

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

**ETA-08/0033
of 13 March 2018**

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Zahn Flat Roof Fasteners

Product family
to which the construction product belongs

Fasteners for flexible roof waterproofing systems

Manufacturer

Harald Zahn GmbH
Ludwig-Wagner-Str. 10
69168 Wiesloch
DEUTSCHLAND

Manufacturing plant

Factories of Harald Zahn GmbH

This European Technical Assessment
contains

186 pages including 181 annexes which form an integral
part of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

ETAG 006,
used as EAD according to Article 66 Paragraph 3 of
Regulation (EU) No 305/2011.

This version replaces

ETA-08/0033 issued on 24 May 2013

European Technical Assessment

ETA-08/0033

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Specific Part

1 Technical description of the product

The construction products are mechanical fasteners.

The fasteners comprise a screw made of coated carbon or stainless steel and a steel bar or a washer made of metal or plastic materials (polyamide). The washers without integrated sleeve are made of coated steel or plastic materials.

The washers made of plastic materials partially have a formed or adaptable sleeve. In conjunction with the steel bar a sleeve, which has a collar, will each be inserted into a hole prepared in the bar's ground and sits with its collar on the bar's ground.

The sleeve is designed either as a hollow shaft receiving the screw, from whose shaft tip the screw emerges or as an anchor sleeve expandable by the screw. Such a dowel sleeve can also be adapted to the sleeve formed as a hollow shaft. Likewise, a dowel sleeve may be formed as a cavity anchor.

The washer with sleeve can be composited from individual components beyond.

The plastic washers are probably provided with additional sealing washers.

The fasteners shall correspond to the information given in Annexes 1 to 169 of this ETA.

The material properties, dimensions and tolerances not indicated in Annexes 1 to 169 shall correspond to the information laid down in the technical information¹ to this European technical assessment.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The fasteners are intended to be used for the fastening of flexible roof waterproofing membranes according to ETAG 006. The possible substructures are steel decks, concrete, aerated and light weight concrete, timber, thin plates of steel or aluminium and sandwich panels.

The performances given in Section 3 are only valid if the fasteners are used in compliance with the specifications and conditions given in the Annexes to this ETA and if the installation is carried out according to the manufacturer's assembly instructions.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fasteners of at least 10 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

In order to use the fasteners for systems of mechanically fastened flexible roof waterproofing membranes according to ETAG 006 a separate ETA is necessary for the entire roof waterproofing system. The system ETA covers the wind uplift resistance of the entire system as well as the product characteristics of the components of the system.

¹

The technical documentation is deposited with Deutsches Institut für Bautechnik and as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure is handed over to the approved bodies.

3 Performance of the product and references to the methods used for its assessment

3.1 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Characteristic tensile loading	See Annexes 170 to 181
Resistance to unwinding	pass
Resistance to corrosion of metallic fasteners	pass; ≤ 15 % surface corrosion
Impact resistance and brittleness of plastic fasteners (before and after heat ageing)	pass; drop height > 1,0 m
Requirements for results of Charpy tests for plastic materials (before and after heat ageing)	pass; not any significant decline compared to the results before heat ageing

The thickness and strengths of the materials listed in the tables of characteristic tensile loads (Annexes 170 to 181) are minimum requirements. The values given are also applicable for materials with higher thickness and strengths. The values of axial loading shown in Annexes 170 to 181 were determined by axial loading tests according to ETAG 006.

The fasteners are deemed to satisfy the requirements of ETAG 006 concerning unwinding. This was evaluated on the basis of the existing field experience of the manufacturer.

The durability requirements of ETAG 006 (resistance to corrosion of metallic fasteners, impact resistance and brittleness of plastic fasteners before and after heat ageing, requirements for results of Charpy tests for plastic materials before and after heat ageing) are satisfied for the coated carbon steel, stainless steel and polyamide components of the fasteners.

All coated carbon steel components resisted to 15 cycles of the test procedure described in ETAG 006 (Kesternich test) and did not show more than 15 % surface corrosion.

The test results of the tests to check the impact resistance and brittleness of the polyamide components showed a drop height of more than 1.0 m before and after heat ageing of these components. Furthermore the results of the corresponding Charpy tests after heat ageing did not show any significant decline compared to the results before heat ageing.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with ETAG 006 the applicable European legal act is: 1998/143/EC.

The system to be applied is: 2+

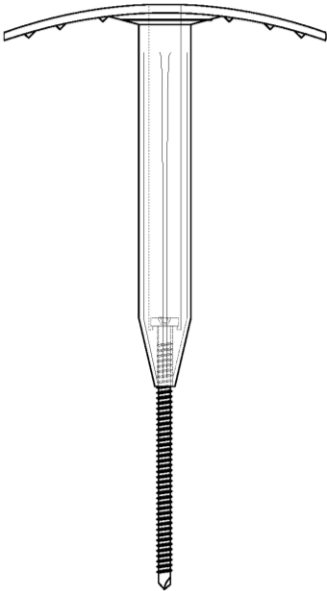
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

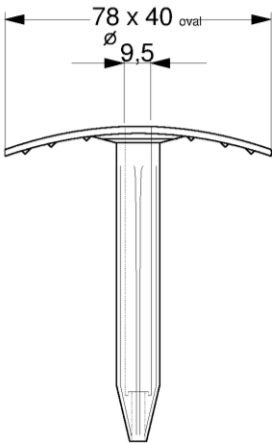
Issued in Berlin on 13 March 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

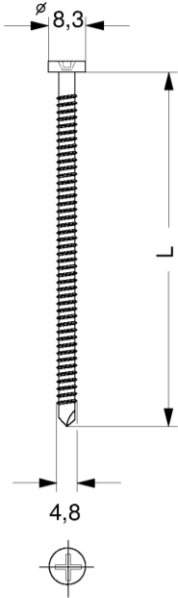
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Reimuth



Zahn ZKSH oval



Zahn ZDBK 4,8 x L

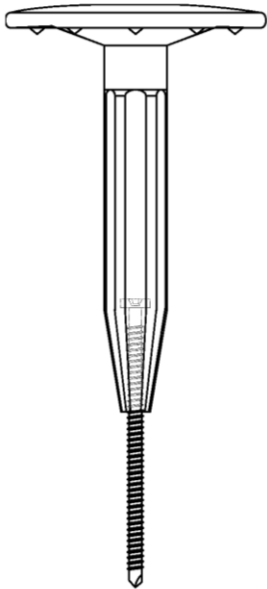


Zahn Flat Roof Fasteners

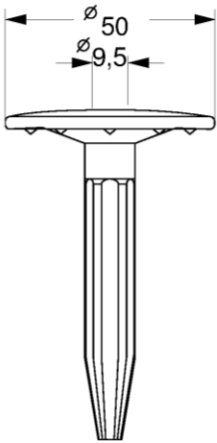
Combination 1
ZKSK consisting of ZDBK / ZKSH oval

Annex 1

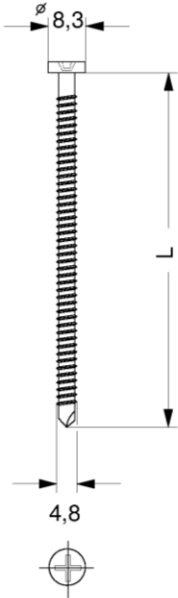
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Zahn ZKSH round



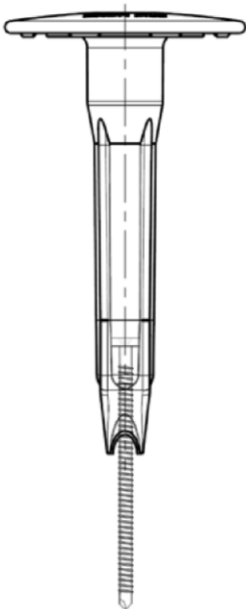
Zahn ZDBK 4,8 x L



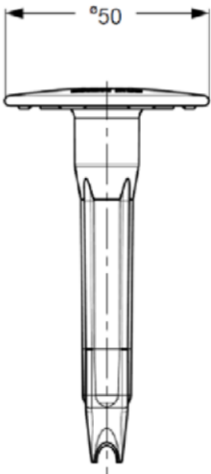
Zahn Flat Roof Fasteners

Combination 2
ZKSK-R consisting of ZDBK / ZKSH round

Annex 2



Zahn ZKSH-Rplus



Zahn ZDBK 4,8 x L

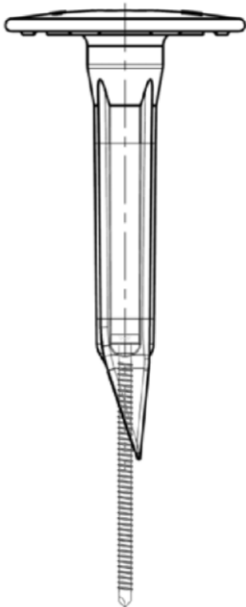


Zahn Flat Roof Fasteners

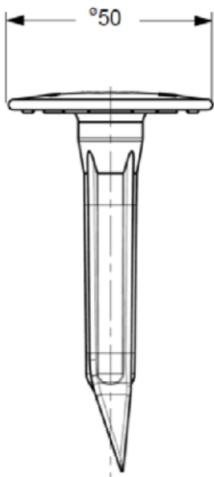
Combination 3
ZKSK-Rplus consisting of ZDBK / ZKSH-Rplus

Annex 3

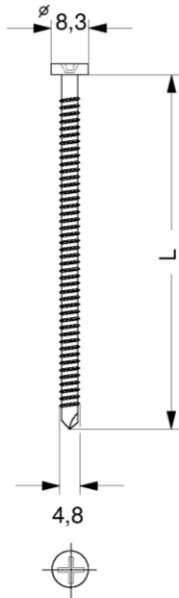
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Zahn ZKSH-Rplus pile tip



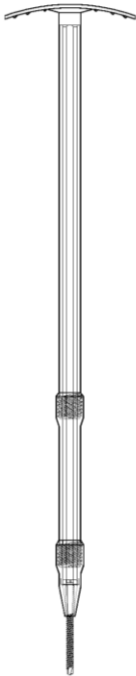
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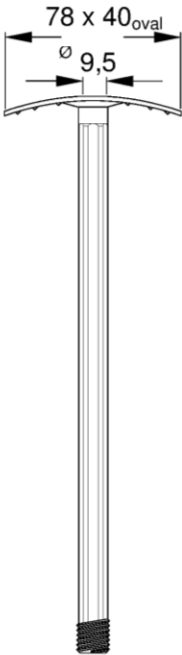
Zahn Flat Roof Fasteners

Combination 4
ZKSK-Rplus with pile tip consisting of ZDBK / ZKSH-Rplus with pile tip

Annex 4



Zahn ZKSH oval module 4,8



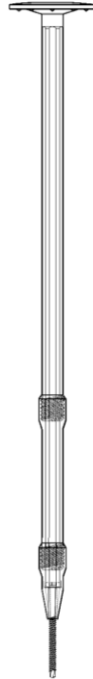
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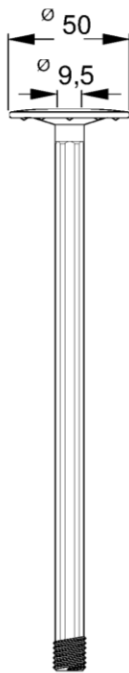
Zahn Flat Roof Fasteners

Combination 5
ZKSK-Modul 4,8 consisting of ZDBK / ZKSH oval module with module middle piece and spike 4,8

Annex 5



Zahn ZKSH round module 4,8



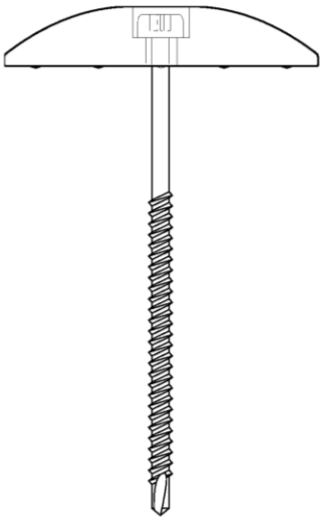
Zahn ZDBK 4,8 x L



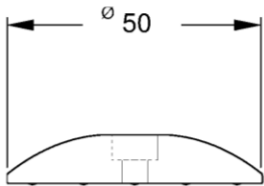
Zahn Flat Roof Fasteners

Combination 6
ZKSK-R-Modul 4,8 consisting of ZDBK / ZKSH round module with module middle piece and spike 4,8

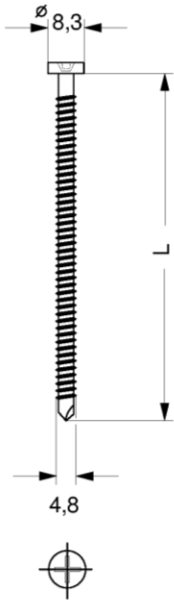
Annex 6



Zahn ZTSK 4,8



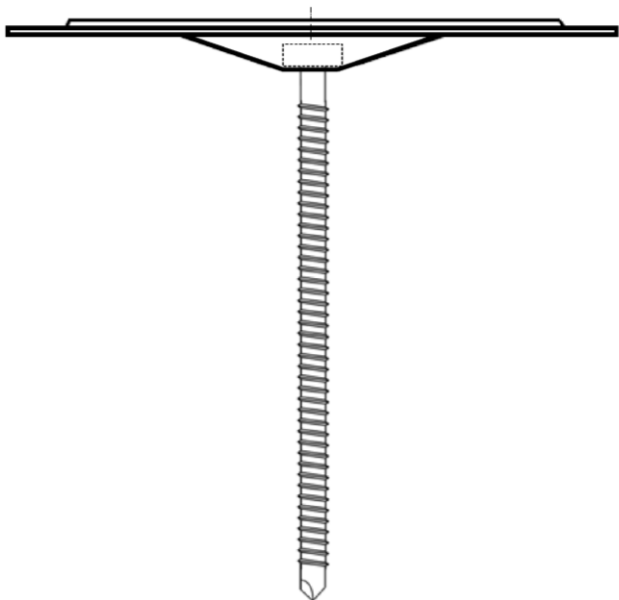
Zahn ZDBK 4,8 x L



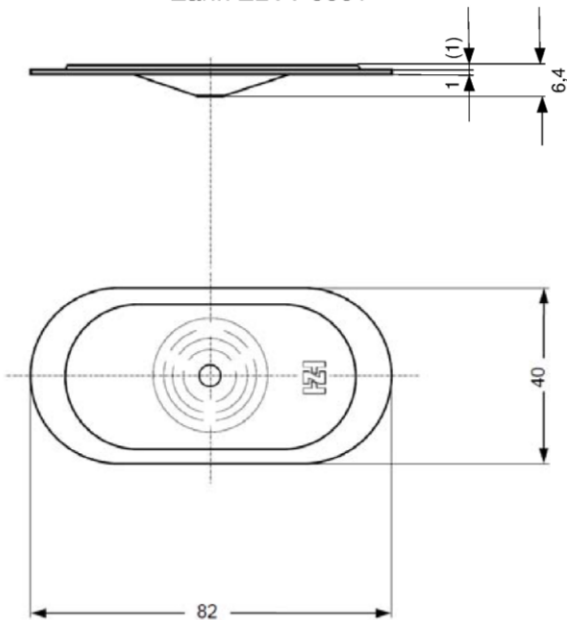
Zahn Flat Roof Fasteners

Combination 7
ZTSK 4,8 consisting of ZDBK / ZTSK 4,8

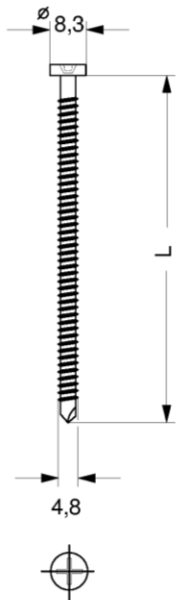
Annex 7



Zahn ZLVT 0001



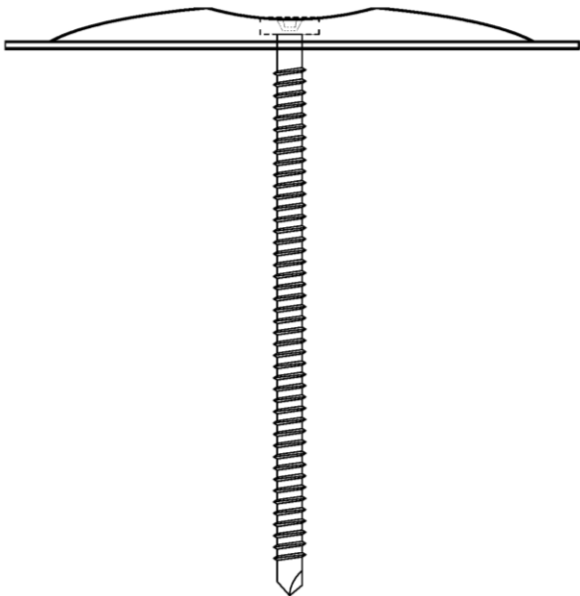
Zahn ZDBK 4,8 x L



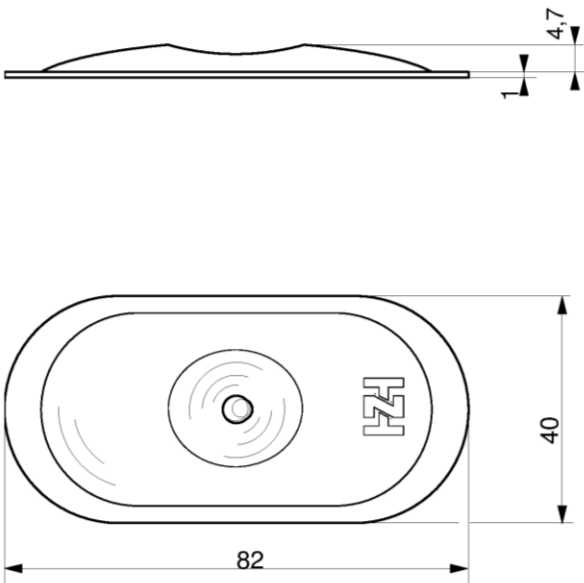
Zahn Flat Roof Fasteners

Combination 8
ZDBK / ZLVT 0001

Annex 8



Zahn ZLVT 0005



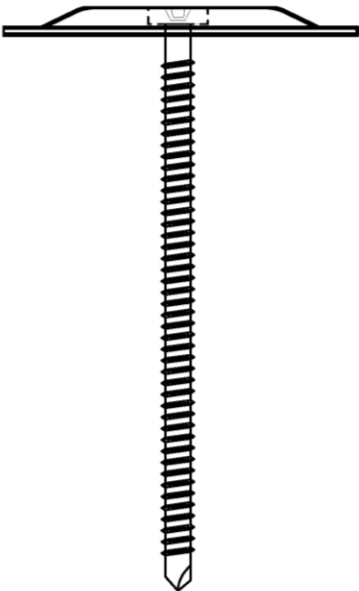
Zahn ZDBK 4,8 x L



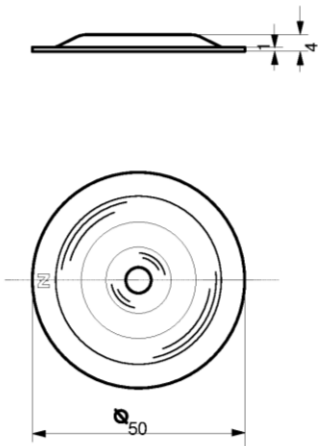
Zahn Flat Roof Fasteners

Combination 9
ZDBK / ZLVT 0005

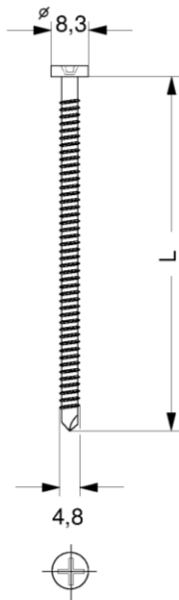
Annex 9



Zahn ZLVT 0015



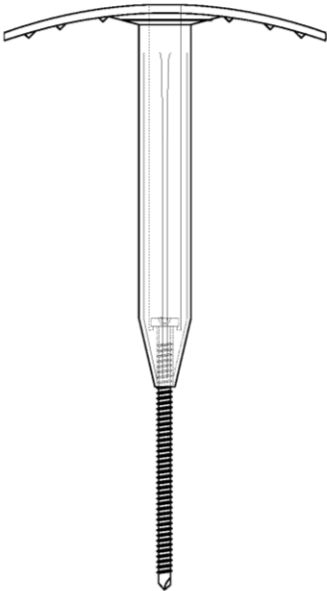
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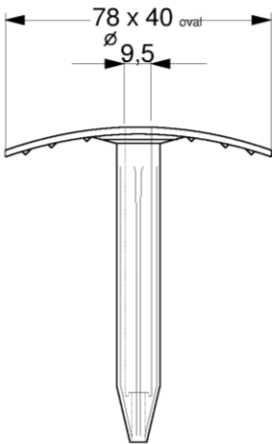
Zahn Flat Roof Fasteners

Combination 10
ZDBK / ZLVT 0015

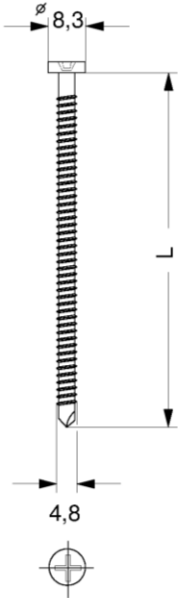
Annex 10



Zahn ZKSH oval



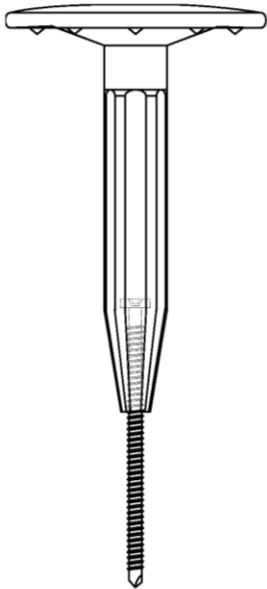
Zahn ZDBK-E 4,8 x L



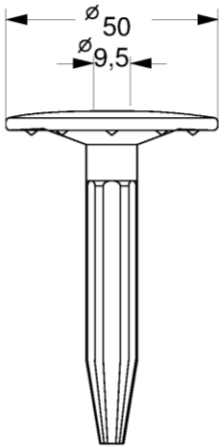
Zahn Flat Roof Fasteners

Combination 11
ZKSK-E consisting of ZDBK-E / ZKSH oval

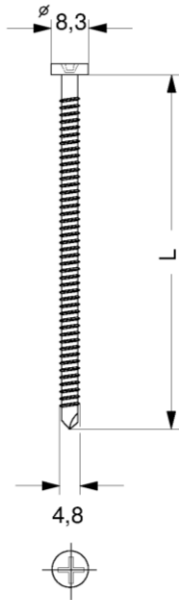
Annex 11



Zahn ZKSH round



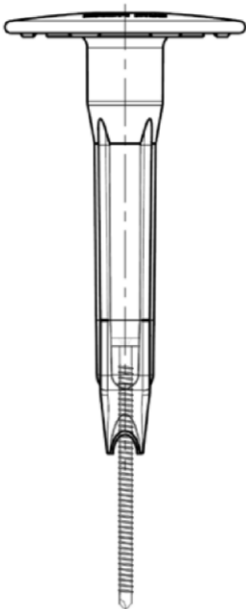
Zahn ZDBK-E 4,8 x L



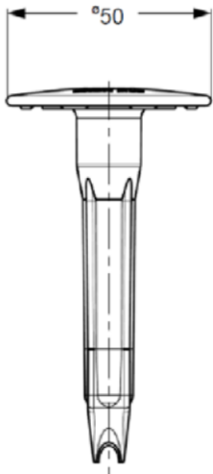
Zahn Flat Roof Fasteners

Combination 12
ZKSK-E/R consisting of ZDBK-E / ZKSH round

Annex 12



Zahn ZKSH-Rplus



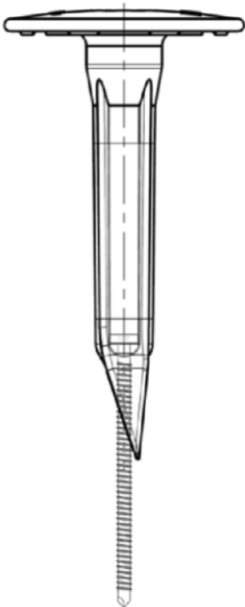
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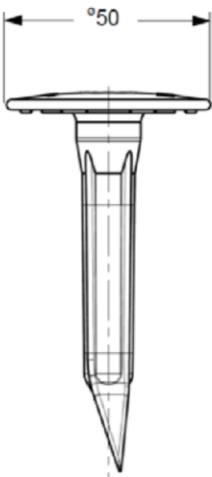
Zahn Flat Roof Fasteners

Combination 13
ZKSK-E/Rplus consisting of ZDBK -E / ZKSH-Rplus

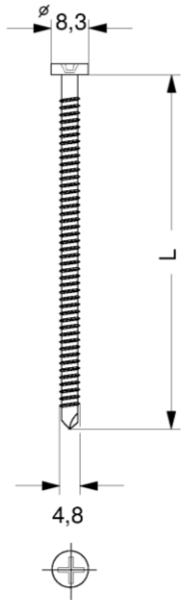
Annex 13



Zahn ZKSH-Rplus with pile tip



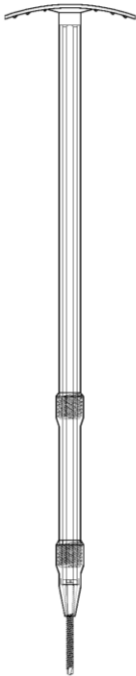
Zahn ZDBK-E 4,8 x L



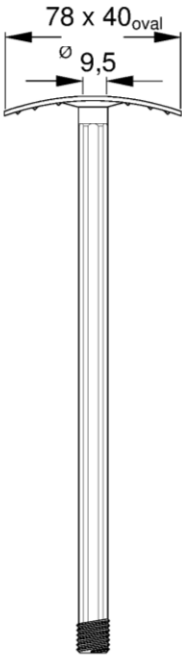
Zahn Flat Roof Fasteners

Combination 14
ZKSK-E/Rplus with pile tip consisting of ZDBK -E / ZKSH-Rplus with pile tip

Annex 14



Zahn ZKSH oval module 4,8



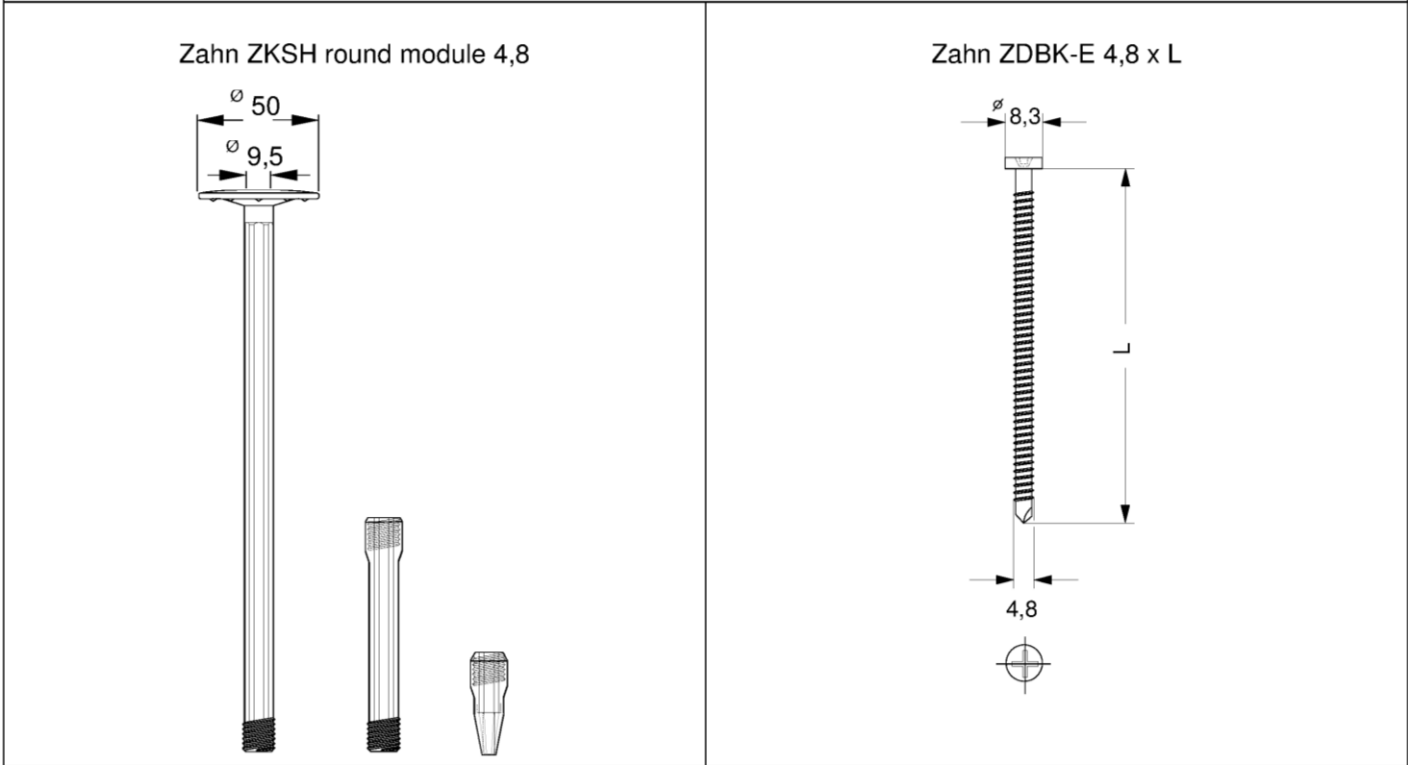
Zahn ZDBK-E 4,8 x L



Zahn Flat Roof Fasteners

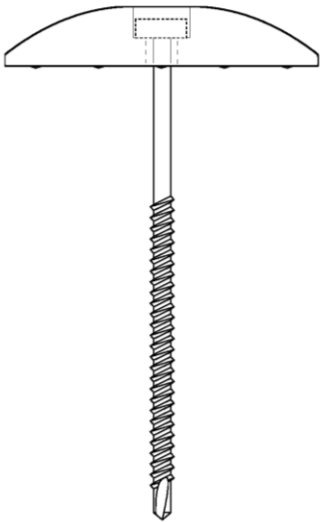
Combination 15
ZKSK-E-Modul 4,8 consisting of ZDBK-E / ZKSH oval module with modular middle piece and spike 4,8

Annex 15

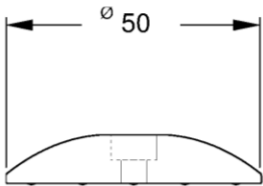


Zahn Flat Roof Fasteners	Annex 16
Combination 16 ZKSK-E/R-Modul 4,8 consisting of ZDBK-E/ZKSH round module with module middle piece and spike 4,8	

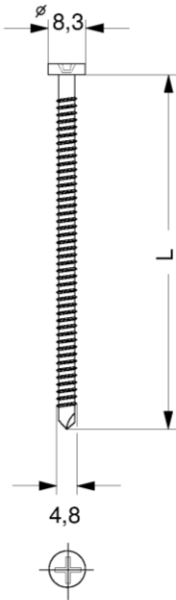
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Zahn ZTSK 4,8



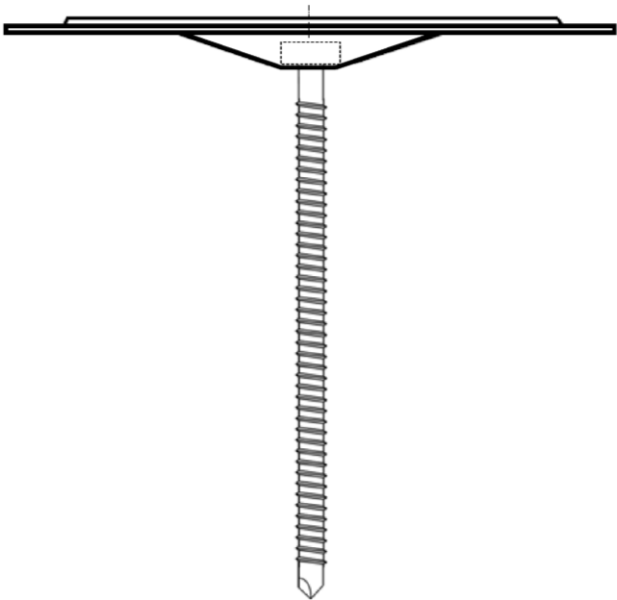
Zahn ZDBK-E 4,8 x L



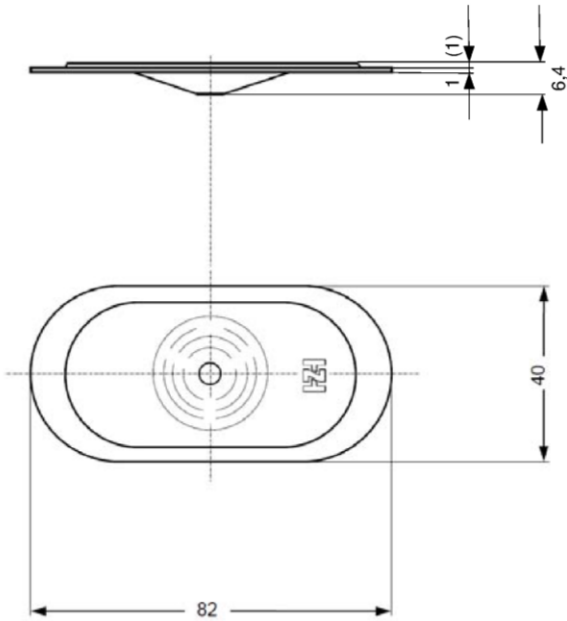
Zahn Flat Roof Fasteners

Combination 17
ZTSK-E 4,8 consisting of ZDBK-E / ZTSK 4,8

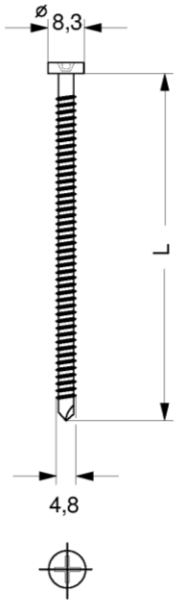
Annex 17



Zahn ZLVT 0001



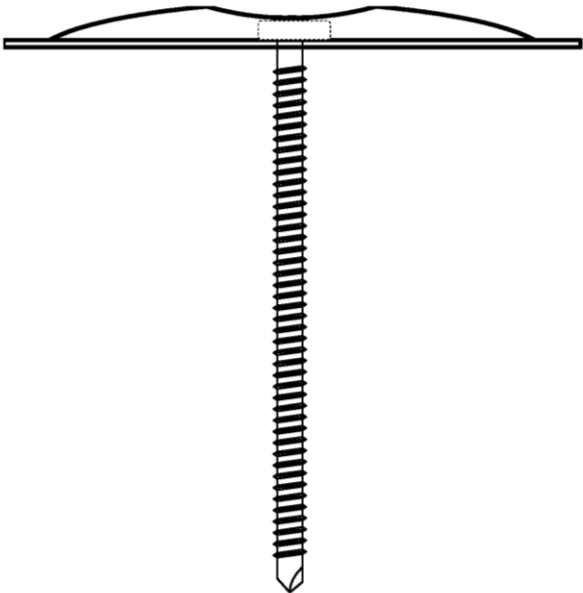
Zahn ZDBK-E 4,8 x L



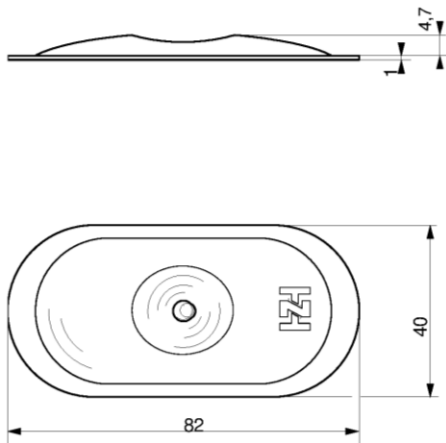
Zahn Flat Roof Fasteners

Combination 18
ZDBK-E / ZLVT 0001

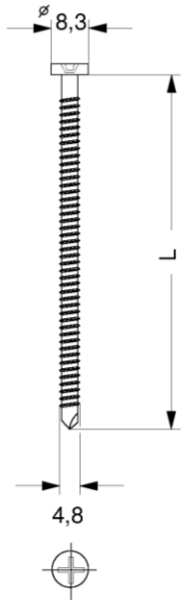
Annex 18



Zahn ZLVT 0005



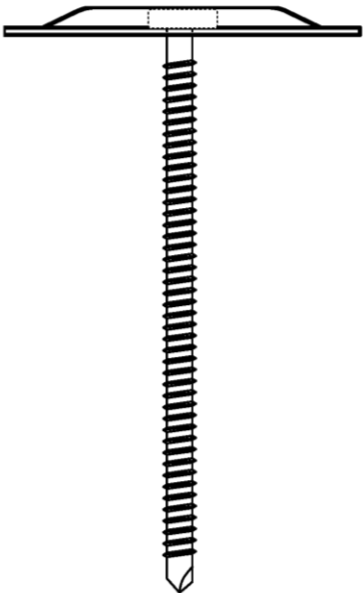
Zahn ZDBK-E 4,8 x L



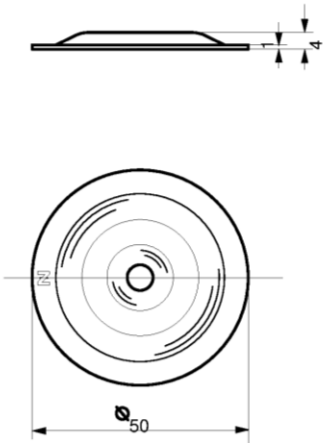
Zahn Flat Roof Fasteners

Combination 19
ZDBK-E / ZLVT 0005

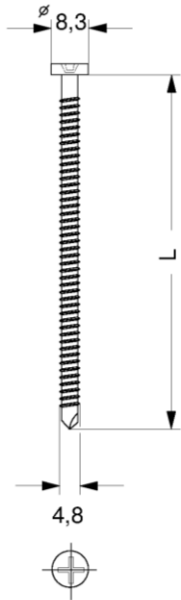
Annex 19



Zahn ZLVT 0015



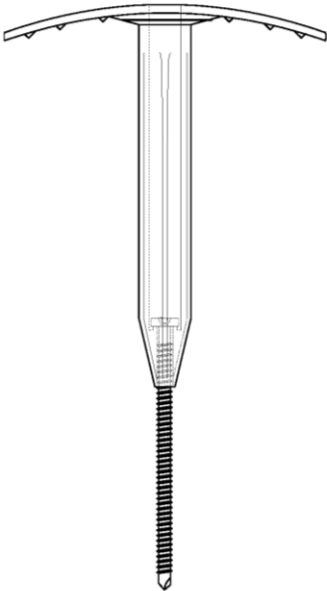
Zahn ZDBK-E 4,8 x L



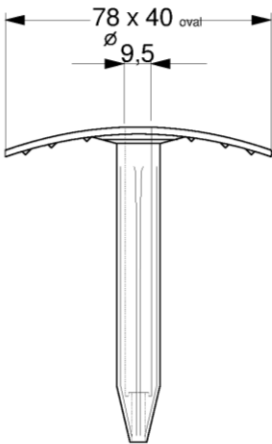
Zahn Flat Roof Fasteners

Combination 20
ZDBK-E / ZLVT 0015

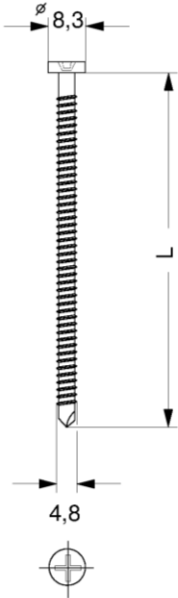
Annex 20



Zahn ZKSH oval



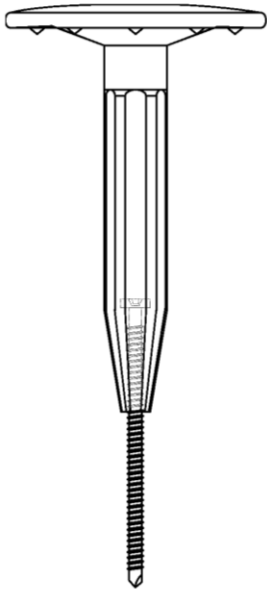
Zahn ZDBK-VB 4,8 x L



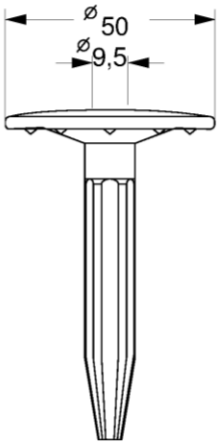
Zahn Flat Roof Fasteners

Combination 21
ZKSK-VB consisting of ZDBK-VB / ZKSH oval

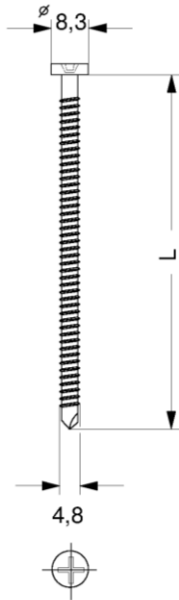
Annex 21



Zahn ZKSH round



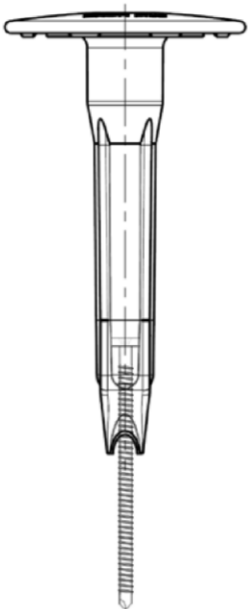
Zahn ZDBK-VB 4,8 x L



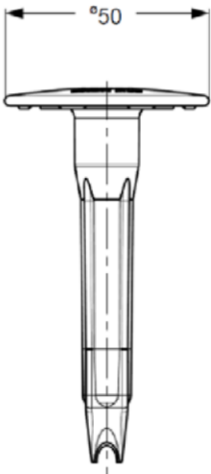
Zahn Flat Roof Fasteners

Combination 22
ZKSK-VB/R consisting of ZDBK-VB / ZKSH round

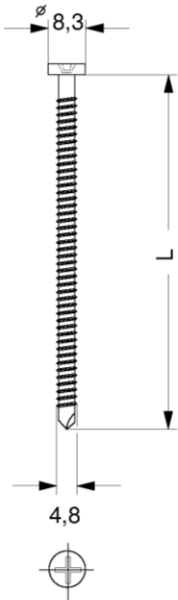
Annex 22



Zahn ZKSH-Rplus



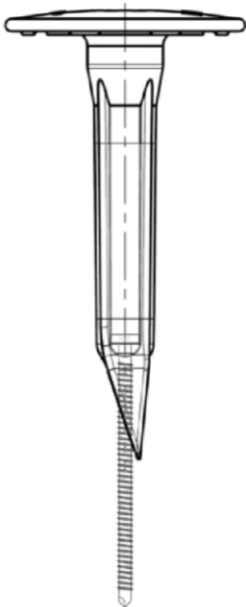
Zahn ZDBK-VB 4,8 x L



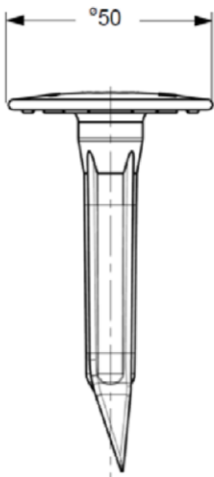
Zahn Flat Roof Fasteners

Combination 23
ZKSK-VB/Rplus consisting of ZDBK -VB / ZKSH-Rplus

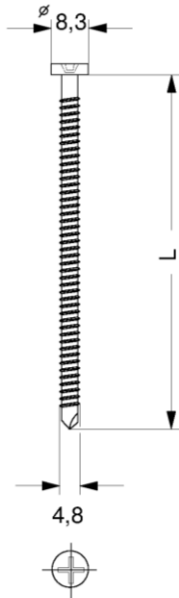
Annex 23



Zahn ZKSH-Rplus with pile tip



Zahn ZDBK-VB 4,8 x L

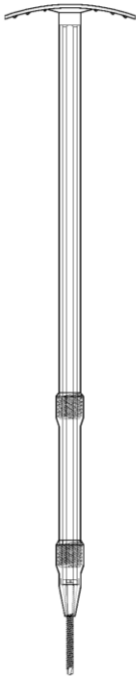


Zahn Flat Roof Fasteners

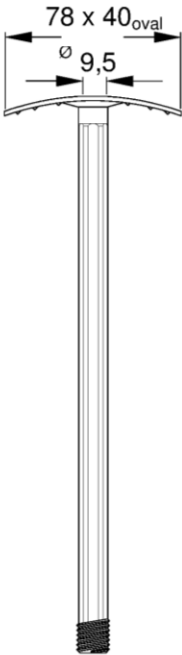
Combination 24
ZKSK-VB/Rplus with pile tip consisting of ZDBK -VB / ZKSH-Rplus with pile tip

Annex 24

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Zahn ZKSH oval module 4,8



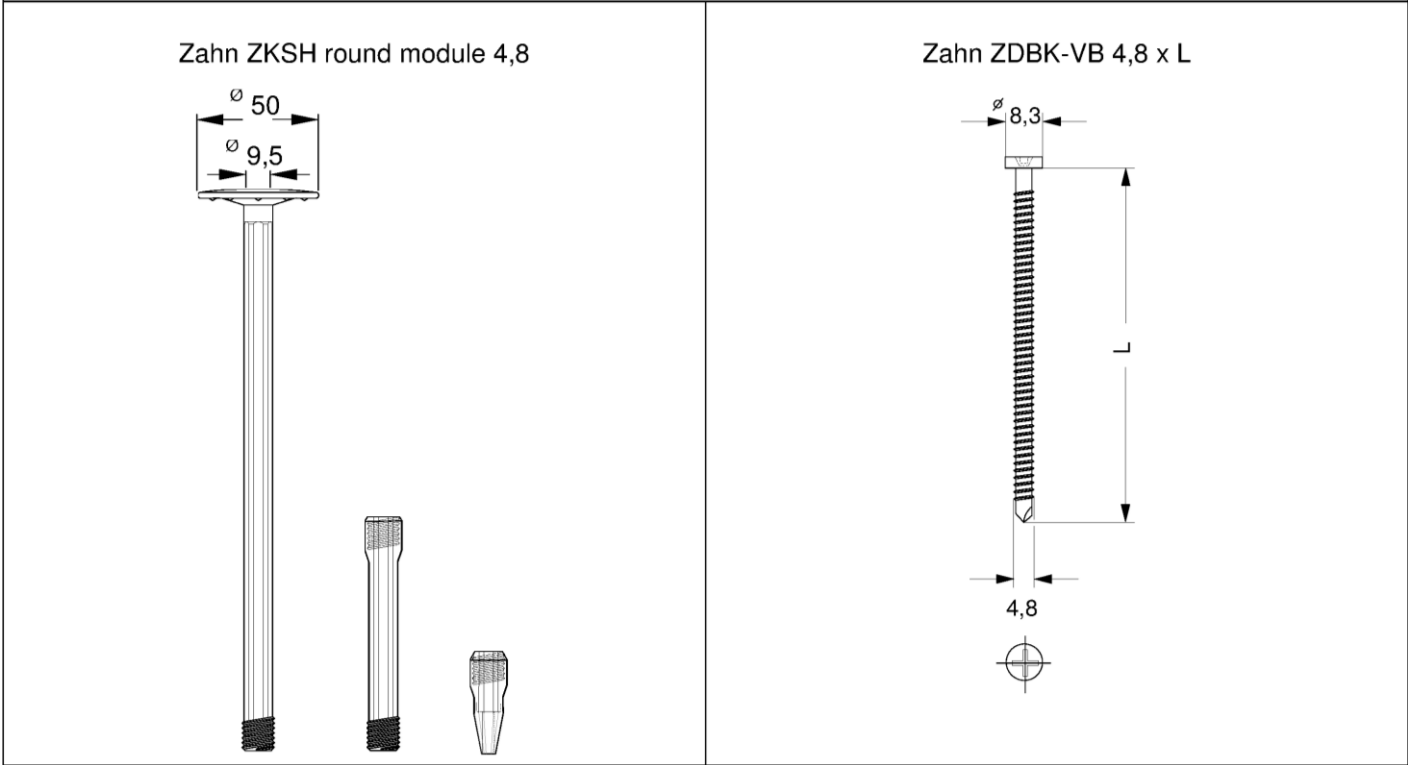
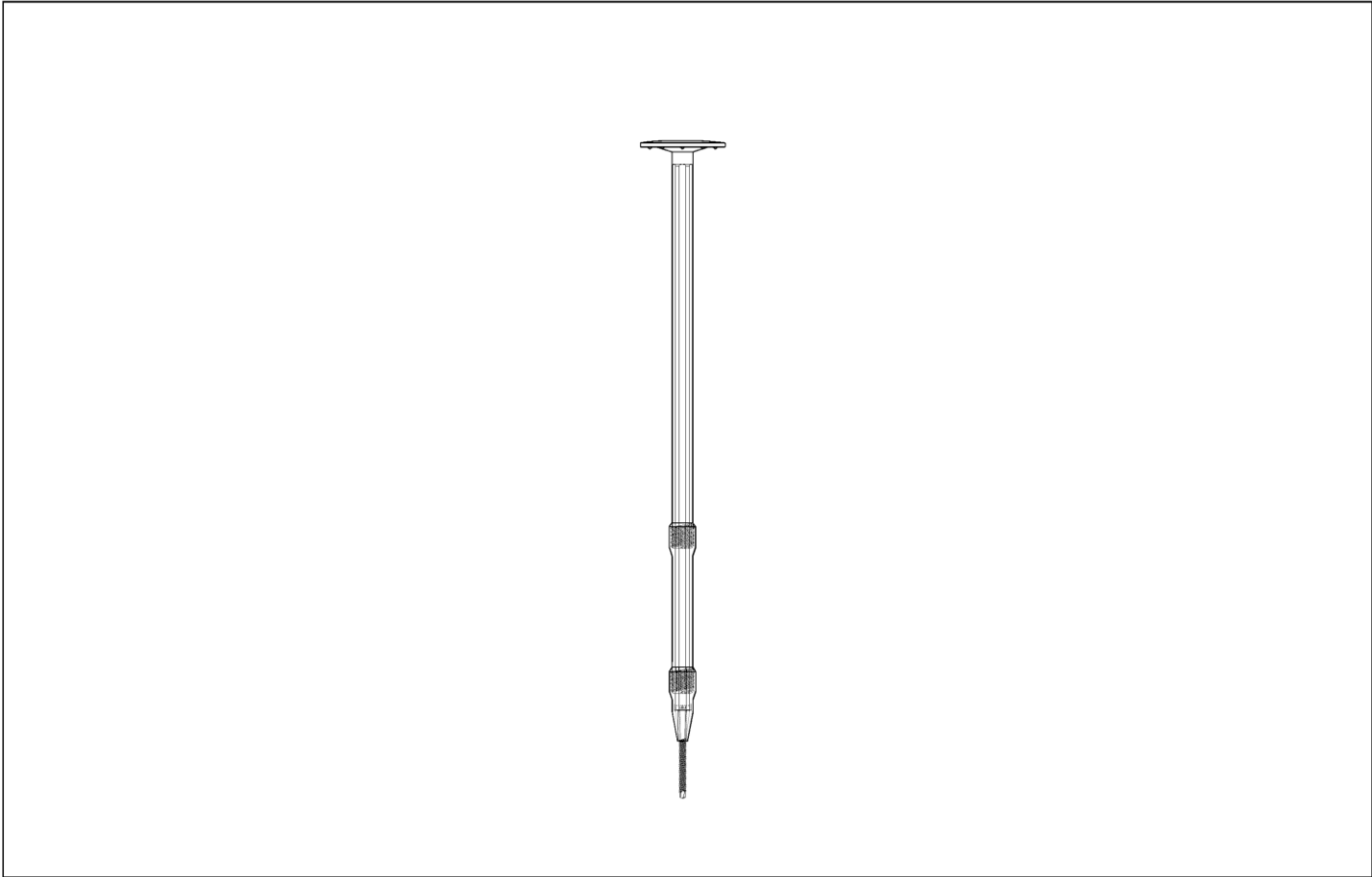
Zahn ZDBK-VB 4,8 x L



Zahn Flat Roof Fasteners

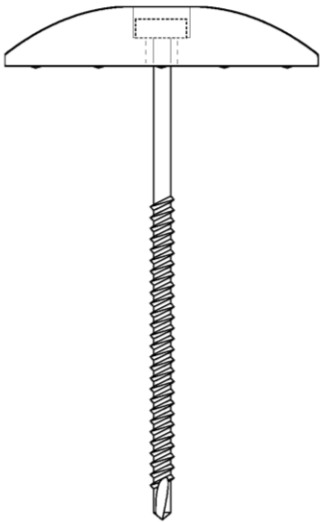
Combination 25
ZKSK-VB-Modul 4,8 consisting of ZDBK-VB/ZKSH oval module with module middle piece and spike 4,8

Annex 25

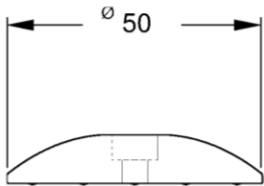


Zahn Flat Roof Fasteners	Annex 26
Combination 26 ZKSK-VB/R-Modul 4,8 consisting of ZDBK-VB/ZKSH round module with module middle piece and spike 4,8	

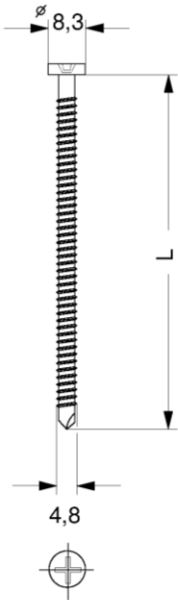
electronic copy of the eta by dibt: eta-08/0033



Zahn ZTSK 4,8



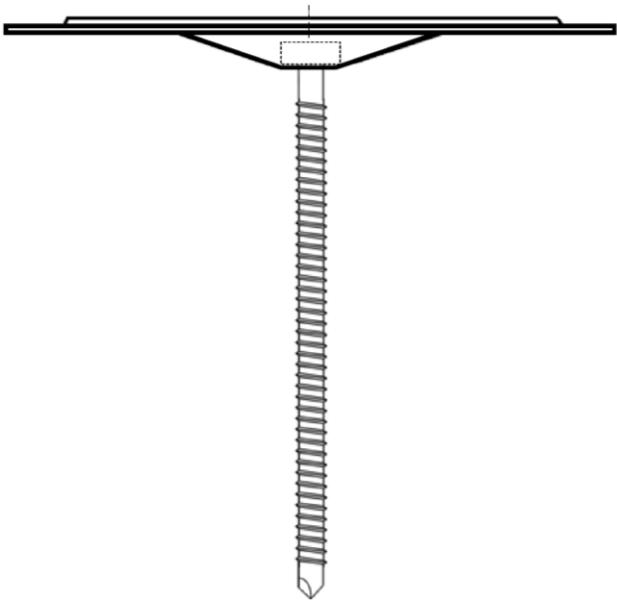
Zahn ZDBK-VB 4,8 x L



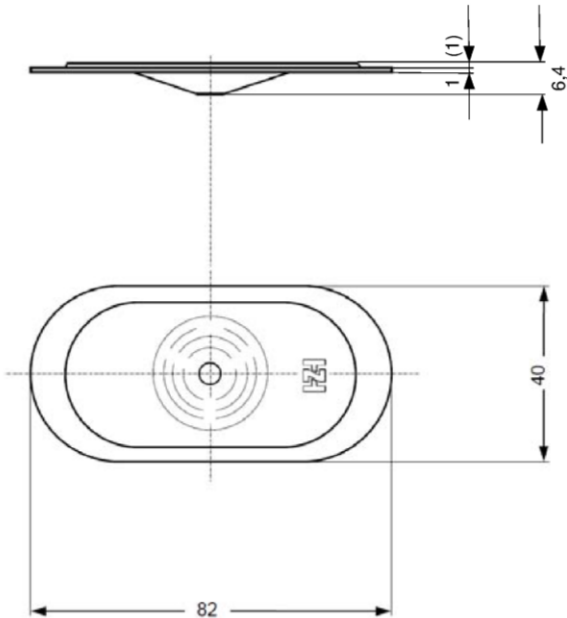
Zahn Flat Roof Fasteners

Combination 27
ZTSK-VB 4,8 consisting of ZDBK-VB / ZTSK 4,8

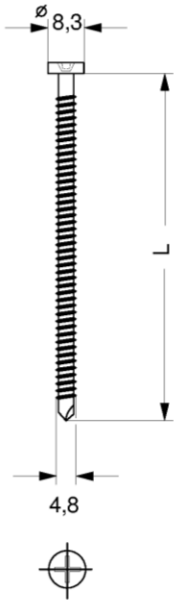
Annex 27



Zahn ZLVT 0001



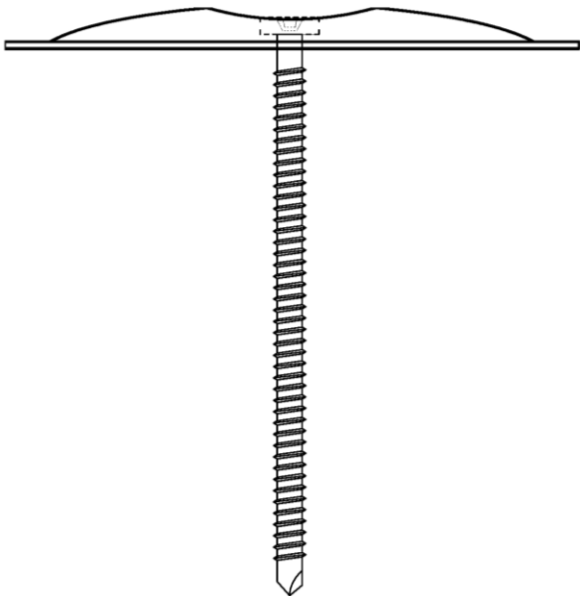
Zahn ZDBK-VB 4,8 x L



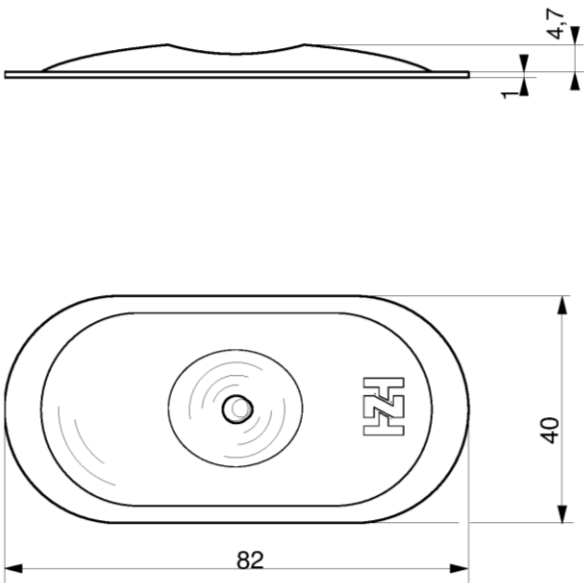
Zahn Flat Roof Fasteners

Combination 28
ZDBK-VB / ZLVT 0001

Annex 28



Zahn ZLVT 0005



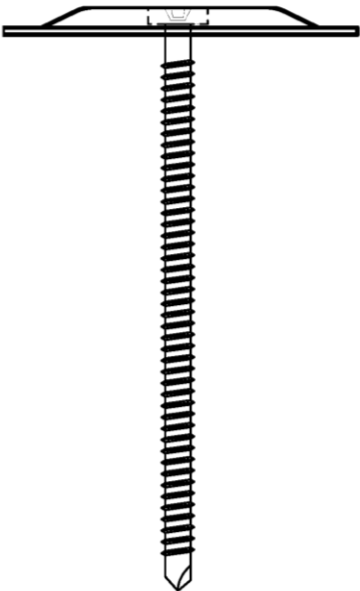
Zahn ZDBK-VB 4,8 x L



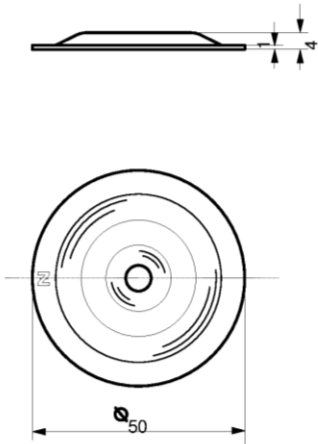
Zahn Flat Roof Fasteners

Combination 29
ZDBK-VB / ZLVT 0005

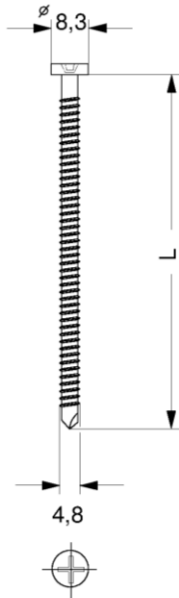
Annex 29



Zahn ZLVT 0015



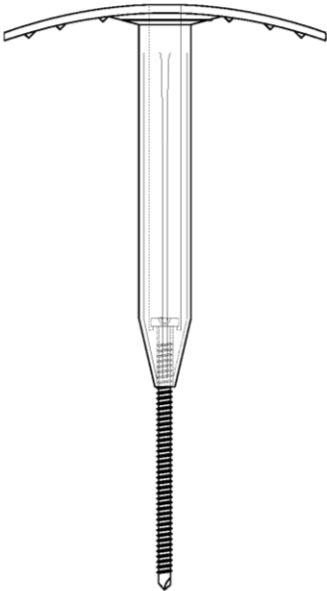
Zahn ZDBK-VB 4,8 x L



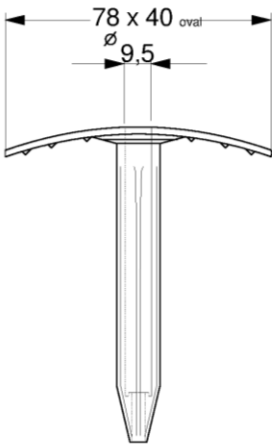
Zahn Flat Roof Fasteners

Combination 30
ZDBK-VB / ZLVT 0015

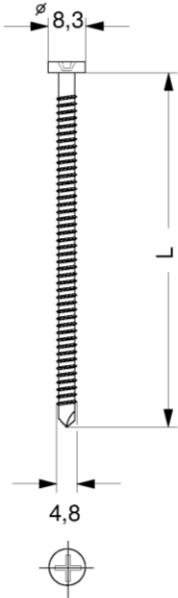
Annex 30



Zahn ZKSH oval



Zahn ZDBK-VB-E 4,8 x L

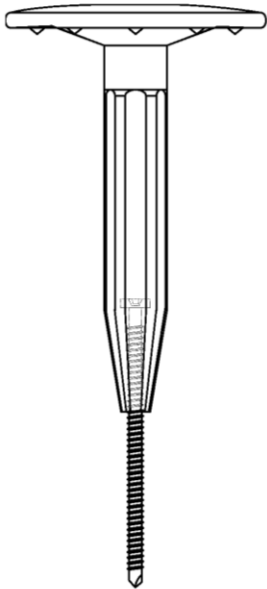


Zahn Flat Roof Fasteners

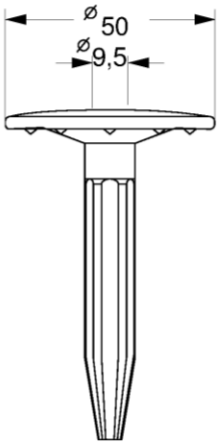
Combination 31
ZKSK-VB-E consisting of ZDBK-VB-E / ZKSH oval

Annex 31

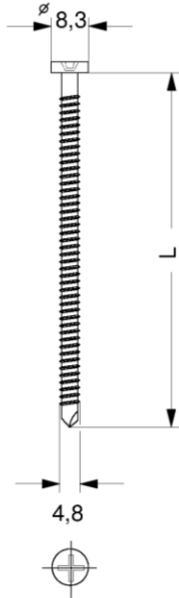
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Zahn ZKSH round



Zahn ZDBK-VB-E 4,8 x L

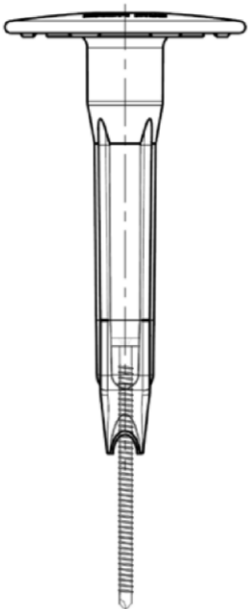


Zahn Flat Roof Fasteners

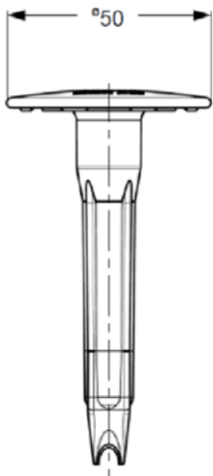
Combination 32
ZKSK-VB-E/R consisting of ZDBK-VB-E / ZKSH round

Annex 32

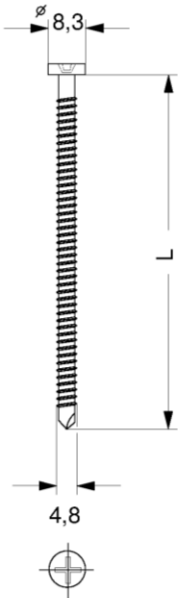
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH Rplus



Zahn ZDBK-VB-E 4,8 x L

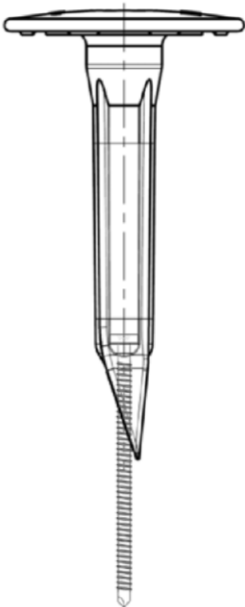


Zahn Flat Roof Fasteners

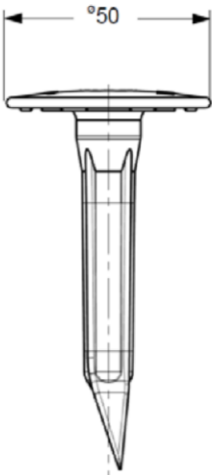
Combination 33
ZKSK-VB-E/Rplus consisting of ZDBK -VB-E / ZKSH-Rplus

Annex 33

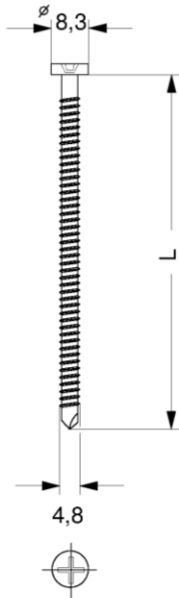
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH-Rplus with pile tip



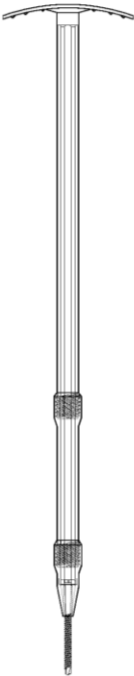
Zahn ZDBK-VB-E 4,8 x L



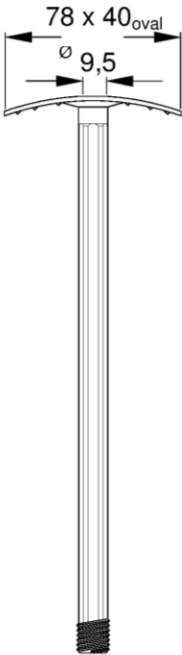
Zahn Flat Roof Fasteners

Combination 34
ZKSK-VB-E/Rplus with pile tip consisting of ZDBK -VB-E / ZKSH-Rplus with pile tip

Annex 34



Zahn ZKSH oval module 4,8



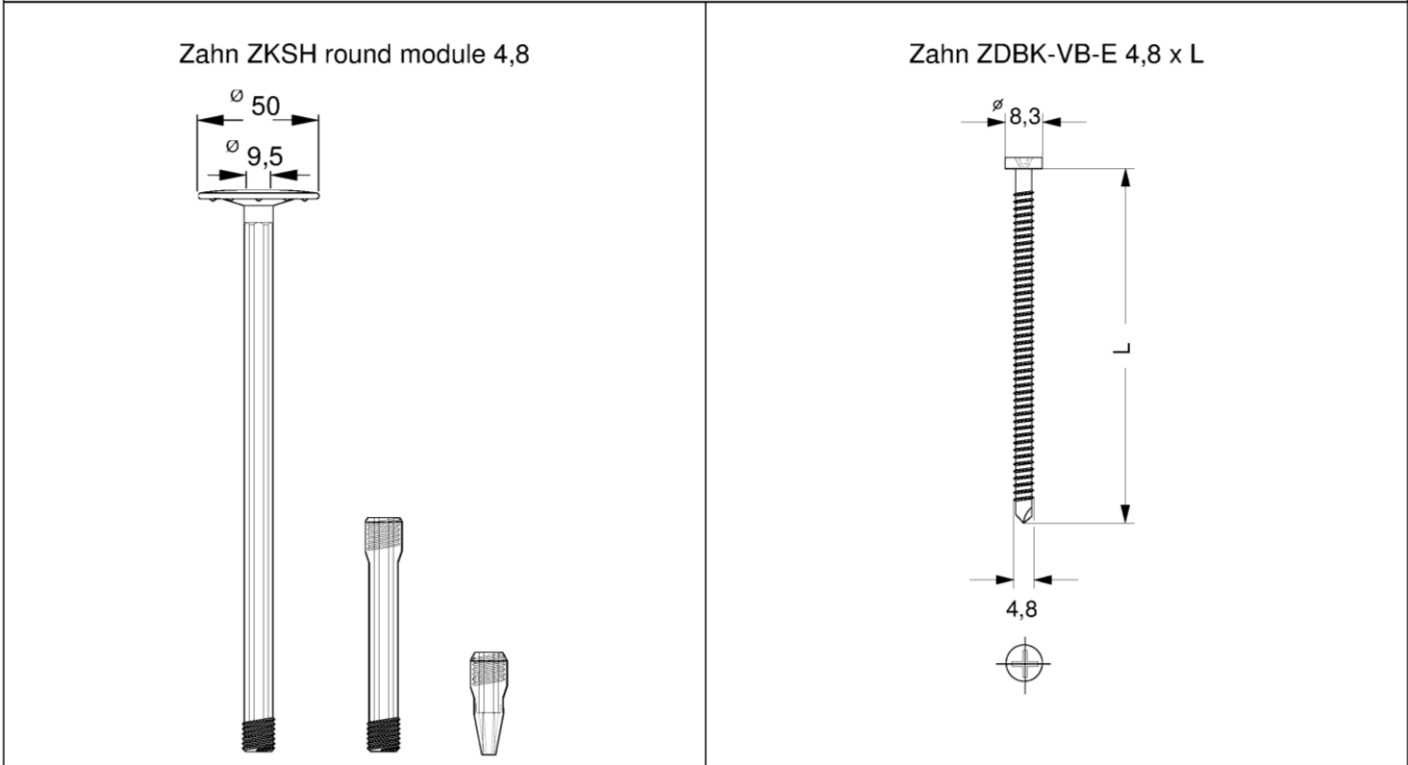
Zahn ZDBK-VB-E 4,8 x L



Zahn Flat Roof Fasteners

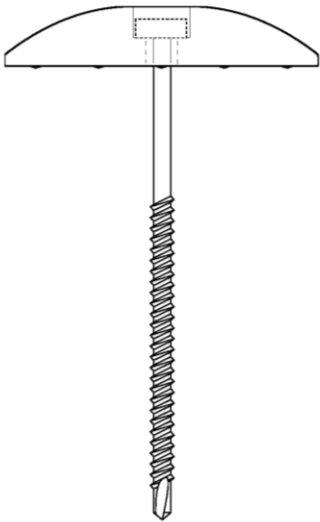
Combination 35
ZKSK-VB-E-Modul 4,8 consisting of ZDBK-VB-E/ZKSH oval module with module middle piece and spike 4,8

Annex 35

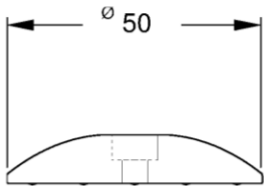


Zahn Flat Roof Fasteners	Annex 36
Combination 36 ZKSK-VB-E/R-Modul 4,8 consisting of ZDBK-VB-E/ZKSH round module with module middle piece and spike 4,8	

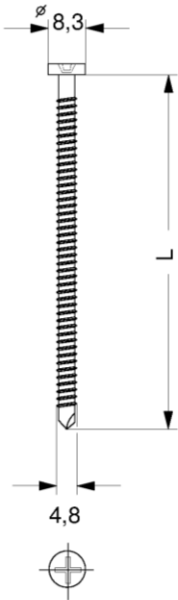
electronic copy of the eta by dibt: eta-08/0033



Zahn ZTSK 4,8



Zahn ZDBK-VB-E 4,8 x L

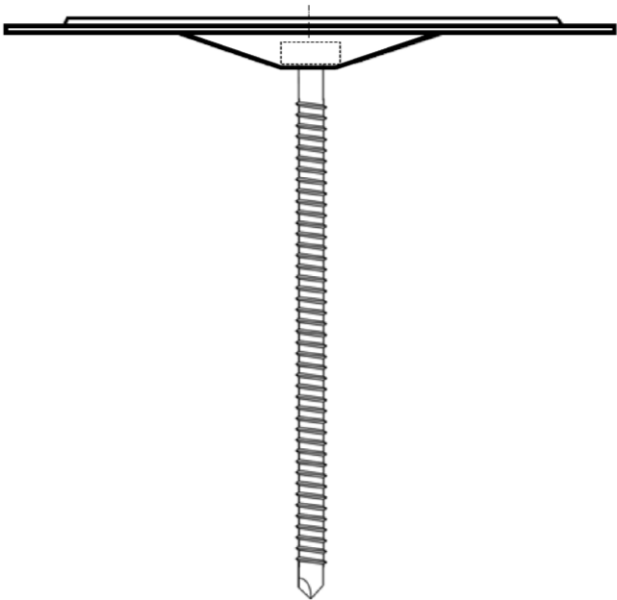


Zahn Flat Roof Fasteners

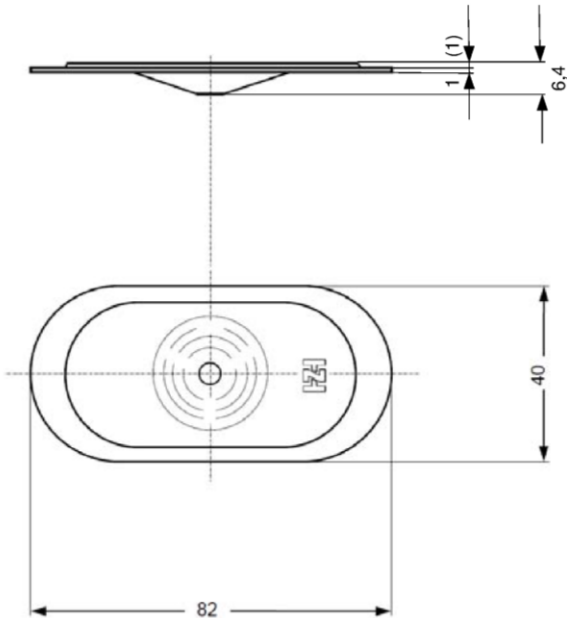
Combination 37
ZTSK-VB-E 4,8 consisting of ZDBK-VB-E / ZTSK 4,8

Annex 37

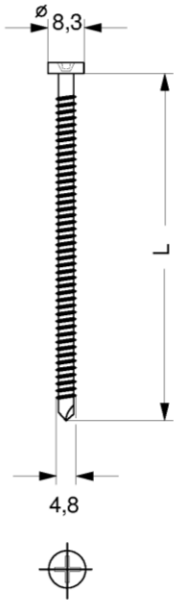
electronic copy of the eta by dibt: eta-08/0033



Zahn ZLVT 0001



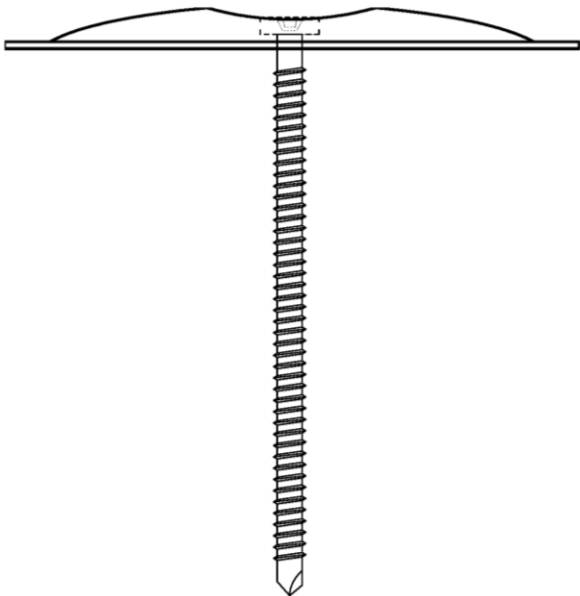
Zahn ZDBK-VB-E 4,8 x L



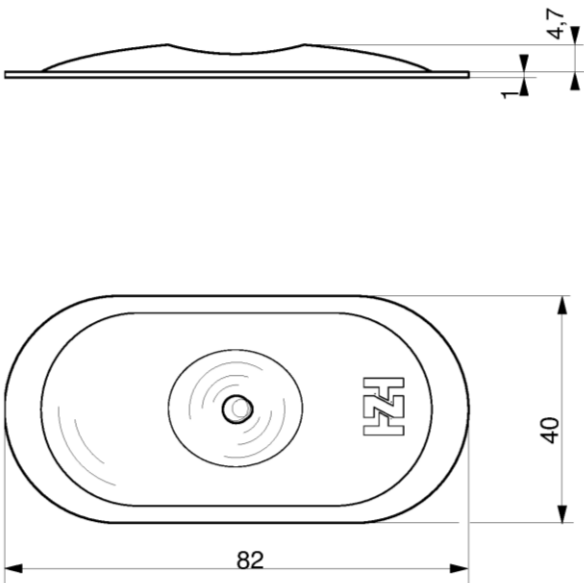
Zahn Flat Roof Fasteners

Combination 38
ZDBK-VB-E / ZLVT 0001

Annex 38



Zahn ZLVT 0005



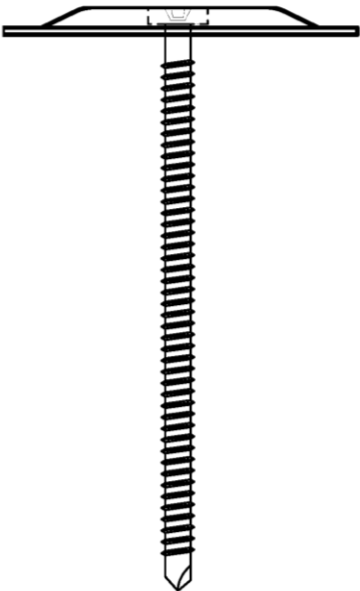
Zahn ZDBK-VB-E 4,8 x L



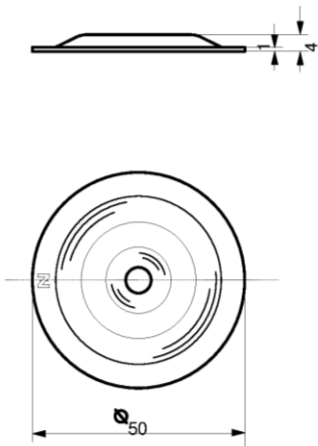
Zahn Flat Roof Fasteners

Combination 39
ZDBK-VB-E / ZLVT 0005

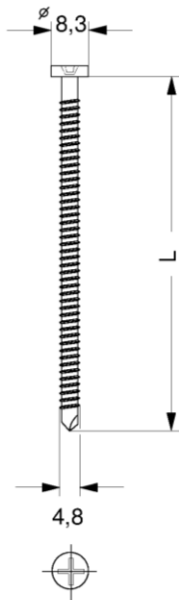
Annex 39



Zahn ZLVT 0015



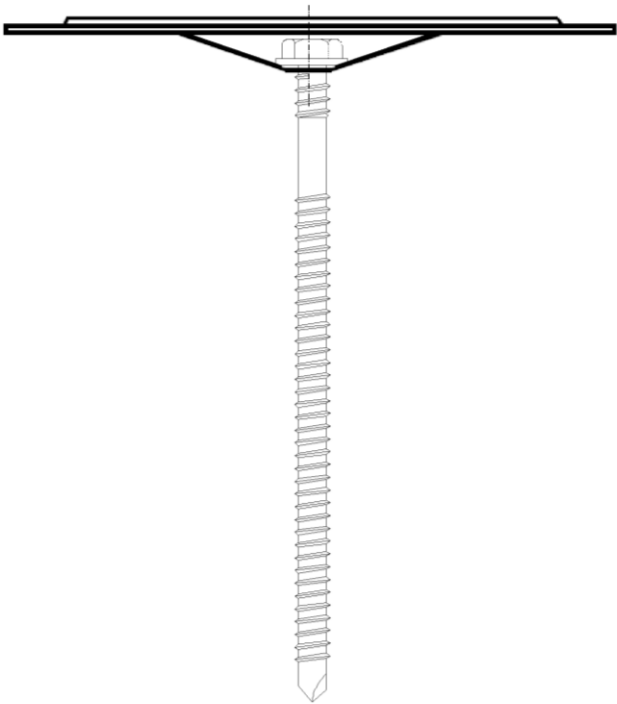
Zahn ZDBK-VB-E 4,8 x L



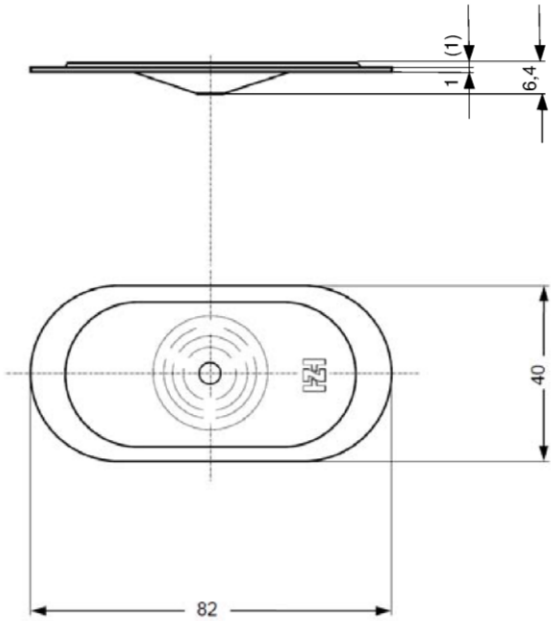
Zahn Flat Roof Fasteners

Combination 40
ZDBK-VB-E / ZLVT 0015

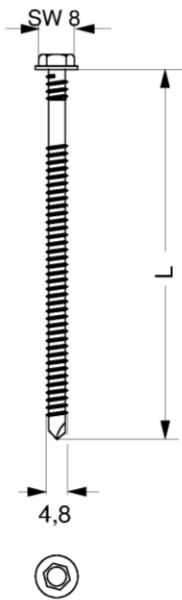
Annex 40



Zahn ZLVT 0001



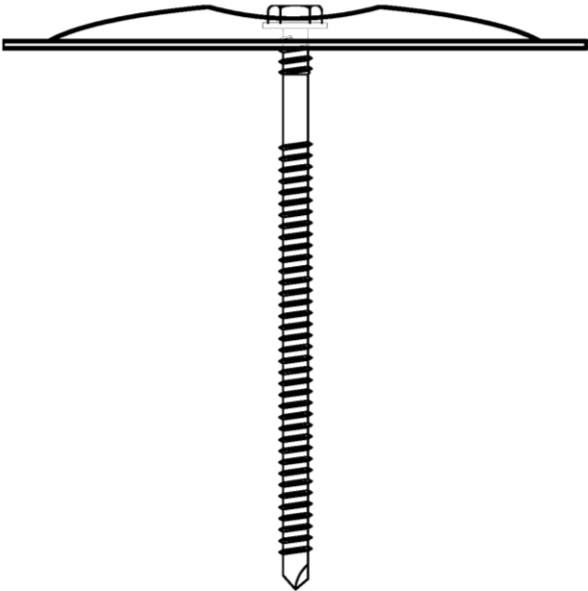
Zahn ZDBS 4,8 x L



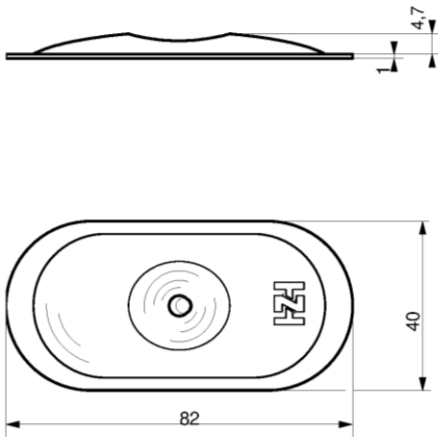
Zahn Flat Roof Fasteners

Combination 41
ZDBS / ZLVT 0001

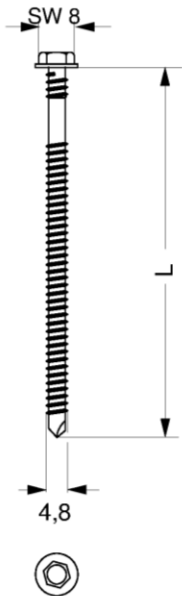
Annex 41



Zahn ZLVT 0005



Zahn ZDBS 4,8 x L

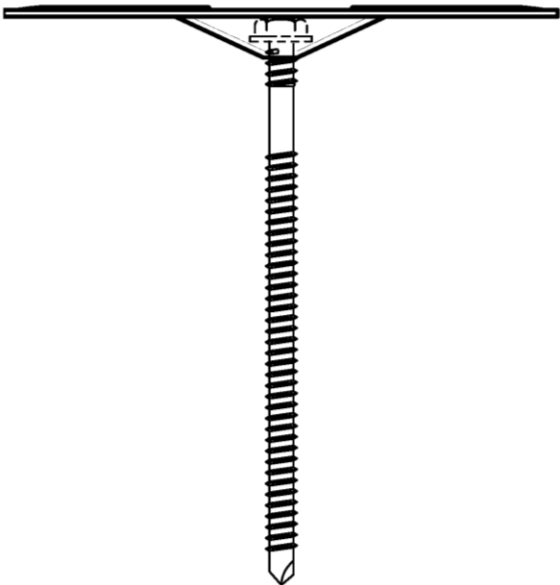


Zahn Flat Roof Fasteners

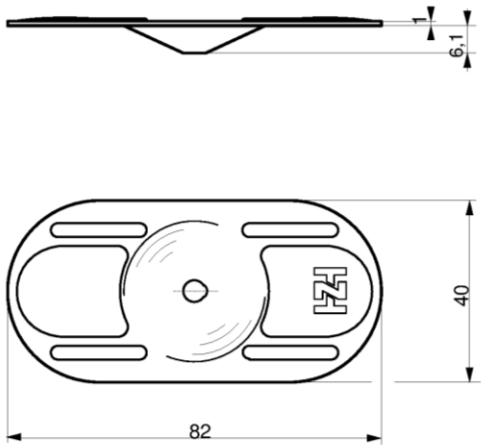
Combination 42
ZDBS / ZLVT 0005

Annex 42

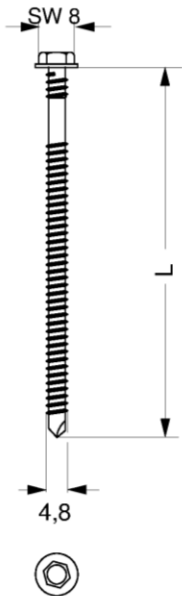
electronic copy of the eta by dibt: eta-08/0033



Zahn ZLVT 0012



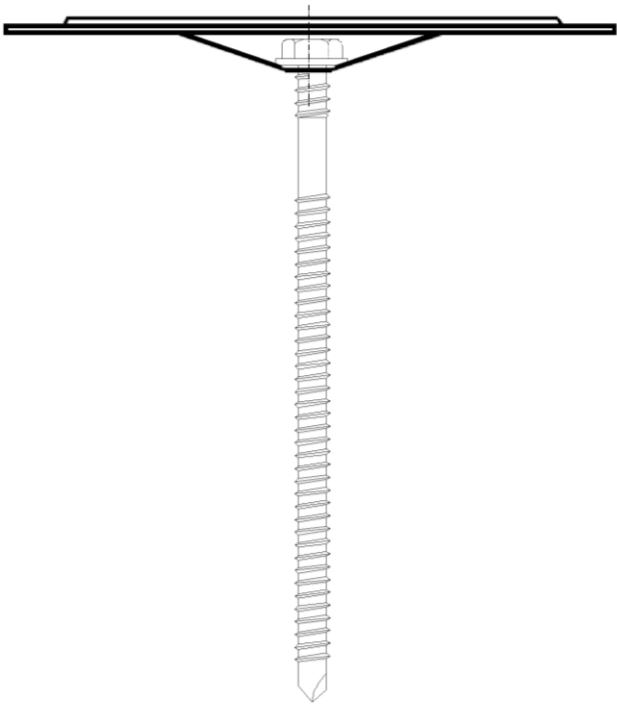
Zahn ZDBS 4,8 x L



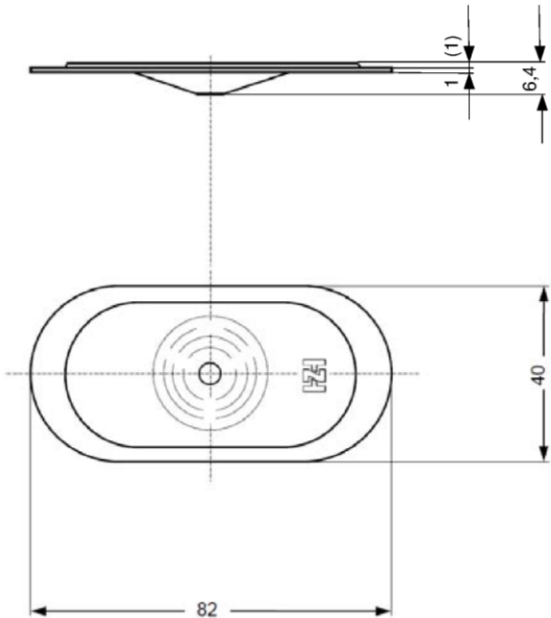
Zahn Flat Roof Fasteners

Combination 43
ZDBS / ZLVT 0012

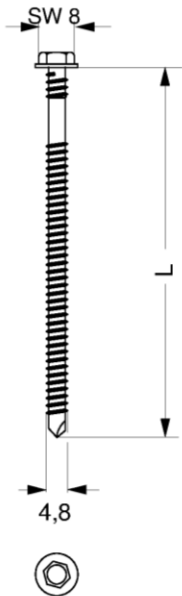
Annex 43



Zahn ZLVT 0001



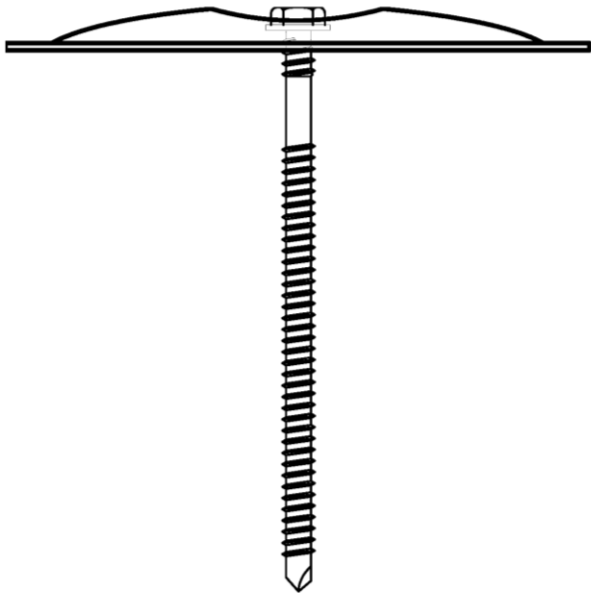
Zahn ZDBS-E 4,8 x L



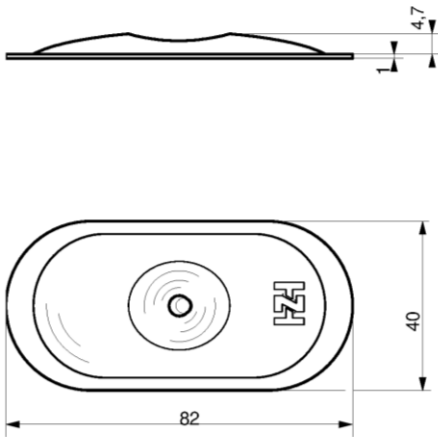
Zahn Flat Roof Fasteners

Combination 44
ZDBS-E / ZLVT 0001

Annex 44



Zahn ZLVT 0005



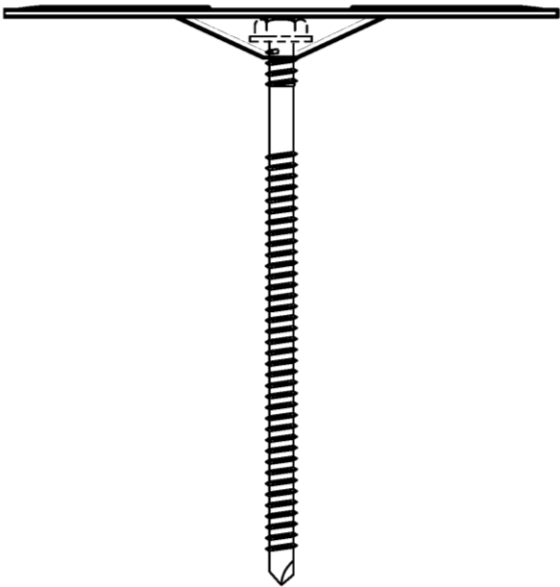
Zahn ZDBS-E 4,8 x L



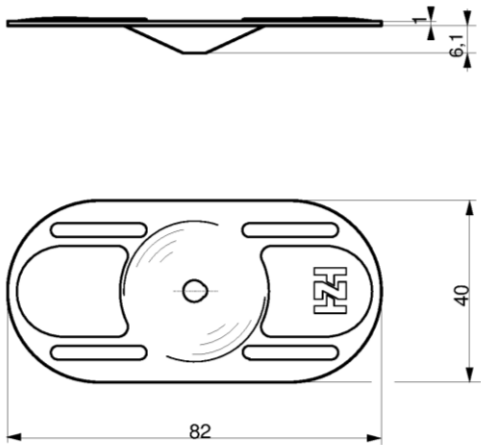
Zahn Flat Roof Fasteners

Combination 45
ZDBS-E / ZLVT 0005

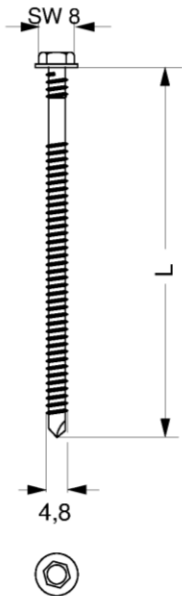
Annex 45



Zahn ZLVT 0012



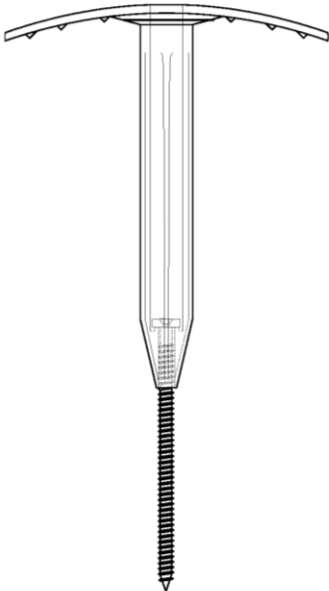
Zahn ZDBS-E 4,8 x L



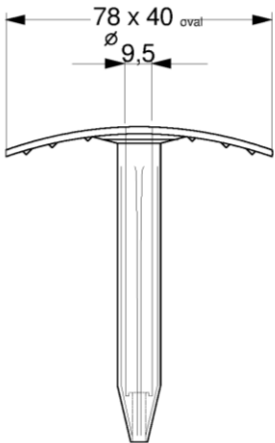
Zahn Flat Roof Fasteners

Combination 46
ZDBS-E / ZLVT 0012

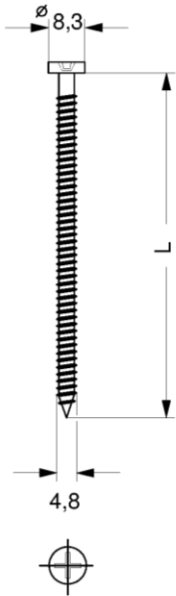
Annex 46



Zahn ZKSH oval



Zahn ZHBK 4,8 x L

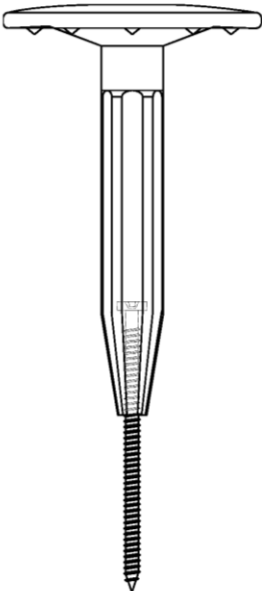


Zahn Flat Roof Fasteners

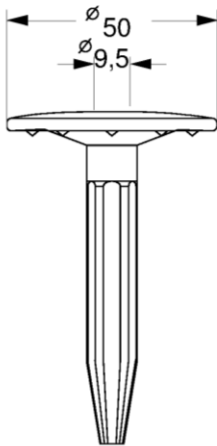
Combination 47
ZHSK consisting of ZHBK / ZKSH oval

Annex 47

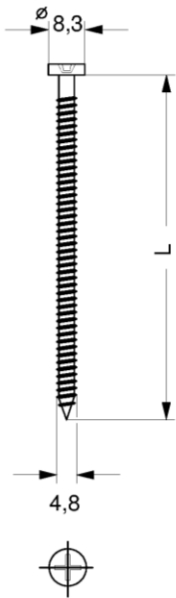
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH round



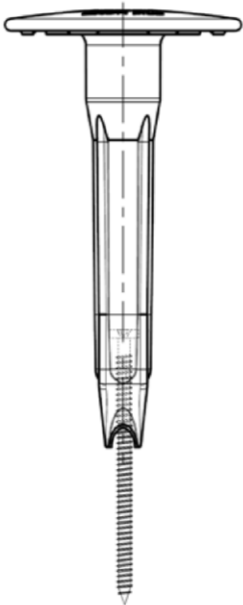
Zahn ZHBK 4,8 x L



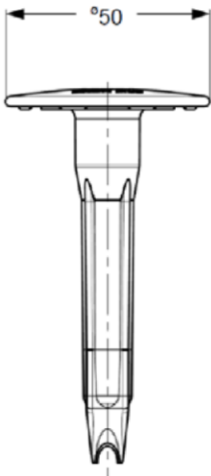
Zahn Flat Roof Fasteners

Combination 48
ZHSK-R consisting of ZHBK / ZKSH round

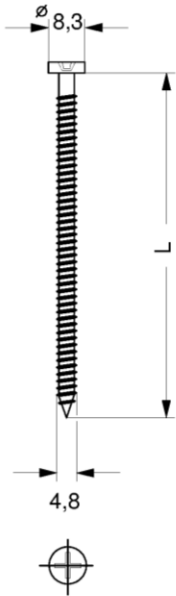
Annex 48



Zahn ZKSH-Rplus



Zahn ZHBK 4,8 x L

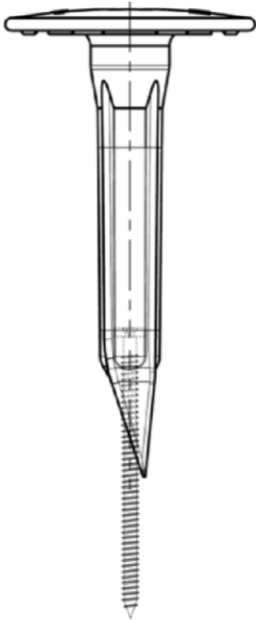


Zahn Flat Roof Fasteners

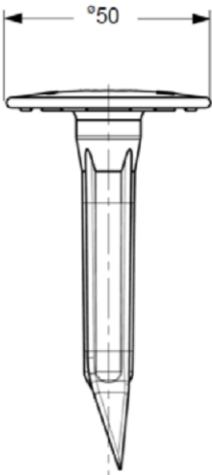
Combination 49
ZHSK-Rplus consisting of ZHBK / ZKSH Rplus

Annex 49

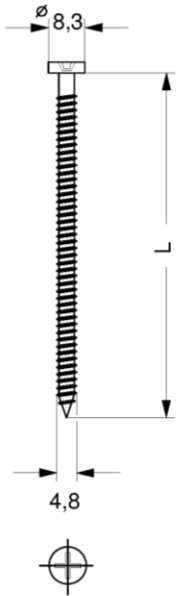
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH-Rplus with pile tip



Zahn ZHBK 4,8 x L

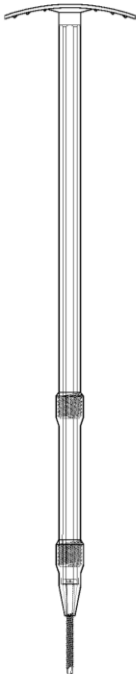


Zahn Flat Roof Fasteners

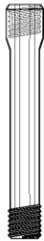
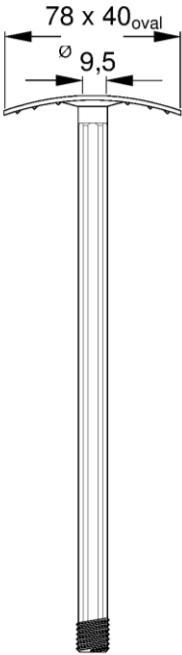
Combination 50
ZHSK-Rplus with pile tip consisting of ZHBK / ZKSH-Rplus with pile tip.

Annex 50

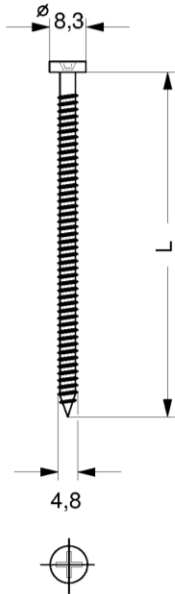
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH oval module 4,8



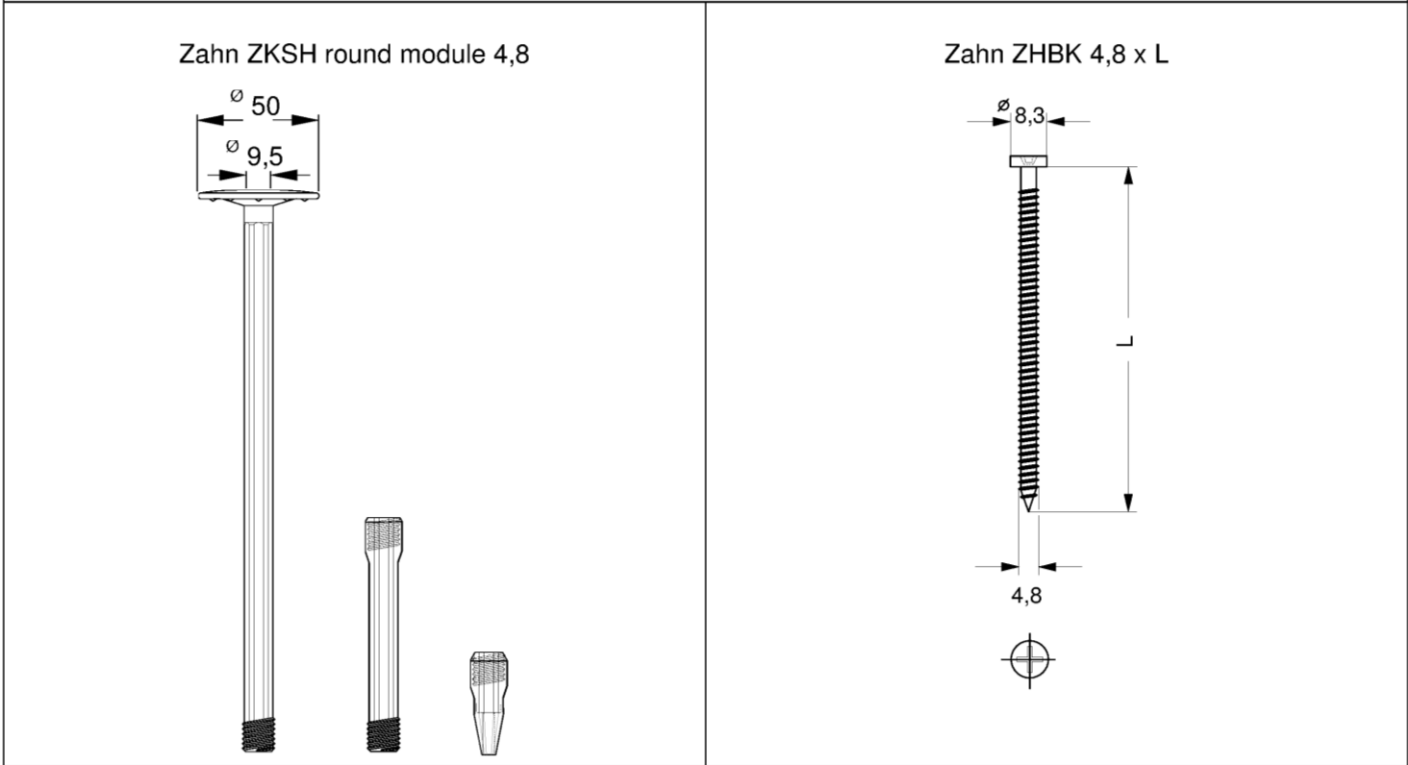
Zahn ZHBK 4,8 x L



Zahn Flat Roof Fasteners

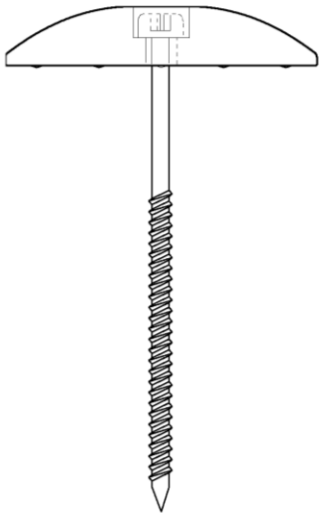
Combination 51
ZHSK-Modul 4,8 consisting of ZHBK / ZKSH oval module with module middle piece and spike 4,8

Annex 51

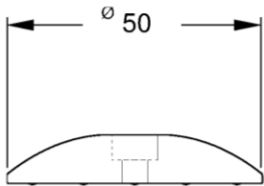


Zahn Flat Roof Fasteners	
Combination 52 ZHSK-R-Modul 4,8 consisting of ZHBK / ZKSH round module with module middle piece and spike 4,8	Annex 52

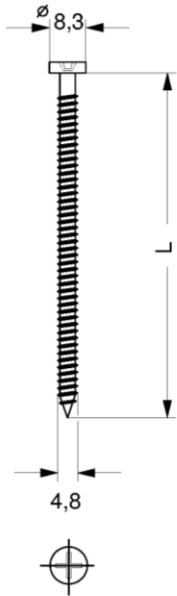
electronic copy of the eta by dibt: eta-08/0033



Zahn ZTSK 4,8



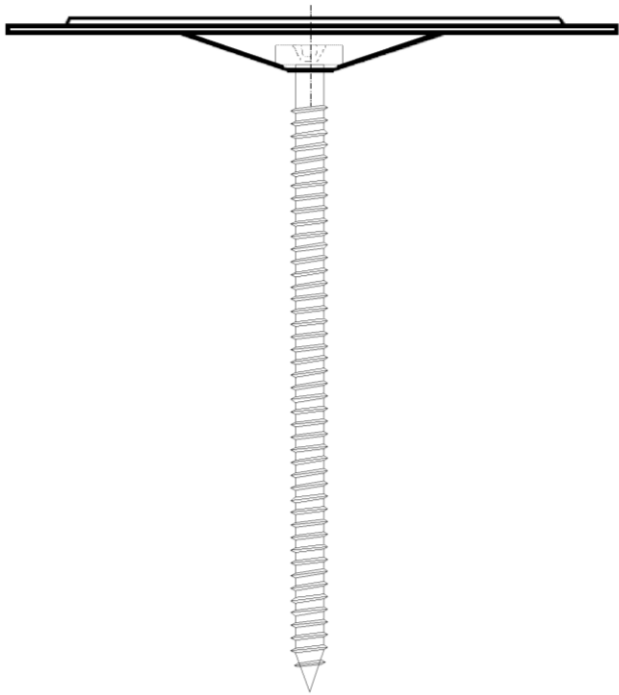
Zahn ZHBK 4,8 x L



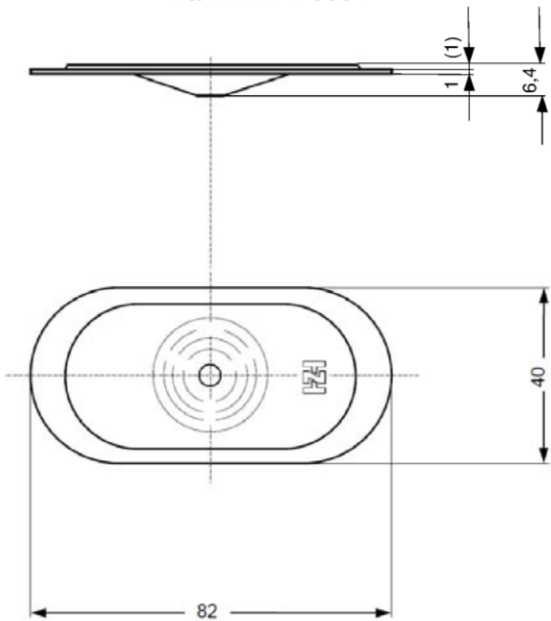
Zahn Flat Roof Fasteners

Combination 53
ZTSK-Timber 4,8 consisting of ZHBK / ZTSK 4,8

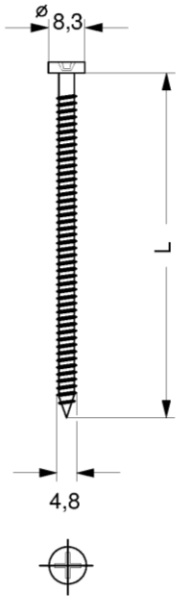
Annex 53



Zahn ZLVT 0001



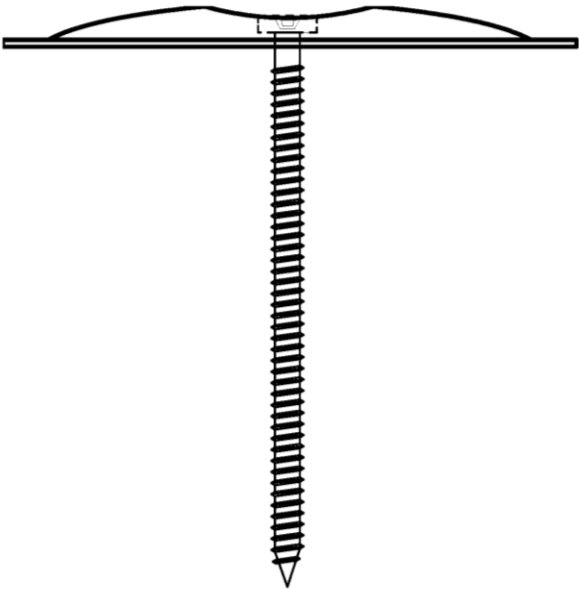
Zahn ZHBK 4,8 x L



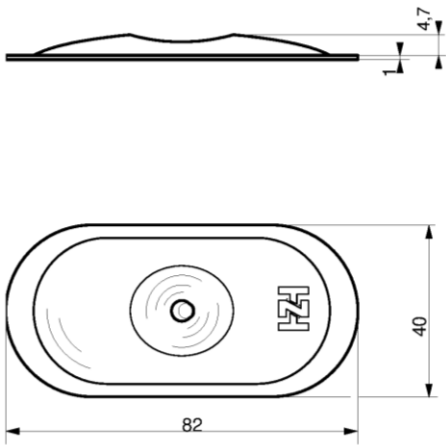
Zahn Flat Roof Fasteners

Combination 54
ZHBK / ZLVT 0001

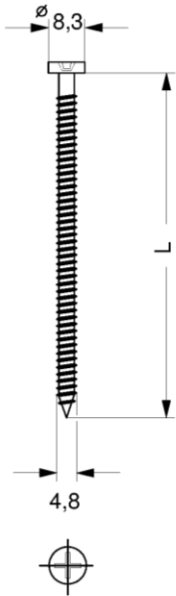
Annex 54



Zahn ZLVT 0005



Zahn ZHBK 4,8 x L

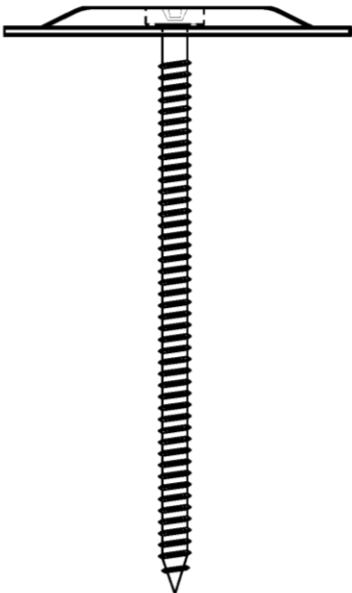


Zahn Flat Roof Fasteners

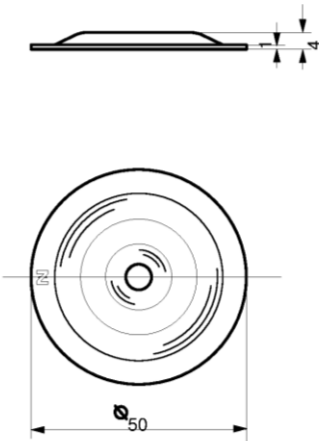
Combination 55
ZHBK / ZLVT 0005

Annex 55

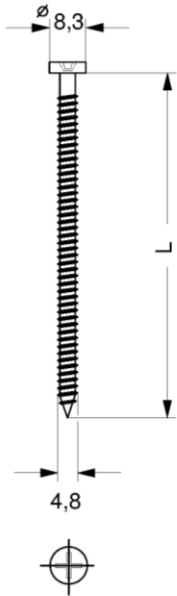
electronic copy of the eta by dibt: eta-08/0033



Zahn ZLVT 0015



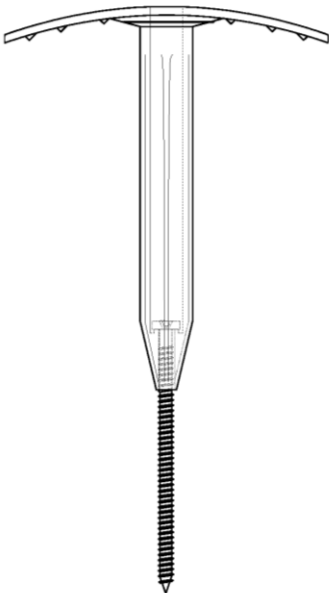
Zahn ZHBK 4,8 x L



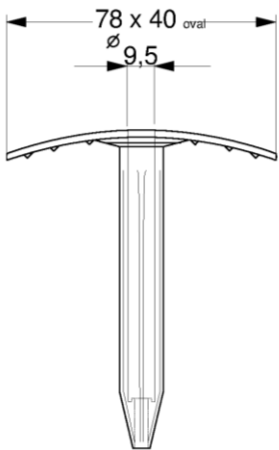
Zahn Flat Roof Fasteners

Combination 56
ZHBK / ZLVT 0015

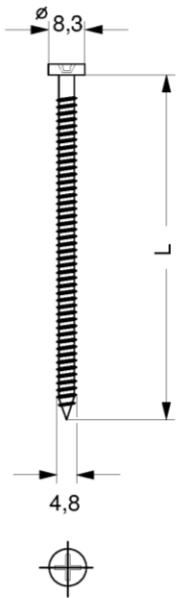
Annex 56



Zahn ZKSH oval



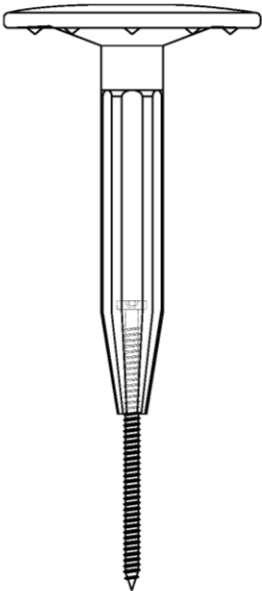
Zahn ZHBK-E 4,8 x L



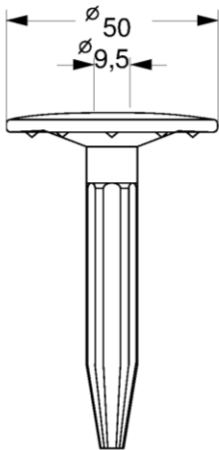
Zahn Flat Roof Fasteners

Combination 57
ZHSK-E consisting of ZHBK-E / ZKSH oval

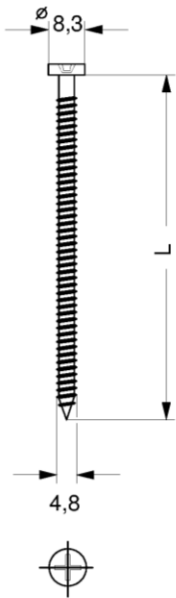
Annex 57



Zahn ZKSH round



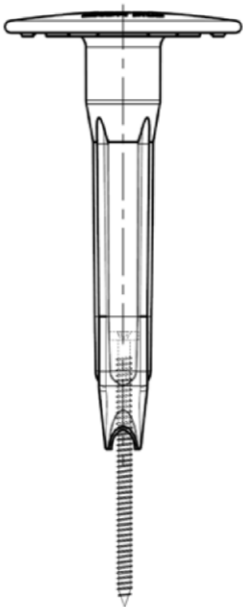
Zahn ZHBK-E 4,8 x L



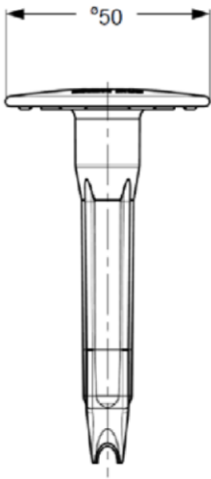
Zahn Flat Roof Fasteners

Combination 58
ZHSK-E/R consisting of ZHBK-E / ZKSH round

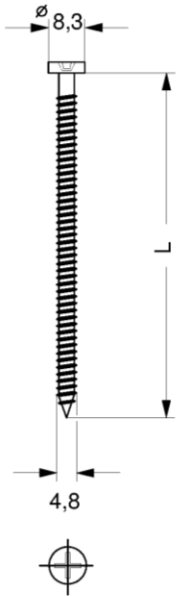
Annex 58



Zahn ZKSH-Rplus



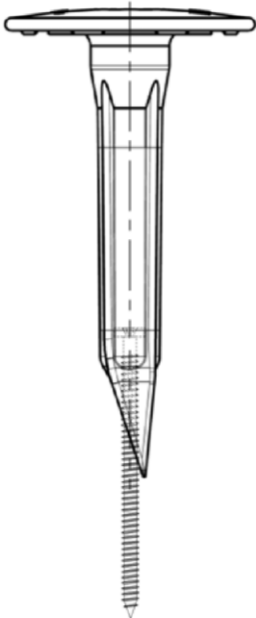
Zahn ZHBK-E 4,8 x L



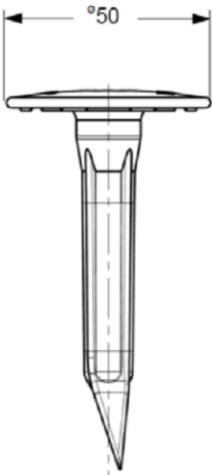
Zahn Flat Roof Fasteners

Combination 59
ZHSK-E/Rplus consisting of ZHBK -E / ZKSH-Rplus

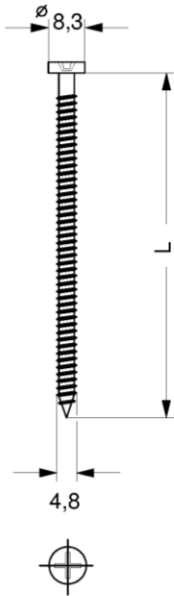
Annex 59



Zahn ZKSH-Rplus with pile tip



Zahn ZHBK -E 4,8 x L

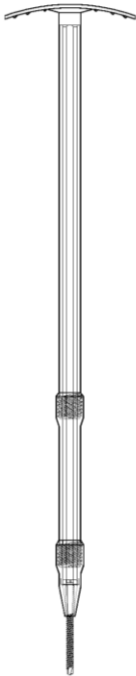


Zahn Flat Roof Fasteners

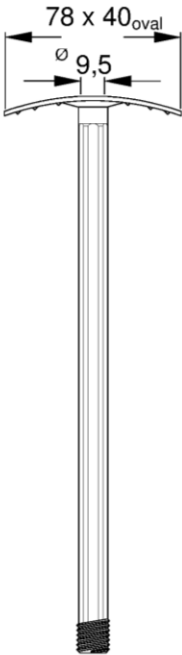
Combination 60
ZHSK-E/Rplus with pile tip consisting of ZHBK -E / ZKSH-Rplus with pile tip.

Annex 60

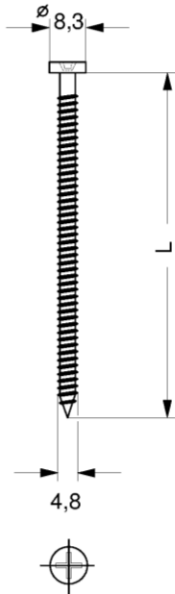
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Zahn ZKSH oval module 4,8



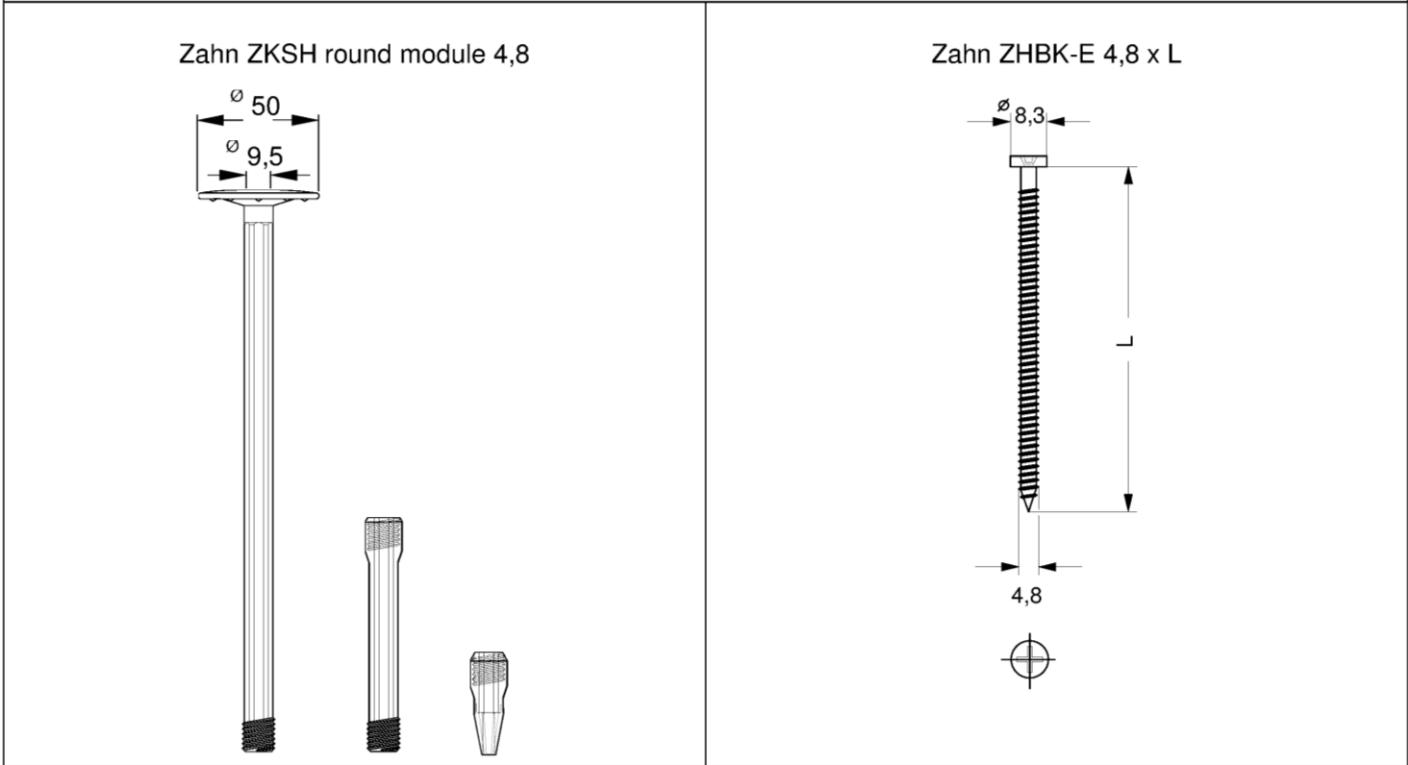
Zahn ZHBK-E 4,8 x L



Zahn Flat Roof Fasteners

Combination 61
ZHSK-E-Modul 4,8 consisting of ZHBK-E / ZKSH oval module with module middle piece and spike 4,8

Annex 61

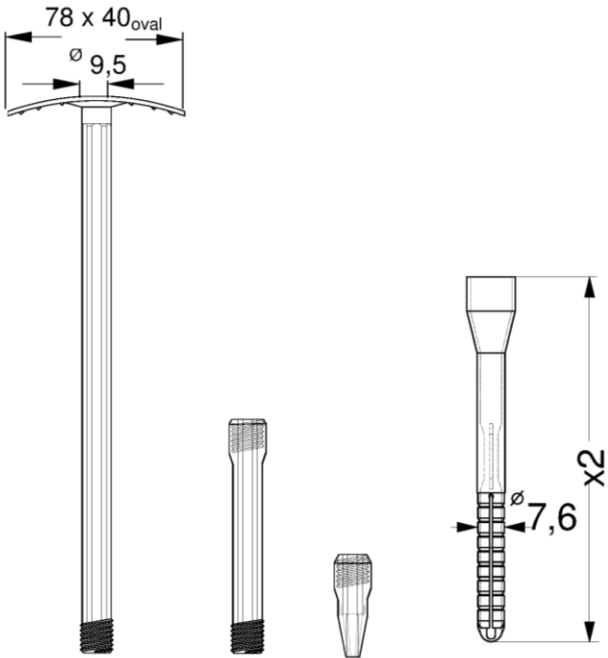


Zahn Flat Roof Fasteners	Annex 62
Combination 62 ZHSK-E/R-Modul 4,8 consisting of ZHBK-E/ZKSH round module with module middle piece and spike 4,8	

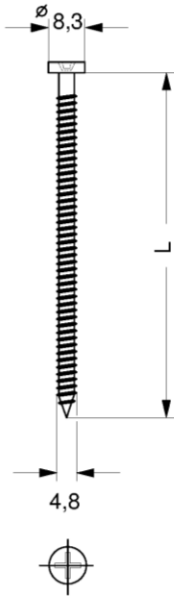
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH oval module 4,8 with dowel extension



Zahn ZHBK-E 4,8 x L

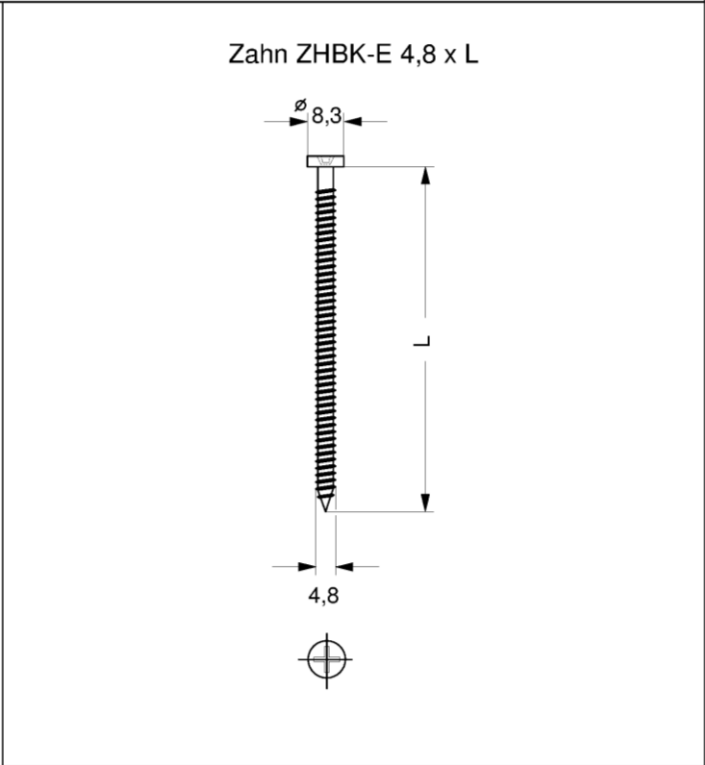
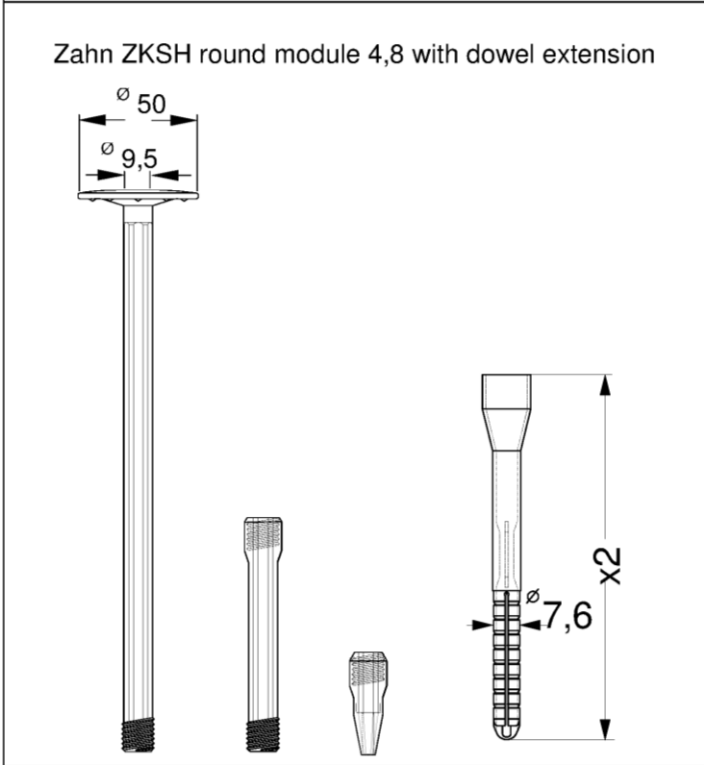
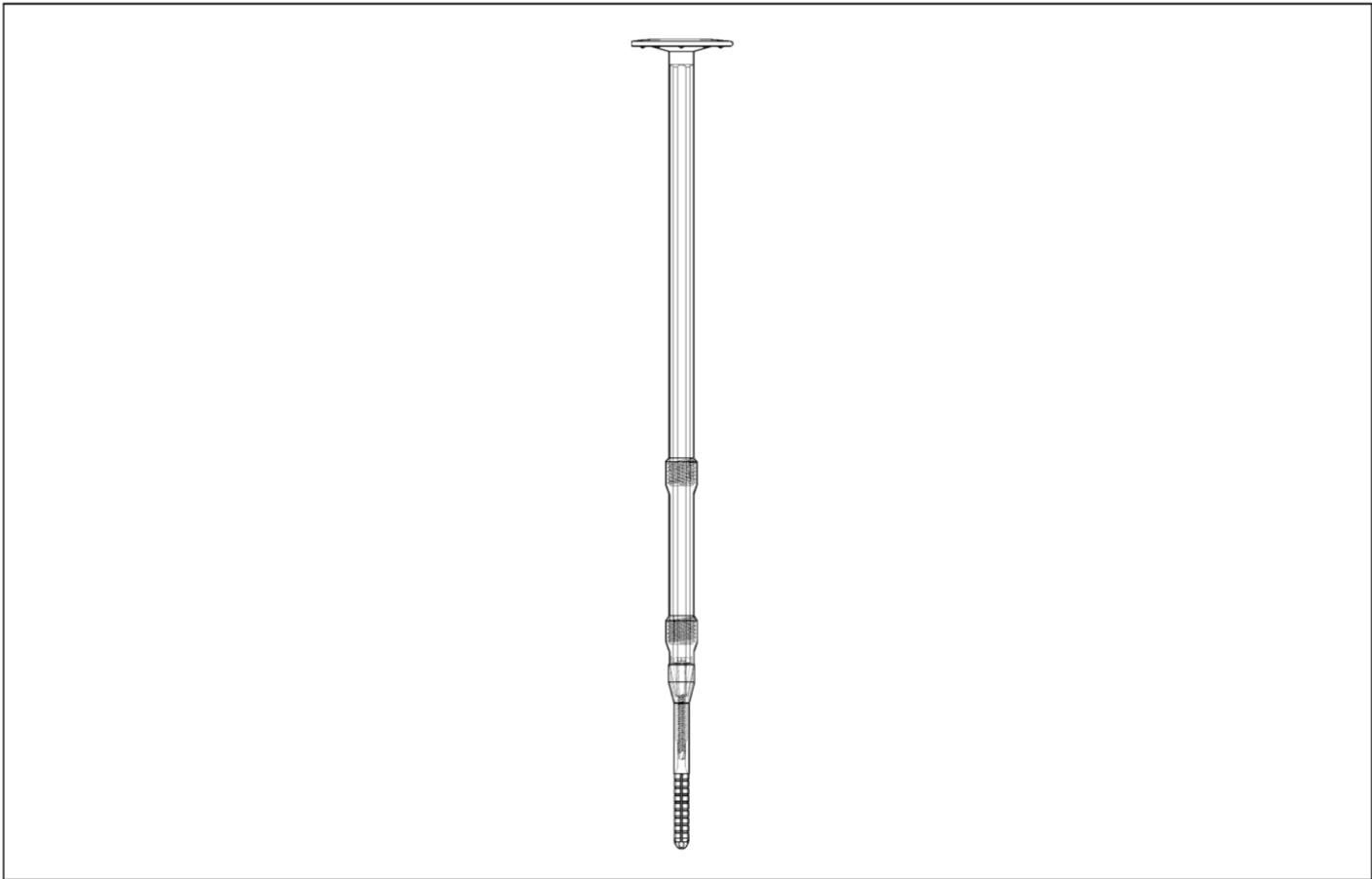


Zahn Flat Roof Fasteners

Combination 63
ZSDK-E-Modul 4,8 consisting of ZHBK-E / ZKSH oval module with middle piece, spike 4,8 and dowel extens.

Annex 63

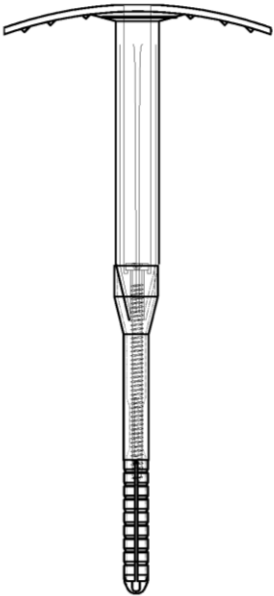
electronic copy of the eta by dibt: eta-08/0033



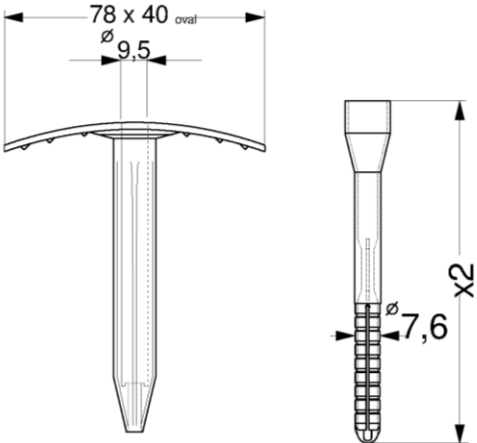
Zahn Flat Roof Fasteners	
Combination 64 ZSDK-E/R-Modul 4,8 consisting of ZHBK -E/ZKSH round module with middle piece, spike 4,8 and dowel extension	

Annex 64

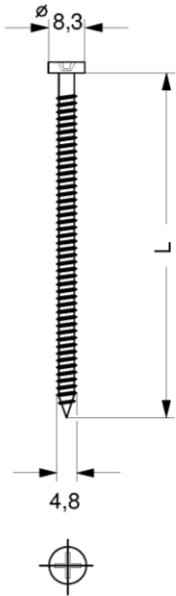
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH oval with dowel extension



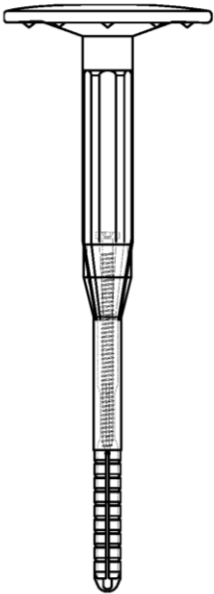
Zahn ZHBK-E 4,8 x L



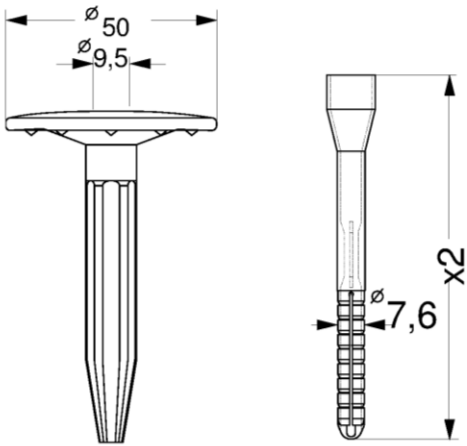
Zahn Flat Roof Fasteners

Combination 65
ZSDK-E consisting of ZHBK-E / ZKSH oval with dowel extension

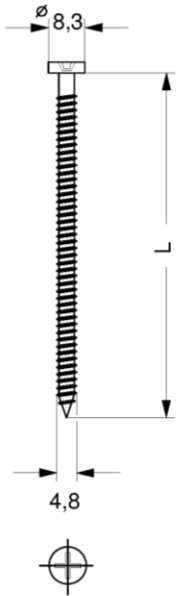
Annex 65



Zahn ZKSH round with dowel extension



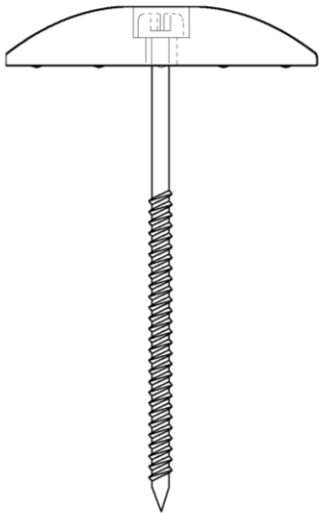
Zahn ZHBK-E 4,8 x L



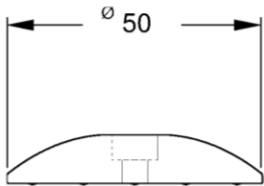
Zahn Flat Roof Fasteners

Combination 66
ZSDK-E/R consisting of ZHBK-E / ZKSH round with dowel extension

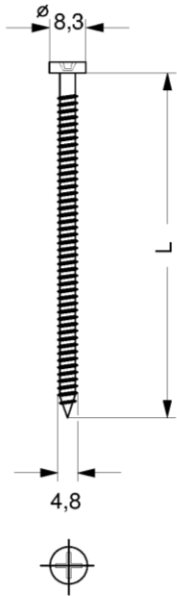
Annex 66



Zahn ZTSK 4,8



Zahn ZHBK-E 4,8 x L

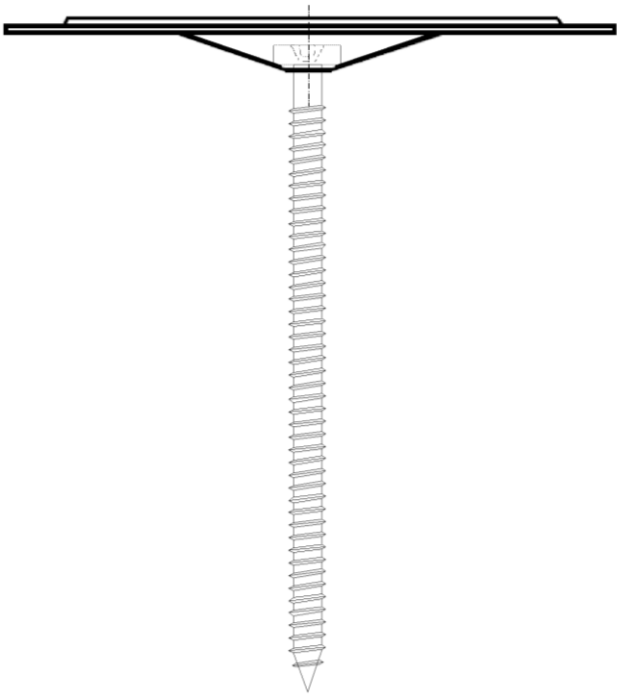


Zahn Flat Roof Fasteners

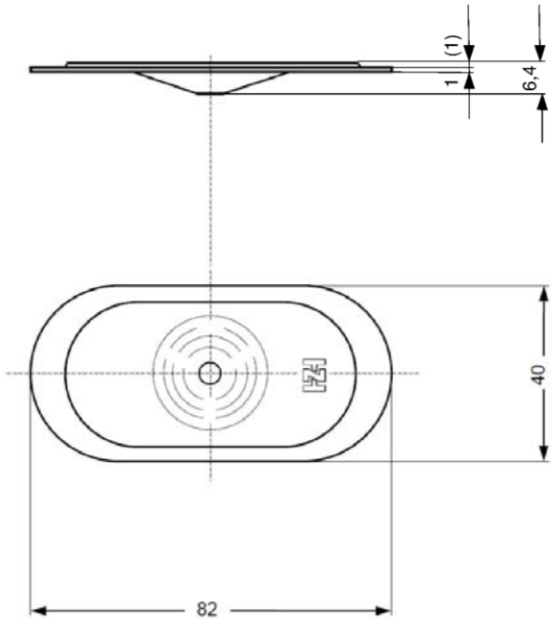
Combination 67
ZTSK-E-Timber 4,8 consisting of ZHBK-E / ZTSK 4,8

Annex 67

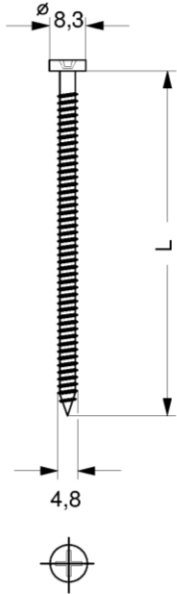
electronic copy of the eta by dibt: eta-08/0033



Zahn ZLVT 0001



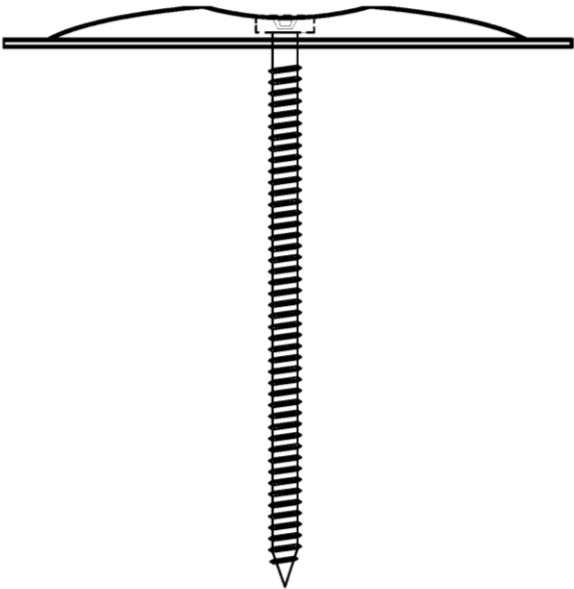
Zahn ZHBK-E 4,8 x L



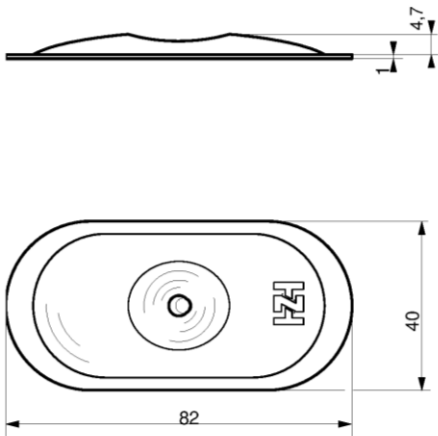
Zahn Flat Roof Fasteners

Combination 68
ZHBK-E / ZLVT 0001

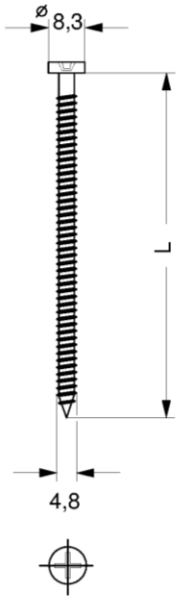
Annex 68



Zahn ZLVT 0005



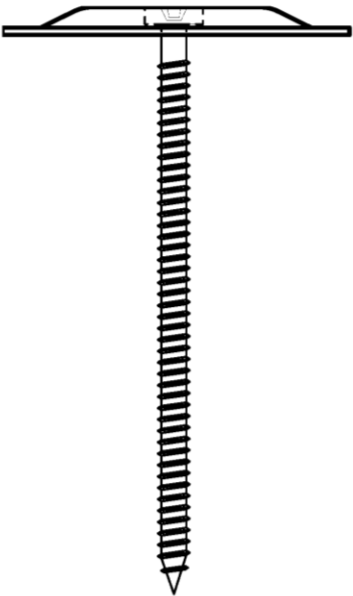
Zahn ZHBK-E 4,8 x L



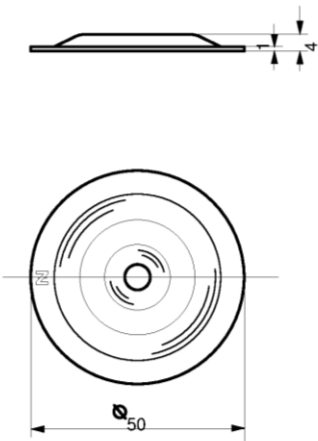
Zahn Flat Roof Fasteners

Combination 69
ZHBK-E / ZLVT 0005

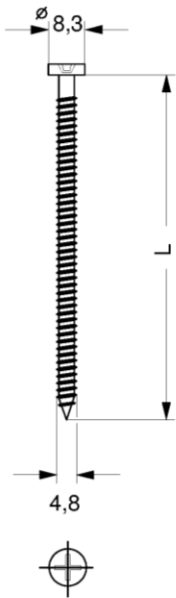
Annex 69



Zahn ZLVT 0015



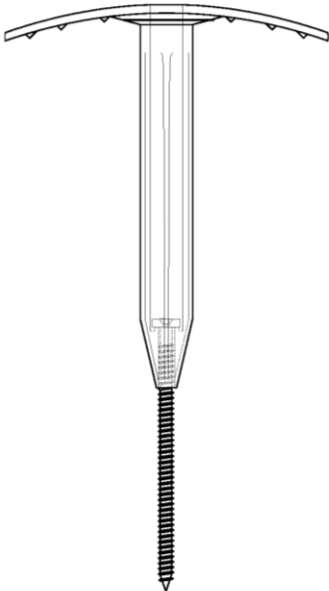
Zahn ZHBK-E 4,8 x L



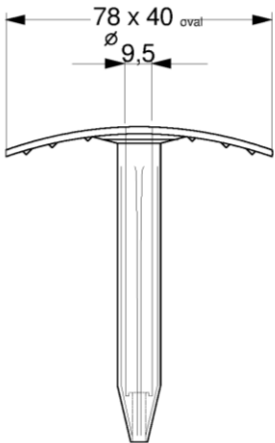
Zahn Flat Roof Fasteners

Combination 70
ZHBK-E / ZLVT 0015

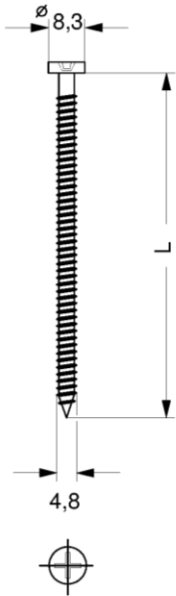
Annex 70



Zahn ZKSH oval



Zahn ZDBK dowel 4,8 x L

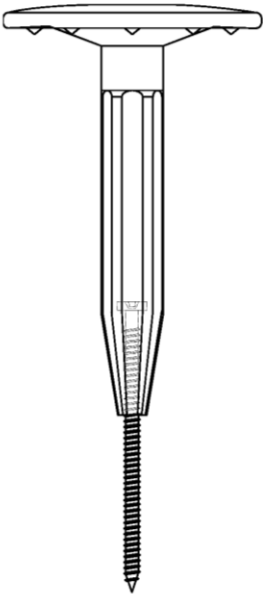


Zahn Flat Roof Fasteners

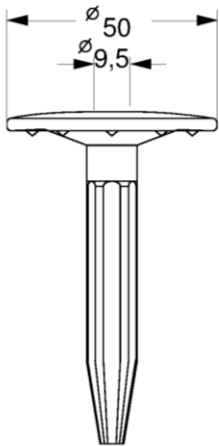
Combination 71
ZDBK-Dowel / ZKSH oval

Annex 71

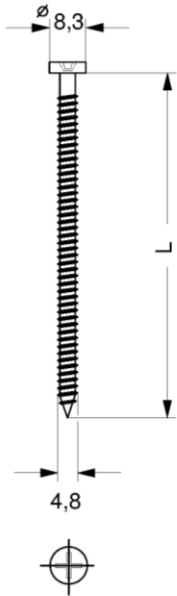
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH round



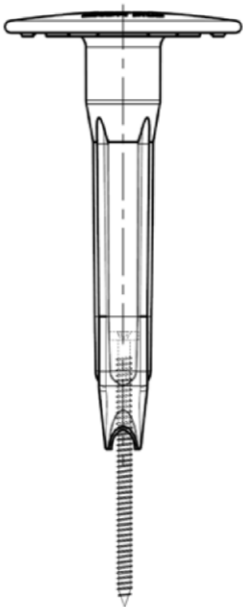
Zahn ZDBK dowel 4,8 x L



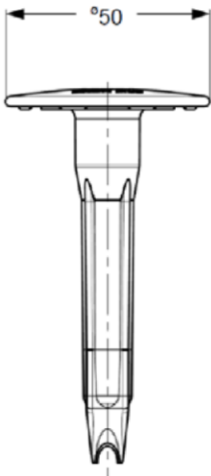
Zahn Flat Roof Fasteners

Combination 72
ZDBK-Dowel / R / ZKSH round

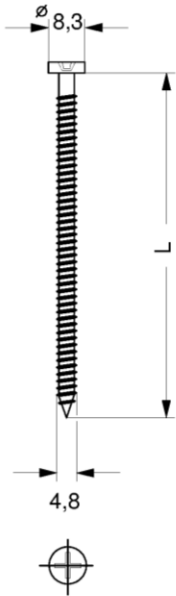
Annex 72



Zahn ZKSH-Rplus



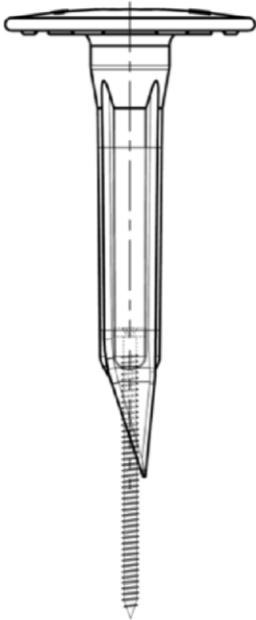
Zahn ZDBK_{dowel} 4,8 x L



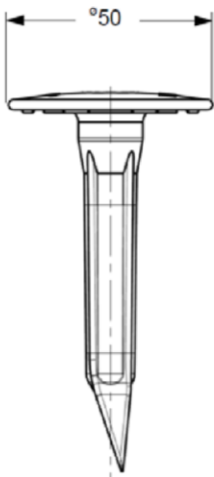
Zahn Flat Roof Fasteners

Combination 73
ZKSK-Dowel/Rplus consisting of ZDBK_{dowel} / ZKSH-Rplus

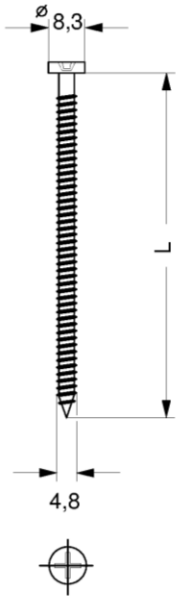
Annex 73



Zahn ZKSH-Rplus with pile tip



Zahn ZDBK_{dowel} 4,8 x L



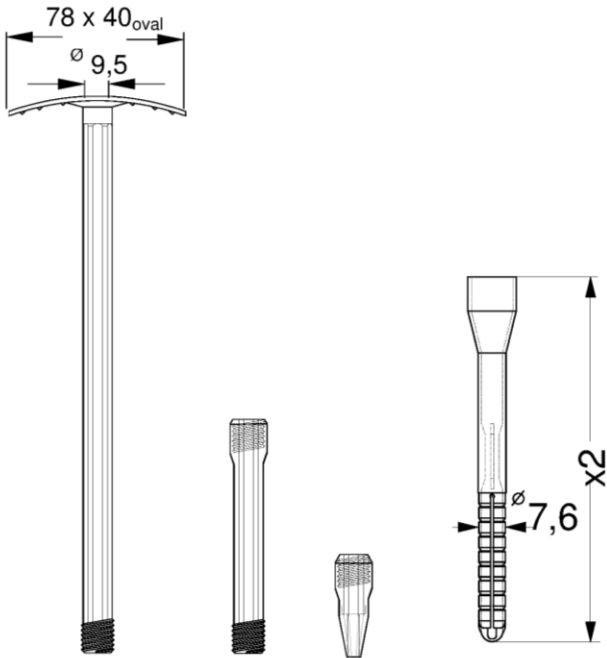
Zahn Flat Roof Fasteners

Combination 74
ZKSK–Dowel/Rplus with pile tip consisting of ZDBK_{dowel} / ZKSH-Rplus with pile tip.

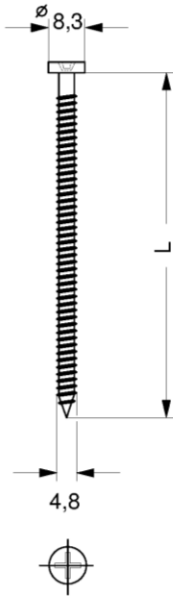
Annex 74



Zahn ZKSH oval module 4,8 with dowel extension



Zahn ZDBK_dowel 4,8 x L

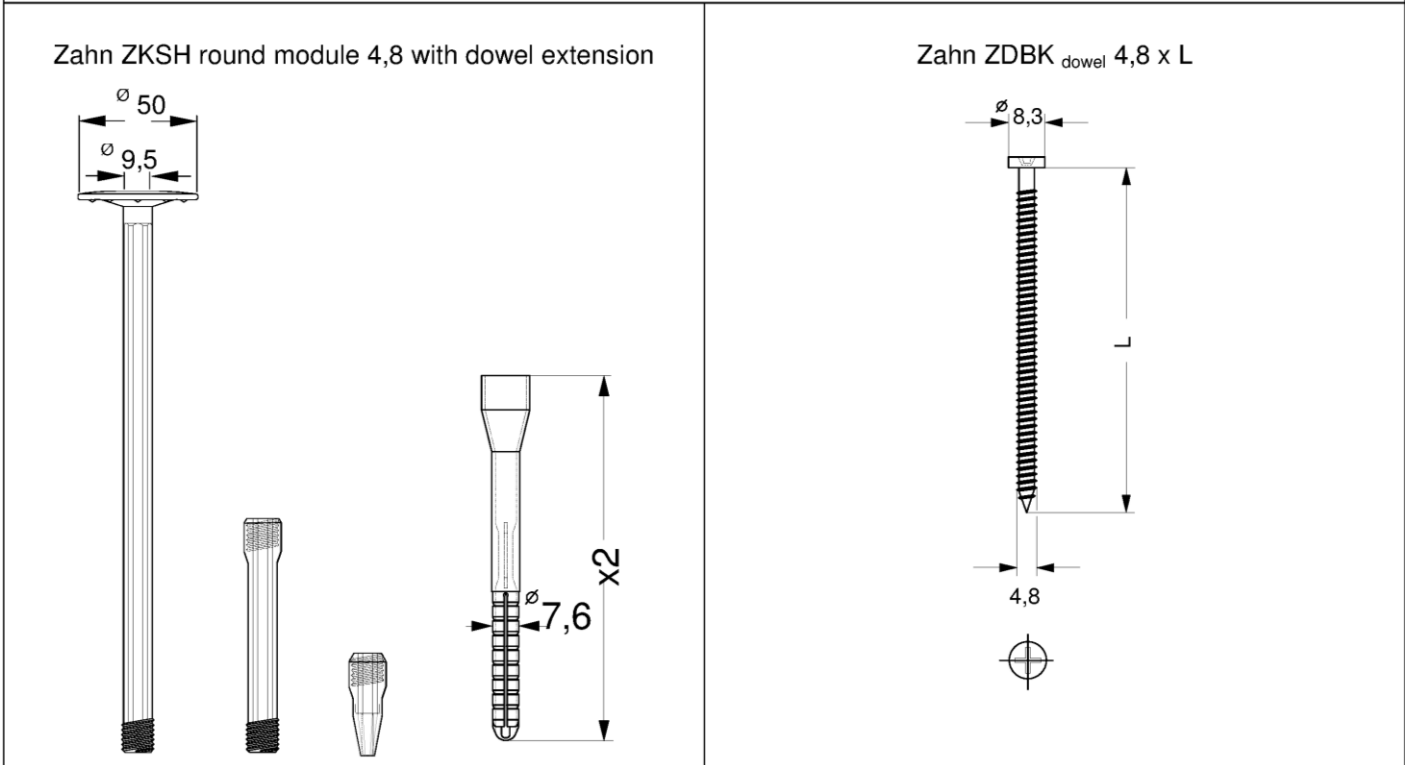


Zahn Flat Roof Fasteners

Combination 75
ZSDK-Modul 4,8 consisting of ZDBK_dowel/ZKSH oval module with middle piece, spike 4,8 and dowel extension

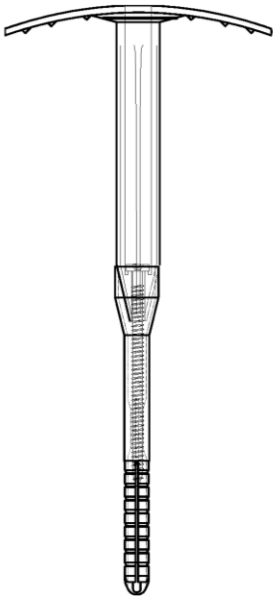
Annex 75

electronic copy of the eta by dibt: eta-08/0033

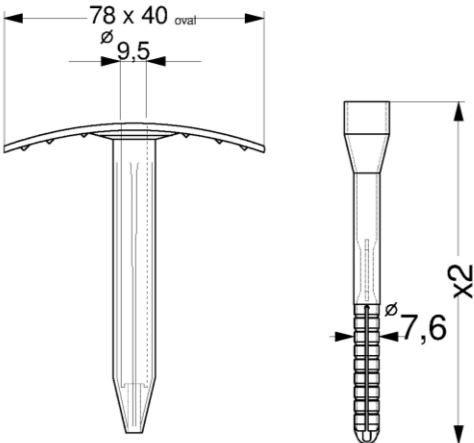


Zahn Flat Roof Fasteners	Annex 76
Combination 76 ZSDK-R-Modul 4,8 consisting of ZDBK _{dowel} /ZKSH round module with middle piece, spike 4,8 and dowel extension	

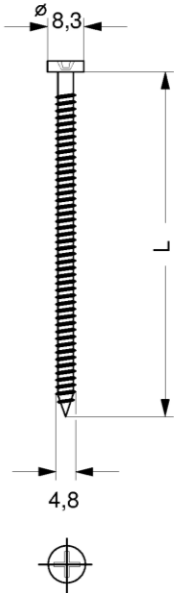
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH oval with dowel extension



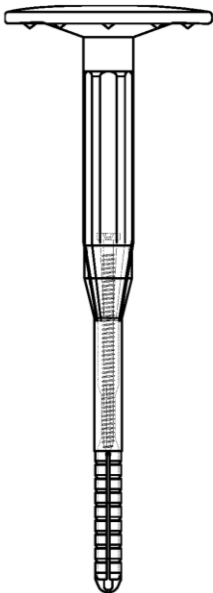
Zahn ZDBK_{dowel} 4,8 x L



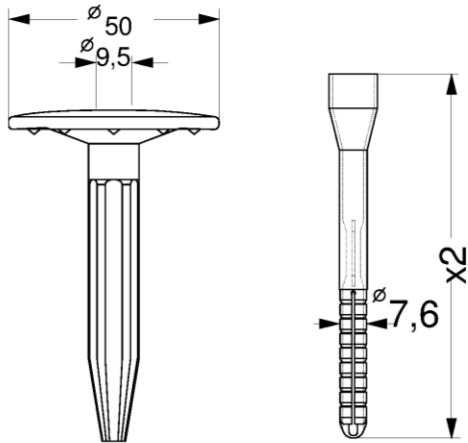
Zahn Flat Roof Fasteners

Combination 77
ZSDK consisting of ZDBK_{dowel} / ZKSH oval with dowel extension

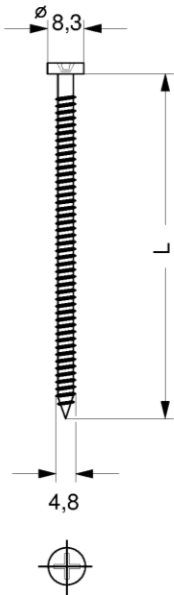
Annex 77



Zahn ZKSH round with dowel extension



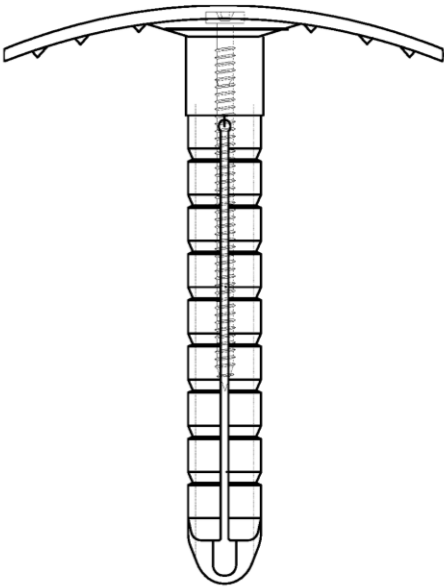
Zahn ZDBK_{dowel} 4,8 x L



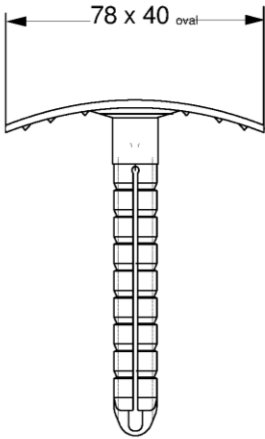
Zahn Flat Roof Fasteners

Combination 78
ZSDK-R consisting of ZDBK_{dowel} / ZKSH round with dowel extension

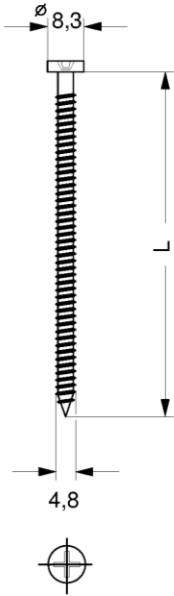
Annex 78



Zahn ZTSD oval



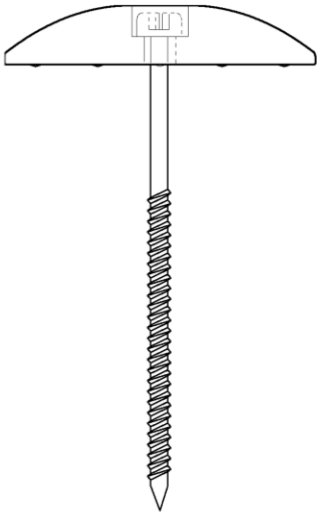
Zahn ZDBK_{dowel} 4,8 x L



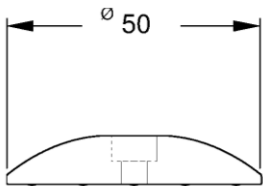
Zahn Flat Roof Fasteners

Combination 79
ZTSD consisting of ZDBK_{dowel} / ZTSD oval

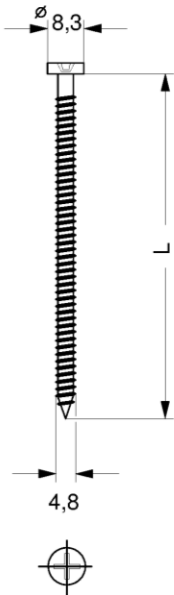
Annex 79



Zahn ZTSK 4,8



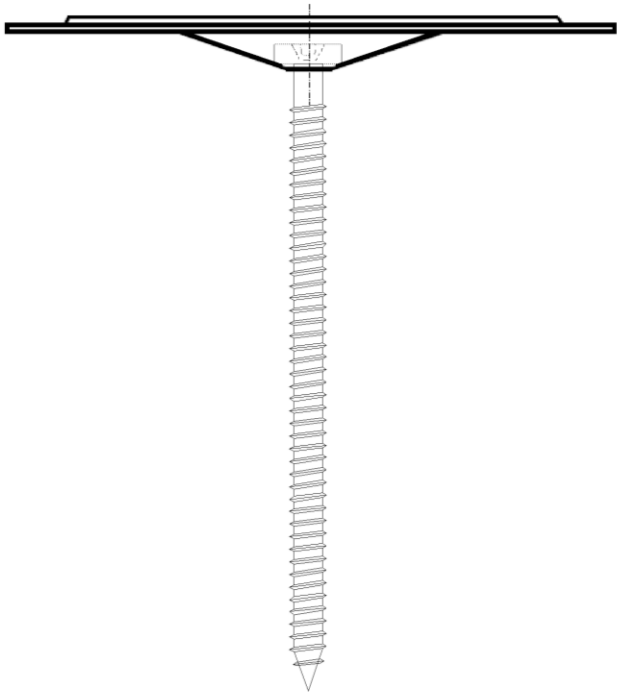
Zahn ZDBK_{dowel} 4,8 x L



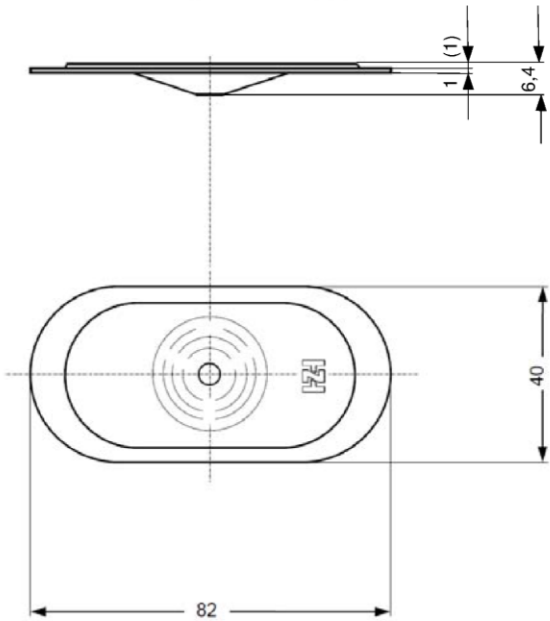
Zahn Flat Roof Fasteners

Combination 80
ZTSK-Dowel 4,8 consisting of ZDBK_{dowel} / ZTSK 4,8

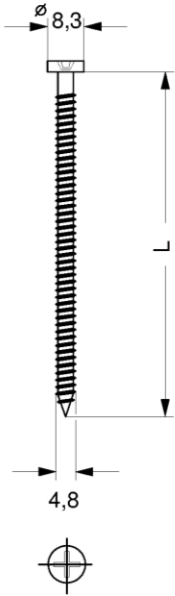
Annex 80



Zahn ZLVT 0001



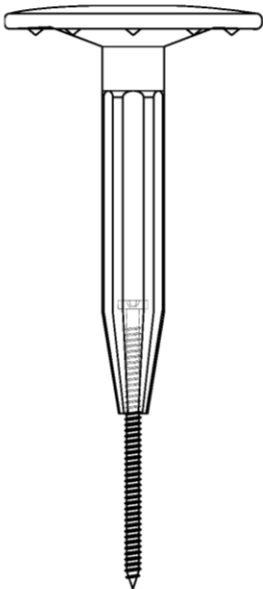
Zahn ZDBK dowel 4,8 x L



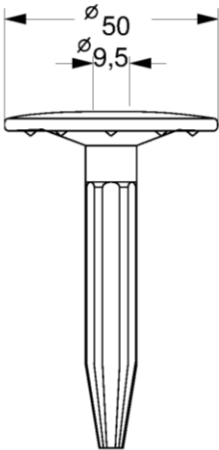
Zahn Flat Roof Fasteners

Combination 81
ZDBK-Dowel / ZLVT 0001

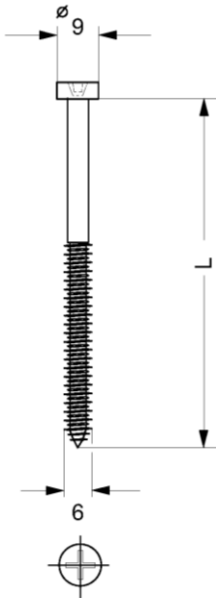
Annex 81



Zahn ZKSH gray / round



Zahn ZGBK-E 6,0 x L

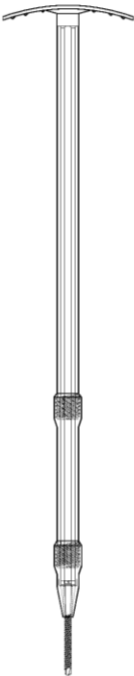


Zahn Flat Roof Fasteners

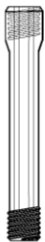
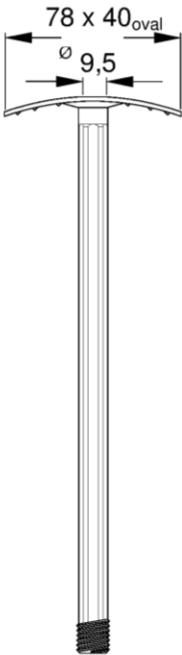
Combination 82
ZKGK-E/R consisting of ZGBK-E / ZKSH gray / round

Annex 82

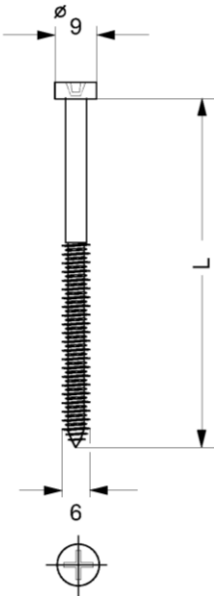
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Zahn ZKSH oval module 6,0



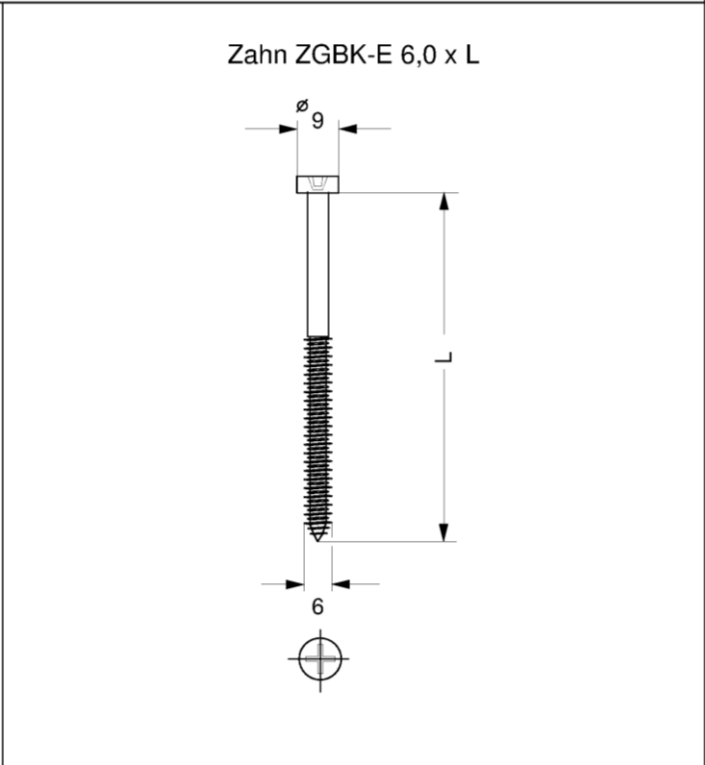
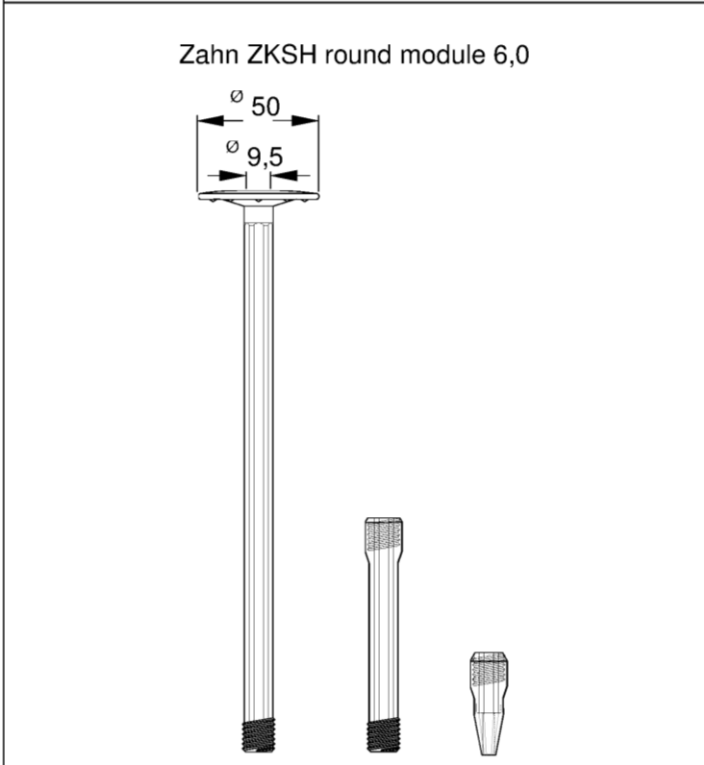
Zahn ZGBK-E 6,0 x L



Zahn Flat Roof Fasteners

Combination 83
ZKGK-E-Modul 6,0 consisting of ZGBK-E / ZKSH oval module with module middle piece and spike 6,0

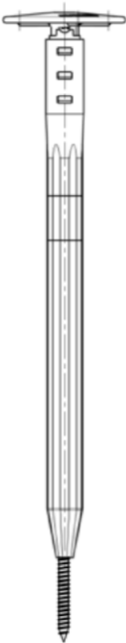
Annex 83



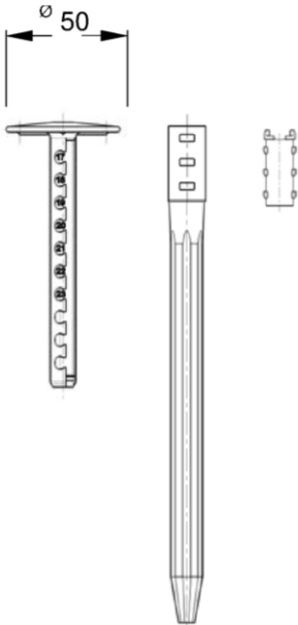
Zahn Flat Roof Fasteners
Combination 84 ZKGK-E/R-Modul 6,0 consisting of ZGBK-E/ZKSH round module with module middle piece and spike 6,0

Annex 84

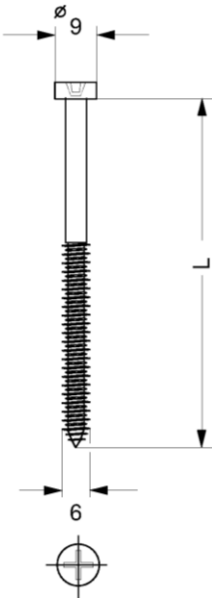
electronic copy of the eta by dibt: eta-08/0033



Zahn ZHVM



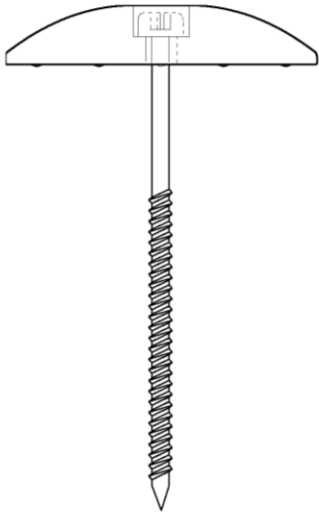
Zahn ZGBK-E 6,0 x L



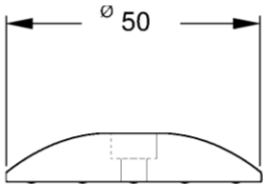
Zahn Flat Roof Fasteners

Combination 85
ZHVM-E-HPB consisting of ZGBK-E / ZHVM with headboard, shaft and locking sleeve

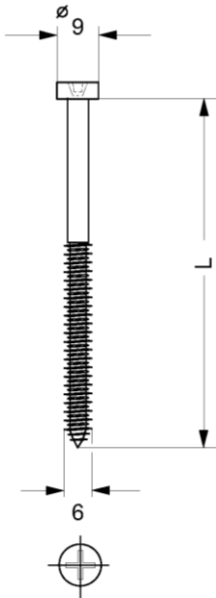
Annex 85



Zahn ZTSK 6,0



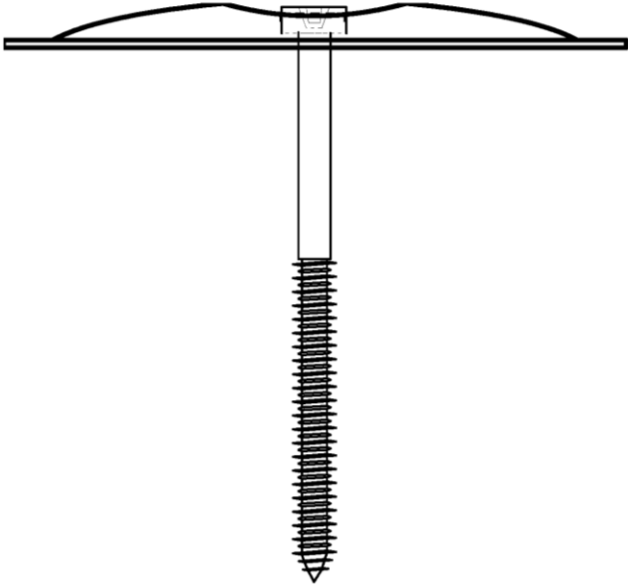
Zahn ZGBK-E 6,0 x L



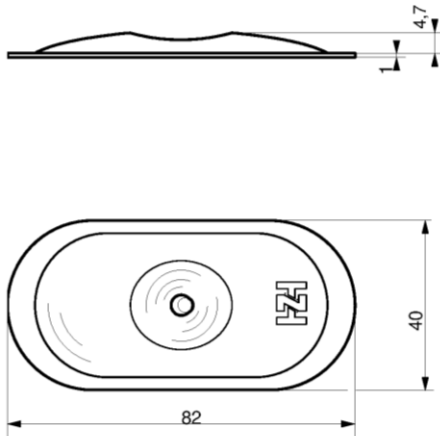
Zahn Flat Roof Fasteners

Combination 86
ZTSK-E-Pumice 6,0 consisting of ZGBK-E / ZTSK 6,0

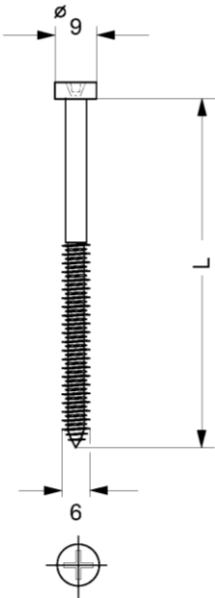
Annex 86



Zahn ZLVT 0008



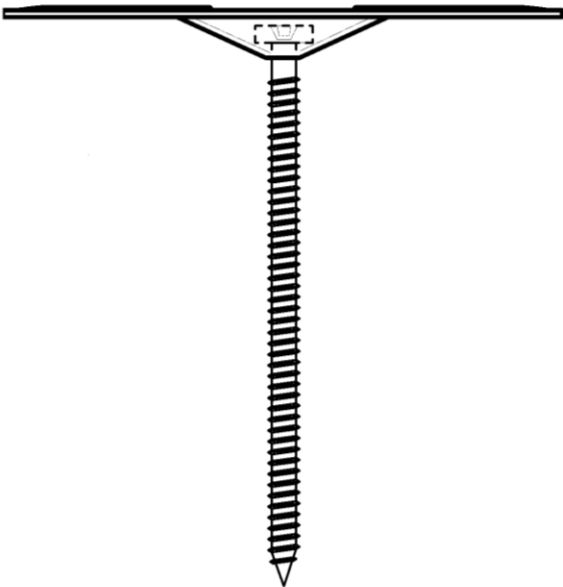
Zahn ZGBK-E 6,0 x L



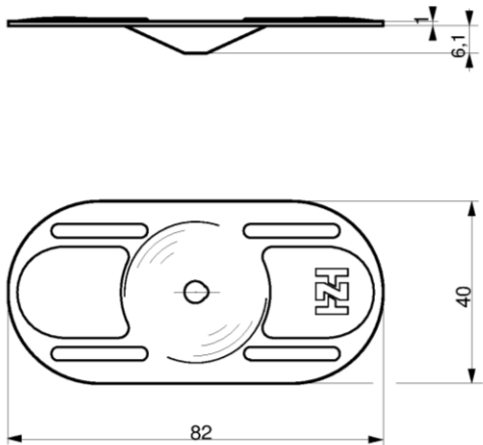
Zahn Flat Roof Fasteners

Combination 87
ZGBK-E / ZLVT 0008

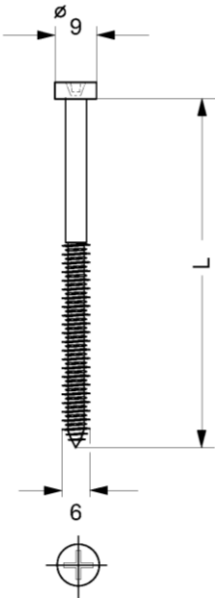
Annex 87



Zahn ZLVT 0012



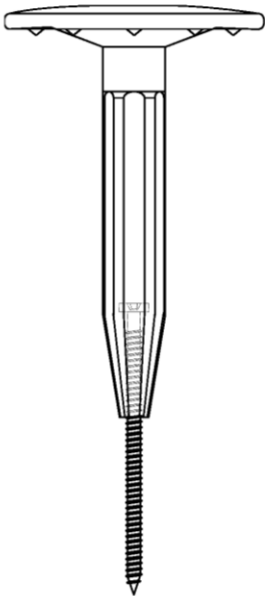
Zahn ZGBK-E 6,0 x L



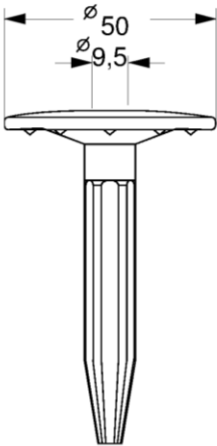
Zahn Flat Roof Fasteners

Combination 88
ZGBK-E / ZLVT 0012

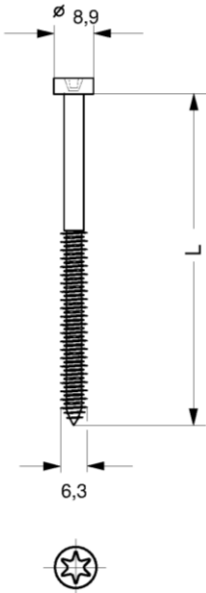
Annex 88



Zahn ZKSH gray / round



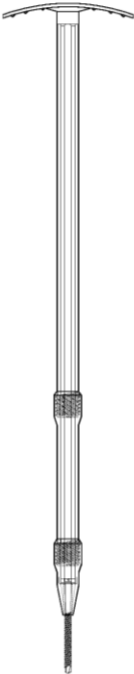
Zahn ZBST 6,3 x L



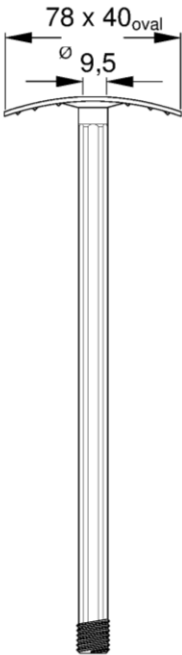
Zahn Flat Roof Fasteners

Combination 89
ZBSK-R consisting of ZBST / ZKSH gray / round

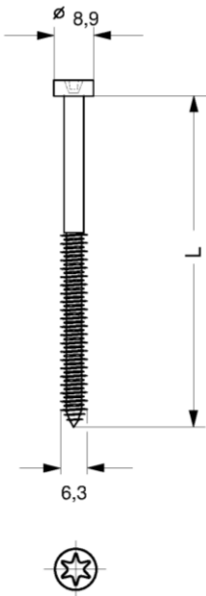
Annex 89



Zahn ZKSH oval module 6,0



Zahn ZBST 6,3 x L

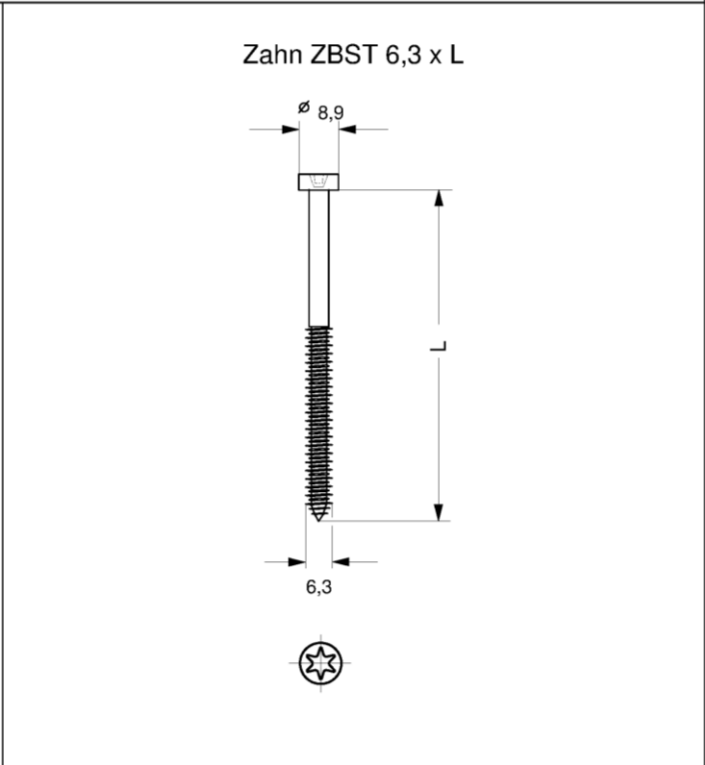
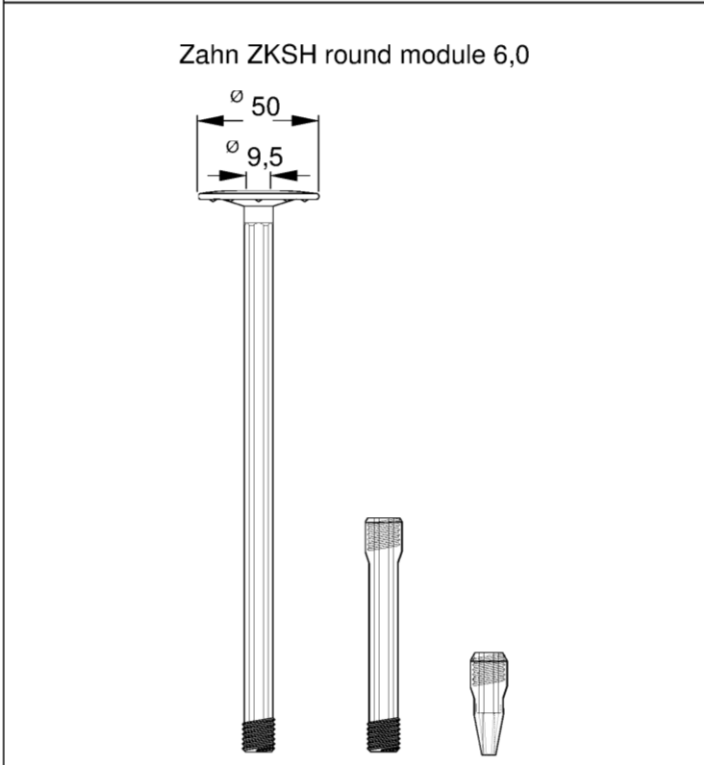


Zahn Flat Roof Fasteners

Combination 90
ZBSK-Modul 6,0 consisting of ZBST/ZKSH oval module with module middle piece and spike 6,0

Annex 90

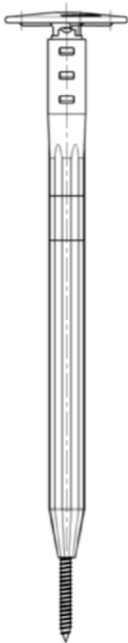
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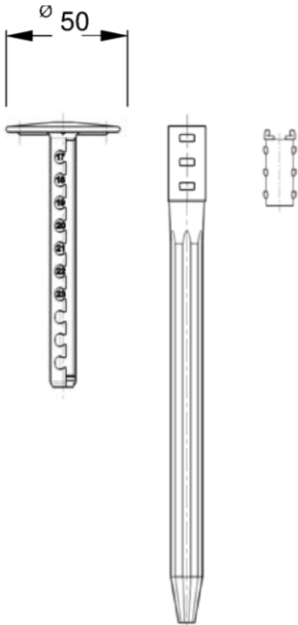
Zahn Flat Roof Fasteners
Combination 91 ZBSK-R-Modul 6,0 consisting of ZBST / ZKSH round module with module middle piece and spike 6,0

Annex 91

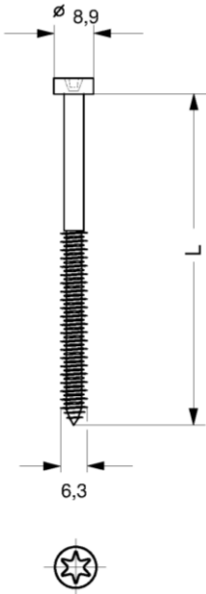
electronic copy of the eta by dibt: eta-08/0033



Zahn ZHVM



Zahn ZBST 6,3 x L

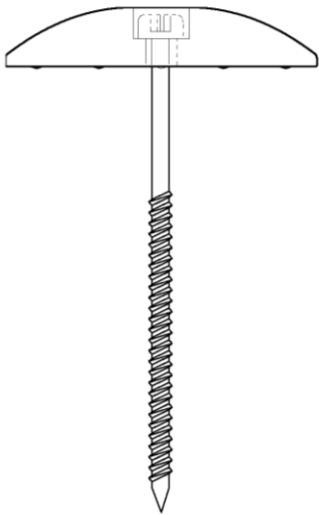


Zahn Flat Roof Fasteners

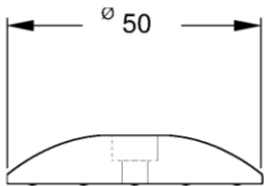
Combination 92
ZHVM-Concrete consisting of ZBST / ZHVM with headboard, shaft and locking sleeve

Annex 92

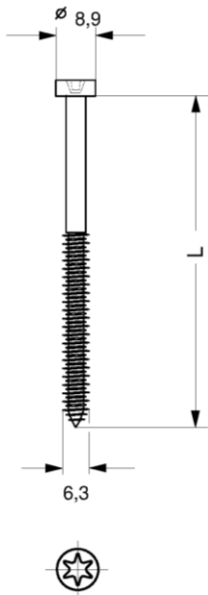
electronic copy of the eta by dibt: eta-08/0033



Zahn ZTSK 6,0



Zahn ZBST 6,3 x L

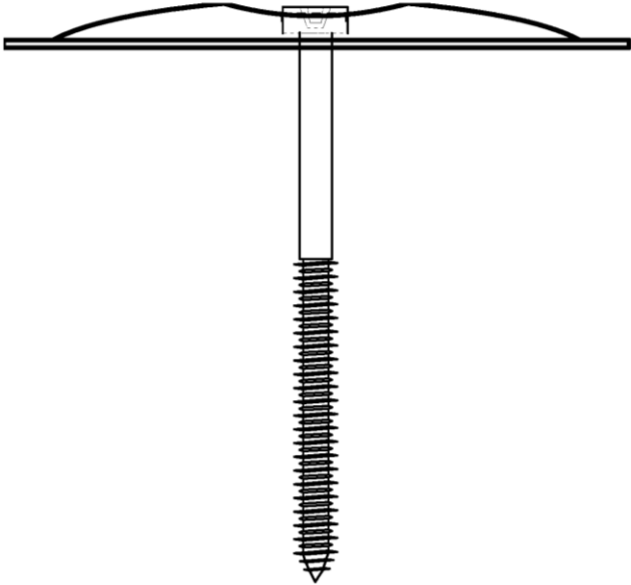


Zahn Flat Roof Fasteners

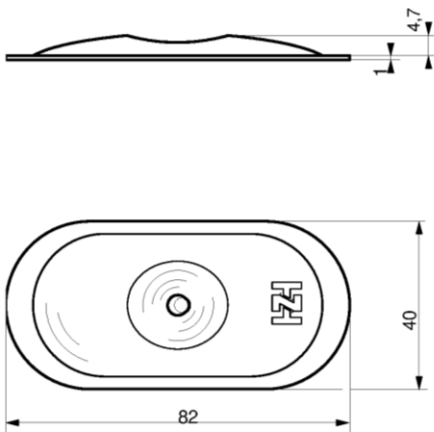
Combination 93
ZTSK-Concrete 6,0 consisting of ZBST / ZTSK 6,0

Annex 93

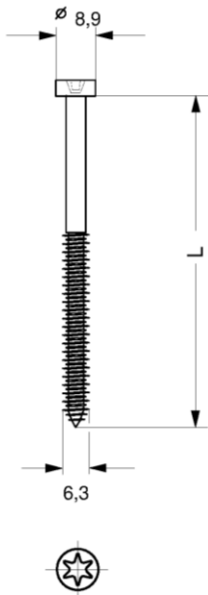
electronic copy of the eta by dibt: eta-08/0033



Zahn ZLVT 0008



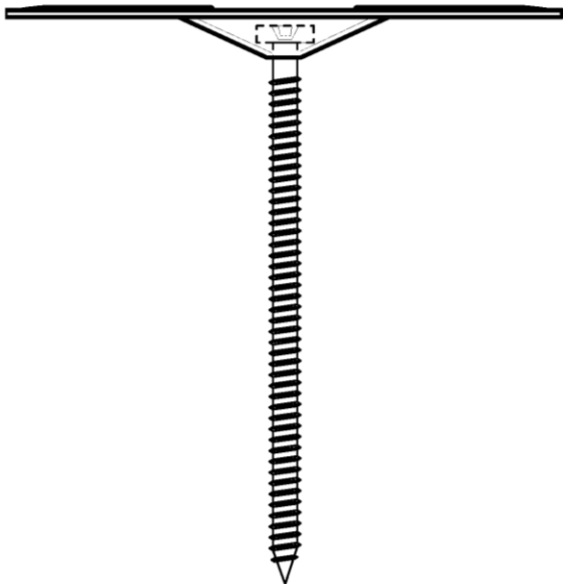
Zahn ZBST 6,3 x L



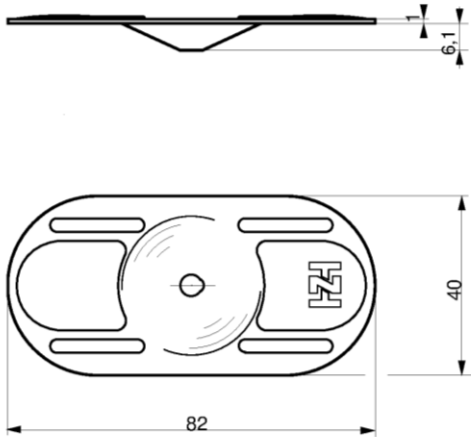
Zahn Flat Roof Fasteners

Combination 94
ZBST / ZLVT 0008

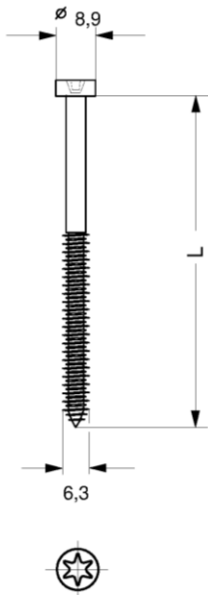
Annex 94



Zahn ZLVT 0012



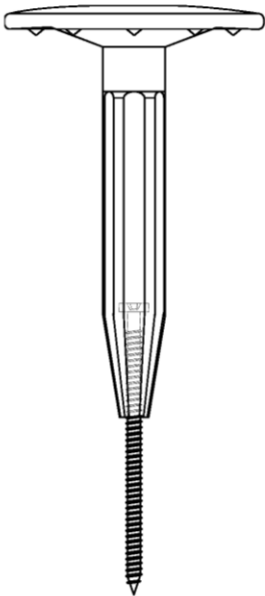
Zahn ZBST 6,3 x L



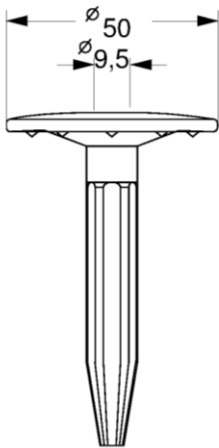
Zahn Flat Roof Fasteners

Combination 95
ZBST / ZLVT 0012

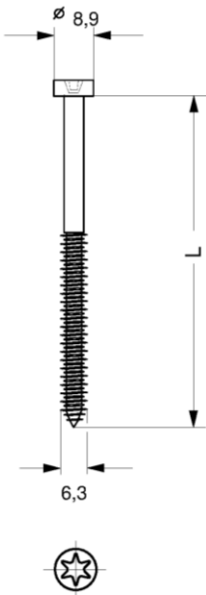
Annex 95



Zahn ZKSH gray / round



Zahn ZBST-E 6,3 x L

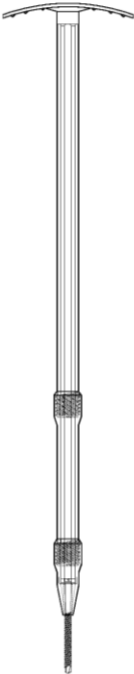


Zahn Flat Roof Fasteners

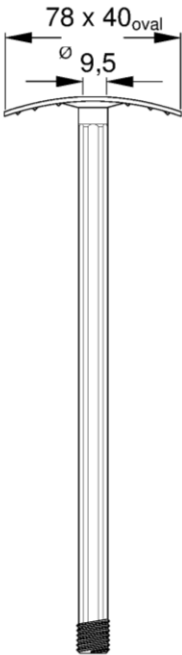
Combination 96
ZBSK-E/R consisting of ZBST -E / ZKSH gray / round

Annex 96

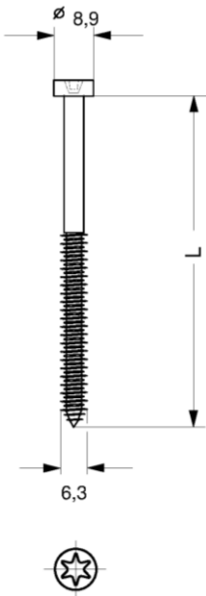
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH oval module 6,0



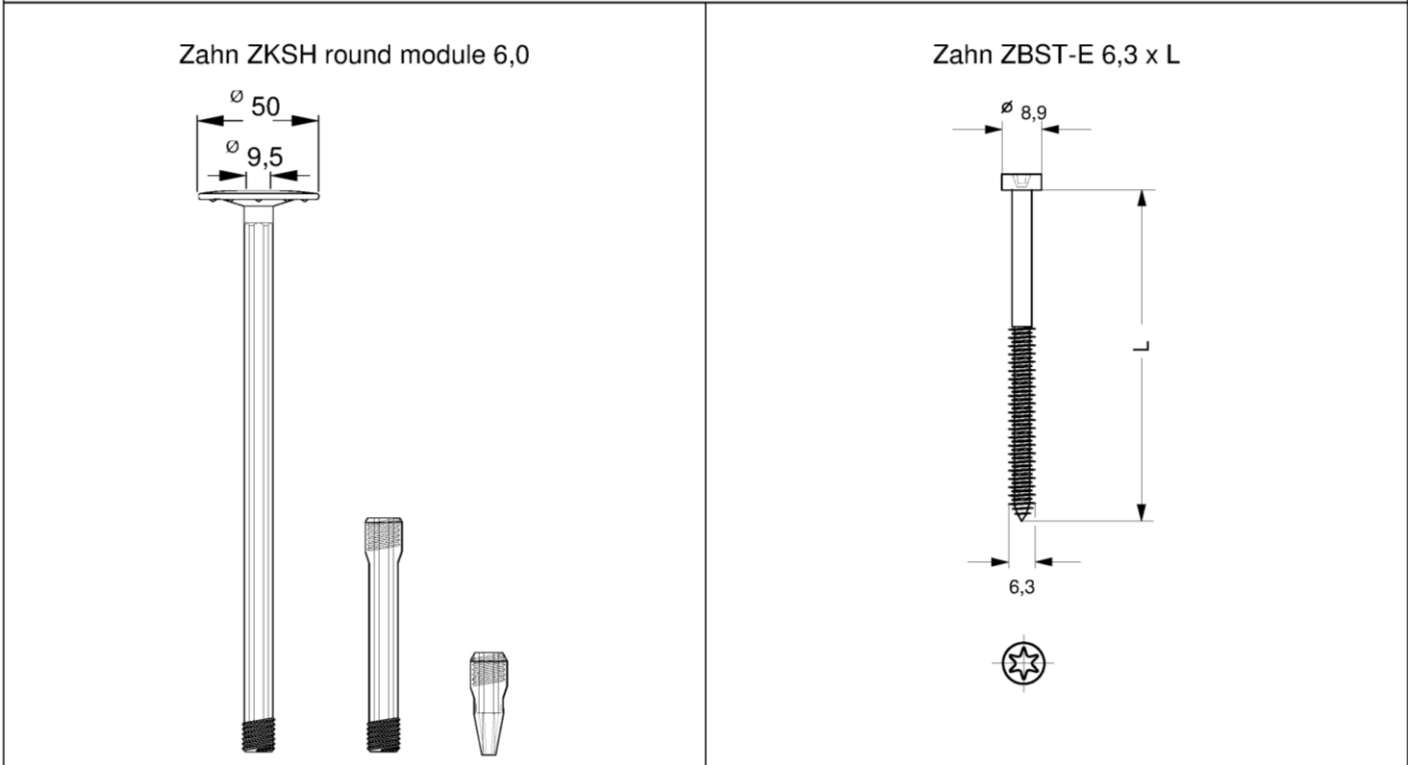
Zahn ZBST-E 6,3 x L



Zahn Flat Roof Fasteners

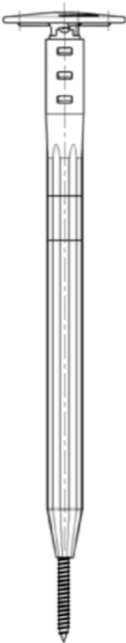
Combination 97
ZBSK-E-Modul 6,0 consisting of ZBST-E / ZKSH oval module with module middle piece and spike 6,0

Annex 97

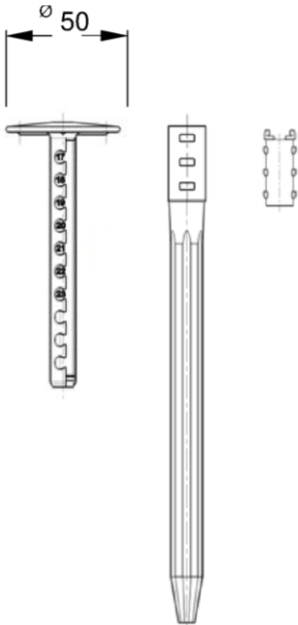


Zahn Flat Roof Fasteners	Annex 98
Combination 98 ZBSK-E/R-Modul 6,0 consisting of ZBST-E / ZKSH round module with module middle piece and spike 6,0	

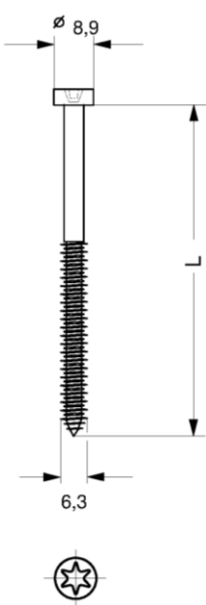
electronic copy of the eta by dibt: eta-08/0033



Zahn ZHVM



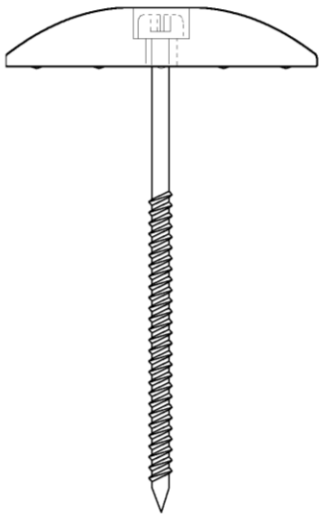
Zahn ZBST -E 6,3 x L



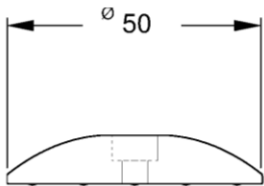
Zahn Flat Roof Fasteners

Combination 99
ZHVM-E-Concrete consisting of ZBST-E / ZHVM with headboard, shaft and locking sleeve

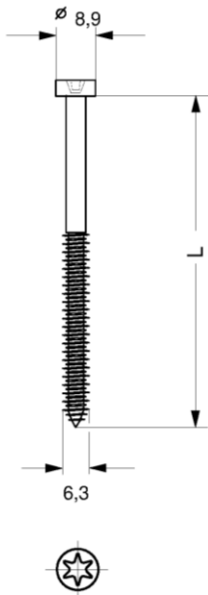
Annex 99



Zahn ZTSK 6,0



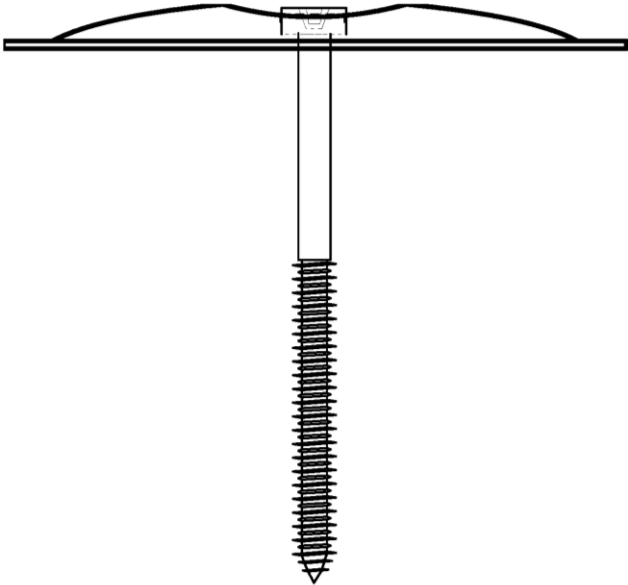
Zahn ZBST-E 6,3 x L



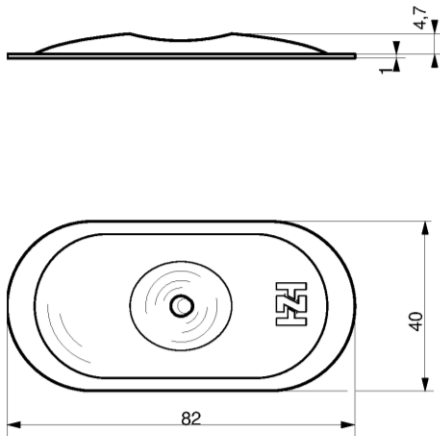
Zahn Flat Roof Fasteners

Combination 100
ZTSK-E-Concrete 6,0 consisting of ZBST-E / ZTSK 6,0

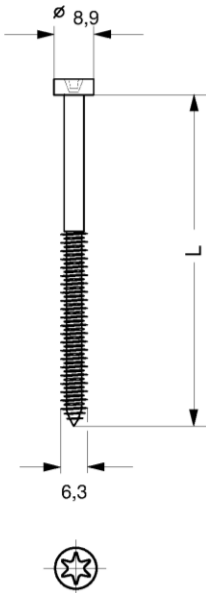
Annex 100



Zahn ZLVT 0008



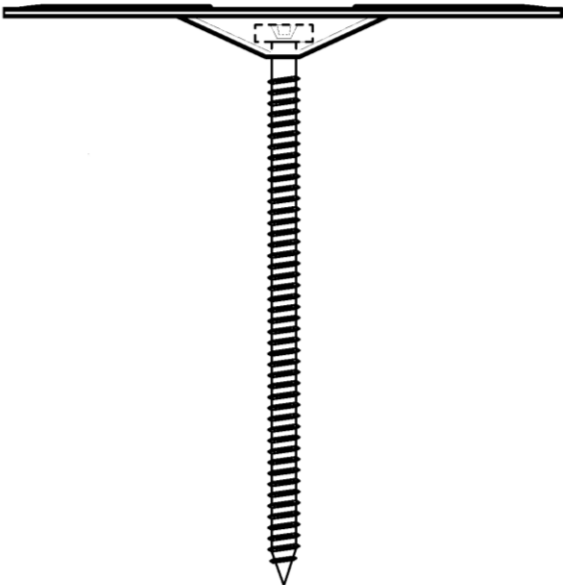
Zahn ZBST-E 6,3 x L



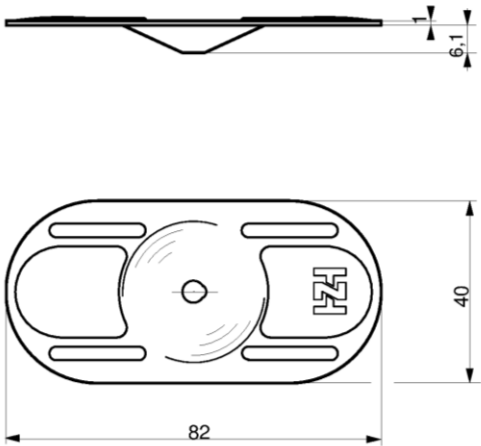
Zahn Flat Roof Fasteners

Combination 101
ZBST-E / ZLVT 0008

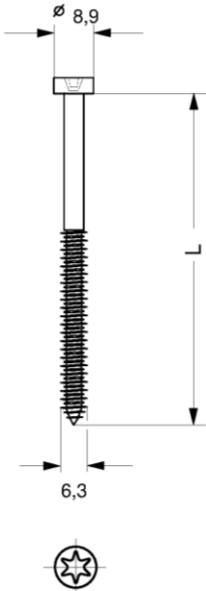
Annex 101



Zahn ZLVT 0012



Zahn ZBST-E 6,3 x L

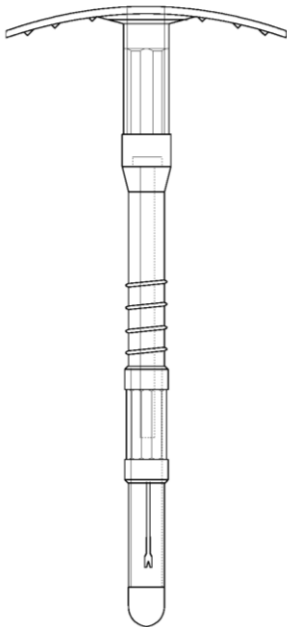


Zahn Flat Roof Fasteners

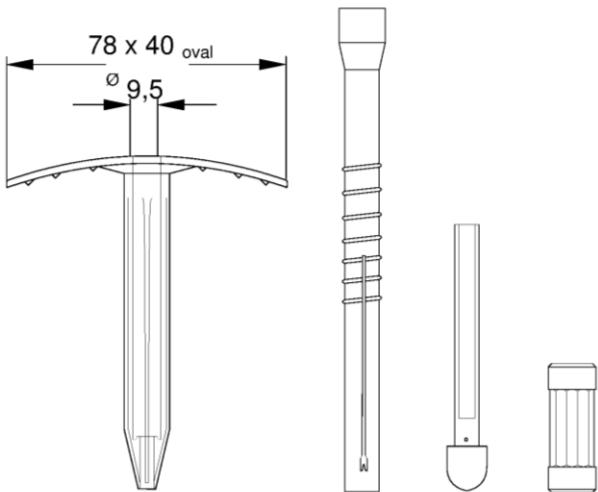
Combination 102
ZBST-E / ZLVT 0012

Annex 102

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Zahn ZHRD oval with expanding dowel extension



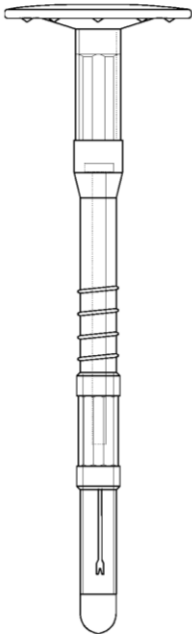
Zahn metric screw -E 3,14 x L



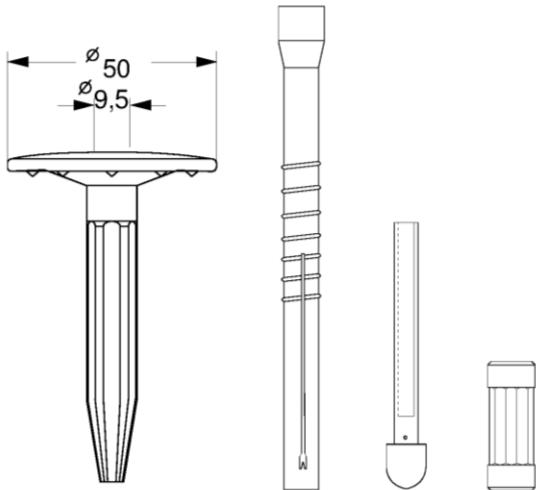
Zahn Flat Roof Fasteners

Combination 103
ZHRD consisting of metr. screw-E / ZKSH oval with expanding dowel extension

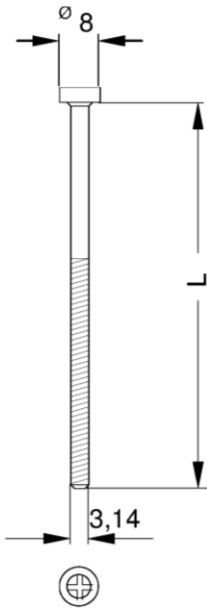
Annex 103



Zahn ZHRD round with expanding dowel extension



Zahn metric screw-E 3,14 x L



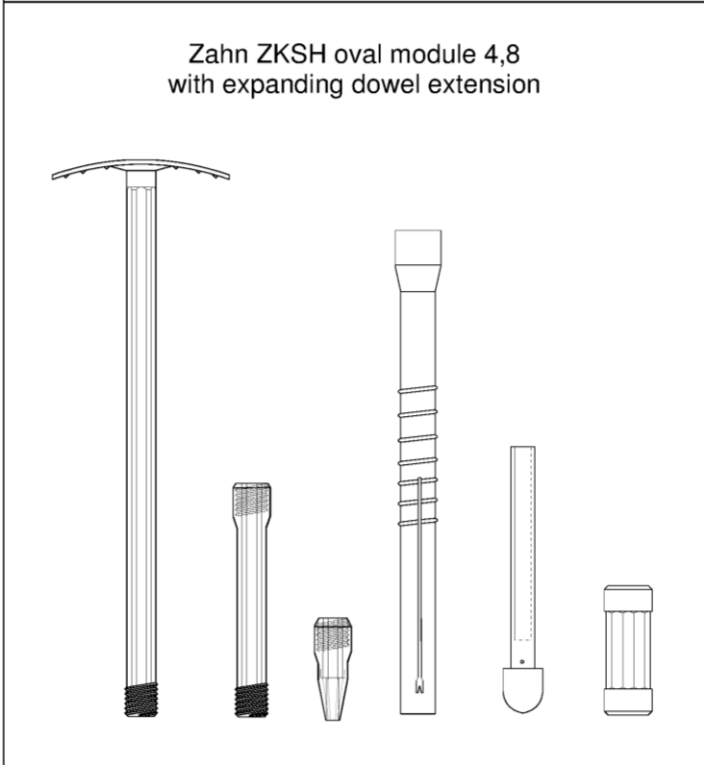
Zahn Flat Roof Fasteners

Combination 104
ZHRD-R consisting of metr. screw-E / ZKSH round with expanding dowel extension

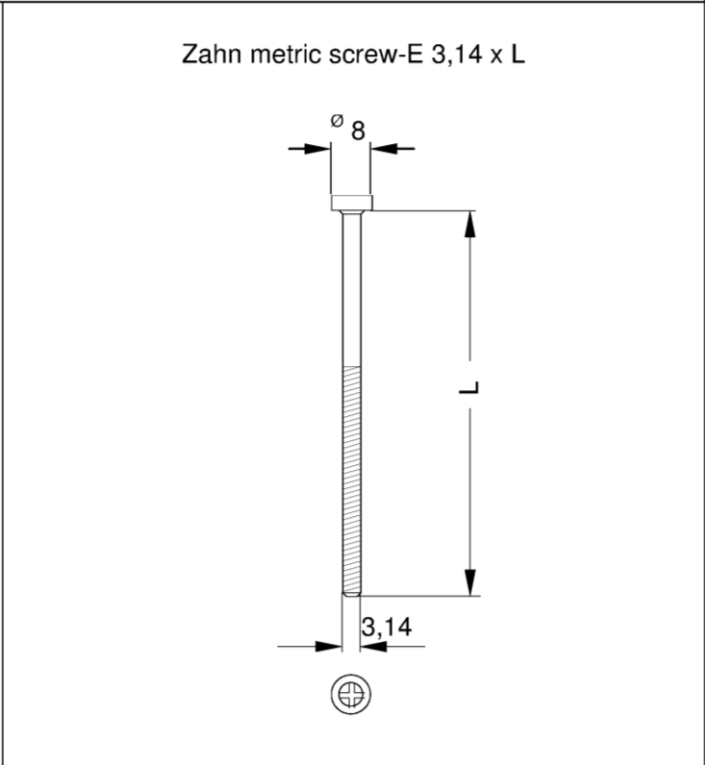
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Zahn ZKSH oval module 4,8
with expanding dowel extension



Zahn metric screw-E 3,14 x L



Zahn Flat Roof Fasteners

Combination 105
metric screw-E / ZKSH oval module with middle piece, spike 4,8 and expanding dowel ext.

ZHRD-on-Modul 4,8

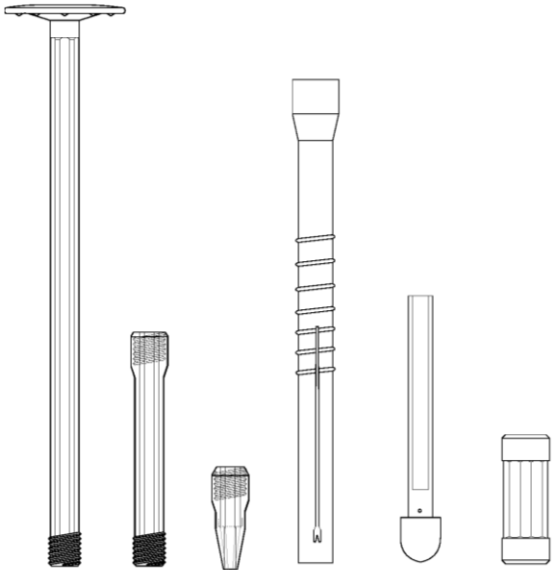
consisting of

Annex 105

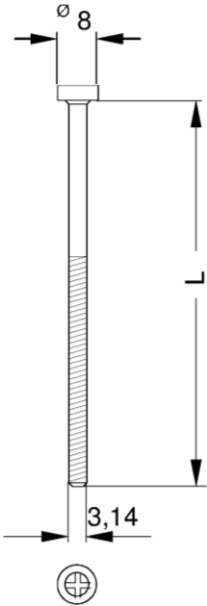
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH round module 4,8
with expanding dowel extension



Zahn metric screw-E 3,14 x L

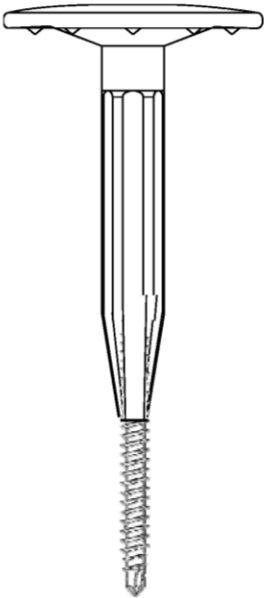


Zahn Flat Roof Fasteners

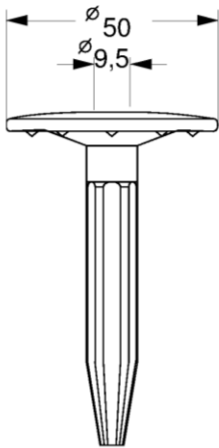
Combination 106 ZHRD-on-Modul-R 4,8 consisting of
metric screw-E / ZKSH round module with middle piece, spike 4,8 and expanding dowel ext.

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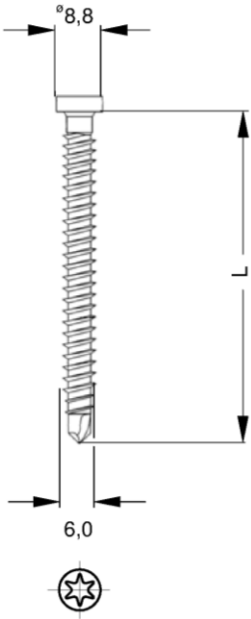
electronic copy of the eta by dibt: eta-08/0033



Zahn ZKSH gray / round



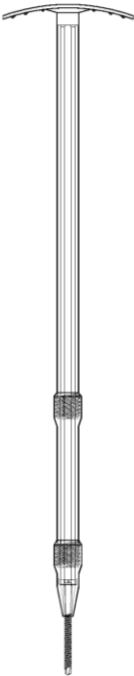
Zahn ZMDS 6,0 x L



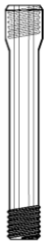
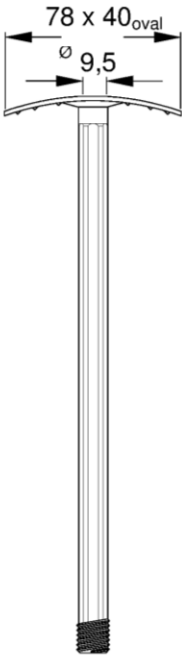
Zahn Flat Roof Fasteners

Combination 107
ZMDS-R consisting of ZMDS / ZKSH gray / round

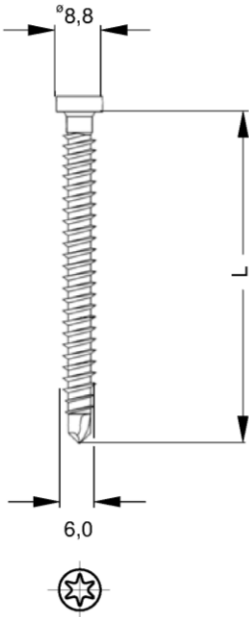
Annex 107



Zahn ZKSH oval module 6,0



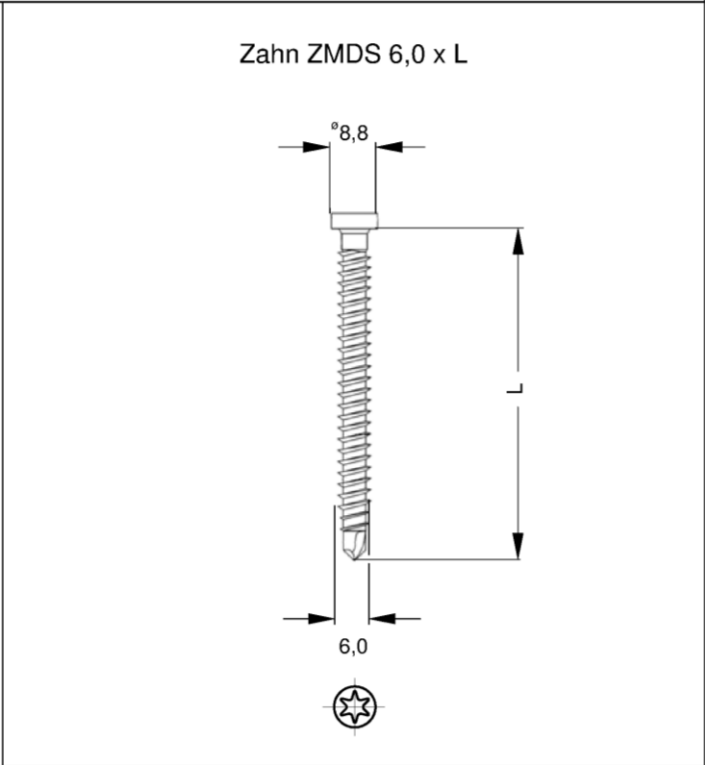
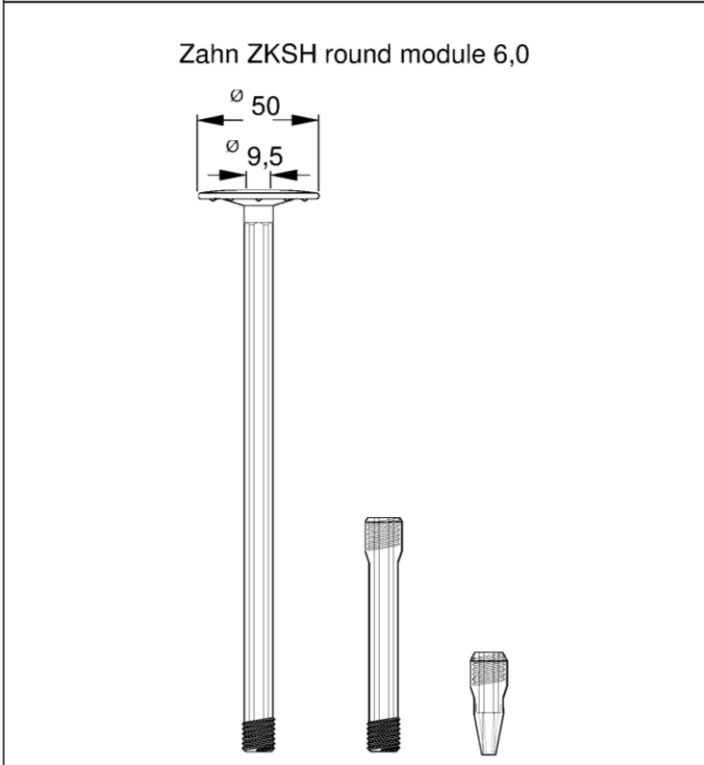
Zahn ZMDS 6,0 x L



Zahn Flat Roof Fasteners

Combination 108
ZMDS-Modul 6,0 consisting of ZMDS / ZKSH oval module with module middle piece and spike 6,0

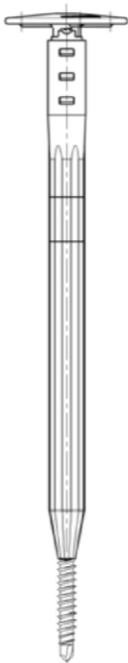
Annex 108



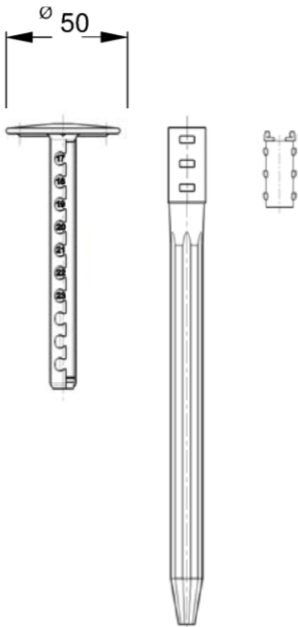
Zahn Flat Roof Fasteners
Combination 109 ZMDS-R-Modul 6,0 consisting of ZMDS / ZKSH round module with module middle piece and spike 6,0

Annex 109

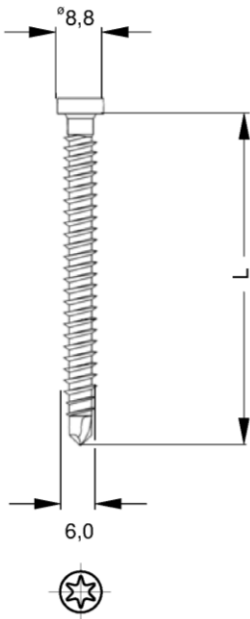
electronic copy of the eta by dibt: eta-08/0033



Zahn ZHVM



Zahn ZMDS 6,0 x L



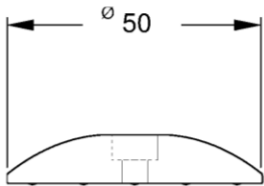
Zahn Flat Roof Fasteners

Combination 110
ZHVM-Multi consisting of ZMDS / ZHVM with headboard, shaft and locking sleeve

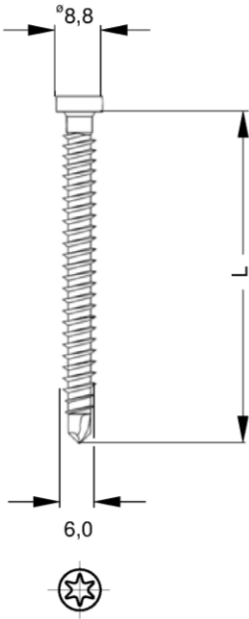
Annex 110



Zahn ZTSK 6,0



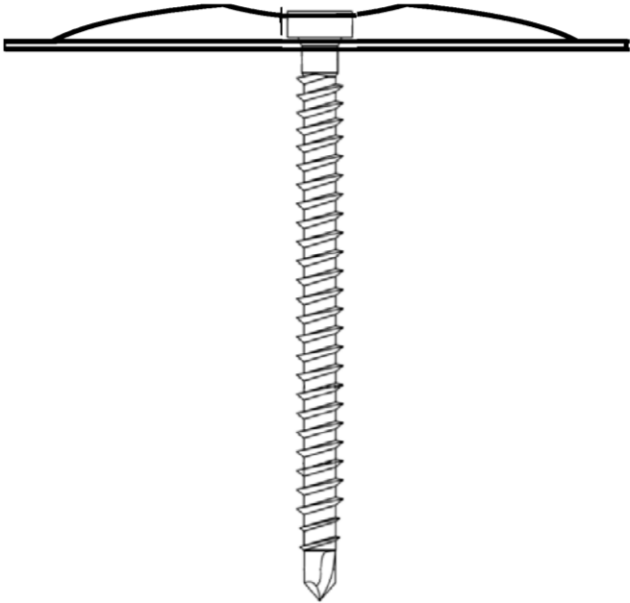
Zahn ZMDS 6,0 x L



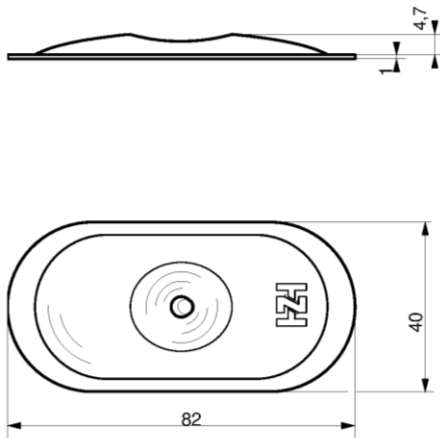
Zahn Flat Roof Fasteners

Combination 111
ZTSK-Multi 6,0 consisting of ZMDS / ZTSK 6,0

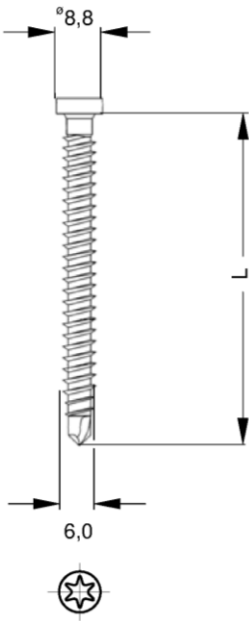
Annex 111



Zahn ZLVT 0008



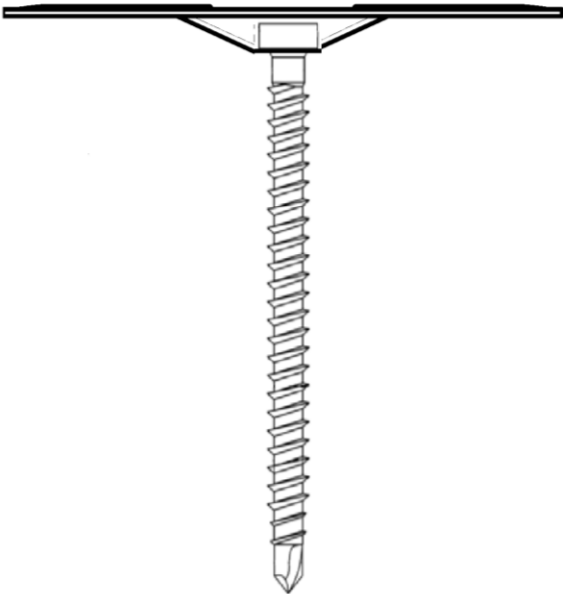
Zahn ZMDS 6,0 x L



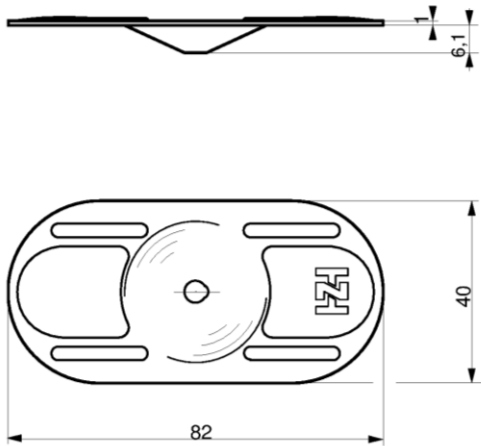
Zahn Flat Roof Fasteners

Combination 112
ZMDS / ZLVT 0008

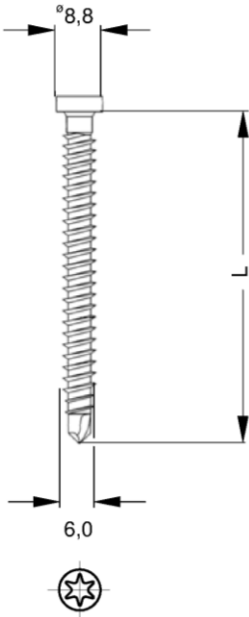
Annex 112



Zahn ZLVT 0012



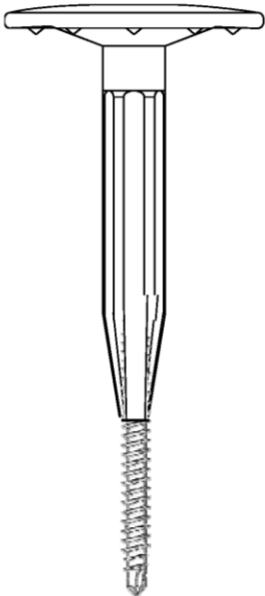
Zahn ZMDS 6,0 x L



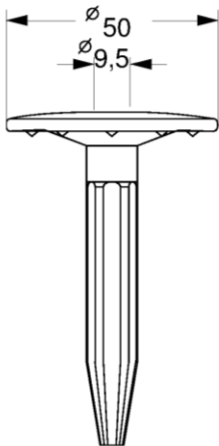
Zahn Flat Roof Fasteners

Combination 113
ZMDS / ZLVT 0012

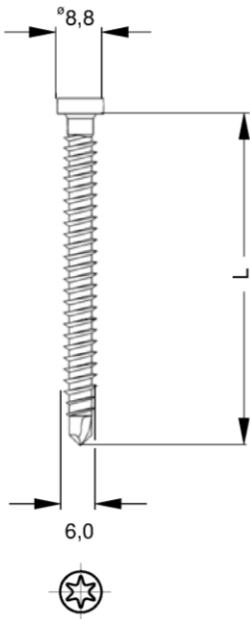
Annex 113



Zahn ZKSH gray / round



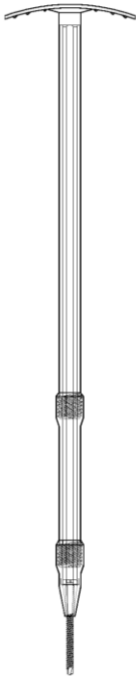
Zahn ZMDS-E 6,0 x L



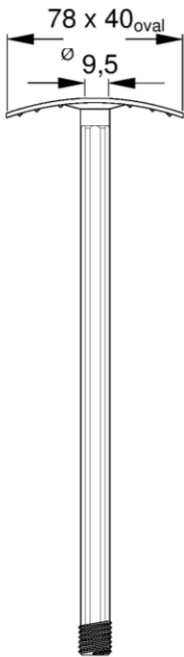
Zahn Flat Roof Fasteners

Combination 114
ZMDS-E/R consisting of ZMDS-E / ZKSH gray / round

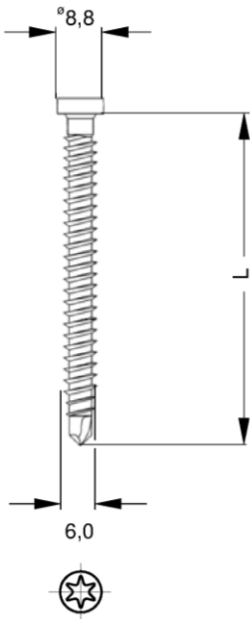
Annex 114



Zahn ZKSH oval module 6,0



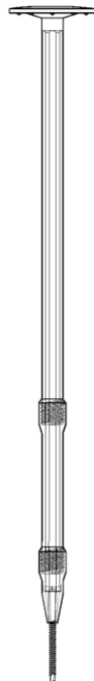
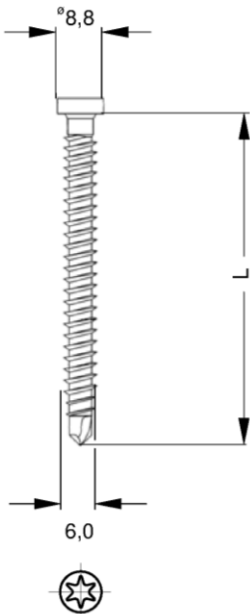
Zahn ZMDS-E 6,0 x L



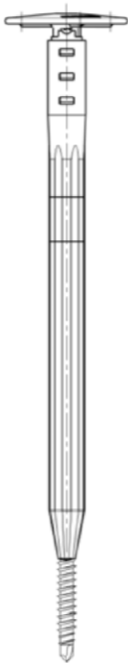
Zahn Flat Roof Fasteners

Combination 115
ZMDS-E-Modul 6,0 consisting of ZMDS-E/ZKSH oval module with module middle piece and spike 6,0

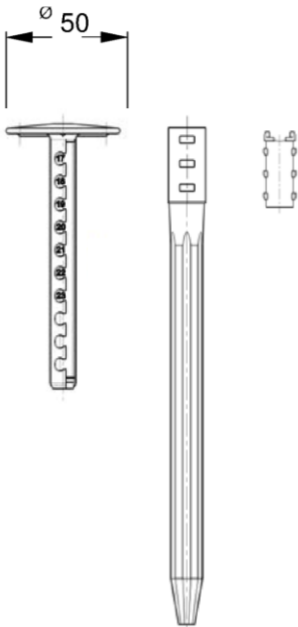
Annex 115

		
Zahn ZKSH round module 6,0 	Zahn ZMDS-E 6,0 x L 	
Zahn Flat Roof Fasteners		Annex 116
Combination 116 ZMDS-E/R-Modul 6,0 consisting of ZMDS-E/ZKSH round module with module middle piece and spike 6,0		

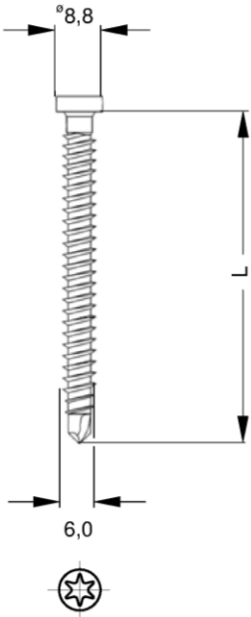
electronic copy of the eta by dibt: eta-08/0033



Zahn ZHVM



Zahn ZMDS-E 6,0 x L



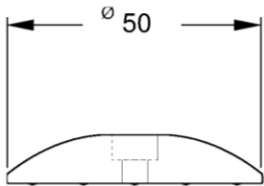
Zahn Flat Roof Fasteners

Combination 117
ZHVM-E-Multi consisting of ZMDS-E / ZHVM with headboard, shaft and locking sleeve

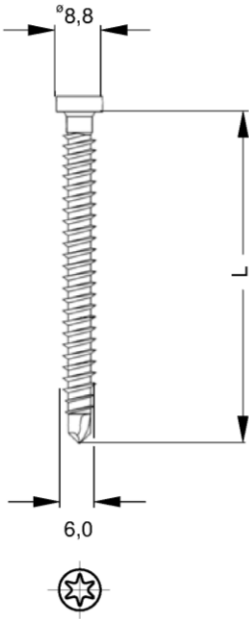
Annex 117



Zahn ZTSK 6,0



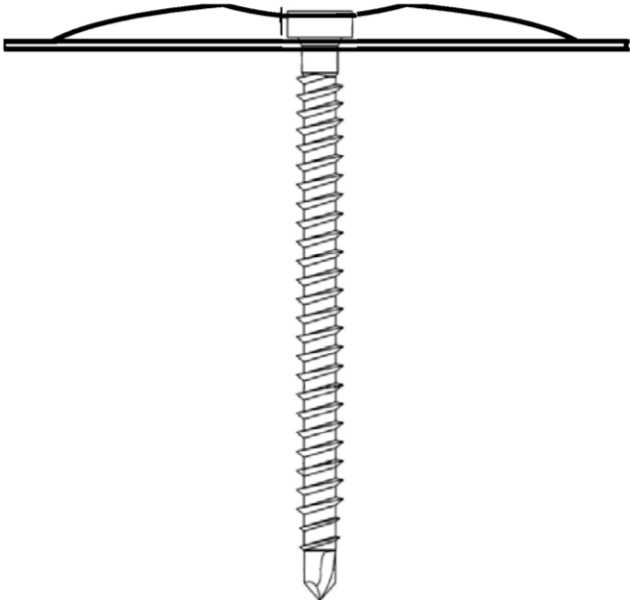
Zahn ZMDS-E 6,0 x L



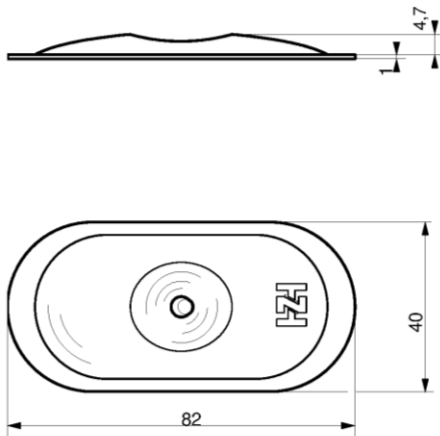
Zahn Flat Roof Fasteners

Combination 118
ZTSK-E 6,0 consisting of ZMDS-E / ZTSK 6,0

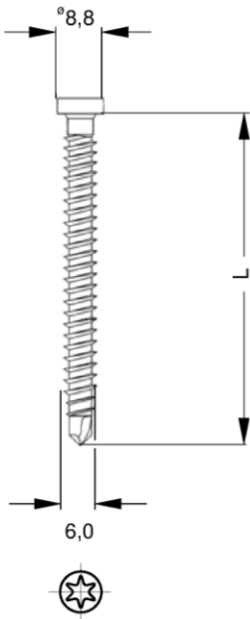
Annex 118



Zahn ZLVT 0008



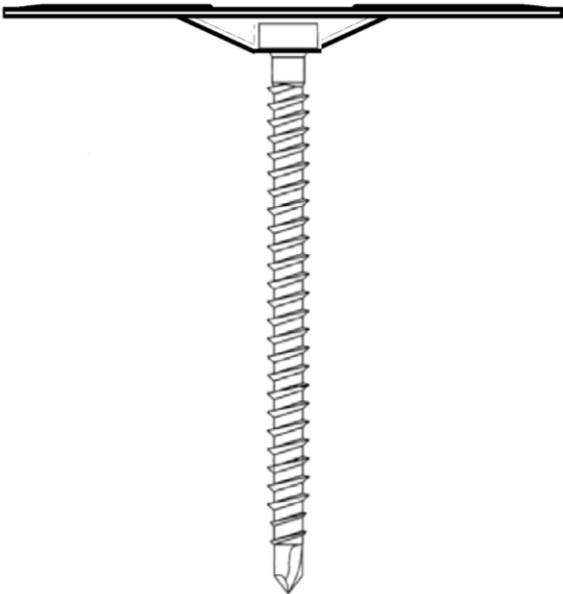
Zahn ZMDS-E 6,0 x L



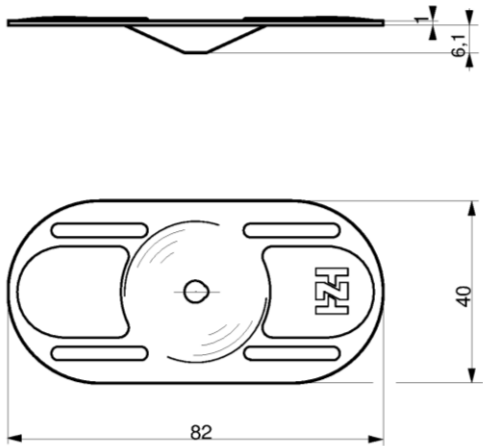
Zahn Flat Roof Fasteners

Combination 119
ZMDS-E / ZLVT 0008

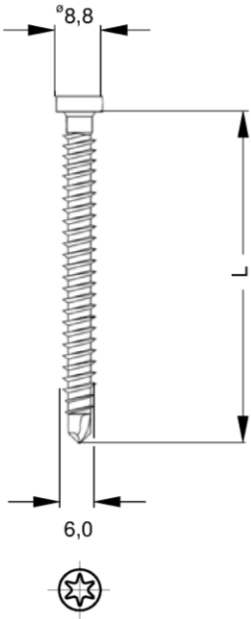
Annex 119



Zahn ZLVT 0012



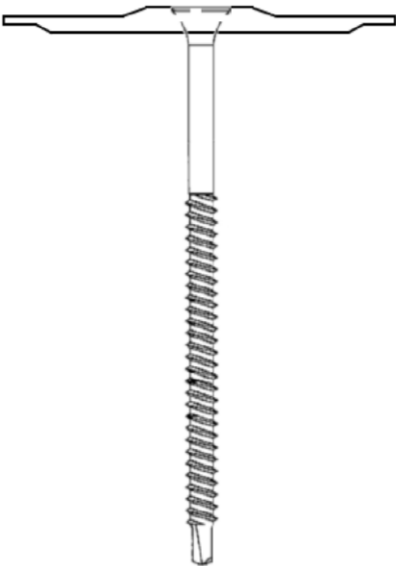
Zahn ZMDS-E 6,0 x L



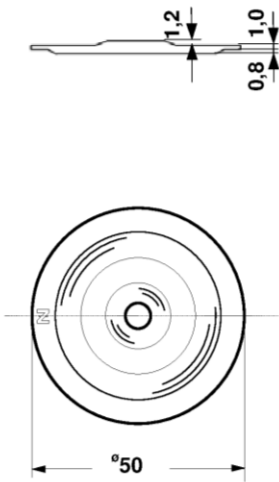
Zahn Flat Roof Fasteners

Combination 120
ZMDS-E / ZLVT 0012

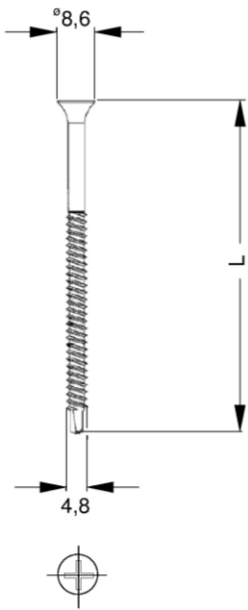
Annex 120



Zahn ZLVT 0016



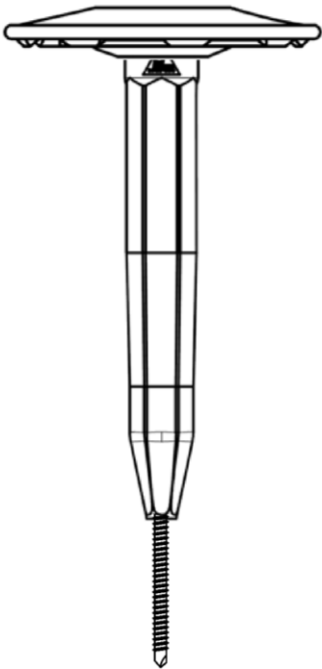
Zahn ZDBK-TK 4,8 x L



Zahn Flat Roof Fasteners

Combination 121
ZDBK-TK / ZLVT 0016

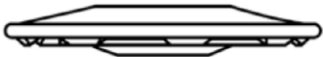
Annex 121



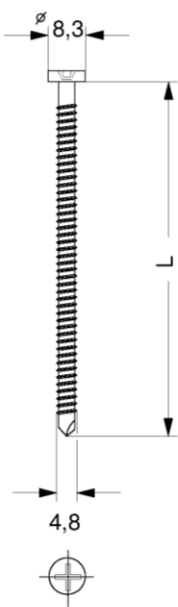
ZSSB 4,8



clickplate



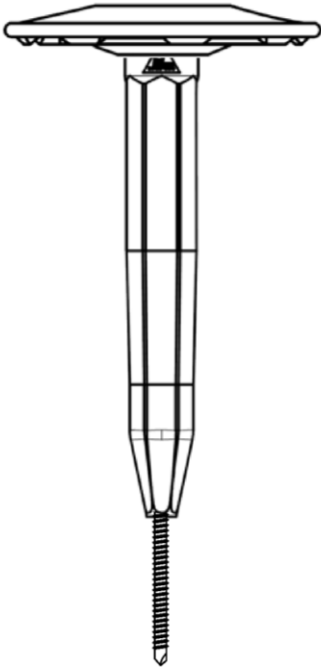
Zahn ZDBK 4,8 x L



Zahn Flat Roof Fasteners

Combination 122
ZSSB 4,8 / clickplate / ZDBK 4,8

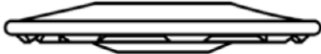
Annex 122



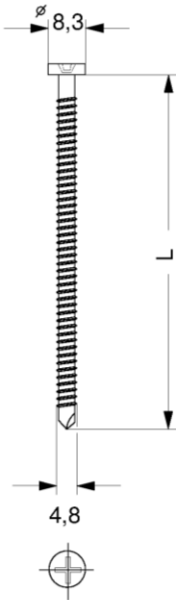
ZSSB 4,8



clickplate



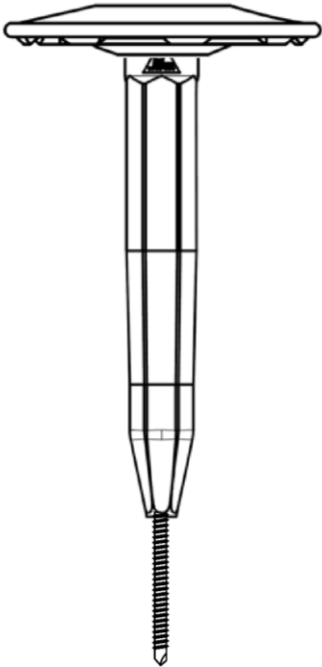
Zahn ZDBK-E 4,8 x L



Zahn Flat Roof Fasteners

Combination 123
ZSSB 4,8 / clickplate / ZDBK-E 4,8

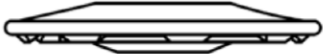
Annex 123



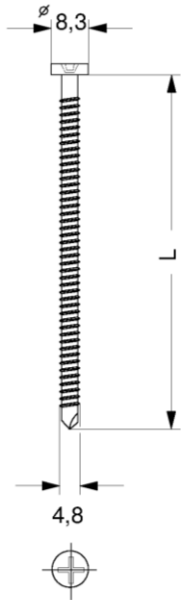
ZSSB 4,8



clickplate



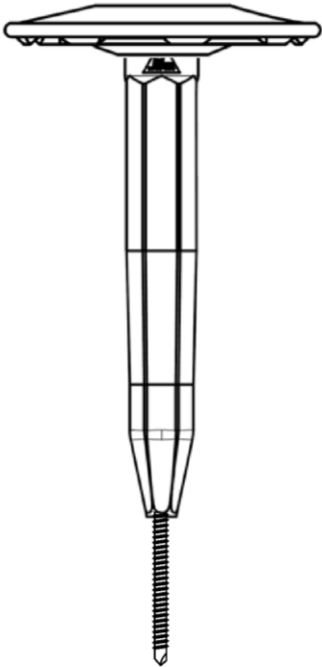
Zahn ZDBK-VB 4,8 x L



Zahn Flat Roof Fasteners

Combination 124
ZSSB 4,8 / clickplate / ZDBK-VB 4,8

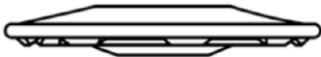
Annex 124



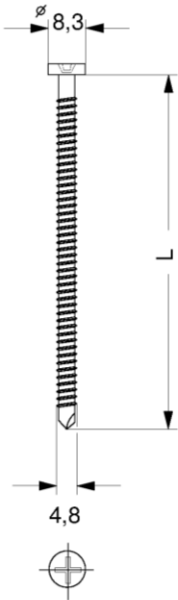
ZSSB 4,8



clickplate



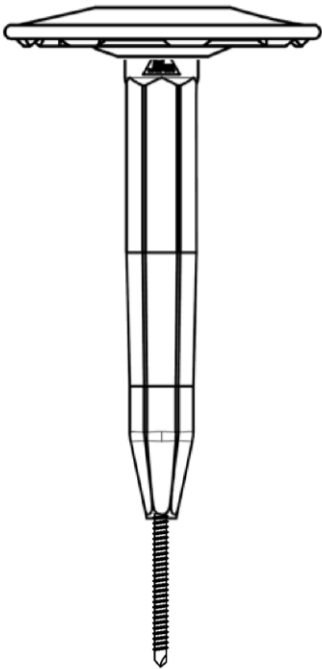
Zahn ZDBK-VB-E 4,8 x L



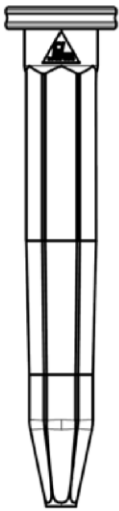
Zahn Flat Roof Fasteners

Combination 125
ZSSB 4,8 / clickplate / ZDBK-VB-E 4,8

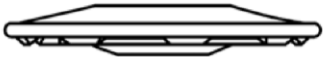
Annex 125



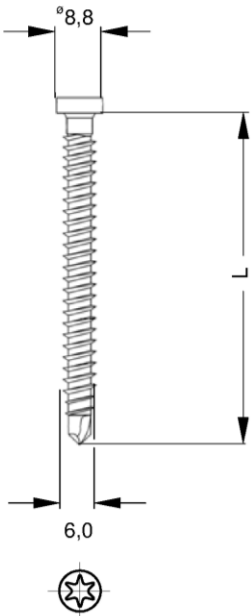
ZSSB 6,0



clickplate



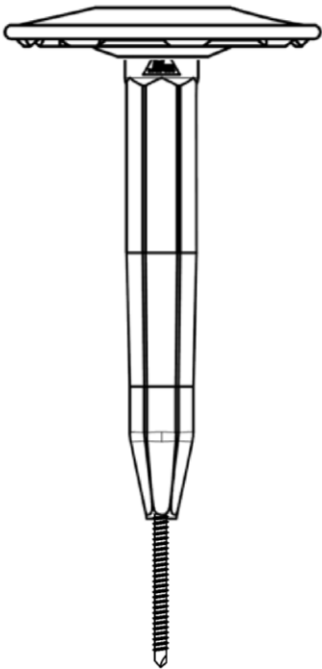
Zahn ZMDS 6,0 x L



Zahn Flat Roof Fasteners

Combination 126
ZSSB 6,0 / clickplate / ZMDS 6,0

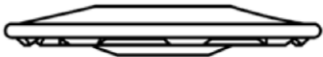
Annex 126



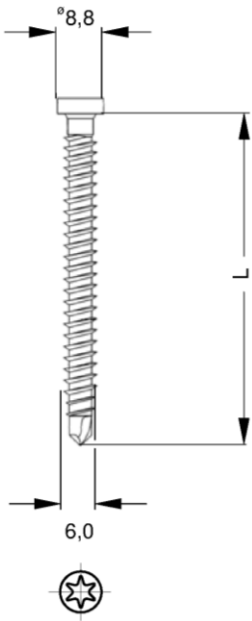
ZSSB 6,0



clickplate



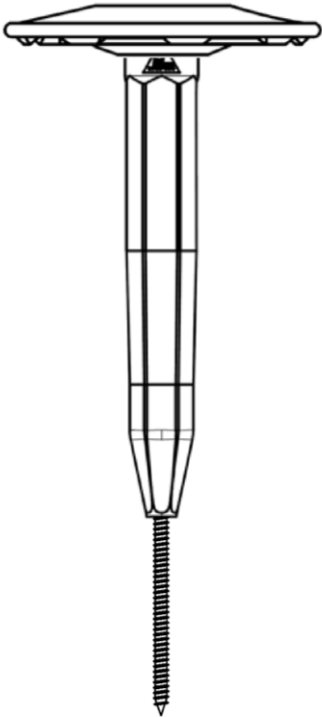
Zahn ZMDS-E 6,0 x L



Zahn Flat Roof Fasteners

Combination 127
ZSSB 6,0 / clickplate / ZMDS-E 6,0

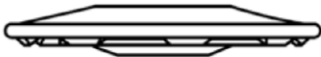
Annex 127



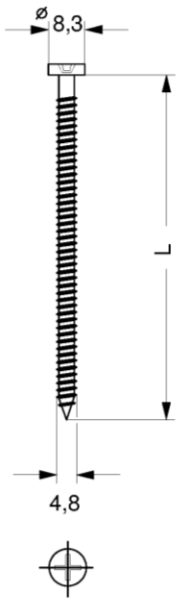
ZSSB 4,8



clickplate



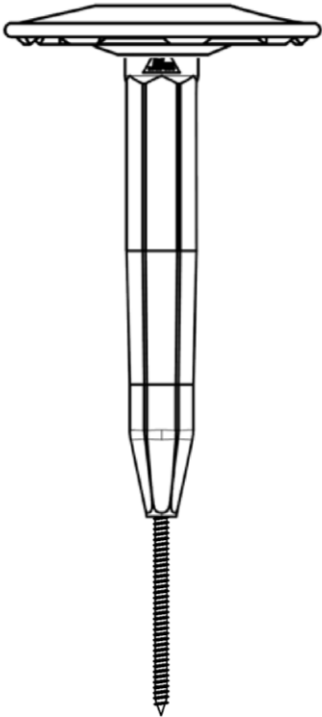
Zahn ZHBK 4,8 x L



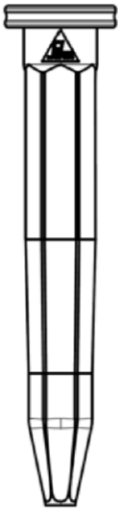
Zahn Flat Roof Fasteners

Combination 128
ZSSB 4,8 / clickplate / ZHBK 4,8

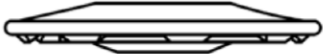
Annex 128



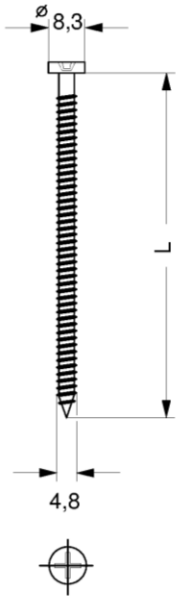
ZSSB 4,8



clickplate



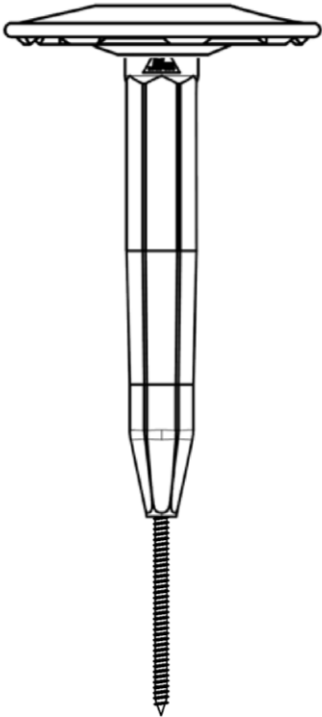
Zahn ZHBK-E 4,8 x L



Zahn Flat Roof Fasteners

Combination 129
ZSSB 4,8 / clickplate / ZHBK-E 4,8

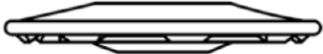
Annex 129



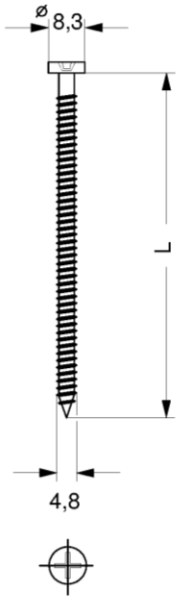
ZSSB 4,8



clickplate



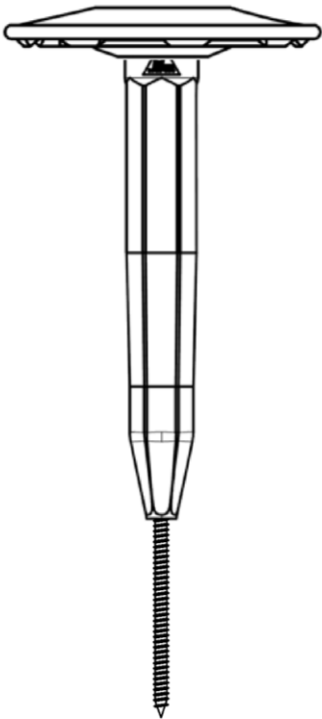
Zahn ZDBK dowel 4,8 x L



Zahn Flat Roof Fasteners

Combination 130
ZSSB 4,8 / clickplate / ZDBK-Dowel 4,8

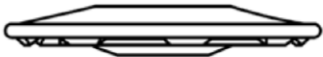
Annex 130



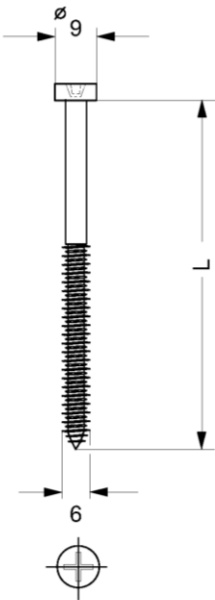
ZSSB 6,0



clickplate



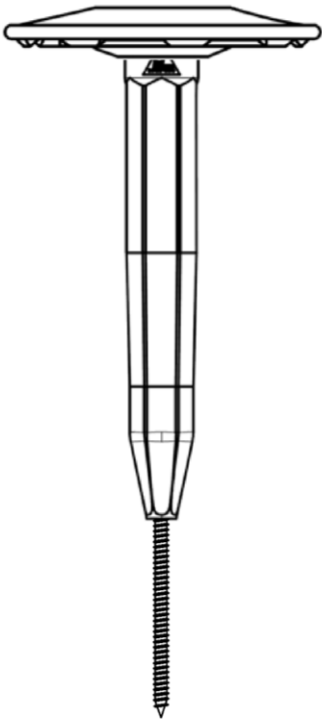
Zahn ZGBK-E 6,0 x L



Zahn Flat Roof Fasteners

Combination 131
ZSSB 6,0 / clickplate / ZGBK-E 6,0

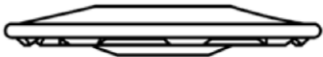
Annex 131



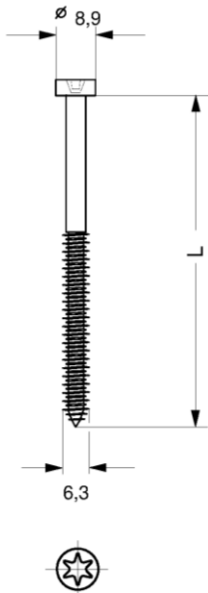
ZSSB 6,0



clickplate



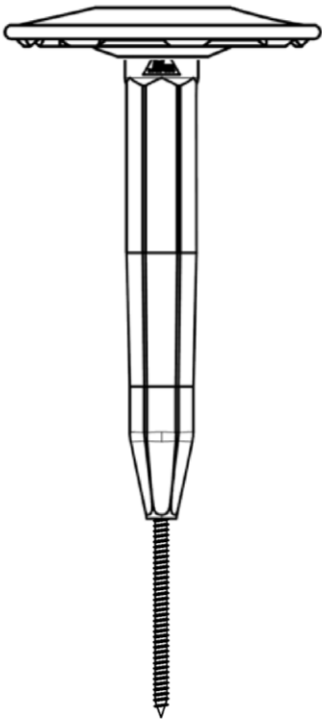
Zahn ZBST 6,3 x L



Zahn Flat Roof Fasteners

Combination 132
ZSSB 6,0 / clickplate / ZBST 6,3

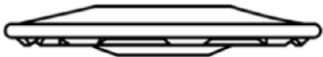
Annex 132



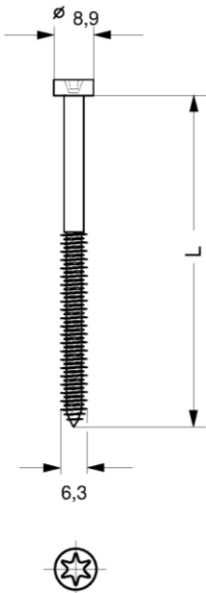
ZSSB 6,0



clickplate



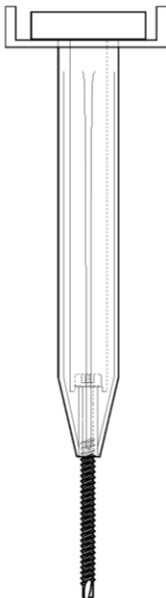
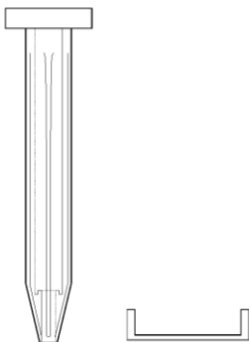
Zahn ZBST-E 6,3 x L



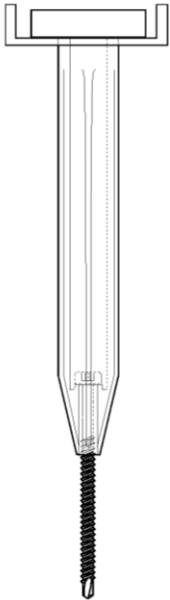
Zahn Flat Roof Fasteners

Combination 133
ZSSB 6,0 / clickplate / ZBST-E 6,3

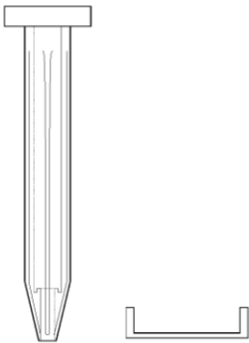
Annex 133

		
Zahn ZSSB-pipe 4,8 with bar 	Zahn ZDBK 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 134
Combination 134 ZSSB 4,8 consisting of ZDBK / ZSSB-pipe 4,8 and bar		

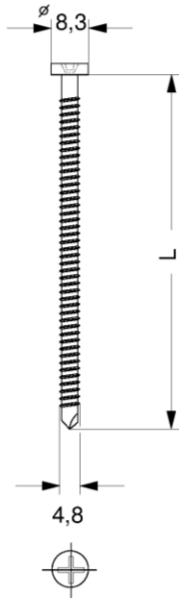
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Zahn ZSSB-pipe 4,8 with bar



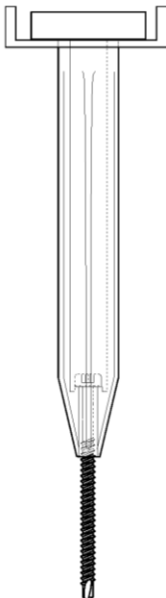
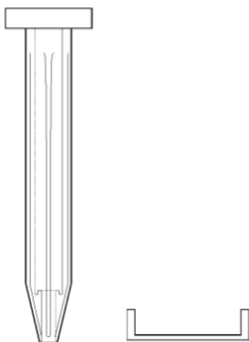
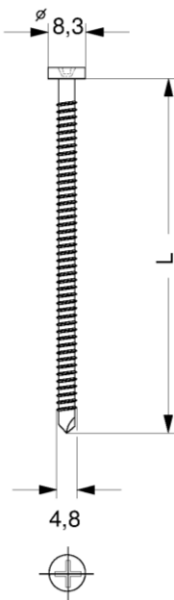
Zahn ZDBK-E 4,8 x L



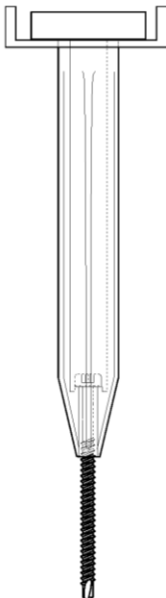
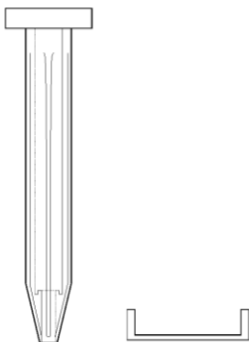
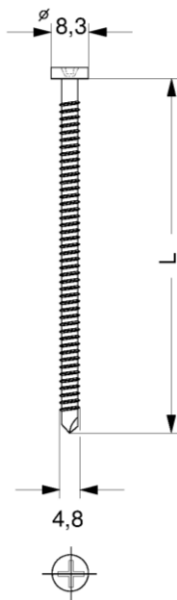
Zahn Flat Roof Fasteners

Combination 135
ZSSB-E 4,8 consisting of ZDBK-E / ZSSB-pipe 4,8 and bar

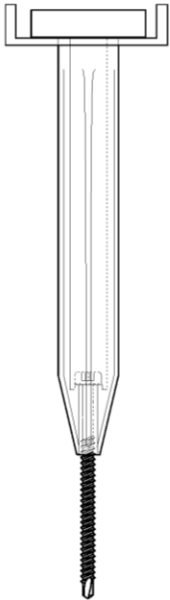
Annex 135

		
Zahn ZSSB-pipe 4,8 with bar 	Zahn ZDBK-VB 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 136
Combination 136 ZSSB-VB 4,8 consisting of ZDBK-VB / ZSSB-pipe 4,8 and bar		

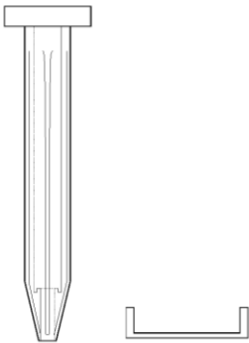
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-pipe 4,8 with bar 	Zahn ZDBK-VB-E 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 137
Combination 137 ZSSB-VB-E 4,8 consisting of ZDBK-VB-E / ZSSB-pipe 4,8 and bar		

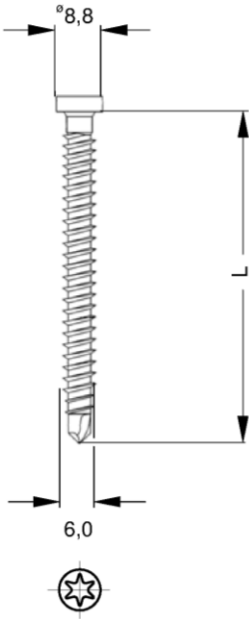
electronic copy of the eta by dibt: eta-08/0033



Zahn ZSSB-pipe 6,0 with bar



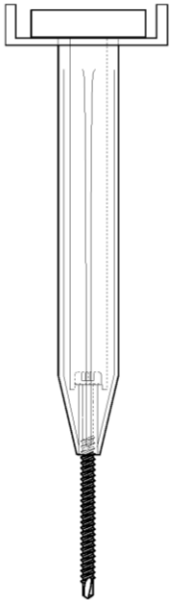
Zahn ZMDS 6,0 x L



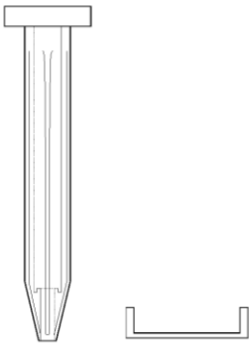
Zahn Flat Roof Fasteners

Combination 138
ZSSB 6,0 consisting of ZMDS / ZSSB-pipe 6,0 and bar

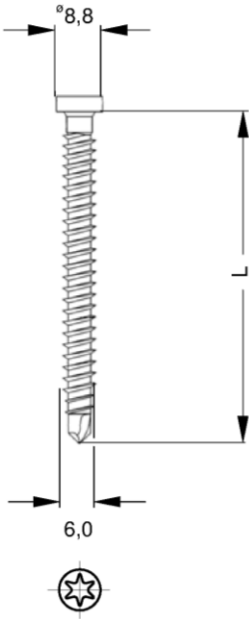
Annex 138



Zahn ZSSB-pipe 6,0 with bar



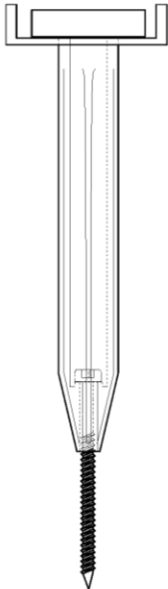
Zahn ZMDS-E 6,0 x L



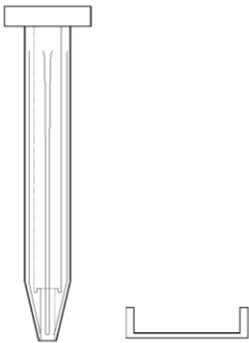
Zahn Flat Roof Fasteners

Combination 139
ZSSB-E 6,0 consisting of ZMDS-E / ZSSB-pipe 6,0 and bar

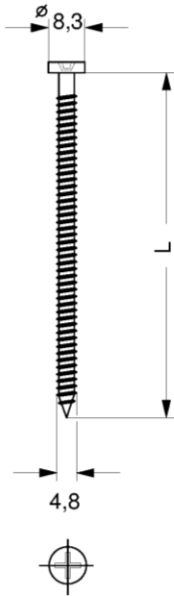
Annex 139



Zahn ZSSB-pipe 4,8 with bar



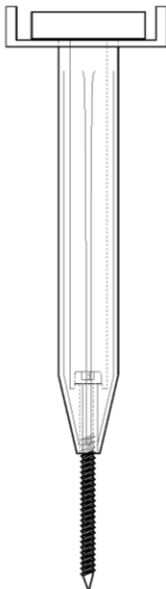
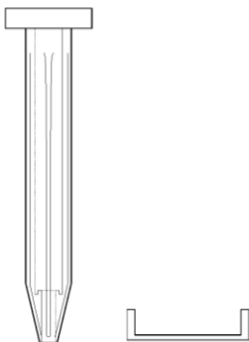
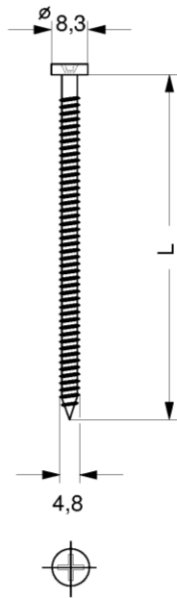
Zahn ZHBK 4,8 x L



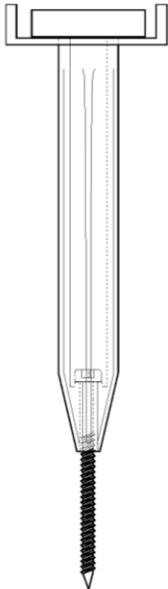
Zahn Flat Roof Fasteners

Combination 140
ZSSB-Timber 4,8 consisting of ZHBK / ZSSB-pipe 4,8 and bar

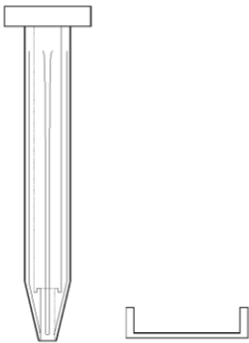
Annex 140

		
Zahn ZSSB-pipe 4,8 with bar 	Zahn ZHBK-E 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 141
Combination 141 ZSSB-E-Timber consisting of ZHBK-E / ZSSB-pipe 4,8 and bar		

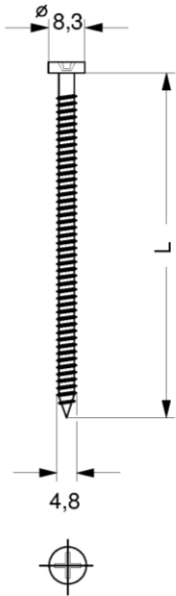
electronic copy of the eta by dibt: eta-08/0033



Zahn ZSSB-pipe 4,8 with bar



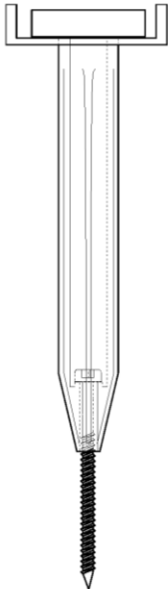
Zahn ZDBK _{dowel} 4,8 x L



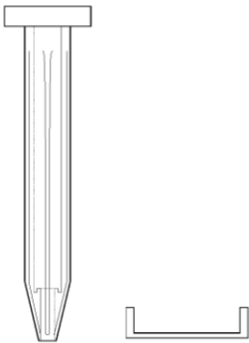
Zahn Flat Roof Fasteners

Combination 142
ZSSB-Dowel 4,8 consisting of ZDBK _{dowel} / ZSSB-pipe 4,8 and bar

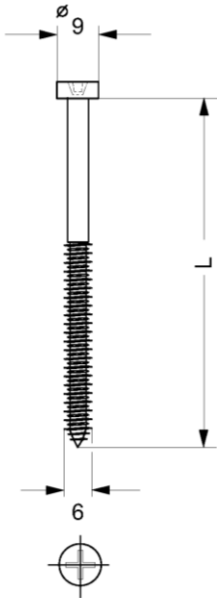
Annex 142



Zahn ZSSB-pipe 6,0 with bar



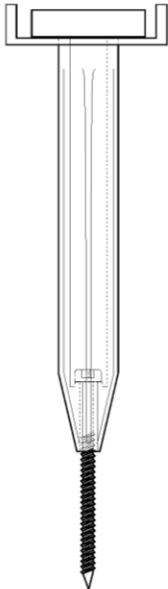
Zahn ZGBK-E 6,0 x L



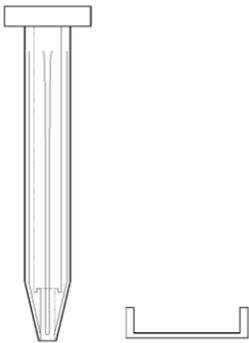
Zahn Flat Roof Fasteners

Combination 143
ZSSB-HPB 6,0 consisting of ZGBK-E/ ZSSB-pipe 6,0 and bar

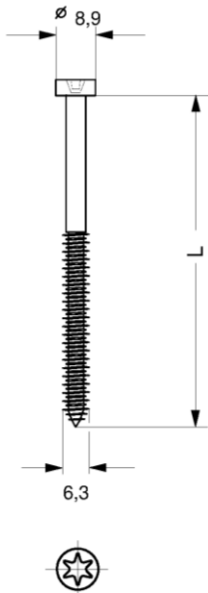
Annex 143



Zahn ZSSB-pipe 6,0 with bar



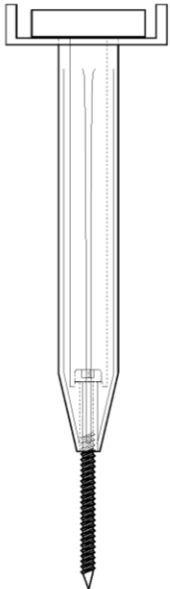
Zahn ZBST 6,3 x L



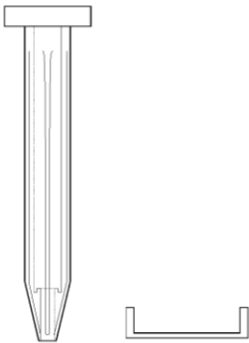
Zahn Flat Roof Fasteners

Combination 144
ZSSB-Concrete 6,0 consisting of ZBST / ZSSB-pipe 6,0 and bar

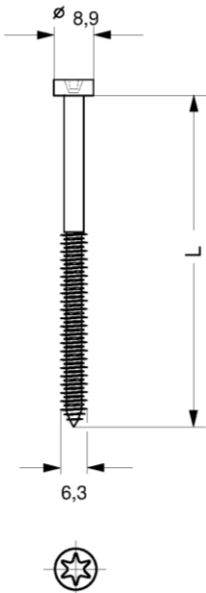
Annex 144



Zahn ZSSB-pipe 6,0 with bar



Zahn ZBST-E 6,3 x L



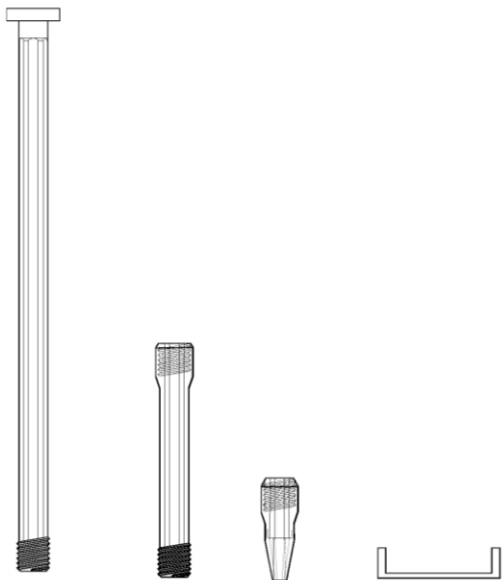
Zahn Flat Roof Fasteners

Combination 145
ZSSB-E-Concrete 6,0 consisting of ZBST-E / ZSSB-pipe 6,0 and bar

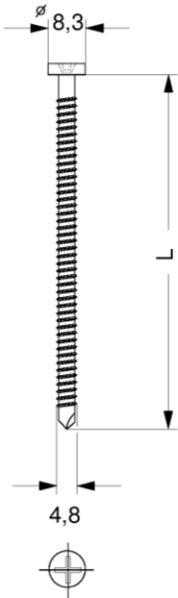
Annex 145



Zahn ZSSB-module pipe 4,8 with module and bar



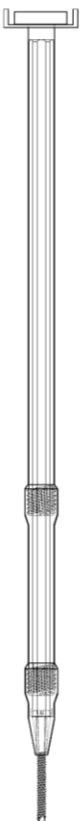
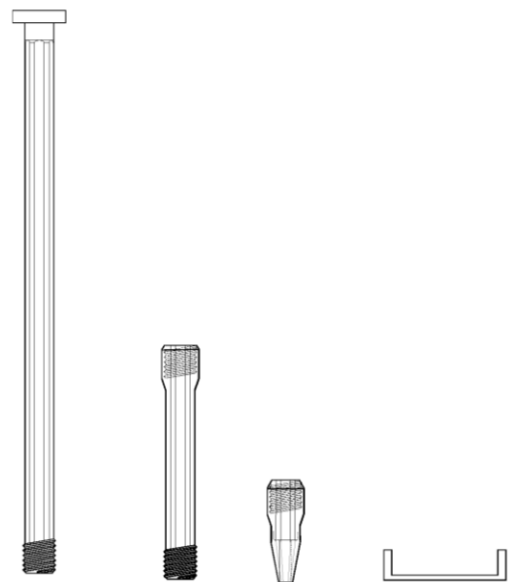
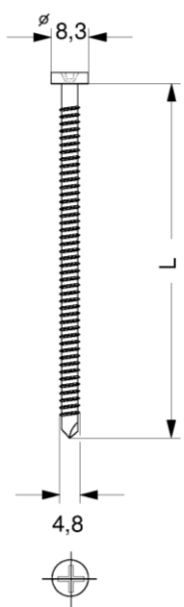
Zahn ZDBK 4,8 x L



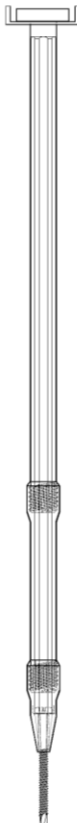
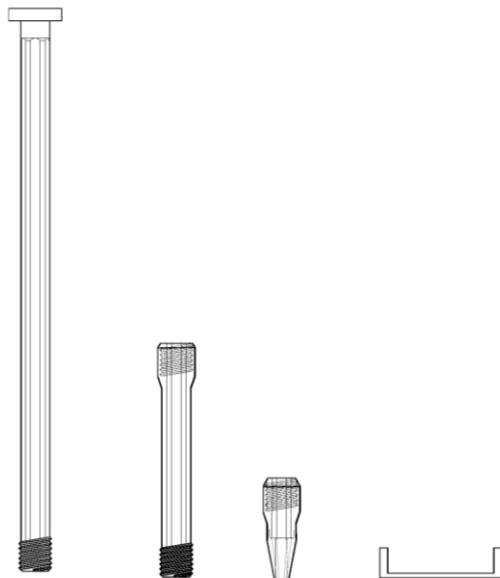
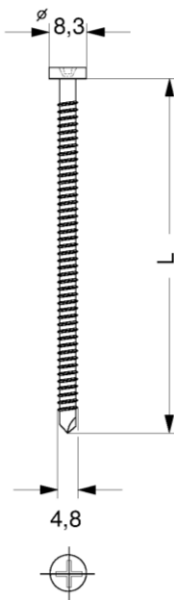
Zahn Flat Roof Fasteners

Combination 146
ZSSB-Modul 4,8 consisting of ZDBK / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar

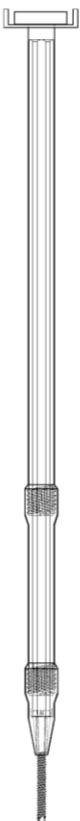
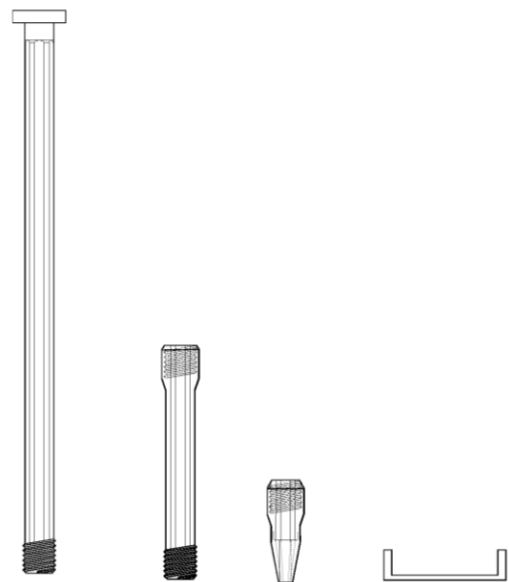
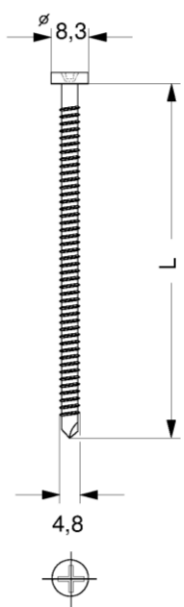
Annex 146

		
Zahn ZSSB-module pipe 4,8 with module and bar 	Zahn ZDBK-E 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 147
Combination 147 ZSSB-E-Modul 4,8 consisting of ZDBK-E / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar		

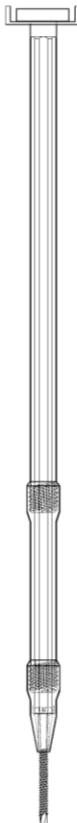
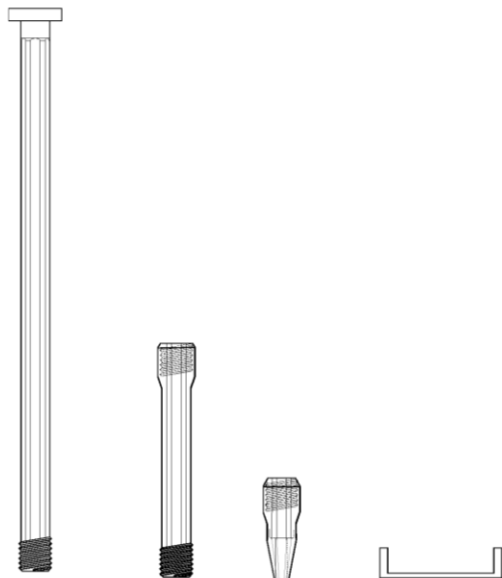
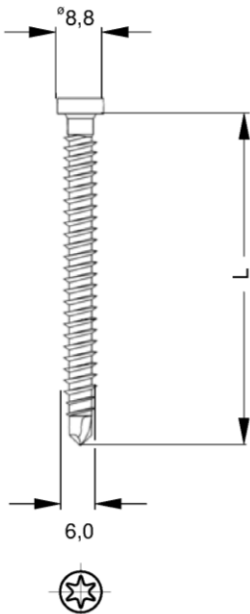
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Zahn ZSSB-module pipe 4,8 with module and bar 	Zahn ZDBK-VB 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 148
Combination 148 ZSSB-VB-Modul 4,8 consisting of ZDBK-VB / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar		

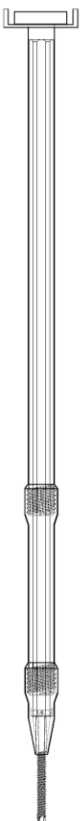
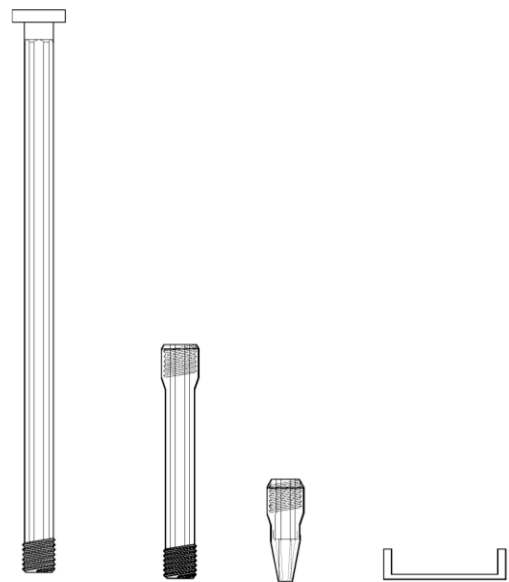
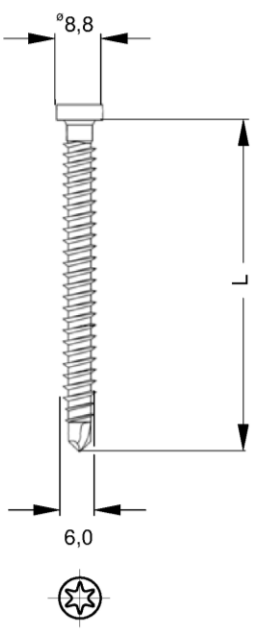
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 4,8 with module and bar 	Zahn ZDBK-VB-E 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 149
Combination 149 ZSSB-VB-E-Modul 4,8 consisting of ZDBK-VB-E / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar		

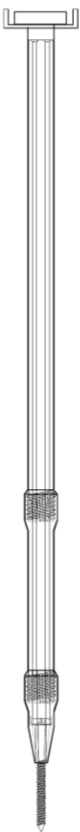
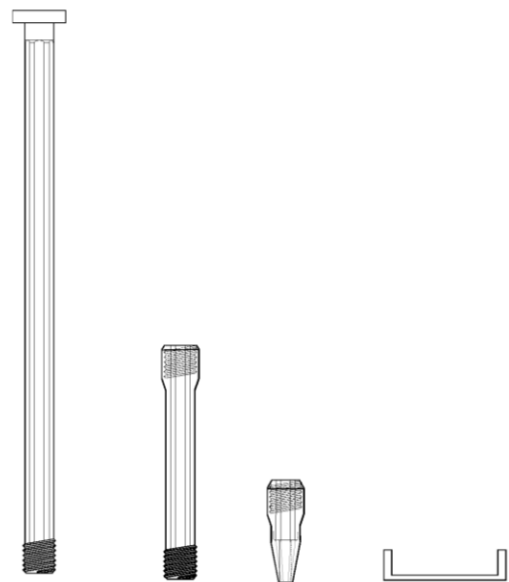
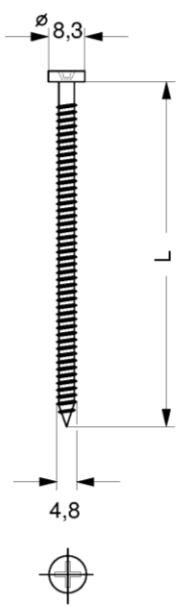
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 6,0 with module and bar 		Zahn ZMDS 6,0 x L 
Zahn Flat Roof Fasteners		Annex 150
Combination 150 ZSSB-Multi-Modul 6,0 consisting of ZMDS / ZSSB-module pipe, -middle piece, -spike 6,0 and ZSSB bar		

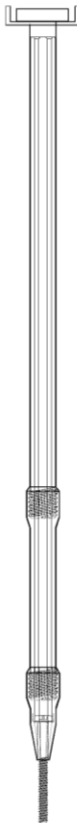
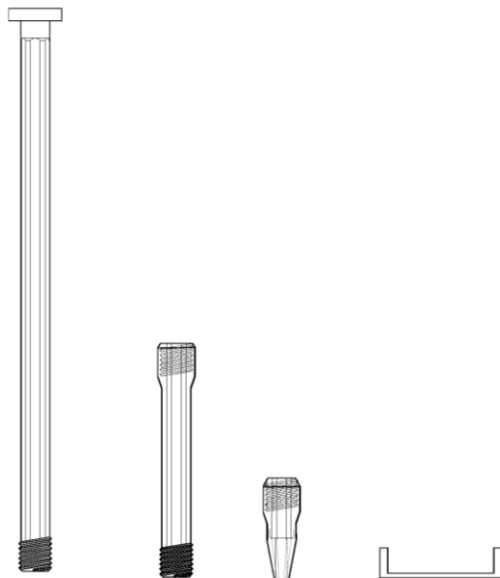
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 6,0 with module and bar 	Zahn ZMDS-E 6,0 x L 	
Zahn Flat Roof Fasteners		Annex 151
Combination 151 ZSSB-E-Multi 6,0 consisting of ZMDS-E / ZSSB-module pipe, -middle piece, -spike 6,0 and ZSSB bar		

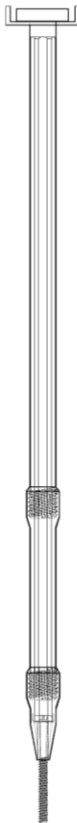
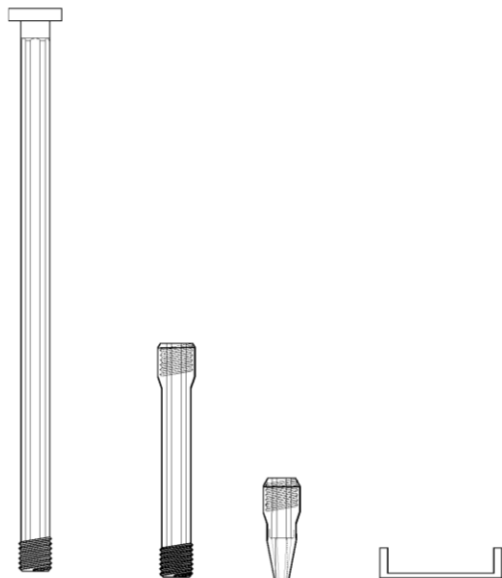
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 4,8 with module and bar 	Zahn ZHBK 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 152
Combination 152 ZSSB-Timber-Modul 4,8 consisting of ZHBK / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar		

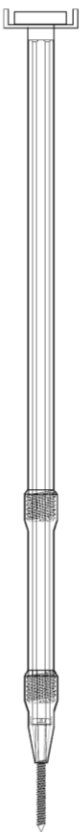
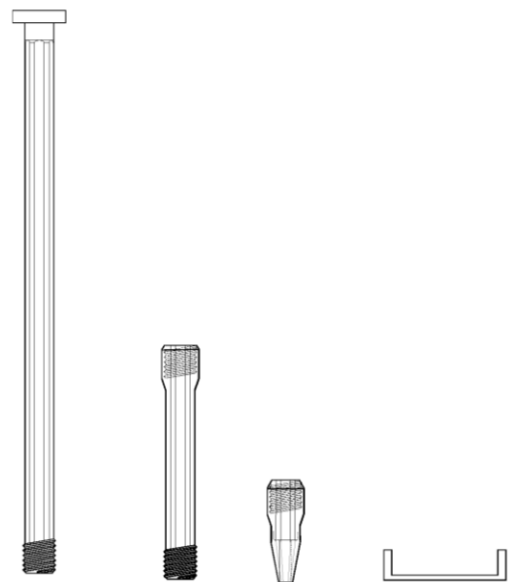
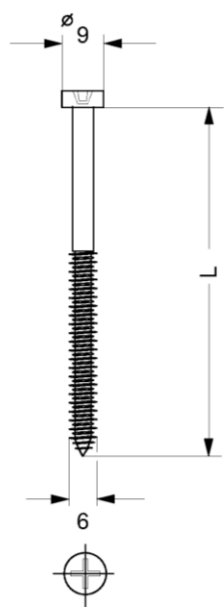
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 4,8 with module and bar 	Zahn ZHBK-E 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 153
Combination 153 ZSSB-E-Timber-Modul 4,8 consisting of ZHBK-E / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar		

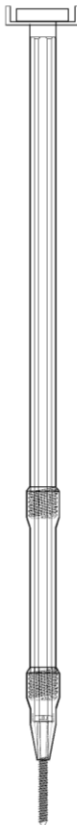
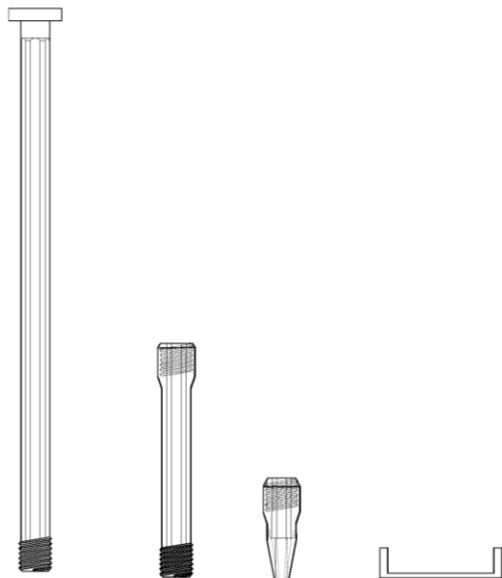
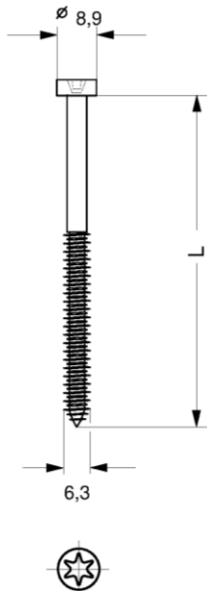
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 4,8 with module and bar 	Zahn ZDBK_{dowel} 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 154
Combination 154 ZSSB-Dowel-Modul 4,8 consisting of ZDBK_{dowel} / ZSSB-module pipe, -middle piece, -spike 4,8 and ZSSB bar		

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Zahn ZSSB-module pipe 6,0 with module and bar 	Zahn ZGBK-E 6,0 x L 	
Zahn Flat Roof Fasteners		Annex 155
Combination 155 ZSSB-HPB-Modul 6,0 consisting of ZGBK-E / ZSSB-module pipe, -middle piece, -spike 6,0 and ZSSB bar		

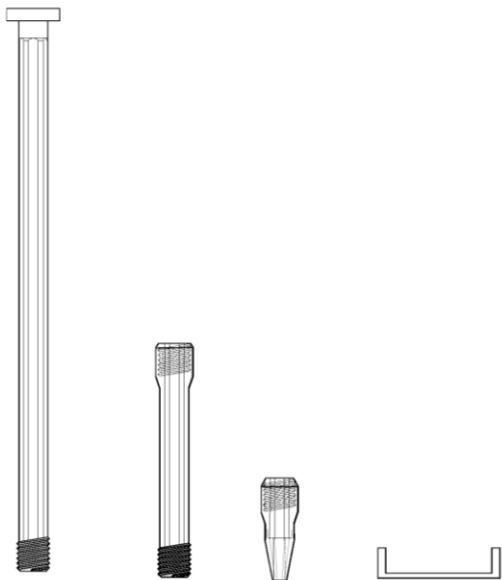
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 6,0 with module and bar 	Zahn ZBST 6,3 x L 	
Zahn Flat Roof Fasteners		Annex 156
Combination 156 ZSSB-Concrete-Modul 6,0 consisting of ZBST / ZSSB-module pipe, -middle piece, -spike 6,0 and ZSSB bar		

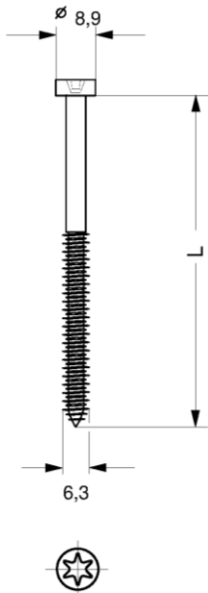
electronic copy of the eta by dibt: eta-08/0033



Zahn ZSSB-module pipe 6,0 with module and bar



Zahn ZBST-E 6,3 x L

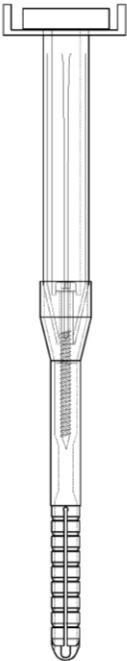


Zahn Flat Roof Fasteners

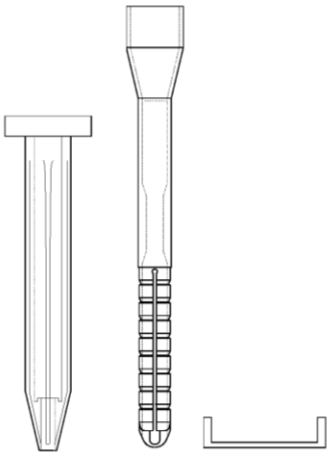
Combination 157
ZSSB-E-Concrete-Modul 6,0 consisting of ZBST / ZSSB-module pipe, -middle piece, -spike 6,0 and ZSSB bar

Annex 157

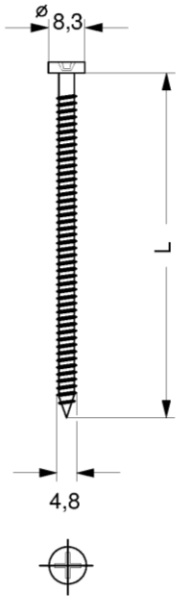
electronic copy of the eta by dibt: eta-08/0033



Zahn ZSSB-pipe 4,8 dowel extension and bar



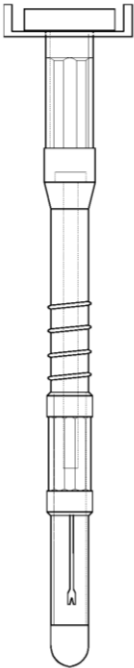
Zahn ZDBK_{dowel} 4,8 x L



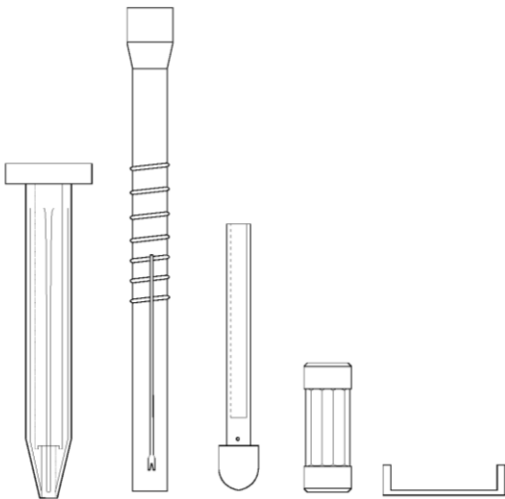
Zahn Flat Roof Fasteners

Combination 158
ZSSB-Dowel-Ext 4,8 consisting of ZDBK_{dowel} / ZSSB-pipe 4,8, ZSSB bar and dowel extension

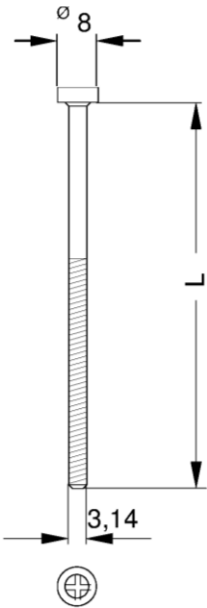
Annex 158



Zahn ZSSB-pipe 4,8 with expanding dowel extension and bar



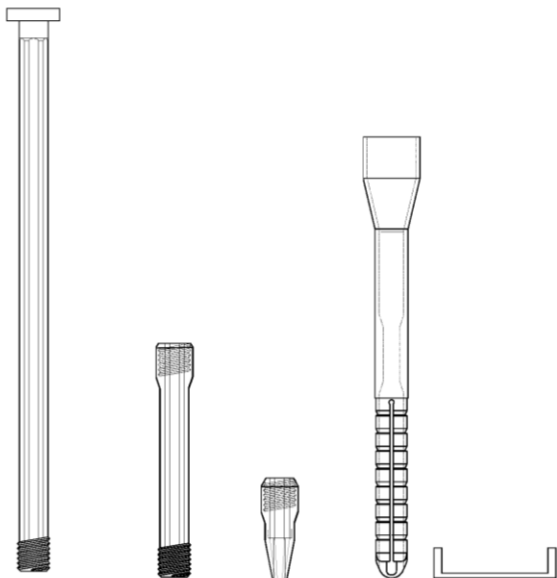
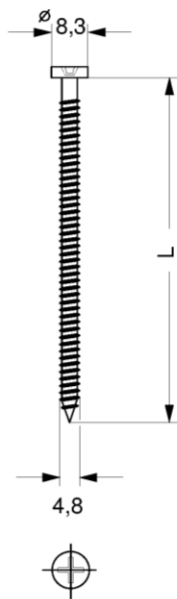
Zahn metric screw -E 3,14 x L



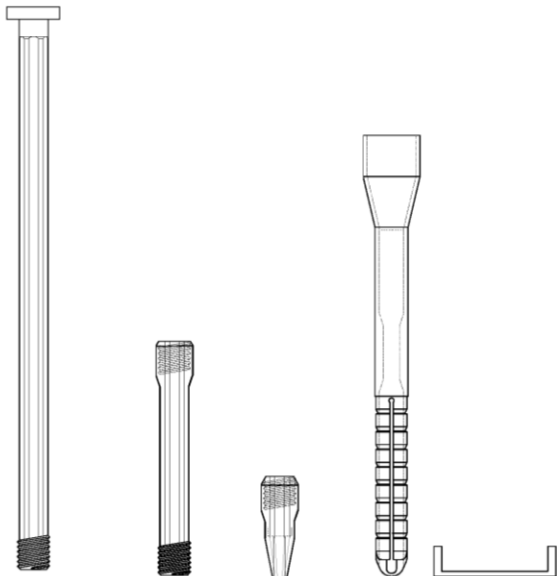
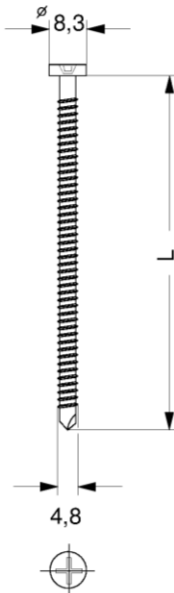
Zahn Flat Roof Fasteners

Combination 159
ZSSB-ZHRD consisting of metric screw-E / ZSSB-pipe 4,8, ZSSB bar and expanding dowel extension

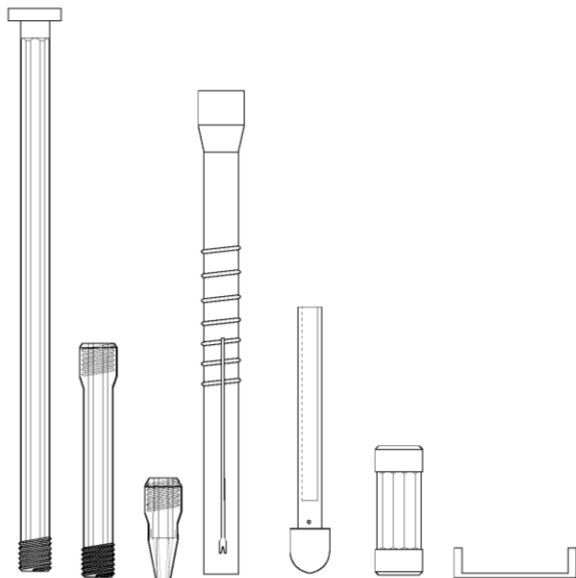
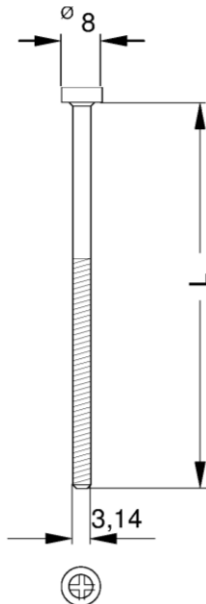
Annex 159

		
Zahn ZSSB-module pipe 4,8 with module, dowel extension and bar 		Zahn ZDBK_{dowel} 4,8 x L 
Zahn Flat Roof Fasteners		
Combination 160 ZDBK_{dowel} / ZSSB-modul pipe, -middle piece, -spike 4,8, dowel extension and ZSSB bar		Annex 160
ZSSB-Dowel-Ext-Modul 4,8 consisting of		

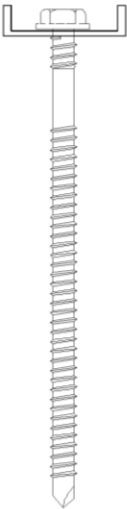
electronic copy of the eta by dibt: eta-08/0033

		
Zahn ZSSB-module pipe 4,8 with module, dowel extension and bar 	Zahn ZDBK-E 4,8 x L 	
Zahn Flat Roof Fasteners		Annex 161
Combination 161 ZDBK-E / ZSSB-module pipe, -middle piece, -spike 4,8, dowel extension and ZSSB bar		

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Zahn ZSSB-module pipe 4,8 with module and expanding dowel extension and bar 		Zahn metric screw -E 3,14 x L 
Zahn Flat Roof Fasteners		Annex 162
Combination 162 metric screw –E / ZSSB-module pipe, -middle piece, -spike 4,8, ZSSB bar and expanding dowel ext.		

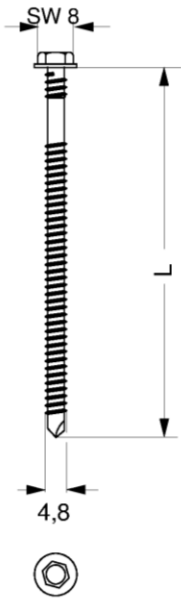
electronic copy of the eta by dibt: eta-08/0033



ZSSB bar



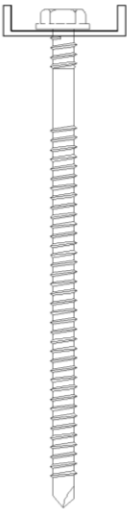
Zahn ZDBS 4,8 x L



Zahn Flat Roof Fasteners

Combination 163
ZSSB / ZDBS

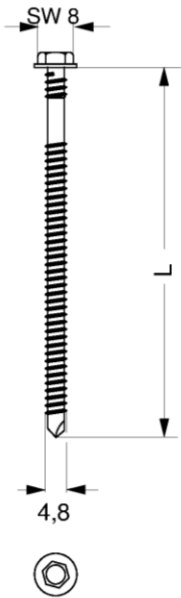
Annex 163



ZSSB bar



Zahn ZDBS-E 4,8 x L



Zahn Flat Roof Fasteners

Combination 164
ZSSB / ZDBS-E

Annex 164

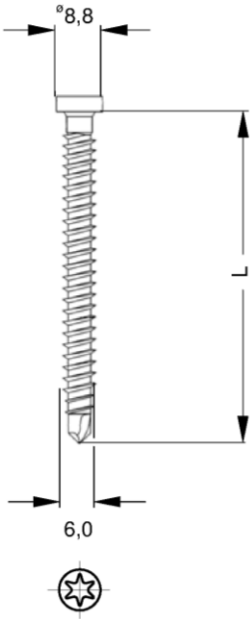
electronic copy of the eta by dibt: eta-08/0033



ZSSB bar



Zahn ZMDS 6,0 x L



Zahn Flat Roof Fasteners

Combination 165
ZSSB / ZMDS

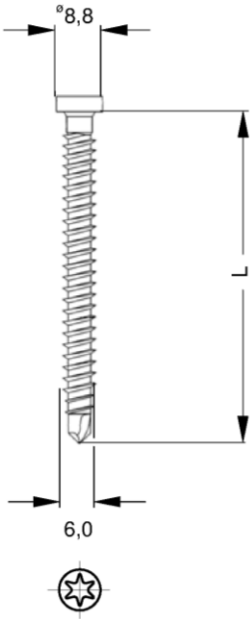
Annex 165



ZSSB bar



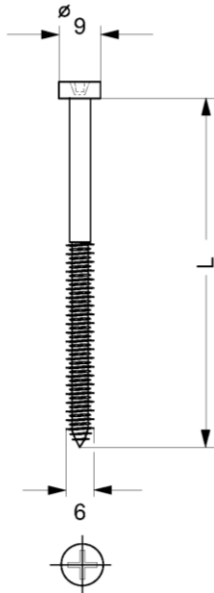
Zahn ZMDS-E 6,0 x L



Zahn Flat Roof Fasteners

Combination 166
ZSSB / ZMDS-E

Annex 166

		
ZSSB bar	Zahn ZGBK-E 6,0 x L	
		
Zahn Flat Roof Fasteners		Annex 167
Combination 167 ZSSB / ZGBK-E		

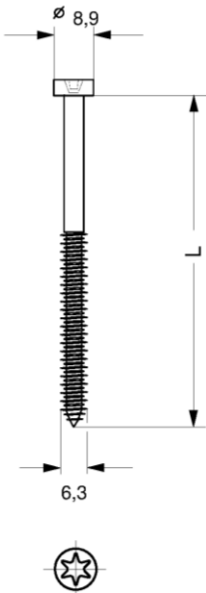
electronic copy of the eta by dibt: eta-08/0033



ZSSB bar



Zahn ZBST 6,3 x L

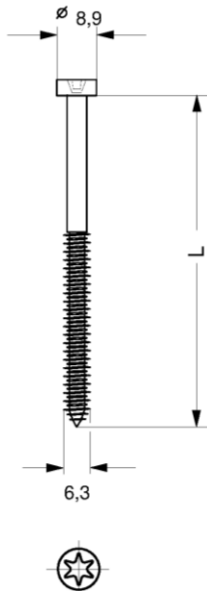


Zahn Flat Roof Fasteners

Combination 168
ZSSB / ZBST

Annex 168

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ZSSB bar	Zahn ZBST-E 6,3 x L	
		
Zahn Flat Roof Fasteners		Annex 169
Combination 169 ZSSB / ZBST-E		

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Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure					
		Steelsheet		Timber			
		S280GD - EN 10346		C24, EN 338	OSB3, EN 300	Particleboard EN 312 / P5	Plywood EN 636
		$t \geq 0,75\text{mm}$	$t \geq 1,50\text{mm}$	$t \geq 22\text{mm}$ $\rho_{\min} = 350\text{kg/m}^3$	$t \geq 18\text{mm}$ $\rho_{\min} = 550\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 500\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 400\text{kg/m}^3$
1	ZSKS	0,92	-	-	-	-	-
2	ZSKS-R	0,92	-	-	-	-	-
3	ZSKS-Rplus	0,92	-	-	-	-	-
4	ZSKS-Rplus with pile tip	0,92	-	-	-	-	-
5	ZSKS-Modul 4,8	0,92	-	-	-	-	-
6	ZSKS-R-Modul 4,8	0,92	-	-	-	-	-
7	ZTSK 4,8	0,92	-	-	-	-	-
8	ZDBK / ZLVT 0001	0,92	-	-	-	-	-
9	ZDBK / ZLVT 0005	0,92	-	-	-	-	-
10	ZDBK / ZLVT 0015	0,92	-	-	-	-	-
11	ZSKS-E	0,98	-	2,05	0,98	1,00	1,61
12	ZSKS-E/R	0,98	-	1,91	0,98	1,00	1,61
13	ZSKS-E/Rplus	0,98	-	2,05	0,98	1,00	1,61
14	ZSKS-E/Rplus with pile tip	0,98	-	2,05	0,98	1,00	1,61
15	ZSKS-E-Modul 4,8	0,98	-	1,16	0,98	1,00	1,16
16	ZSKS-E/R-Modul 4,8	0,98	-	1,16	0,98	1,00	1,16
17	ZTSK-E 4,8	0,98	-	1,62	0,98	1,00	1,61
18	ZDBK-E / ZLVT 0001	0,98	-	2,05	0,98	1,00	1,61
19	ZDBK-E / ZLVT 0005	0,98	-	2,05	0,98	1,00	1,61
20	ZDBK-E / ZLVT 0015	0,98	-	1,37	0,98	1,00	1,37
21	ZSKS-VB	-	2,15	-	-	-	-
22	ZSKS-VB/R	-	1,91	-	-	-	-
23	ZSKS-VB/Rplus	-	2,15	-	-	-	-
24	ZSKS-VB/Rplus with pile tip	-	2,15	-	-	-	-
25	ZSKS-VB-Modul 4,8	-	1,16	-	-	-	-
26	ZSKS-VB/R-Modul 4,8	-	1,16	-	-	-	-
27	ZTSK-VB 4,8	-	1,62	-	-	-	-
28	ZDBK-VB / ZLVT 0001	-	2,15	-	-	-	-
29	ZDBK-VB / ZLVT 0005	-	2,13	-	-	-	-
30	ZDBK-VB / ZLVT 0015	-	1,37	-	-	-	-

For timber substructures
thickness "t" also represents the minimum of effective embedment depth
(= penetration length of threaded part)

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 170

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure					
		Steelsheet		Timber			
		S280GD - EN 10346		C24, EN 338	OSB3, EN 300	Particleboard EN 312 / P5	Plywood EN 636
		$t \geq 0,75\text{mm}$	$t \geq 1,50\text{mm}$	$t \geq 22\text{mm}$ $\rho_{\min} = 350\text{kg/m}^3$	$t \geq 18\text{mm}$ $\rho_{\min} = 550\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 500\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 400\text{kg/m}^3$
31	ZKSK-VB-E	-	1,57	-	-	-	-
32	ZKSK-VB-E/R	-	1,57	-	-	-	-
33	ZKSK-VB-E/Rplus	-	1,57	-	-	-	-
34	ZKSK-VB-E/Rplus with pile tip	-	1,57	-	-	-	-
35	ZKSK-VB-E-Modul 4,8	-	1,16	-	-	-	-
36	ZKSK-VB-E/R-Modul 4,8	-	1,16	-	-	-	-
37	ZTSK-VB-E 4,8	-	1,57	-	-	-	-
38	ZDBK-VB-E / ZLVT 0001	-	1,57	-	-	-	-
39	ZDBK-VB-E / ZLVT 0005	-	1,57	-	-	-	-
40	ZDBK-VB-E / ZLVT 0015	-	1,37	-	-	-	-
41	ZDBS / ZLVT 0001	0,97	-	1,13	1,21	1,16	2,47
42	ZDBS / ZLVT 0005	0,97	-	1,13	1,21	1,16	2,47
43	ZDBS / ZLVT 0012	0,97	-	1,13	1,21	1,16	2,47
163	ZSSB / ZDBS	0,97	-	1,13	1,21	1,16	2,47
44	ZDBS-E / ZLVT 0001	1,08	-	1,13	1,21	1,16	2,47
45	ZDBS-E / ZLVT 0005	1,08	-	1,13	1,21	1,16	2,47
46	ZDBS-E / ZLVT 0012	1,08	-	1,13	1,21	1,16	2,47
164	ZSSB / ZDBS-E	1,08	-	1,13	1,21	1,16	2,47

For timber substructures

thickness "t" also represents the minimum of effective embedment depth

(= penetration length of threaded part)

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 171

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure					
		Steelsheet		Timber			
		S280GD - EN 10346		C24, EN 338	OSB3, EN 300	Particleboard EN 312 / P5	Plywood EN 636
		$t \geq 0,75\text{mm}$	$t \geq 1,50\text{mm}$	$t \geq 22\text{mm}$ $\rho_{\min} = 350\text{kg/m}^3$	$t \geq 18\text{mm}$ $\rho_{\min} = 550\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 500\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 400\text{kg/m}^3$
107	ZMDS-R	1,85	-	1,85	0,94	1,24	1,85
108	ZMDS-Modul 6,0	1,16	-	1,16	0,94	1,16	1,16
109	ZMDS-R-Modul 6,0	1,16	-	1,16	0,94	1,16	1,16
110	ZHVM-Multi	1,61	-	1,61	0,94	1,24	1,61
111	ZTSK-Multi 6,0	1,41	-	1,41	0,94	1,24	1,41
112	ZMDS/ ZLVT 0008	1,71	-	1,71	0,94	1,24	1,71
113	ZMDS/ ZLVT 0012	1,67	-	1,67	0,94	1,24	1,67
165	ZSSB / ZMDS	1,69	-	1,85	0,94	1,24	1,85
126	ZSSB 6,0 / clickplate / ZMDS 6,0	1,69	-	1,85	0,94	1,24	1,85
138	ZSSB 6,0	1,41	-	1,41	0,94	1,24	1,41
150	ZSSB-Multi-Modul 6,0	1,16	-	1,16	0,94	1,16	1,16
114	ZMDS-E/R	1,85	-	1,85	0,94	1,24	1,85
115	ZMDS-E-Modul 6,0	1,16	-	1,16	0,94	1,16	1,16
116	ZMDS-E/R-Modul 6,0	1,16	-	1,16	0,94	1,16	1,16
117	ZHVM-E-Multi	1,61	-	1,61	0,94	1,24	1,61
118	ZTSK-E 6,0	1,41	-	1,41	0,94	1,24	1,41
119	ZMDS-E / ZLVT 0008	1,71	-	1,71	0,94	1,24	1,71
120	ZMDS-E / ZLVT 0012	1,67	-	1,67	0,94	1,24	1,67
166	ZSSB / ZMDS-E	1,85	-	1,85	0,94	1,24	1,85
127	ZSSB 6,0 / clickplate / ZMDS-E 6,0	1,85	-	1,85	0,94	1,24	1,85
139	ZSSB-E 6,0	1,41	-	1,41	0,94	1,24	1,41
151	ZSSB-E-Multi 6,0	1,16	-	1,16	0,94	1,16	1,16

For timber substructures

thickness "t" also represents the minimum of effective embedment depth

(= penetration length of threaded part)

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 172

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure					
		Steelsheet		Timber			
		S280GD - EN 10346		C24, EN 338	OSB3, EN 300	Particleboard EN 312 / P5	Plywood EN 636
		$t \geq 0,75\text{mm}$	$t \geq 1,50\text{mm}$	$t \geq 22\text{mm}$ $\rho_{\min} = 350\text{kg/m}^3$	$t \geq 18\text{mm}$ $\rho_{\min} = 550\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 500\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 400\text{kg/m}^3$
121	ZDBK-TK / ZLVT 0016	1,21	-	-	-	-	-
122	ZSSB 4,8 / clickplate / ZDBK 4,8	0,92	-	-	-	-	-
123	ZSSB 4,8 / clickplate / ZDBK-E 4,8	0,92	-	2,05	0,98	1,00	1,61
124	ZSSB 4,8 / clickplate / ZDBK-VB 4,8	-	2,15	-	-	-	-
125	ZSSB 4,8 / clickplate / ZDBK-VB-E 4,8	-	1,57	-	-	-	-
134	ZSSB 4,8	0,92	-	-	-	-	-
135	ZSSB-E 4,8	0,92	-	1,41	0,98	1,00	1,41
136	ZSSB-VB 4,8	-	1,41	-	-	-	-
137	ZSSB-VB-E 4,8	-	1,41	-	-	-	-
146	ZSSB-Modul 4,8	0,92	-	-	-	-	-
147	ZSSB-E-Modul 4,8	0,92	-	1,16	0,98	1,00	1,16
148	ZSSB-VB-Modul 4,8	-	1,16	-	-	-	-
149	ZSSB-VB-E-Modul 4,8	-	1,16	-	-	-	-

For timber substructures
thickness "t" also represents the minimum of effective embedment depth
(= penetration length of threaded part)

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 173

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure				
		Aluminium		Steelsheet		
		EN 485, $t \geq 0,50\text{mm}$		S280GD - EN 10346		
		R_m $\geq 165\text{N/mm}^2$	R_m $\geq 215\text{N/mm}^2$	$t \geq 0,50\text{mm}$	$t \geq 0,75\text{mm}$	$t \geq 1,50\text{mm}$
71	ZDBK-Dowel / ZKSH oval	0,33	0,43	0,65	1,53	-
72	ZDBK-Dowel / R / ZKSH round	0,33	0,43	0,65	1,53	-
73	ZKSK-Dowel/Rplus	0,33	0,43	0,65	1,53	-
74	ZKSK-Dowel/Rplus with pile tip	0,33	0,43	0,65	1,53	-
80	ZTSK-Dowel 4,8	0,33	0,43	0,65	1,19	-
81	ZDBK-Dowel / ZLVT 0001	0,33	0,43	0,65	1,19	-
130	ZSSB 4,8 / clickplate / ZDBK-Dowel 4,8	0,33	0,43	0,65	1,53	-
142	ZSSB-Dowel 4,8	0,33	0,43	0,65	1,41	-
154	ZSSB-Dowel-Modul 4,8	0,33	0,43	0,65	1,16	-
159	ZSSB-ZHRD	0,36	0,47	0,41	1,02	-
162	ZSSB-ZHRD-Modul 4,8	0,36	0,47	0,41	1,02	-
103	ZHRD	0,36	0,47	0,41	1,02	-
104	ZHRD-R	0,36	0,47	0,41	1,02	-
105	ZHRD-on-Modul 4,8	0,36	0,47	0,41	1,02	-
106	ZHRD-on-Modul-R 4,8	0,36	0,47	0,41	1,02	-

		pre-drill $\varnothing$ [mm]
159	ZSSB-ZHRD	10,0
162	ZSSB-ZHRD-Modul 4,8	10,0
103	ZHRD	10,0
104	ZHRD-R	10,0
105	ZHRD-on-Modul 4,8	10,0
106	ZHRD-on-Modul-R 4,8	10,0

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 174

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure			
		Timber			
		C24, EN 338	OSB3, EN 300	Particleboard EN 312 / P5	Plywood EN 636
		$t \geq 22\text{mm}$ $\rho_{\min} = 350\text{kg/m}^3$	$t \geq 18\text{mm}$ $\rho_{\min} = 550\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 500\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 400\text{kg/m}^3$
47	ZHSK	1,71	1,21	1,80	1,27
48	ZHSK-R	1,71	1,21	1,80	1,27
49	ZHSK-Rplus	1,71	1,21	1,80	1,27
50	ZHSK-Rplus with pile tip	1,71	1,21	1,80	1,27
51	ZHSK-Modul 4,8	1,16	1,16	1,16	1,16
52	ZHSK-R-Modul 4,8	1,16	1,16	1,16	1,16
53	ZTSK-Timber 4,8	1,58	1,21	1,58	1,27
54	ZHBK / ZLVT 0001	1,71	1,21	1,80	1,27
55	ZHBK / ZLVT 0005	1,71	1,21	1,80	1,27
56	ZHBK / ZLVT 0015	1,38	1,21	1,38	1,27
128	ZSSB 4,8 / clickplate / ZHBK 4,8	1,71	1,21	1,80	1,27
140	ZSSB-Timber 4,8	1,41	1,21	1,41	1,27
152	ZSSB-Timber-Modul 4,8	1,16	1,16	1,16	1,16
57	ZHSK-E	1,71	1,21	1,80	1,27
58	ZHSK-E/R	1,71	1,21	1,80	1,27
59	ZHSK-E/Rplus	1,71	1,21	1,80	1,27
60	ZHSK-E/Rplus with pile tip	1,71	1,21	1,80	1,27
61	ZHSK-E-Modul 4,8	1,16	1,16	1,16	1,16
62	ZHSK-E/R-Modul 4,8	1,16	1,16	1,16	1,16
67	ZTSK-E-Timber 4,8	1,58	1,21	1,58	1,27
68	ZHBK-E / ZLVT 0001	1,71	1,21	1,80	1,27
69	ZHBK-E / ZLVT 0005	1,71	1,21	1,80	1,27
70	ZHBK-E / ZLVT 0015	1,38	1,21	1,38	1,27
129	ZSSB 4,8 / clickplate / ZHBK-E 4,8	1,71	1,21	1,80	1,27
141	ZSSB-E-Timber	1,41	1,21	1,41	1,27
153	ZSSB-E-Timber-Modul 4,8	1,16	1,16	1,16	1,16

For timber substructures
thickness "t" also represents the minimum of effective embedment depth
(= penetration length of threaded part)

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 175

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure			
		Timber			
		C24, EN 338	OSB3, EN 300	Particleboard EN 312 / P5	Plywood EN 636
		$t \geq 22\text{mm}$ $\rho_{\min} = 350\text{kg/m}^3$	$t \geq 18\text{mm}$ $\rho_{\min} = 550\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 500\text{kg/m}^3$	$t \geq 19\text{mm}$ $\rho_{\min} = 400\text{kg/m}^3$
82	ZKGK-E/R	1,43	1,08	1,40	1,52
83	ZKGK-E-Modul 6,0	1,16	1,08	1,16	1,16
84	ZKGK-E/R-Modul 6,0	1,16	1,08	1,16	1,16
85	ZHVM-E-HPB	1,43	1,08	1,40	1,52
86	ZTSK-E-Pumice 6,0	1,33	1,08	1,33	1,33
87	ZGBK-E / ZLVT 0008	1,34	1,08	1,34	1,34
88	ZGBK-E / ZLVT 0012	1,28	1,08	1,28	1,28
131	ZSSB 6,0 / clickplate / ZGBK-E 6,0	1,43	1,08	1,40	1,52
143	ZSSB-HPB 6,0	1,41	1,08	1,40	1,27
155	ZSSB-HPB-Modul 6,0	1,16	1,08	1,16	1,16
167	ZSSB / ZGBK-E	1,43	1,08	1,40	1,52

For timber substructures
thickness "t" also represents the minimum of effective embedment depth
(= penetration length of threaded part)

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 176

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure				
		Concrete EN 206-1		Aerated Concrete EN 12602		Pumice EN 1520
		C12/15	C25/30	AAC 3,5 $\rho_{class}=500$	AAC 4,5 $\rho_{class}=600$	LAC 6 $\rho_{class}=1,0$
63	ZSDK-E-Modul 4,8	1,16	1,16	0,82	1,12	0,38
64	ZSDK-E/R-Modul 4,8	1,16	1,16	0,82	1,12	0,38
65	ZSDK-E	1,48	1,48	0,82	1,12	0,38
66	ZSDK-E/R	1,48	1,48	0,82	1,12	0,38
82	ZKGK-E/R	-	-	1,03	1,60	1,08
83	ZKGK-E-Modul 6,0	-	-	1,03	1,16	1,08
84	ZKGK-E/R-Modul 6,0	-	-	1,03	1,16	1,08
85	ZHVM-E-HPB	-	-	1,03	1,60	1,08
86	ZTSK-E-Pumice 6,0	-	-	1,03	1,33	1,08
87	ZGBK-E / ZLVT 0008	-	-	1,03	1,34	1,08
88	ZGBK-E / ZLVT 0012	-	-	1,03	1,28	1,08
131	ZSSB 6,0 / clickplate / ZGBK-E 6,0	-	-	1,03	1,28	1,08
143	ZSSB-HPB 6,0	-	-	1,03	1,28	1,08
155	ZSSB-HPB-Modul 6,0	-	-	1,03	1,16	1,08
167	ZSSB / ZGBK-E	-	-	1,03	1,60	1,08
161	ZSSB-E-Dowel-Modul 4,8	1,16	1,16	-	-	1,10

		Concrete		Aerated Concrete		Pumice	
		min. setting depth [mm]	pre-drill Ø [mm]	min. setting depth [mm]	pre-drill Ø [mm]	min. setting depth [mm]	pre-drill Ø [mm]
63	ZSDK-E-Modul 4,8	40,0	8,0	60,0	8,0	60,0	8,0
64	ZSDK-E/R-Modul 4,8	40,0	8,0	60,0	8,0	60,0	8,0
65	ZSDK-E	40,0	8,0	60,0	8,0	60,0	8,0
66	ZSDK-E/R	40,0	8,0	60,0	8,0	60,0	8,0
82	ZKGK-E/R	-	-	60,0	-	60,0	-
83	ZKGK-E-Modul 6,0	-	-	60,0	-	60,0	-
84	ZKGK-E/R-Modul 6,0	-	-	60,0	-	60,0	-
85	ZHVM-E-HPB	-	-	60,0	-	60,0	-
86	ZTSK-E-Pumice 6,0	-	-	60,0	-	60,0	-
87	ZGBK-E / ZLVT 0008	-	-	60,0	-	60,0	-
88	ZGBK-E / ZLVT 0012	-	-	60,0	-	60,0	-
131	ZSSB 6,0 / clickplate / ZGBK-E 6,0	-	-	60,0	-	60,0	-
143	ZSSB-HPB 6,0	-	-	60,0	-	60,0	-
155	ZSSB-HPB-Modul 6,0	-	-	60,0	-	60,0	-
167	ZSSB / ZGBK-E	-	-	60,0	-	60,0	-
161	ZSSB-E-Dowel-Modul 4,8	40,0	8,0	-	-	60,0	8,0

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 177

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure				
		Concrete EN 206-1		Aerated Concrete EN 12602		Pumice EN 1520
		C12/15	C25/30	AAC 3,5 $\rho_{class}=500$	AAC 4,5 $\rho_{class}=600$	LAC 6 $\rho_{class}=1,0$
75	ZSDK-Modul 4,8	1,16	1,16	1,16	1,16	1,10
76	ZSDK-R-Modul 4,8	1,16	1,16	1,16	1,16	1,10
77	ZSDK	1,55	1,55	1,21	1,21	1,10
78	ZSDK-R	1,55	1,55	1,21	1,21	1,10
79	ZTSD	1,42	1,42	1,21	1,21	1,10
158	ZSSB-Dowel-Ext 4,8	1,41	1,41	1,21	1,21	1,10
160	ZSSB-Dowel-Ext-Modul 4,8	1,16	1,16	1,16	1,16	1,10

		Concrete		Aerated Concrete		Pumice	
		min. setting depth [mm]	pre-drill Ø [mm]	min. setting depth [mm]	pre-drill Ø [mm]	min. setting depth [mm]	pre-drill Ø [mm]
75	ZSDK-Modul 4,8	40,0	8,0	60,0	8,0	60,0	8,0
76	ZSDK-R-Modul 4,8	40,0	8,0	60,0	8,0	60,0	8,0
77	ZSDK	40,0	8,0	60,0	8,0	60,0	8,0
78	ZSDK-R	40,0	8,0	60,0	8,0	60,0	8,0
79	ZTSD	40,0	8,0	60,0	8,0	60,0	8,0
158	ZSSB-Dowel-Ext 4,8	40,0	8,0	60,0	8,0	60,0	8,0
160	ZSSB-Dowel-Ext-Modul 4,8	40,0	8,0	60,0	8,0	60,0	8,0

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 178

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure				
		Concrete EN 206-1		Aerated Concrete EN 12602		Pumice EN 1520
		C12/15	C25/30	AAC 3,5 $\rho_{class}= 500$	AAC 4,5 $\rho_{class}= 600$	LAC 2 $\rho_{class}= 1,0$
89	ZBSK-R	1,60	1,85	-	-	-
90	ZBSK-Modul 6,0	1,16	1,16	-	-	-
91	ZBSK-R-Modul 6,0	1,16	1,16	-	-	-
92	ZHVM-Concrete	1,60	1,61	-	-	-
93	ZTSK-Concrete 6,0	1,41	1,41	-	-	-
94	ZBST / ZLVT 0008	1,60	1,71	-	-	-
95	ZBST / ZLVT 0012	1,60	1,67	-	-	-
96	ZBSK-E/R	1,60	1,71	-	-	-
97	ZBSK-E-Modul 6,0	1,16	1,16	-	-	-
98	ZBSK-E/R-Modul 6,0	1,16	1,16	-	-	-
99	ZHVM-E-Concrete	1,60	1,61	-	-	-
100	ZTSK-E-Concrete 6,0	1,41	1,41	-	-	-
101	ZBST-E / ZLVT 0008	1,60	1,71	-	-	-
102	ZBST-E / ZLVT 0012	1,60	1,67	-	-	-

Concrete	
min. setting depth [mm]	pre-drill $\varnothing$ [mm]

89	ZBSK-R	30,0	5,0
90	ZBSK-Modul 6,0	30,0	5,0
91	ZBSK-R-Modul 6,0	30,0	5,0
92	ZHVM-Concrete	30,0	5,0
93	ZTSK-Concrete 6,0	30,0	5,0
94	ZBST / ZLVT 0008	30,0	5,0
95	ZBST / ZLVT 0012	30,0	5,0
96	ZBSK-E/R	40,0	5,0
97	ZBSK-E-Modul 6,0	40,0	5,0
98	ZBSK-E/R-Modul 6,0	40,0	5,0
99	ZHVM-E-Concrete	40,0	5,0
100	ZTSK-E-Concrete 6,0	40,0	5,0
101	ZBST-E / ZLVT 0008	40,0	5,0
102	ZBST-E / ZLVT 0012	40,0	5,0

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 179

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure				
		Concrete EN 206-1		Aerated Concrete EN 12602		Pumice EN 1520
		C12/15	C25/30	AAC 3,5 $\rho_{class}= 500$	AAC 4,5 $\rho_{class}= 600$	LAC 2 $\rho_{class}= 1,0$
103	ZHRD	-	-	-	-	1,02
104	ZHRD-R	-	-	-	-	1,02
105	ZHRD-on-Modul 4,8	-	-	-	-	1,02
106	ZHRD-on-Modul-R 4,8	-	-	-	-	1,02
132	ZSSB 6,0 / clickplate / ZBST 6,3	1,60	1,85	-	-	-
133	ZSSB 6,0 / clickplate / ZBST-E 6,3	1,60	1,71	-	-	-
144	ZSSB-Concrete 6,0	1,41	1,41	-	-	-
145	ZSSB-E-Concrete 6,0	1,41	1,41	-	-	-
156	ZSSB-Concrete-Modul 6,0	1,16	1,16	-	-	-
157	ZSSB-E-Concrete-Modul 6,0	1,16	1,16	-	-	-
159	ZSSB-ZHRD	-	-	-	-	1,02
162	ZSSB-ZHRD-Modul 4,8	-	-	-	-	1,02
168	ZSSB / ZBST	1,60	1,85	-	-	-
169	ZSSB / ZBST-E	1,60	1,71	-	-	-

		Concrete				Pumice	
		min. setting depth [mm]	pre-drill Ø [mm]			min. setting depth [mm]	pre-drill Ø [mm]
103	ZHRD	-	-			80,0	10,0
104	ZHRD-R	-	-			80,0	10,0
105	ZHRD-on-Modul 4,8	-	-			80,0	10,0
106	ZHRD-on-Modul-R 4,8	-	-			80,0	10,0
132	ZSSB 6,0 / clickplate / ZBST 6,3	30,0	5,0			-	-
133	ZSSB 6,0 / clickplate / ZBST-E 6,3	40,0	5,0			-	-
144	ZSSB-Concrete 6,0	30,0	5,0			-	-
145	ZSSB-E-Concrete 6,0	40,0	5,0			-	-
156	ZSSB-Concrete-Modul 6,0	30,0	5,0			-	-
157	ZSSB-E-Concrete-Modul 6,0	40,0	5,0			-	-
159	ZSSB-ZHRD	-	-			80,0	10,0
162	ZSSB-ZHRD-Modul 4,8	-	-			80,0	10,0
168	ZSSB / ZBST	30,0	5,0			-	-
169	ZSSB / ZBST-E	40,0	5,0			-	-

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 180

Characteristic Axial Load Resistance $N_{R,k}$ [kN]

Annex	ZAHN Flat Roof Fasteners	Substructure				
		Concrete EN 206-1		Aerated Concrete EN 12602		Pumice EN 1520
		C12/15	C25/30	AAC 3,5 $\rho_{class}=500$	AAC 4,5 $\rho_{class}=600$	LAC 6 $\rho_{class}=1,0$
107	ZMDS-R	1,51	1,51	-	-	-
108	ZMDS-Modul 6,0	1,16	1,16	-	-	-
109	ZMDS-R-Modul 6,0	1,16	1,16	-	-	-
110	ZHVM-Multi	1,51	1,51	-	-	-
111	ZTSK-Multi 6,0	1,41	1,41	-	-	-
112	ZMDS/ ZLVT 0008	1,51	1,51	-	-	-
113	ZMDS/ ZLVT 0012	1,51	1,51	-	-	-
126	ZSSB 6,0 / clickplate / ZMDS 6,0	1,51	1,51	-	-	-
138	ZSSB 6,0	1,41	1,41	-	-	-
150	ZSSB-Multi-Modul 6,0	1,16	1,16	-	-	-
165	ZSSB / ZMDS	1,51	1,51	-	-	-
114	ZMDS-E/R	1,51	1,51	-	-	-
115	ZMDS-E-Modul 6,0	1,16	1,16	-	-	-
116	ZMDS-E/R-Modul 6,0	1,16	1,16	-	-	-
117	ZHVM-E-Multi	1,51	1,51	-	-	-
118	ZTSK-E 6,0	1,41	1,41	-	-	-
119	ZMDS-E / ZLVT 0008	1,51	1,51	-	-	-
120	ZMDS-E / ZLVT 0012	1,51	1,51	-	-	-
127	ZSSB 6,0 / clickplate / ZMDS-E 6,0	1,51	1,51	-	-	-
139	ZSSB-E 6,0	1,41	1,41	-	-	-
151	ZSSB-E-Multi 6,0	1,16	1,16	-	-	-
166	ZSSB / ZMDS-E	1,51	1,51	-	-	-

Concrete	
min. setting depth [mm]	pre-drill Ø [mm]

107	ZMDS-R	30,0	5,0
108	ZMDS-Modul 6,0	30,0	5,0
109	ZMDS-R-Modul 6,0	30,0	5,0
110	ZHVM-Multi	30,0	5,0
111	ZTSK-Multi 6,0	30,0	5,0
112	ZMDS/ ZLVT 0008	30,0	5,0
113	ZMDS/ ZLVT 0012	30,0	5,0
126	ZSSB 6,0 / clickplate / ZMDS 6,0	30,0	5,0
138	ZSSB 6,0	30,0	5,0
150	ZSSB-Multi-Modul 6,0	30,0	5,0
165	ZSSB / ZMDS	30,0	5,0
114	ZMDS-E/R	40,0	5,0
115	ZMDS-E-Modul 6,0	40,0	5,0
116	ZMDS-E/R-Modul 6,0	40,0	5,0
117	ZHVM-E-Multi	40,0	5,0
118	ZTSK-E 6,0	40,0	5,0
119	ZMDS-E / ZLVT 0008	40,0	5,0
120	ZMDS-E / ZLVT 0012	40,0	5,0
127	ZSSB 6,0 / clickplate / ZMDS-E 6,0	40,0	5,0
139	ZSSB-E 6,0	40,0	5,0
151	ZSSB-E-Multi 6,0	40,0	5,0
166	ZSSB / ZMDS-E	40,0	5,0

Zahn Flat Roof Fasteners

Characteristic Axial Load Resistance

Annex 181