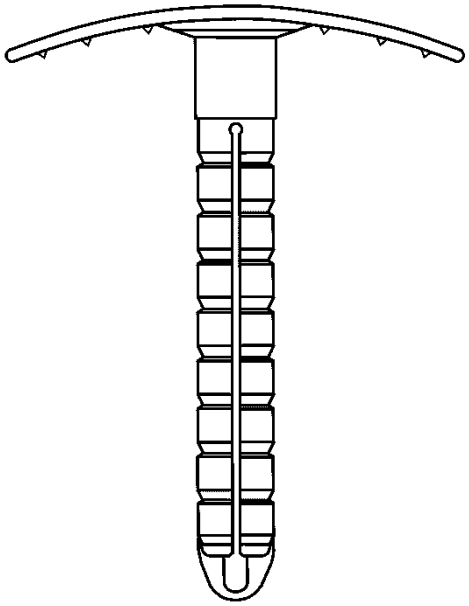
Zahn ZKSH-Rplus



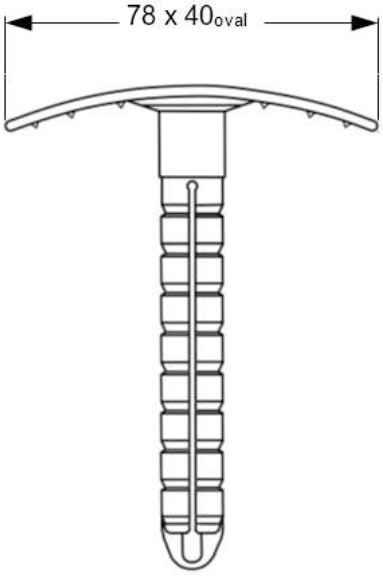
Zahn ZHBK-E 4,8 x L



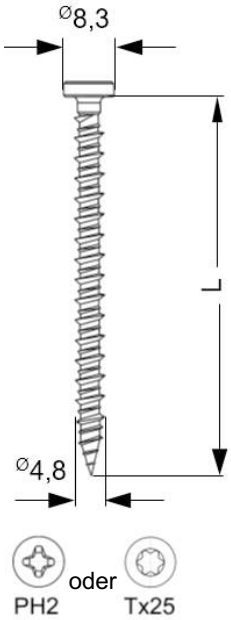
Zahn Flachdachbefestigungselemente	Anhang 60
Kombination 60 ZHSK-E/Rplus aus ZHBK-E / ZKSH-Rplus	



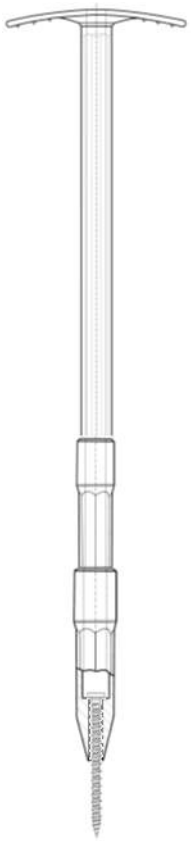
Zahn ZTSD oval



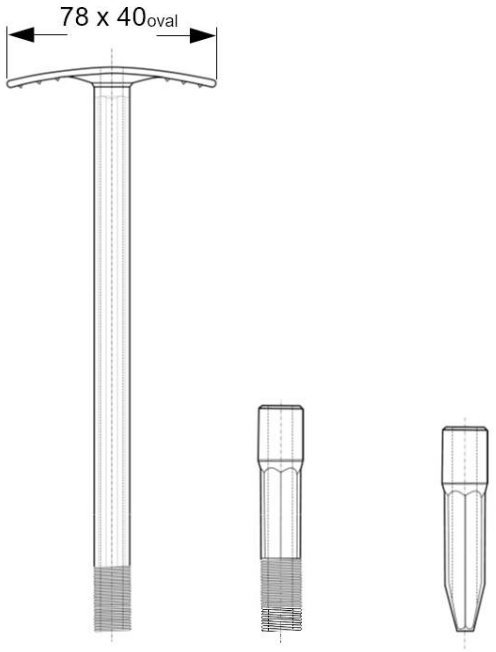
Zahn ZHBK-E 4,8 x L



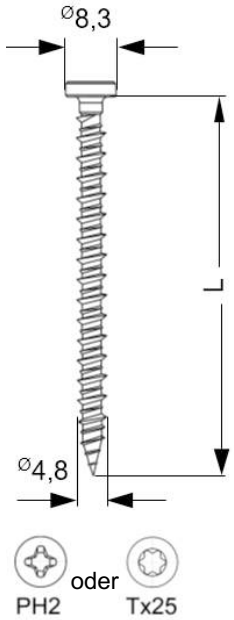
Zahn Flachdachbefestigungselemente	Anhang 60a
Kombination 60a ZTSD-E / ZHBK-E aus ZHBK-E / ZTSD oval	



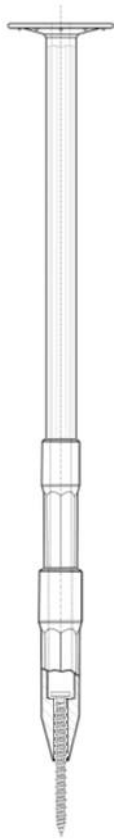
Zahn ZKSH oval Modul 4,8



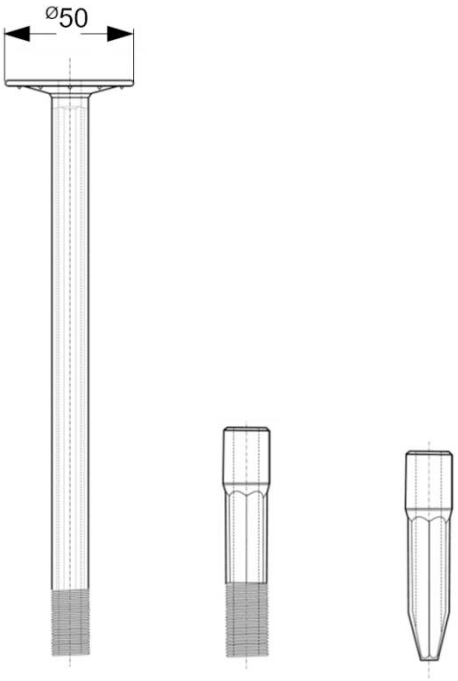
Zahn ZHBK-E 4,8 x L



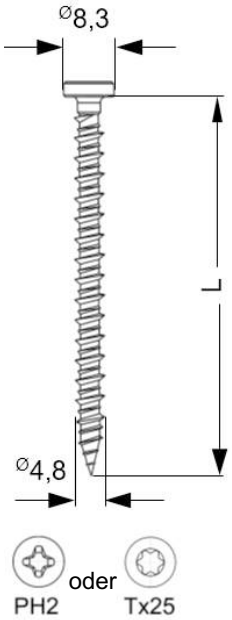
Zahn Flachdachbefestigungselemente	Anhang 61
Kombination 61 ZHSK-E-Modul aus ZHBK-E / ZKSH oval Modul mit modularem Mittelstück und Spitze 4,8	



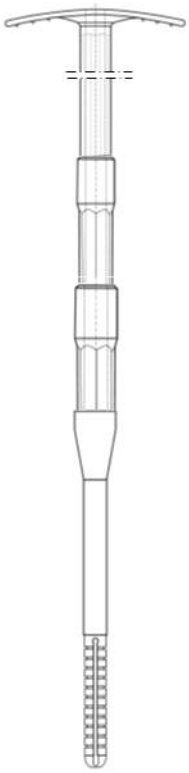
Zahn ZKSH rund Modul 4,8



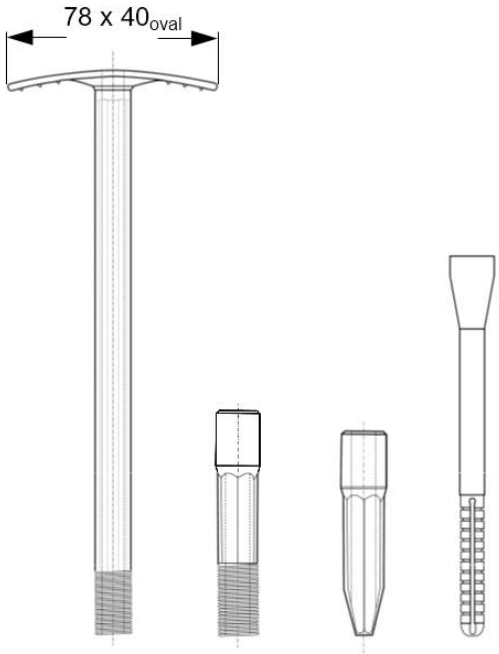
Zahn ZHBK-E 4,8 x L



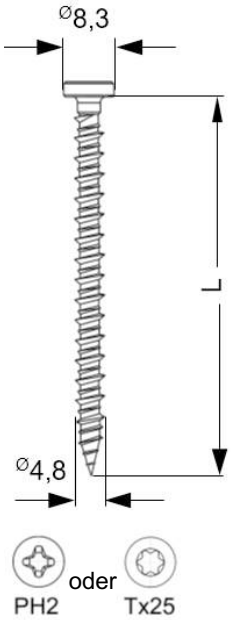
Zahn Flachdachbefestigungselemente	Anhang 62
Kombination 62 ZHSK-E/R-Modul aus ZHBK-E / ZKSH rund Modul mit modularem Mittelstück und Spitze 4,8	



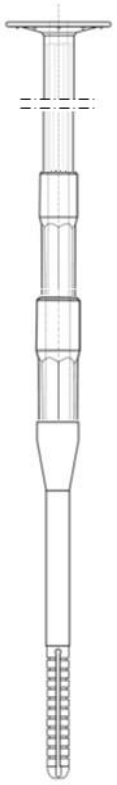
Zahn ZKSH oval Modul 4,8 mit Dübelvorsatz



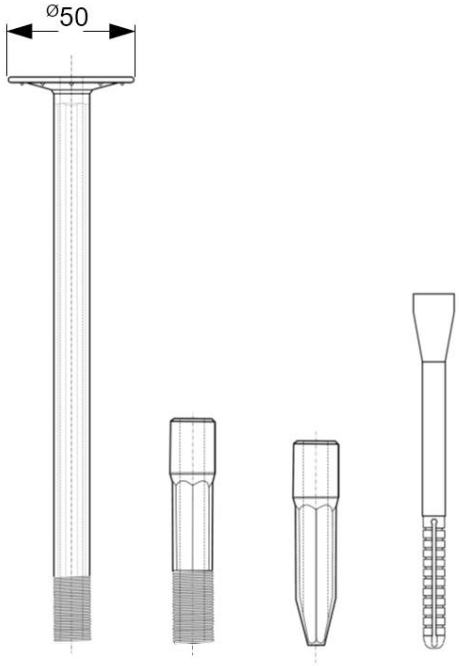
Zahn ZHBK-E 4,8 x L



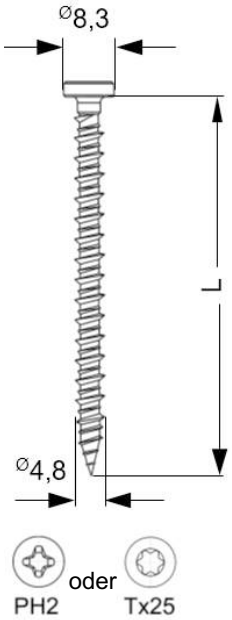
Zahn Flachdachbefestigungselemente	Anhang 63
Kombination 63 ZSDK-E-Modul / ZHBK-E aus ZHBK-E / ZKSH oval Modul 4,8 mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	



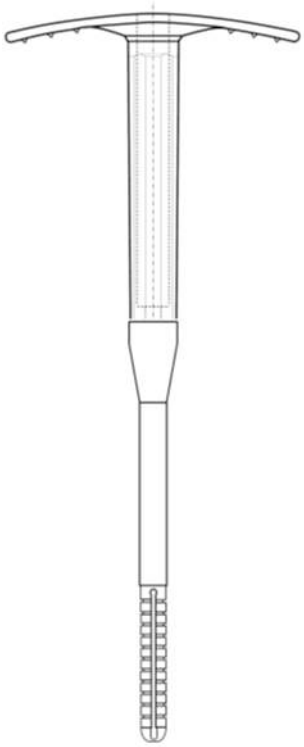
Zahn ZKSH rund Modul 4,8 mit Dübelvorsatz



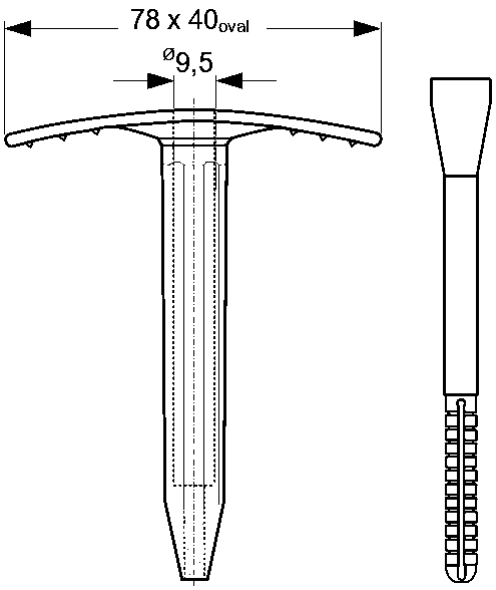
Zahn ZHBK-E 4,8 x L



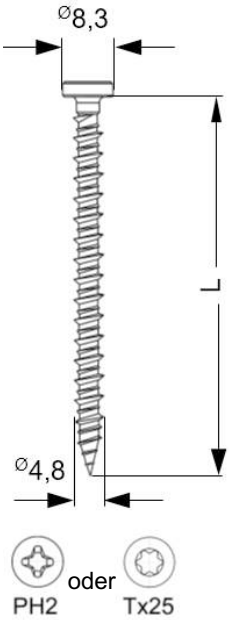
Zahn Flachdachbefestigungselemente	Anhang 64
Kombination 64 ZSDK-E/R-Modul / ZHBK-E aus ZHBK-E / ZKSH rund Modul 4,8 mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	



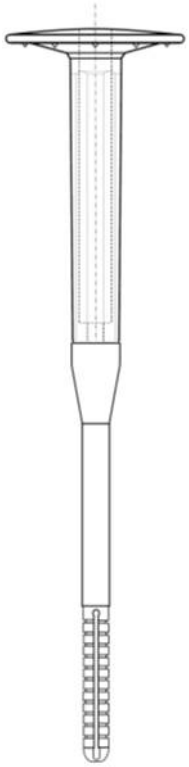
Zahn ZKSH oval mit Dübelvorsatz



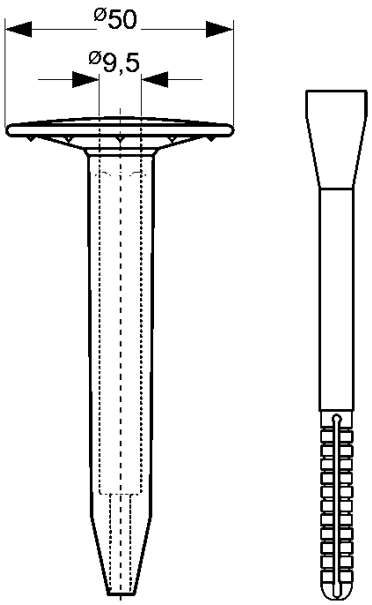
Zahn ZHBK-E 4,8 x L



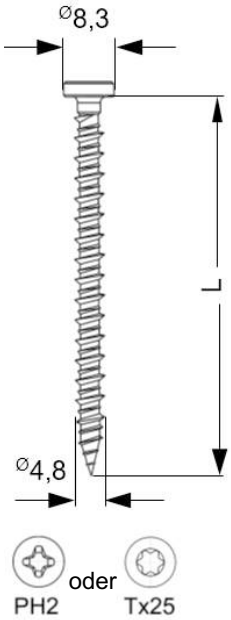
Zahn Flachdachbefestigungselemente	Anhang 65
Kombination 65 ZSDK-E / ZHBK-E aus ZHBK-E / ZKSH oval mit Dübelvorsatz	



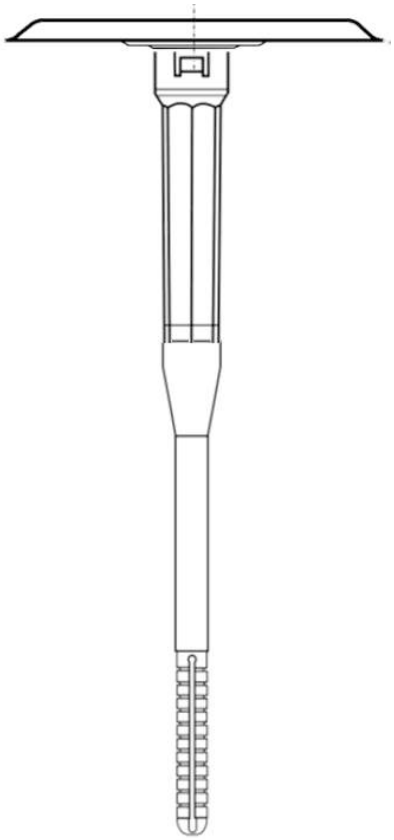
Zahn ZKSH rund mit Dübelvorsatz



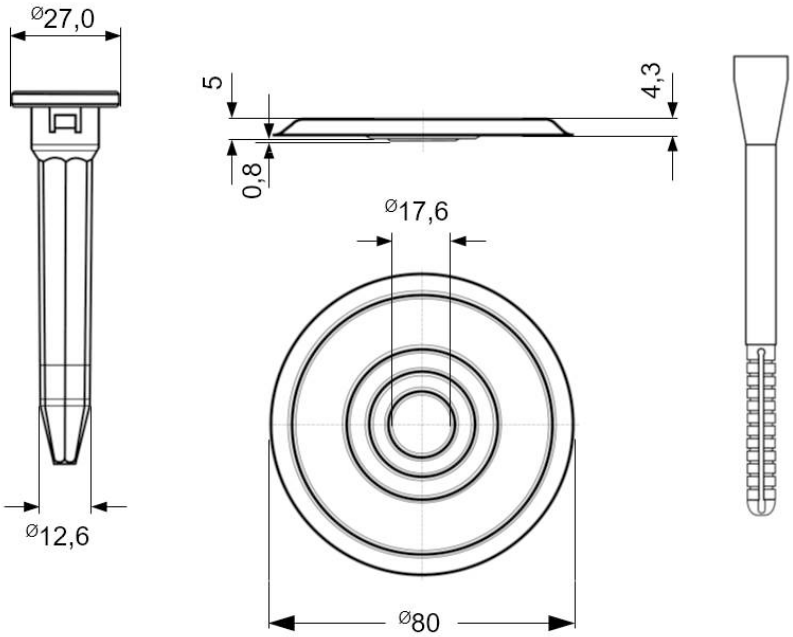
Zahn ZHBK-E 4,8 x L



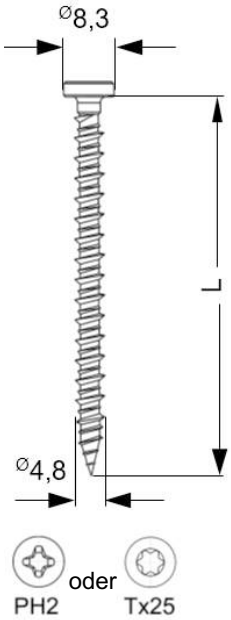
Zahn Flachdachbefestigungselemente	Anhang 66
Kombination 66 ZSDK-E/R / ZHBK-E aus ZHBK-E / ZKSH rund mit Dübelvorsatz	



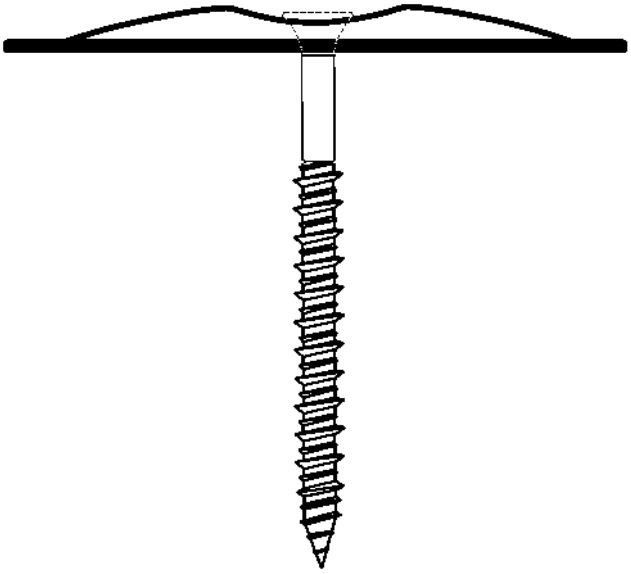
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller und Dübelvorsatz



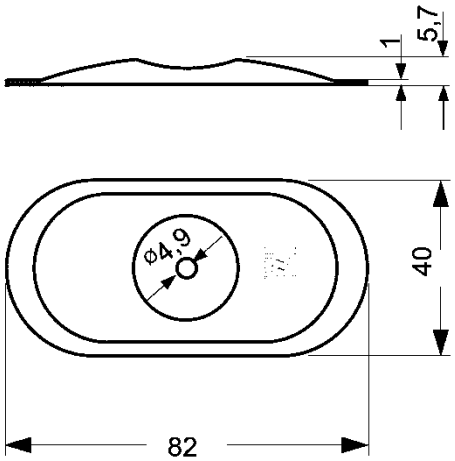
Zahn ZHBK-E 4,8 x L



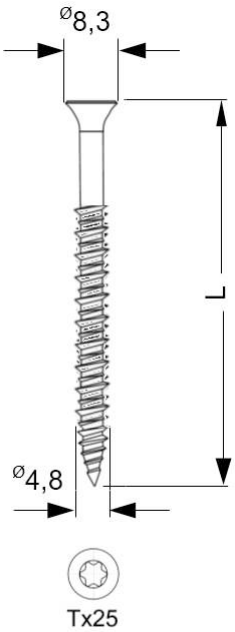
Zahn Flachdachbefestigungselemente	Anhang 66a
Kombination 66a ZCTS-E / ZHBK-E Beton aus ZHBK-E / ZCTS-Tülle 4,8, ZCTS-Teller und Dübelvorsatz	



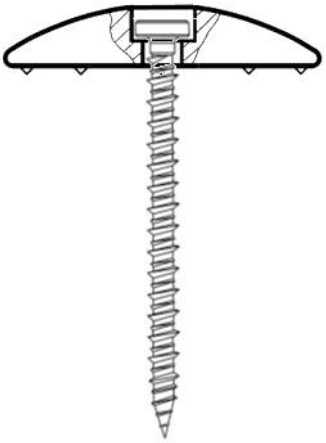
Zahn ZLVT 0005



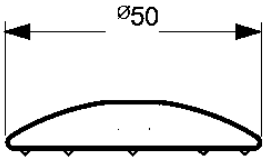
Zahn ZHBK-E_{TK} 4,8 x L



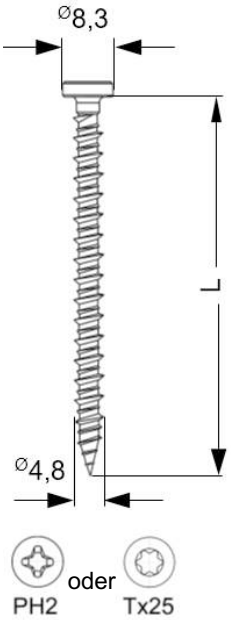
Zahn Flachdachbefestigungselemente	Anhang 66b
Kombination 66b ZHBK-E-TK / ZLVT 0005	



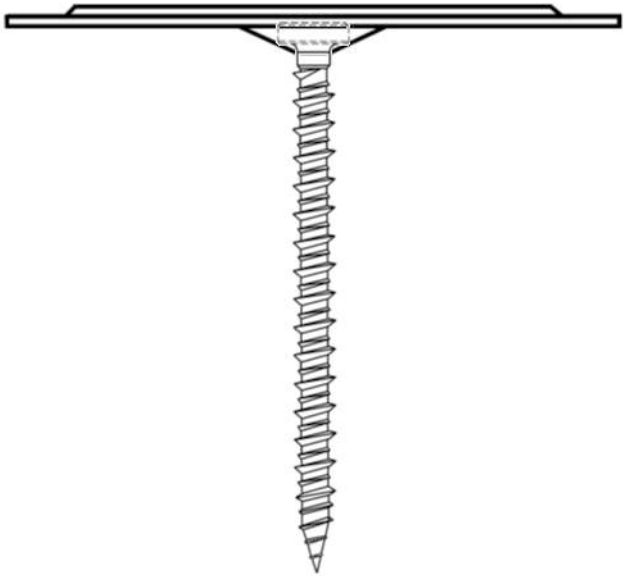
Zahn ZTSK 4,8



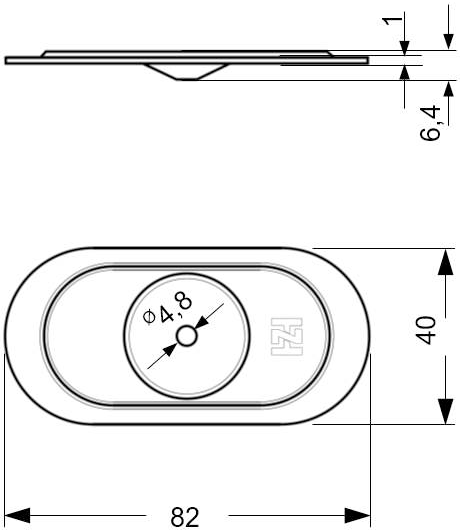
Zahn ZHBK-E 4,8 x L



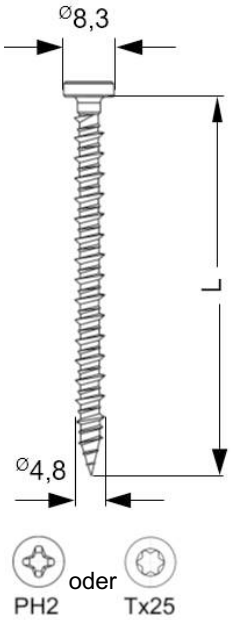
Zahn Flachdachbefestigungselemente	Anhang 67
Kombination 67 ZTSK-E-Holz aus ZHBK-E / ZTSK 4,8	



Zahn ZLVT 0001

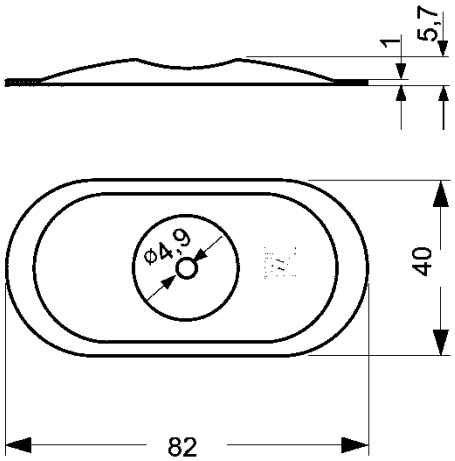


Zahn ZHBK-E 4,8 x L

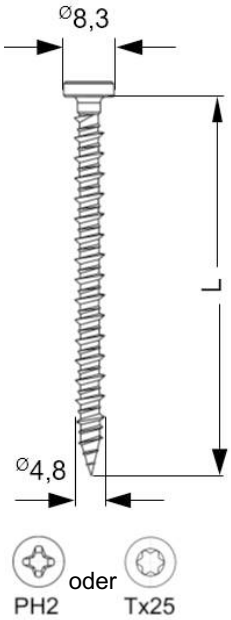


Zahn Flachdachbefestigungselemente	Anhang 68
Kombination 68 ZHBK-E / ZLVT 0001	

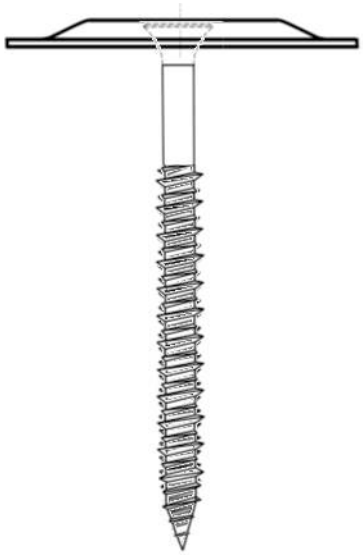
Zahn ZLVT 0005



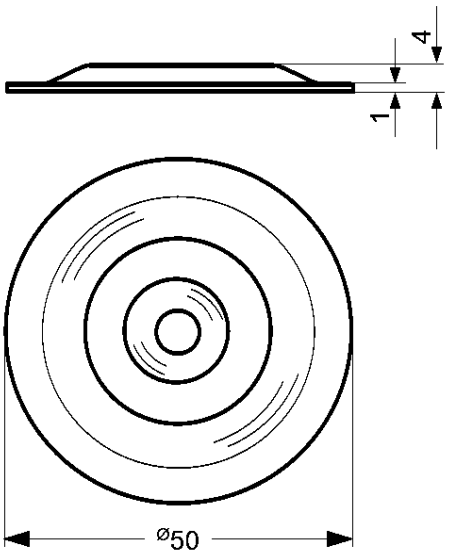
Zahn ZHBK-E 4,8 x L



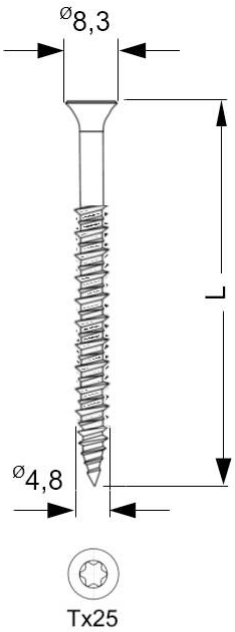
Zahn Flachdachbefestigungselemente	Anhang 69
Kombination 69 ZHBK-E / ZLVT 0005	



Zahn ZLVT 0015

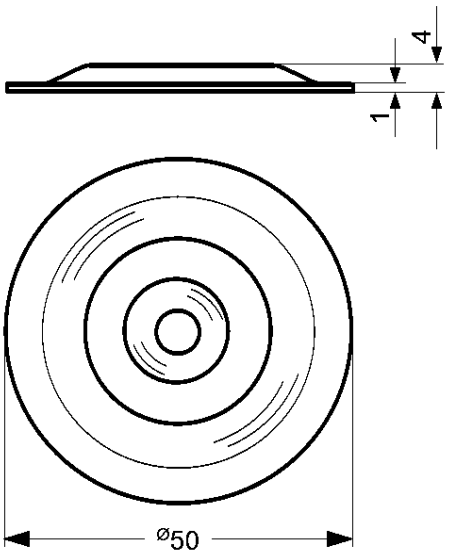


Zahn ZHBK-E_{TK} 4,8 x L

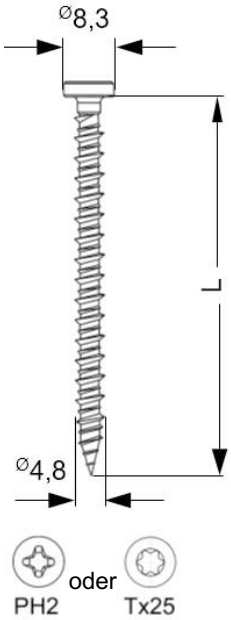


Zahn Flachdachbefestigungselemente	Anhang 69a
Kombination 69a ZHBK-E-TK / ZLVT 0015	

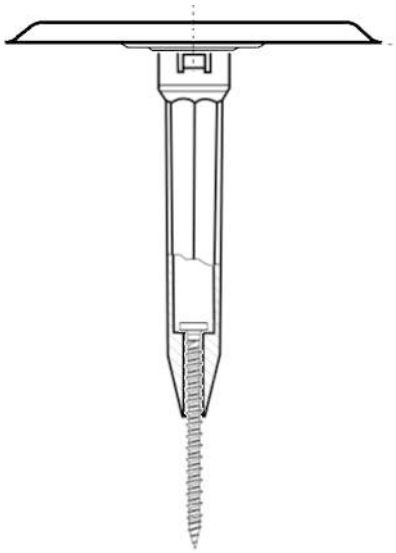
Zahn ZLVT 0015



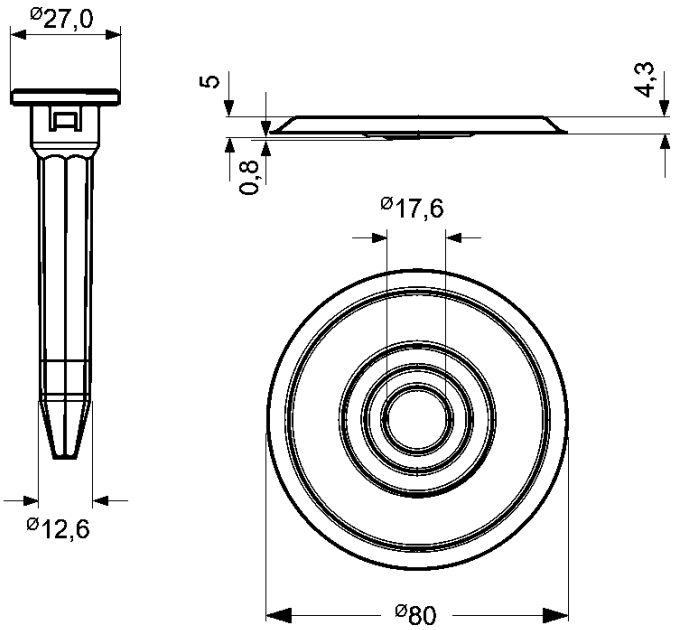
Zahn ZHBK-E 4,8 x L



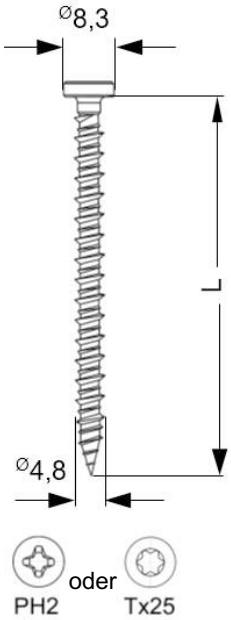
Zahn Flachdachbefestigungselemente	Anhang 70
Kombination 70 ZHBK-E / ZLVT 0015	



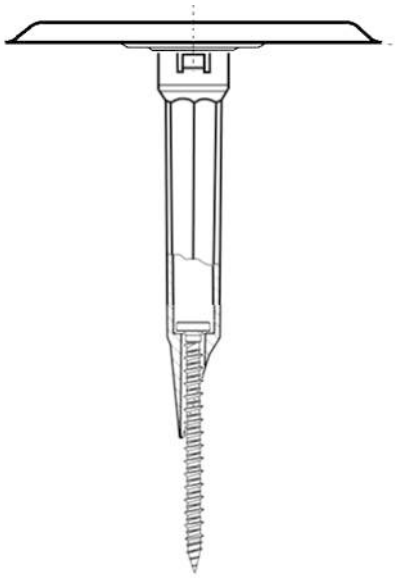
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



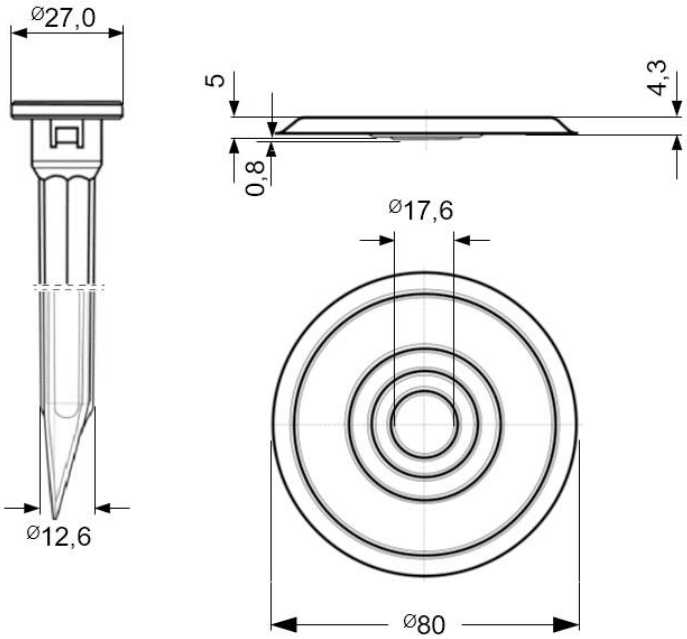
Zahn ZHBK-E 4,8 x L



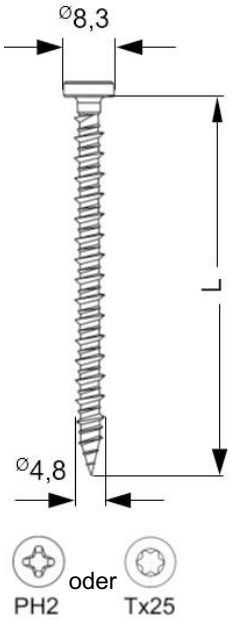
Zahn Flachdachbefestigungselemente	Anhang 70a
Kombination 70a ZCTS-E Holz aus ZHBK-E / ZCTS-Tülle 4,8 und ZCTS-Teller	



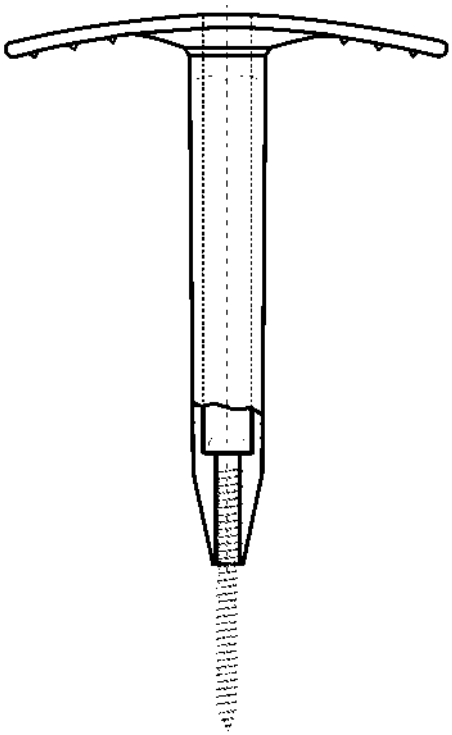
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



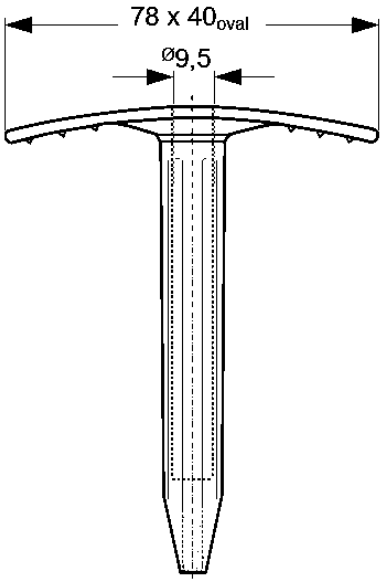
Zahn ZHBK-E 4,8 x L



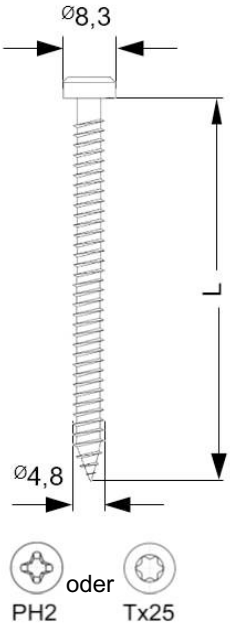
Zahn Flachdachbefestigungselemente	Anhang 70b
Kombination 70b ZCTS-Eplus Holz aus ZHBK-E / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



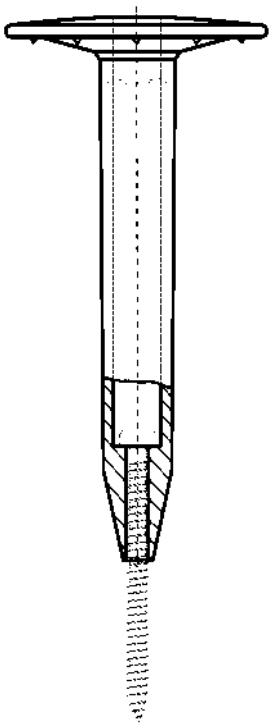
Zahn ZKSH oval



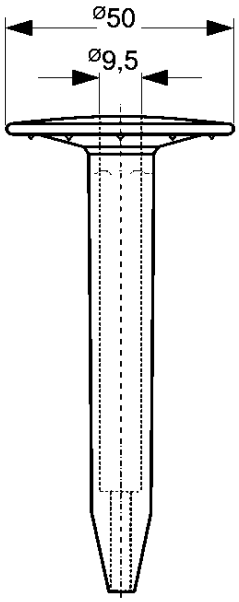
Zahn $ZDBK_{Dübel}$ 4,8 x L



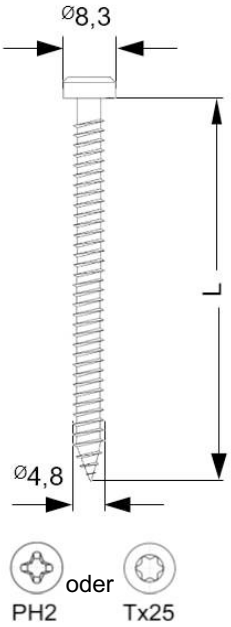
Zahn Flachdachbefestigungselemente	Anhang 71
Kombination 71 ZKSK / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH oval	



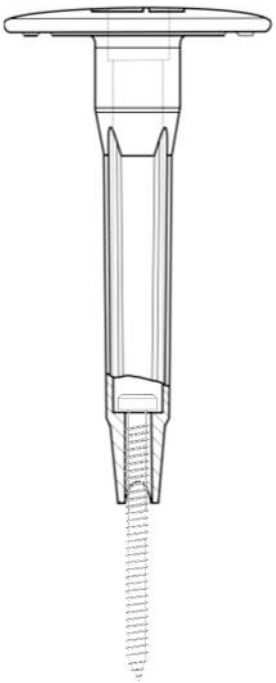
Zahn ZKSH rund



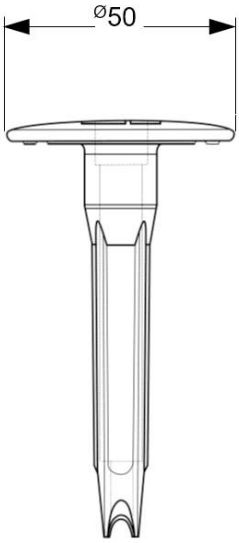
Zahn $ZDBK_{Dübel}$ 4,8 x L



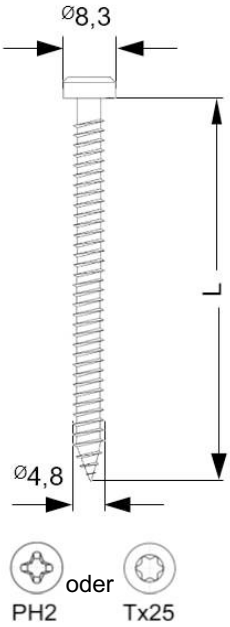
Zahn Flachdachbefestigungselemente	Anhang 72
Kombination 72 ZKSK-R / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH rund	



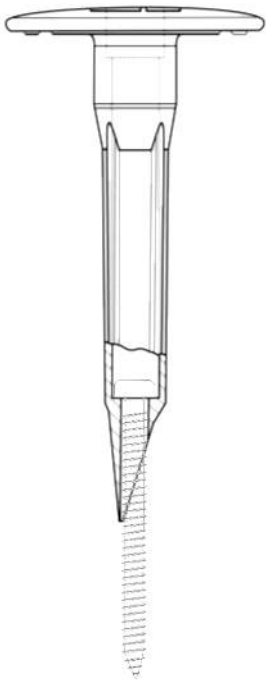
Zahn ZKSH-Rplus mit Pfahlspitze



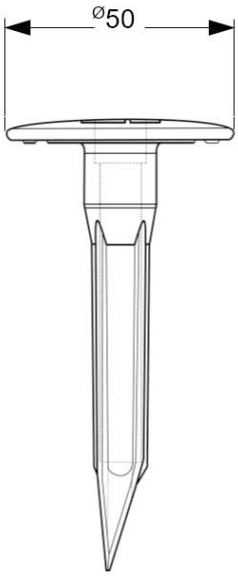
Zahn $ZDBK_{Dübel}$ 4,8 x L



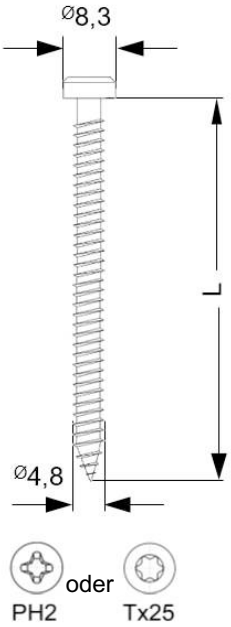
Zahn Flachdachbefestigungselemente	Anhang 73
Kombination 73 ZKSK-Rplus / ZDBK-Dübel mit Pfahlspitze aus $ZDBK_{Dübel}$ / ZKSH-Rplus mit Pfahlspitze	



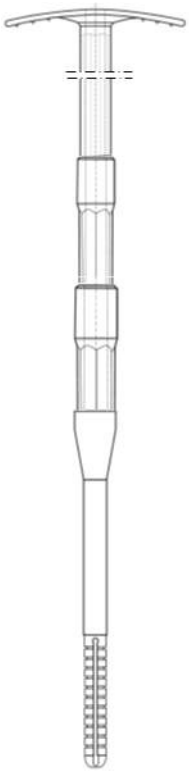
Zahn ZKSH-Rplus



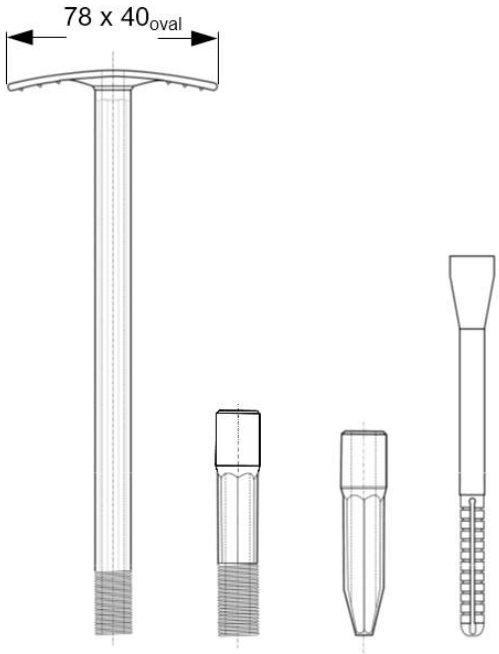
Zahn $ZDBK_{Dübel}$ 4,8 x L



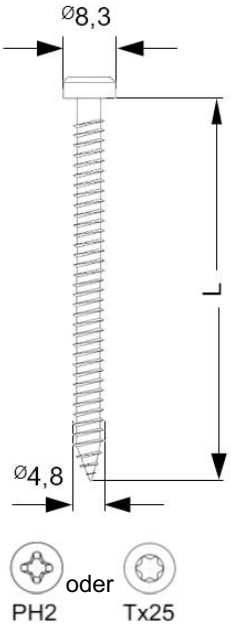
Zahn Flachdachbefestigungselemente	Anhang 74
Kombination 74 ZKSK-Rplus / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH-Rplus	



Zahn ZKSH oval Modul 4,8 mit Dübelvorsatz

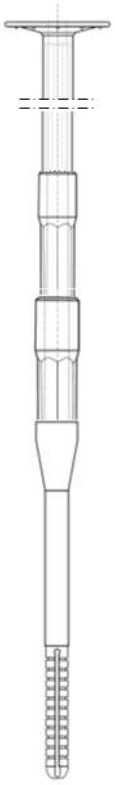


Zahn $ZDBK_{Dübel}$ 4,8 x L

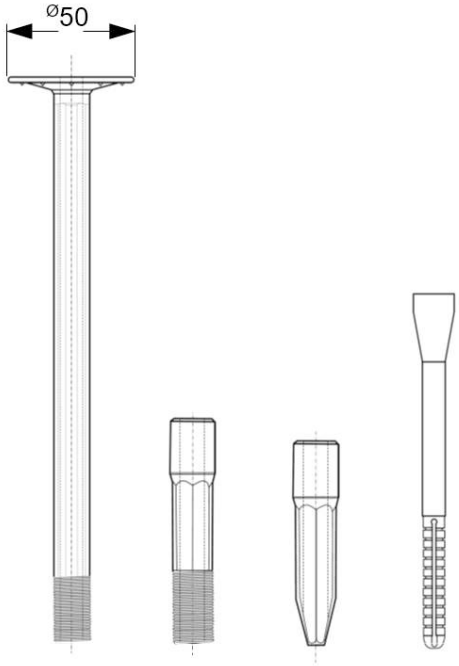


Zahn Flachdachbefestigungselemente	Anhang 75
Kombination 75 ZSDK-Modul / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH oval Modul 4,8 mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	

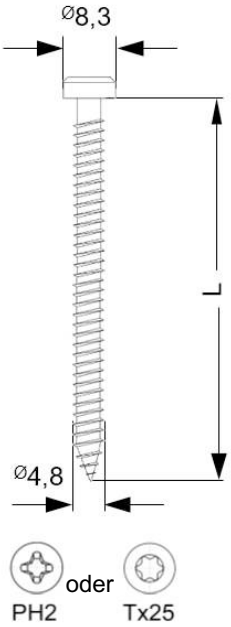
Modul 4,8 mit Dübelvorsatz



Zahn ZKSH rund Modul 4,8 mit Dübelvorsatz



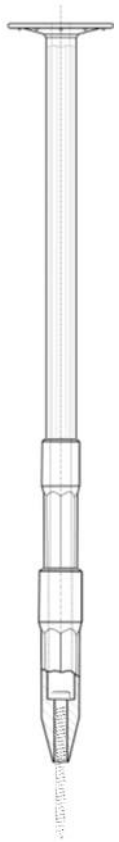
Zahn $ZDBK_{Dübel}$ 4,8 x L



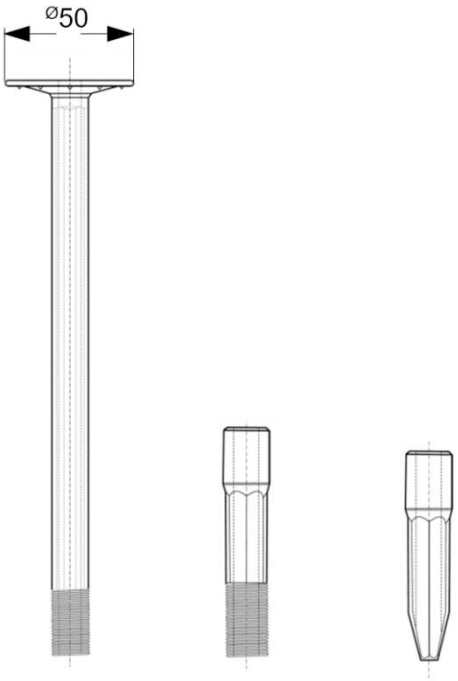
Zahn Flachdachbefestigungselemente

Kombination 76
ZSDK-R-Modul / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH rund Modul 4,8
mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz

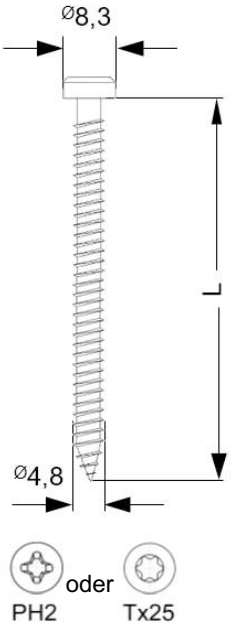
Anhang 76



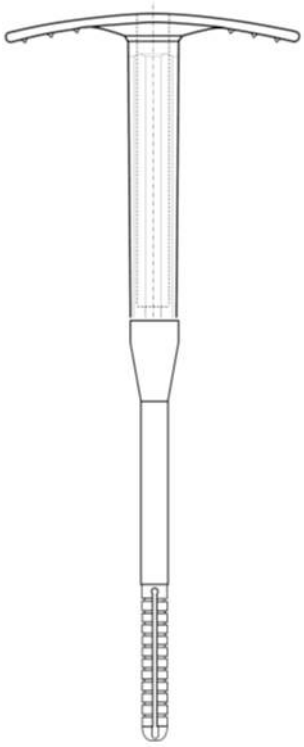
Zahn ZKSH rund Modul 4,8



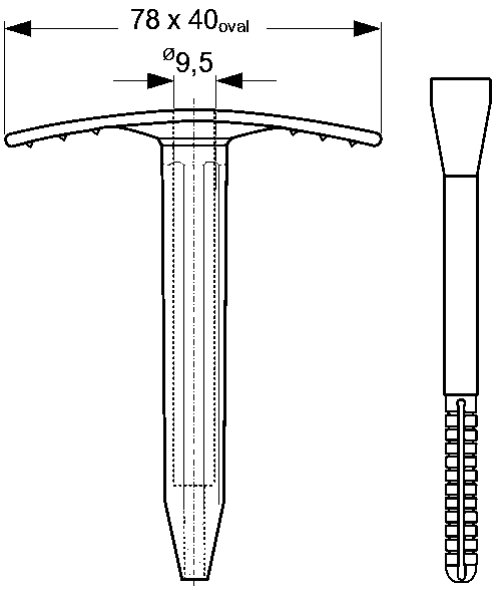
Zahn $ZDBK_{Dübel}$ 4,8 x L



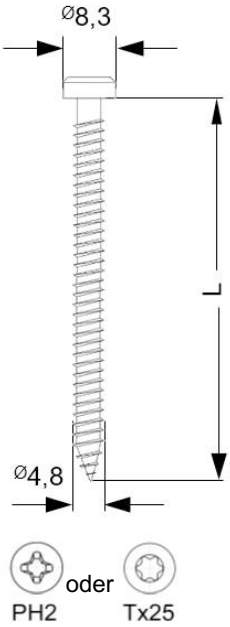
Zahn Flachdachbefestigungselemente	Anhang 76a
Kombination 76a ZHSK-R-Modul / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH rund Modul 4,8 mit modularem Mittelstück und Spitze 4,8	



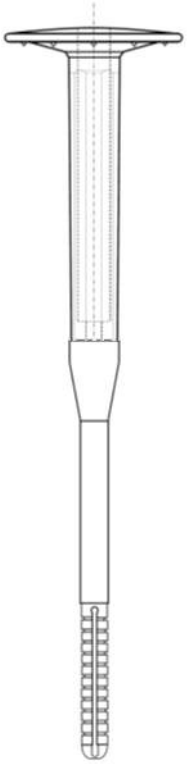
Zahn ZKSH oval mit Dübelvorsatz



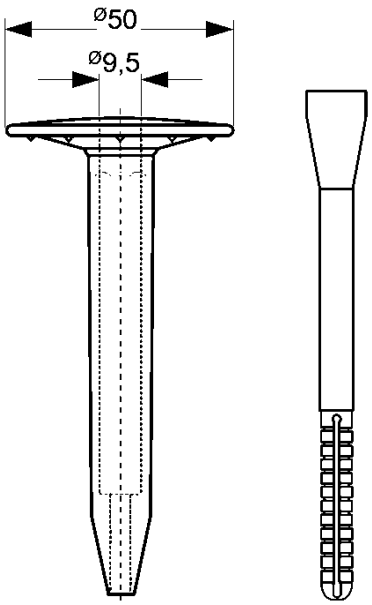
Zahn $ZDBK_{Dübel}$ 4,8 x L



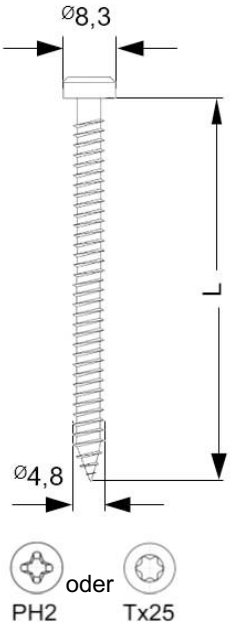
Zahn Flachdachbefestigungselemente	Anhang 77
Kombination 77 ZSDK / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH oval mit Dübelvorsatz	



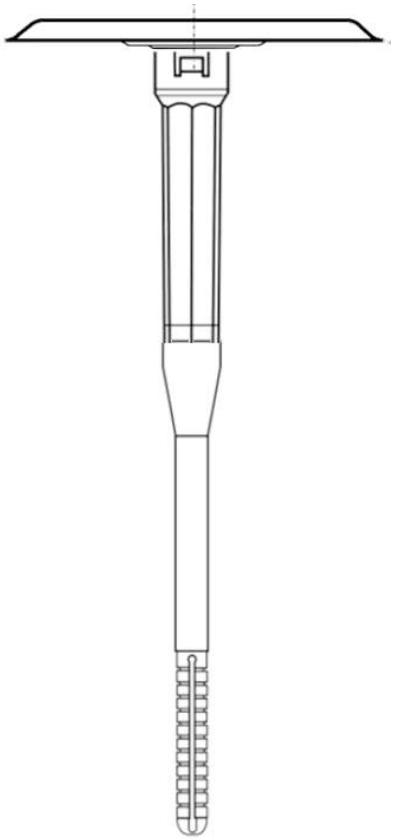
Zahn ZKSH rund mit Dübelvorsatz



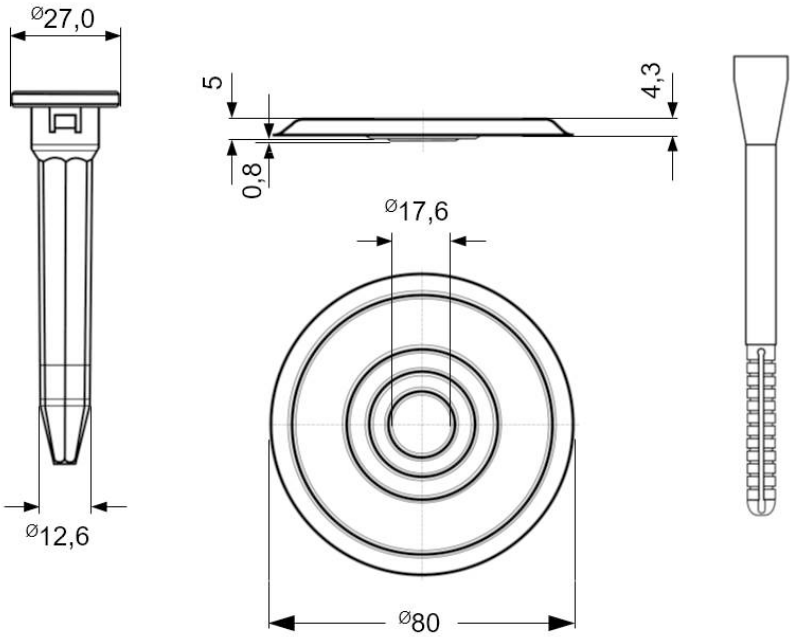
Zahn $ZDBK_{Dübel}$ 4,8 x L



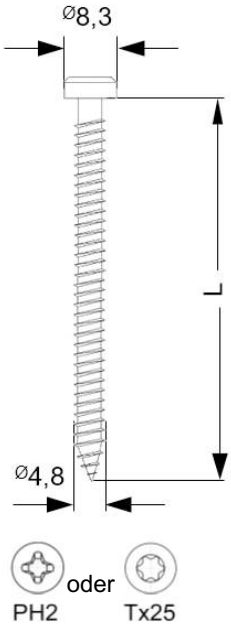
Zahn Flachdachbefestigungselemente	Anhang 78
Kombination 78 ZSDK-R / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZKSH rund mit Dübelvorsatz	



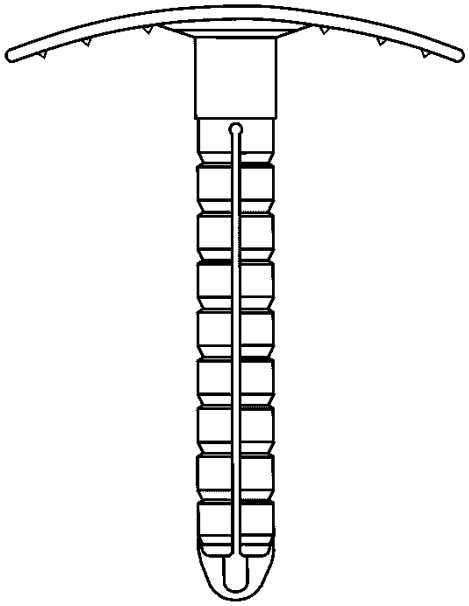
Zahn ZCTS-Tülle 4,8 mit ZCTS- Teller und Dübelvorsatz



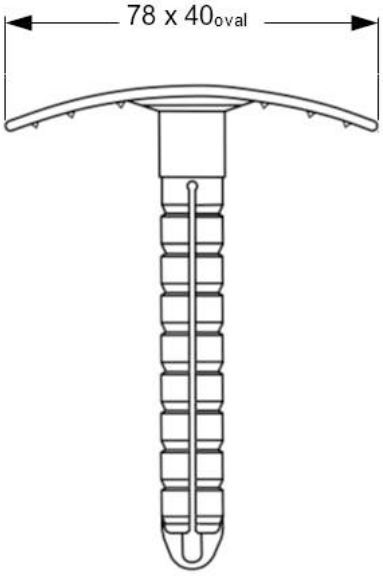
Zahn $ZDBK_{Dübel}$ 4,8 x L



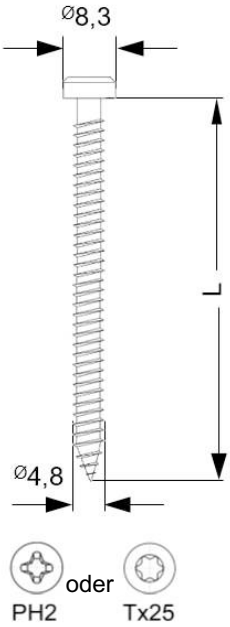
Zahn Flachdachbefestigungselemente	Anhang 78a
Kombination 78a ZCTS / ZDBK-Dübel-Beton aus $ZDBK_{Dübel}$ / ZCTS-Tülle 4,8, ZCTS-Teller und Dübelvorsatz	



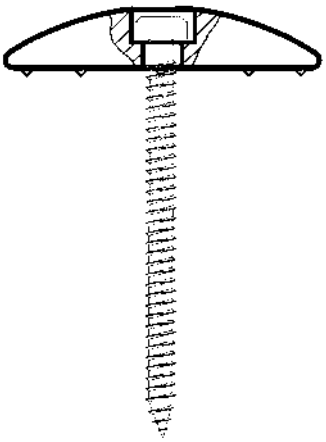
Zahn ZTSD oval



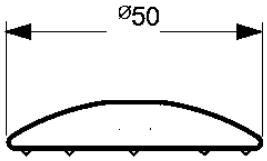
Zahn $ZDBK_{Dübel}$ 4,8 x L



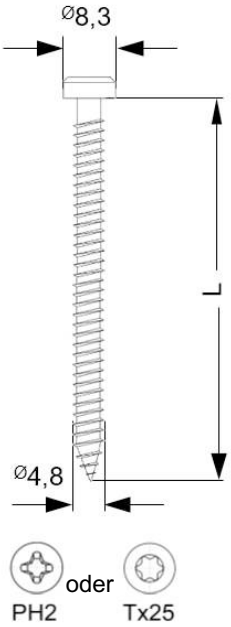
Zahn Flachdachbefestigungselemente	Anhang 79
Kombination 79 ZTSD / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZTSD oval	



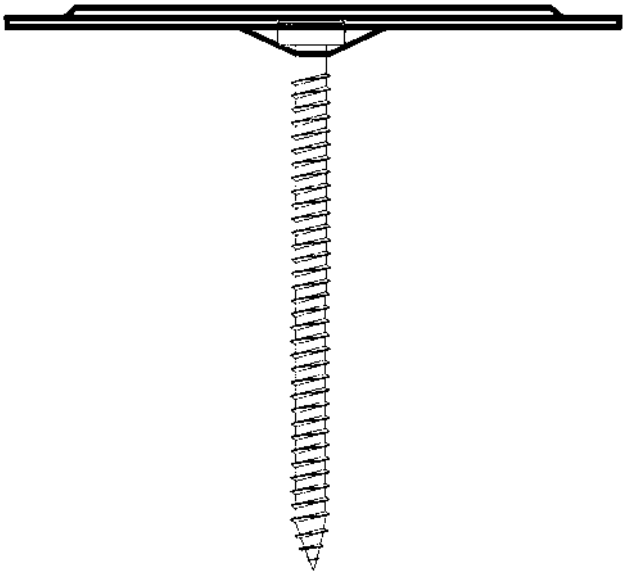
Zahn ZTSK 4,8



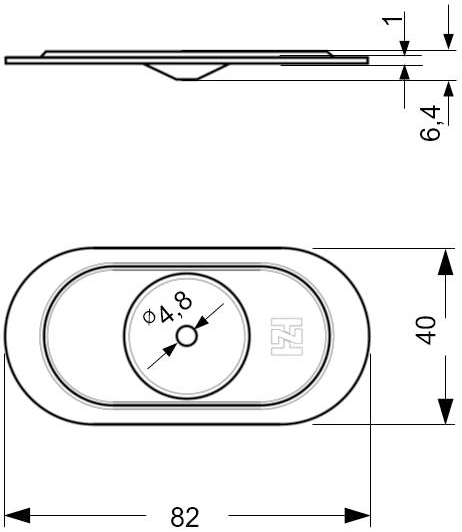
Zahn $ZDBK_{Dübel}$ 4,8 x L



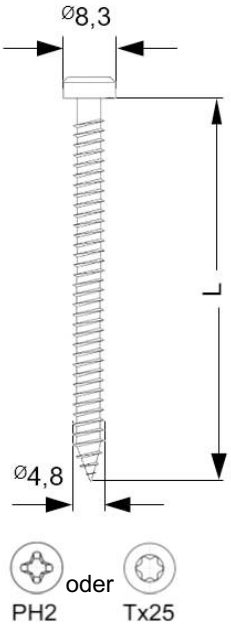
Zahn Flachdachbefestigungselemente	Anhang 80
Kombination 80 ZTSK / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZTSK 4,8	



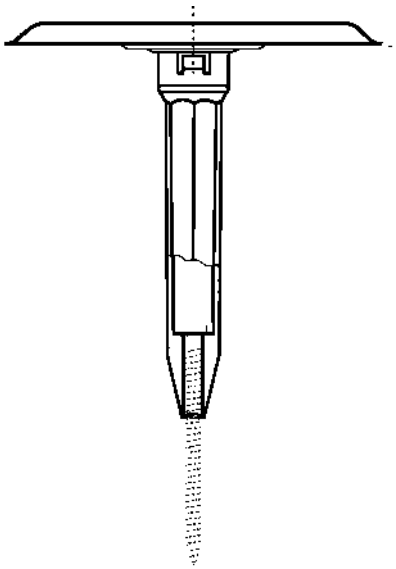
Zahn ZLVT 0001



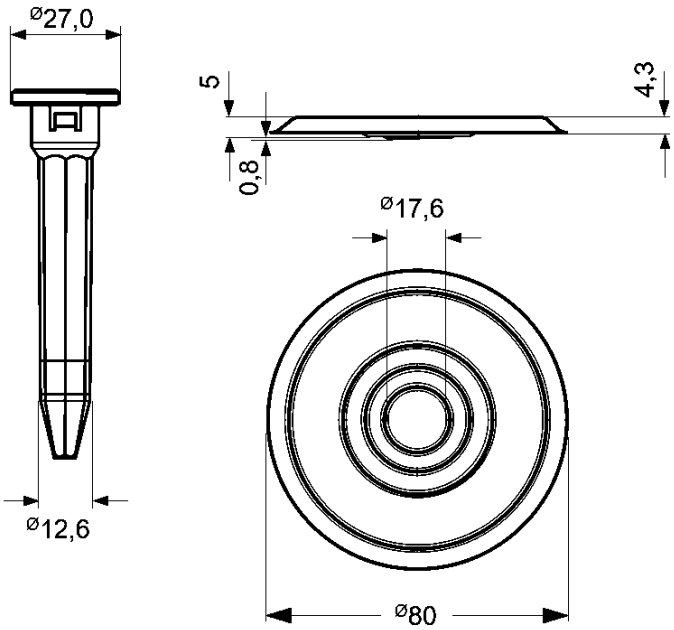
Zahn $ZDBK_{Dübel}$ 4,8 x L



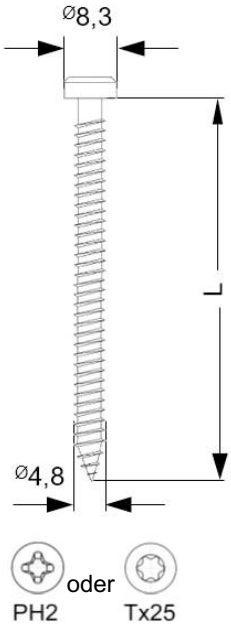
Zahn Flachdachbefestigungselemente	Anhang 81
Kombination 81 ZDBK-Dübel / ZLVT 0001	



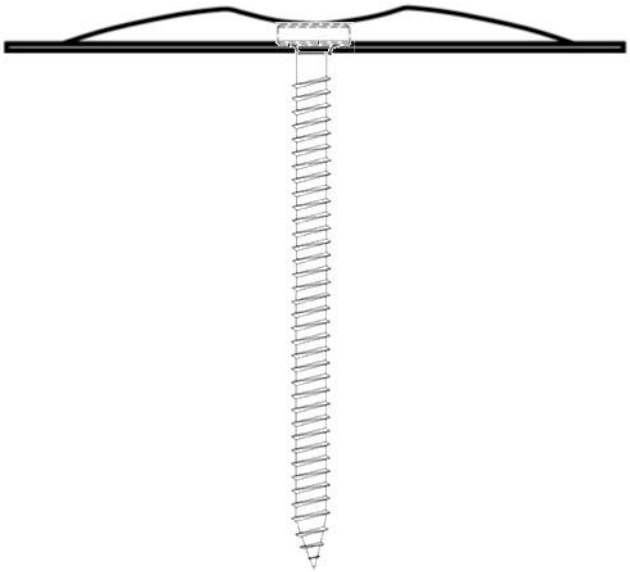
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller



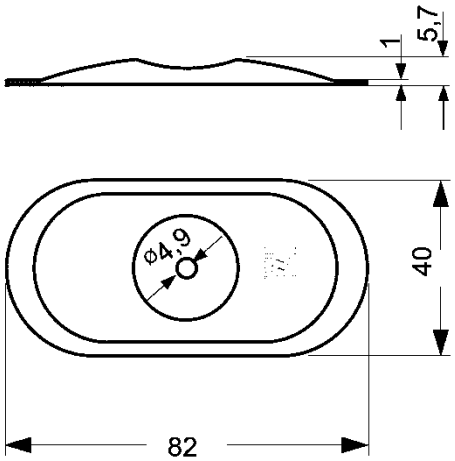
Zahn $ZDBK_{Dübel}$ 4,8 x L



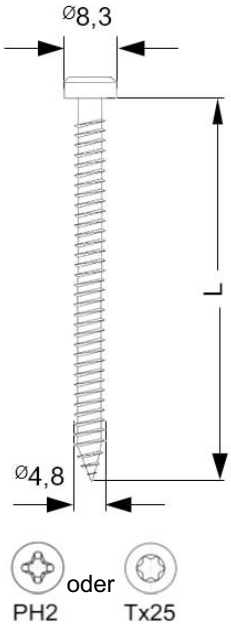
Zahn Flachdachbefestigungselemente	Anhang 81a
Kombination 81a ZCTS / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZCTS-Tülle 4,8 und ZCTS-Teller	



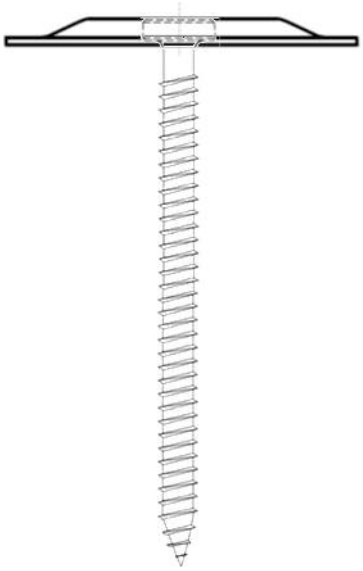
Zahn ZLVT 0005



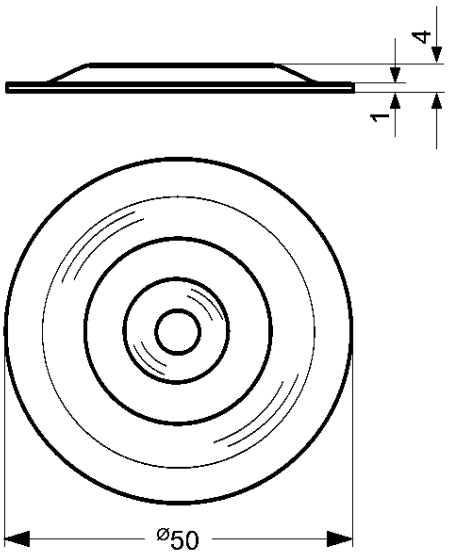
Zahn $ZDBK_{Dübel}$ 4,8 x L



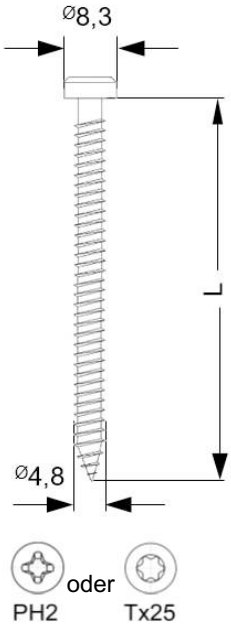
Zahn Flachdachbefestigungselemente	Anhang 81b
Kombination 81b ZDBK-Dübel / ZLVT 0005	



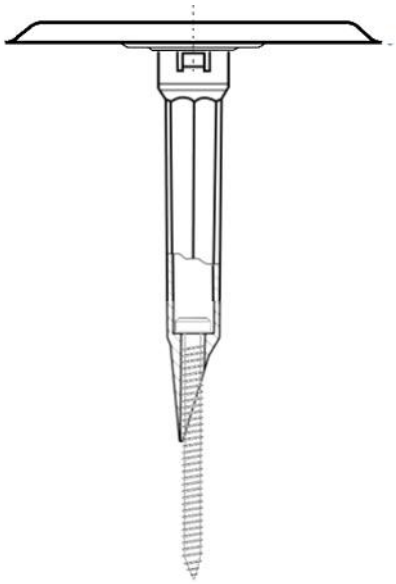
Zahn ZLVT 0015



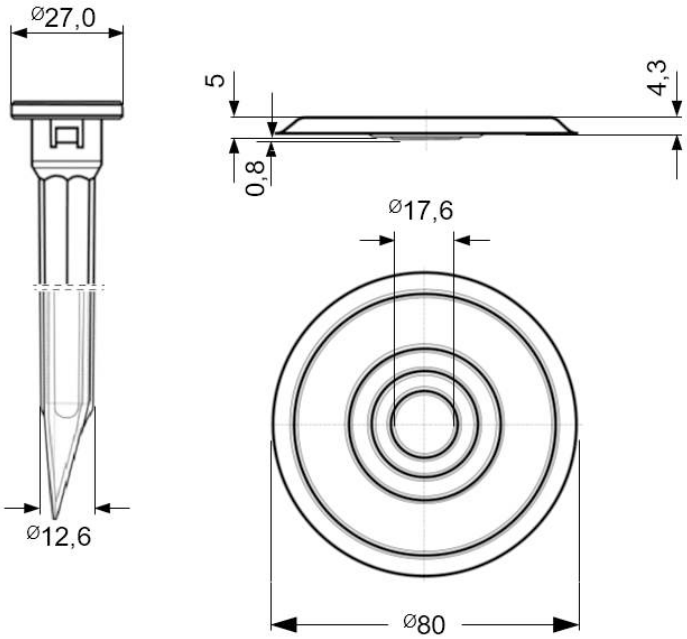
Zahn $ZDBK_{Dübel}$ 4,8 x L



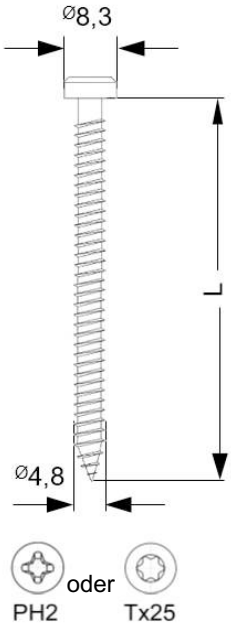
Zahn Flachdachbefestigungselemente	Anhang 81c
Kombination 81c ZDBK-Dübel / ZLVT 0015	



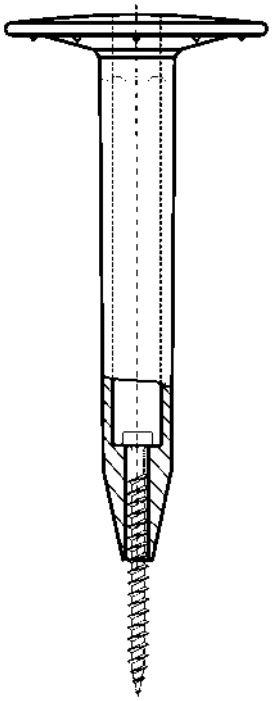
Zahn ZCTS-Tülle-plus 4,8 mit ZCTS-Teller



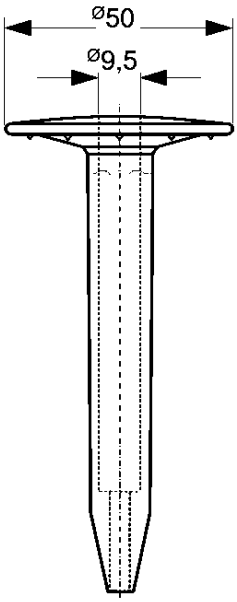
Zahn $ZDBK_{Dübel}$ 4,8 x L



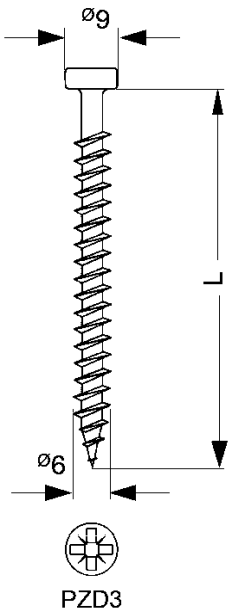
Zahn Flachdachbefestigungselemente	Anhang 81d
Kombination 81d ZCTSplus / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZCTS-Tülle-plus 4,8 und ZCTS-Teller	



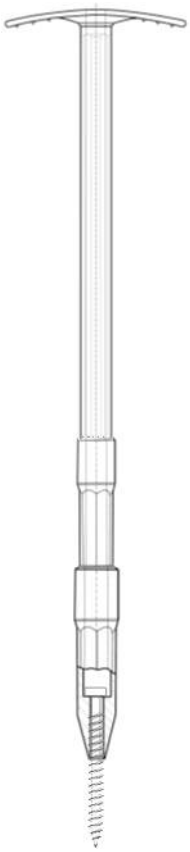
Zahn ZKSH grau / rund



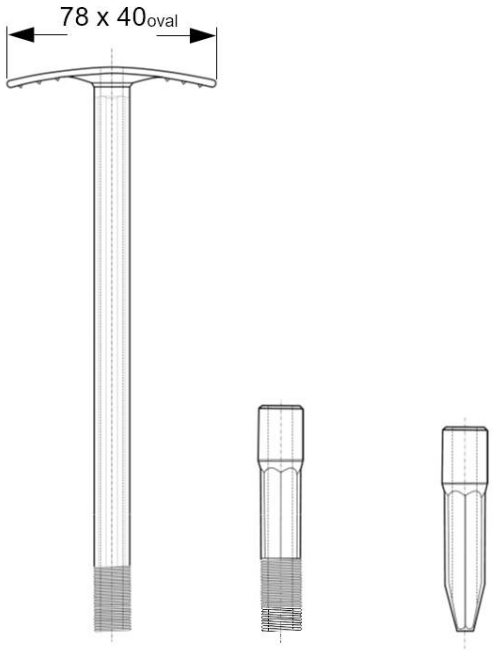
Zahn ZGBK-E 6,0 x L



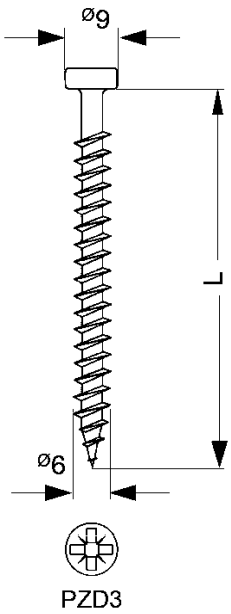
Zahn Flachdachbefestigungselemente	Anhang 82
Kombination 82 ZKGK-E/R aus ZGBK-E / ZKSH grau / rund	



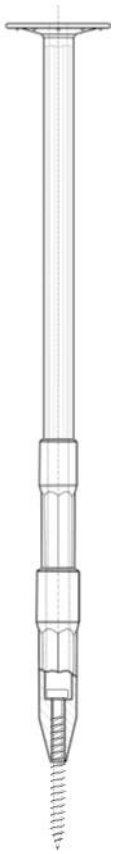
Zahn ZKSH oval Modul 6,0



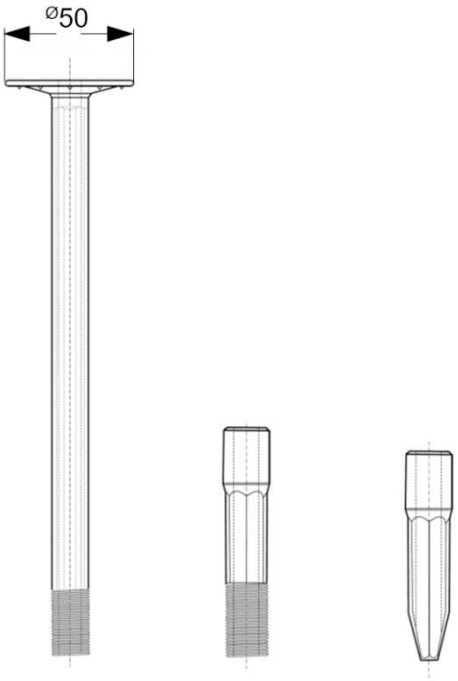
Zahn ZGBK-E 6,0 x L



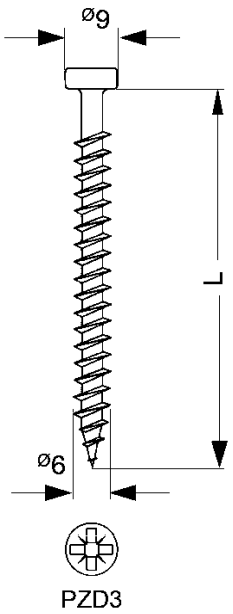
Zahn Flachdachbefestigungselemente	Anhang 83
Kombination 83 ZKGK-E-Modul aus ZGBK-E / ZKSH oval Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



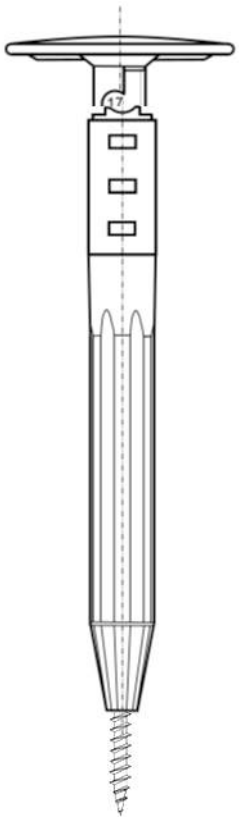
Zahn ZKSH rund Modul 6,0



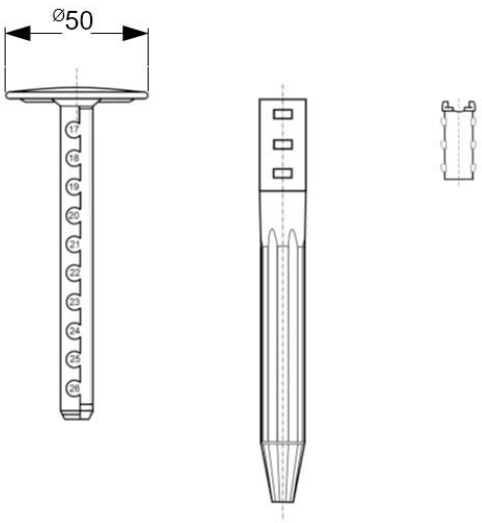
Zahn ZGBK-E 6,0 x L



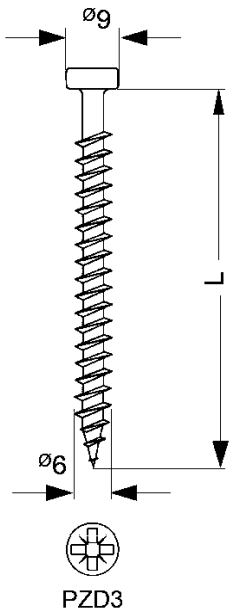
Zahn Flachdachbefestigungselemente	Anhang 84
Kombination 84 ZKGK-E/R-Modul aus ZGBK-E / ZKSH rund Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



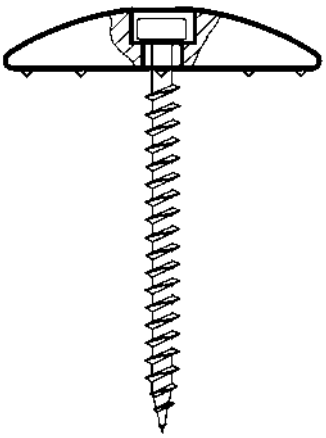
Zahn ZHVM



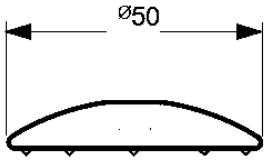
Zahn ZGBK-E 6,0 x L



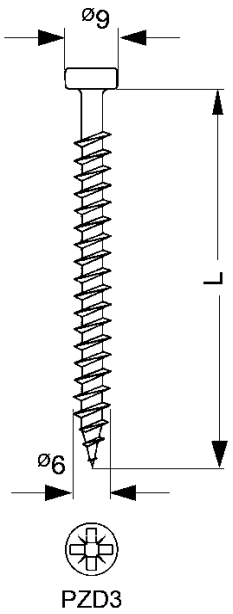
Zahn Flachdachbefestigungselemente	Anhang 85
Kombination 85 ZHVM-E PB-Direkt aus ZGBK-E / ZHVM mit Kopfteil, Schaftteil und Verriegelungsbuchse	



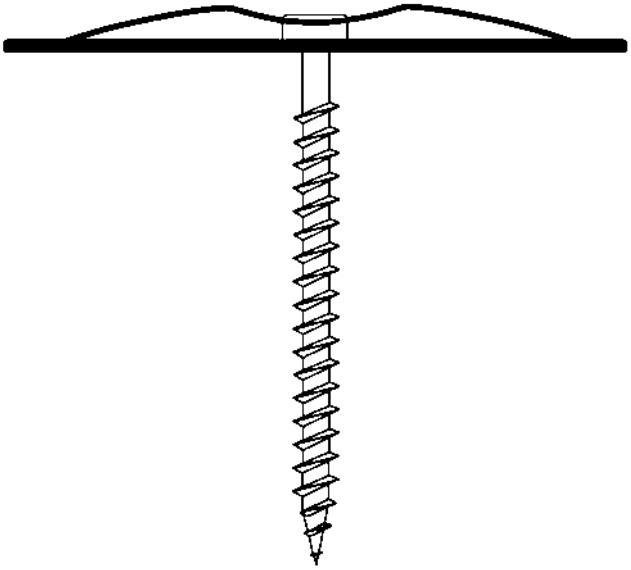
Zahn ZTSK 6,0



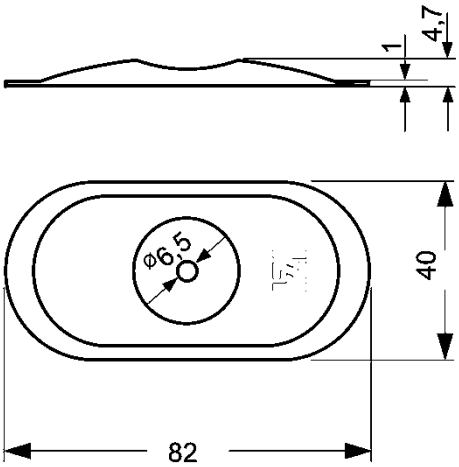
Zahn ZGBK-E 6,0 x L



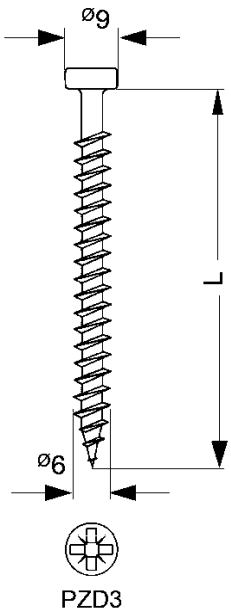
Zahn Flachdachbefestigungselemente	Anhang 86
Kombination 86 ZTSK-E PB-Direkt aus ZGBK-E / ZTSK 6,0	



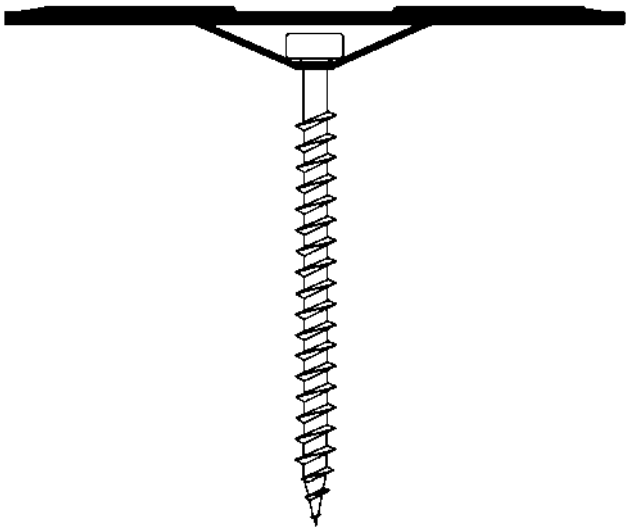
Zahn ZLVT 0008



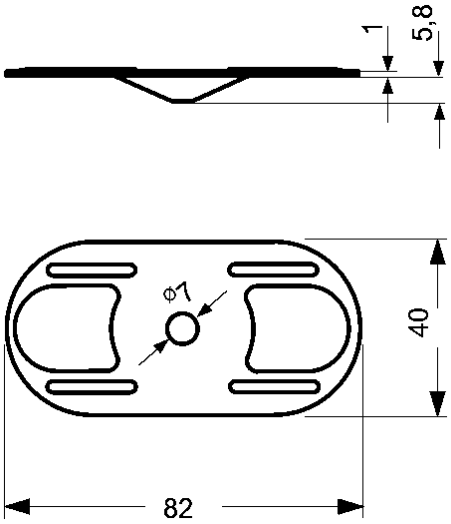
Zahn ZGBK-E 6,0 x L



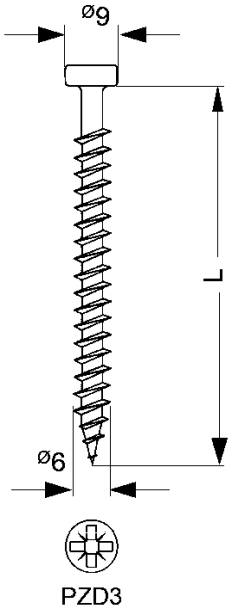
Zahn Flachdachbefestigungselemente	Anhang 87
Kombination 87 ZGBK-E / ZLVT 0008	



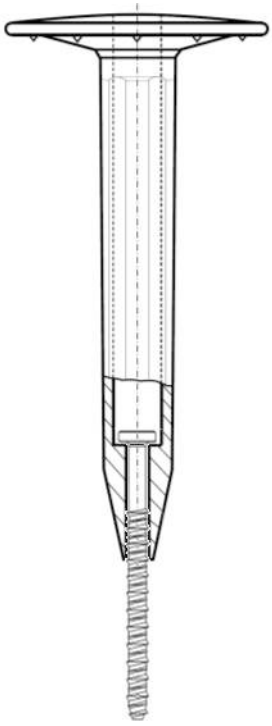
Zahn ZLVT 0012



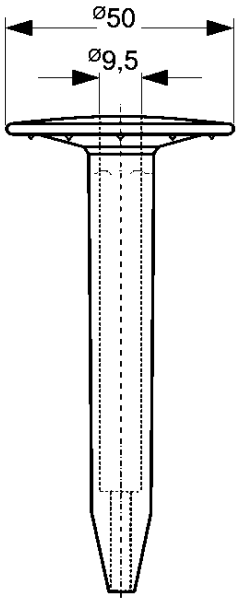
Zahn ZGBK-E 6,0 x L



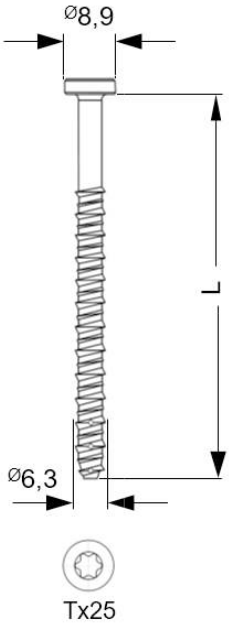
Zahn Flachdachbefestigungselemente	Anhang 88
Kombination 88 ZGBK-E / ZLVT 0012	



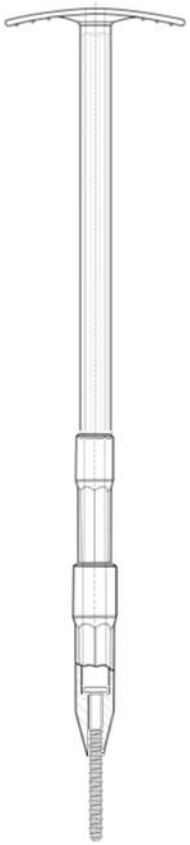
Zahn ZKSH grau / rund



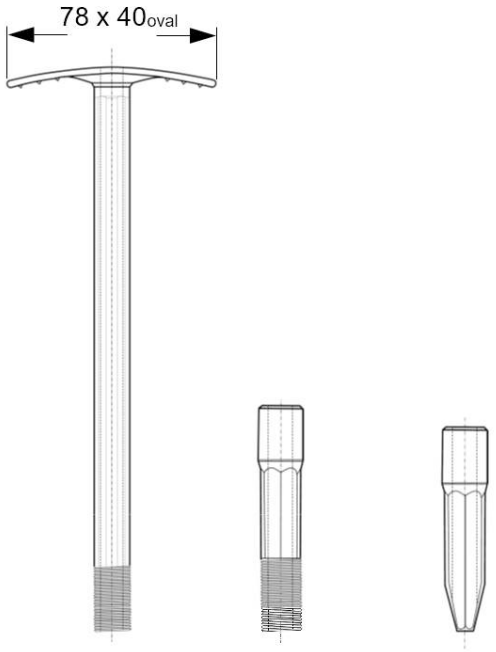
Zahn ZBST 6,3 x L



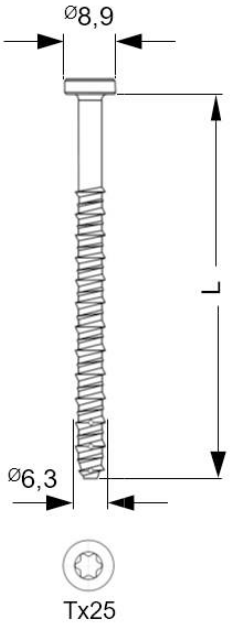
Zahn Flachdachbefestigungselemente	Anhang 89
Kombination 89 ZBSK-R aus ZBST / ZKSH grau / rund	



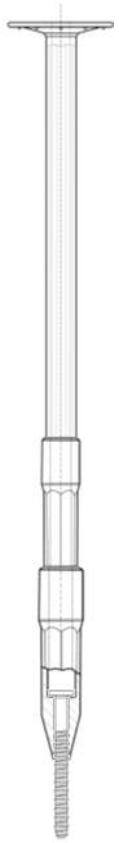
Zahn ZKSH oval Modul 6,0



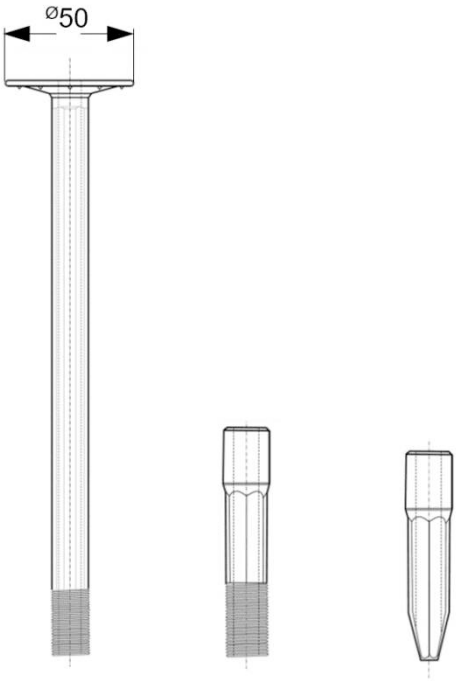
Zahn ZBST 6,3 x L



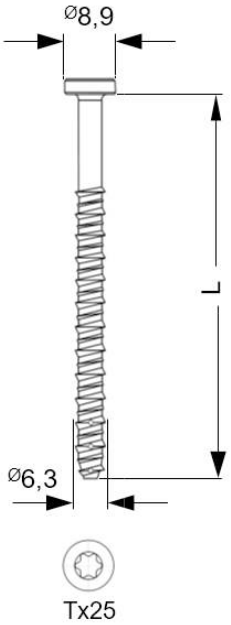
Zahn Flachdachbefestigungselemente	Anhang 90
Kombination 90 ZBSK-Modul aus ZBST / ZKSH oval Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



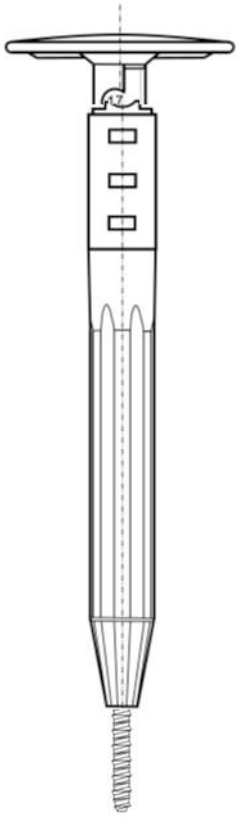
Zahn ZKSH rund Modul 6,0



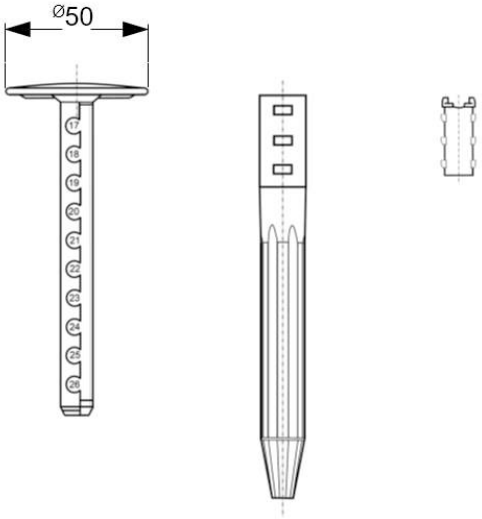
Zahn ZBST 6,3 x L



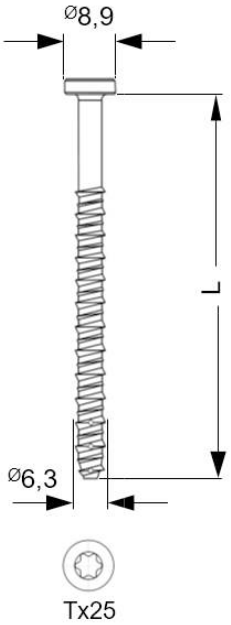
Zahn Flachdachbefestigungselemente	Anhang 91
Kombination 91 ZBSK-R-Modul aus ZBST / ZKSH rund Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



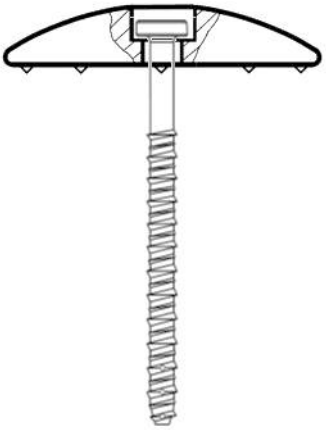
Zahn ZHVM



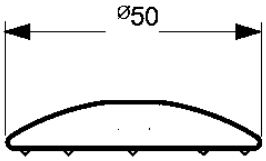
Zahn ZBST 6,3 x L



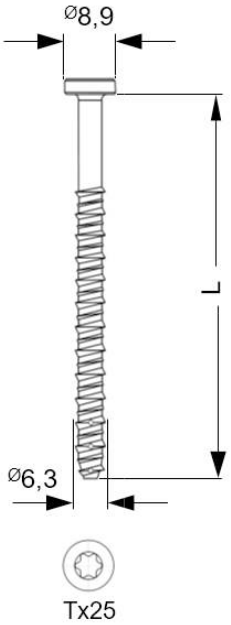
Zahn Flachdachbefestigungselemente	Anhang 92
Kombination 92 ZHVM-Beton-Direkt aus ZBST / ZHVM mit Kopfteil, Schaftteil und Verriegelungsbuchse	



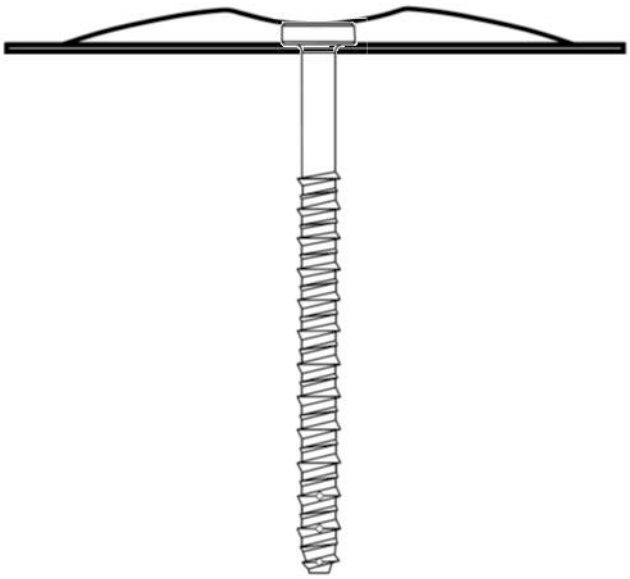
Zahn ZTSK 6,0



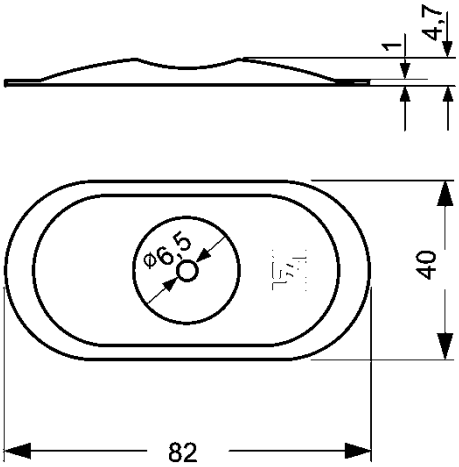
Zahn ZBST 6,3 x L



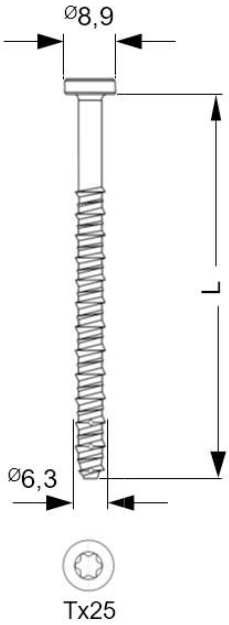
Zahn Flachdachbefestigungselemente	Anhang 93
Kombination 93 ZTSK-Beton-Direkt aus ZBST / ZTSK 6,0	



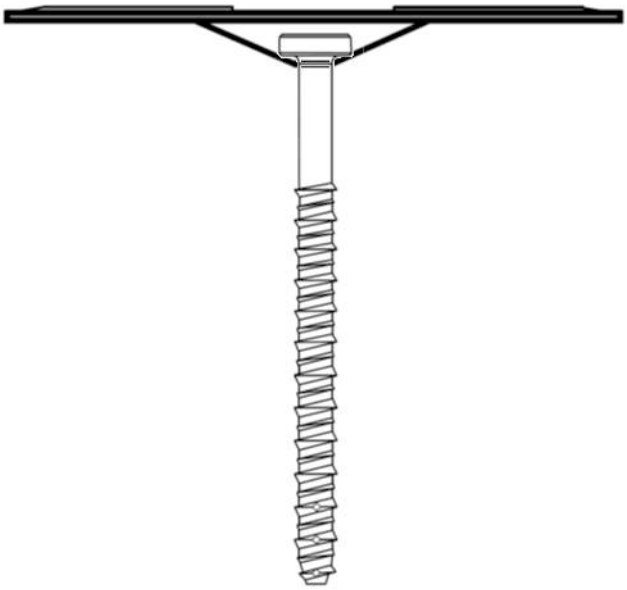
Zahn ZLVT 0008



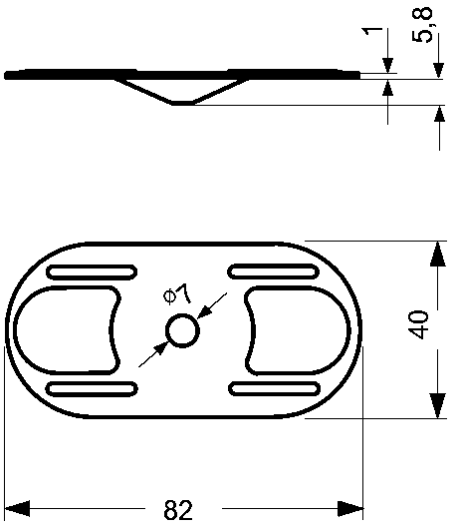
Zahn ZBST 6,3 x L



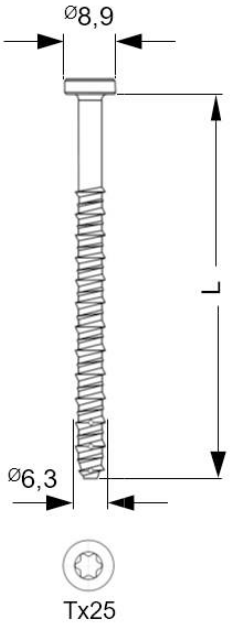
Zahn Flachdachbefestigungselemente	Anhang 94
Kombination 94 ZBST / ZLVT 0008	



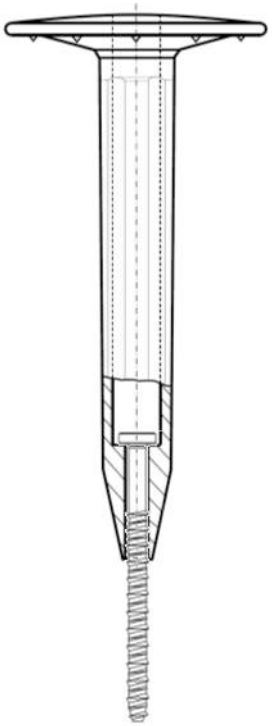
Zahn ZLVT 0012



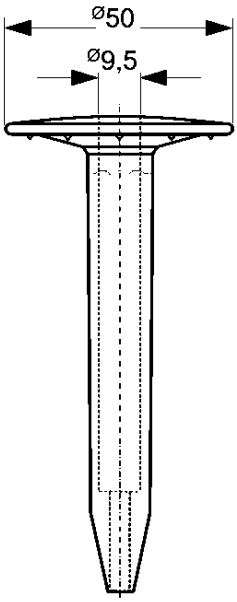
Zahn ZBST 6,3 x L



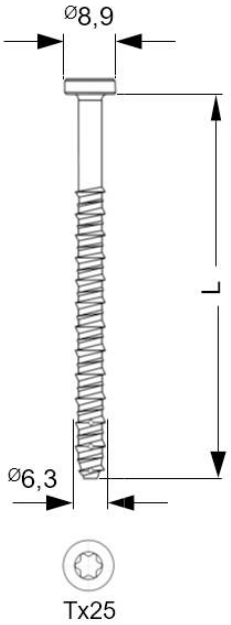
Zahn Flachdachbefestigungselemente	Anhang 95
Kombination 95 ZBST / ZLVT 0012	



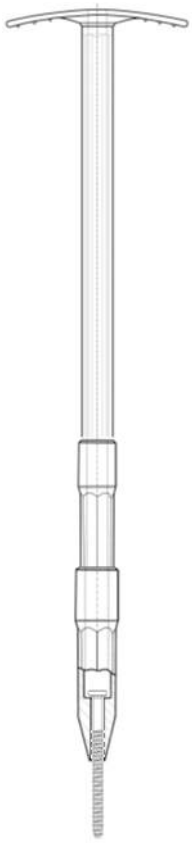
Zahn ZKSH grau / rund



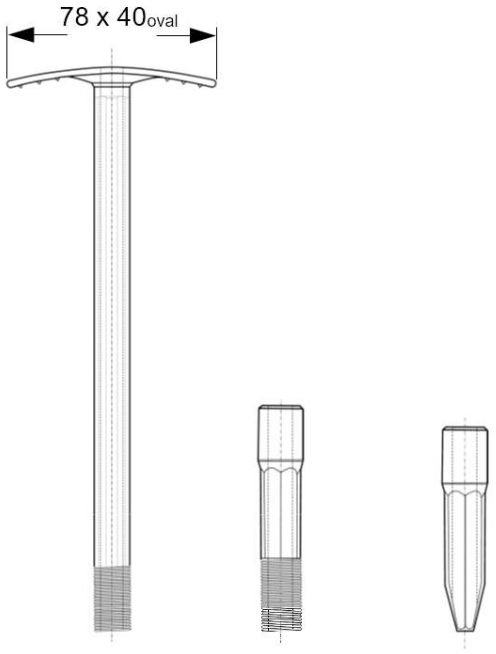
Zahn ZBST-E 6,3 x L



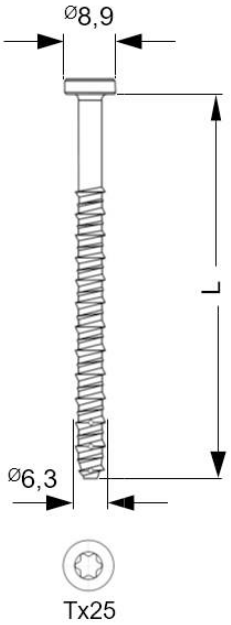
Zahn Flachdachbefestigungselemente	Anhang 96
Kombination 96 ZBSK-E/R aus ZBST-E / ZKSH grau / rund	



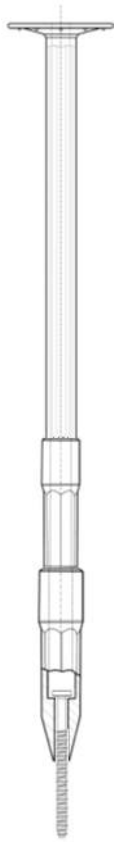
Zahn ZKSH oval Modul 6,0



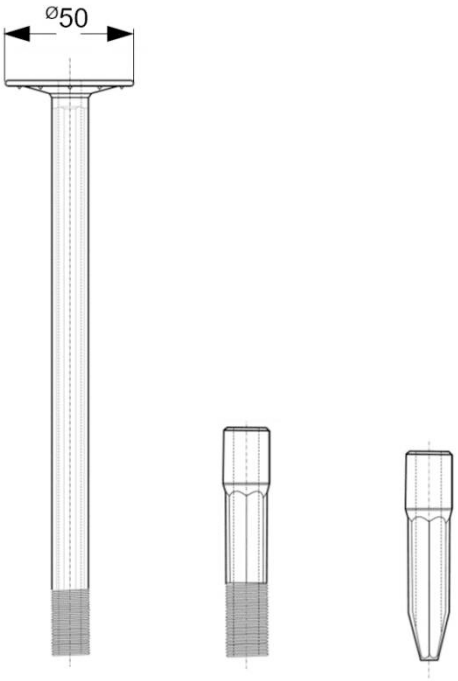
Zahn ZBST-E 6,3 x L



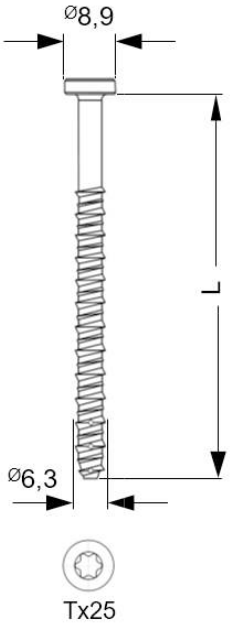
Zahn Flachdachbefestigungselemente	Anhang 97
Kombination 97 ZBSK-E-Modul aus ZBST-E / ZKSH oval Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



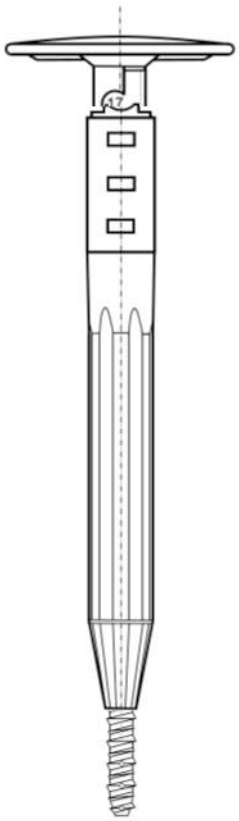
Zahn ZKSH rund Modul 6,0



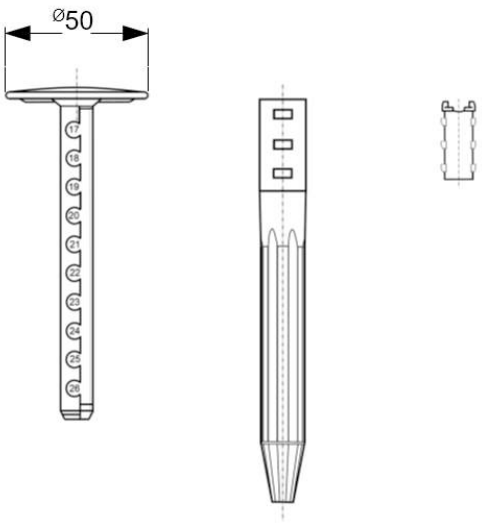
Zahn ZBST-E 6,3 x L



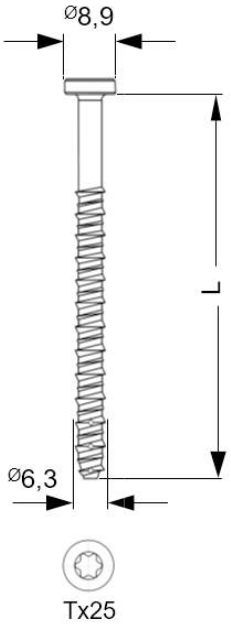
Zahn Flachdachbefestigungselemente	Anhang 98
Kombination 98 ZBSK-E/R-Modul aus ZBST-E / ZKSH rund Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



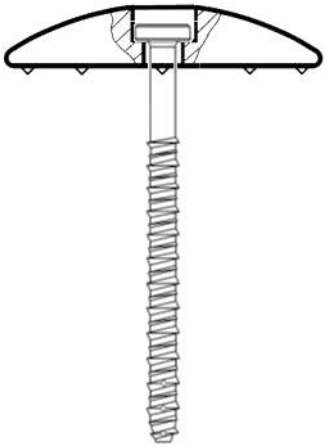
Zahn ZHVM



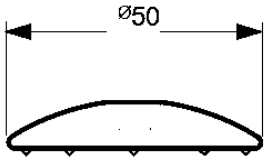
Zahn ZBST-E 6,3 x L



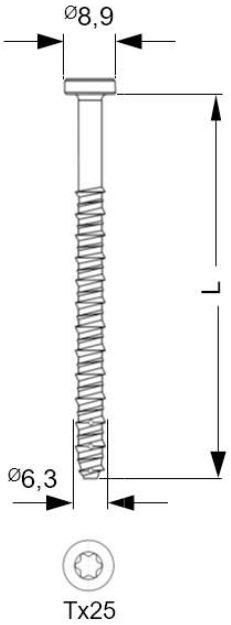
Zahn Flachdachbefestigungselemente	Anhang 99
Kombination 99 ZHVM-E-Beton-Direkt aus ZBST-E / ZHVM mit Kopfteil, Schaftteil und Verriegelungsbuchse	



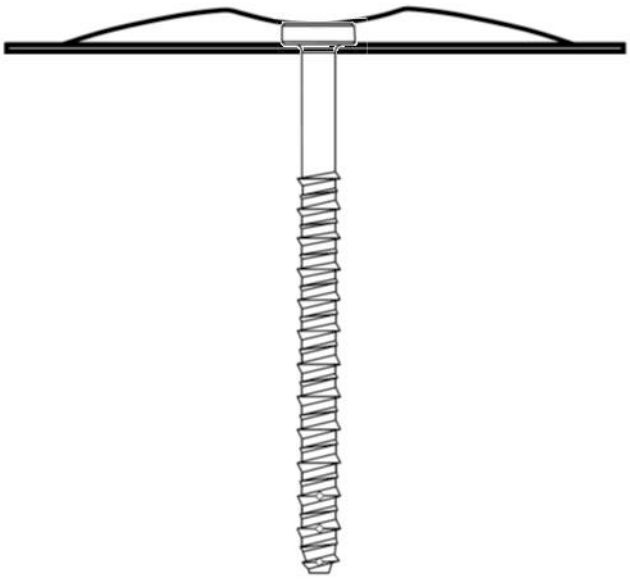
Zahn ZTSK 6,0



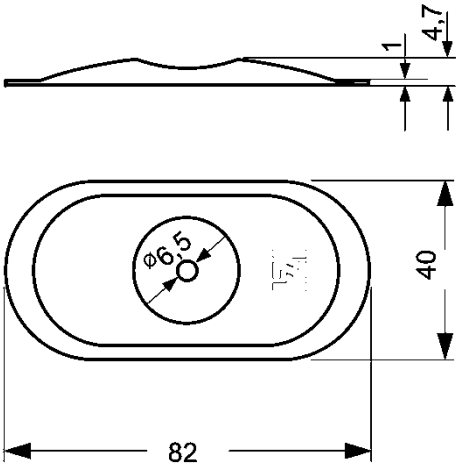
Zahn ZBST-E 6,3 x L



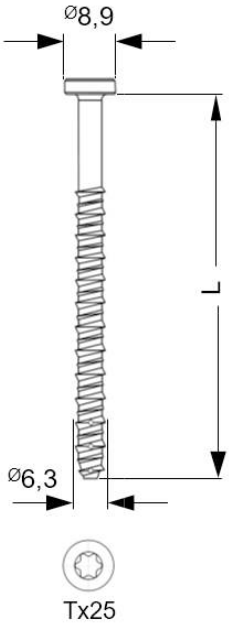
Zahn Flachdachbefestigungselemente	Anhang 100
Kombination 100 ZTSK-E-Beton-Direkt aus ZBST-E / ZTSK 6,0	



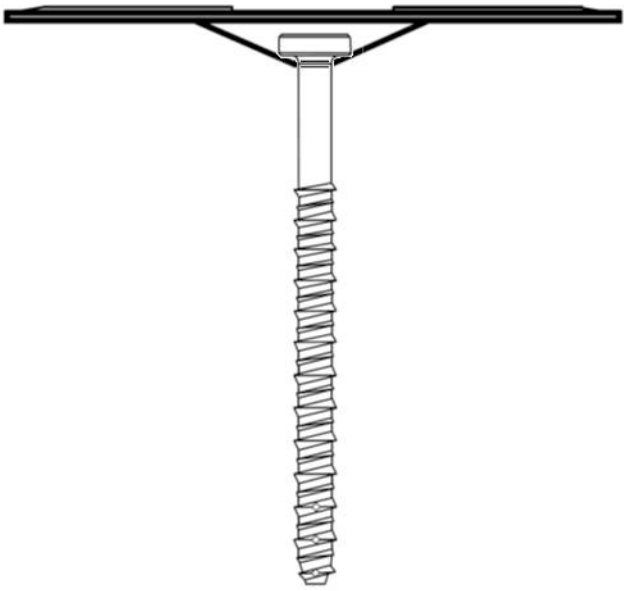
Zahn ZLVT 0008



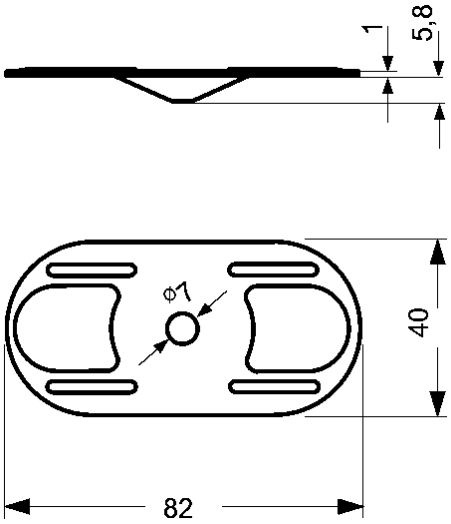
Zahn ZBST-E 6,3 x L



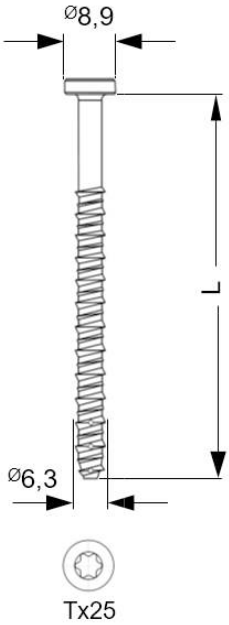
Zahn Flachdachbefestigungselemente	Anhang 101
Kombination 101 ZBST-E / ZLVT 0008	



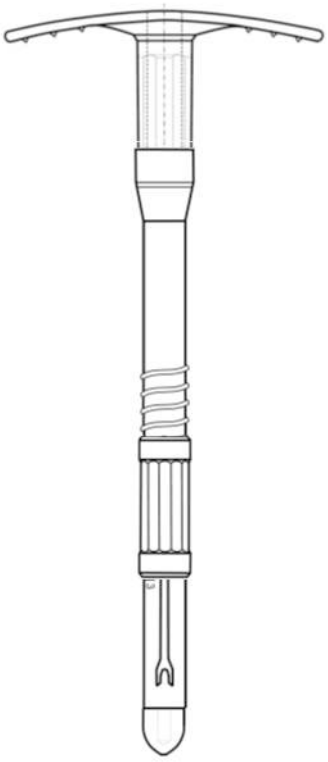
Zahn ZLVT 0012



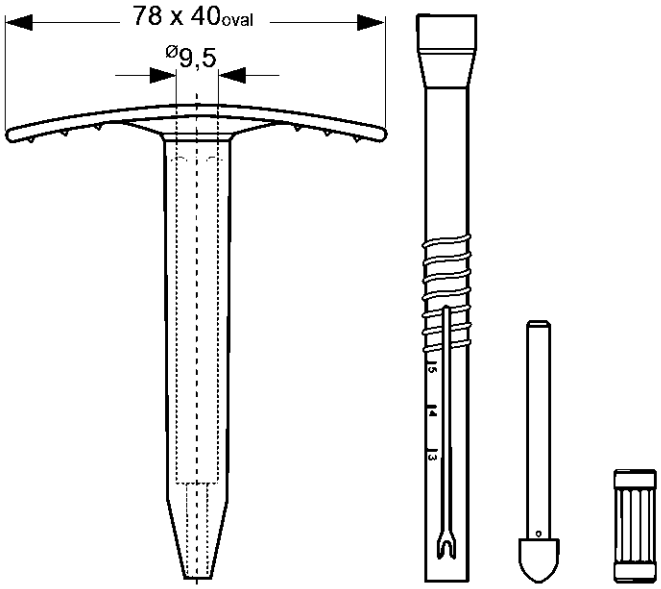
Zahn ZBST-E 6,3 x L



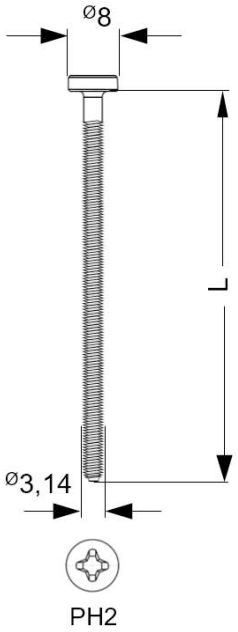
Zahn Flachdachbefestigungselemente	Anhang 102
Kombination 102 ZBST-E / ZLVT 0012	



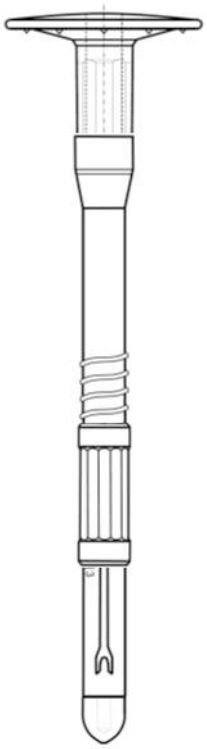
Zahn ZKSH oval mit Spreizdübelvorsatz



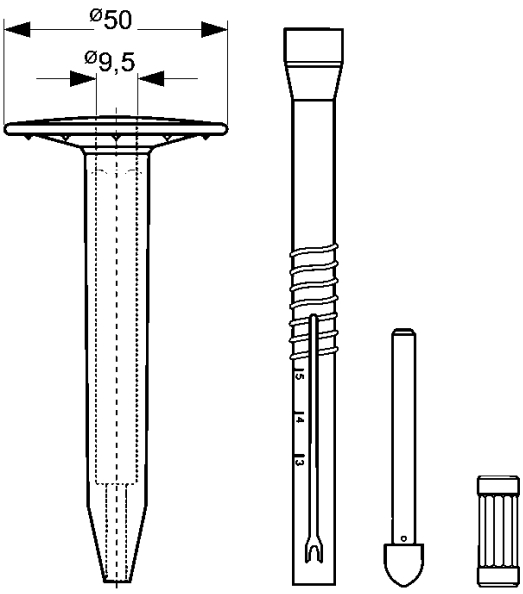
Zahn Metrische Schraube-E 3,14 x L



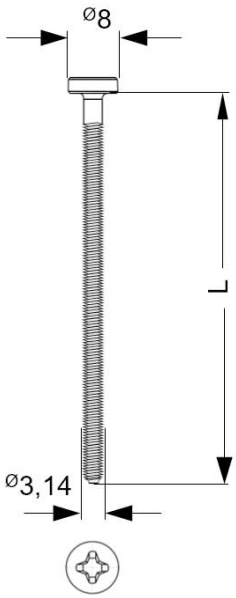
Zahn Flachdachbefestigungselemente	Anhang 103
Kombination 103 ZHRD aus Metrischer Schraube-E / ZKSH oval mit Spreizdübelvorsatz	



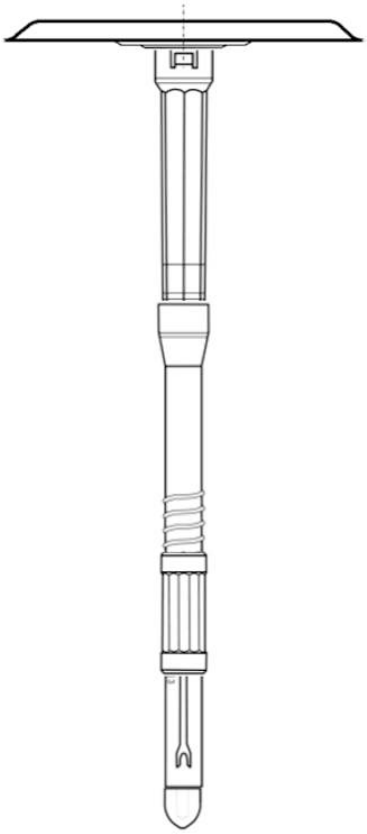
Zahn ZKSH rund mit Spreizdübelvorsatz



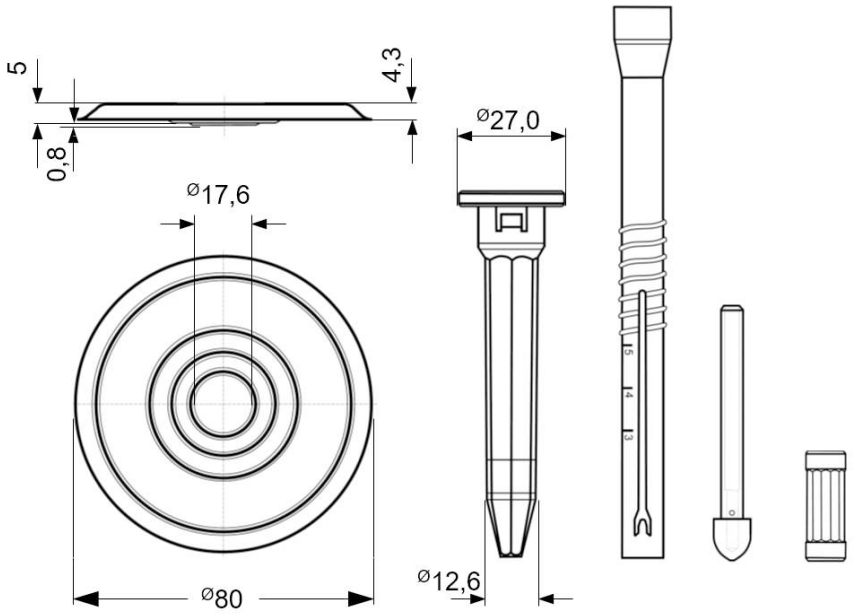
Zahn Metrische Schraube-E 3,14 x L



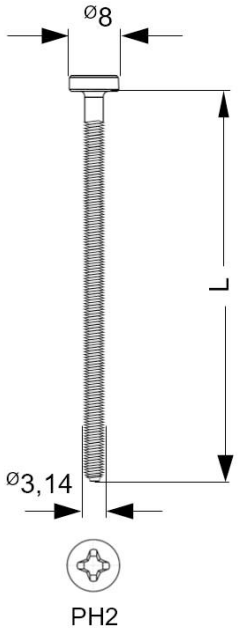
Zahn Flachdachbefestigungselemente	Anhang 104
Kombination 104 ZHRD-R aus Metrischer Schraube-E / ZKSH rund mit Spreizdübelvorsatz	



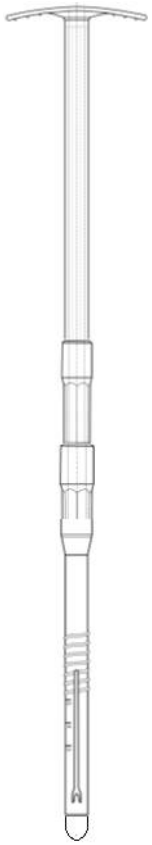
Zahn ZCTS-Tülle 4,8 mit ZCTS-Teller und Spreitzdübelvorsatz



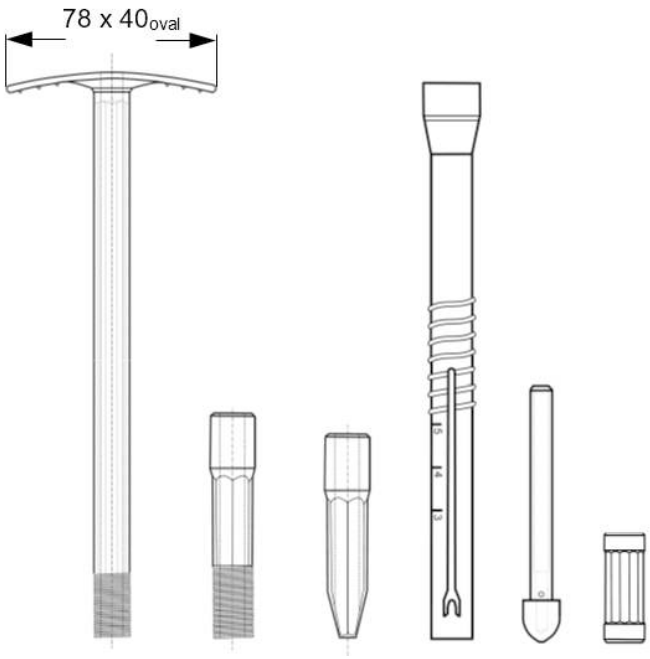
Zahn Metrische Schraube-E 3,14 x L



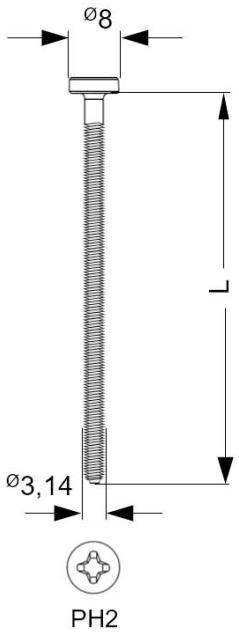
Zahn Flachdachbefestigungselemente	Anhang 104a
Kombination 104a ZCTS mit Spreitzdübelvorsatz aus Metrischer Schraube-E / ZCTS-Tülle, ZCTS-Teller und Spreitzdübelvorsatz	



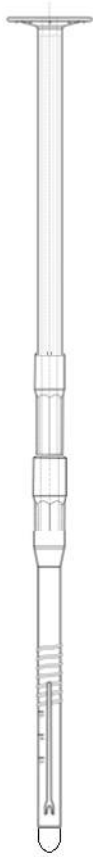
Zahn ZKSH oval Modul 4,8 mit Spreitzdübelvorsatz



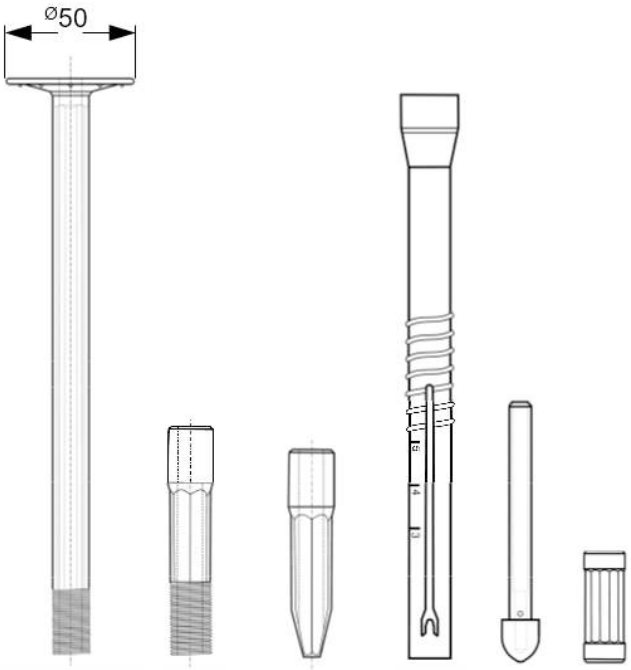
Zahn Metrische Schraube-E 3,14 x L



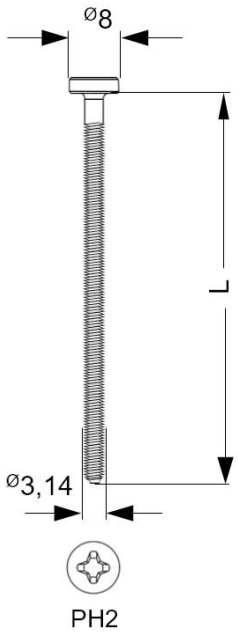
Zahn Flachdachbefestigungselemente	Anhang 105
Kombination 105 ZHRD auf Modul oval 4,8 aus Metrischer Schraube-E / ZKSH oval Modul 4.8 mit Mittelstück, Schaftspitze 4,8 und Spreitzdübelvorsatz	



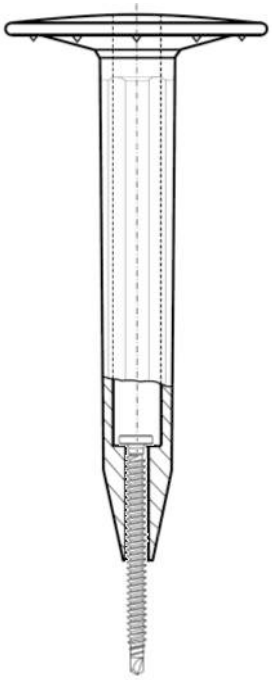
Zahn ZKSH rund Modul 4,8 mit Spreitzdübelvorsatz



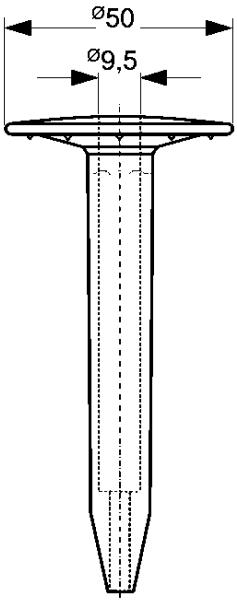
Zahn Metrische Schraube-E 3,14 x L



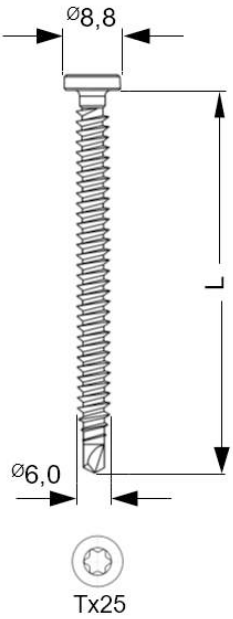
Zahn Flachdachbefestigungselemente	Anhang 106
Kombination 106 ZHRD-R auf Modul rund 4,8 aus Metrischer Schraube-E / ZKSH rund Modul 4,8 mit Mittelstück, Schaftspitze 4,8 und Spreitzdübelvorsatz	



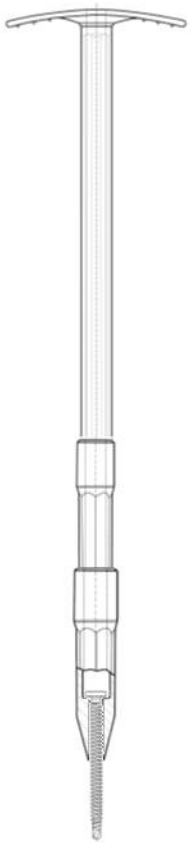
Zahn ZKSH grau / rund



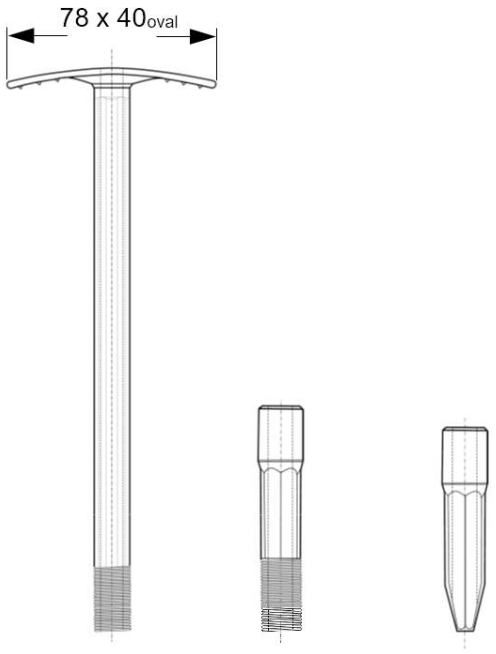
Zahn ZMDS 6,0 x L



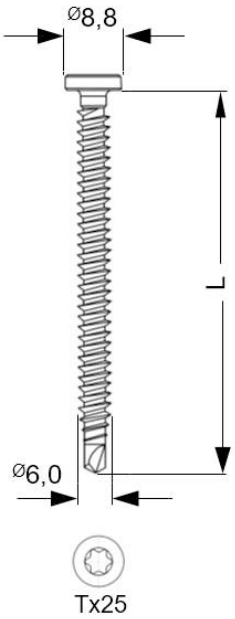
Zahn Flachdachbefestigungselemente	Anhang 107
Kombination 107 ZMDS-R aus ZMDS / ZKSH grau / rund	



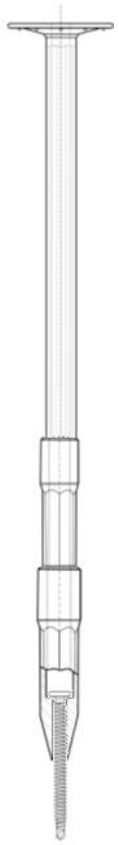
Zahn ZKSH oval Modul 6,0



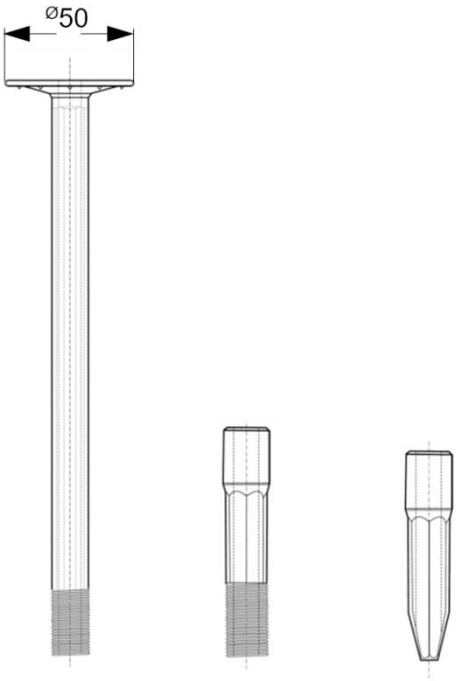
Zahn ZMDS 6,0 x L



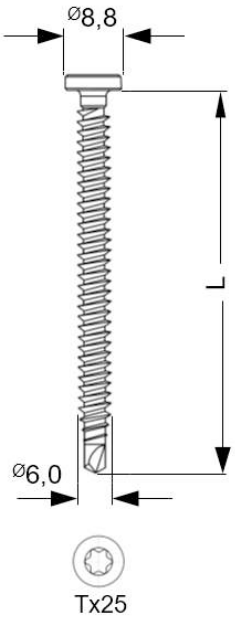
Zahn Flachdachbefestigungselemente	Anhang 108
Kombination 108 ZMDS-Modul aus ZMDS / ZKSH oval Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



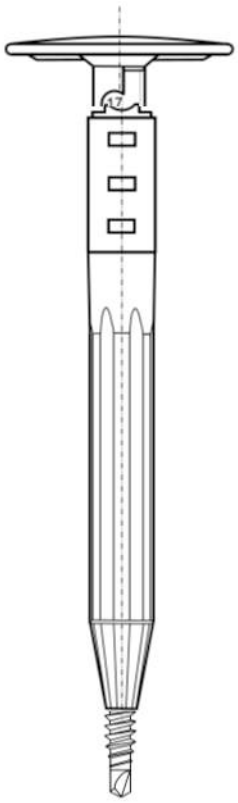
Zahn ZKSH rund Modul 6,0



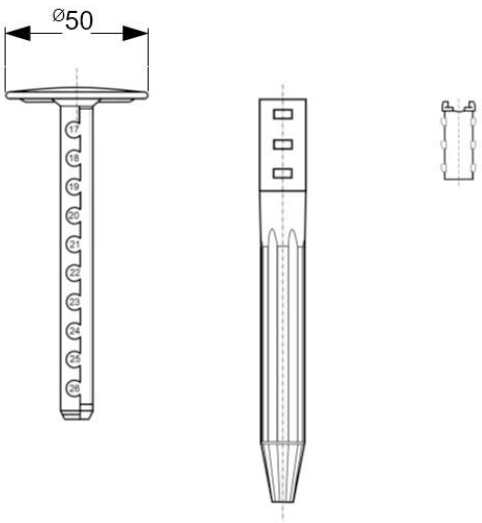
Zahn ZMDS 6,0 x L



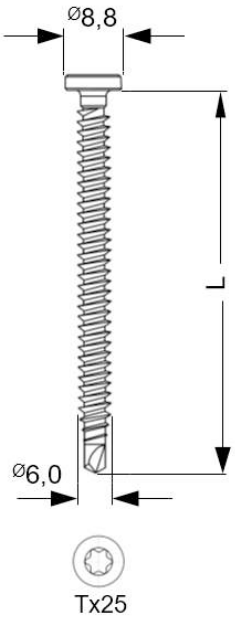
Zahn Flachdachbefestigungselemente	Anhang 109
Kombination 109 ZMDS-R-Modul aus ZMDS / ZKSH rund Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



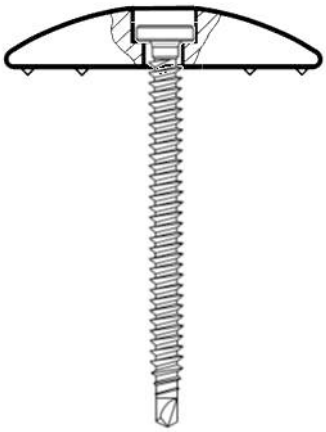
Zahn ZHVM



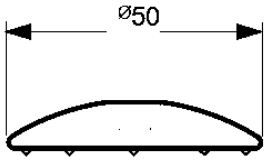
Zahn ZMDS 6,0 x L



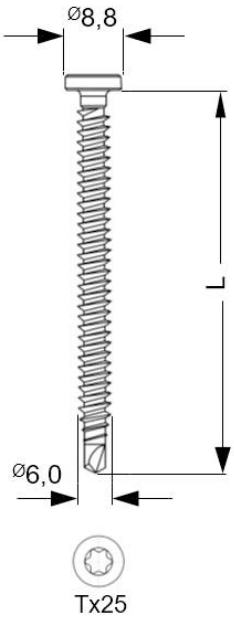
Zahn Flachdachbefestigungselemente	Anhang 110
Kombination 110 ZHVM-Multi aus ZMDS / ZHVM mit Kopfteil, Schaftteil und Verriegelungsbuchse	



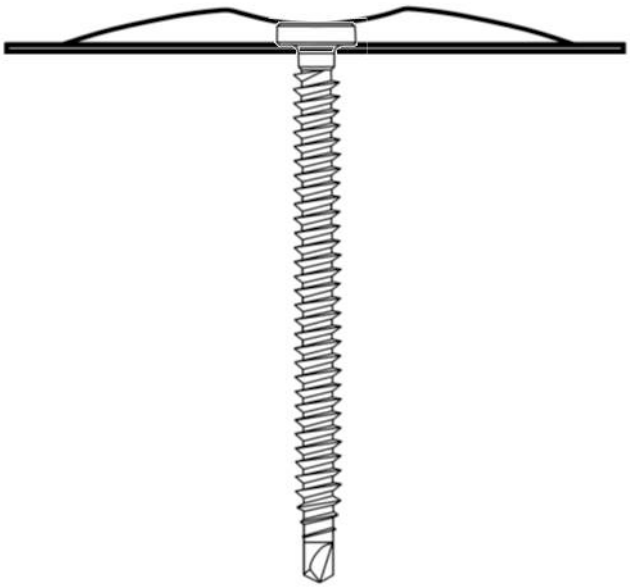
Zahn ZTSK 6,0



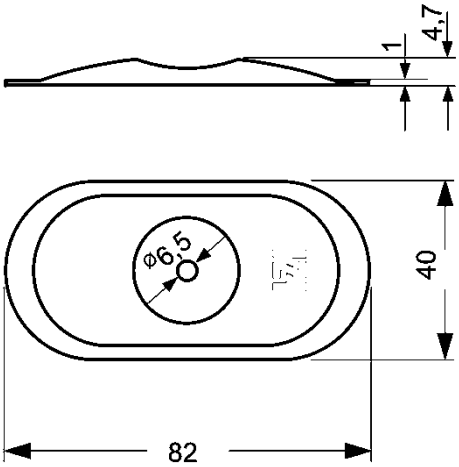
Zahn ZMDS 6,0 x L



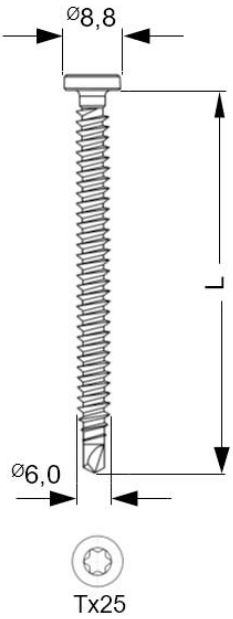
Zahn Flachdachbefestigungselemente	Anhang 111
Kombination 111 ZTSK-Multi aus ZMDS / ZTSK 6,0	



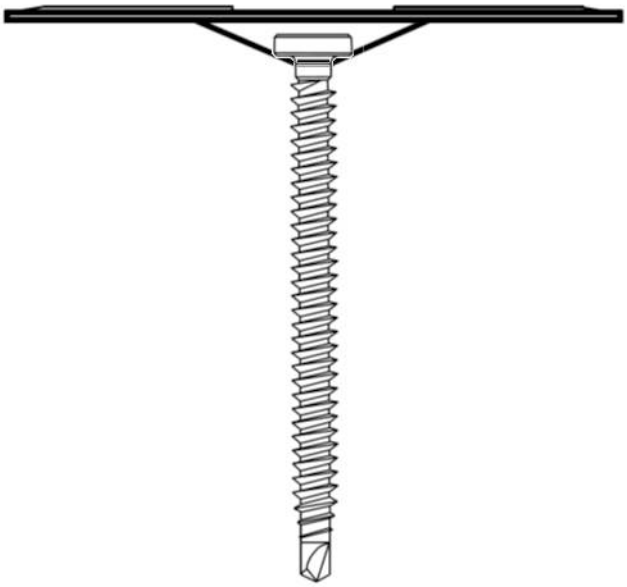
Zahn ZLVT 0008



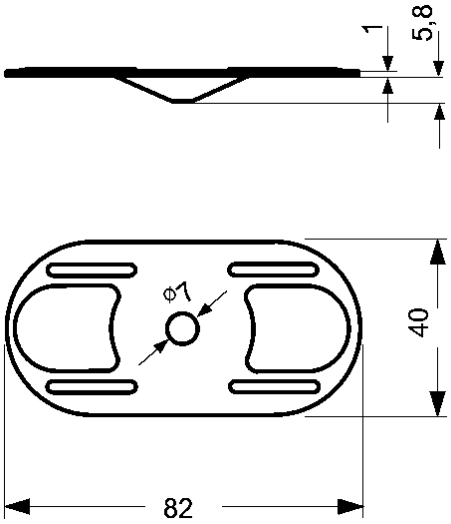
Zahn ZMDS 6,0 x L



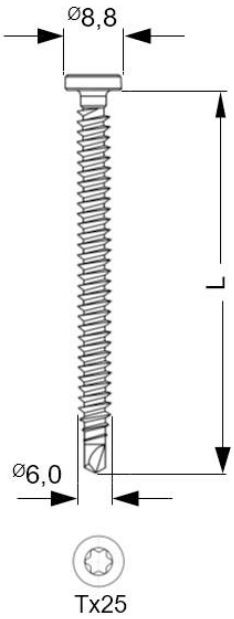
Zahn Flachdachbefestigungselemente	Anhang 112
Kombination 112 ZMDS / ZLVT 0008	



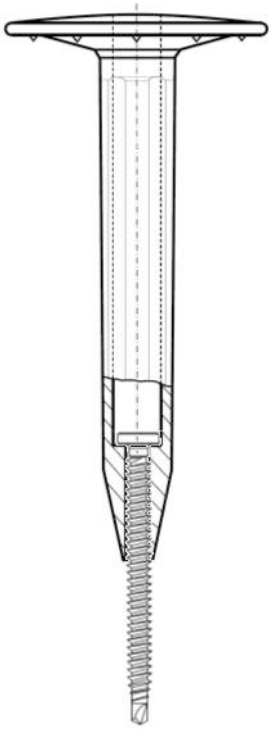
Zahn ZLVT 0012



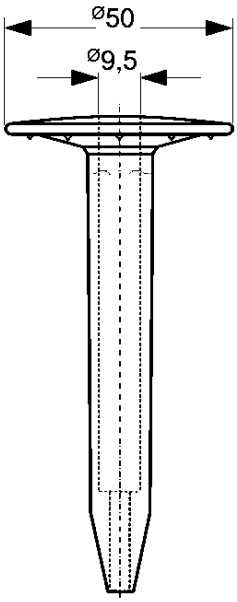
Zahn ZMDS 6,0 x L



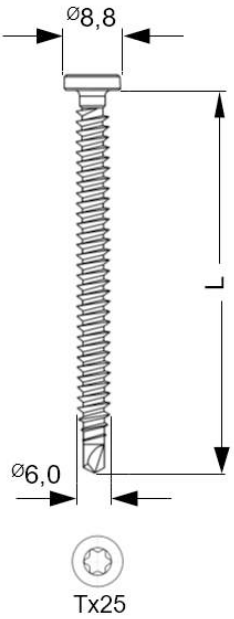
Zahn Flachdachbefestigungselemente	Anhang 113
Kombination 113 ZMDS / ZLVT 0012	



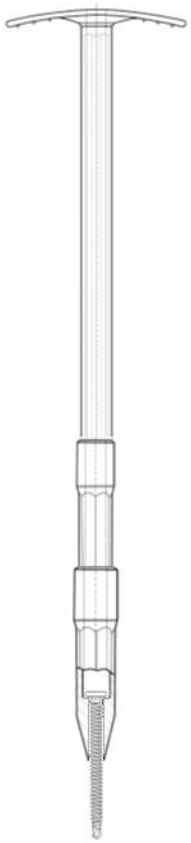
Zahn ZKSH grau / rund



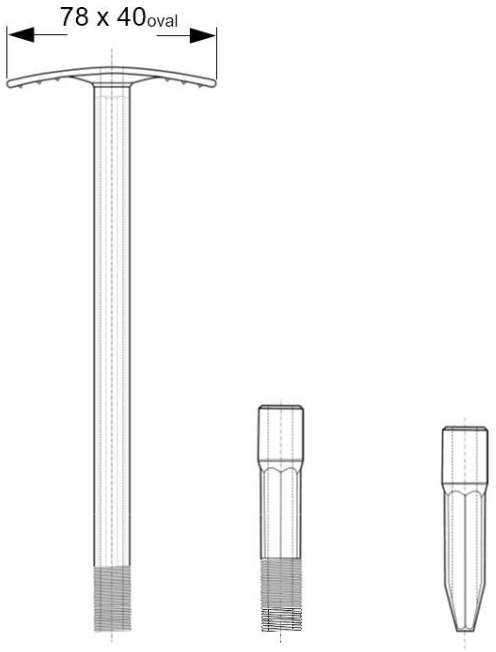
Zahn ZMDS-E 6,0 x L



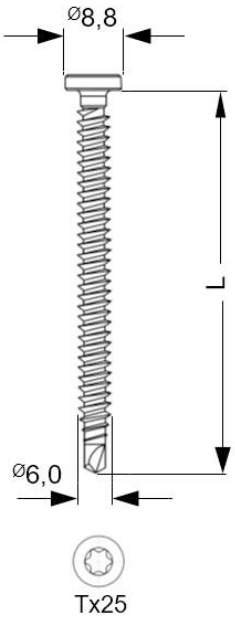
Zahn Flachdachbefestigungselemente	Anhang 114
Kombination 114 ZMDS-E/R aus ZMDS-E / ZKSH grau / rund	



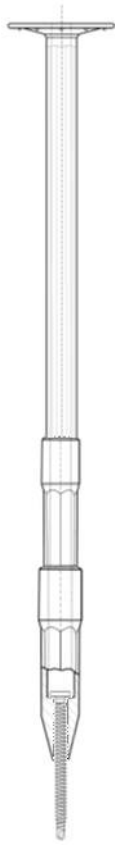
Zahn ZKSH oval Modul 6,0



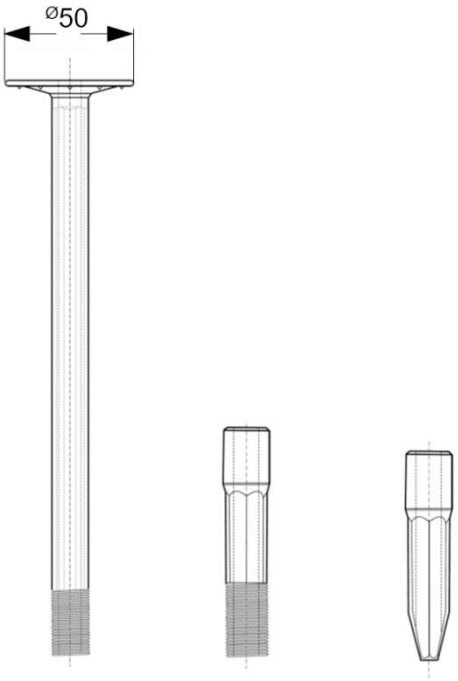
Zahn ZMDS-E 6,0 x L



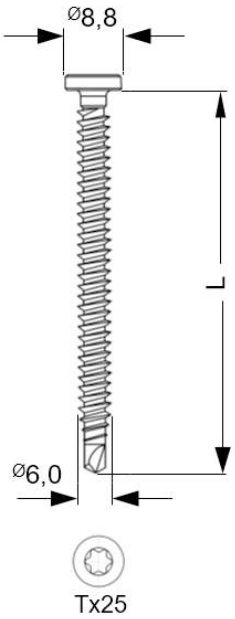
Zahn Flachdachbefestigungselemente	Anhang 115
Kombination 115 ZMDS-E-Modul aus ZMDS-E / ZKSH oval Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



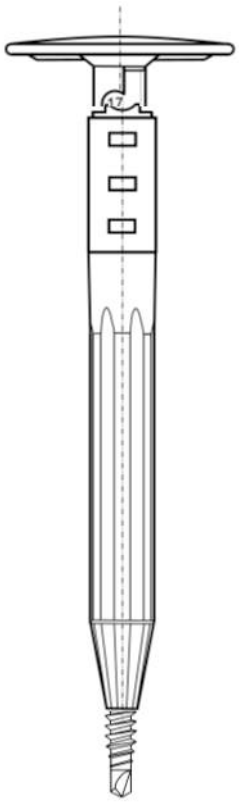
Zahn ZKSH rund Modul 6,0



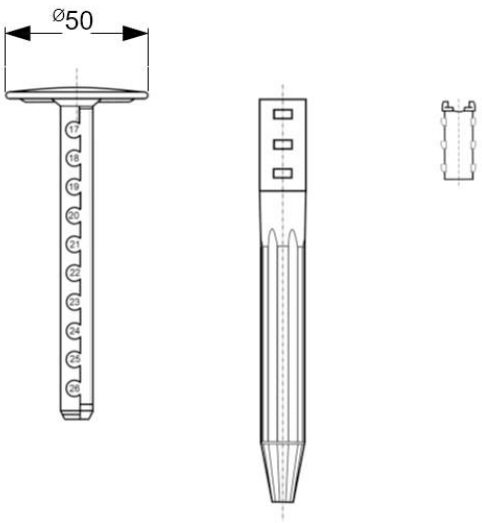
Zahn ZMDS-E 6,0 x L



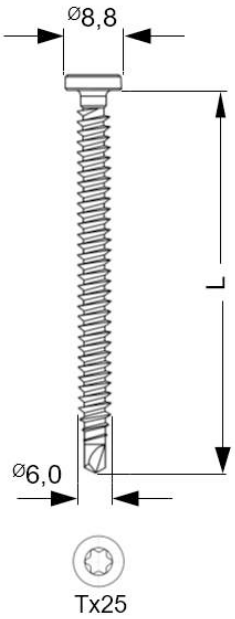
Zahn Flachdachbefestigungselemente	Anhang 116
Kombination 116 ZMDS-E/R-Modul aus ZMDS-E / ZKSH rund Modul 6,0 mit modularem Mittelstück und Spitze 6,0	



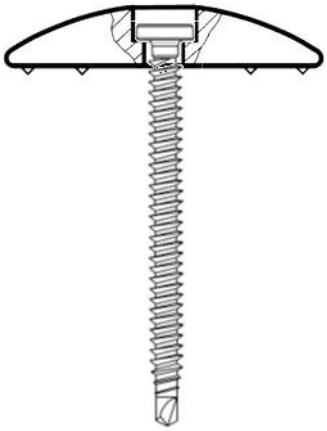
Zahn ZHVM



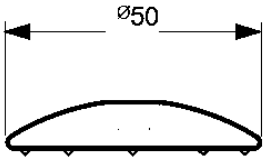
Zahn ZMDS-E 6,0 x L



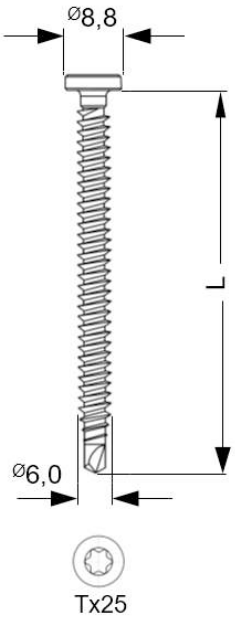
Zahn Flachdachbefestigungselemente	Anhang 117
Kombination 117 ZHVM-E-Multi aus ZMDS-E / ZHVM mit Kopfteil, Schaftteil und Verriegelungsbuchse	



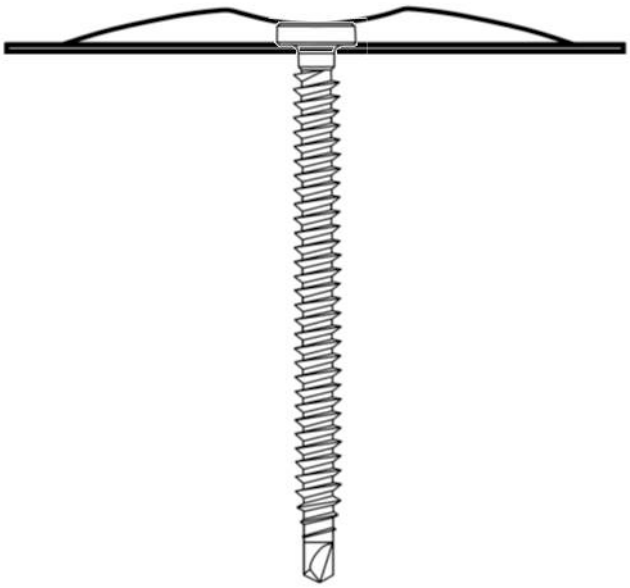
Zahn ZTSK 6,0



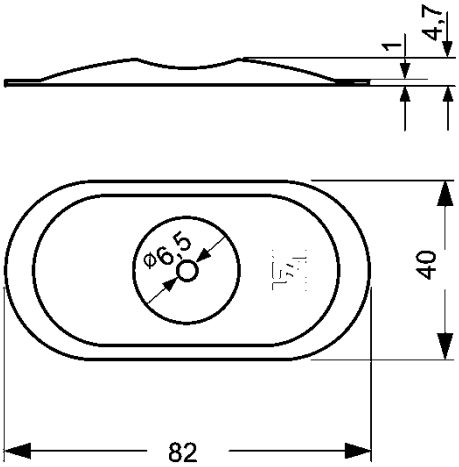
Zahn ZMDS-E 6,0 x L



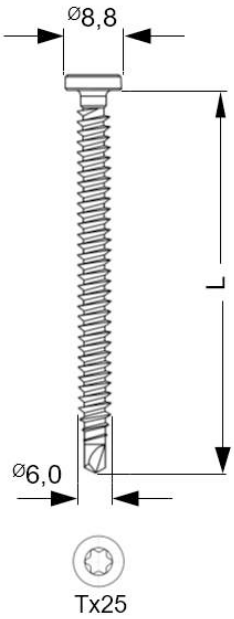
Zahn Flachdachbefestigungselemente	Anhang 118
Kombination 118 ZTSK-E-Multi aus ZMDS-E / ZTSK 6,0	



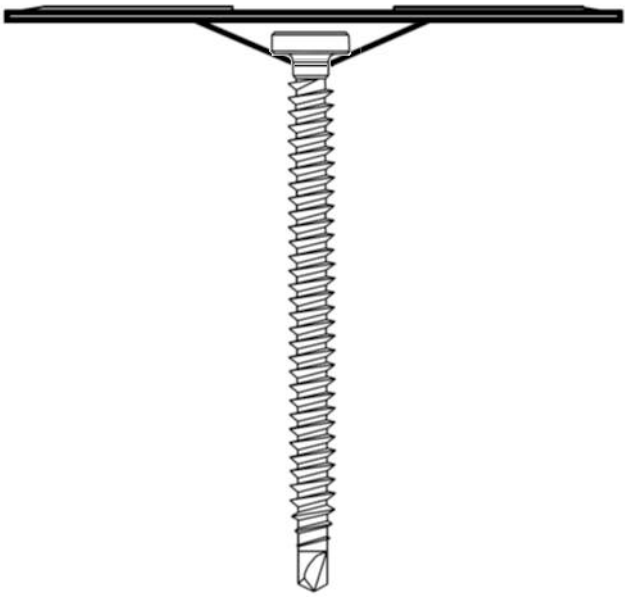
Zahn ZLVT 0008



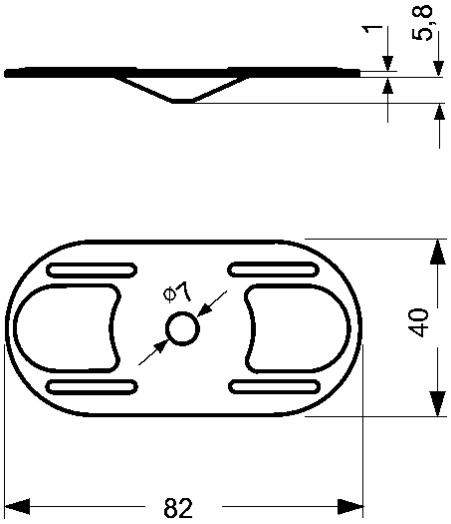
Zahn ZMDS-E 6,0 x L



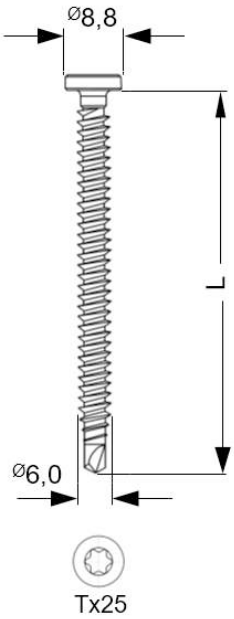
Zahn Flachdachbefestigungselemente	Anhang 119
Kombination 119 ZMDS-E / ZLVT 0008	



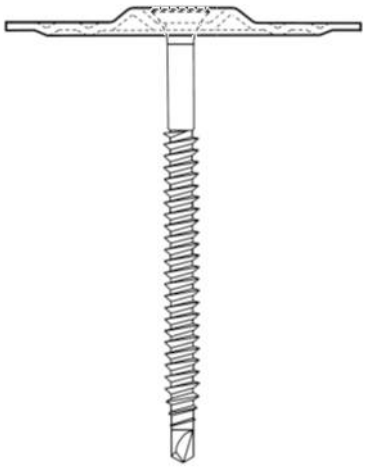
Zahn ZLVT 0012



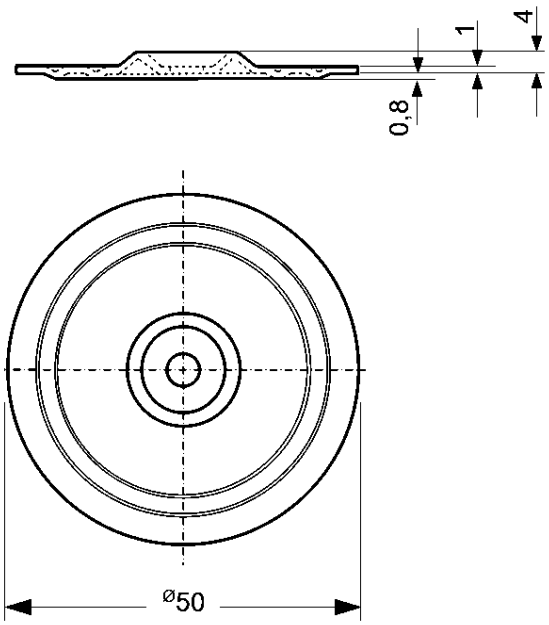
Zahn ZMDS-E 6,0 x L



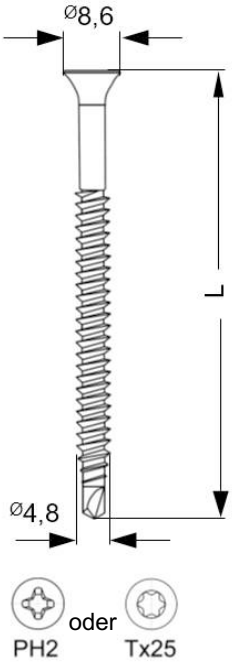
Zahn Flachdachbefestigungselemente	Anhang 120
Kombination 120 ZMDS-E / ZLVT 0012	



Zahn ZLVT 0016

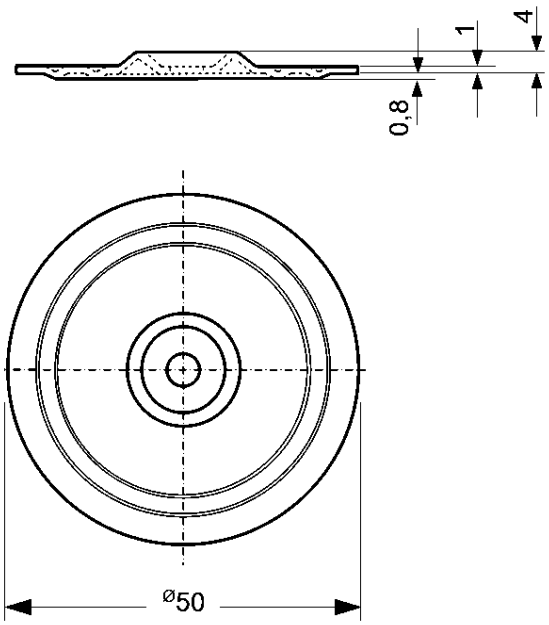


Zahn ZDBK-TK 4,8 x L

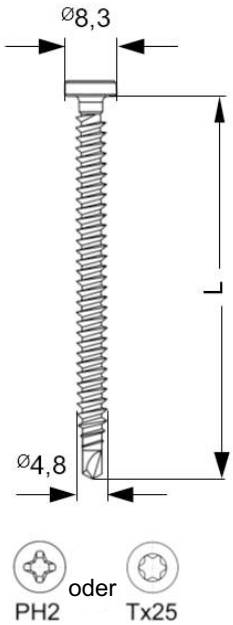


Zahn Flachdachbefestigungselemente	Anhang 121
Kombination 121 ZDBK-TK / ZLVT 0016	

Zahn ZLVT 0016

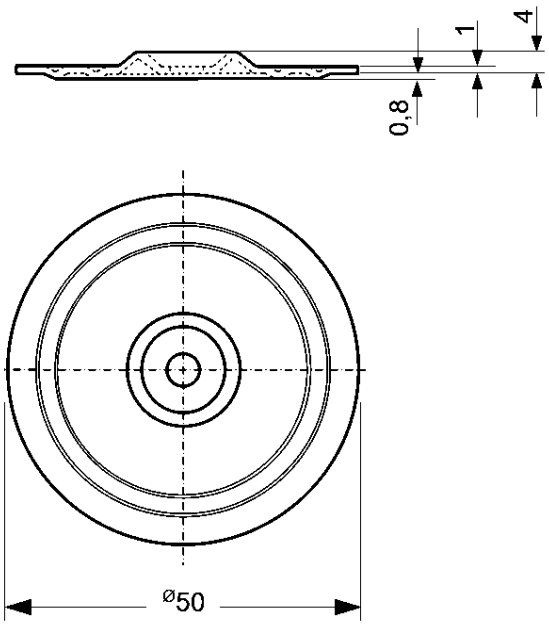


Zahn ZDBK 4,8 x L

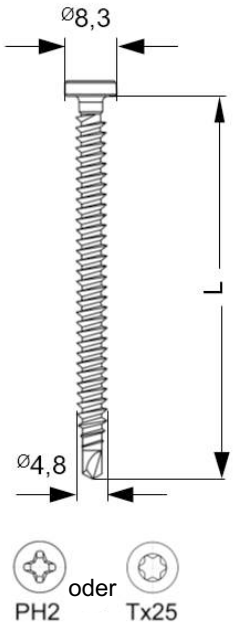


Zahn Flachdachbefestigungselemente	Anhang 121a
Kombination 121a ZDBK / ZLVT 0016	

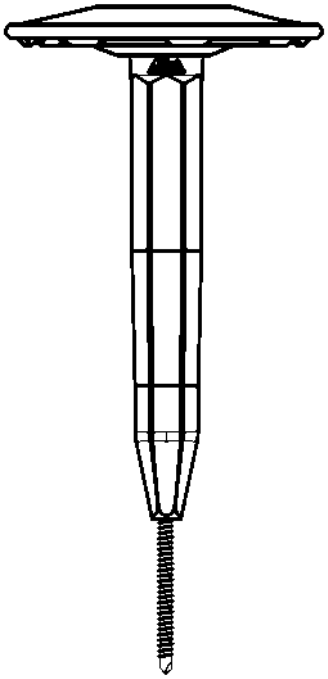
Zahn ZLVT 0016



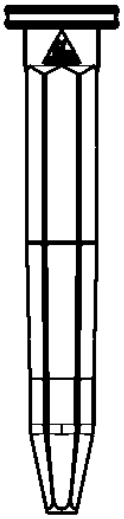
Zahn ZDBK-E 4,8 x L



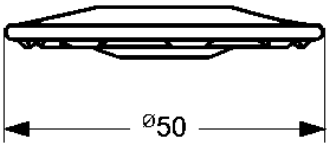
Zahn Flachdachbefestigungselemente	Anhang 121b
Kombination 121b ZDBK-E / ZLVT 0016	



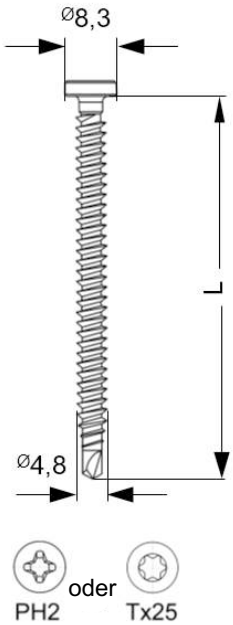
ZSSB 4,8



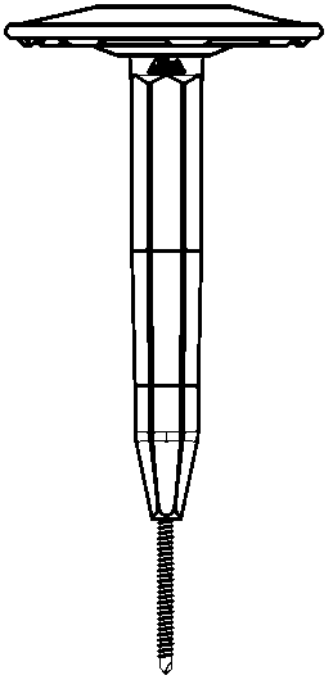
Klickteller



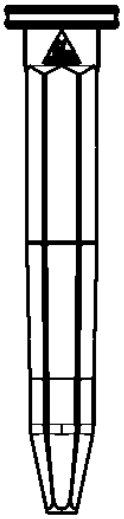
Zahn ZDBK 4,8 x L



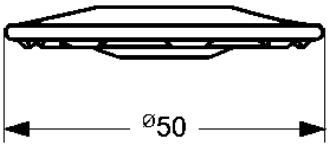
Zahn Flachdachbefestigungselemente	Anhang 122
Kombination 122 ZSSB / Klickteller / ZDBK Trapez	



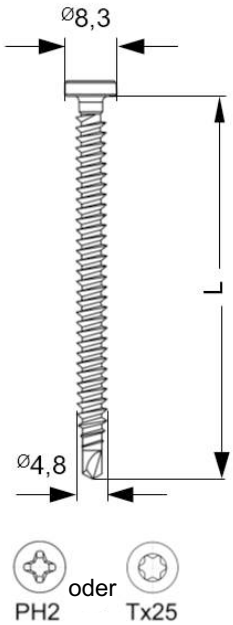
ZSSB 4,8



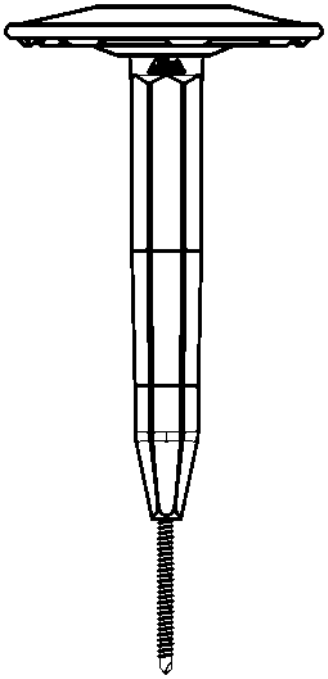
Klickteller



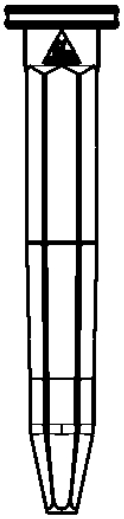
Zahn ZDBK-E 4,8 x L



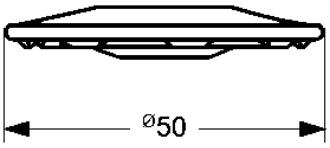
Zahn Flachdachbefestigungselemente	Anhang 123
Kombination 123 ZSSB / Klickteller / ZDBK-E Trapez	



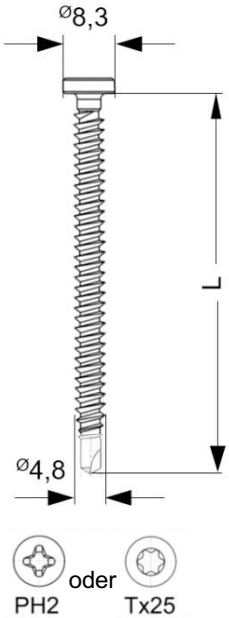
ZSSB 4,8



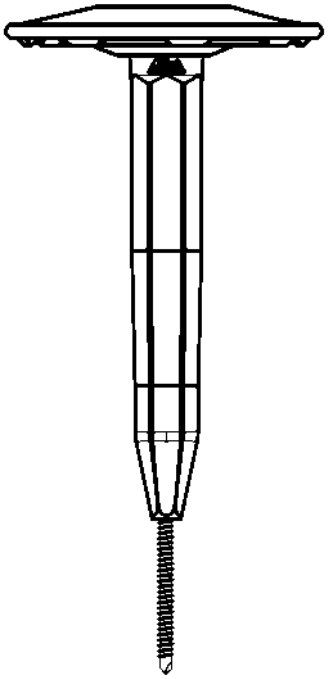
Klickteller



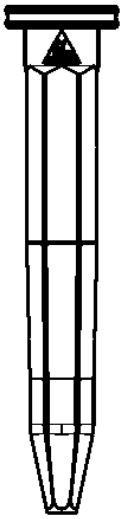
Zahn ZDBK-VB 4,8 x L



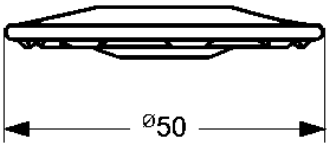
Zahn Flachdachbefestigungselemente	Anhang 124
Kombination 124 ZSSB / Klickteller / ZDBK-VB Trapez	



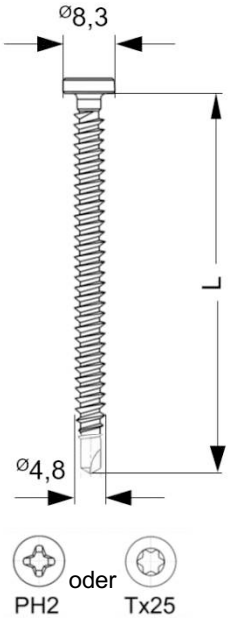
ZSSB 4,8



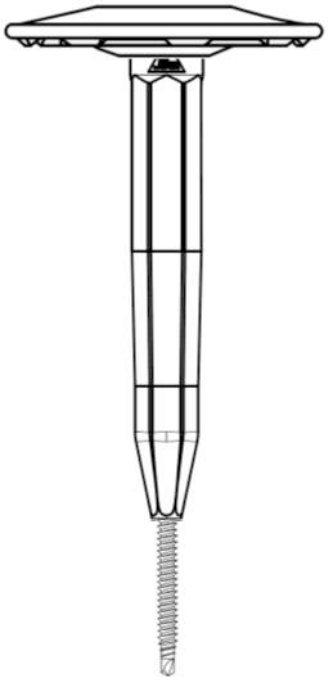
Klickteller



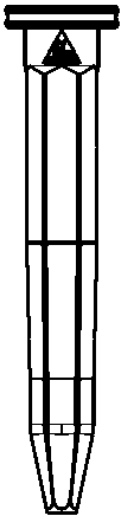
Zahn ZDBK-VB 4,8 x L



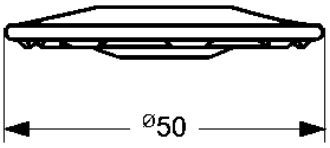
Zahn Flachdachbefestigungselemente	Anhang 125
Kombination 125 ZSSB / Klickteller / ZDBK-VB-E Trapez	



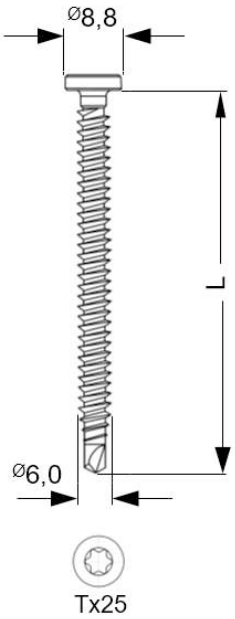
ZSSB 6,0



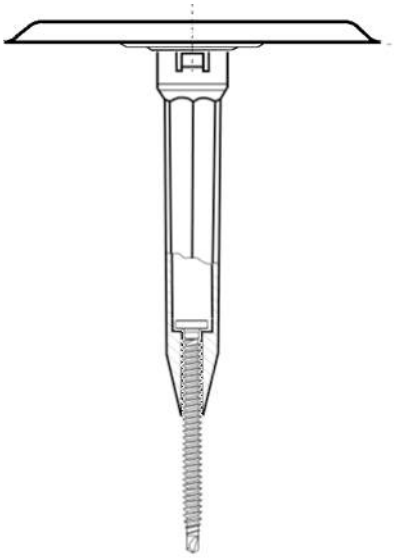
Klickteller



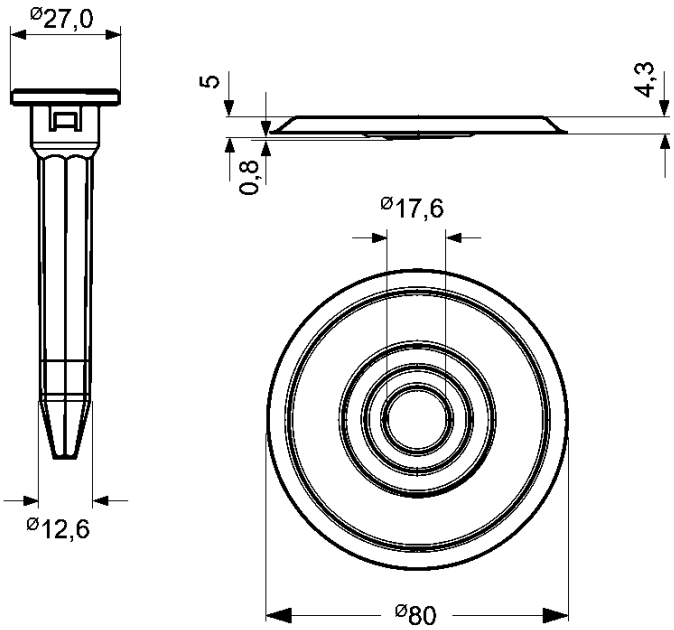
Zahn ZMDS 6,0 x L



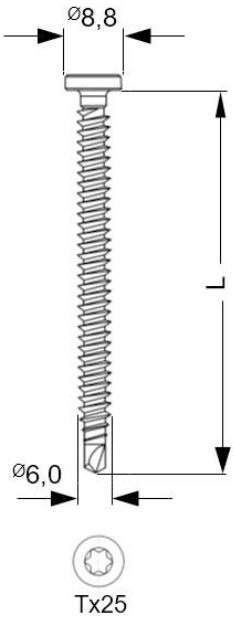
Zahn Flachdachbefestigungselemente	Anhang 126
Kombination 126 ZSSB / Klickteller / ZMDS	



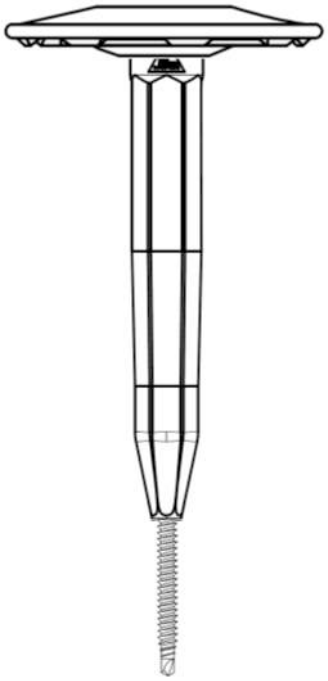
Zahn ZCTS-Tülle 6,0 und ZCTS-Teller



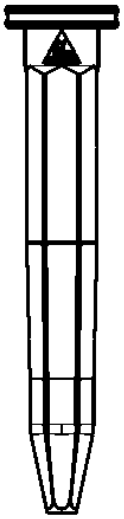
Zahn ZMDS 6,0 x L



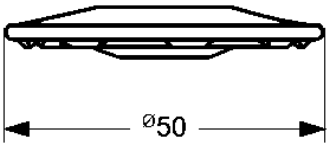
Zahn Flachdachbefestigungselemente	Anhang 126a
Kombination 126a ZCTS / ZMDS aus ZMDS / ZCTS-Tülle 6,0 und ZCTS-Teller	



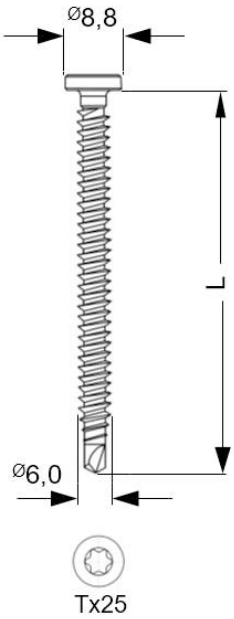
ZSSB 6,0



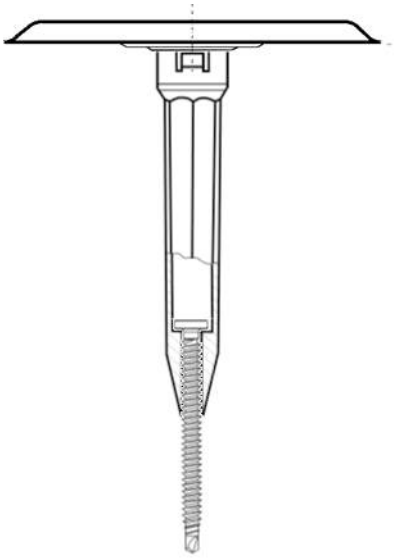
Klickteller



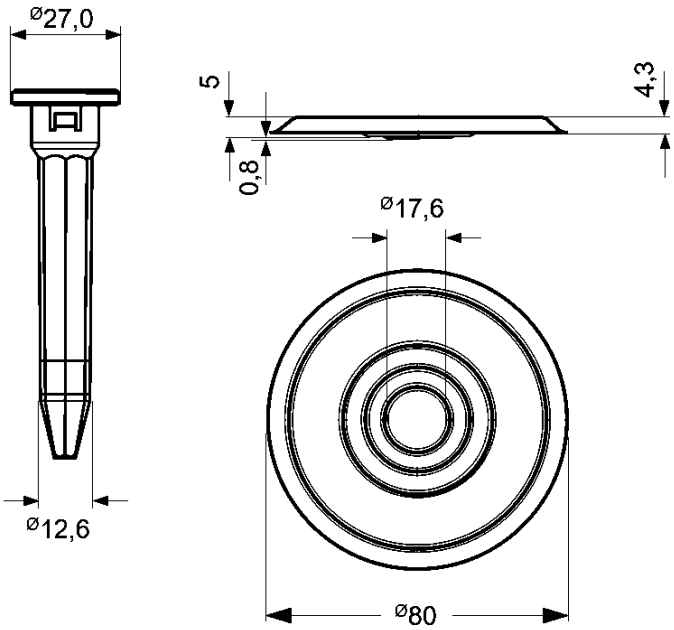
Zahn ZMDS-E 6,0 x L



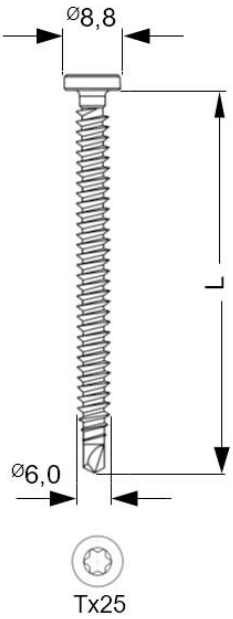
Zahn Flachdachbefestigungselemente	Anhang 127
Kombination 127 ZSSB / Klickteller / ZMDS-E	



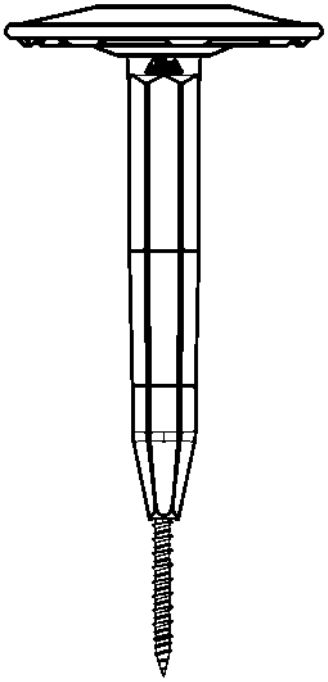
Zahn ZCTS-Tülle 6,0 und ZCTS-Teller



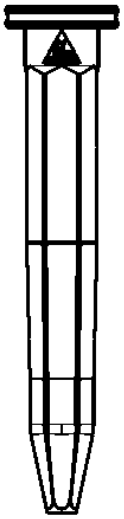
Zahn ZMDS-E 6,0 x L



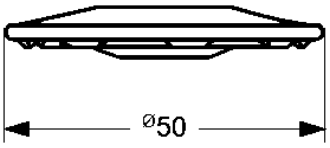
Zahn Flachdachbefestigungselemente	Anhang 127a
Kombination 127a ZCTS-E / ZMDS-E aus ZMDS-E / ZCTS-Tülle 6,0 und ZCTS-Teller	



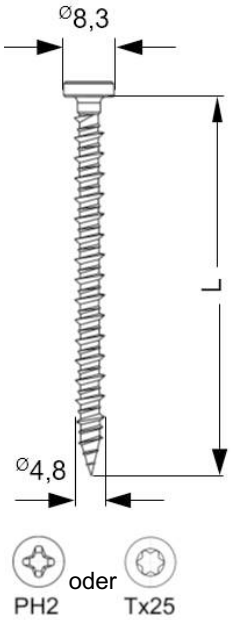
ZSSB 4,8



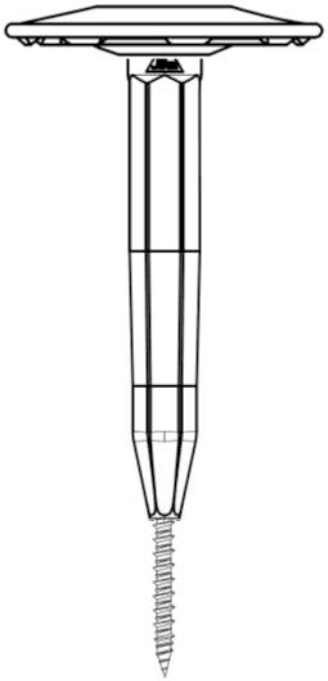
Klickteller



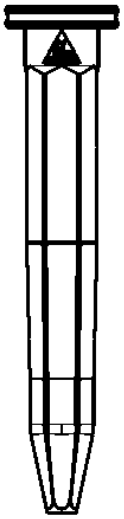
Zahn ZHBK 4,8 x L



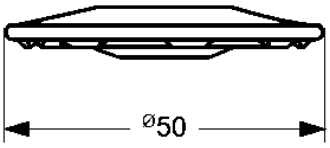
Zahn Flachdachbefestigungselemente	Anhang 128
Kombination 128 ZSSB / Klickteller / ZHBK Holz	



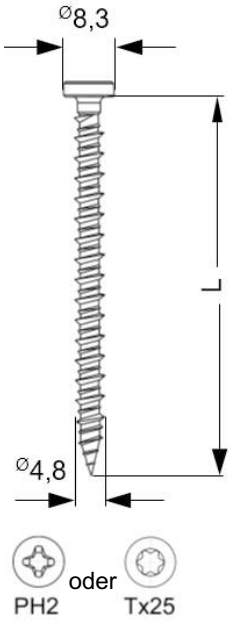
ZSSB 4,8



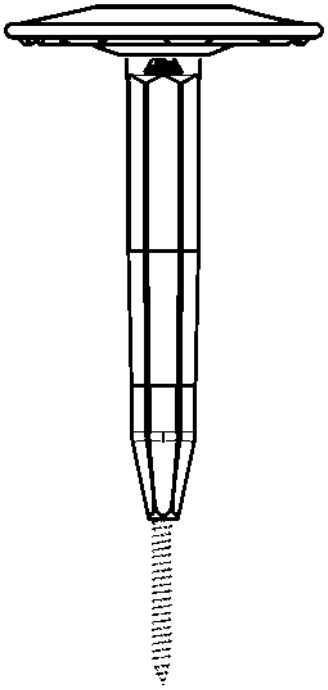
Klickteller



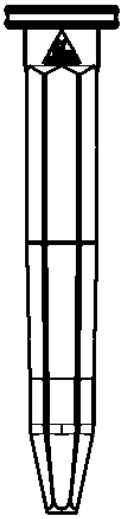
Zahn ZHBK-E 4,8 x L



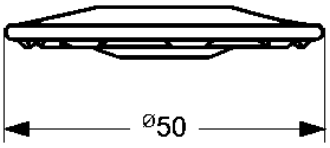
Zahn Flachdachbefestigungselemente	Anhang 129
Kombination 129 ZSSB / Klickteller / ZHBK-E-Holz	



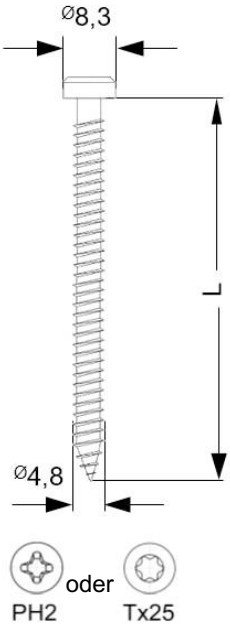
ZSSB 4,8



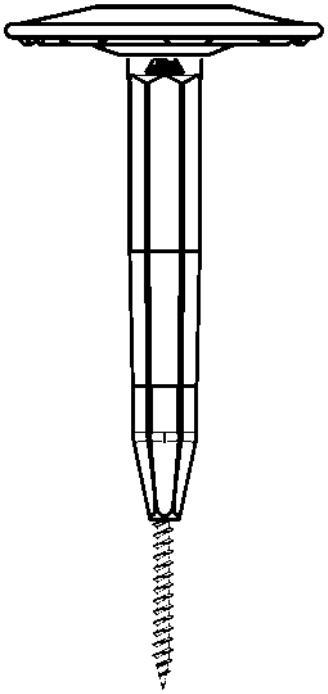
Klickteller



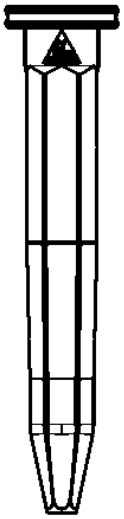
Zahn $ZDBK_{Dübel}$ 4,8 x L



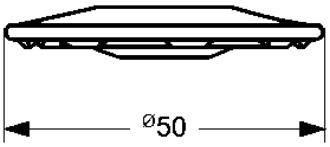
Zahn Flachdachbefestigungselemente	Anhang 130
Kombination 130 ZSSB / Klickteller / ZDBK-Dübel	



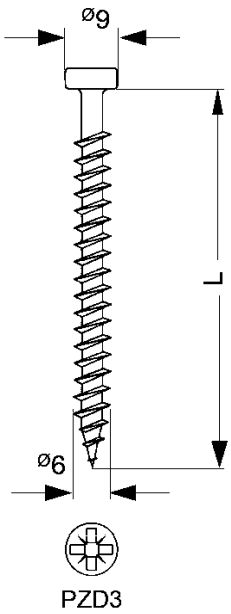
ZSSB 6,0



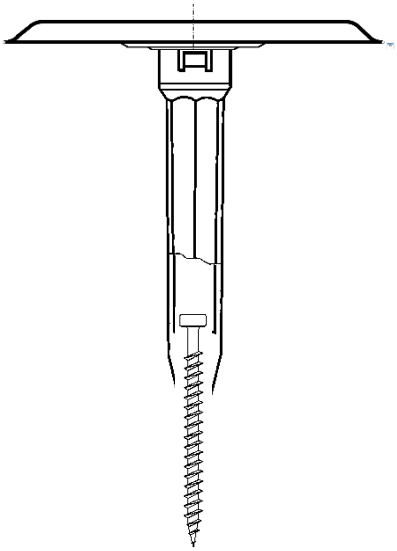
Klickteller



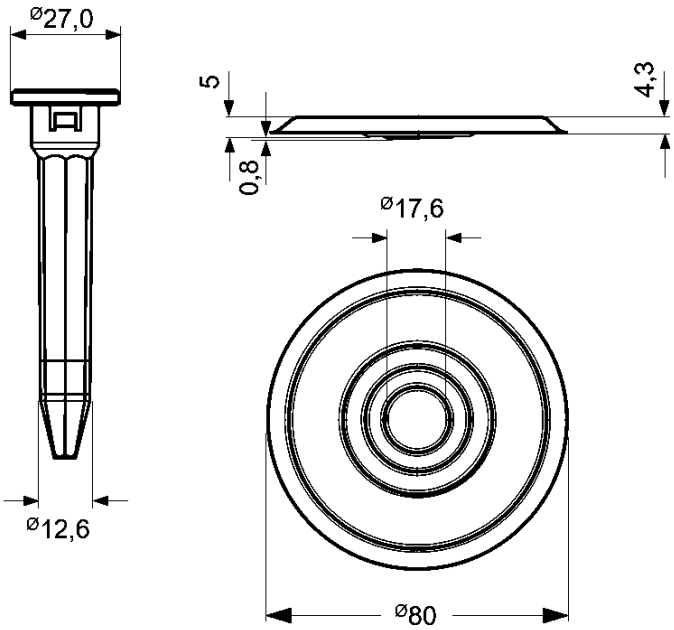
Zahn ZGBK-E 6,0 x L



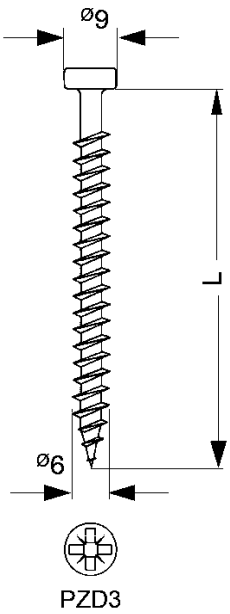
Zahn Flachdachbefestigungselemente	Anhang 131
Kombination 131 ZSSB / Klickteller / ZGBK-E PB-Direkt	



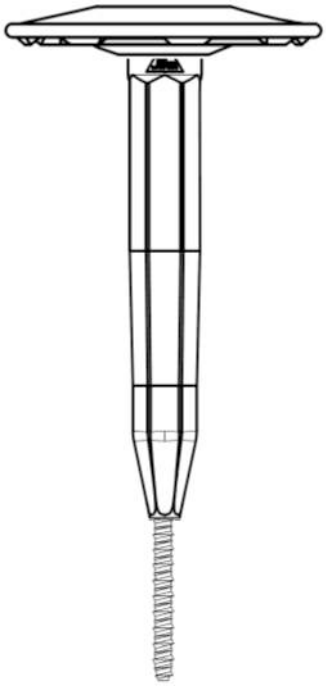
Zahn ZCTS-Tülle 6,0 und ZCTS-Teller



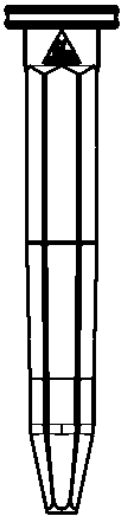
Zahn ZGBK-E 6,0 x L



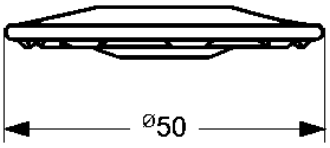
Zahn Flachdachbefestigungselemente	Anhang 131a
Kombination 131a ZCTS PB-Direkt / ZGBK-E aus ZGBK-E / ZCTS-Tülle 6,0 und ZCTS-Teller	



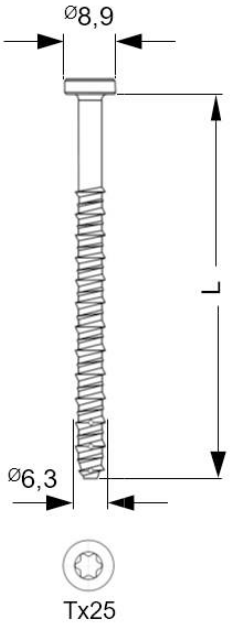
ZSSB 6,0



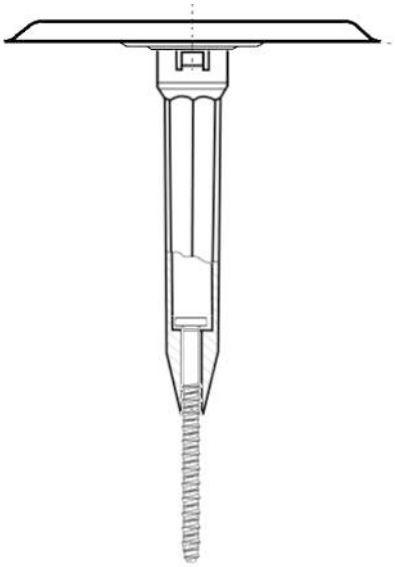
Klickteller



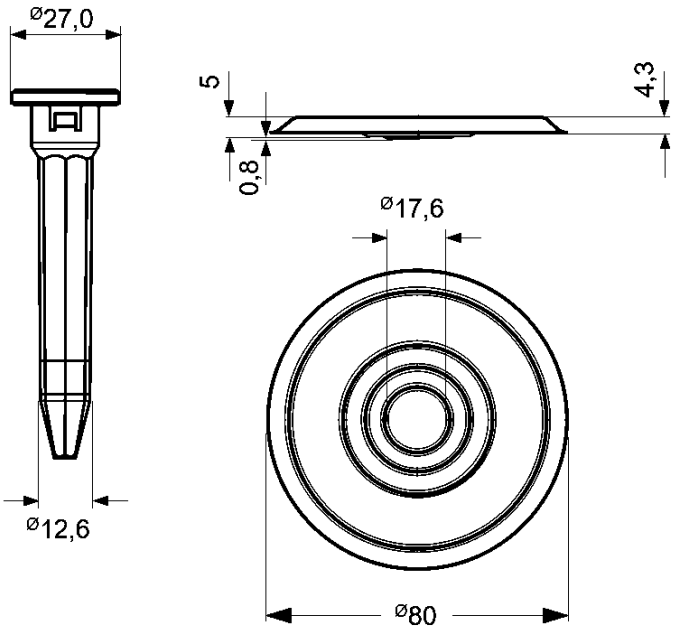
Zahn ZBST 6,3 x L



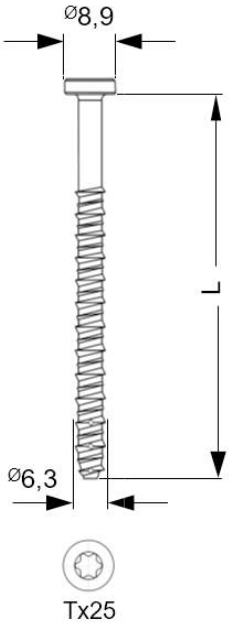
Zahn Flachdachbefestigungselemente	Anhang 132
Kombination 132 ZSSB / Klickteller / ZBST Beton-Direkt	



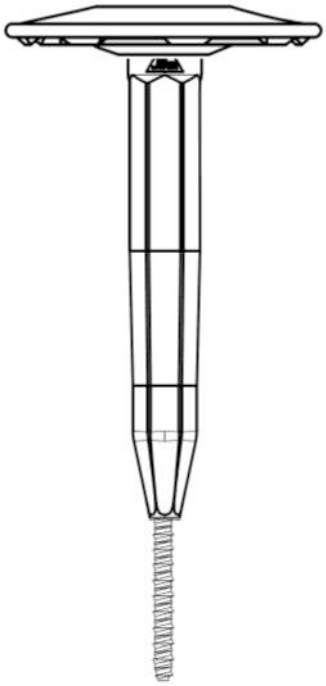
Zahn ZCTS-Tülle 6,0 und ZCTS-Teller



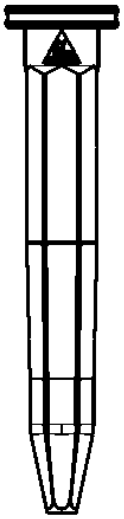
Zahn ZBST 6,3 x L



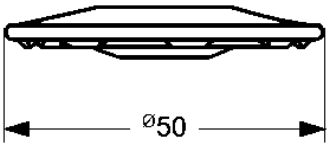
Zahn Flachdachbefestigungselemente	Anhang 132a
Kombination 132a ZCTS Beton-Direkt / ZBST 6,3 aus ZBST 6,3 / ZCTS-Tülle 6,0 und ZCTS-Teller	



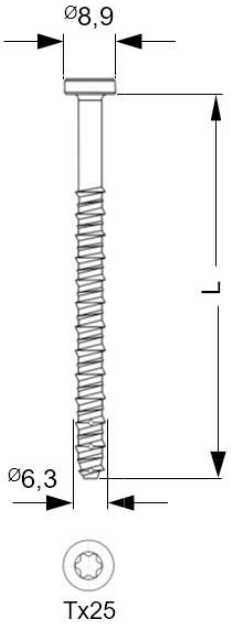
ZSSB 6,0



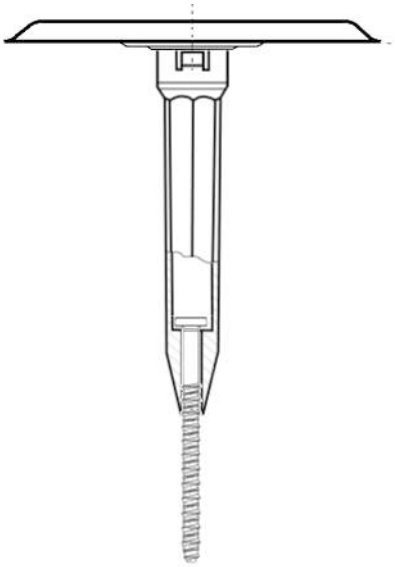
Klickteller



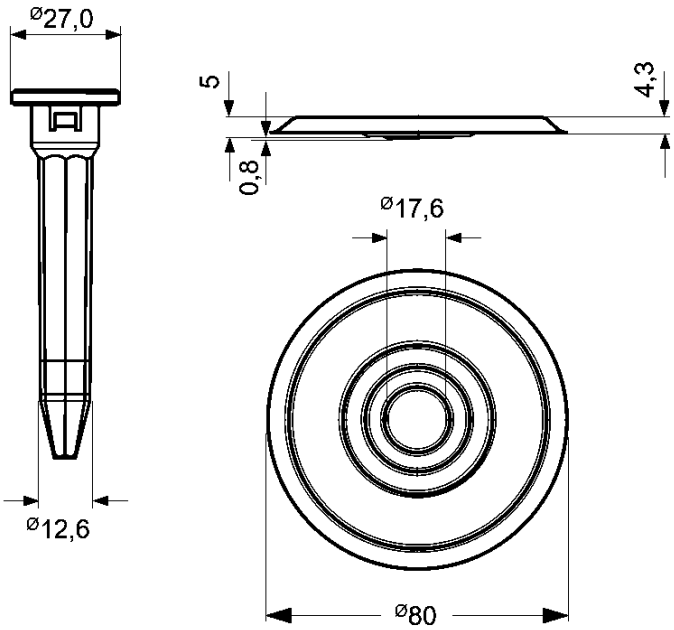
Zahn ZBST-E 6,3 x L



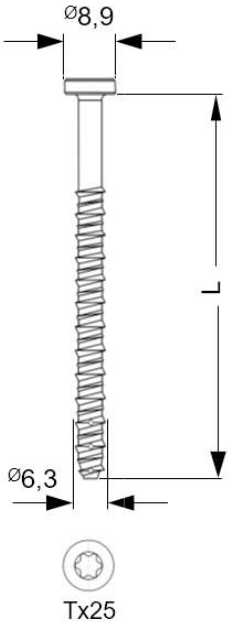
Zahn Flachdachbefestigungselemente	Anhang 133
Kombination 133 ZSSB / Klickteller / ZBST-E Beton-Direkt	



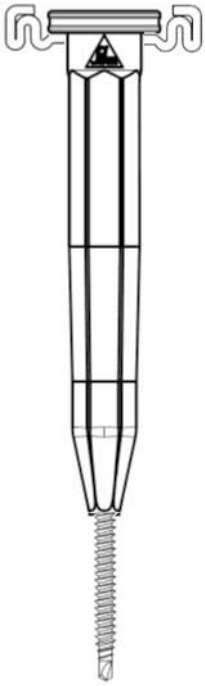
Zahn ZCTS-Tülle 6,0 und ZCTS-Teller



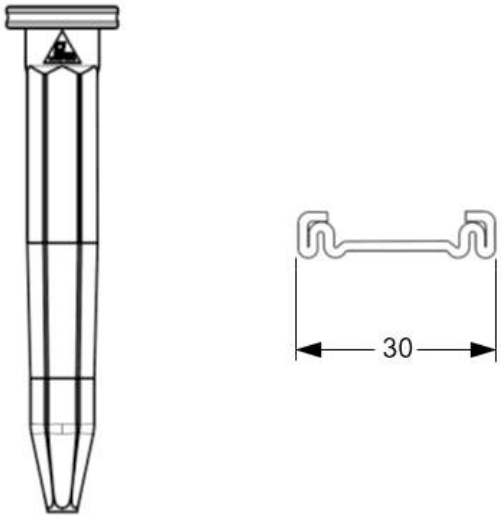
Zahn ZBST-E 6,3 x L



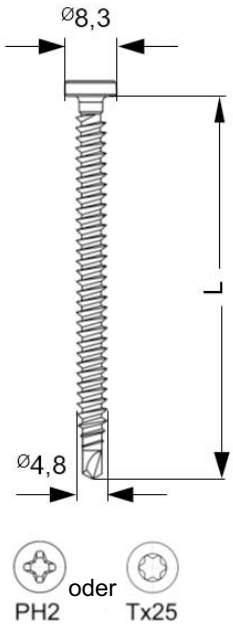
Zahn Flachdachbefestigungselemente	Anhang 133a
Kombination 133a ZCTS-E Beton-Direkt / ZBST-E aus ZBST-E 6,3 / ZCTS-Tülle 6,0 und ZCTS-Teller	



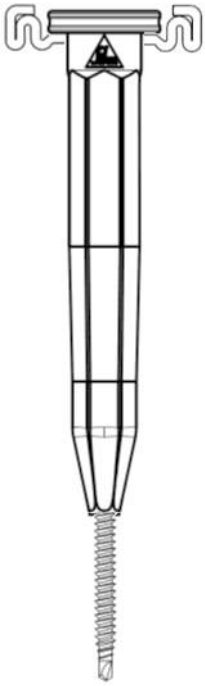
Zahn ZSSB-Tülle 4,8 mit Schiene



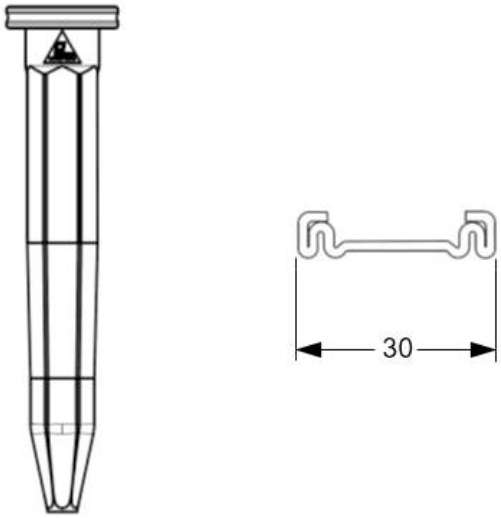
Zahn ZDBK 4,8 x L



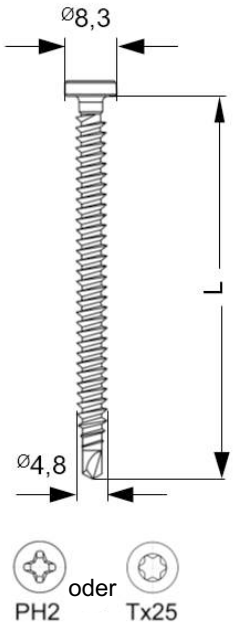
Zahn Flachdachbefestigungselemente	Anhang 134
Kombination 134 ZSSB Trapez aus ZDBK / ZSSB-Tülle 4,8 und Schiene	



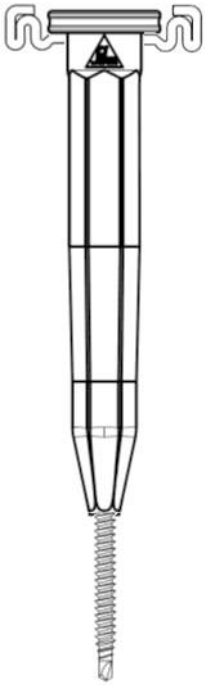
Zahn ZSSB-Tülle 4,8 mit Schiene



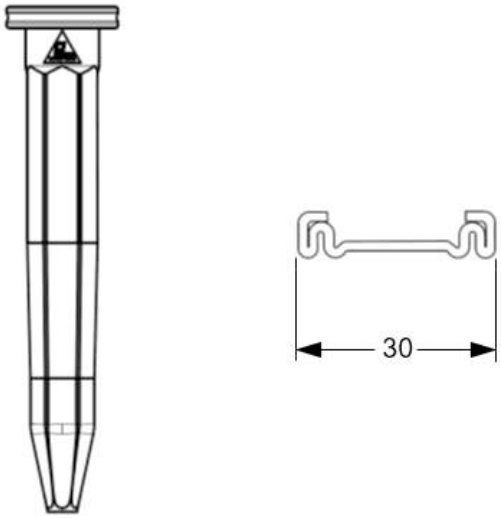
Zahn ZDBK-E 4,8 x L



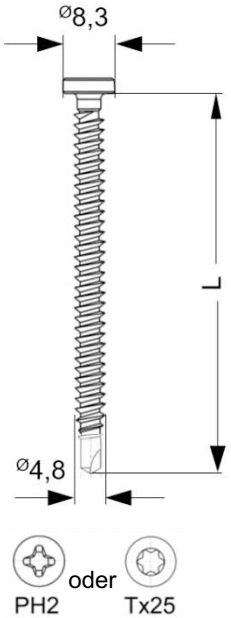
Zahn Flachdachbefestigungselemente	Anhang 135
Kombination 135 ZSSB-E Trapez aus ZDBK-E / ZSSB-Tülle 4,8 und Schiene	



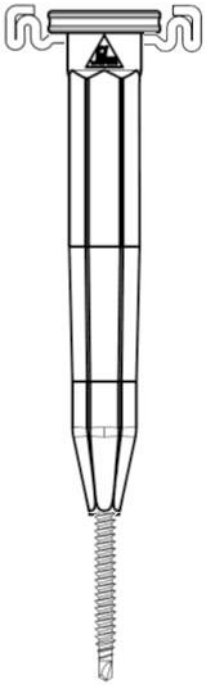
Zahn ZSSB-Tülle 4,8 mit Schiene



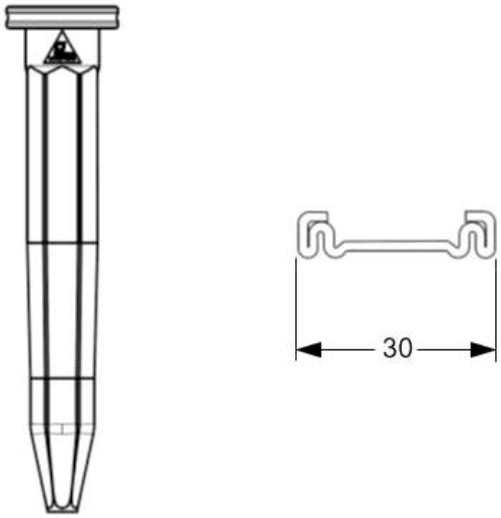
Zahn ZDBK-VB 4,8 x L



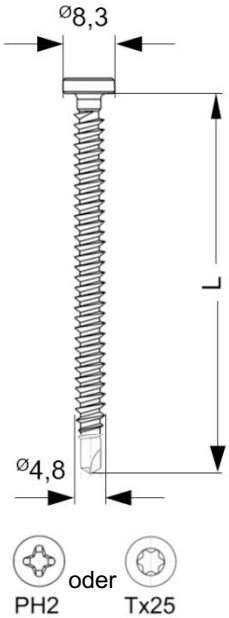
Zahn Flachdachbefestigungselemente	Anhang 136
Kombination 136 ZSSB-VB Trapez aus ZDBK-VB / ZSSB-Tülle 4,8 und Schiene	



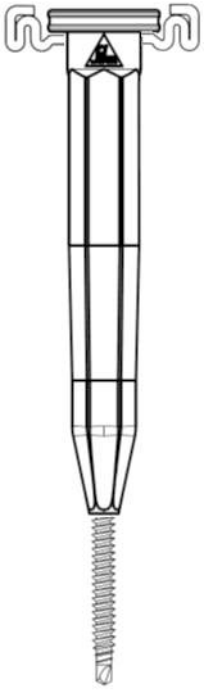
Zahn ZSSB-Tülle 4,8 mit Schiene



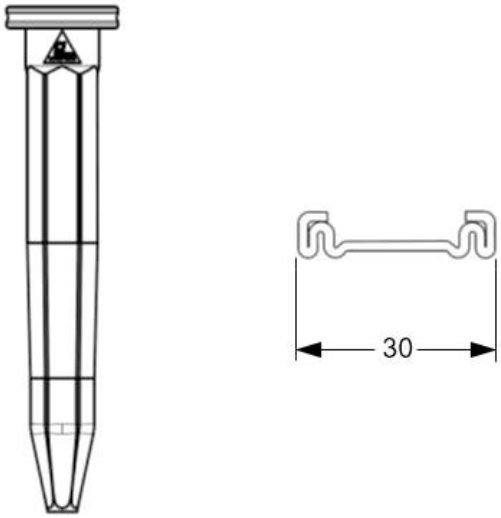
Zahn ZDBK-VB-E 4,8 x L



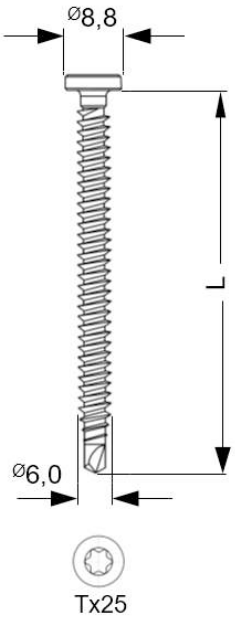
Zahn Flachdachbefestigungselemente	Anhang 137
Kombination 137 ZSSB-E-VB Trapez aus ZDBK-VB-E / ZSSB-Tülle 4,8 und Schiene	



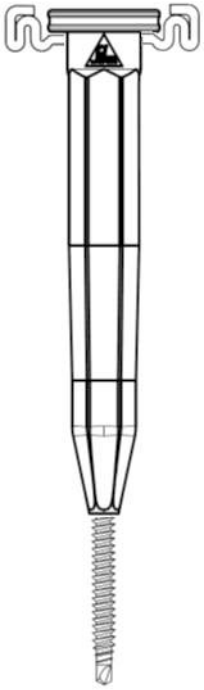
Zahn ZSSB-Tülle 6,0 mit Schiene



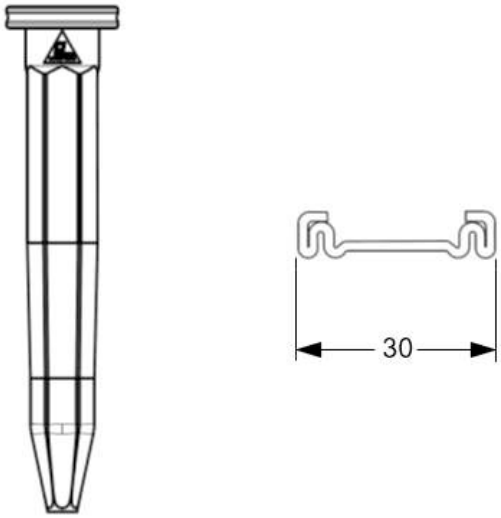
Zahn ZMDS 6,0 x L



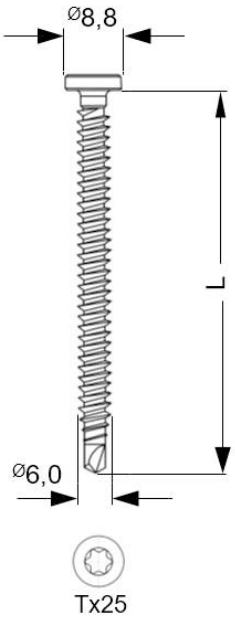
Zahn Flachdachbefestigungselemente	Anhang 138
Kombination 138 ZSSB Multi aus ZMDS / ZSSB-Tülle 6,0 und Schiene	



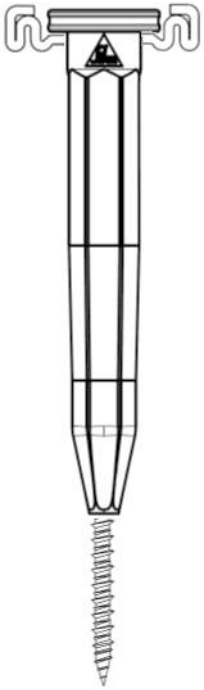
Zahn ZSSB-Tülle 6,0 mit Schiene



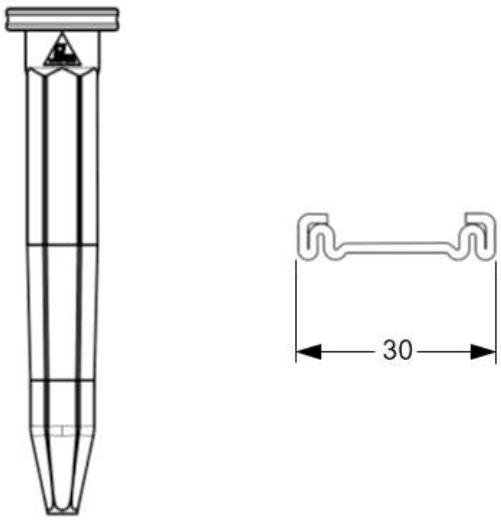
Zahn ZMDS-E 6,0 x L



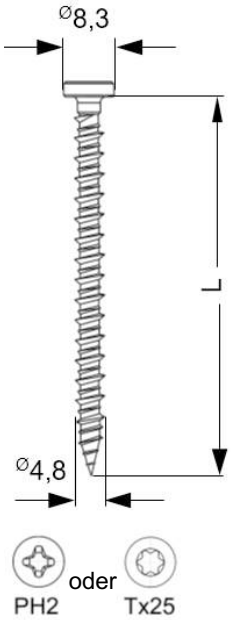
Zahn Flachdachbefestigungselemente	Anhang 139
Kombination 139 ZSSB-Multi-E aus ZMDS-E / ZSSB-Tülle 6,0 und Schiene	



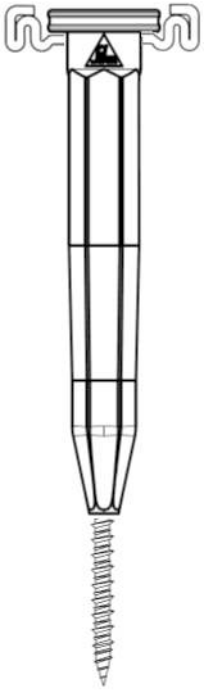
Zahn ZSSB-Tülle 4,8 mit Schiene



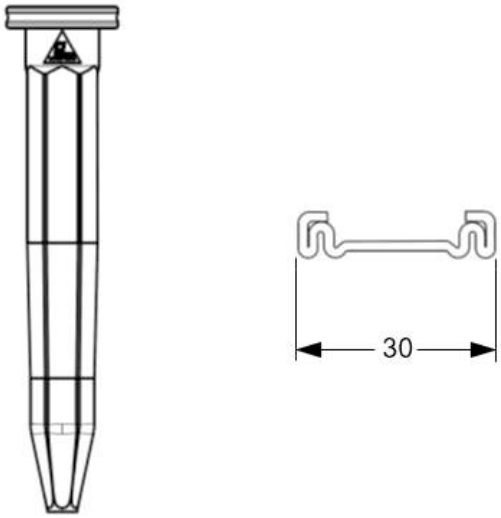
Zahn ZHBK 4,8 x L



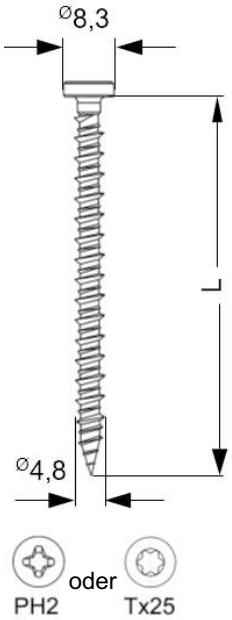
Zahn Flachdachbefestigungselemente	Anhang 140
Kombination 140 ZSSB-Holz aus ZHBK / ZSSB-Tülle 4,8 und Schiene	



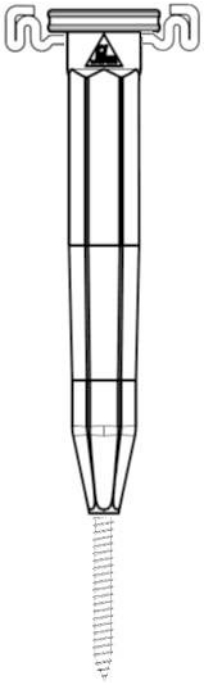
Zahn ZSSB-Tülle 4,8 mit Schiene



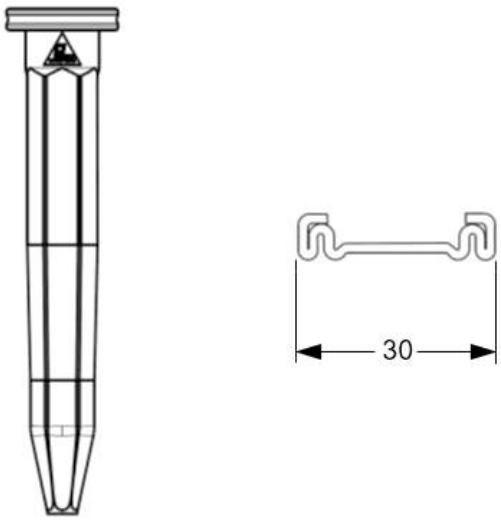
Zahn ZHBK-E 4,8 x L



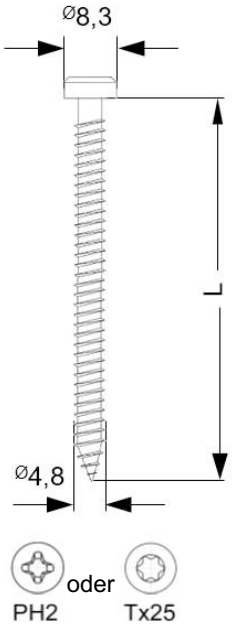
Zahn Flachdachbefestigungselemente	Anhang 141
Kombination 141 ZSSB-E-Holz aus ZHBK-E / ZSSB-Tülle 4,8 und Schiene	



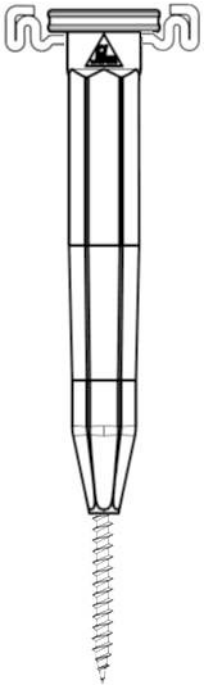
Zahn ZSSB-Tülle 4,8 mit Schiene



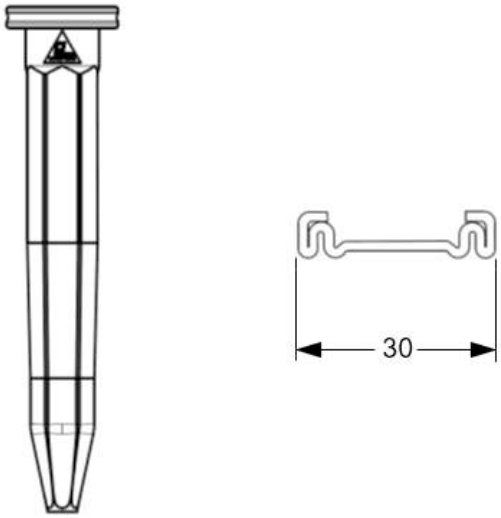
Zahn $ZDBK_{Dübel}$ 4,8 x L



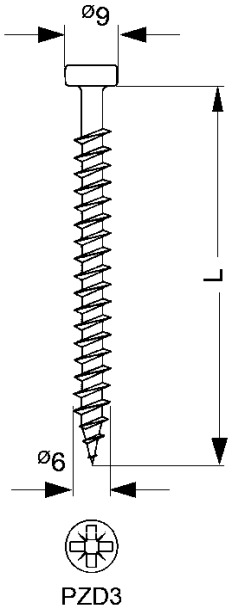
Zahn Flachdachbefestigungselemente	Anhang 142
Kombination 142 ZSSB-ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZSSB-Tülle 4,8 und Schiene	



Zahn ZSSB-Tülle 6,0 mit Schiene



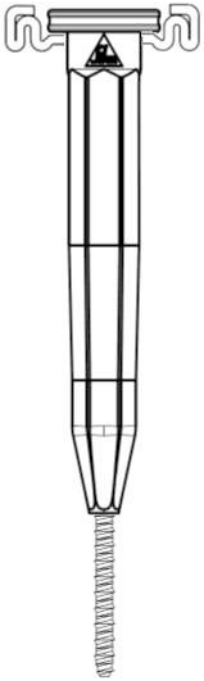
Zahn ZGBK-E 6,0 x L



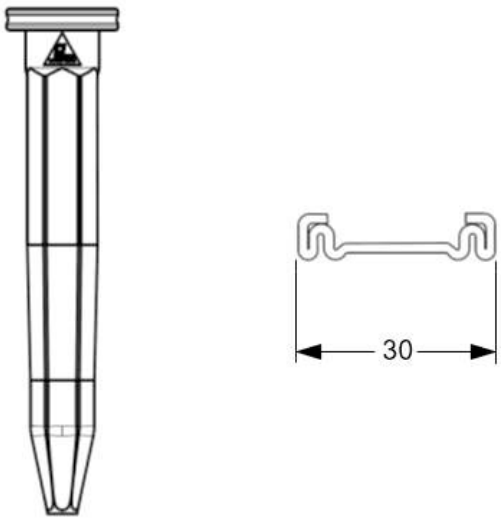
Zahn Flachdachbefestigungselemente

Kombination 143
ZSSB-PB Direkt
aus ZGBK-E / ZSSB-Tülle 6,0 und Schiene

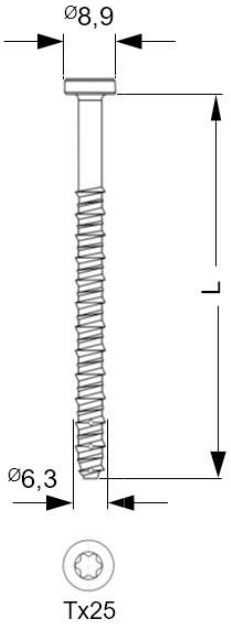
Anhang 143



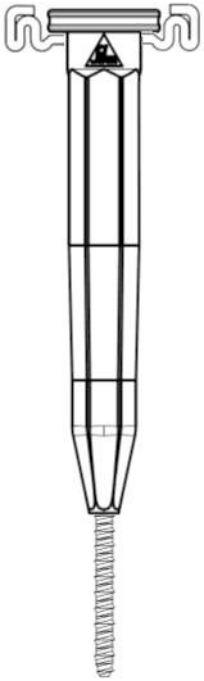
Zahn ZSSB-Tülle 6,0 mit Schiene



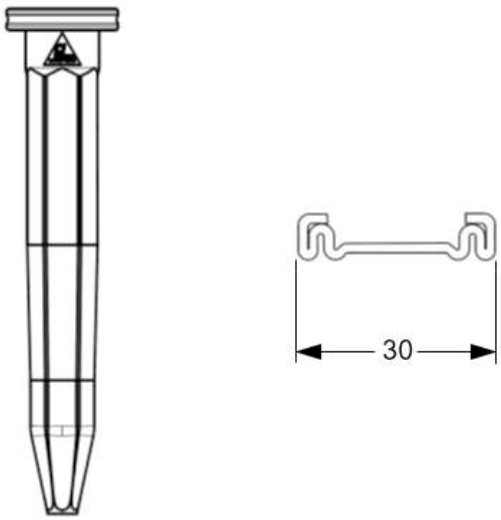
Zahn ZBST 6,3 x L



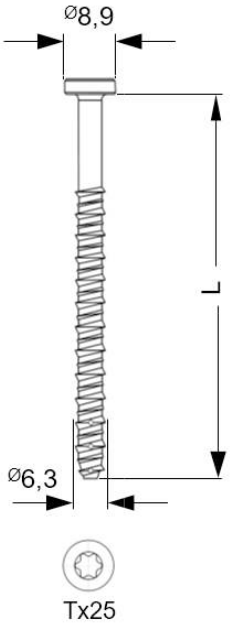
Zahn Flachdachbefestigungselemente	Anhang 144
Kombination 144 ZSSB-Beton-Direkt aus ZBST / ZSSB-Tülle 6,0 und Schiene	



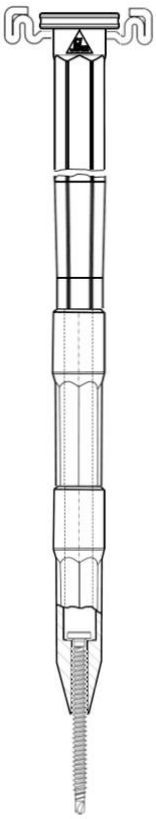
Zahn ZSSB-Tülle 6,0 mit Schiene



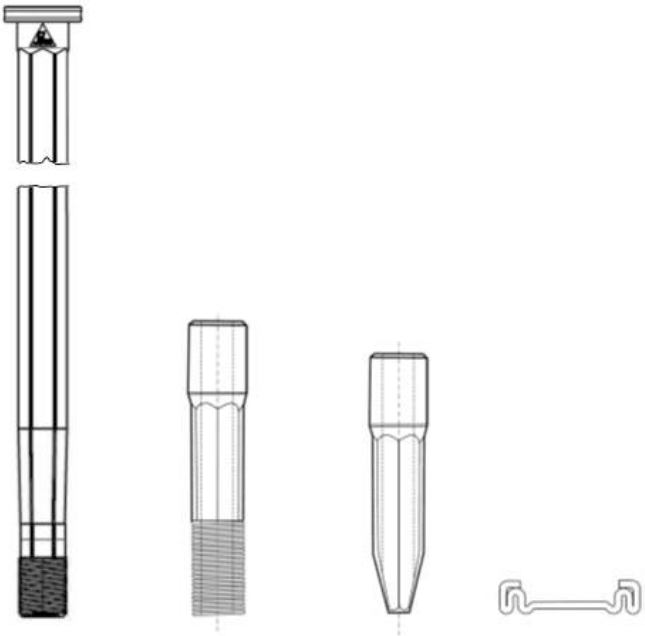
Zahn ZBST-E 6,3 x L



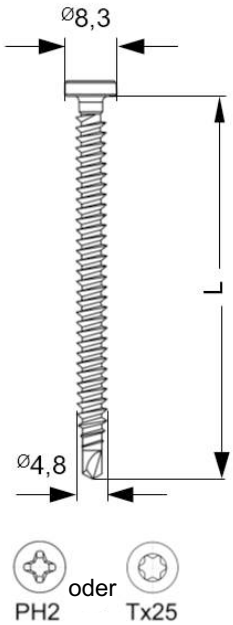
Zahn Flachdachbefestigungselemente	Anhang 145
Kombination 145 ZSSB-E-Beton-Direkt aus ZBST-E / ZSSB-Tülle 6,0 und Schiene	



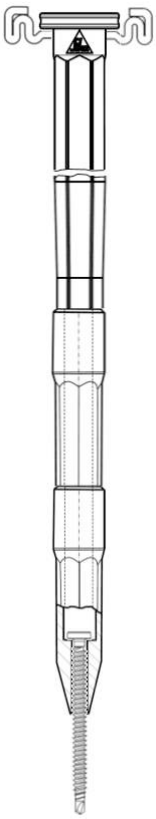
Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



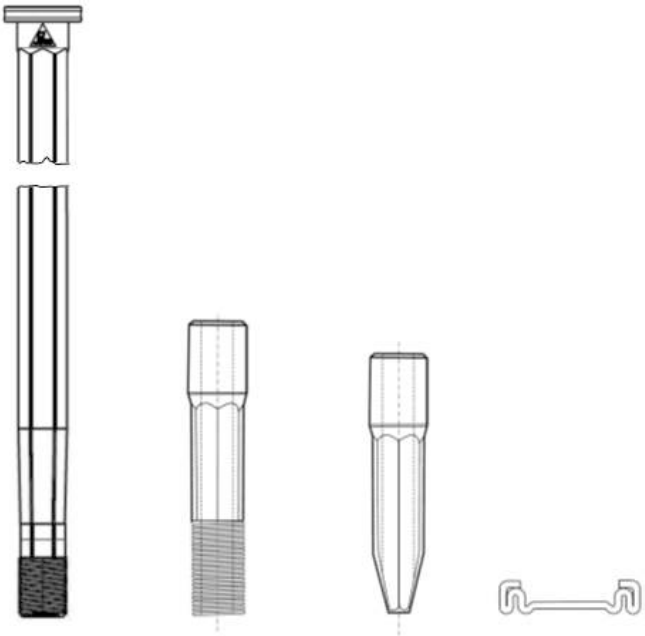
Zahn ZDBK 4,8 x L



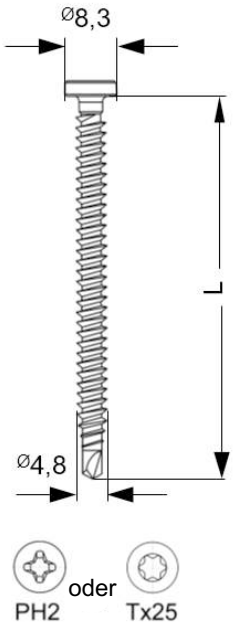
Zahn Flachdachbefestigungselemente	Anhang 146
Kombination 146 ZSSB-Modul Trapez aus ZDBK / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene	



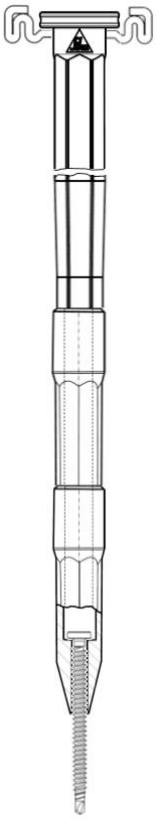
Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



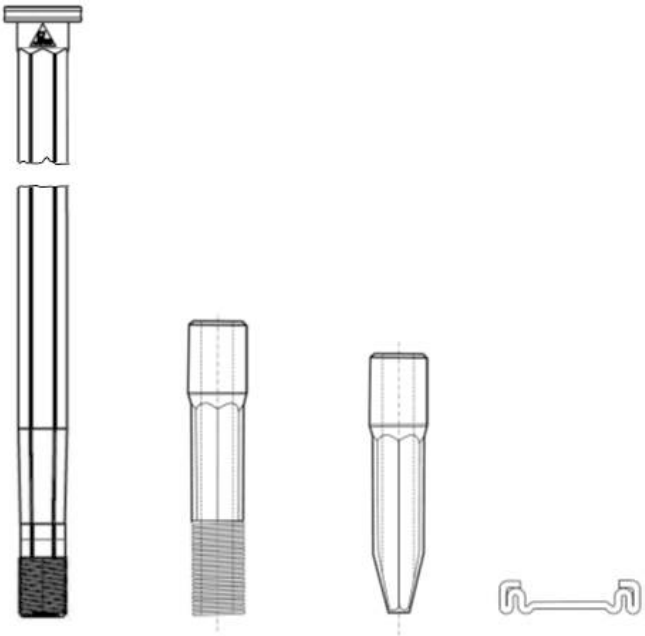
Zahn ZDBK-E 4,8 x L



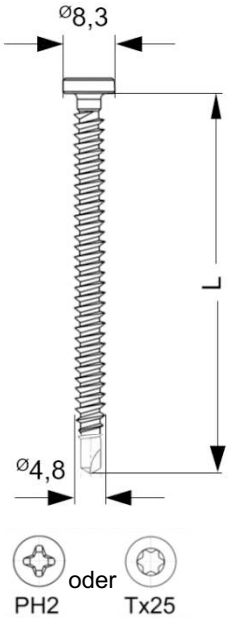
Zahn Flachdachbefestigungselemente	Anhang 147
Kombination 147 ZSSB-E-Modul Trapez aus ZDBK-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene	



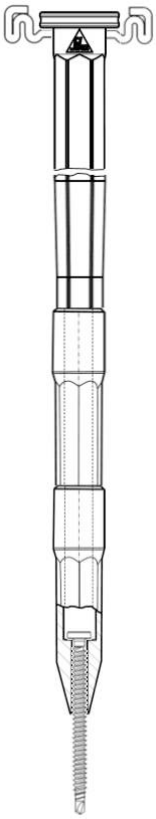
Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



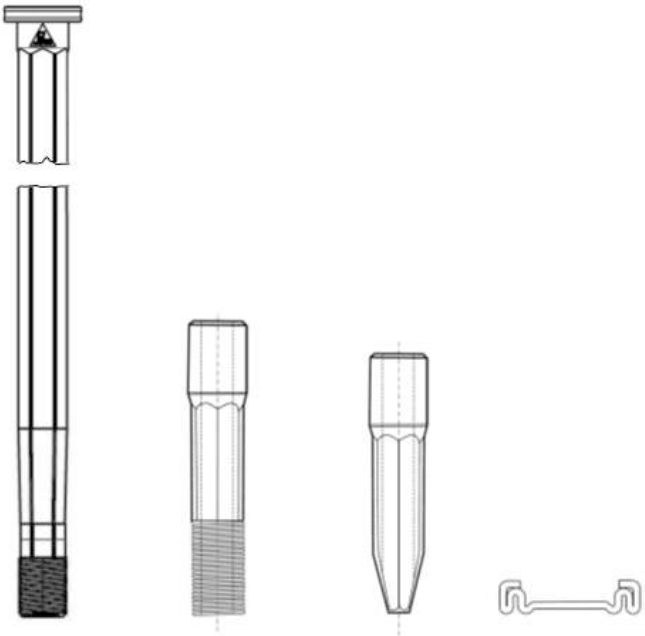
Zahn ZDBK-VB 4,8 x L



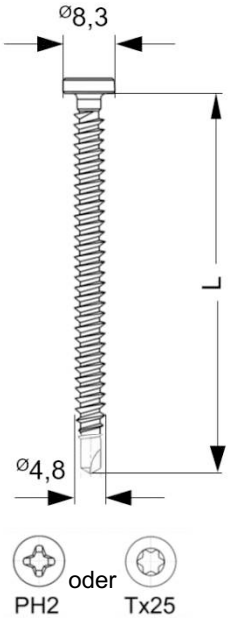
Zahn Flachdachbefestigungselemente	Anhang 148
Kombination 148 ZSSB-VB-Modul Trapez aus ZDBK-VB / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene	



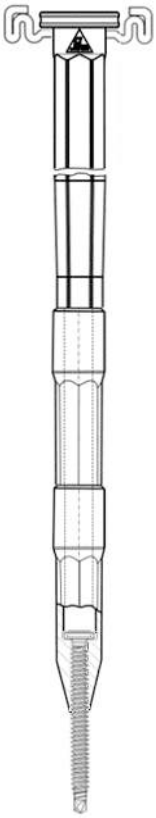
Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



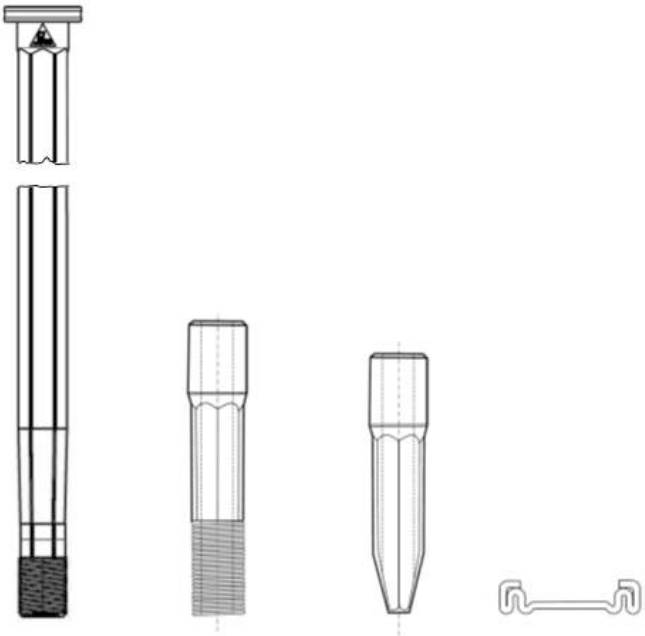
Zahn ZDBK-VB-E 4,8 x L



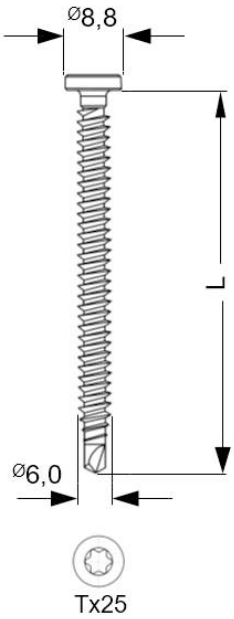
Zahn Flachdachbefestigungselemente	Anhang 149
Kombination 149 ZSSB-E-VB-Modul Trapez aus ZDBK-VB-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene	



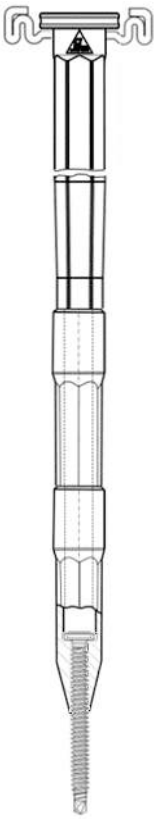
Zahn ZSSB- Modul-Tülle mit Modul 6,0 und Schiene



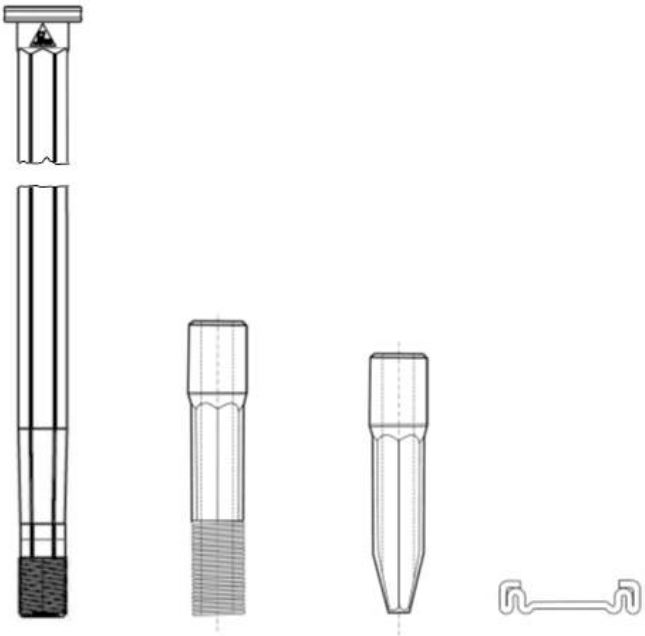
Zahn ZMDS 6,0 x L



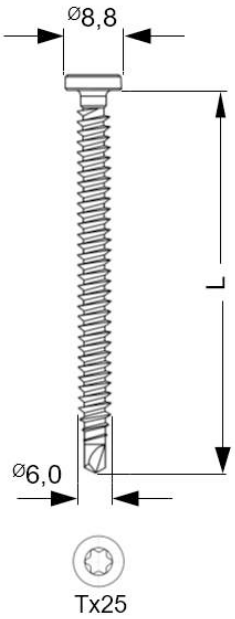
Zahn Flachdachbefestigungselemente	Anhang 150
Kombination 150 ZSSB-Multi-Modul aus ZMDS / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und ZSSB Schiene	



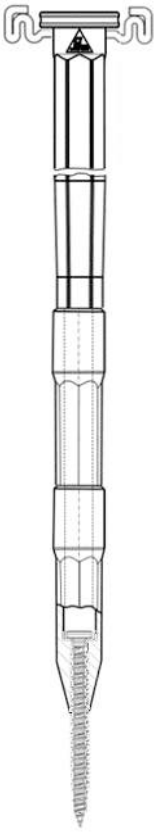
Zahn ZSSB- Modul-Tülle mit Modul 6,0 und Schiene



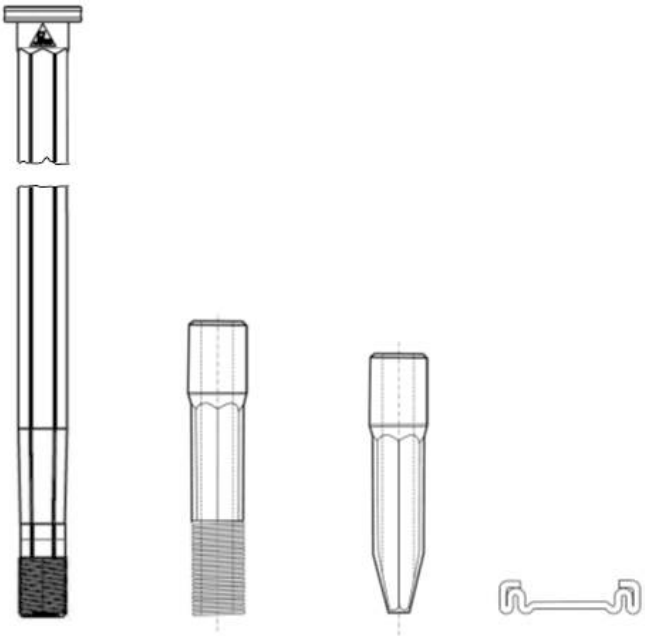
Zahn ZMDS-E 6,0 x L



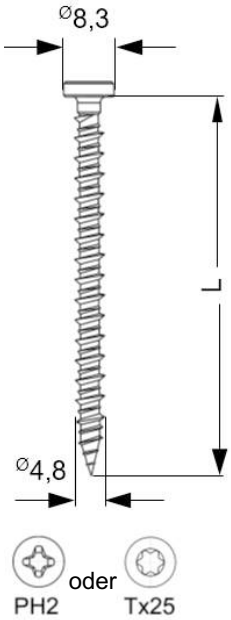
Zahn Flachdachbefestigungselemente	Anhang 151
Kombination 151 ZSSB-Multi-E Modul aus ZMDS-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und ZSSB Schiene	



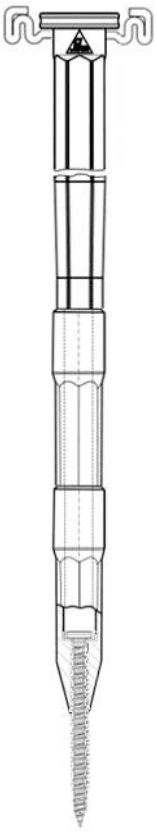
Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



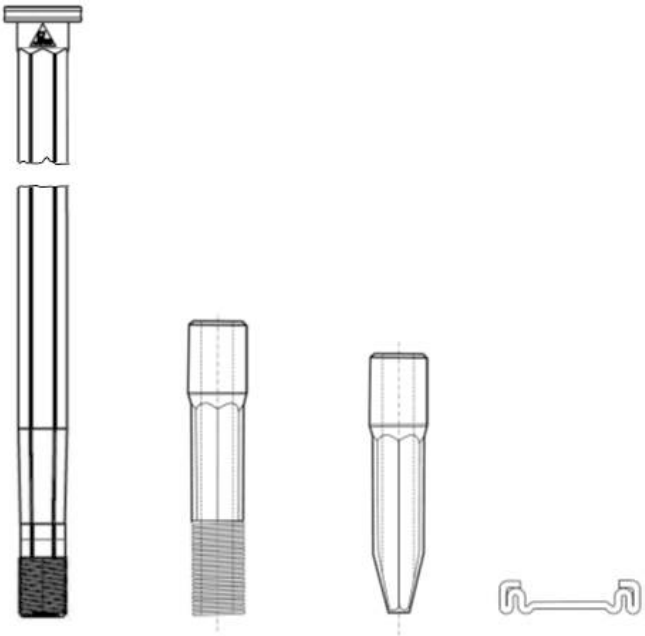
Zahn ZHBK 4,8 x L



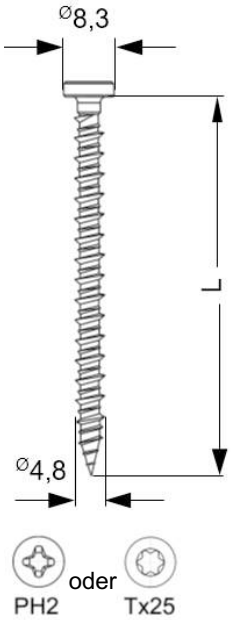
Zahn Flachdachbefestigungselemente	Anhang 152
Kombination 152 ZSSB-Modul Holz aus ZHBK / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene	



Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



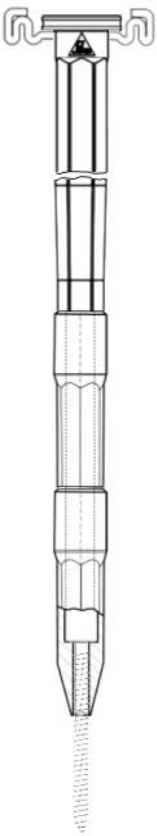
Zahn ZHBK-E 4,8 x L



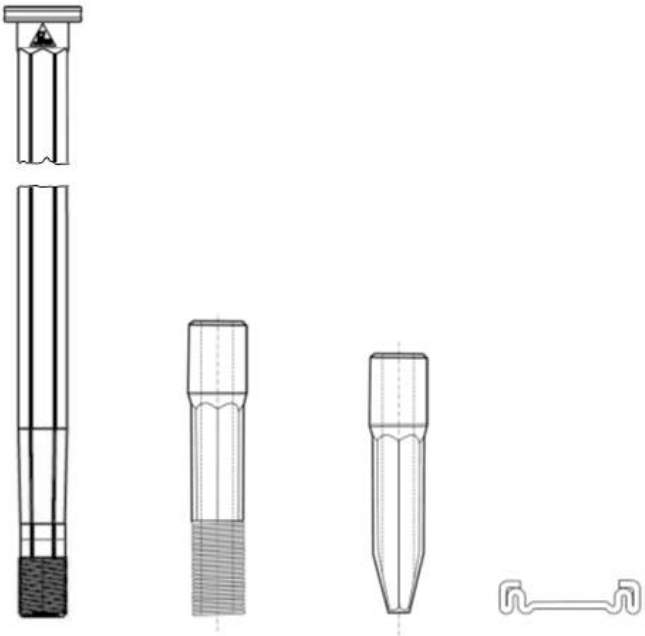
Zahn Flachdachbefestigungselemente

Kombination 153
ZSSB-E-Modul Holz aus ZHBK-E / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene

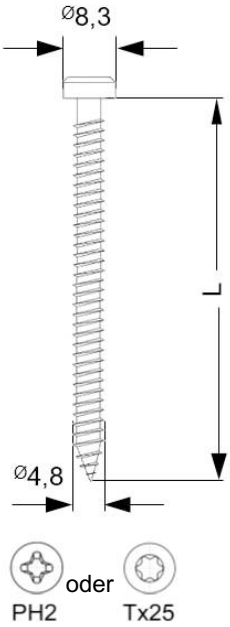
Anhang 153



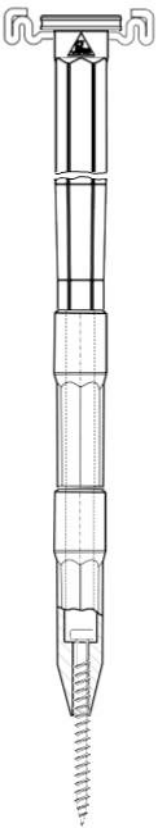
Zahn ZSSB- Modul-Tülle mit Modul 4,8 und Schiene



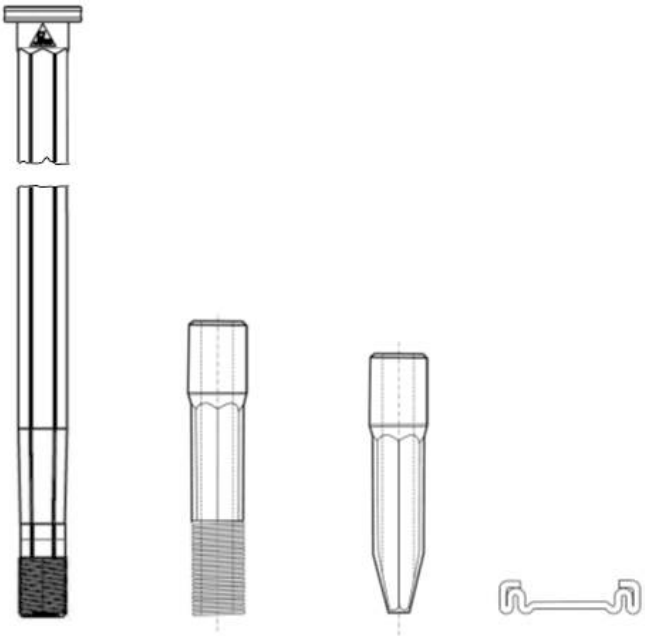
Zahn $ZDBK_{Dübel}$ 4,8 x L



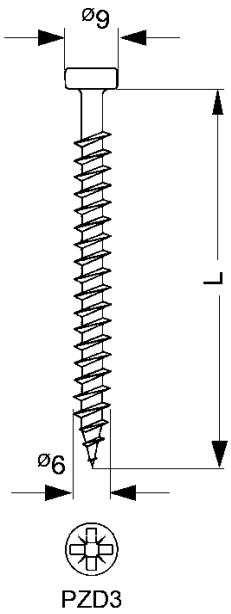
Zahn Flachdachbefestigungselemente	Anhang 154
Kombination 154 ZSSB-Modul ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und ZSSB Schiene	



Zahn ZSSB- Modul-Tülle mit Modul 6,0 und Schiene



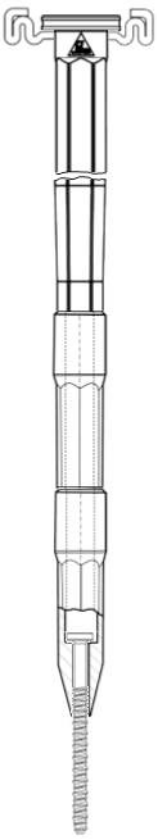
Zahn ZGBK-E 6,0 x L



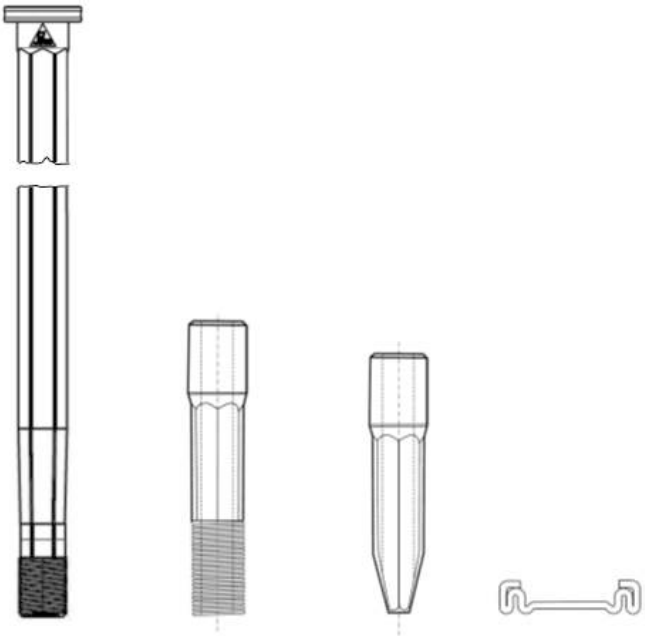
Zahn Flachdachbefestigungselemente

Kombination 155
ZSSB-Modul PB-Direkt aus ZGBK-E / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 6,0 und ZSSB Schiene

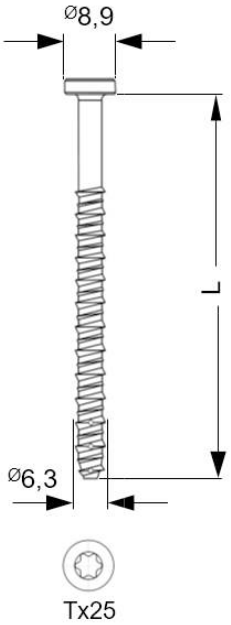
Anhang 155



Zahn ZSSB- Modul-Tülle mit Modul 6,0 und Schiene



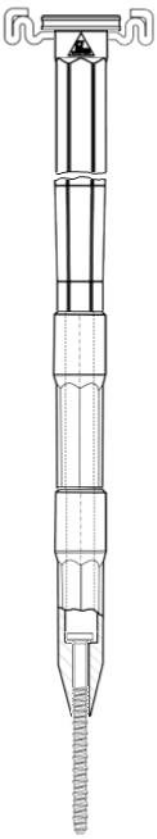
Zahn ZBST 6,3 x L



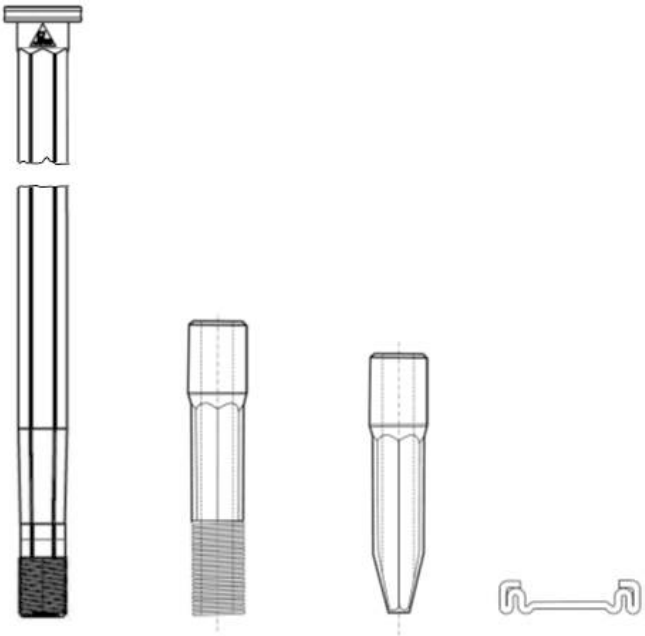
Zahn Flachdachbefestigungselemente

Kombination 156
ZSSB-Modul Beton-Direkt aus ZBST / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 6,0 und ZSSB Schiene

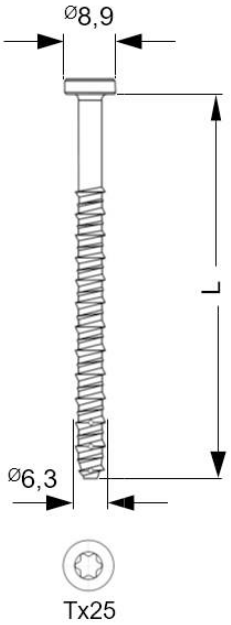
Anhang 156



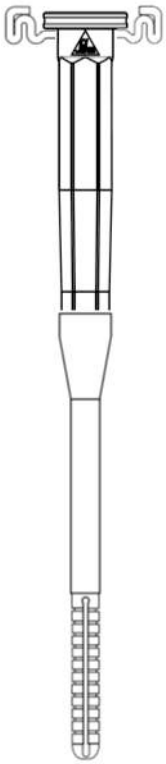
Zahn ZSSB- Modul-Tülle mit Modul 6,0 und Schiene



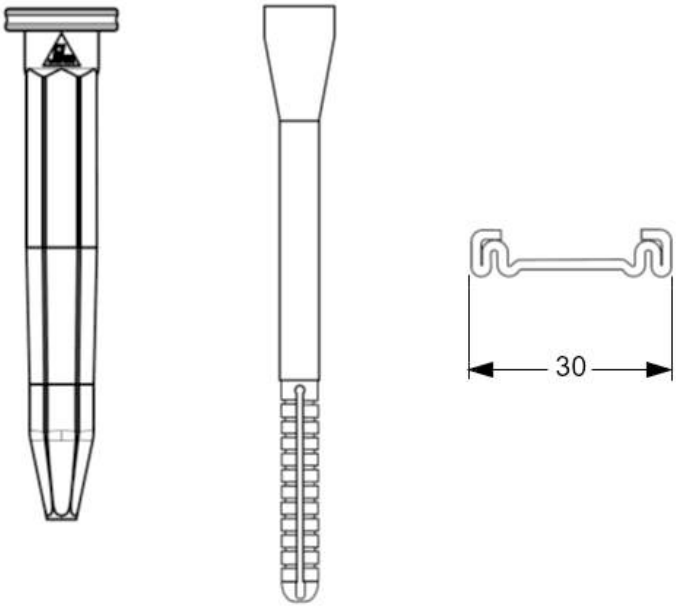
Zahn ZBST-E 6,3 x L



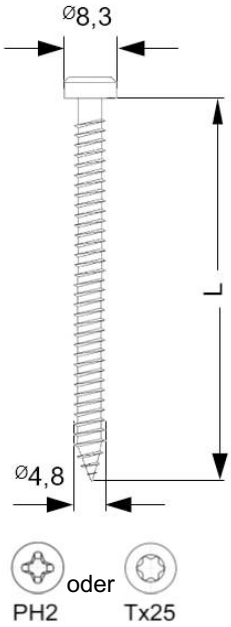
Zahn Flachdachbefestigungselemente	Anhang 157
Kombination 157 ZSSB-E-Modul Beton-Direkt aus ZBST-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und ZSSB Schiene	



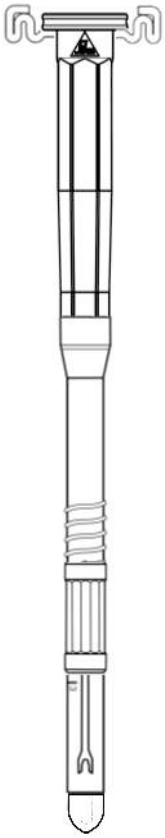
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Schiene



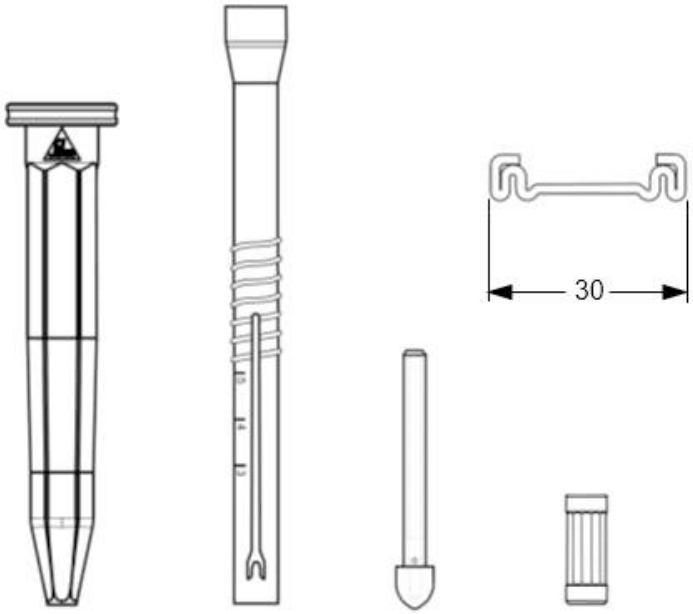
Zahn $ZDBK_{Dübel}$ 4,8 x L



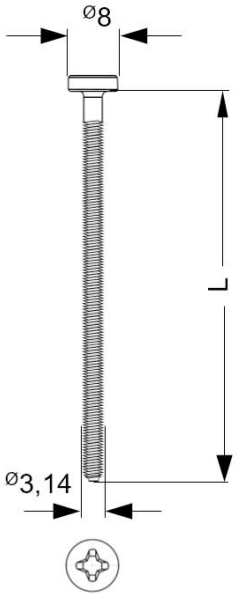
Zahn Flachdachbefestigungselemente	Anhang 158
Kombination 158 ZSSB-ZDBK-Dübel Beton aus $ZDBK_{Dübel}$ / ZSSB-Tülle 4,8, ZSSB Schiene und Dübelvorsatz	



Zahn ZSSB-Tülle 4,8 mit Spreizdübelvorsatz und Schiene



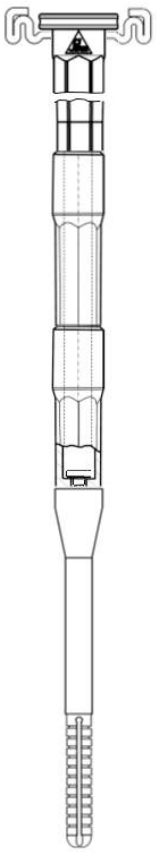
Zahn Metrische Schraube-E 3,14 x L



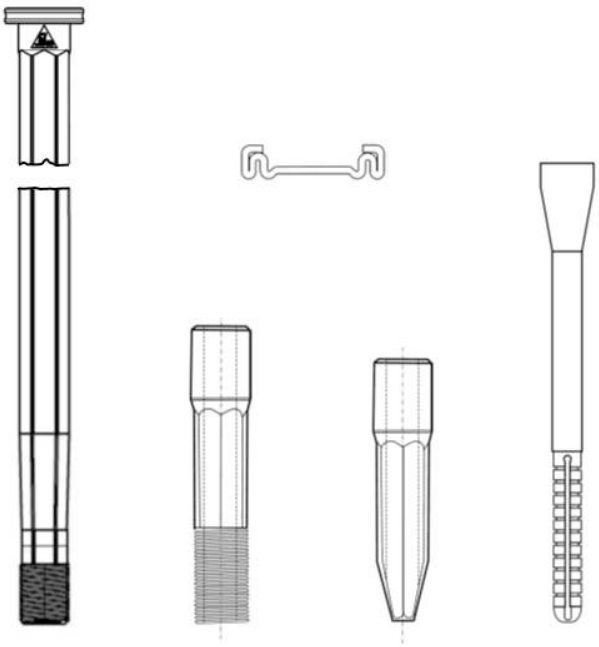
Zahn Flachdachbefestigungselemente

Kombination 159
ZSSB-ZHRD aus Metrischer Schraube-E / ZSSB-Tülle 4,8,
ZSSB Schiene und Spreizdübelvorsatz

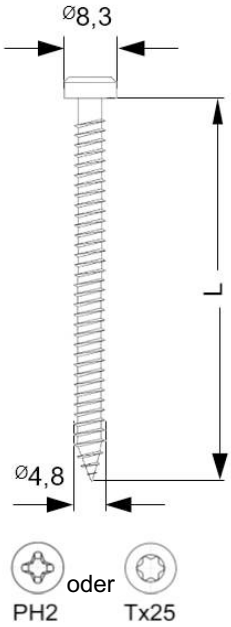
Anhang 159



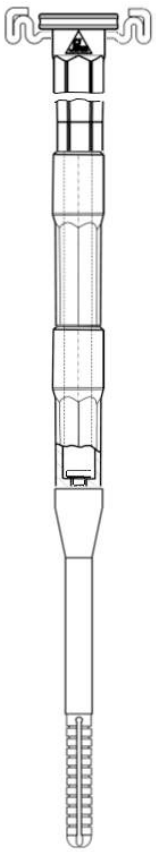
Zahn ZSSB-Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Schiene



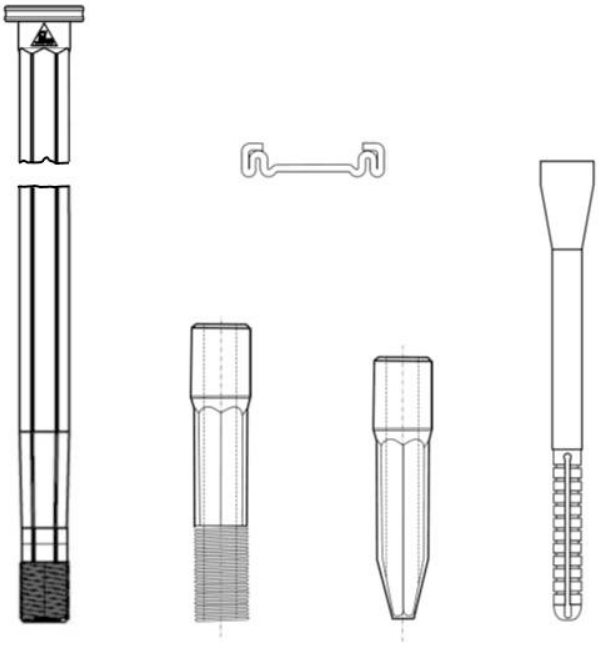
Zahn $ZDBK_{Dübel}$ 4,8 x L



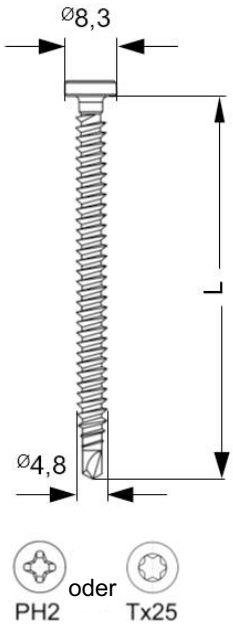
Zahn Flachdachbefestigungselemente	Anhang 160
Kombination 160 ZSSB-Modul-ZDBK-Dübel Beton aus $ZDBK_{Dübel}$ / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und ZSSB Schiene	



Zahn ZSSB-Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Schiene



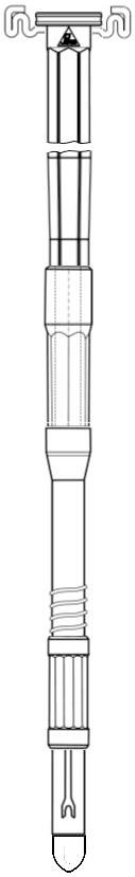
Zahn ZDBK-E 4,8 x L



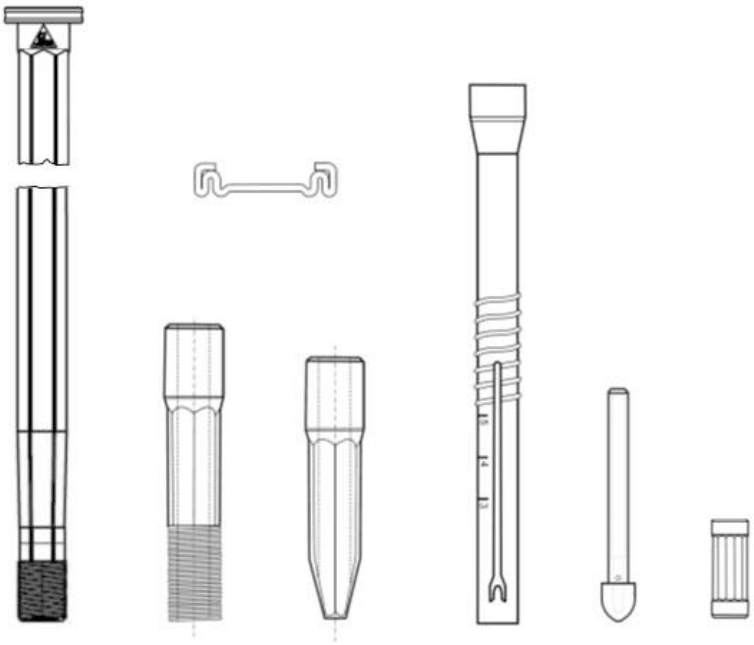
Zahn Flachdachbefestigungselemente

Kombination 161
ZSSB-E-Modul Beton aus ZDBK-E / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und ZSSB Schiene

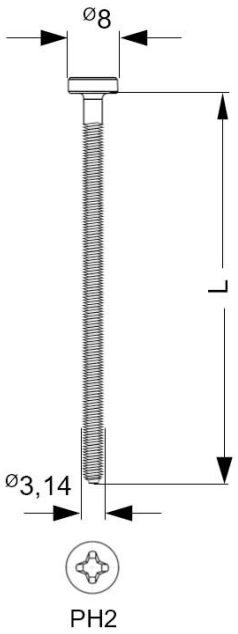
Anhang 161



Zahn ZSSB- Modul-Tülle 4,8 mit Modul, Spreizdübelvorsatz und Schiene



Zahn Metrische Schraube-E 3,14 x L

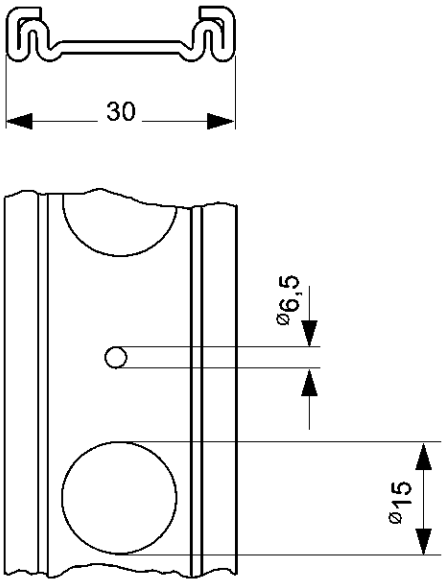


Zahn Flachdachbefestigungselemente

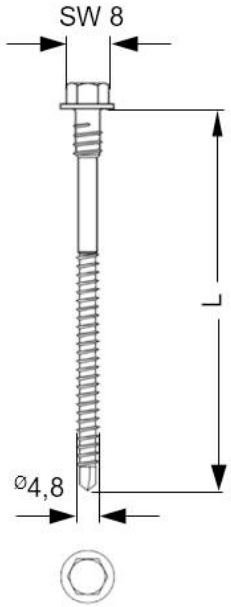
Kombination 162
ZSSB-ZHRD-Modul aus Metrischer Schraube-E / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 4,8, ZSSB Schiene und Spreizdübelvorsatz

Anhang 162

ZSSB Schiene



Zahn ZDBS 4,8 x L

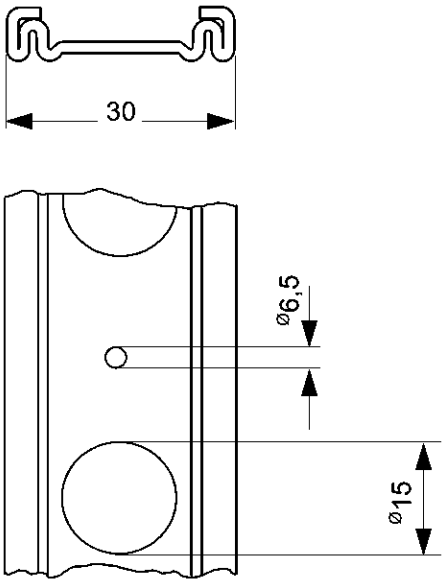


Zahn Flachdachbefestigungselemente

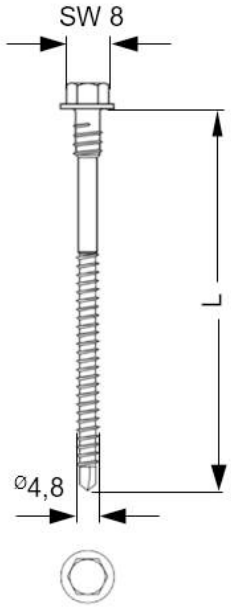
Kombination 163
Sarnabar / ZDBS

Anhang 163

ZSSB Schiene

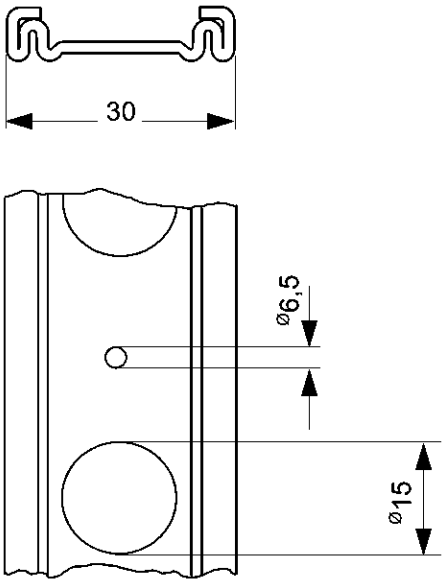


Zahn ZDBS-VB 4,8 x L

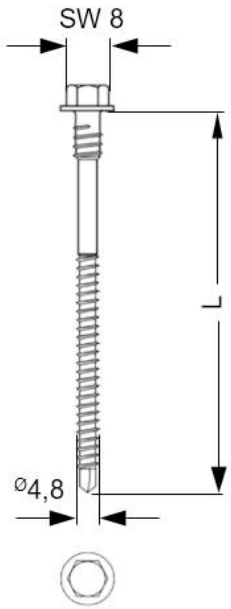


Zahn Flachdachbefestigungselemente	Anhang 163a
Kombination 163a Sarnabar / ZDBS-VB	

ZSSB Schiene

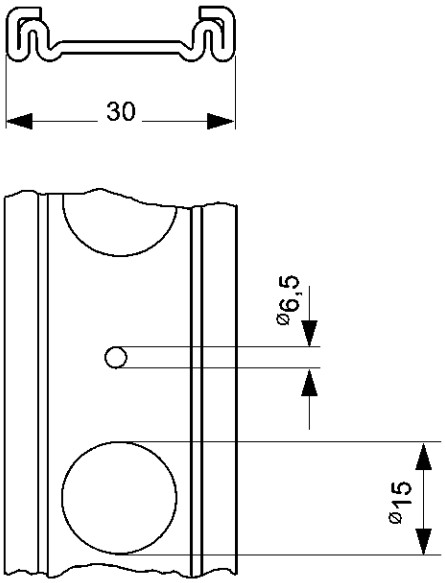


Zahn ZDBS-E 4,8 x L

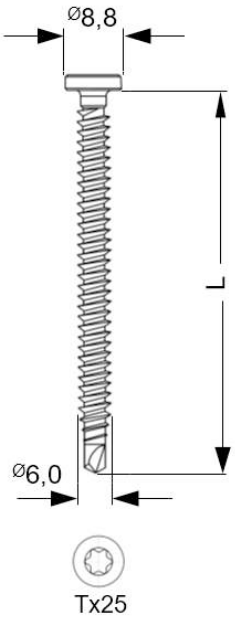


Zahn Flachdachbefestigungselemente	Anhang 164
Kombination 164 Sarnabar / ZDBS-E	

ZSSB Schiene

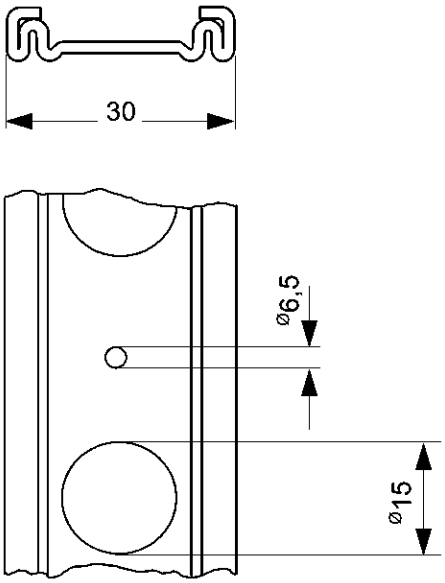


Zahn ZMDS 6,0 x L

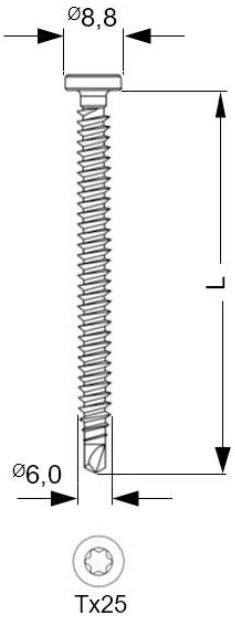


Zahn Flachdachbefestigungselemente	Anhang 165
Kombination 165 Sarnabar / ZMDS	

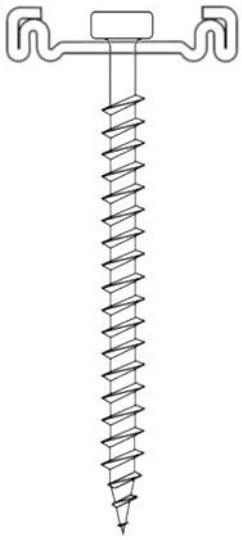
ZSSB Schiene



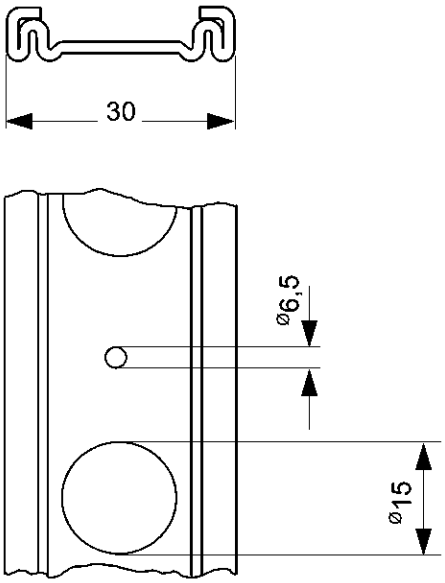
Zahn ZMDS-E 6,0 x L



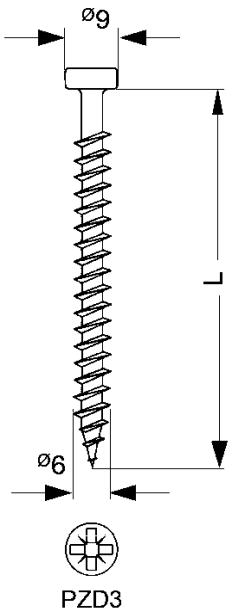
Zahn Flachdachbefestigungselemente	Anhang 166
Kombination 166 Sarnabar / ZMDS-E	



ZSSB Schiene

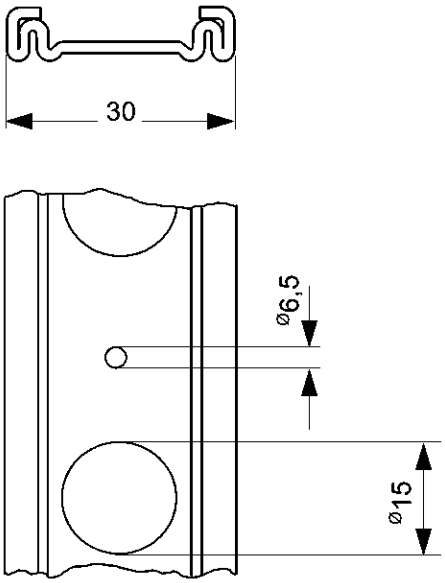


Zahn ZGBK-E 6,0 x L

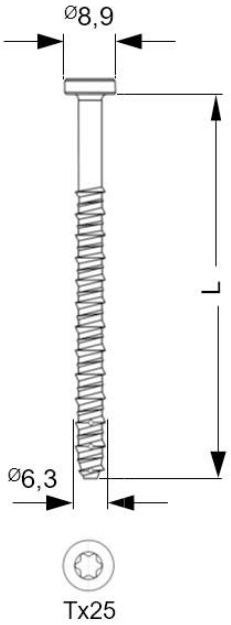


Zahn Flachdachbefestigungselemente	Anhang 167
Kombination 167 Sarnabar / ZGBK-E	

ZSSB Schiene

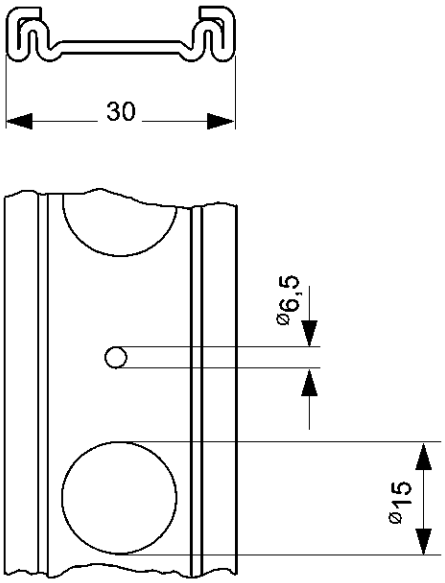


Zahn ZBST 6,3 x L

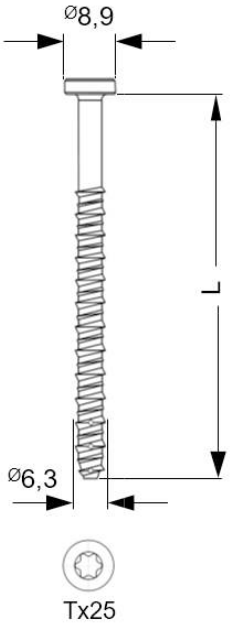


Zahn Flachdachbefestigungselemente	Anhang 168
Kombination 168 Sarnabar / ZBST	

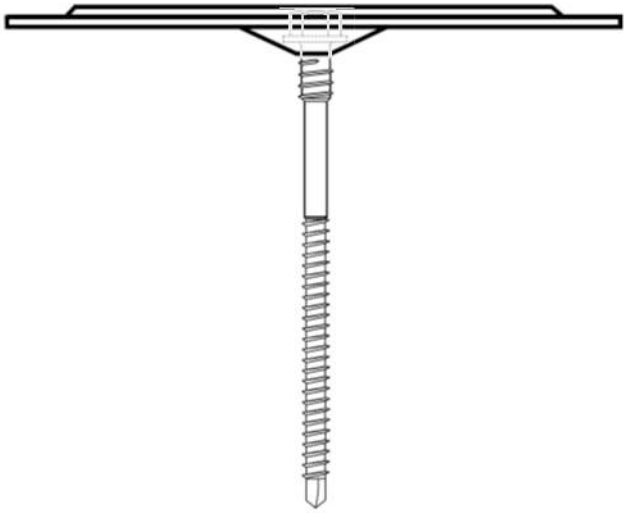
ZSSB Schiene



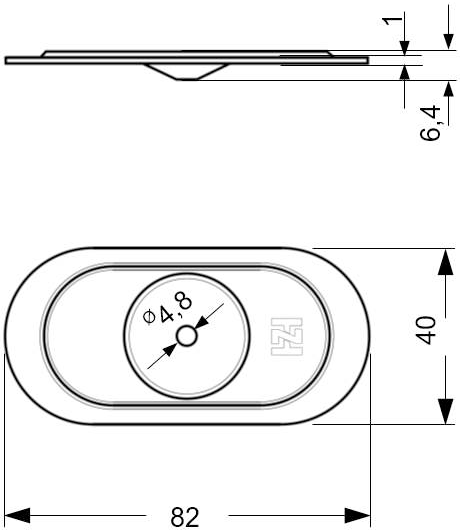
Zahn ZBST-E 6,3 x L



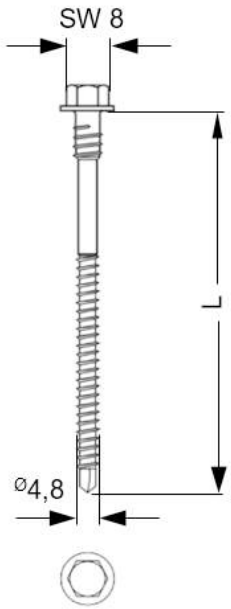
Zahn Flachdachbefestigungselemente	Anhang 169
Kombination 169 Sarnabar / ZBST-E	



Zahn ZLVT 0001

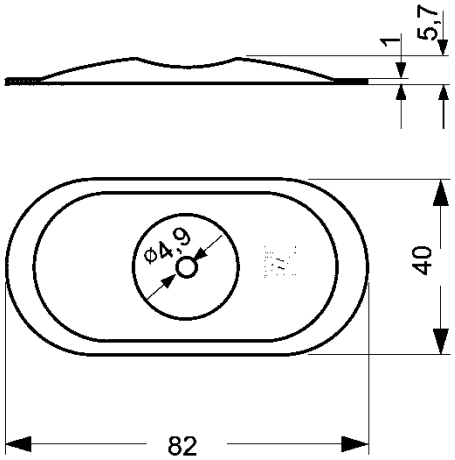


Zahn $ZDBS_1$ 4,8 x L

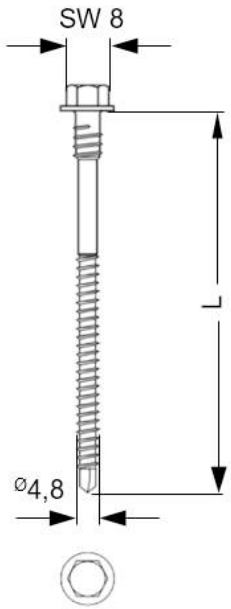


Zahn Flachdachbefestigungselemente	Anhang 170
Kombination 170 ZDBS-1 / ZLVT 0001	

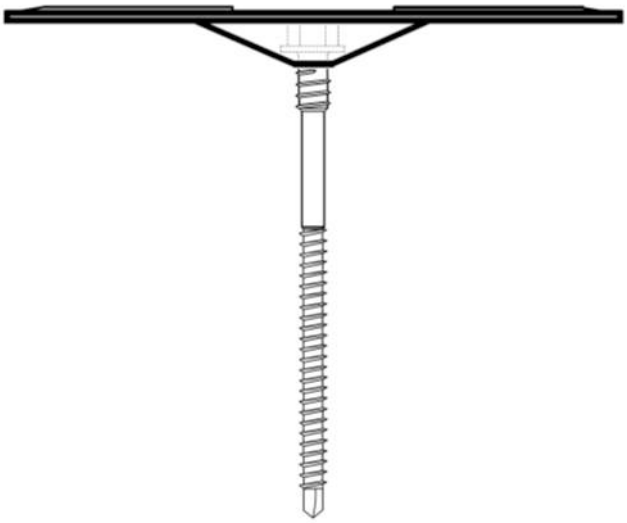
Zahn ZLVT 0005



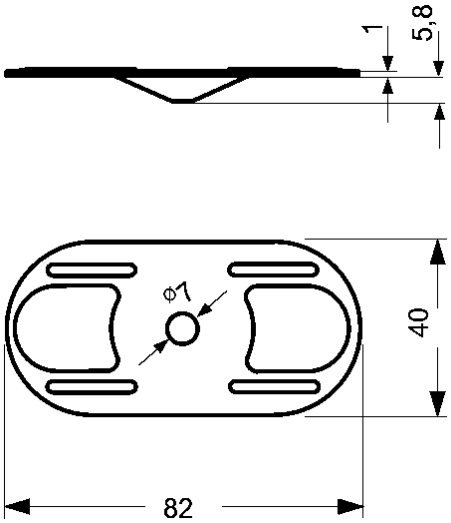
Zahn $ZDBS_1$ 4,8 x L



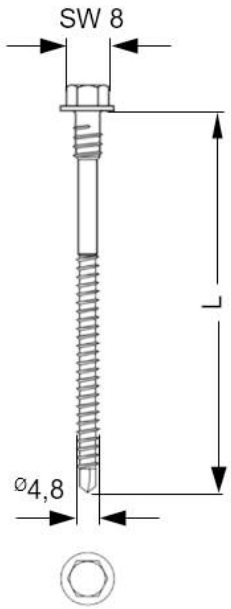
Zahn Flachdachbefestigungselemente	Anhang 171
Kombination 171 ZDBS-1 / ZLVT 0005	



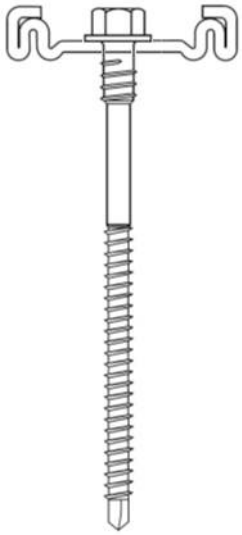
Zahn ZLVT 0012



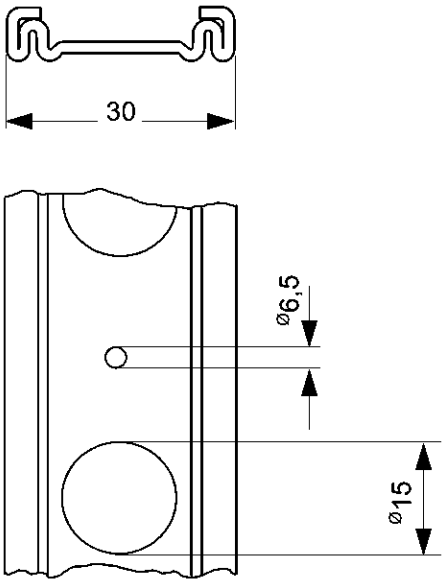
Zahn $ZDBS_1$ 4,8 x L



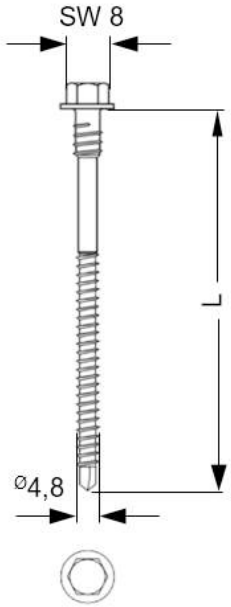
Zahn Flachdachbefestigungselemente	Anhang 172
Kombination 172 ZDBS-1 / ZLVT 0012	



ZSSB Schiene



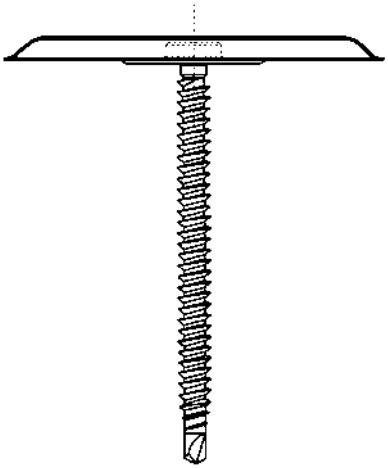
Zahn $ZDBS_1$ 4,8 x L



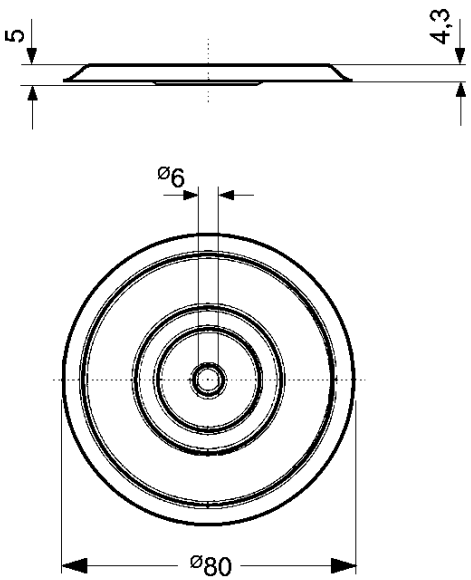
Zahn Flachdachbefestigungselemente

Kombination 173
Sarnabar / ZSSB-1

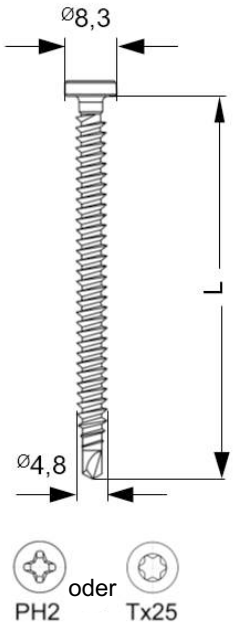
Anhang 173



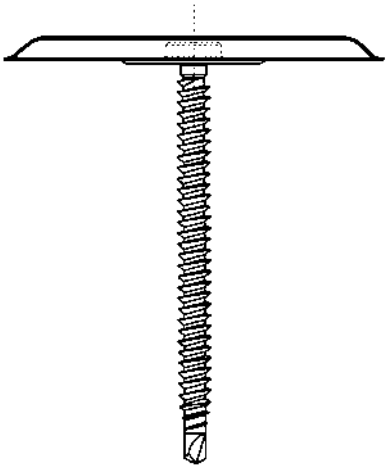
Zahn $ZCTS_1$-Teller



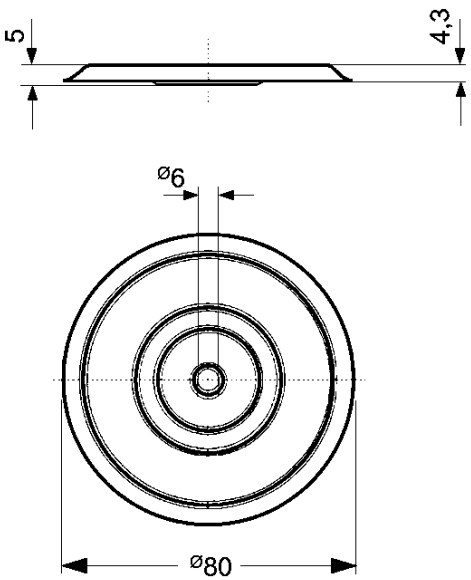
Zahn ZDBK 4,8 x L



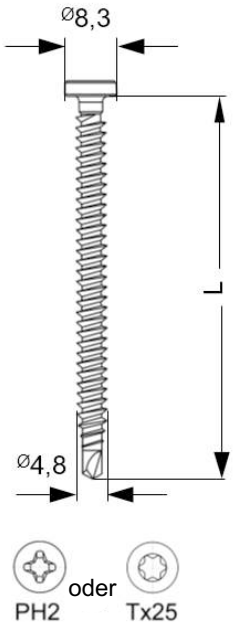
Zahn Flachdachbefestigungselemente	Anhang 174
Kombination 174 ZCTS-1 Trapez aus ZDBK und ZCTS-1-Teller	



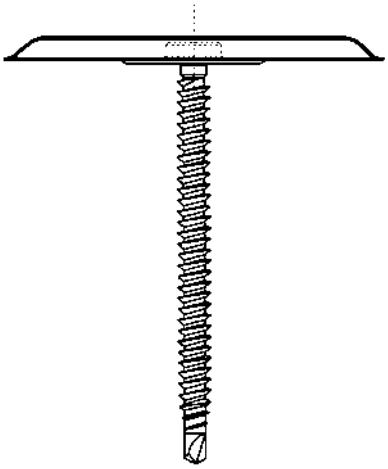
Zahn $ZCTS_1$-Teller



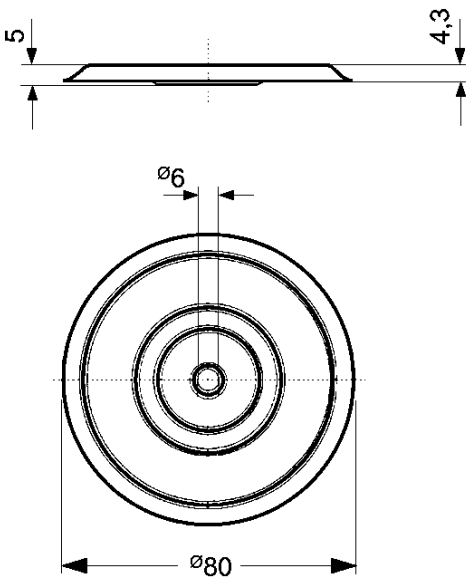
Zahn ZDBK-E 4,8 x L



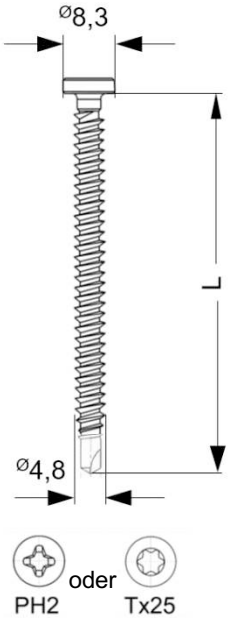
Zahn Flachdachbefestigungselemente	Anhang 175
Kombination 175 ZCTS-1-E Trapez aus ZDBK-E und ZCTS-1-Teller	



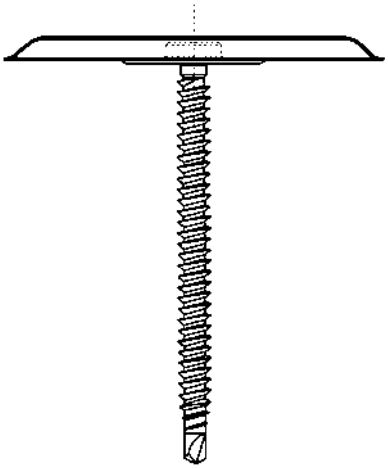
Zahn $ZCTS_1$-Teller



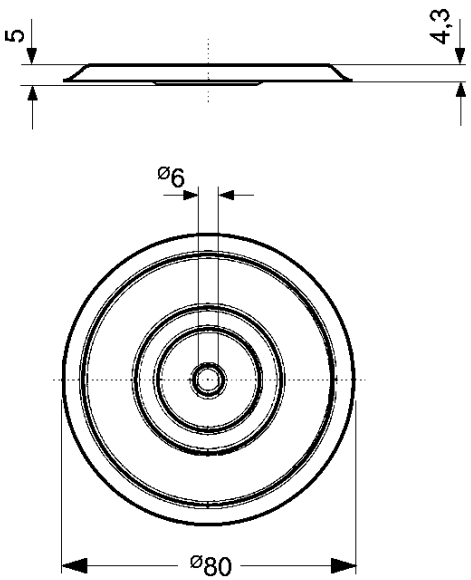
Zahn ZDBK-VB 4,8 x L



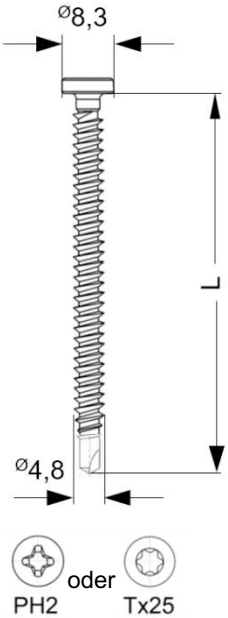
Zahn Flachdachbefestigungselemente	Anhang 176
Kombination 176 ZCTS-1-VB Trapez aus ZDBK-VB und ZCTS-1-Teller	



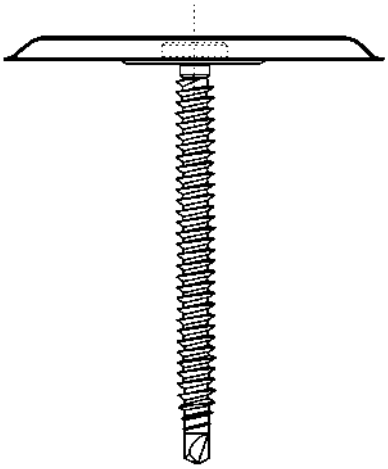
Zahn $ZCTS_1$-Teller



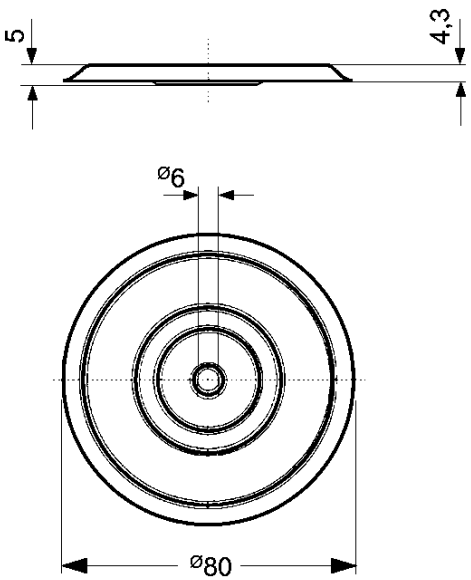
Zahn ZDBK-VB-E 4,8 x L



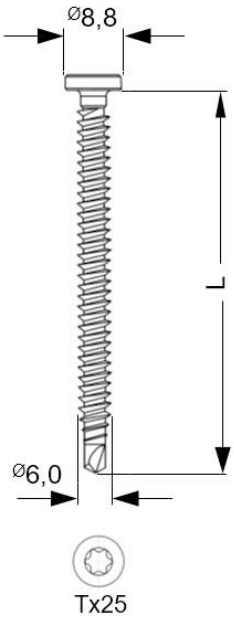
Zahn Flachdachbefestigungselemente	Anhang 177
Kombination 177 ZCTS-1-E/VB Trapez aus ZDBK-VB-E und ZCTS-1-Teller	



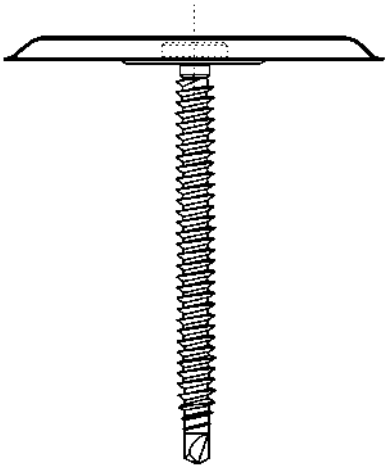
Zahn $ZCTS_1$-Teller



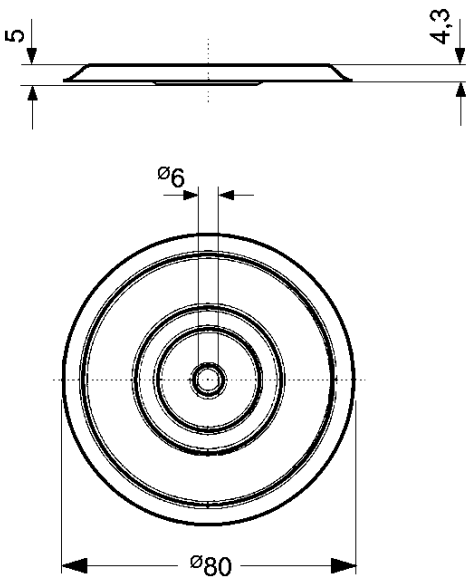
Zahn ZMDS 6,0 x L



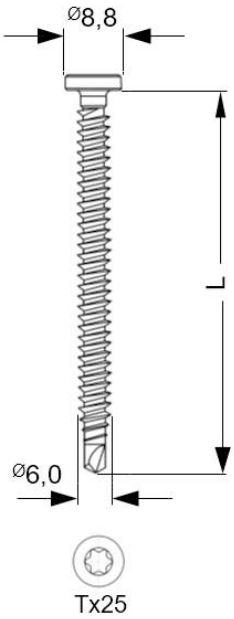
Zahn Flachdachbefestigungselemente	Anhang 178
Kombination 178 ZCTS-1-Multi aus ZMDS und ZCTS-1-Teller	



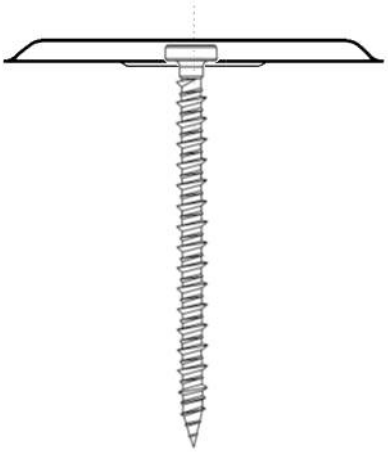
Zahn $ZCTS_1$-Teller



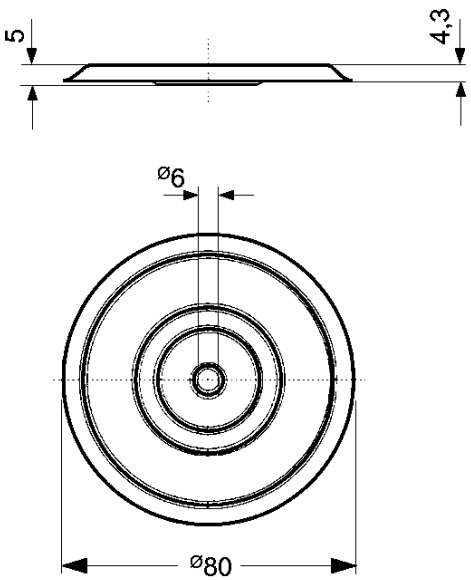
Zahn ZMDS-E 6,0 x L



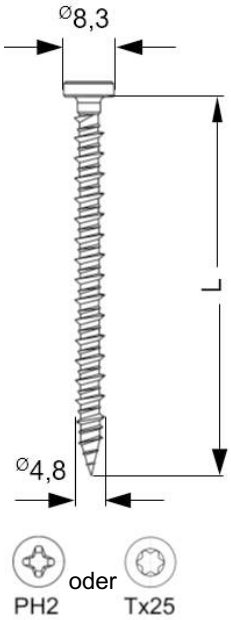
Zahn Flachdachbefestigungselemente	Anhang 179
Kombination 179 ZCTS-1-Multi-E aus ZMDS-E und ZCTS-1-Teller	



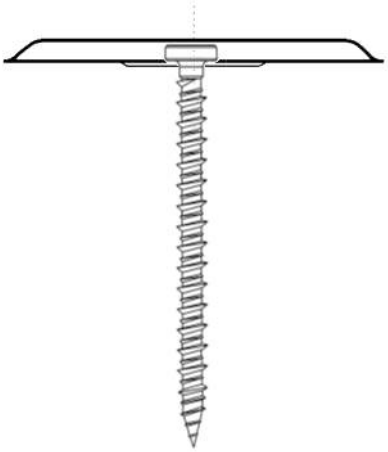
Zahn $ZCTS_1$-Teller



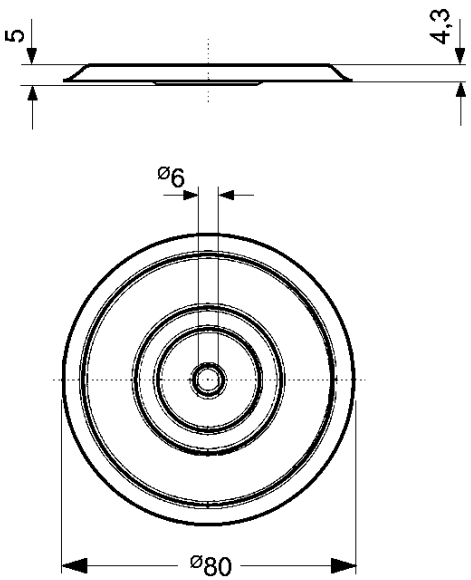
Zahn ZHBK 4,8 x L



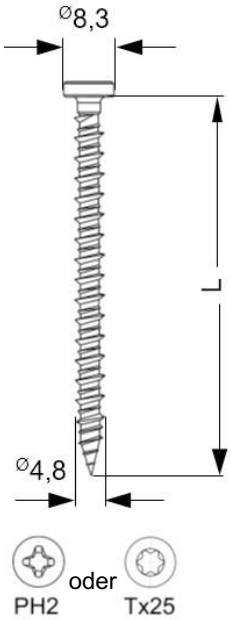
Zahn Flachdachbefestigungselemente	Anhang 180
Kombination 180 ZCTS-1 Holz aus ZHBK und ZCTS-1-Teller	



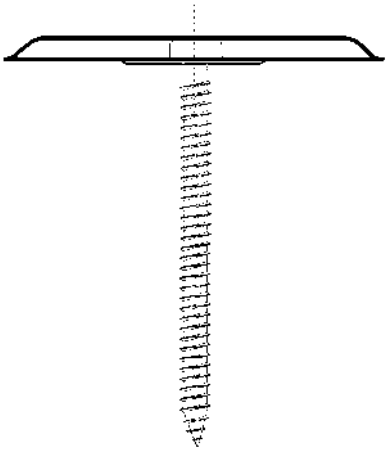
Zahn $ZCTS_1$-Teller



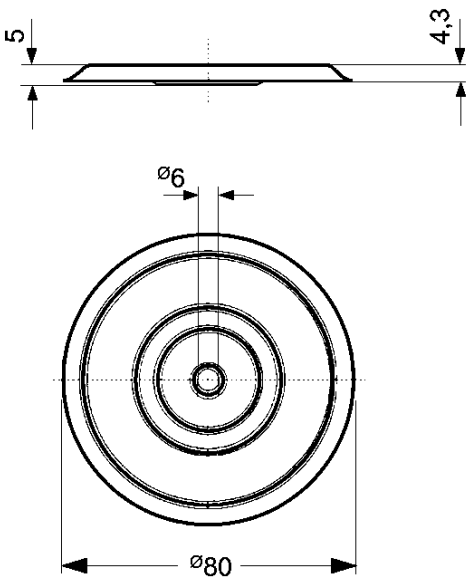
Zahn ZHBK-E 4,8 x L



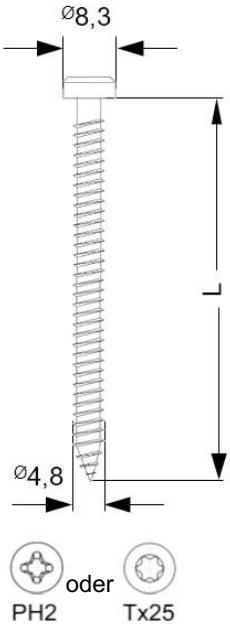
Zahn Flachdachbefestigungselemente	Anhang 181
Kombination 181 ZCTS-1-E Holz aus ZHBK-E und ZCTS-1-Teller	



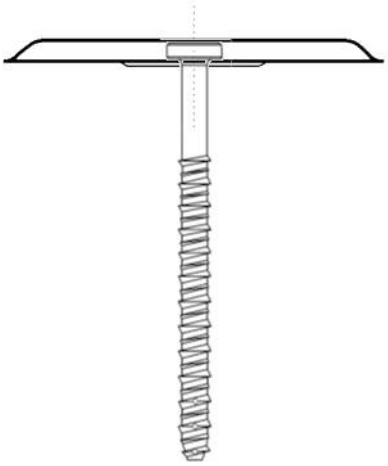
Zahn $ZCTS_1$-Teller



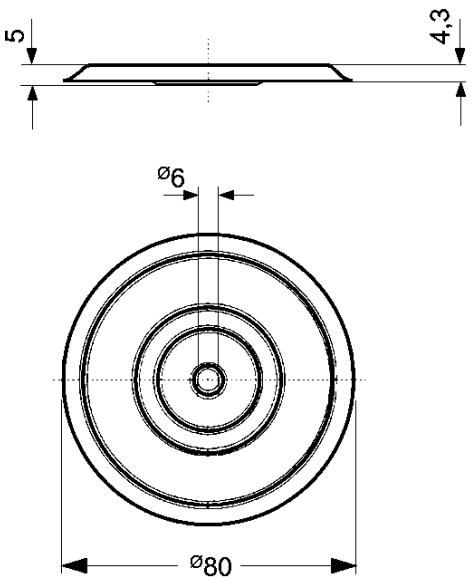
Zahn $ZDBK_{Dübel}$ 4,8 x L



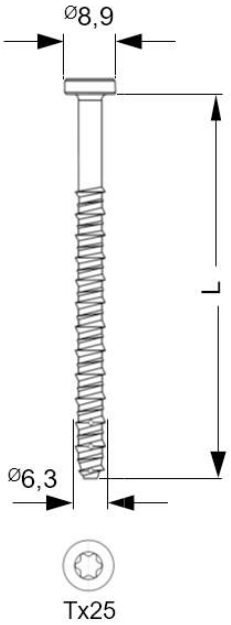
Zahn Flachdachbefestigungselemente	Anhang 182
Kombination 182 ZCTS-1-Dübel aus $ZDBK_{Dübel}$ und ZCTS-1-Teller	



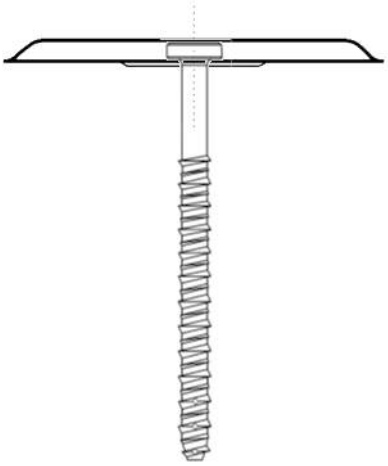
Zahn $ZCTS_1$-Teller



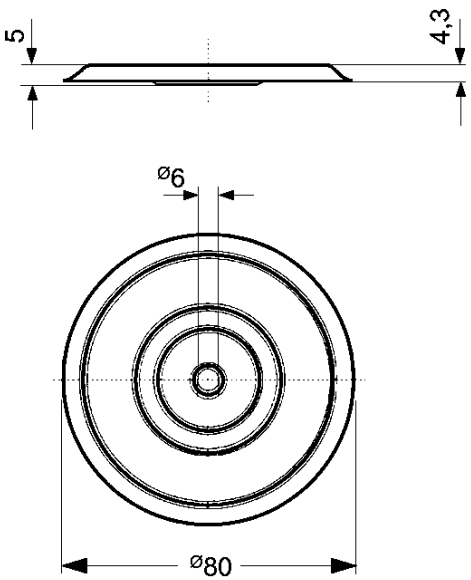
Zahn ZBST 6,3 x L



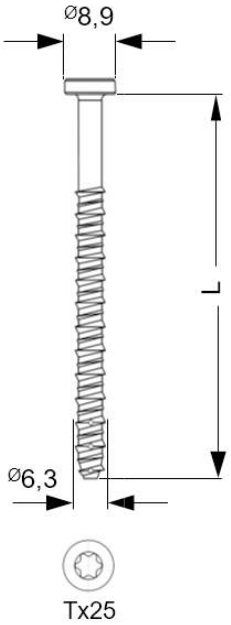
Zahn Flachdachbefestigungselemente	Anhang 183
Kombination 183 ZCTS-1 Beton-Direkt aus ZBST 6,3 und ZCTS-1-Teller	



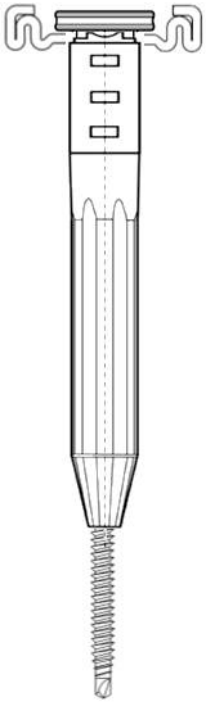
Zahn $ZCTS_1$-Teller



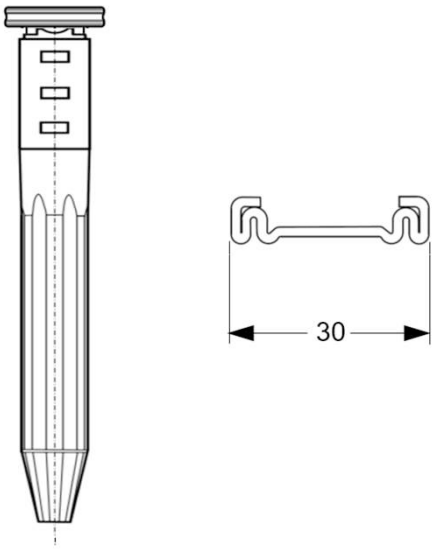
Zahn ZBST-E 6,3 x L



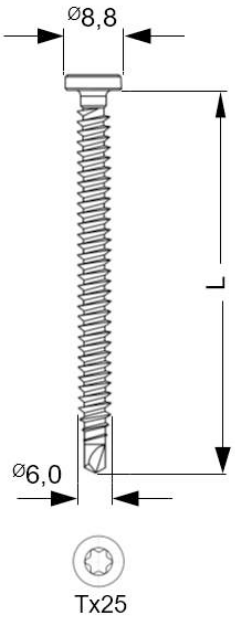
Zahn Flachdachbefestigungselemente	Anhang 184
Kombination 184 ZCTS-1-E Beton aus ZBST-E 6,3 und ZCTS-1-Teller	



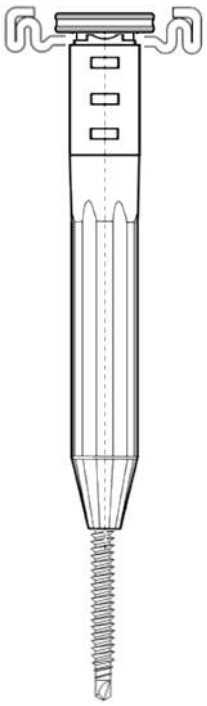
Zahn HVM_1 und Schiene



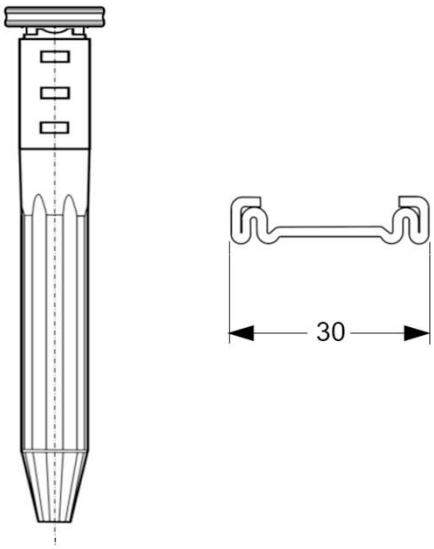
Zahn ZMDS 6,0 x L



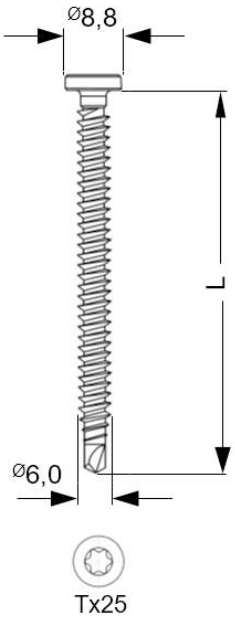
Zahn Flachdachbefestigungselemente	Anhang 185
Kombination 185 ZSSB-HVM-1-Multi aus ZMDS / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und ZSSB-Schiene	



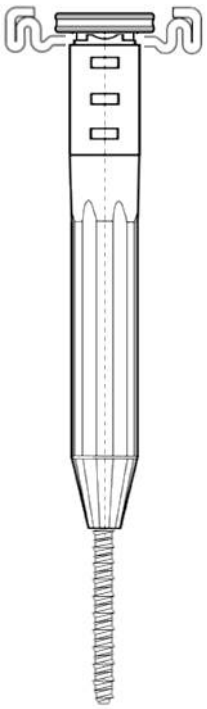
Zahn HVM_1 und Schiene



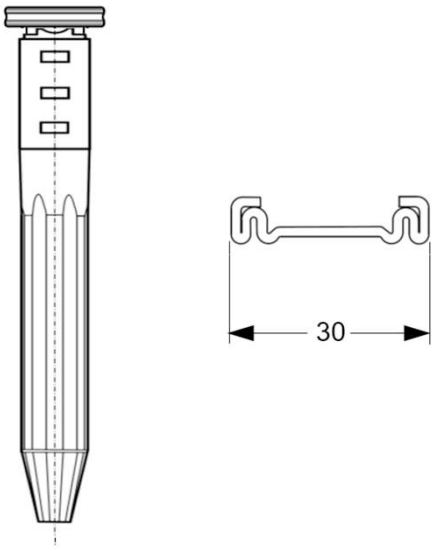
Zahn ZMDS-E 6,0 x L



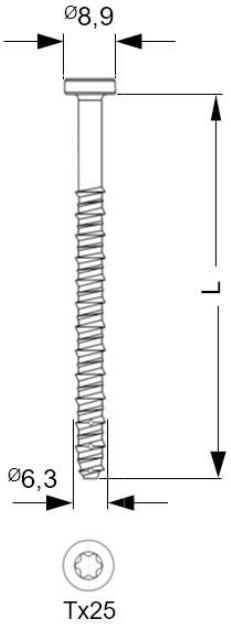
Zahn Flachdachbefestigungselemente	Anhang 186
Kombination 186 ZSSB-HVM-1-Multi-E aus ZMDS-E / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und ZSSB-Schiene	



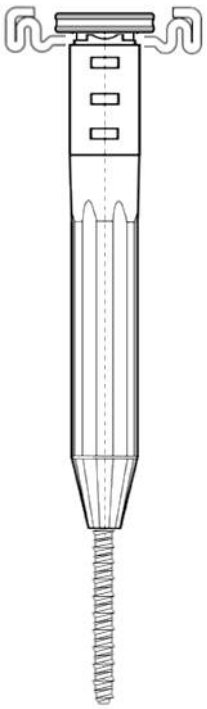
Zahn HVM_1 und Schiene



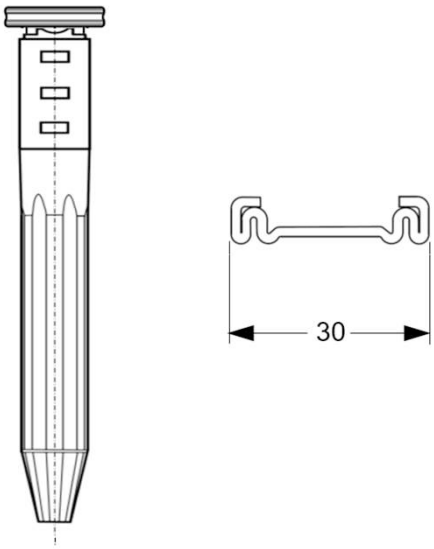
Zahn ZBST 6,3 x L



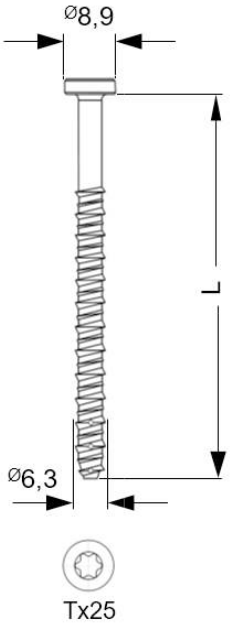
Zahn Flachdachbefestigungselemente	Anhang 187
Kombination 187 ZSSB-HVM-1 Beton-Direkt aus ZBST / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und ZSSB-Schiene	



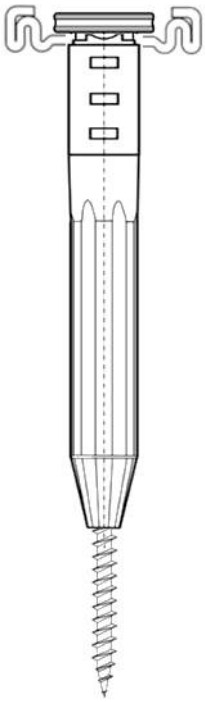
Zahn HVM_1 und Schiene



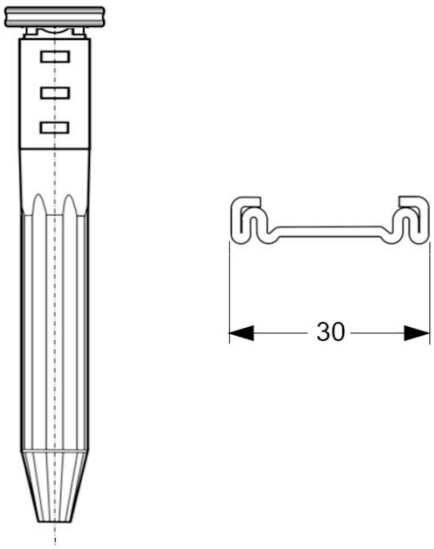
Zahn ZBST-E 6,3 x L



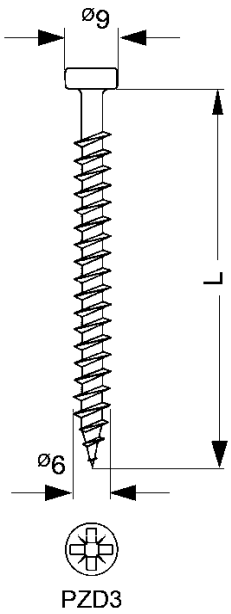
Zahn Flachdachbefestigungselemente	Anhang 188
Kombination 188 ZSSB-HVM-1-E Beton-Direkt aus ZBST-E / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und ZSSB-Schiene	



Zahn HVM_1 und Schiene



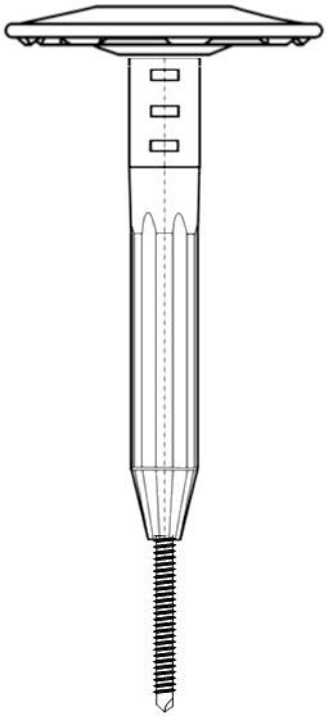
Zahn ZGBK-E 6,0 x L



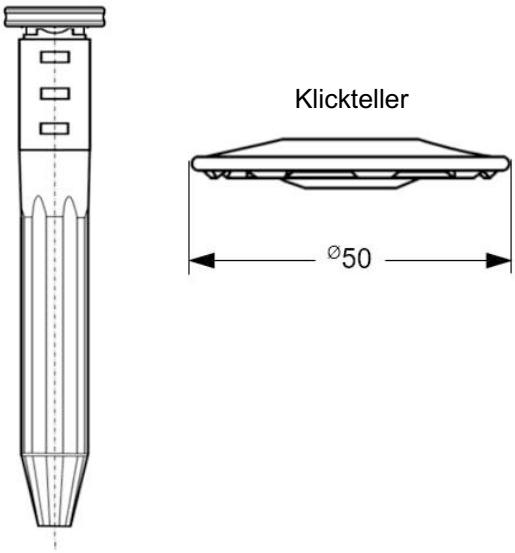
Zahn Flachdachbefestigungselemente

Kombination 189
ZSSB-HVM-1 PB-Direkt
aus ZGBK-E / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und ZSSB-Schiene

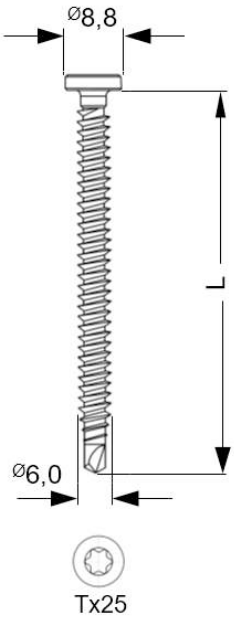
Anhang 189



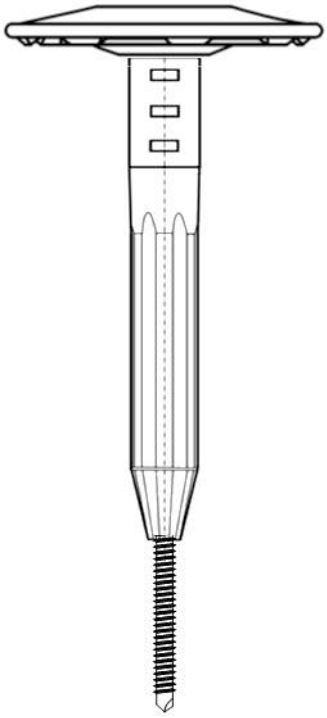
Zahn HVM_1 und Klickteller



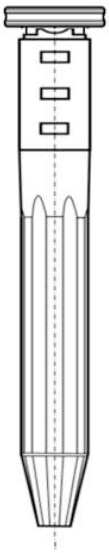
Zahn ZMDS 6,0 x L



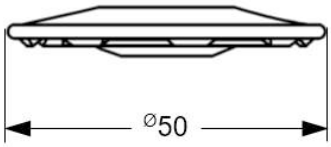
Zahn Flachdachbefestigungselemente	Anhang 190
Kombination 190 ZSSB / Klickteller / HVM-1-Multi aus ZMDS / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und Klickteller	



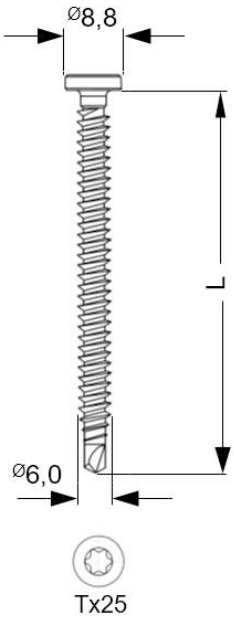
Zahn HVM_1 und Klickteller



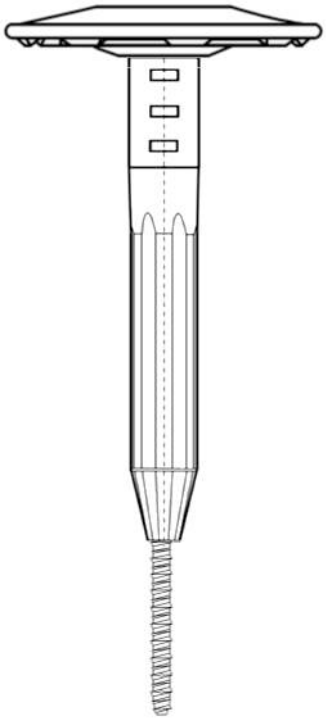
Klickteller



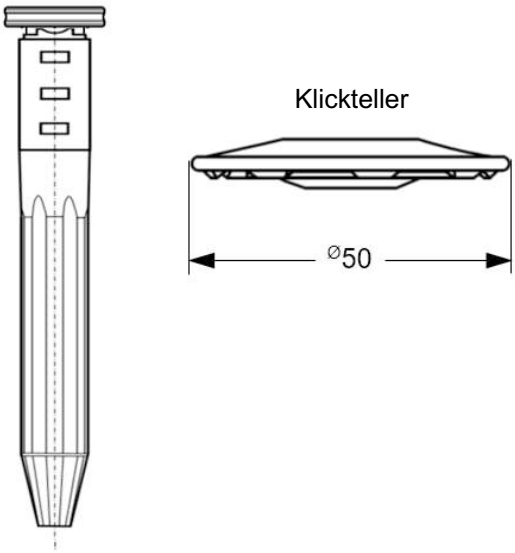
Zahn ZMDS-E 6,0 x L



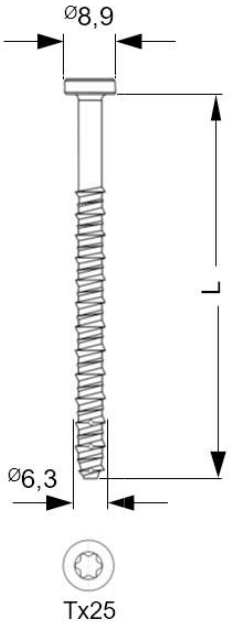
Zahn Flachdachbefestigungselemente	Anhang 191
Kombination 191 ZSSB / Klickteller / HVM-1-Multi-E aus ZMDS-E / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und Klickteller	



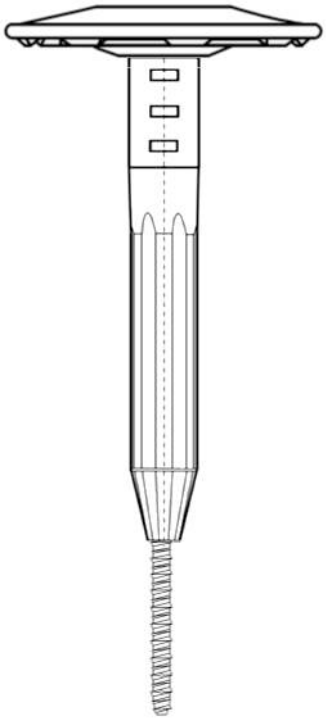
Zahn HVM_1 und Klickteller



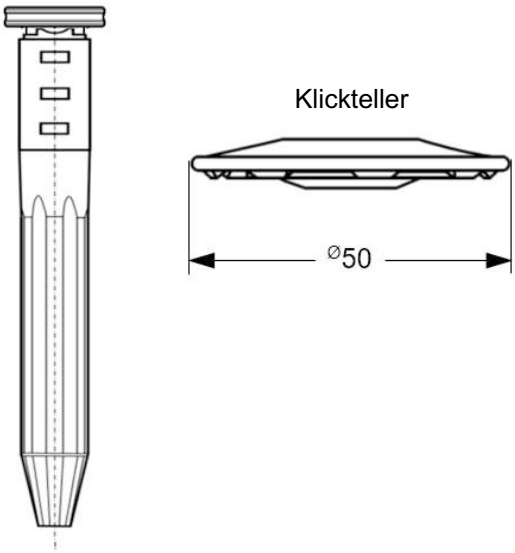
Zahn ZBST 6,3 x L



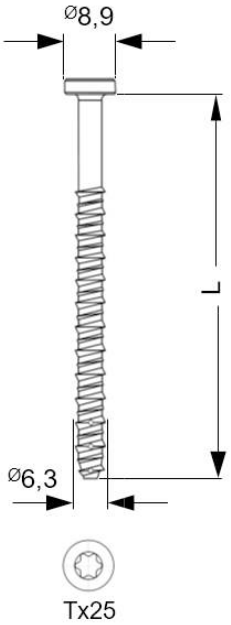
Zahn Flachdachbefestigungselemente	Anhang 192
Kombination 192 ZSSB / Klickteller / HVM-1 Beton-Direkt aus ZBST / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und Klickteller	



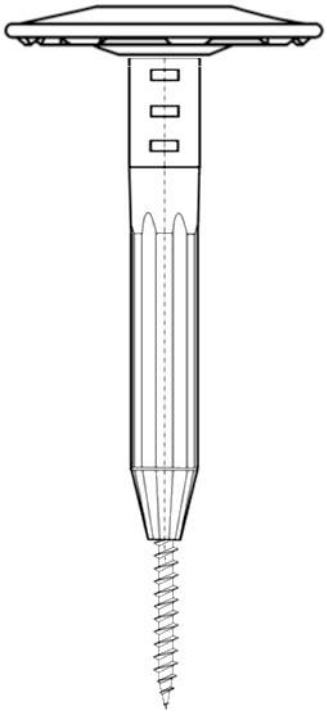
Zahn HVM_1 und Klickteller



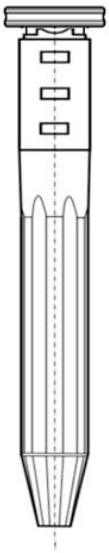
Zahn ZBST-E 6,3 x L



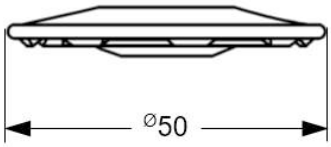
Zahn Flachdachbefestigungselemente	Anhang 193
Kombination 193 ZSSB / Klickteller / HVM-1-E Beton-Direkt aus ZBST-E / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und Klickteller	



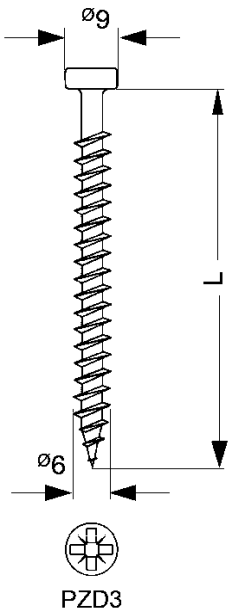
Zahn HVM_1 und Klickteller



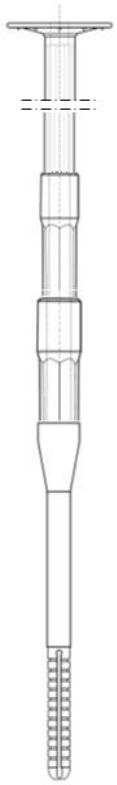
Klickteller



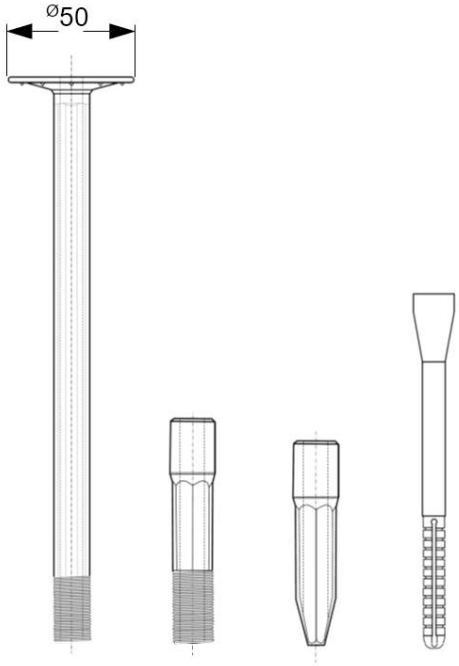
Zahn ZGBK-E 6,0 x L



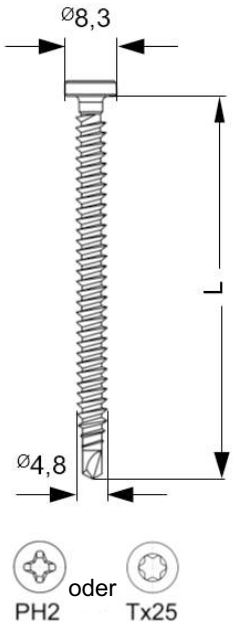
Zahn Flachdachbefestigungselemente	Anhang 194
Kombination 194 ZSSB / Klickteller / HVM-1-E PB-Direkt aus ZGBK-E / HVM-1 mit Kopfteil, Schaftteil mit Verriegelungsbuchse und Klickteller	



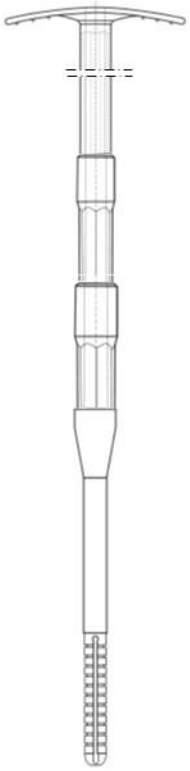
Zahn ZKSH rund Modul 4,8 mit Dübelvorsatz



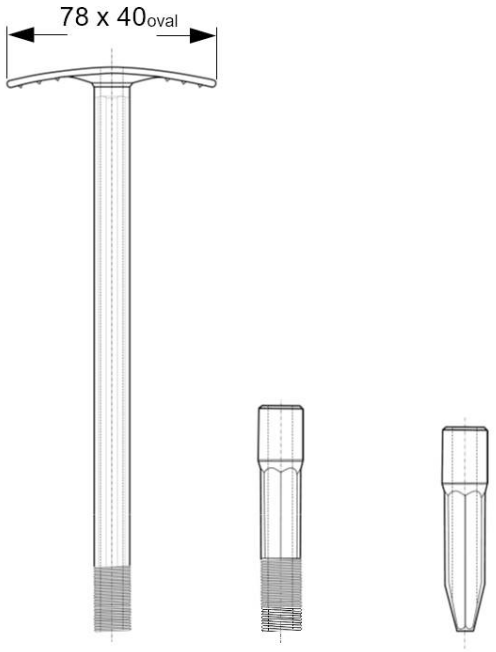
Zahn ZDBK 4,8 x L



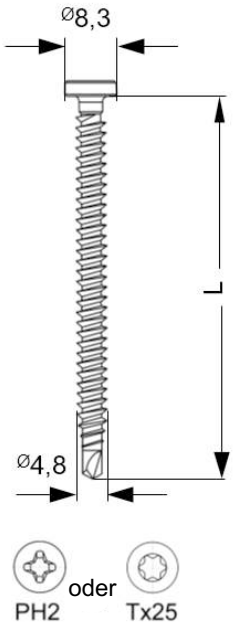
Zahn Flachdachbefestigungselemente	Anhang 195
Kombination 195 ZSDK-R-Modul / ZDBK aus ZDBK / ZKSH rund Modul mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	



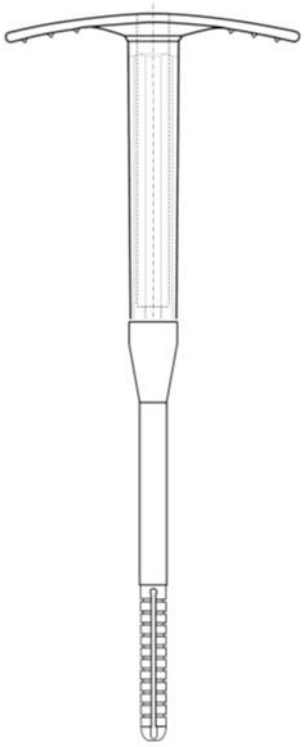
Zahn ZKSH oval Modul 4,8



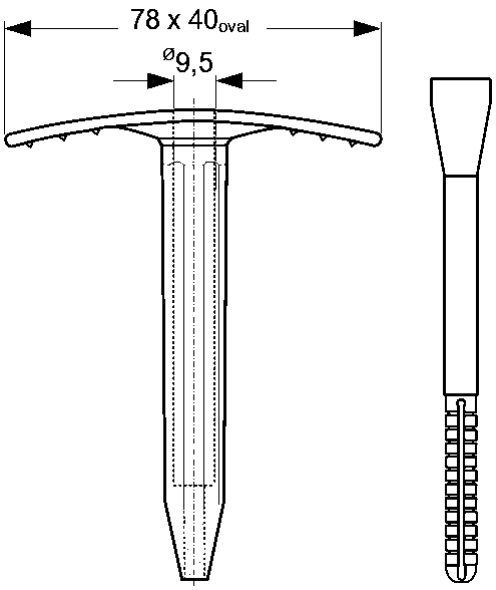
Zahn ZDBK 4,8 x L



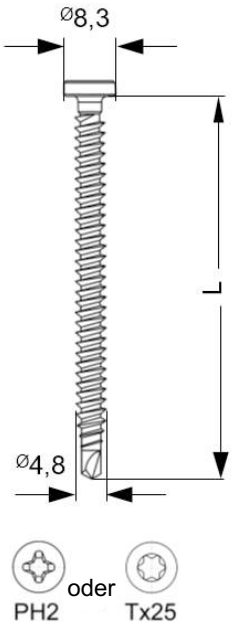
Zahn Flachdachbefestigungselemente	Anhang 196
Kombination 196 ZSDK-Modul / ZDBK aus ZDBK / ZKSH oval Modul mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	



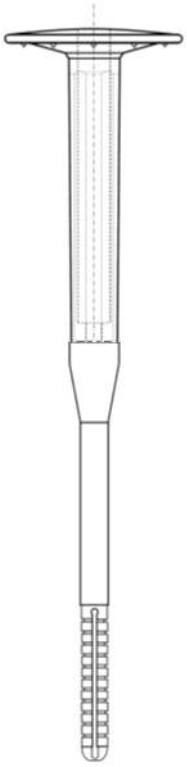
Zahn ZKSH oval mit Dübelvorsatz



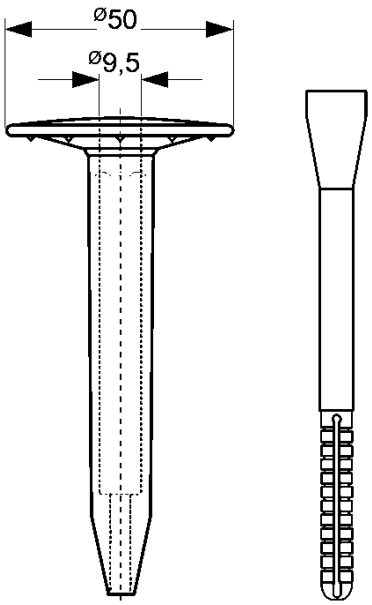
Zahn ZDBK 4,8 x L



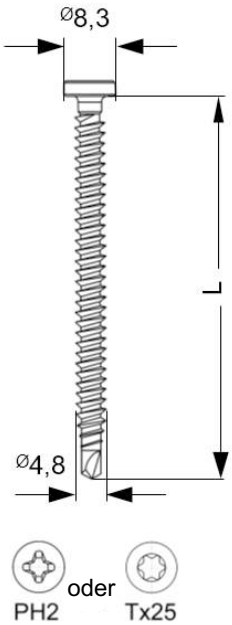
Zahn Flachdachbefestigungselemente	Anhang 197
Kombination 197 ZSDK / ZDBK aus ZDBK / ZKSH oval mit Dübelvorsatz	



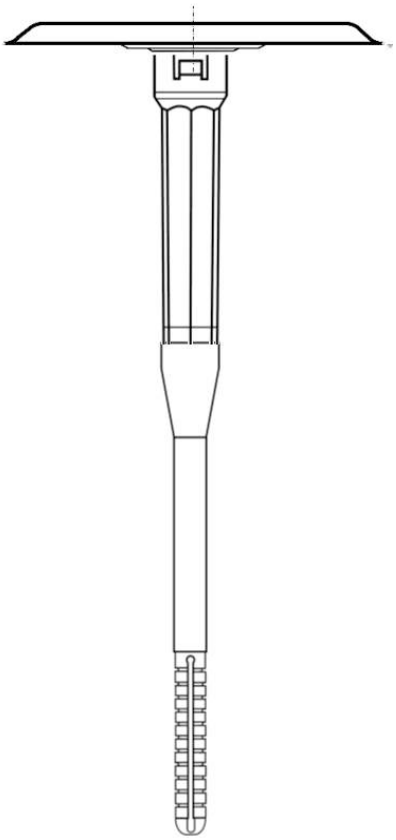
Zahn ZKSH rund mit Dübelvorsatz



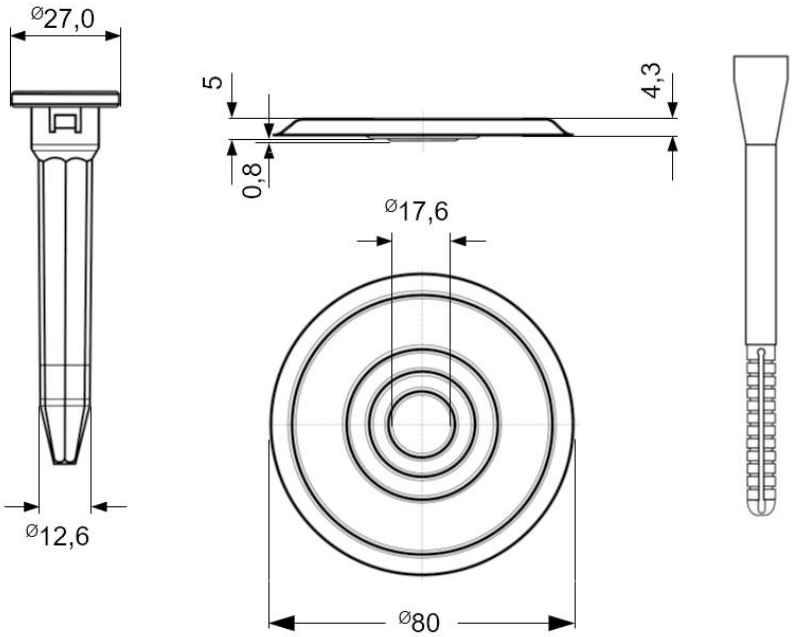
Zahn ZDBK 4,8 x L



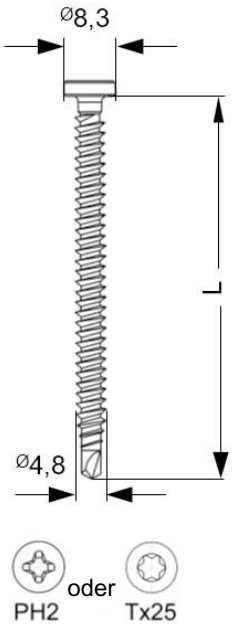
Zahn Flachdachbefestigungselemente	Anhang 198
Kombination 198 ZSDK-R / ZDBK aus ZDBK / ZKSH rund mit Dübelvorsatz	



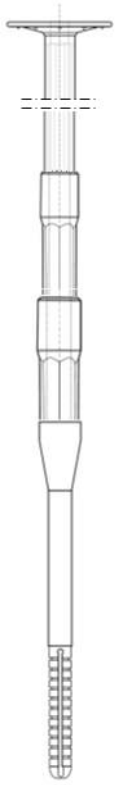
Zahn ZCTS-Tülle 4,8 mit ZCTS- Teller und Dübelvorsatz



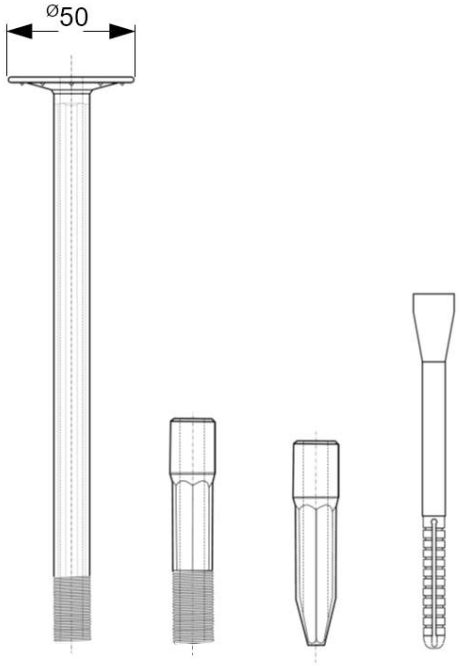
Zahn ZDBK 4,8 x L



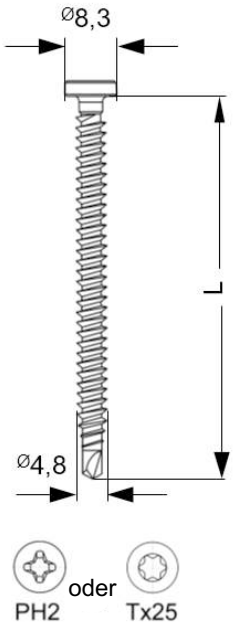
Zahn Flachdachbefestigungselemente	Anhang 199
Kombination 199 ZCTS / ZDBK Beton aus ZDBK / ZCTS-Tülle 4,8, ZCTS-Teller und Dübelvorsatz	



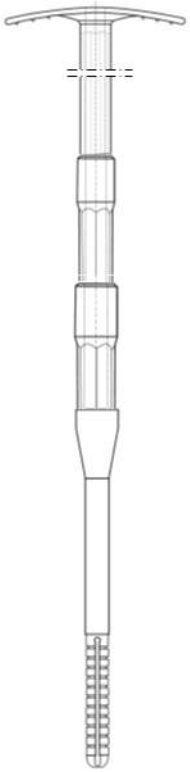
Zahn ZKSH rund Modul 4,8 mit Dübelvorsatz



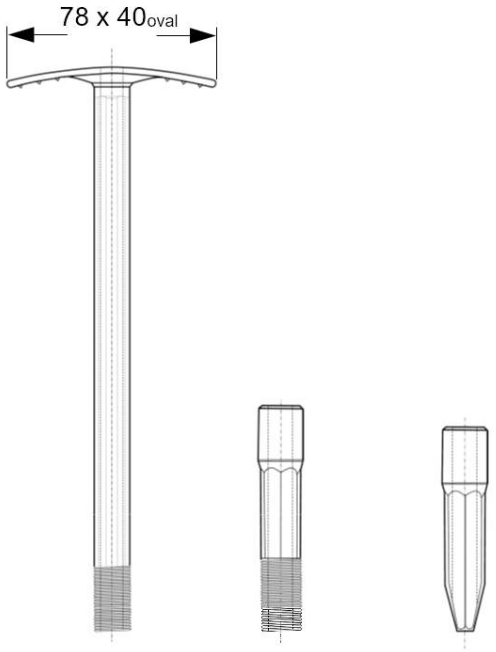
Zahn ZDBK-E 4,8 x L



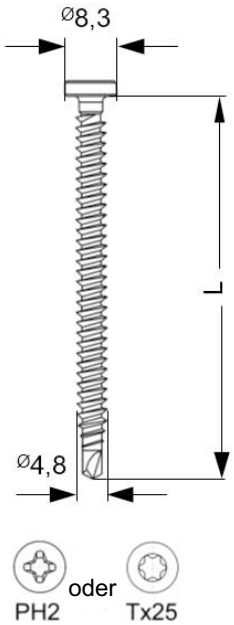
Zahn Flachdachbefestigungselemente	Anhang 200
Kombination 200 ZSDK-E / R-Modul / ZDBK-E aus ZDBK-E / ZKSH rund Modul mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	



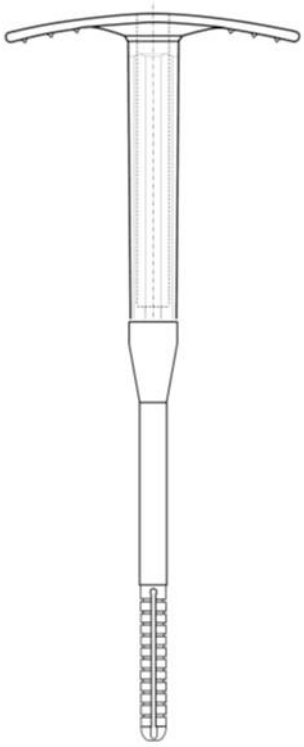
Zahn ZKSH oval Modul 4,8



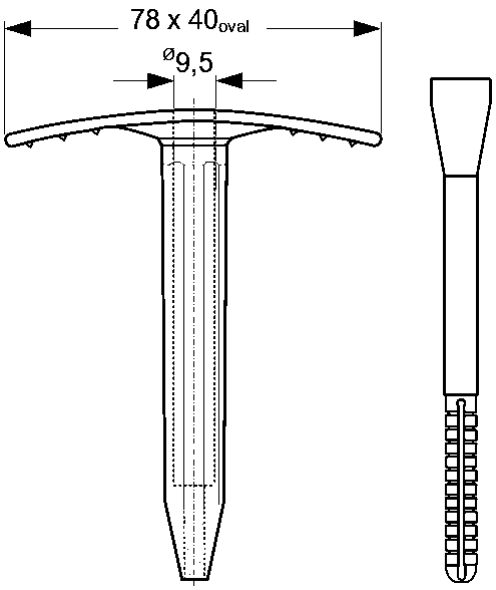
Zahn ZDBK-E 4,8 x L



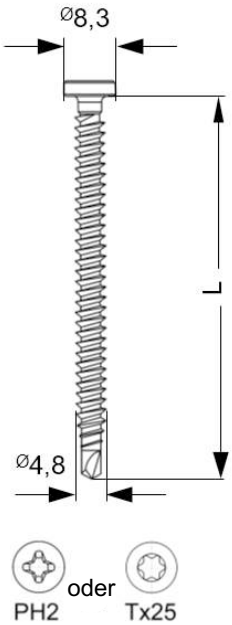
Zahn Flachdachbefestigungselemente	Anhang 201
Kombination 201 ZSDK-E Modul / ZDBK-E aus ZDBK-E / ZKSH oval Modul mit modularem Mittelstück, Spitze 4,8 und Dübelvorsatz	



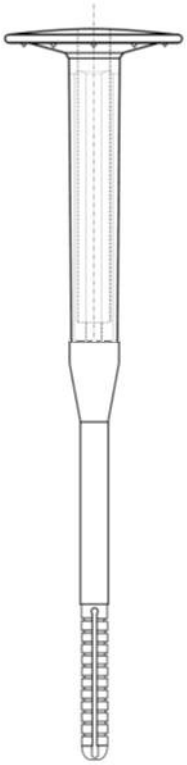
Zahn ZKSH oval mit Dübelvorsatz



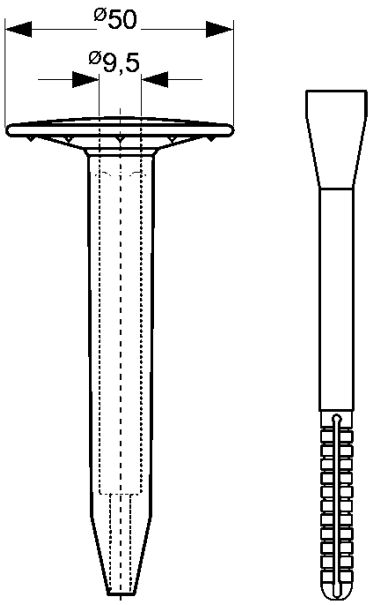
Zahn ZDBK-E 4,8 x L



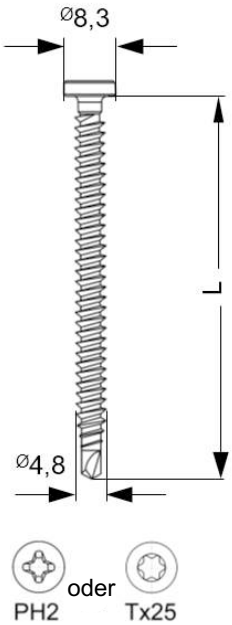
Zahn Flachdachbefestigungselemente	Anhang 202
Kombination 202 ZSDK-E / ZDBK-E aus ZDBK-E / ZKSH oval mit Dübelvorsatz	



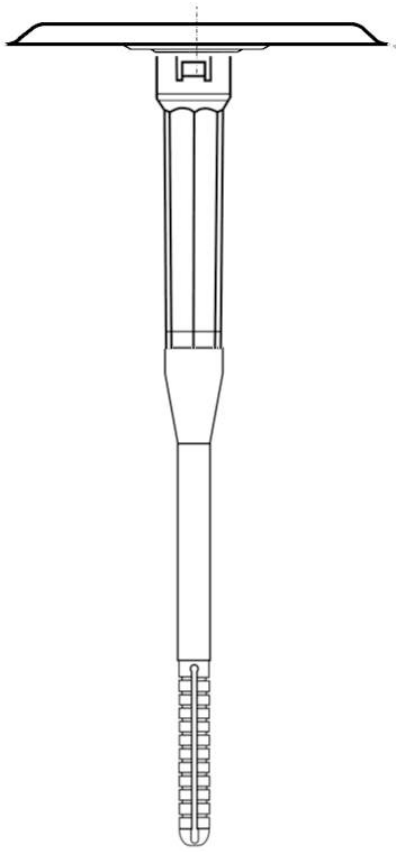
Zahn ZKSH rund mit Dübelvorsatz



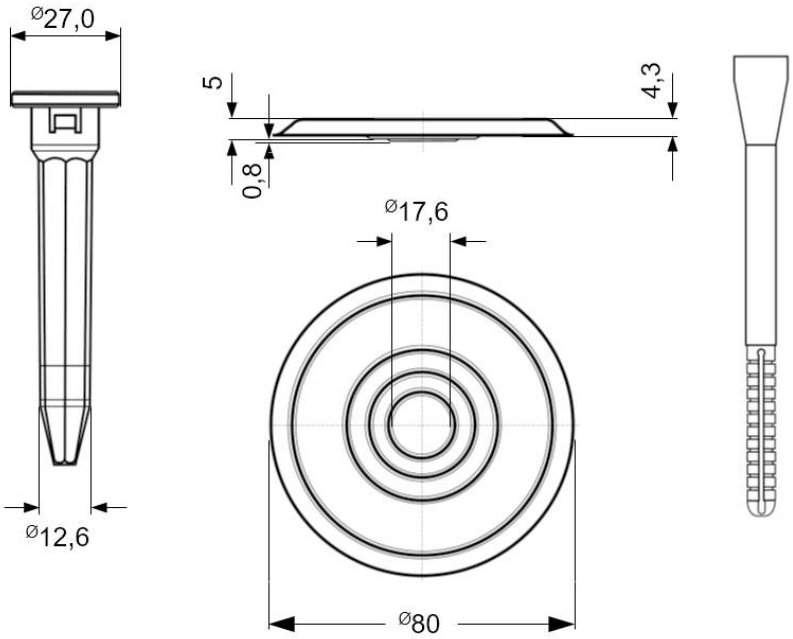
Zahn ZDBK-E 4,8 x L



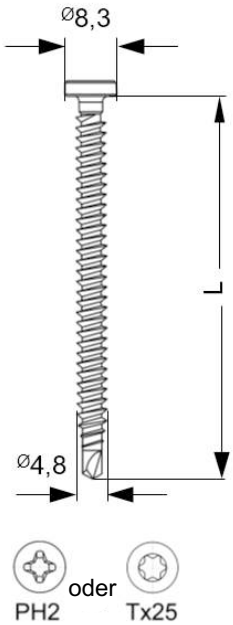
Zahn Flachdachbefestigungselemente	Anhang 203
Kombination 203 ZSDK-E / R / ZDBK-E aus ZDBK-E / ZKSH rund mit Dübelvorsatz	



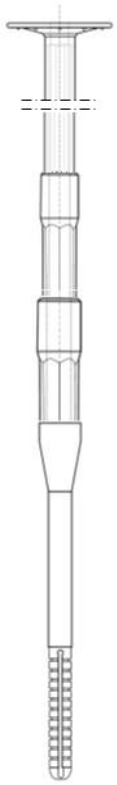
Zahn ZCTS-Tülle 4,8 mit ZCTS- Teller und Dübelvorsatz



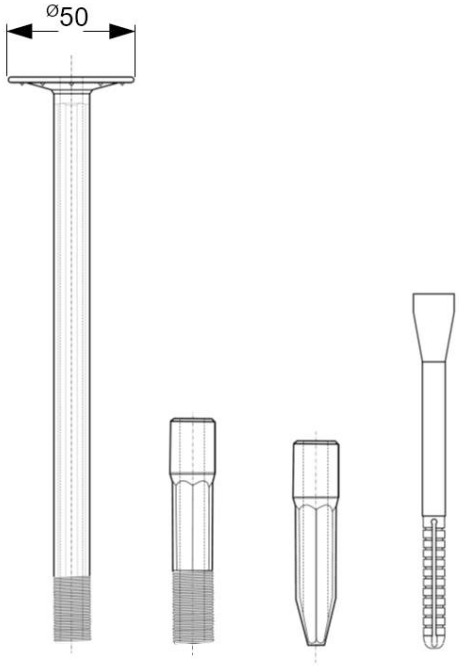
Zahn ZDBK-E 4,8 x L



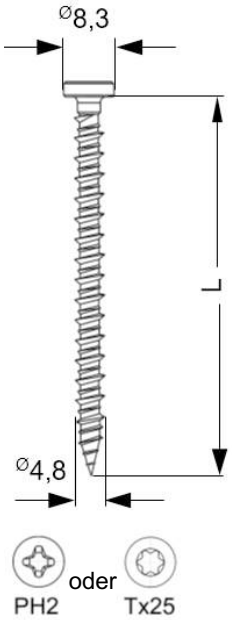
Zahn Flachdachbefestigungselemente	Anhang 204
Kombination 204 ZCTS-E / ZDBK-E Beton aus ZDBK-E / ZCTS-Tülle 4,8, ZCTS-Teller und Dübelvorsatz	



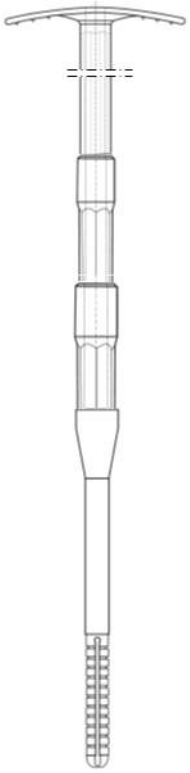
Zahn ZKSH rund Modul 4,8 mit Dübelvorsatz



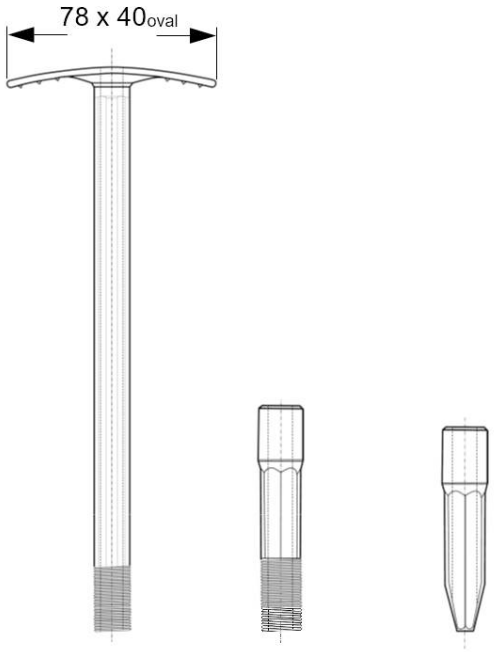
Zahn ZHBK 4,8 x L



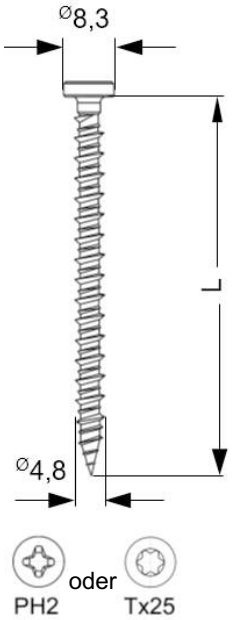
Zahn Flachdachbefestigungselemente	Anhang 205
Kombination 205 ZSDK-R-Modul / ZHBK aus ZHBK / ZKSH rund Modul mit Modul Mittelstück, Spitze 4,8 und Dübelvorsatz	



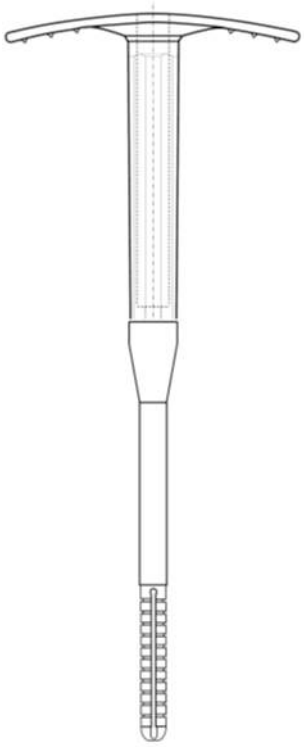
Zahn ZKSH oval Modul 4,8



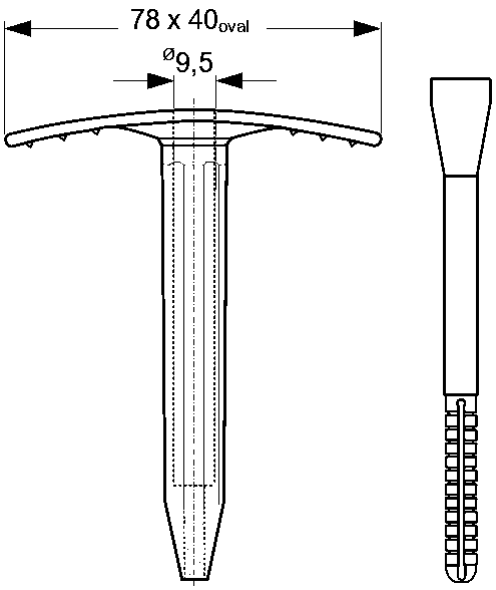
Zahn ZHBK 4,8 x L



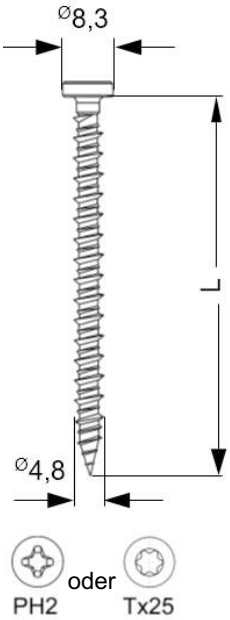
Zahn Flachdachbefestigungselemente	Anhang 206
Kombination 206 ZSDK-Modul / ZHBK aus ZHBK / ZKSH oval Modul mit Modul Mittelstück, Spitze 4,8 und Dübelvorsatz	



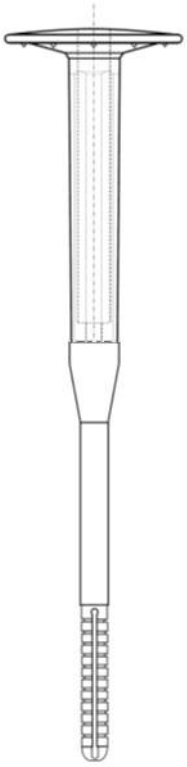
Zahn ZKSH oval mit Dübelvorsatz



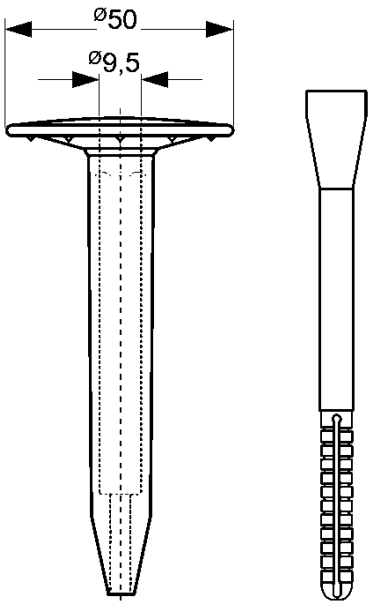
Zahn ZHBK 4,8 x L



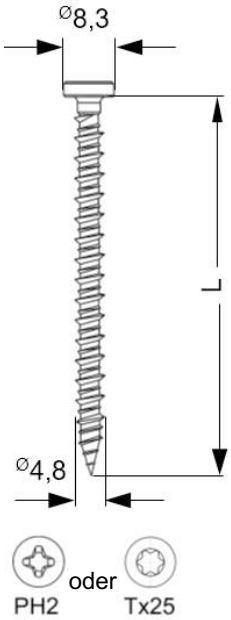
Zahn Flachdachbefestigungselemente	Anhang 207
Kombination 207 ZSDK / ZHSK aus ZHBK / ZKSH oval mit Dübelvorsatz	



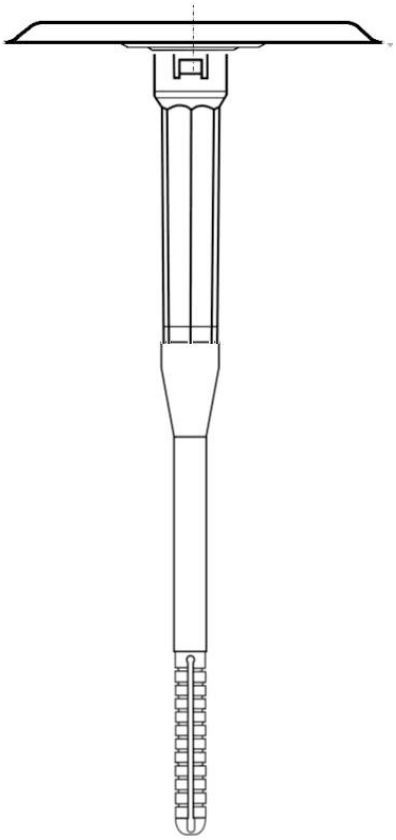
Zahn ZKSH rund mit Dübelvorsatz



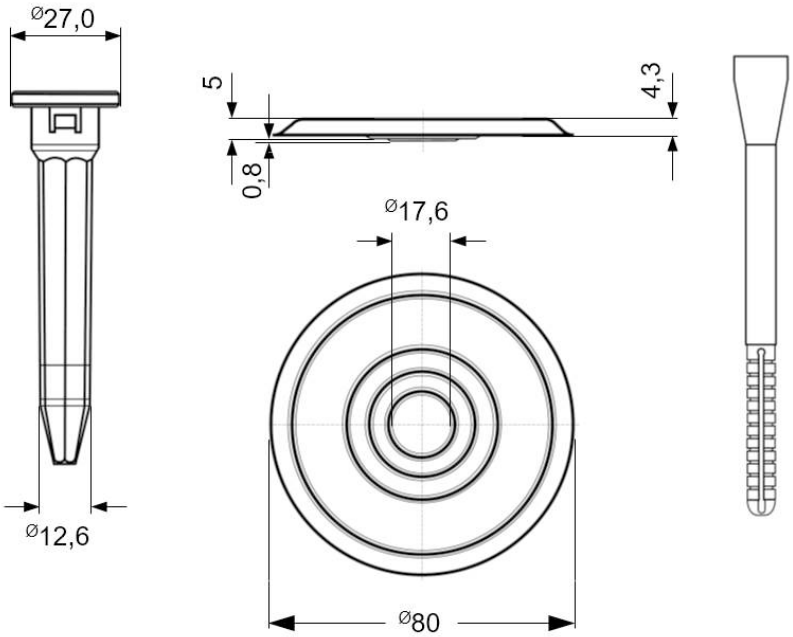
Zahn ZHBK 4,8 x L



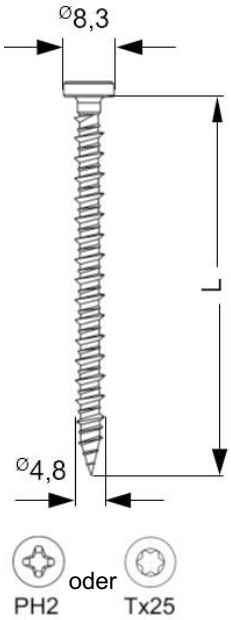
Zahn Flachdachbefestigungselemente	Anhang 208
Kombination 208 ZSDK-R / ZHBK aus ZHBK / ZKSH rund mit Dübelvorsatz	



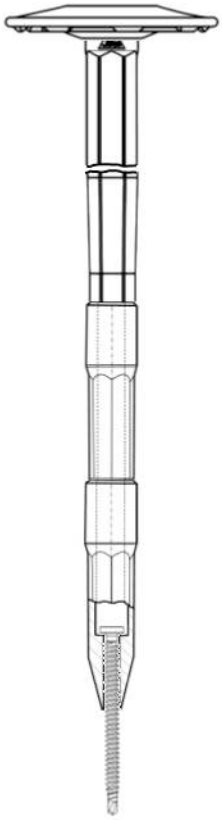
Zahn ZCTS-Tülle 4,8 mit ZCTS- Teller und Dübelvorsatz



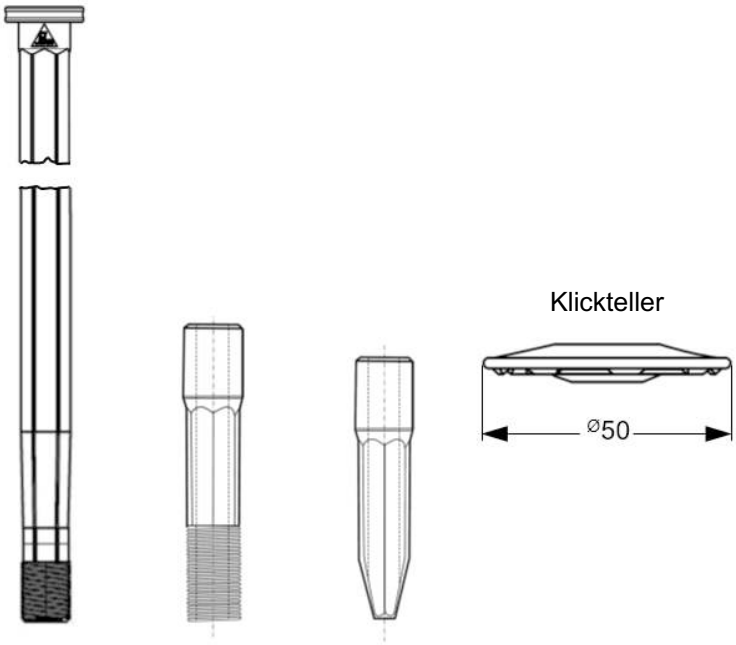
Zahn ZHBK 4,8 x L



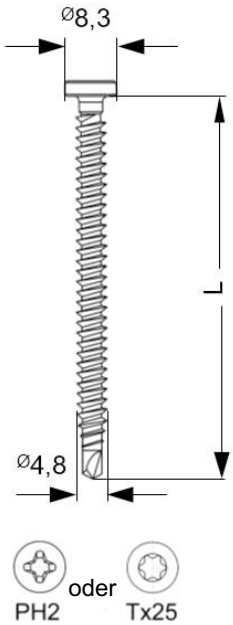
Zahn Flachdachbefestigungselemente	Anhang 209
Kombination 209 ZCTS / ZHBK Beton aus ZHBK / ZCTS-Tülle 4,8, ZCTS-Teller und Dübelvorsatz	



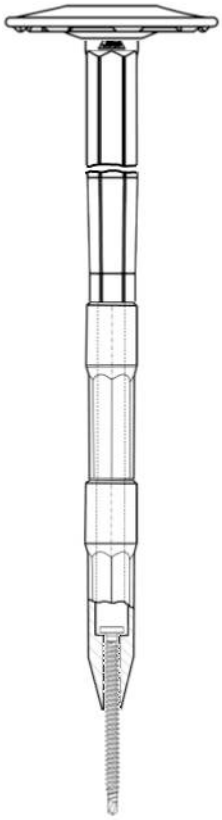
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



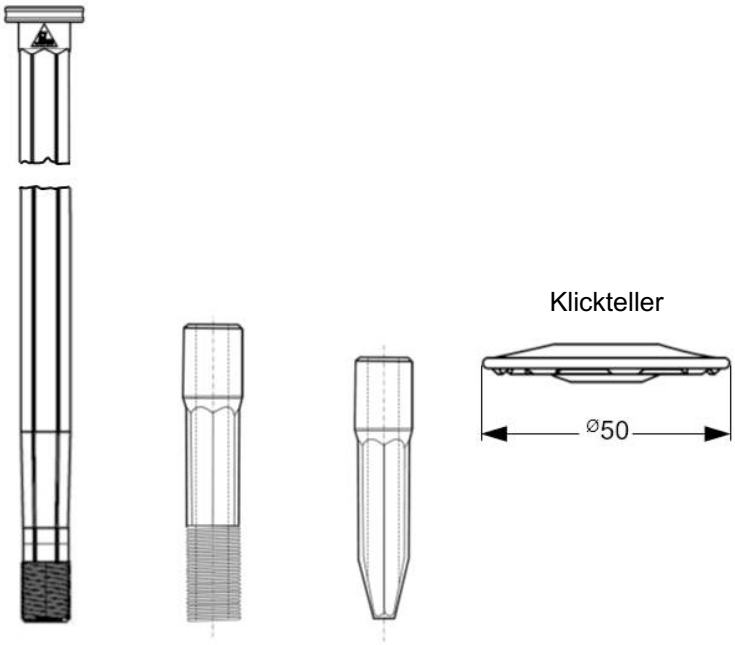
Zahn ZDBK 4,8 x L



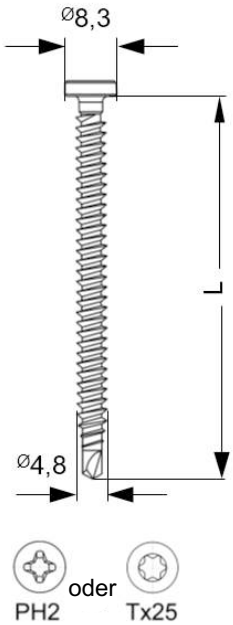
Zahn Flachdachbefestigungselemente	Anhang 210
Kombination 210 ZSSB-Modul / Klickteller / ZDBK aus ZDBK / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



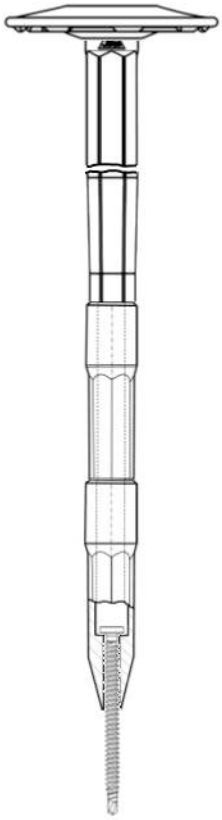
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



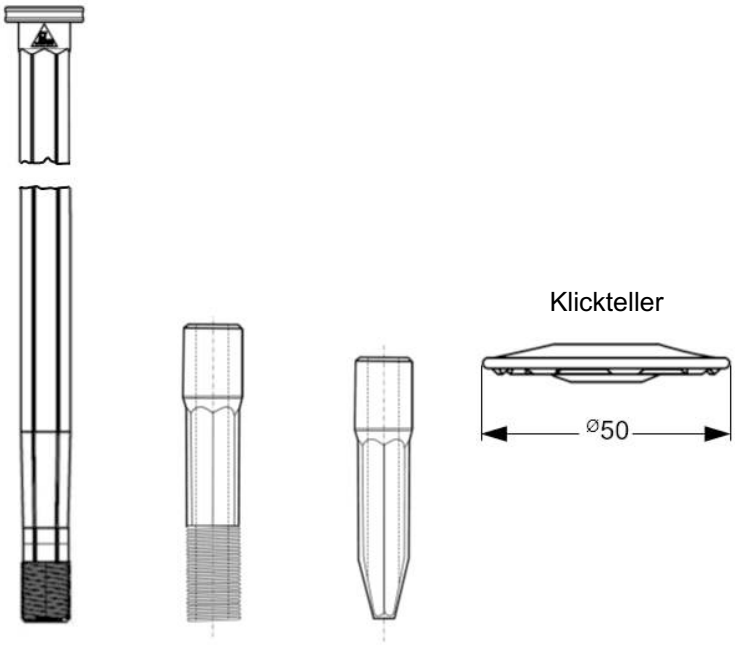
Zahn ZDBK-E 4,8 x L



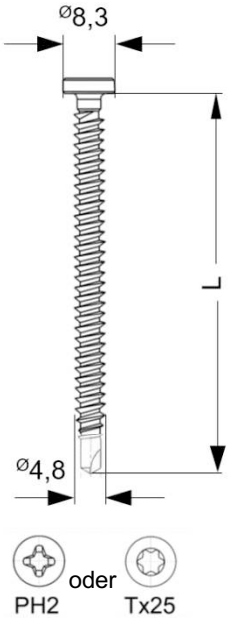
Zahn Flachdachbefestigungselemente	Anhang 211
Kombination 211 ZSSB-E-Modul / Klickteller / ZDBK-E aus ZDBK-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



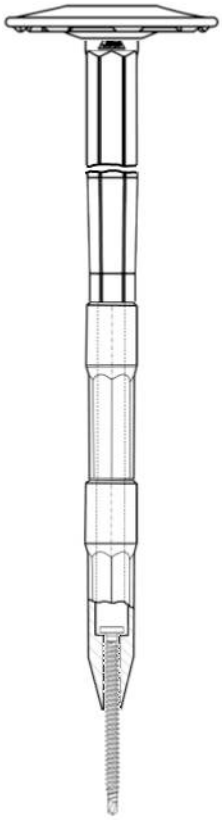
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



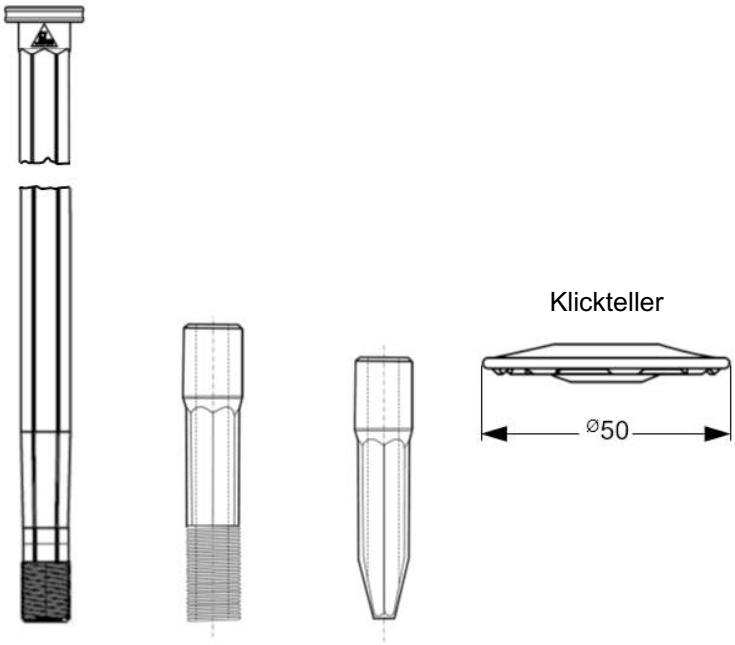
Zahn ZDBK-VB 4,8 x L



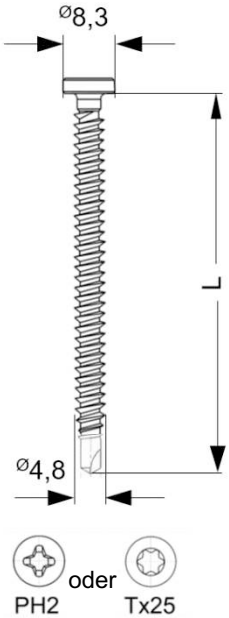
Zahn Flachdachbefestigungselemente	Anhang 212
Kombination 212 ZSSB-Modul / Klickteller / ZDBK-VB aus ZDBK-VB / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



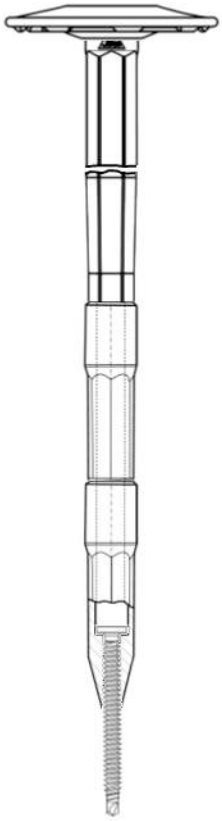
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



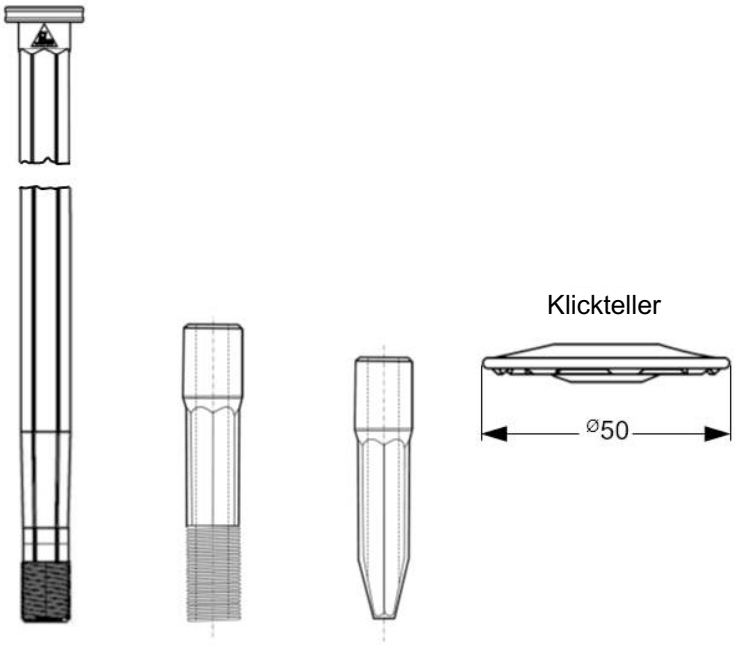
Zahn ZDBK-VB-E 4,8 x L



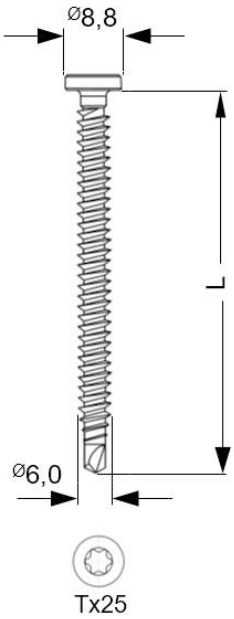
Zahn Flachdachbefestigungselemente	Anhang 213
Kombination 213 ZSSB-Modul / Klickteller / ZDBK-E / VB aus ZDBK-E / VB / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



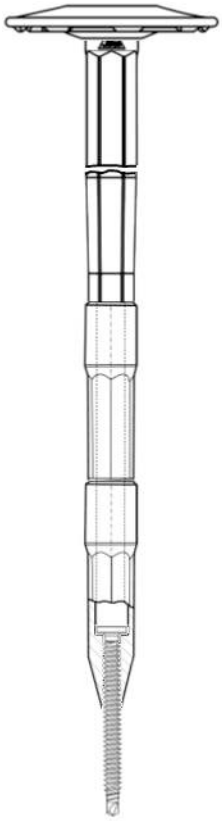
Zahn ZSSB- Modul-Tülle 6,0 mit Modul und Klickteller



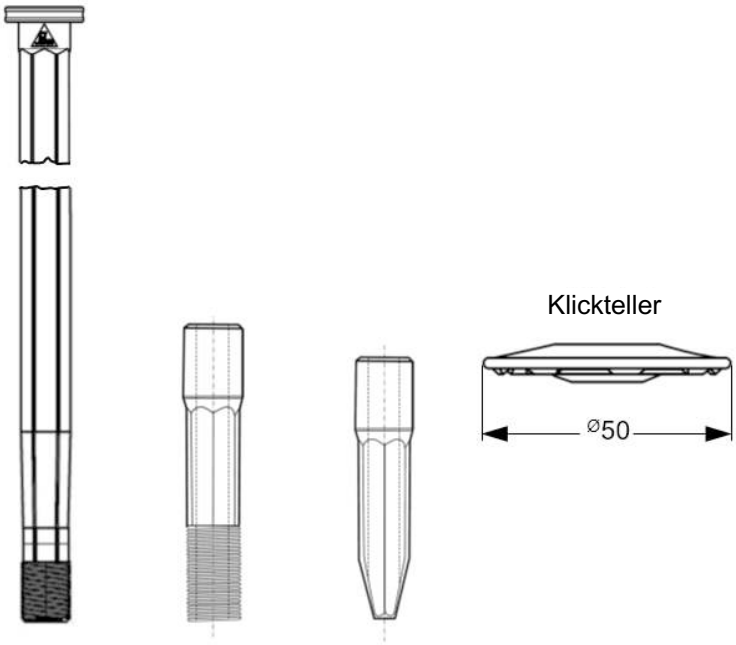
Zahn ZMDS 6,0 x L



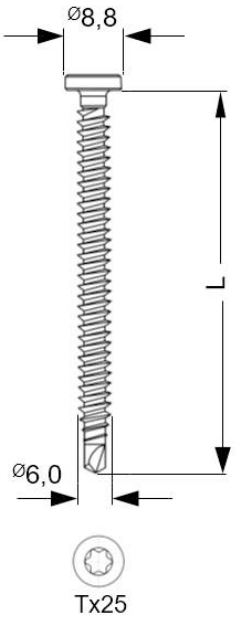
Zahn Flachdachbefestigungselemente	Anhang 214
Kombination 214 ZSSB-Modul / Klickteller / ZMDS aus ZMDS / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und Klickteller	



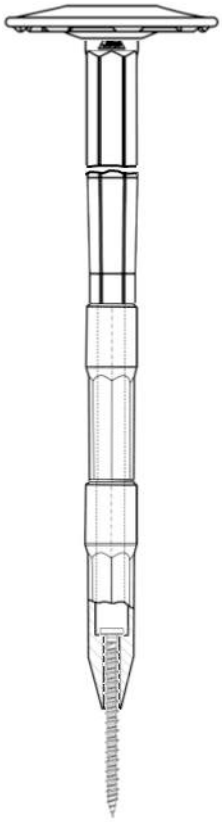
Zahn ZSSB- Modul-Tülle 6,0 mit Modul und Klickteller



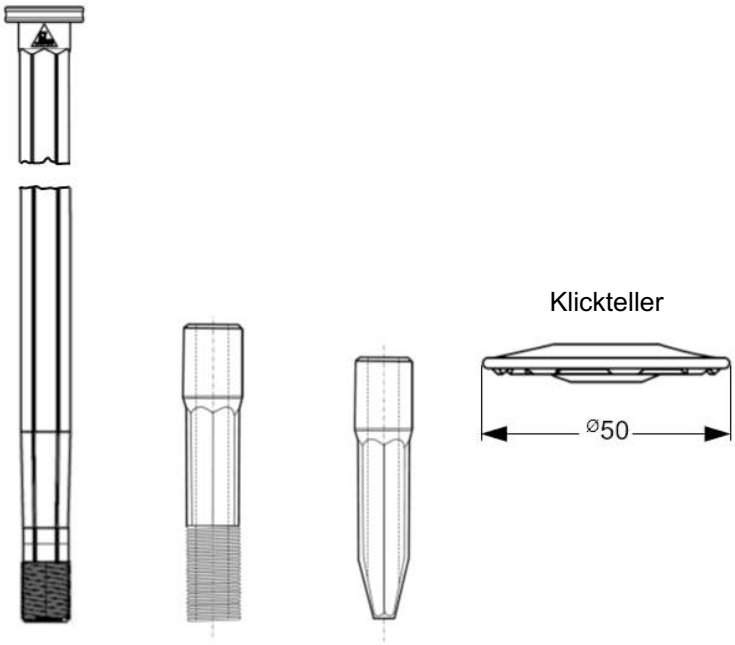
Zahn ZMDS-E 6,0 x L



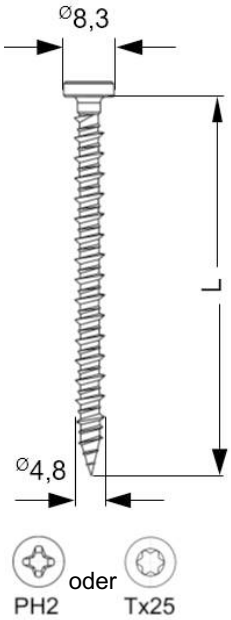
Zahn Flachdachbefestigungselemente	Anhang 215
Kombination 215 ZSSB-Modul / Klickteller / ZMDS-E aus ZMDS-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und Klickteller	



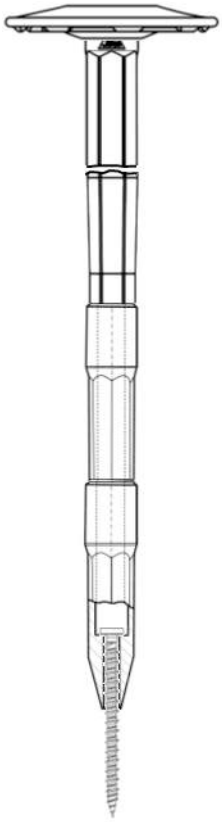
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



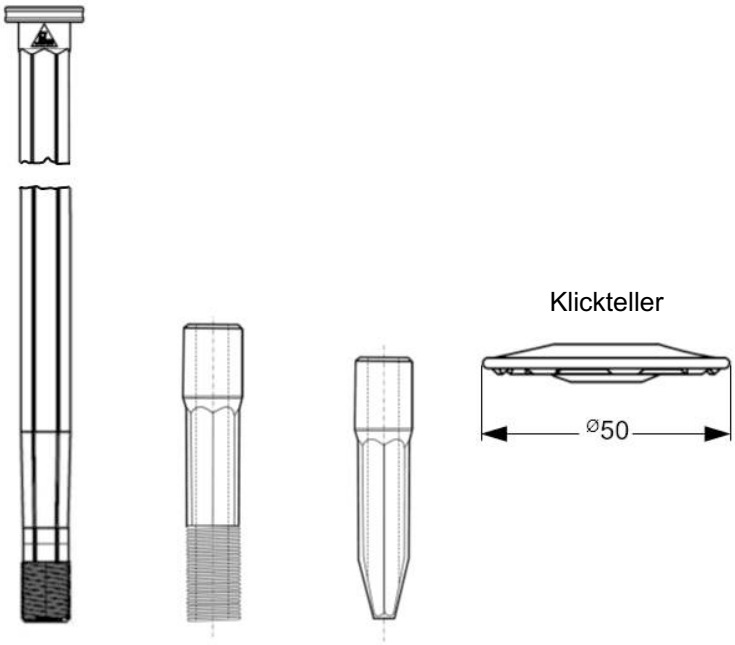
Zahn ZHBK 4,8 x L



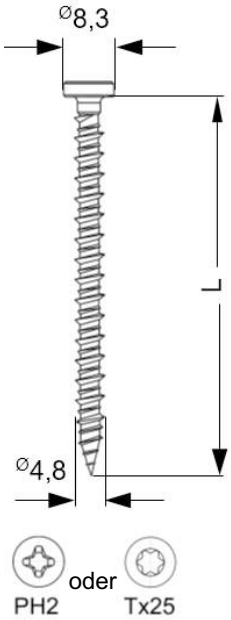
Zahn Flachdachbefestigungselemente	Anhang 216
Kombination 216 ZSSB-Modul / Klickteller / ZHBK aus ZHBK / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



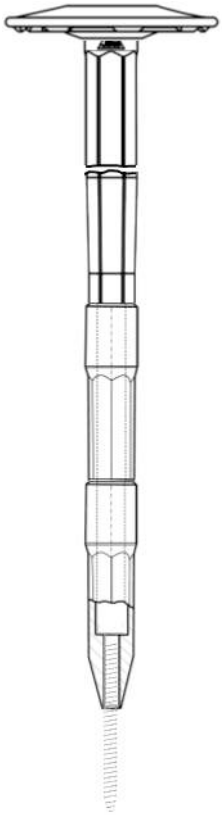
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



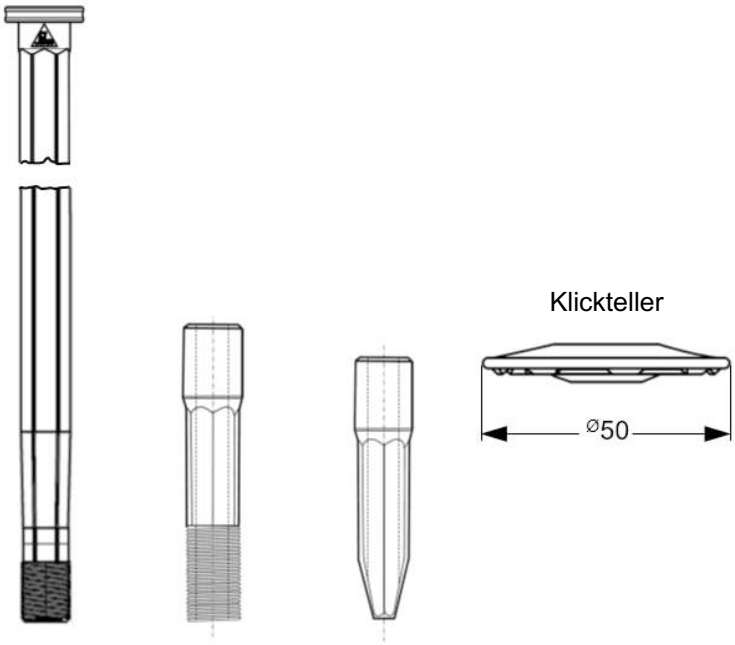
Zahn ZHBK-E 4,8 x L



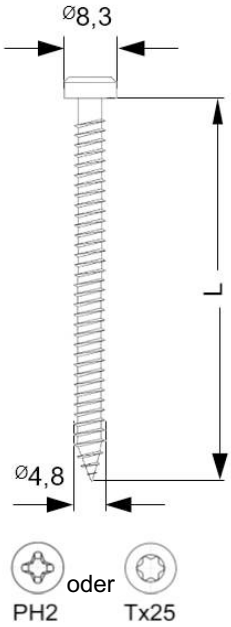
Zahn Flachdachbefestigungselemente	Anhang 217
Kombination 217 ZSSB-Modul / Klickteller / ZHBK-E aus ZHBK-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



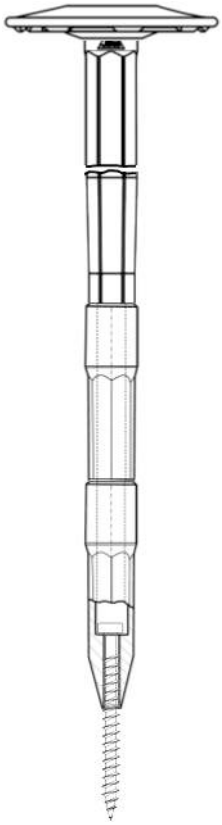
Zahn ZSSB- Modul-Tülle 4,8 mit Modul und Klickteller



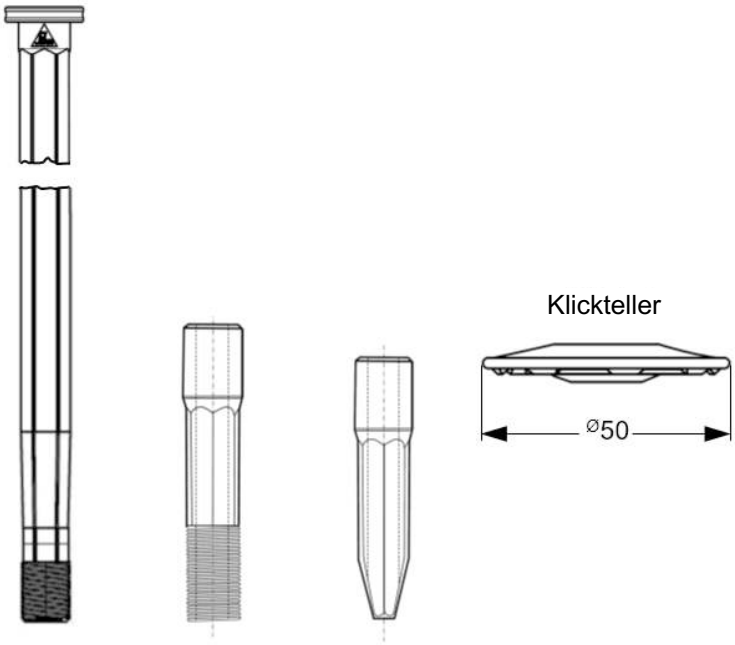
Zahn $ZDBK_{Dübel}$ 4,8 x L



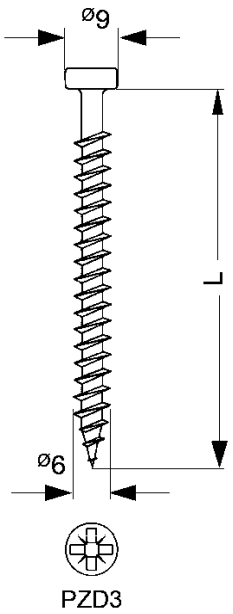
Zahn Flachdachbefestigungselemente	Anhang 218
Kombination 218 ZSSB-Modul / Klickteller / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8 und Klickteller	



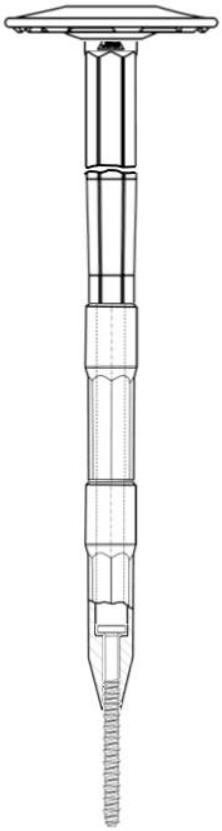
Zahn ZSSB- Modul-Tülle 6,0 mit Modul und Klickteller



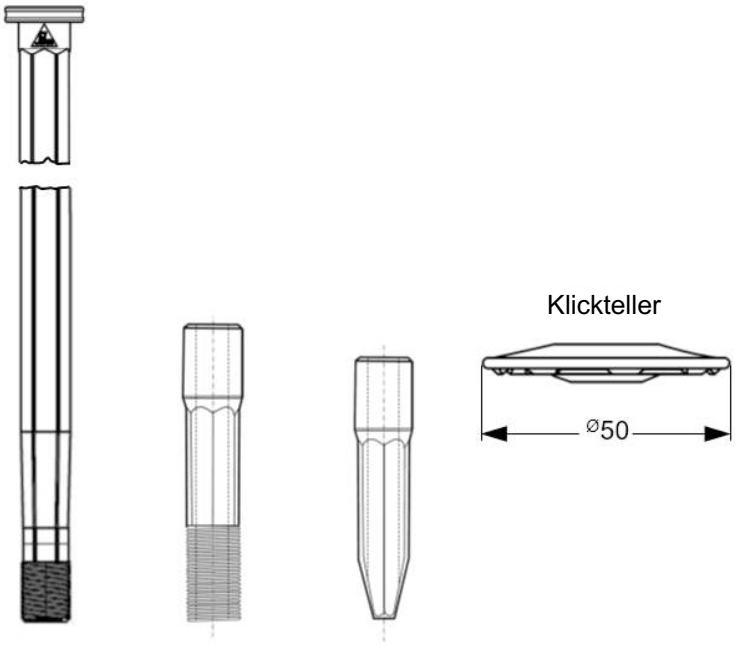
Zahn ZGBK-E 6,0 x L



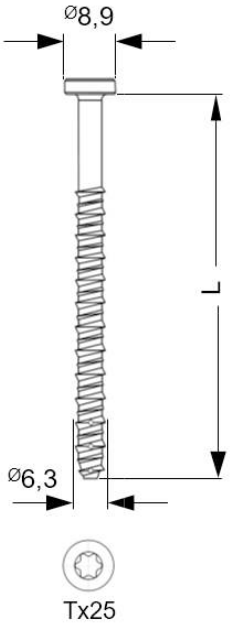
Zahn Flachdachbefestigungselemente	Anhang 219
Kombination 219 ZSSB-Modul / Klickteller / ZGBK-E aus ZGBK-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und Klickteller	



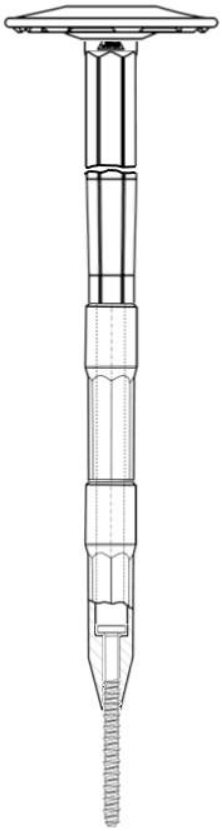
Zahn ZSSB- Modul-Tülle 6,0 mit Modul und Klickteller



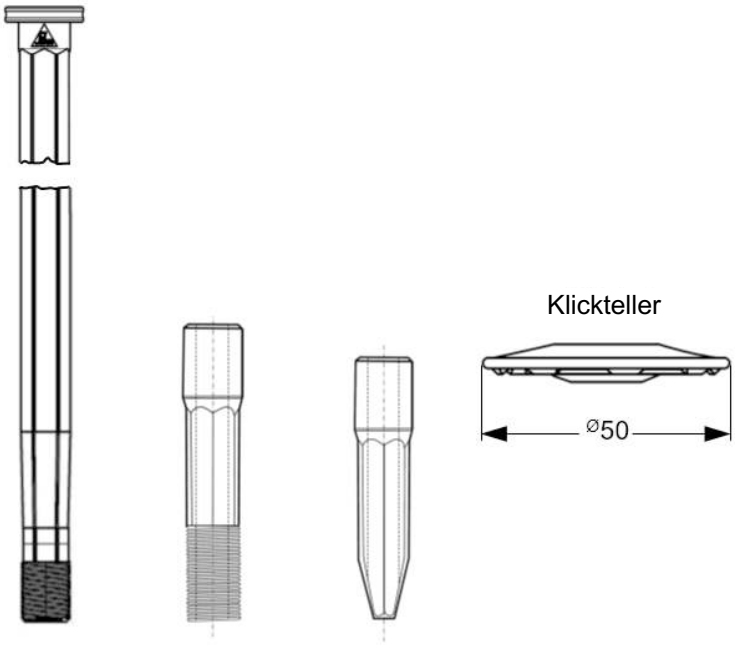
Zahn ZBST 6,3 x L



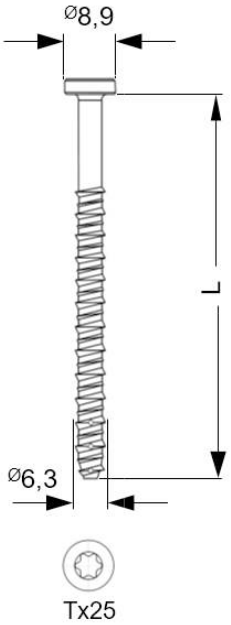
Zahn Flachdachbefestigungselemente	Anhang 220
Kombination 220 ZSSB-Modul / Klickteller / ZBST aus ZBST / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und Klickteller	



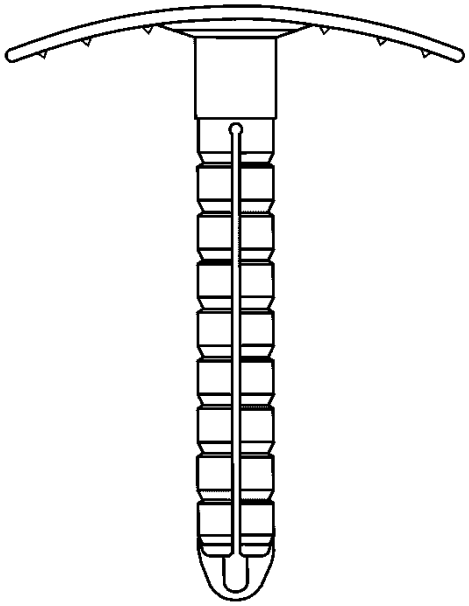
Zahn ZSSB- Modul-Tülle 6,0 mit Modul und Klickteller



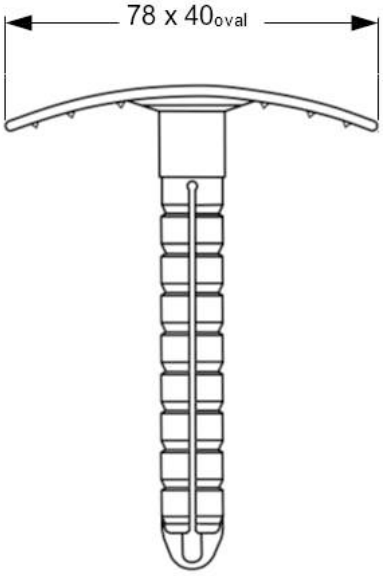
Zahn ZBST-E 6,3 x L



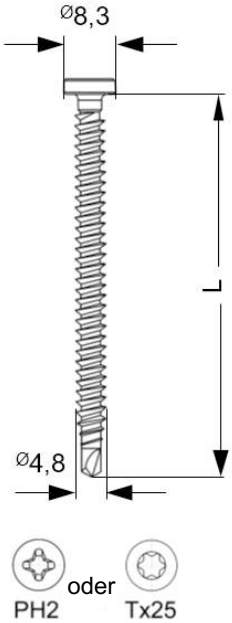
Zahn Flachdachbefestigungselemente	Anhang 221
Kombination 221 ZSSB-Modul / Klickteller / ZBST-E aus ZBST-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 6,0 und Klickteller	



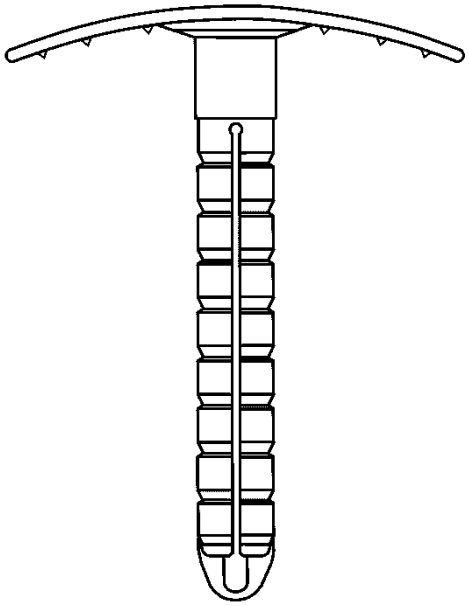
Zahn ZTSD oval



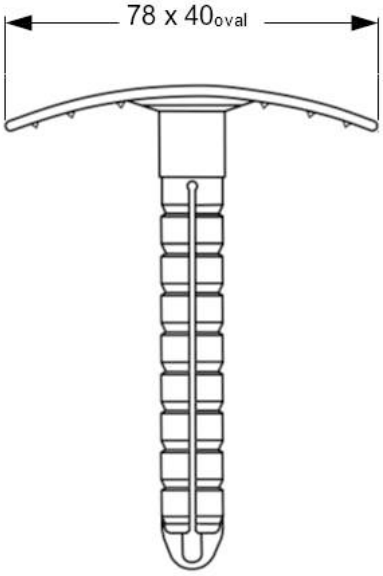
Zahn ZDBK 4,8 x L



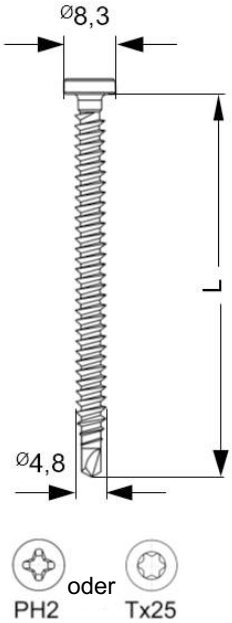
Zahn Flachdachbefestigungselemente	Anhang 222
Kombination 222 ZTSD / ZDBK aus ZDBK / ZTSD oval	



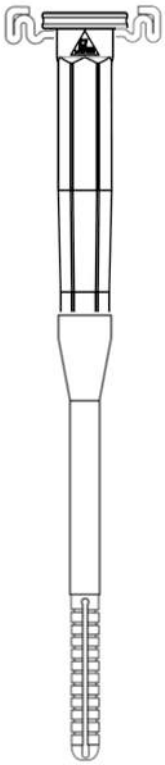
Zahn ZTSD oval



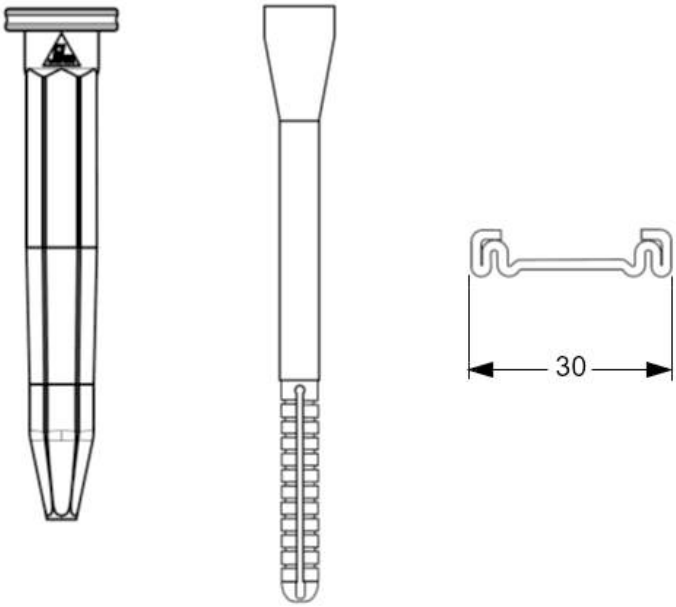
Zahn ZDBK-E 4,8 x L



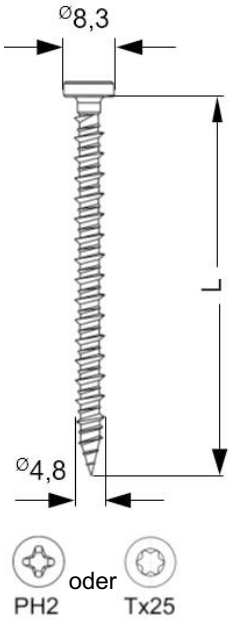
Zahn Flachdachbefestigungselemente	Anhang 223
Kombination 223 ZTSD-E / ZDBK-E aus ZDBK-E / ZTSD oval	



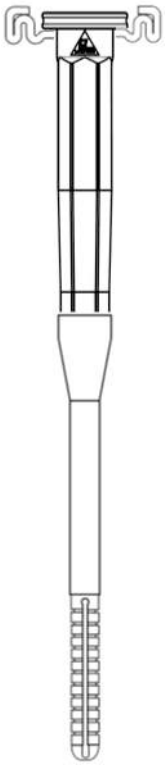
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Schiene



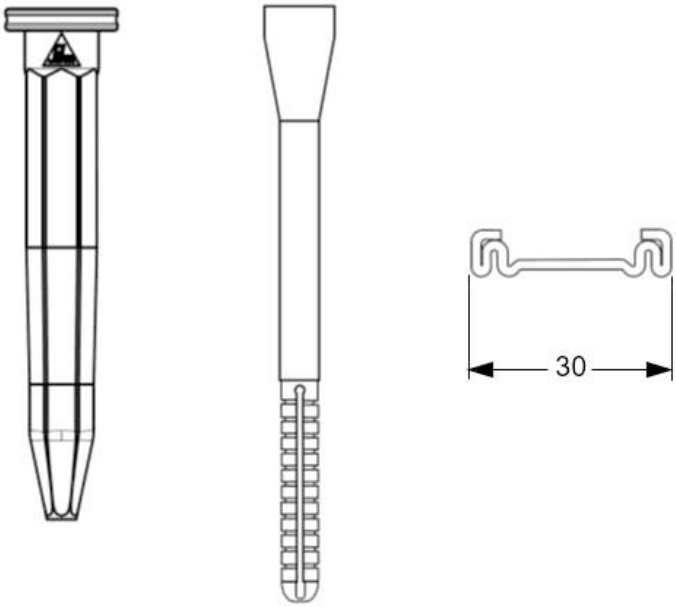
Zahn ZHBK-E 4,8 x L



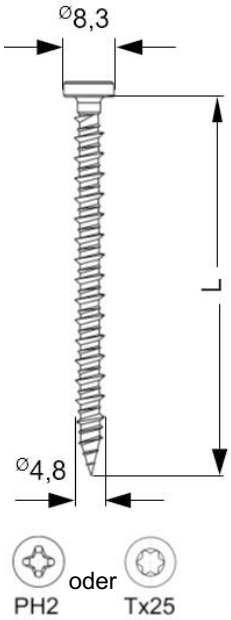
Zahn Flachdachbefestigungselemente	Anhang 224
Kombination 224 ZSSB-ZHBK-E Beton aus ZHBK-E / ZSSB-Tülle 4,8, ZSSB Schiene und Dübelvorsatz	



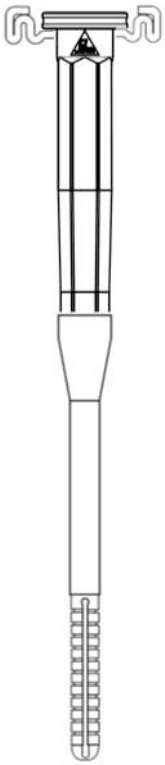
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Schiene



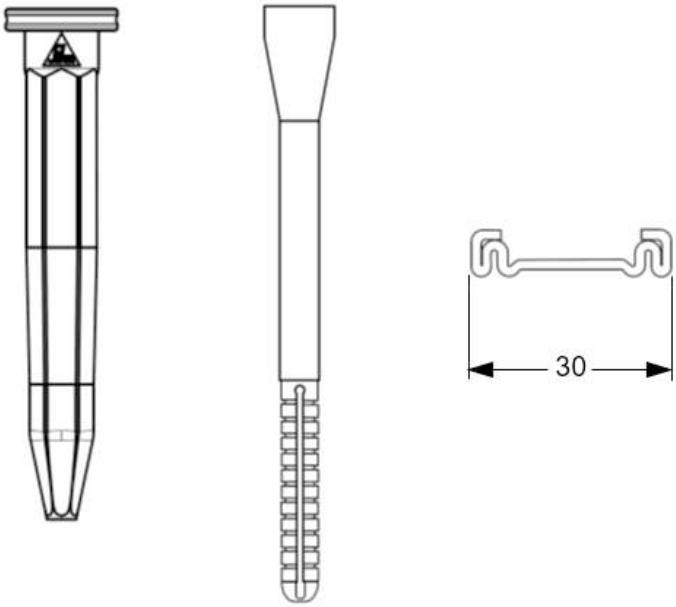
Zahn ZHBK 4,8 x L



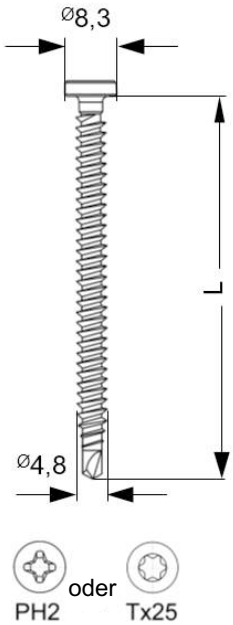
Zahn Flachdachbefestigungselemente	Anhang 225
Kombination 225 ZSSB-ZHBK Beton aus ZHBK / ZSSB-Tülle 4,8, ZSSB Schiene und Dübelvorsatz	



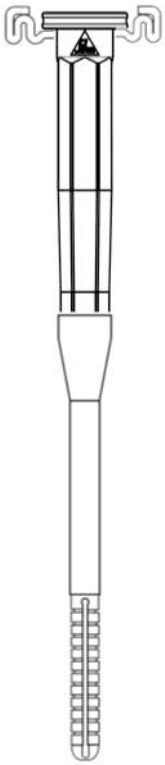
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Schiene



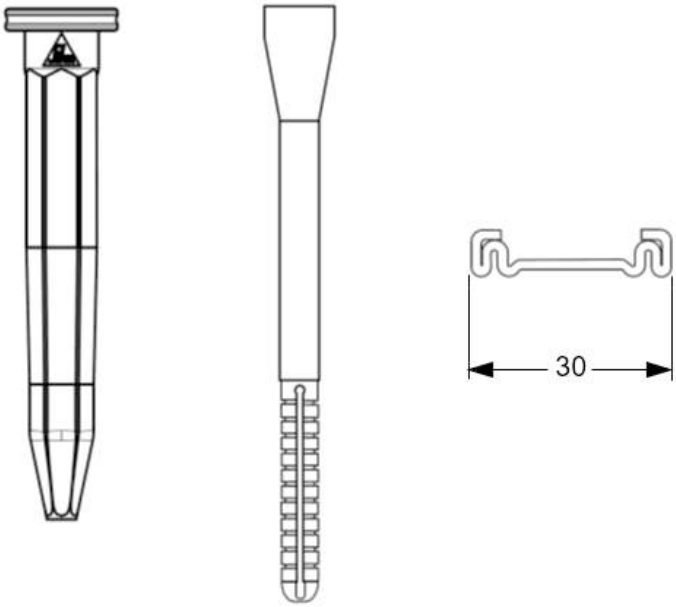
Zahn ZDBK 4,8 x L



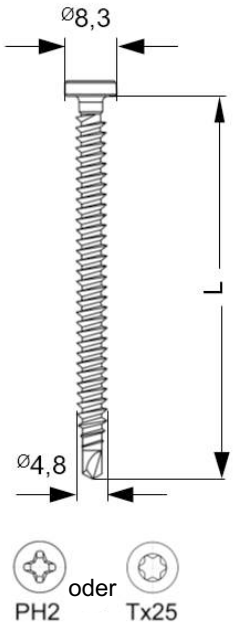
Zahn Flachdachbefestigungselemente	Anhang 226
Kombination 226 ZSSB-ZDBK Beton aus ZDBK / ZSSB-Tülle 4,8, ZSSB Schiene und Dübelvorsatz	



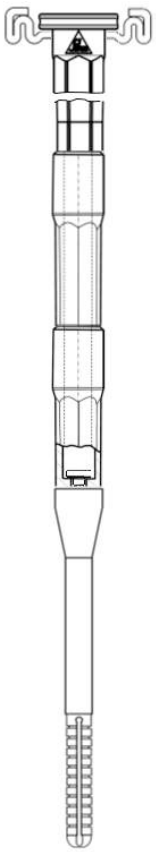
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Schiene



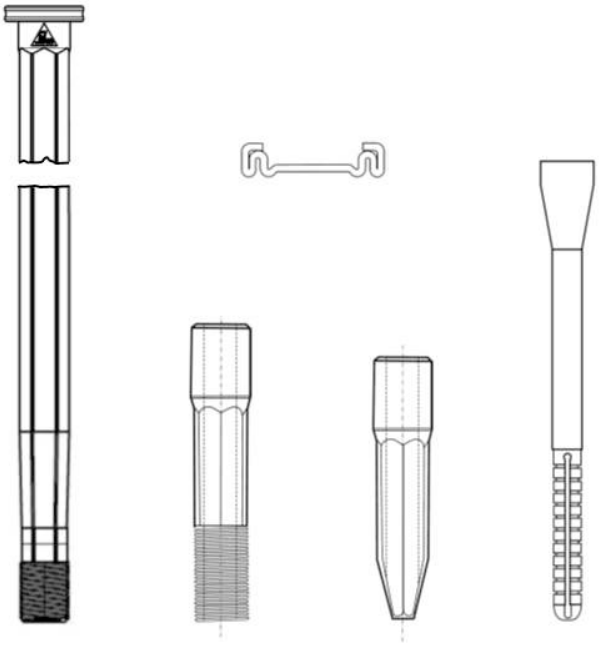
Zahn ZDBK-E 4,8 x L



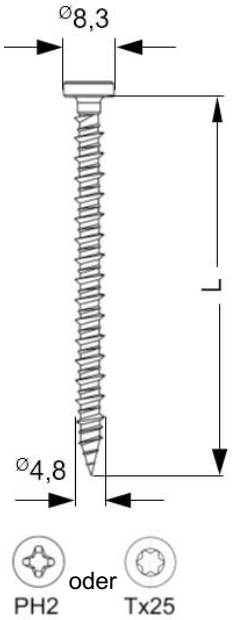
Zahn Flachdachbefestigungselemente	Anhang 227
Kombination 227 ZSSB-ZDBK-E Beton aus ZDBK-E / ZSSB-Tülle 4,8, ZSSB Schiene und Dübelvorsatz	



Zahn ZSSB-Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Schiene



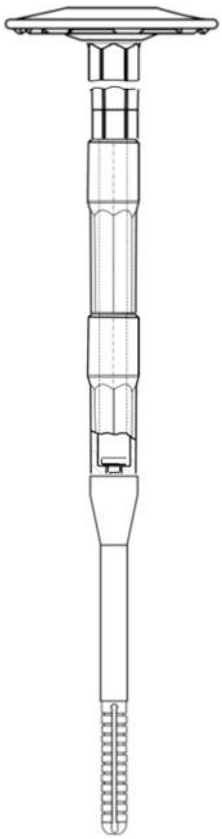
Zahn ZHBK-E 4,8 x L



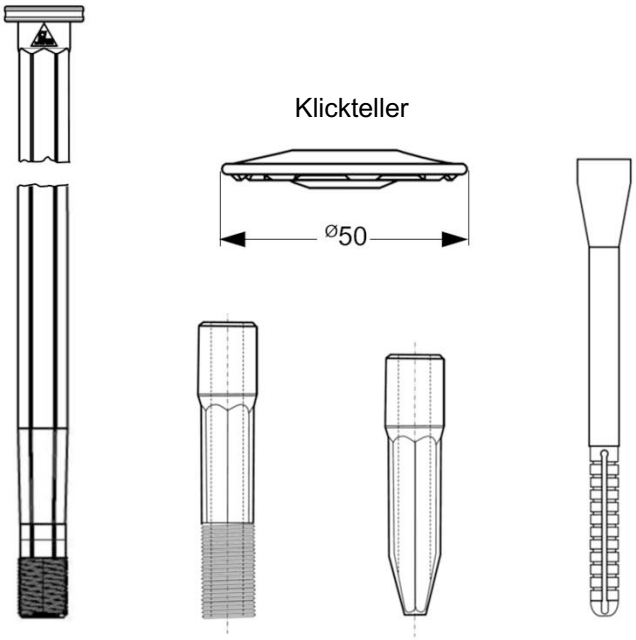
Zahn Flachdachbefestigungselemente

Kombination 228
ZSSB-Modul / ZHBK-E Beton aus ZHBK-E / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und ZSSB Schiene

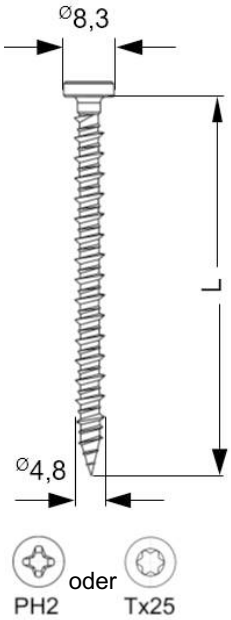
Anhang 228



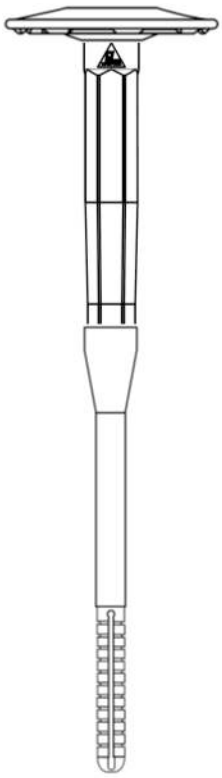
Zahn ZSSB- Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Klickteller



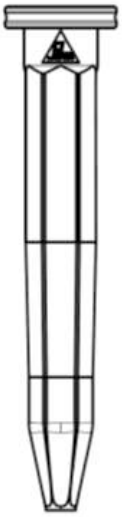
Zahn ZHBK-E 4,8 x L



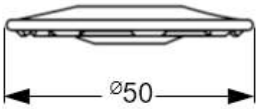
Zahn Flachdachbefestigungselemente	Anhang 229
Kombination 229 ZSSB-Modul / Klickteller / ZHBK-E Beton aus ZHBK-E / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und Klickteller	



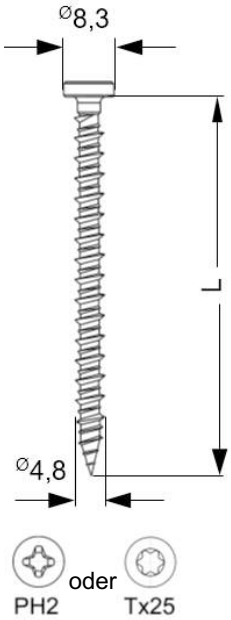
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Klickteller



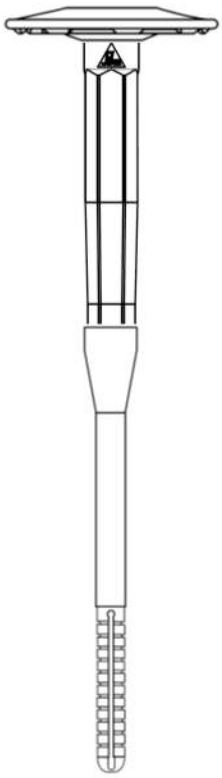
Klickteller



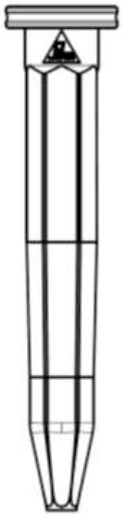
Zahn ZHBK-E 4,8 x L



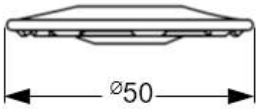
Zahn Flachdachbefestigungselemente	Anhang 230
Kombination 230 ZSSB / Klickteller / ZHBK-E Beton aus ZHBK-E / ZSSB-Tülle 4,8, Klickteller und Dübelvorsatz	



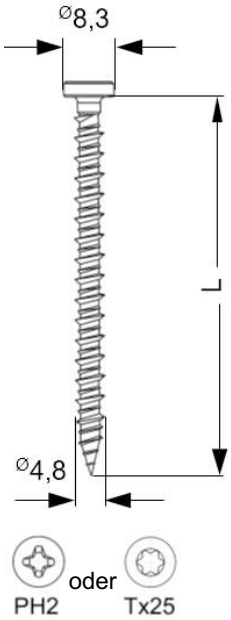
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Klickteller



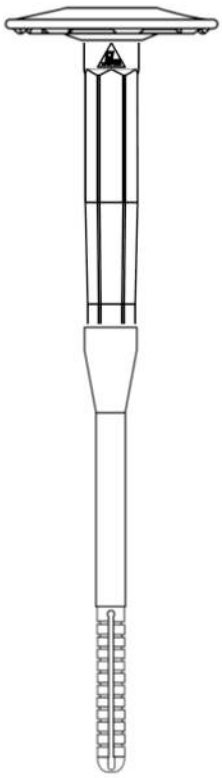
Klickteller



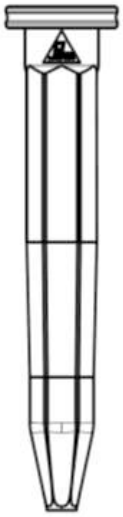
Zahn ZHBK 4,8 x L



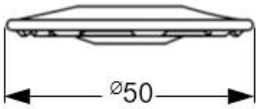
Zahn Flachdachbefestigungselemente	Anhang 231
Kombination 231 ZSSB / Klickteller / ZHBK Beton aus ZHBK / ZSSB-Tülle 4,8, Klickteller und Dübelvorsatz	



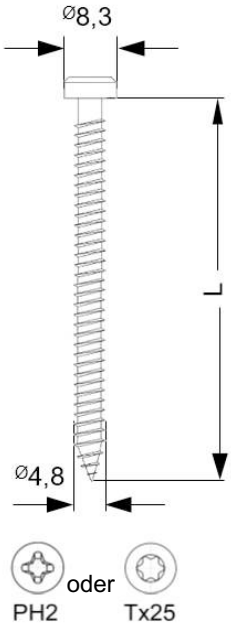
Zahn ZSSB-Tülle 4,8 mit Dübelvorsatz und Klickteller



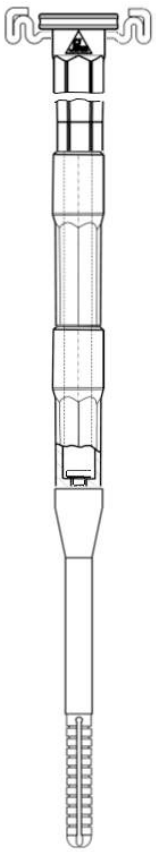
Klickteller



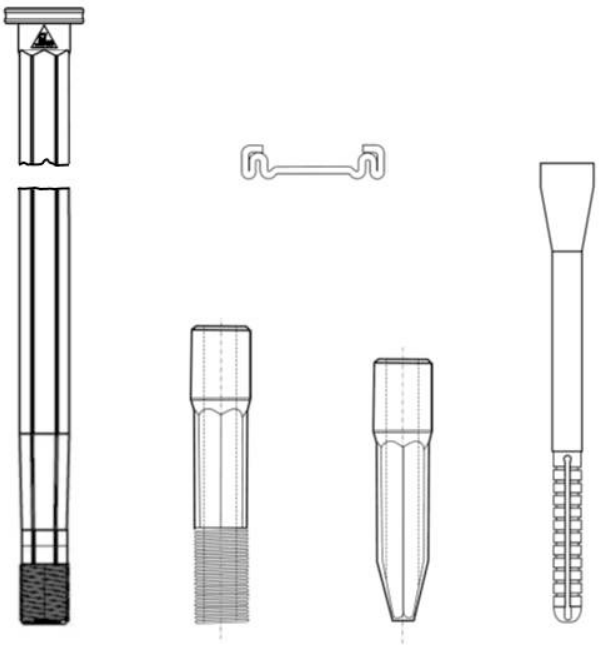
Zahn $ZDBK_{Dübel}$ 4,8 x L



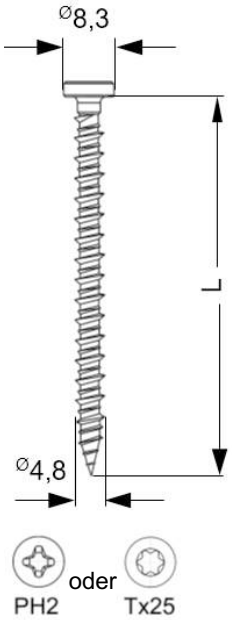
Zahn Flachdachbefestigungselemente	Anhang 232
Kombination 232 ZSSB / Klickteller / ZDBK-Dübel aus $ZDBK_{Dübel}$ / ZSSB-Tülle 4,8, Klickteller und Dübelvorsatz	



Zahn ZSSB-Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Schiene



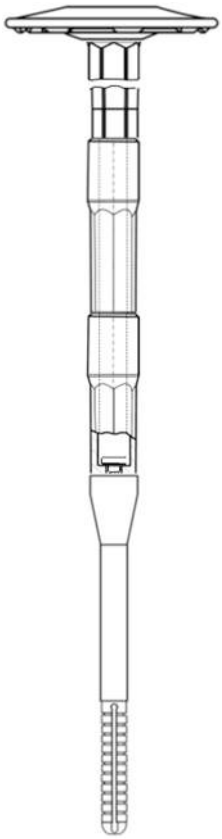
Zahn ZHBK 4,8 x L



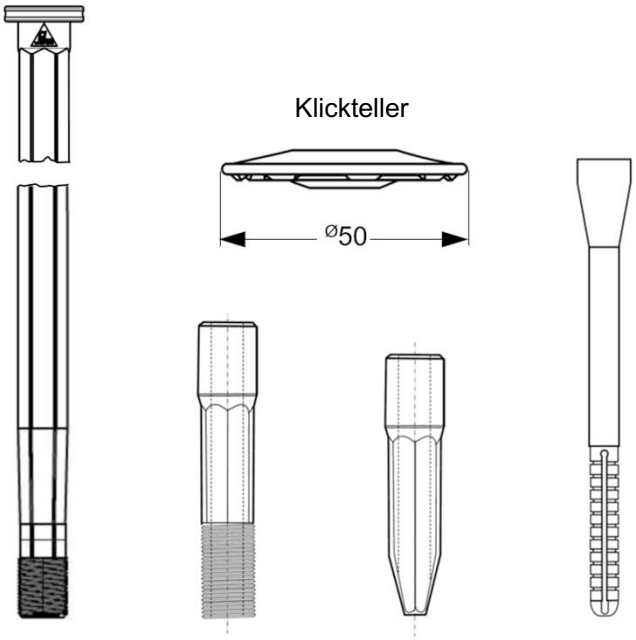
Zahn Flachdachbefestigungselemente

Kombination 233
ZSSB-Modul / ZHBK Beton aus ZHBK / ZSSB-Modul-Tülle,
Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und ZSSB Schiene

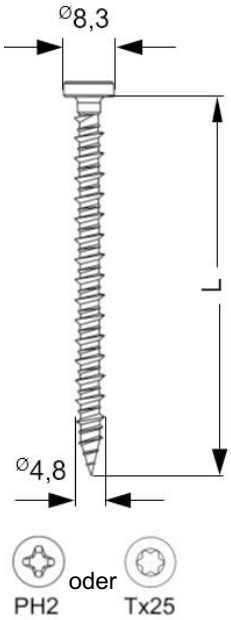
Anhang 233



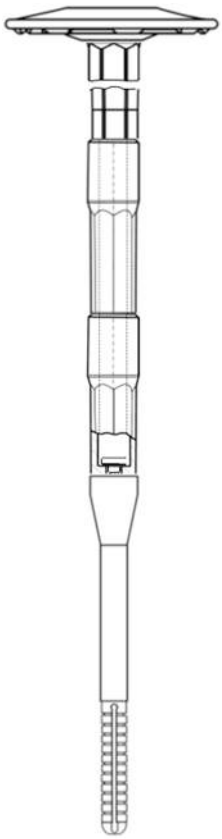
Zahn ZSSB- Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Klickteller



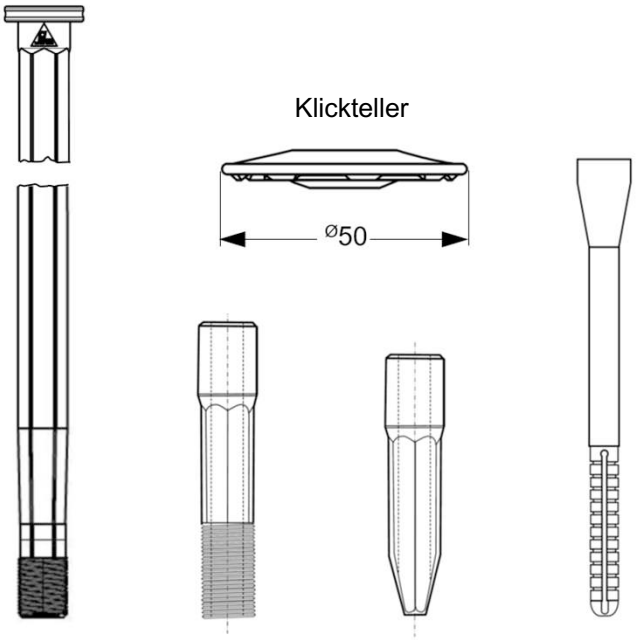
Zahn ZHBK 4,8 x L



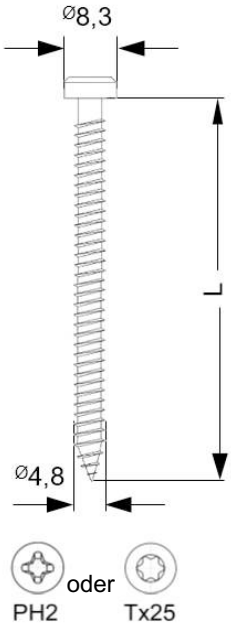
Zahn Flachdachbefestigungselemente	Anhang 234
Kombination 234 ZSSB-Modul / Klickteller / ZHBK Beton aus ZHBK / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und Klickteller	



Zahn ZSSB- Modul-Tülle 4,8 mit Modul, Dübelvorsatz und Klickteller



Zahn $ZDBK_{Dübel}$ 4,8 x L



Zahn Flachdachbefestigungselemente	Anhang 235
Kombination 235 ZSSB-Modul / Klickteller / ZDBK-Dübel Beton aus $ZDBK_{Dübel}$ / ZSSB-Modul-Tülle, Modul Mittelstück, Modulspitze 4,8, Dübelvorsatz und Klickteller	

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Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion								
		Stahlblech					**Holz*)**			
		S320GD - EN 10346					C24	OSB3	P5	Sperr-holz
		t [mm] ≥					t [mm] ≥			
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	**22**	**18**	**19**	**19**
1	ZKSK	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
2	ZKSK-R	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
3	ZKSK-Rplus mit Pfahlspitze	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
4	ZKSK-Rplus	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
5	ZKSK Modul	0,75	0,77	1,02	1,16	-	-	-	-	-
6	ZKSK-R-Modul	0,75	0,77	1,02	1,16	-	1,04	0,98	0,97	1,16
7	ZTSK Trapez	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
8	ZDBK / ZLVT 0001	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
9	ZDBK / ZLVT 0005	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
10	ZDBK / ZLVT 0015	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,37
10a	ZCTS Trapez	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
10b	ZCTSplus Trapez	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
11	ZKSK-E	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
12	ZKSK-E/R	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
13	ZKSK-E/Rplus mit Pfahlspitze	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
14	ZKSK-E/Rplus	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
15	ZKSK-E-Modul	0,75	0,77	1,02	1,16	-	1,04	0,98	0,97	1,16
16	ZKSK-E/R-Modul	0,75	0,77	1,02	1,16	-	1,04	0,98	0,97	1,16
17	ZTSK-E Trapez	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
18	ZDBK-E / ZLVT 0001	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
19	ZDBK-E / ZLVT 0005	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
20	ZDBK-E / ZLVT 0015	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,37
20a	ZCTS-E Trapez	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60
20b	ZCTS-Eplus Trapez	0,75	0,77	1,02	1,19	-	1,04	0,98	0,97	1,60

*)

C24	EN 338	ρ_{min} = 350kg/m³
OSB3	EN 300	ρ_{min} = 550kg/m³
Spanplatte / P5	EN 312	ρ_{min} = 500kg/m³
Sperrholz	EN 636	ρ_{min} = 400kg/m³

Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

Zahn Flachdachbefestigungselemente	Anhang 236.01
Charakteristische Zugtragfähigkeiten	

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Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	**Unterkonstruktion**					
		Stahlblech					
		S320GD - EN 10346					
		t [mm] ≥					
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	
21	ZKSK-VB	-	-	-	-	2,15	
22	ZKSK-R/VB	-	-	-	-	1,91	
23	ZKSK-R/VBplus mit Pfahlspitze	-	-	-	-	2,28	
24	ZKSK-R/VB/plus	-	-	-	-	2,28	
25	ZKSK-VB-Modul	-	-	-	-	1,16	
26	ZKSK-R/VB-Modul	-	-	-	-	1,16	
27	ZTSK-VB Trapez	-	-	-	-	1,62	
28	ZDBK-VB / ZLVT 0001	-	-	-	-	2,28	
29	ZDBK-VB / ZLVT 0005	-	-	-	-	2,13	
30	ZDBK-VB / ZLVT 0015	-	-	-	-	1,37	
30a	ZCTS-VB Trapez	-	-	-	-	1,91	
30b	ZCTSplus-VB Trapez	-	-	-	-	2,28	
31	ZKSK-E/VB	-	-	-	-	2,15	
32	ZKSK-E/R/VB	-	-	-	-	1,91	
33	ZKSK-E/R/VBplus mit Pfahlspitze	-	-	-	-	2,28	
34	ZKSK-E/R/VBplus	-	-	-	-	2,28	
35	ZKSK-E/VB-Modul	-	-	-	-	1,16	
36	ZKSK-E/R/VB-Modul	-	-	-	-	1,16	
37	ZTSK-E / VB Trapez	-	-	-	-	1,62	
38	ZDBK-E/VB / ZLVT 0001	-	-	-	-	2,28	
39	ZDBK-E/VB / ZLVT 0005	-	-	-	-	2,13	
40	ZDBK-E/VB / ZLVT 0015	-	-	-	-	1,37	
40a	ZCTS-E / VB Trapez	-	-	-	-	1,91	
40b	ZCTS-Eplus / VB Trapez	-	-	-	-	2,28	

Zahn Flachdachbefestigungselemente	Anhang 236.02
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion								
		Stahlblech					**Holz*)**			
		S320GD - EN 10346					C24	OSB3	P5	Sperr-holz
		t [mm] ≥					t [mm] ≥			
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	**22**	**18**	**19**	**19**
41	ZDBS / ZLVT 0001	0,75	0,77	1,02	1,19	-	1,04	1,21	0,97	2,34
41a	ZDBS-VB / ZLVT 0001	-	-	-	-	2,28	-	-	-	-
42	ZDBS / ZLVT 0005	0,75	0,77	1,02	1,19	-	1,04	1,21	0,97	2,34
42a	ZDBS-VB / ZLVT 0005	-	-	-	-	2,28	-	-	-	-
43	ZDBS / ZLVT 0012	0,75	0,77	1,02	1,19	-	1,04	1,21	0,97	2,34
43a	ZDBS-VB / ZLVT 0012	-	-	-	-	2,28	-	-	-	-
44	ZDBS-E / ZLVT 0001	0,75	0,77	1,02	1,19	-	1,04	1,21	0,97	2,34
45	ZDBS-E / ZLVT 0005	0,75	0,77	1,02	1,19	-	1,04	1,21	0,97	2,34
46	ZDBS-E / ZLVT 0012	0,75	0,77	1,02	1,19	-	1,04	1,21	0,97	2,34
47	ZHSK	-	-	-	-	-	1,60	1,18	1,51	1,25
48	ZHSK-R	-	-	-	-	-	1,60	1,18	1,51	1,25
49	ZHSK-Rplus mit Pfahlspitze	-	-	-	-	-	1,60	1,18	1,51	1,25
50	ZHSK-Rplus	-	-	-	-	-	1,60	1,18	1,51	1,25
51	ZHSK Modul	-	-	-	-	-	1,16	1,16	1,16	1,16
52	ZHSK-R-Modul	-	-	-	-	-	1,16	1,16	1,16	1,16
53	ZTSK Holz	-	-	-	-	-	1,58	1,18	1,51	1,25
54	ZHBK / ZLVT 0001	-	-	-	-	-	1,60	1,18	1,51	1,25
55	ZHBK / ZLVT 0005	-	-	-	-	-	1,60	1,18	1,51	1,25
55a	ZHBK-TK / ZLVT 0005	-	-	-	-	-	1,47	1,18	1,47	1,25
56	ZHBK / ZLVT 0015	-	-	-	-	-	1,38	1,18	1,38	1,25
56a	ZCTS Holz	-	-	-	-	-	1,60	1,18	1,51	1,25
56b	ZHBK-TK / ZLVT 0015	-	-	-	-	-	1,47	1,18	1,47	1,25
56c	ZCTSplus Holz	-	-	-	-	-	1,60	1,18	1,51	1,25
66b	ZHBK-E-TK / ZLVT 0005	-	-	-	-	-	1,47	1,18	1,47	1,25
69a	ZHBK-E-TK / ZLVT 0015	-	-	-	-	-	1,47	1,18	1,47	1,25

*)

C24	EN 338	ρ_{min} = 350kg/m³
OSB3	EN 300	ρ_{min} = 550kg/m³
Spanplatte / P5	EN 312	ρ_{min} = 500kg/m³
Sperrholz	EN 636	ρ_{min} = 400kg/m³

Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

Zahn Flachdachbefestigungselemente	Anhang 236.03
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion										
		Stahlblech					Aluminium		Holz*)			
		S320GD - EN 10346					EN 485, t ≥ 0,5mm R_m [N/mm²] ≥		C24	OSB3	P5	Sperr-holz
		t [mm] ≥							t [mm] ≥			
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	**165**	**215**	**22**	**18**	**19**	**19**
57	ZHSK-E	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
58	ZHSK-E/R	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
59	ZHSK-E/Rplus mit Pfahlspitze	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
60	ZHSK-E/Rplus	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
61	ZHSK-E-Modul	-	-	-	-	-	-	-	1,16	1,16	1,16	1,16
62	ZHSK-E/R-Modul	-	-	-	-	-	-	-	1,16	1,16	1,16	1,16
67	ZTSK-E-Holz	-	-	-	-	-	-	-	1,58	1,18	1,51	1,25
68	ZHBK-E / ZLVT 0001	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
69	ZHBK-E / ZLVT 0005	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
70	ZHBK-E / ZLVT 0015	-	-	-	-	-	-	-	1,38	1,18	1,38	1,25
70a	ZCTS-E Holz	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
70b	ZCTS-Eplus Holz	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
71	ZKSK / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
72	ZKSK-R / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
73	ZKSK-Rplus / ZDBK-Dübel mit…**)	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
74	ZKSK-Rplus / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
76a	ZHSK-R-Modul / ZDBK-Dübel	0,90	0,90	1,16	1,16	-	0,34	0,44	0,95	1,16	0,98	1,16
80	ZTSK / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
81	ZDBK-Dübel / ZLVT 0001	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
81a	ZCTS / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
81b	ZDBK-Dübel / ZLVT 0005	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
81c	ZDBK-Dübel / ZLVT 0015	0,90	0,90	1,23	1,37	-	0,34	0,44	0,95	1,16	0,98	1,21
81d	ZCTSplus / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21

*) C24 EN 338 ρ_{min} = 350kg/m³
OSB3 EN 300 ρ_{min} = 550kg/m³
Spanplatte / P5 EN 312 ρ_{min} = 500kg/m³
Sperrholz EN 636 ρ_{min} = 400kg/m³
Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

**) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

Zahn Flachdachbefestigungselemente	Anhang 236.04
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion										
		Stahlblech					**Aluminium**		**Holz*)**			
		S320GD - EN 10346					EN 485, t ≥ 0,5mm R_m [N/mm²] ≥		C24	OSB3	P5	Sperr-holz
		t [mm] ≥							t [mm] ≥			
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	**165**	**215**	**22**	**18**	**19**	**19**
121	ZDBK-TK / ZLVT 0016	0,75	0,77	1,02	1,22	-	-	-	-	-	-	-
121a	ZDBK / ZLVT 0016	0,75	0,77	1,02	1,19	-	-	-	-	-	-	-
121b	ZDBK-E / ZLVT 0016	0,75	0,77	1,02	1,19	-	-	-	-	-	-	-
122	ZSSB / Klickteller / ZDBK Trapez	0,75	0,77	1,02	1,19	-	-	-	1,04	0,98	0,97	1,60
123	ZSSB / Klickteller / ZDBK-E Trapez	0,75	0,77	1,02	1,19	-	-	-	1,04	0,98	0,97	1,60
124	ZSSB / Klickteller / ZDBK-VB Trapez	-	-	-	-	2,28	-	-	-	-	-	-
125	ZSSB / Klickteller / ZDBK-VB-E Tr..**)	-	-	-	-	2,28	-	-	-	-	-	-
128	ZSSB / Klickteller / ZHBK Holz	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
129	ZSSB / Klickteller / ZHBK-E-Holz	-	-	-	-	-	-	-	1,60	1,18	1,51	1,25
130	ZSSB / Klickteller / ZDBK-Dübel	0,90	0,90	1,23	1,47	-	0,34	0,44	0,95	1,16	0,98	1,21
134	ZSSB Trapez	0,75	0,77	1,02	1,19	-	-	-	1,04	0,98	0,97	1,41
135	ZSSB-E Trapez	0,75	0,77	1,02	1,19	-	-	-	1,04	0,98	0,97	1,41
136	ZSSB-VB Trapez	-	-	-	-	1,41	-	-	-	-	-	-
137	ZSSB-E-VB Trapez	-	-	-	-	1,41	-	-	-	-	-	-
140	ZSSB-Holz	-	-	-	-	-	-	-	1,41	1,18	1,41	1,25
141	ZSSB-E-Holz	-	-	-	-	-	-	-	1,41	1,18	1,41	1,25
142	ZSSB-ZDBK-Dübel	0,90	0,90	1,23	1,41	-	0,34	0,44	0,95	1,16	0,98	1,21
146	ZSSB-Modul Trapez	0,75	0,77	1,02	1,16	-	-	-	1,04	0,98	0,97	1,16
147	ZSSB-E-Modul Trapez	0,75	0,77	1,02	1,16	-	-	-	1,04	0,98	0,97	1,16
148	ZSSB-VB-Modul Trapez	-	-	-	-	1,16	-	-	-	-	-	-
149	ZSSB-E-VB-Modul Trapez	-	-	-	-	1,16	-	-	-	-	-	-

*) C24 EN 338 ρ_{min} = 350kg/m³
OSB3 EN 300 ρ_{min} = 550kg/m³
Spanplatte / P5 EN 312 ρ_{min} = 500kg/m³
Sperrholz EN 636 ρ_{min} = 400kg/m³
Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

**) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

Zahn Flachdachbefestigungselemente	Anhang 236.05
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion										
		Stahlblech					Aluminium		Holz*)			
		S320GD - EN 10346					EN 485, t ≥ 0,5mm R_m [N/mm²] ≥		C24	OSB3	P5	Sperr-holz
		t [mm] ≥							t [mm] ≥			
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	**165**	**215**	**22**	**18**	**19**	**19**
152	ZSSB-Modul Holz	-	-	-	-	-	-	-	1,16	1,16	1,16	1,16
153	ZSSB-E-Modul Holz	-	-	-	-	-	-	-	1,16	1,16	1,16	1,16
154	ZSSB-Modul ZDBK-Dübel	0,90	0,90	1,16	1,16	-	0,34	0,44	0,95	1,16	0,98	1,16
163	Sarnabar / ZDBS	0,75	0,77	1,02	1,19	-	-	-	1,04	1,21	0,97	2,34
163a	Sarnabar / ZDBS-VB	-	-	-	-	2,28	-	-	-	-	-	-
164	Sarnabar / ZDBS-E	0,75	0,77	1,02	1,19	-	-	-	1,04	1,21	0,97	2,34
170	ZDBS-1 / ZLVT 0001	0,85	0,93	1,24	1,45	-	-	-	1,04	1,21	0,97	2,34
171	ZDBS-1 / ZLVT 0005	0,85	0,93	1,24	1,45	-	-	-	1,04	1,21	0,97	2,34
172	ZDBS-1 / ZLVT 0012	0,85	0,93	1,24	1,45	-	-	-	1,04	1,21	0,97	2,34
173	Sarnabar / ZSSB-1	0,85	0,93	1,24	1,45	-	-	-	1,04	1,21	0,97	2,34
174	ZCTS-1 Trapez	0,75	0,77	1,02	1,19	-	-	-	1,04	0,98	0,97	1,43
175	ZCTS-1-E Trapez	0,75	0,77	1,02	1,19	-	-	-	1,04	0,98	0,97	1,43
176	ZCTS-1-VB Trapez	-	-	-	-	1,43	-	-	-	-	-	-
177	ZCTS-1-E/VB Trapez	-	-	-	-	1,43	-	-	-	-	-	-
180	ZCTS-1 Holz	-	-	-	-	-	-	-	1,43	1,18	1,43	1,25
181	ZCTS-1-E Holz	-	-	-	-	-	-	-	1,43	1,18	1,43	1,25
182	ZCTS-1-Dübel	0,90	0,90	1,23	1,43	-	0,34	0,44	0,95	1,16	0,98	1,21
210	ZSSB-Modul / Klickteller / ZDBK	0,75	0,77	1,02	1,16	-	-	-	1,04	1,16	0,97	1,16
211	ZSSB-E-Mod../ Klick../ ZDBK-E..**)	0,75	0,77	1,02	1,16	-			1,04	1,16	0,97	1,16
212	ZSSB-Modul / Klickteller / ZDBK-VB	-	-	-	-	1,16			-	-	-	-
213	ZSSB-Mod../ Klick../ ZDBK-E / VB..**)	-	-	-	-	1,16			-	-	-	-
216	ZSSB-Modul / Klickteller / ZHBK	-	-	-	-	-	-	-	1,16	1,16	1,16	1,16
217	ZSSB-Modul / Klickteller / ZHBK-E	-	-	-	-	-	-	-	1,16	1,16	1,16	1,16
218	ZSSB-Mod../ Klick../ ZDBK-Dübel..**)	0,90	0,90	1,16	1,16	-	0,34	0,44	0,95	1,16	0,98	1,16

*) C24 EN 338 ρ_{min} = 350kg/m³
OSB3 EN 300 ρ_{min} = 550kg/m³
Spanplatte / P5 EN 312 ρ_{min} = 500kg/m³
Sperrholz EN 636 ρ_{min} = 400kg/m³
Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

**) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

Zahn Flachdachbefestigungselemente	Anhang 236.06
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion									
		Holz[*)]					**Poren-**[**)] **Beton** EN 12602		**Leicht-**[3*)] **beton** EN 1520 **LAC…**		
		C24	OSB3	P5	Sperr-holz						
		t [mm] ≥									
		22	**18**	**19**	**19**		**3,5**	**4,5**	**…2a**	**…2b**	
82	ZKGK-E/R	1,31	1,08	1,17	1,83		1,02	1,59	0,54	1,00	
83	ZKGK-E-Modul	1,16	1,08	1,16	1,16		1,02	1,16	0,54	1,00	
84	ZKGK-E/R-Modul	1,16	1,08	1,16	1,16		1,02	1,16	0,54	1,00	
85	ZHVM-E PB-Direkt	1,31	1,08	1,17	1,61		1,02	1,59	0,54	1,00	
86	ZTSK-E PB-Direkt	1,31	1,08	1,17	1,33		1,02	1,33	0,54	1,00	
87	ZGBK-E / ZLVT 0008	1,31	1,08	1,17	1,34		1,02	1,34	0,54	1,00	
88	ZGBK-E / ZLVT 0012	1,28	1,08	1,17	1,28		1,02	1,28	0,54	1,00	
131	ZSSB / Klick../ ZGBK-E PB-Direkt..[4*)]	1,31	1,08	1,17	1,85		1,02	1,59	0,54	1,00	
131a	ZCTS PB-Direkt / ZGBK-E	1,31	1,08	1,17	1,41		1,02	1,41	0,54	1,00	
143	ZSSB-PB Direkt	1,31	1,08	1,17	1,41		1,02	1,41	0,54	1,00	
155	ZSSB-Modul PB-Direkt	1,16	1,08	1,16	1,16		1,02	1,16	0,54	1,00	
167	Sarnabar / ZGBK-E	1,31	1,08	1,17	2,58		1,02	1,59	0,54	1,00	
189	ZSSB-HVM-1 PB-Direkt	1,31	1,08	1,17	1,89		1,02	1,59	0,54	1,00	
194	ZSSB / Klick../ HVM-1-E PB-Di..[4*)]	1,31	1,08	1,17	1,89		1,02	1,59	0,54	1,00	
219	ZSSB-Modul / Klickteller / ZGBK-E	1,16	1,08	1,16	1,16		1,02	1,16	0,54	1,00	
							min. Setztiefe = 60,0mm				

*) C24 EN 338 ρ_{min} = 350kg/m³
OSB3 EN 300 ρ_{min} = 550kg/m³
Spanplatte / P5 EN 312 ρ_{min} = 500kg/m³
Sperrholz EN 636 ρ_{min} = 400kg/m³
Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

**) 3,5: AAC 3,5 ρ_{class} = 500
4,5: AAC 4,5 ρ_{class} = 600

3*) 2a: LAC 2 ρ_{class} = 0,5
2b: LAC 2 ρ_{class} = 1,0

4*) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

Zahn Flachdachbefestigungselemente

Charakteristische Zugtragfähigkeiten

Anhang 236.07

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente		Unterkonstruktion						
			Beton EN 206-1		**Poren-****) **Beton** EN 12602		**Leicht-** 3*) **beton** EN 1520 **LAC…**		
			C12/15	**C25/30**	**3,5**	**4,5**	**…2a**	**…2b**	
75	ZSDK-Modul / ZDBK-Dübel		1,03	1,16	0,81	1,16	0,56	1,04	
76	ZSDK-R-Modul / ZDBK-Dübel		1,03	1,16	0,81	1,16	0,56	1,04	
77	ZSDK / ZDBK-Dübel		1,03	1,46	0,81	1,21	0,56	1,04	
78	ZSDK-R / ZDBK-Dübel		1,03	1,46	0,81	1,21	0,56	1,04	
78a	ZCTS / ZDBK-Dübel-Beton		1,03	1,46	0,81	1,21	0,56	1,04	
79	ZTSD / ZDBK-Dübel		0,95	1,34	0,46	0,69	0,54	0,99	
222	ZTSD / ZDBK		0,95	1,34	0,46	0,69	0,54	0,99	
223	ZTSD-E / ZDBK-E		0,95	1,34	0,46	0,69	0,54	0,99	
			Vorbohr Ø = 8,0mm						
			min. Setztiefe						
			40mm		60mm				

**) 3,5: AAC 3,5 ρ_{class} = 500
4,5: AAC 4,5 ρ_{class} = 600

3*) 2a: LAC 2 ρ_{class} = 0,5
2b: LAC 2 ρ_{class} = 1,0

Zahn Flachdachbefestigungselemente

Charakteristische Zugtragfähigkeiten

Anhang 236.08

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion					
			Beton EN 206-1				
			C12/15	**C25/30**	**C12/15**	**C25/30**	
			Vorbohr Ø = 5,0mm				
			min. Setztiefe				
			40mm				
96	ZBSK-E/R		1,60	1,85	-	-	
97	ZBSK-E-Modul		1,16	1,16	-	-	
98	ZBSK-E/R-Modul		1,16	1,16	-	-	
99	ZHVM-E-Beton-Direkt		1,60	1,61	-	-	
100	ZTSK-E-Beton-Direkt		1,41	1,41	-	-	
101	ZBST-E / ZLVT 0008		1,60	1,71	-	-	
102	ZBST-E / ZLVT 0012		1,60	1,67	-	-	
133	ZSSB / Klick../ ZBST-E Bet-Dir..*)		1,60	1,85	-	-	
133a	ZCTS-E Beton-Direkt / ZBST-E		1,41	1,41	-	-	
145	ZSSB-E-Beton-Direkt		1,41	1,41	-	-	
157	ZSSB-E-Modul Beton-Direkt		1,16	1,16	-	-	
169	Sarnabar / ZBST-E		1,60	2,26	-	-	
			min. Setztiefe				
			30mm		20mm**)		
89	ZBSK-R		1,60	1,85	1,49	1,85	
90	ZBSK-Modul		1,16	1,16	1,16	1,16	
91	ZBSK-R-Modul		1,16	1,16	1,16	1,16	
92	ZHVM-Beton-Direkt		1,60	1,61	1,49	1,61	
93	ZTSK-Beton-Direkt		1,41	1,41	1,41	1,41	
94	ZBST / ZLVT 0008		1,60	1,71	1,49	1,71	
95	ZBST / ZLVT 0012		1,60	1,67	1,49	1,67	
132	ZSSB / Klick../ ZBST Bet-Dir..*)		1,60	1,85	1,49	1,85	
132a	ZCTS Beton-Direkt / ZBST 6,3		1,41	1,41	1,41	1,41	
144	ZSSB-Beton-Direkt		1,41	1,41	1,41	1,41	
156	ZSSB-Modul Beton-Direkt		1,16	1,16	1,16	1,16	
168	Sarnabar / ZBST		1,60	2,26	1,49	2,16	

*) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

**) Es ist sicherzustellen, dass der Beton eine hohe Oberflächenqualität hat und ein Beton mit reduziertem Größtkorn kleiner 16mm vorliegt. Die Anwendung ist hierbei auf Fertigteile mit Hohlräumen begrenzt.

Zahn Flachdachbefestigungselemente	Anhang 236.09
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion					
			Beton EN 206-1				
			C12/15	**C25/30**	**C12/15**	**C25/30**	
			Vorbohr Ø = 5,0mm				
			min. Setztiefe				
			40mm				
184	ZCTS-1-E Beton		1,43	1,43	-	-	
188	ZSSB-HVM-1-E Beton-Direkt		1,60	1,89	-	-	
193	ZSSB / Klick../ HVM-1-E Bet-Dir..*)		1,60	1,89	-	-	
221	ZSSB-Modul / Klickteller / ZBST-E		1,16	1,16	-	-	
			min. Setztiefe				
			30mm		20mm**)		
183	ZCTS-1 Beton-Direkt		1,43	1,43	1,43	1,43	
187	ZSSB-HVM-1 Beton-Direkt		1,60	1,89	1,49	1,89	
192	ZSSB / Klick../ HVM-1 Bet-Dir..*)		1,60	1,89	1,49	1,89	
220	ZSSB-Modul / Klickteller / ZBST		1,16	1,16	1,16	1,16	

*) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

**) Es ist sicherzustellen, dass der Beton eine hohe Oberflächenqualität hat und ein Beton mit reduziertem Größtkorn kleiner 16mm vorliegt. Die Anwendung ist hierbei auf Fertigteile mit Hohlräumen begrenzt.

Zahn Flachdachbefestigungselemente	Anhang 236.10
Charakteristische Zugtragfähigkeiten	

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente		Unterkonstruktion						
			Beton EN 206-1		**Poren-**[**)] **Beton** EN 12602		**Leicht-**[3*)] **beton** EN 1520 **LAC…**		
			C12/15	**C25/30**	**3,5**	**4,5**	**…2a**	**…2b**	
63	ZSDK-E-Modul / ZHBK-E		1,16	1,16	0,87	1,12	-	0,37	
64	ZSDK-E/R-Modul / ZHBK-E		1,16	1,16	0,87	1,12	-	0,37	
65	ZSDK-E / ZHBK-E		1,48	1,48	0,87	1,12	-	0,37	
66	ZSDK-E/R / ZHBK-E		1,48	1,48	0,87	1,12	-	0,37	
66a	ZCTS-E / ZHBK-E Beton		1,48	1,48	0,87	1,12	-	0,37	
60a	ZTSD-E / ZHBK-E		0,89	0,89	0,52	0,67	-	0,22	
158	ZSSB-ZDBK-Dübel Beton		1,03	1,41	0,81	1,21	0,56	1,04	
160	ZSSB-Modul-ZDBK-Dübel Beton		1,03	1,16	0,81	1,16	0,56	1,04	
161	ZSSB-E-Modul Beton		1,03	1,16	0,81	1,16	0,56	1,04	
195	ZSDK-R-Modul / ZDBK		1,03	1,16	0,81	1,16	0,56	1,04	
196	ZSDK-Modul / ZDBK		1,03	1,16	0,81	1,16	0,56	1,04	
197	ZSDK / ZDBK		1,03	1,46	0,81	1,21	0,56	1,04	
198	ZSDK-R / ZDBK		1,03	1,46	0,81	1,21	0,56	1,04	
199	ZCTS / ZDBK Beton		1,03	1,46	0,81	1,21	0,56	1,04	
			Vorbohr Ø = 8,0mm						
			min. Setztiefe						
			40mm		60mm				

**) 3,5: AAC 3,5 ρ_{class} = 500
4,5: AAC 4,5 ρ_{class} = 600

3*) 2a: LAC 2 ρ_{class} = 0,5
2b: LAC 2 ρ_{class} = 1,0

Zahn Flachdachbefestigungselemente

Charakteristische Zugtragfähigkeiten

Anhang 236.11

Deutsches Institut für Bautechnik DIBt

Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente		Unterkonstruktion						
			Beton EN 206-1		**Poren-**[**)] **Beton** EN 12602		**Leicht-** [3*)] **beton** EN 1520 **LAC…**		
			C12/15	**C25/30**	**3,5**	**4,5**	**…2a**	**…2b**	
200	ZSDK-E / R-Modul / ZDBK-E		1,03	1,16	0,81	1,16	0,56	1,04	
201	ZSDK-E Modul / ZDBK-E		1,03	1,16	0,81	1,16	0,56	1,04	
202	ZSDK-E / ZDBK-E		1,03	1,46	0,81	1,21	0,56	1,04	
203	ZSDK-E / R / ZDBK-E		1,03	1,46	0,81	1,21	0,56	1,04	
204	ZCTS-E / ZDBK-E Beton		1,03	1,46	0,81	1,21	0,56	1,04	
205	ZSDK-R-Modul / ZHBK		1,16	1,16	0,87	1,12	-	0,37	
206	ZSDK-Modul / ZHBK		1,16	1,16	0,87	1,12	-	0,37	
207	ZSDK / ZHSK		1,48	1,48	0,87	1,12	-	0,37	
208	ZSDK-R / ZHBK		1,48	1,48	0,87	1,12	-	0,37	
209	ZCTS / ZHBK Beton		1,48	1,48	0,87	1,12	-	0,37	
224	ZSSB-ZHBK-E Beton		1,41	1,41	0,87	1,12	-	0,37	
225	ZSSB-ZHBK Beton		1,41	1,41	0,87	1,12	-	0,37	
226	ZSSB-ZDBK Beton		1,03	1,16	0,81	1,16	0,56	1,04	
227	ZSSB-ZDBK-E Beton		1,03	1,16	0,81	1,16	0,56	1,04	
228	ZSSB-Modul / ZHBK-E Beton		1,16	1,16	0,87	1,12	-	0,37	
229	ZSSB-Mod../Klic../ ZHBK-E Bet..*)		1,16	1,16	0,87	1,12	-	0,37	
230	ZSSB / Klickteller / ZHBK-E Beton		1,48	1,48	0,87	1,12	-	0,37	
231	ZSSB / Klickteller / ZHBK Beton		1,16	1,16	0,87	1,12	-	0,37	
232	ZSSB / Klickteller / ZDBK-Dübel		1,03	1,16	0,81	1,16	0,56	1,04	
233	ZSSB-Modul / ZHBK Beton		1,16	1,16	0,87	1,12	-	0,37	
234	ZSSB-Mod../Klic../ ZHBK Bet..*)		1,16	1,16	0,87	1,12	-	0,37	
235	ZSSB-Mod../Klic../ ZDBK-Düb Bet..*)		1,03	1,16	0,81	1,16	0,56	1,04	
			Vorbohr Ø = 8,0mm						
			min. Setztiefe						
			40mm		60mm				

*) Der vollständige Bezeichnername ist auf der Anhangseite zu finden

**) 3,5: AAC 3,5 ρ_{class} = 500
4,5: AAC 4,5 ρ_{class} = 600

3*) 2a: LAC 2 ρ_{class} = 0,5
2b: LAC 2 ρ_{class} = 1,0

Zahn Flachdachbefestigungselemente	Anhang 236.12
Charakteristische Zugtragfähigkeiten	

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Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	**Unterkonstruktion**									
		Stahlblech					**Aluminium**		**Leicht- 3*) beton** EN 1520 **LAC…**		
		S280GD - EN 10346					EN 485, t ≥ 0,5mm R_m [N/mm²] ≥				
		t [mm] ≥									
		0,50	**0,60**	**0,70**	**0,75**	**1,50**	**165**	**215**	**…2a**	**…2b**	
103	ZHRD	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
104	ZHRD-R	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
104a	ZCTS mit Spreizdübelvorsatz	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
105	ZHRD auf Modul oval 4,8	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
106	ZHRD-R auf Modul rund 4,8	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
159	ZSSB-ZHRD	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
162	ZSSB-ZHRD-Modul	1,02	-	-	-	-	0,42	0,55	0,56	1,02	
		min. Setztiefe **) = 30,0mm Vorbohr Ø = 10,0mm							min. Setz-tiefe [mm]	Vor-bohr Ø [mm]	
									80,0	10,0	

**) Die Mindesteinbautiefe (min. Setztiefe) entspricht dem Überstand des nicht verknoteten Spreizbereiches unter der Unterseite des Dachuntergrundes.

3*) 2a: LAC 2 ρ_{class} = 0,5
2b: LAC 2 ρ_{class} = 1,0

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Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion											
		Stahlblech				**Holz*)**				**Beton** EN 206-1			
		S320GD - EN 10346				C24	OSB3	P5	Sperr-holz				
		t [mm] ≥				t [mm] ≥							
		0,60	**0,70**	**0,75**	**1,50**	**22**	**18**	**19**	**19**	**C12/15**	**C25/30**	**C12/15**	**C25/30**
										Vorbohr Ø = 5,0mm			
										min. Setztiefe			
										40mm			
114	ZMDS-E/R	-	-	1,68	-	1,85	0,95	1,25	1,85	1,51	1,51		
115	ZMDS-E-Modul	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16		
116	ZMDS-E/R-Modul	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16		
117	ZHVM-E-Multi	-	-	1,61	-	1,61	0,95	1,25	1,61	1,51	1,51		
118	ZTSK-E-Multi	-	-	1,41	-	1,41	0,95	1,25	1,41	1,41	1,41		
119	ZMDS-E / ZLVT 0008	-	-	1,68	-	1,71	0,95	1,25	1,71	1,51	1,51		
120	ZMDS-E / ZLVT 0012	-	-	1,67	-	1,67	0,95	1,25	1,67	1,51	1,51		
										min. Setztiefe			
										30mm		20mm**)	
107	ZMDS-R	-	-	1,68	-	1,85	0,95	1,25	1,85	1,51	1,51	0,33	0,48
108	ZMDS-Modul	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16	0,33	0,48
109	ZMDS-R-Modul	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16	0,33	0,48
110	ZHVM-Multi	-	-	1,61	-	1,61	0,95	1,25	1,61	1,51	1,51	0,33	0,48
111	ZTSK-Multi	-	-	1,41	-	1,41	0,95	1,25	1,41	1,41	1,41	0,33	0,48
112	ZMDS / ZLVT 0008	-	-	1,68	-	1,71	0,95	1,25	1,71	1,51	1,51	0,33	0,48
113	ZMDS / ZLVT 0012	-	-	1,67	-	1,67	0,95	1,25	1,67	1,51	1,51	0,33	0,48
126	ZSSB / Klickteller / ZMDS	-	-	1,68	-	1,85	0,95	1,25	1,85	1,51	1,51	0,33	0,48
126a	ZCTS / ZMDS	-	-	1,41	-	1,41	0,95	1,25	1,41	1,41	1,41	0,33	0,48

*) C24 EN 338 ρ_{min} = 350kg/m³
OSB3 EN 300 ρ_{min} = 550kg/m³
Spanplatte / P5 EN 312 ρ_{min} = 500kg/m³
Sperrholz EN 636 ρ_{min} = 400kg/m³
Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

**) Es ist sicherzustellen, dass der Beton eine hohe Oberflächenqualität hat und ein Beton mit reduziertem Größtkorn kleiner 16mm vorliegt.
Die Anwendung ist hierbei auf Fertigteile mit Hohlräumen begrenzt.

Zahn Flachdachbefestigungselemente	Anhang 236.14
Charakteristische Zugtragfähigkeiten	

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Charakteristische Zugtragfähigkeiten N_{Rk} [kN]

Anhang	**Zahn** Flachdach Befestigungselemente	Unterkonstruktion											
		Stahlblech				**Holz*)**				**Beton** EN 206-1			
		S320GD - EN 10346				C24	OSB3	P5	Sperr-holz				
		t [mm] ≥				t [mm] ≥							
		0,60	**0,70**	**0,75**	**1,50**	**22**	**18**	**19**	**19**	**C12/15**	**C25/30**	**C12/15**	**C25/30**
										Vorbohr Ø = 5,0mm			
										min. Setztiefe			
										40mm			
127	ZSSB / Klickteller / ZMDS-E	-	-	1,68	-	1,85	0,95	1,25	1,85	1,51	1,51		
127a	ZCTS-E / ZMDS-E	-	-	1,41	-	1,41	0,95	1,25	1,41	1,41	1,41		
139	ZSSB-Multi-E	-	-	1,41	-	1,41	0,95	1,25	1,41	1,41	1,41		
151	ZSSB-Multi-E Modul	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16		
166	Sarnabar / ZMDS-E	-	-	1,68	-	2,20	0,95	1,25	1,93	1,51	1,51		
179	ZCTS-1-Multi-E	-	-	1,43	-	1,43	0,95	1,25	1,43	1,43	1,43		
186	ZSSB-HVM-1-Multi-E	-	-	1,68	-	1,89	0,95	1,25	1,89	1,51	1,51		
191	ZSSB / Klickteller / HVM-1-Multi-E	-	-	1,68	-	1,89	0,95	1,25	1,89	1,51	1,51		
215	ZSSB-Modul / Klickteller / ZMDS-E	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16		
										min. Setztiefe			
										30mm		20mm**)	
138	ZSSB Multi	-	-	1,41	-	1,41	0,95	1,25	1,41	1,41	1,41	0,33	0,48
150	ZSSB-Multi-Modul	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16	0,33	0,48
165	Sarnabar / ZMDS	-	-	1,68	-	2,20	0,95	1,25	1,93	1,51	1,51	0,33	0,48
178	ZCTS-1-Multi	-	-	1,43	-	1,43	0,95	1,25	1,43	1,43	1,43	0,33	0,48
185	ZSSB-HVM-1-Multi	-	-	1,68	-	1,89	0,95	1,25	1,89	1,51	1,51	0,33	0,48
190	ZSSB / Klickteller / HVM-1-Multi	-	-	1,68	-	1,89	0,95	1,25	1,89	1,51	1,51	0,33	0,48
214	ZSSB-Modul / Klickteller / ZMDS	-	-	1,16	-	1,16	0,95	1,16	1,16	1,16	1,16	0,33	0,48

*) C24 EN 338 ρ_{min} = 350kg/m³
OSB3 EN 300 ρ_{min} = 550kg/m³
Spanplatte / P5 EN 312 ρ_{min} = 500kg/m³
Sperrholz EN 636 ρ_{min} = 400kg/m³
Für einen Untergrund aus Holz ist die Dicke "t" gleichzeitig als Mindesteinschraubtiefe zu verstehen.

**) Es ist sicherzustellen, dass der Beton eine hohe Oberflächenqualität hat und ein Beton mit reduziertem Größtkorn kleiner 16mm vorliegt.
Die Anwendung ist hierbei auf Fertigteile mit Hohlräumen begrenzt.

Zahn Flachdachbefestigungselemente	Anhang 236.15
Charakteristische Zugtragfähigkeiten	