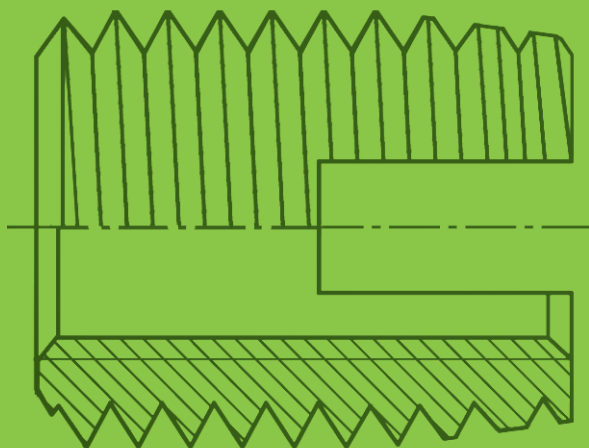


Threaded inserts for metal

Ensaf®
Gripp®
Mubux®-Z
Mubux®-M0



Technical publication

Nr.20



Fastening technology from KerbKonus is in successful application in a wide variety of different industrial sectors around the world.

State-of-the-art production facilities provide our customers with the assurance of quality and reliable delivery, and sophisticated fastening solutions for every conceivable field of application are implemented by our own Research and Development Department.

Close cooperation and exchange of experience and expertise on an international level ensure that our company stays at the cutting edge of technological development.

With independent branches and agencies operating in a number of countries around the world we are a truly reliable partner when it comes to secure fastening technology.

... our products and services

Depending on the required anchoring method in the material, KerbKonus offers a variety of threaded insert options:

- self-tapping threaded inserts for metal, wood and plastics,
- Threaded inserts for cold embedding
- Threaded inserts for hot or ultrasound embedding
- Threaded inserts for screwing into an internal thread
- Threaded inserts for riveting

Alongside its long-standing, proven spectrum of threaded inserts for a wide variety of applications, KerbKonus also offers a range of fastening technology-related products and services:

- Punched rivet system for thin mouldings
- Screw locking
- Thread sealing systems
- Insulating plastic coating

If you have a specific problem related to the field of fastening technology - with its rich fund of expertise and comprehensive product range, KerbKonus has the solution for you.

Technical details of KerbKonus products are provided on our website: **www.kerbkonus.de**

To access design data, go to the download portal of our website. Here, you will be able to download product data in any required formats or as CAD files.

Kerb-Konus-Vertriebs-GmbH
Wernher-von-Braun-Straße 7
Gewerbegebiet Nord
92224 Amberg



Telefon +49 9621 679-0
Telefax +49 9621 679444
e-mail KKV-Amberg@kerbkonus.de

Internet www.kerbkonus.de



Dimensions Product features Retaining hole Specifications Other details

Threaded inserts from KerbKonus ...

Tested quality; Test methods
Ensats® – the self-tapping threaded insert; Pull-out strength; Installation

Page 2 and 3
Page 4 to 6

Ensats®-S 302 / -SI 302 2 and Ensats®-SK 302 1

M2 to M30 Imperial thread M4 to M12 M4 to M10	self-tapping with cutting slot	Form cast or drilled	302 0 302 2 302 1	Page 7 Page 8 Page 9 Page 10
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Ensats®-SB 307 / 308 and Ensats®-SBI 307 2 / 308 2

M3 to M24 M4 to M12	self-tapping with 3 cutting bores	Form cast or drilled	307 0 / 308 0 307 2 / 308 2	Page 11 Page 12
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Ensats®-SBE 307 4 / 308 4

M5 to M16	self-tapping with 3 cutting bores	Form cast or drilled	307 4 / 308 4	Page 13
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Ensats®-SBK 307 1 / 308 1 and Ensats®-SBKI 307 3 / 308 3

M5 to M10 M5 to M10	self-tapping with 3 cutting bores	Form cast or drilled	307 1 / 308 1 307 3 / 308 3	Page 14 Page 15
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Ensats®-SBS 337 0 / 338 0 and Ensats®-SBSI 337 2 / 338 2

M3 to M16 M4 to M12 M3 to M8	self-tapping with 3 cutting bores	Form cast	337 0 / 338 0 337 2 / 338 2 337 0 / 338 0	Page 16 Page 17 Page 18
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Ensats®-SBD 347 0 / 348 0

M3,5 to M12	self-tapping with 3 cutting bores	Form cast or drilled	347 0 / 348 0	Page 19
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Ensats®-SBN 317 0 / 318 0

M4 to M16	self-tapping with 3 cutting bores	Form cast or drilled	317 0 / 318 0	Page 20
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Ensats®-SBT 357 0 / 358 0

M4 to M12	self-tapping with 3 cutting bores	Form cast or drilled	357 0 / 358 0	Page 21
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Mubux®-Z 890 0

M4 and M5	Threaded insert for embedding	Form cast or drilled	890 0	Page 22
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Mubux-M®/-MO® 970 0

M3 to M12	Outside coated with precote 80 for anti-rotation and sealing	drilled and tapped thread (standard thread)	970 0	Page 23 and 24
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Gripp® 304 0

M14 x 1,25 M18 x 1,5	self-tapping with 3 cutting bores	drilled	304 0	Page 25
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Installation tools / Montage

Installation tools Manual installation Machine installation	Page 26 and 27 Page 28 Page 29
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Ensats®-assortment and Repair kit

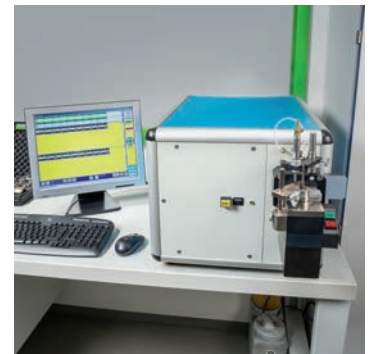
Repair kit Assortment	Page 30 Page 31
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What really counts: tested quality.

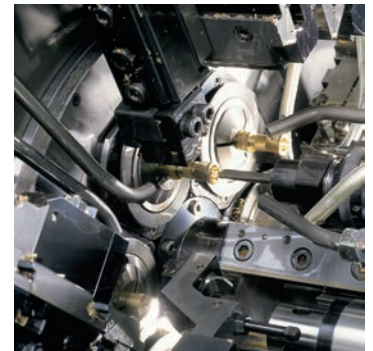


At our parent plant in Amberg, we produce threaded inserts using efficient production methods. A team of qualified and highly motivated staff guarantees a consistent, high standard of production.

The number of products manufactured over the company's history reaches into the billions. State-of-the-art automation lines manufacture around the clock in a precise and high standard of quality. The efficient and low-cost production of large-scale product series is one of the strengths on which we have based our success.

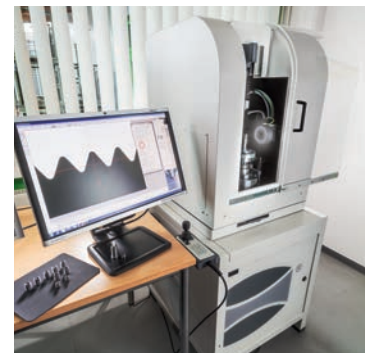


But our high-volume production output in no way compromises flexibility. We are able to quickly and efficiently produce even small batches of non-standard items.



Our state of the art stock control system permits the reliable, prompt delivery of standard products, keeping your production running to schedule at all time and helping to minimize your warehousing costs.

We are particularly proud of a cost-to-performance ratio which ensures satisfied customers the world over. This has made KerbKonus a reputable and respected partner to industry in the global market-place.



priority issues at KerbKonus. Quality consciousness is a continuous thread running through every aspect of the company's work and all its products and services. Quality is lived and breathed at KerbKonus.

As manufacturer in the metal processing industry we are aware of our responsibility for an environmentally compatible production. With this in mind we follow up a policy of sensible resource spending and environment-friendly production both in our process engineering and our product range.



Quality System
DEKRA Certificat in accordance with
ISO 9001:2008 Reg.No. 30507428/3
ISO/TS 16949:2009 Reg.No. 160507011/3
ISO 14001:2004 Reg.No. 170507049/3
ISO 50001:2011 Reg.No. 181115119

Applications on the test stand ...



Threaded inserts from KerbKonus are manufactured in large piece numbers. And human lives and safety can often depend upon just these tiny components, for instance in the case of airbag retaining fasteners.

Because we bear this heavy responsibility, our products are tested and monitored in line with the most stringent directives. In the case of particularly critical applications, each and every part is exhaustively tested on state-of-the-art test equipment before it is delivered to you. For Example:

- dimensional check
- foreign particles

Test methods

The loading capacity of a thread depends in the main on the surface shell of the component which is exposed to shearing stress. By selecting just the right threaded insert for each application, maximum reliability can be achieved.

Using tried and tested, practically oriented test methods (see the table below), we provide the designer with a set of reliable specifications to ensure safe, reliable compliance with any application requirement, however unusual. In most cases, this can even be achieved using standard threaded inserts.

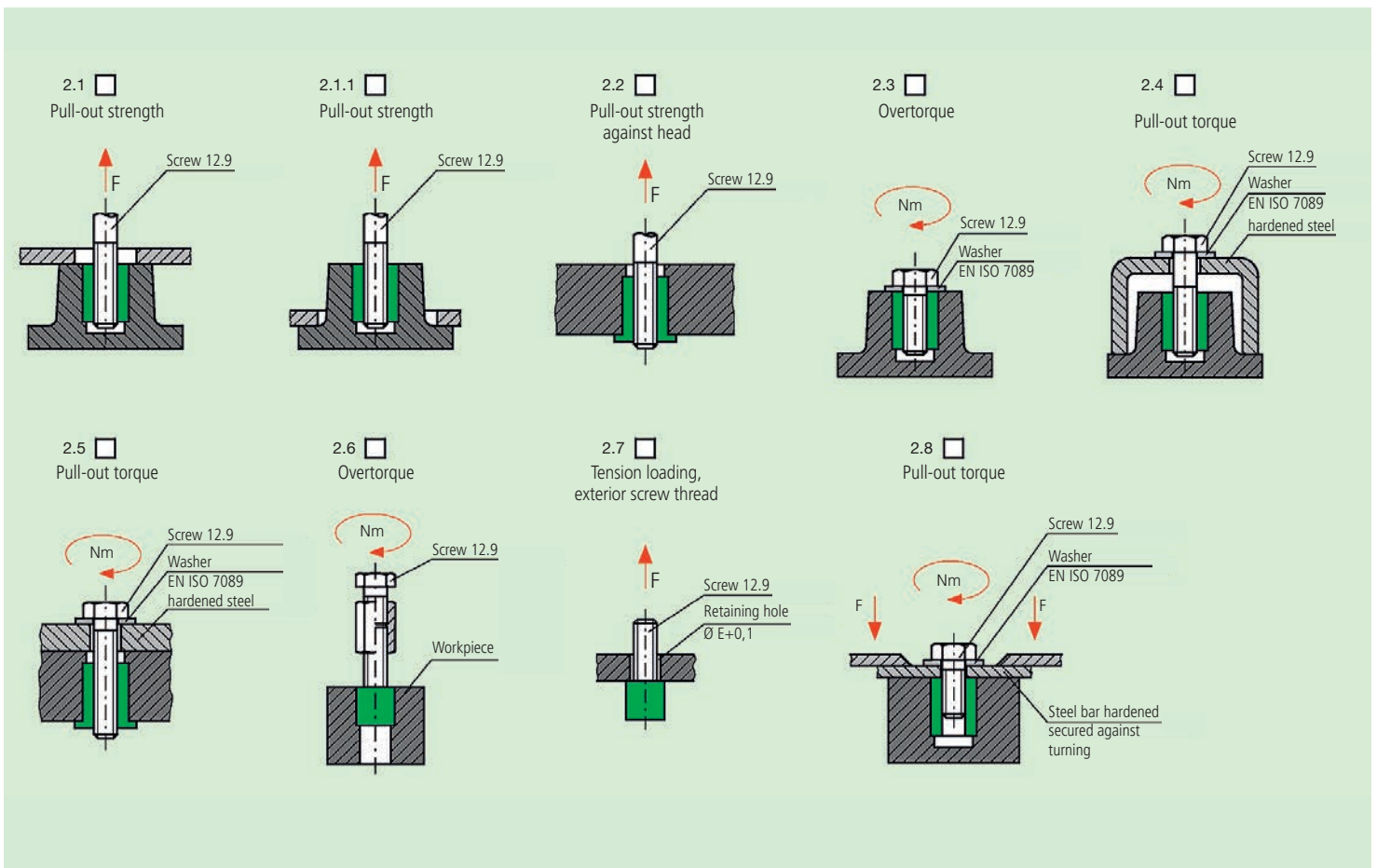
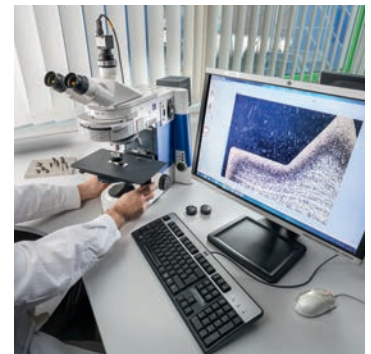
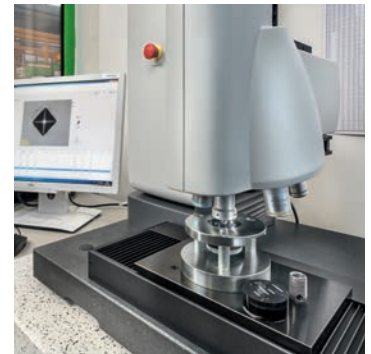


Fig. 1

The Ensat® – self-tapping threaded insert ...



Ensat® is a self-tapping threaded insert with external and internal thread, cutting slots or cutting bores. A continuous process of further development has brought about a number of major improvements to product characteristics.

Ensats-S 302

(with cutting slot) is recommended for most application cases. In certain materials, this Ensat® demonstrates a minimal inward springing action, so creating a certain screw locking effect. (see page 7 to page 10)
If this effect is not required, we recommend using Ensat®-SB 307/308.



Ensats-SB 307/308

(with cutting bores) was developed for materials with difficult cutting properties. This insert has a thick wall and the cutting force is distributed over three cutting edges. The short version Ensat® 307 is particularly suitable where minimal material thicknesses are involved. (see page 11 to page 15)

Ensats-SBS 337/338

with three chip reservoirs. Used primarily wherever only a small amount of chips may be permitted to occur during the tapping process (see page 16 to page 18).

Thin-walled Ensat®-SBD 347/348

for applications involving special space conditions (residual wall thicknesses), and also suitable for driving using a thread tapping machine (same internal and external thread pitch, see page 19).

Ensats-SBT 357/358

with closed floor for additional sealing from below. (see page 21).



Fields of application

The Ensat® is used throughout the whole of the metal and plastics processing industry.

- **Automotive**
- **Plant and equipment construction**
- **Railway supply industry**
- **Electro-technics and laboratory techniques**
- **Household appliance**
- **Medical engineering**
- **Offshore**

Thread reparation

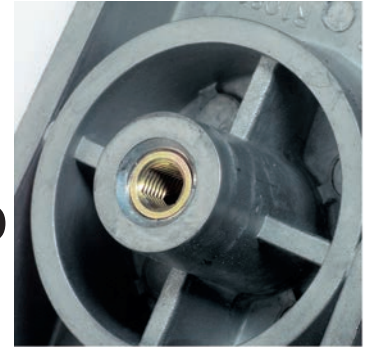
Ensat® is ideally suited for the fast repair of torn and damaged threads. The same screw size can be used again. (see page 30).

Product features

- The Ensat® has a large effective shearing surface, so ensuring a higher degree of pull-out strength, i.e. an Ensat® M4 is often sufficient instead of a cut M5 thread (see page 5, Fig. 2).
- The Ensat® is driven subsequently into the finished workpiece. This means a higher casting machine output, no rejects due to incorrectly cast-in insert components, no moulding sand trapped in the thread.
- A pre-cast or pre-drilled retaining hole with normal tolerance requirements is sufficient for driving in the Ensat®. The thread is always precisely positioned.
- The Ensat® is insensitive to small areas of shrinkage. The Ensat®-system prevents damage caused by torn threads.



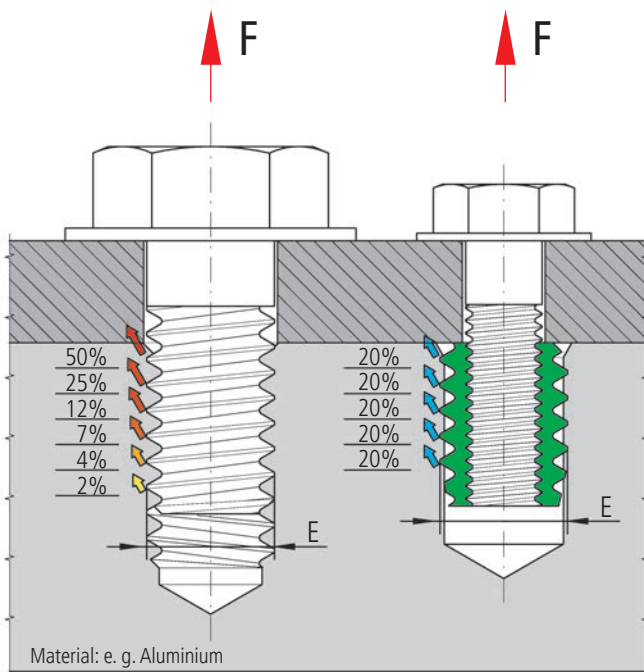
The Ensats® – pull-out resistance due to flange cover ...



Connections using threaded insert Ensats® permit substantially smaller dimensions and consequently material and weight-saving designs.

The illustration below (Fig. 2) shows a screw connection with different screw cross-sections. Despite the smaller

screw cross-section, a screw joint with an Ensats® is capable of withstanding higher axial forces than the screw joint with larger screw cross-section; because the force - both under static and dynamic load - in the Ensats® male thread is distributed evenly over the individual thread turns of the Ensats® male thread.



E = Diameter cut thread = Outside diameter of the Ensats®

Fig. 2

Flange cover

In a workpiece made of a light alloy, the Ensats® 302 achieves almost maximum pull-out strength with only 30 % flange cover (Fig. 3).

Pull-out strength

The Ensats® is capable of withstanding high loads. When used in light alloys, for example, a degree of pull-out strength is achieved which far exceeds the yield strength of the mating screw 8.8 (Fig. 4).

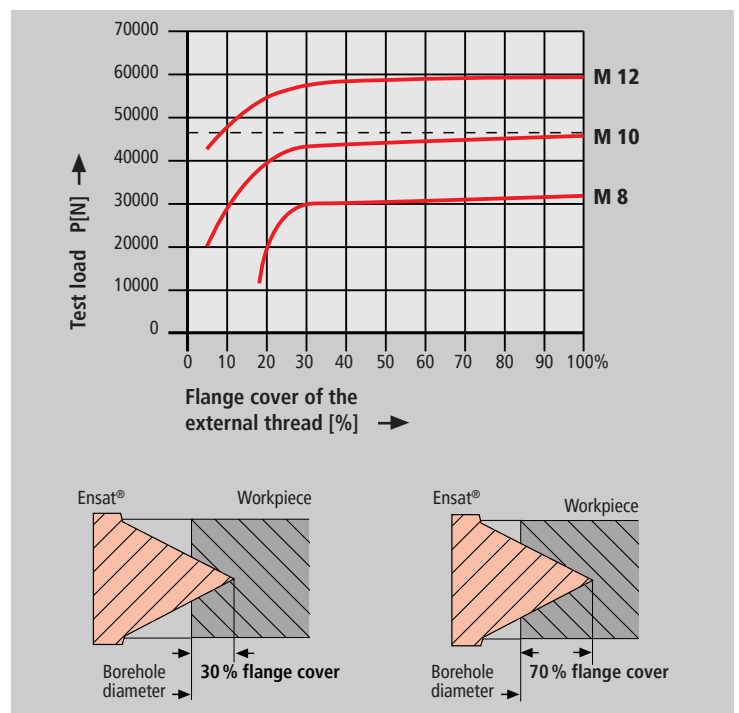


Fig. 3

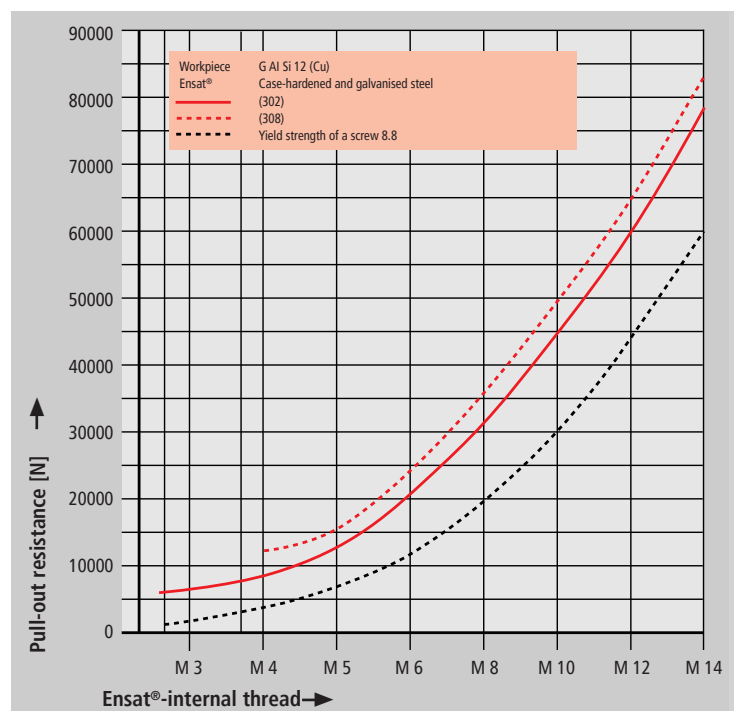


Fig. 4

The Ensats® in the workpiece ...

Installation recommendation

The Ensats® should be recessed appr. 0,1 – 0,2 mm recessed (Fig. 5). After processing, the Ensats® can be immediately subjected to load. If the component material permits subsidence of the Ensats® under load, the Ensats® can only execute an axial movement of 0,1 to 0,2 mm. In other words, the pretension of the screw union is largely retained, loosening of the screw connection under dynamic load is impeded

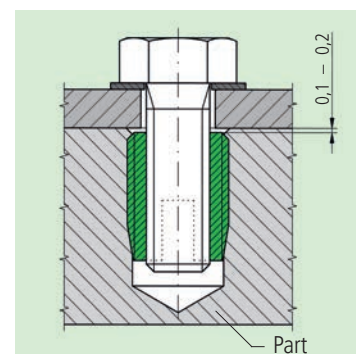


Fig. 5

The adjacent table is used to determine the recommended bore hole diameter depending on the material of the workpiece and the Ensats® type/dimension.

Example:

Light alloy workpiece
Internal thread M8,
recommended bore hole diameter for
Ensats®-S 302: 11,2 to 11,4 mm
Ensats®-SB 307/308: 11,2 to 11,5 mm

In case of processing problems (e.g. markedly increased screw-in torque levels) there is generally no harm in selecting diameter data in the next highest column. In case of doubt, we advise carrying out a test.



Light alloys Ms, Bronze, NF-Metal, Cast iron								
Borehole diameter [mm]			Guideline values for Ensats® 302			Guideline values for Ensats® 307/308		
						337 / 338 357 / 358		
Ensats® internal thread	M 2 / M 2,5	Inch	4,1	4,2	4,3	—	—	—
	M 3	N° 4	4,6	4,7	4,8	4,7	4,8	—
	M 3,5	N° 6	5,5	5,6	5,7	5,6	5,7	—
	M 4	N° 8	6,0	6,1	6,2	6,1	6,2	—
	M 5	N° 10	7,3	7,5	7,6	7,5	7,6	—
	M 6(a)	—	8,3	8,5	8,6	—	—	—
	M 6	1/4"	9,0	9,2	9,4	9,4	9,5	—
	M 8	5/16"	11,0	11,2	11,4	11,2	11,3	—
	M 10	3/8"	13,0	13,2	13,4	13,2	13,3	—
	M 12	7/16"	15,0	15,2	15,4	15,1	15,2	—
	M 14	1/2"	17,0	17,2	17,4	17,1	17,2	—
	M 16	5/8"	19,0	19,2	19,4	19,1	19,2	—
	M 18	—	21,0	21,2	21,4	21,1	21,2	—
	M 20 / M22	3/4"	25,0	25,2	25,4	25,1	25,2	—
	M 24	—	29,0	29,2	29,4	29,1	29,2	—
	M 27	—	33,0	33,2	33,4	—	—	—
	M 30	—	35,0	35,2	35,4	—	—	—
Flange cover appr.			50 %	40 %	30 %	70 %	60 %	50 %
			Recommended borehole diameter for easy assembly.					

Fig. 6

Retaining hole

The retaining hole (L) can be simply drilled or integrated into in the casting.

Countersinking (N) the borehole (Fig. 7) is recommended in order to:

- Prevent the workpiece surface from being raised
- Permit screwing in to a greater depth
- Ensure improved initial cutting characteristics

Material thickness:

Length of the Ensats® = smallest admissible material thickness M.

Depth of the blind hole:

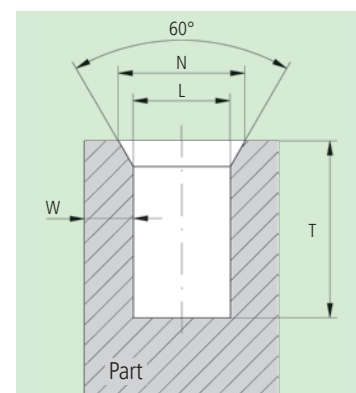
Minimum depth – (T) see Works Standard page 7 to 21

Borehole diameter:

Brittle, tough and hard materials call for a larger borehole than soft or elastic materials. For guideline values, see the table above (Fig. 6).

Edge distance:

The smallest still admissible edge distance W (Fig. 7) depends on the planned stress level and the elasticity of the material into which the Ensats® is screwed.



Guideline values for countersink:
N = 0,06 to 0,08 x E + E

Guideline values for light alloys:
W 0,2 to 0,6 x E

Guideline values for cast iron:
W 0,3 to 0,5 x E

E = Outside diameter of the Ensats® [mm]

Fig. 7

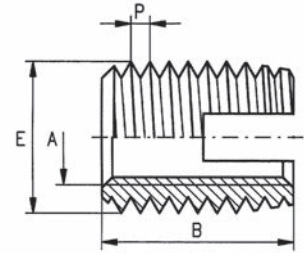


Threaded insert self-tapping metric inner thread

Ensats®-S
Works Standard
302 0

Application

The threaded insert Ensats®-S with cutting slot is a self-tapping fastener for the creation of wear-free, vibration resistant screw joints with high loading capacity in materials with low shearing strength.



Dimensions in mm

Article number	Internal thread	External thread		Length	Minimum borehole depth for blind holes
	A	E	P	B	T
302 000 020 ...	M 2	4,5	0,5	6	8
302 000 025 ...	M 2,5	4,5	0,5	6	8
302 000 030 ...	M 3	5	0,5	6	8
302 000 035 ...	M 3,5	6	0,75	8	10
302 000 040 ...	M 4	6,5	0,75	8	10
302 000 050 ...	M 5	8	1	10	13
302 000 061 ...	M 6 (a)	9	1	12	15
302 000 060 ...	M 6	10	1,5	14	17
302 000 080 ...	M 8	12	1,5	15	18
302 000 100 ...	M 10	14	1,5	18	22
302 000 120 ...	M 12	16	1,5	22	26
302 000 140 ...	M 14	18	1,5	24	28
302 000 160 ...	M 16	20	1,5	22	26
302 000 180 ...	M 18	22	1,5	24	29
302 000 200 ...	M 20	26	1,5	27	32
302 000 220 ...	M 22	26	1,5	30	36
302 000 240 ...	M 24	30	1,5	30	36
302 000 270 ...	M 27	34	1,5	30	36
302 000 300 ...	M 30	36	1,5	40	46

Example for finding the article number

Self-tapping threaded insert Ensats®-S to Works Standard 302 0 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-S 302 000 050. 110

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: as per KKV standard
Internal thread UNC, UNF, Whitworth see page 8

Borehole diameter

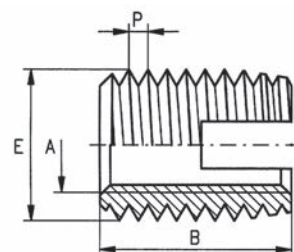
Guideline values for borehole diameter see table page 6 (Fig. 6).

Animation



Application

Threaded insert with cutting
slot and internal thread.
Whitworth, UNC or UNF



Dimensions in mm

	Article number	Internal thread inch	External thread mm		Length mm	Minimum borehole depth for blind holes
		A	E	P	B	T
Whitworth B.S.84 Internal thread Tolerance: medium	302 000 525 ...	1/4	10	1,5	14	17
	302 000 531 ...	5/16	12	1,5	15	18
	302 000 537 ...	3/8	14	1,5	18	22
	302 000 544 ...	7/16	16	1,5	22	26
	302 000 550 ...	1/2	18	1,5	22	26
	302 000 562 ...	5/8	20	1,5	22	26
UNC Unified Coarse Thread ANSI B1.1/BS 1580 Internal thread Tolerance 2B	302 000 604 ...	4 – 40	5	0,5	6	8
	302 000 606 ...	6 – 32	6	0,75	8	10
	302 000 608 ...	8 – 32	6,5	0,75	8	10
	302 000 610 ...	10 – 24	8	1	10	13
	302 000 625 ...	1/4 – 20	10	1,5	14	17
	302 000 631 ...	5/16 – 18	12	1,5	15	18
	302 000 637 ...	3/8 – 16	14	1,5	18	22
	302 000 644 ...	7/16 – 14	16	1,5	22	26
	302 000 650 ...	1/2 – 13	18	1,5	22	26
	302 000 662 ...	5/8 – 11	20	1,5	22	26
UNF Unified Fine Thread ANSI B1.1/BS 1580 Internal thread Tolerance 2B	302 000 704 ...	4 – 48	5	0,5	6	8
	302 000 706 ...	6 – 40	6	0,75	8	10
	302 000 708 ...	8 – 36	6,5	0,75	8	10
	302 000 710 ...	10 – 32	8	1	10	13
	302 000 725 ...	1/4 – 28	10	1,5	14	17
	302 000 731 ...	5/16 – 24	12	1,5	15	18
	302 000 737 ...	3/8 – 24	14	1,5	18	22
	302 000 744 ...	7/16 – 20	16	1,5	22	26
	302 000 750 ...	1/2 – 20	18	1,5	22	26
	302 000 762 ...	5/8 – 18	20	1,5	22	26

Example for finding the article number

Self-tapping threaded insert Ensats®-S to Works Standard 302 0 with internal thread A = UNF 1/4-28 made of case-hardened, zinc plated and blue passivated steel: Ensats®-S 302 000 725. 110

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

External thread E: as per KKV standard

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).

Remark:

Female threads in imperial measurements are also available for other Ensats® types.
Example: Self-tapping thread insert Ensats®-SB (see page 11, female thread M6) with female thread A = 1/4-20
UNC in steel, case hardened, zinc plated, blue passivated and a length of B = 12 mm: 308 000 625.110



Threaded insert

self-tapping / with hexagonal socket

Ensatz®-SI
Works Standard
302 2

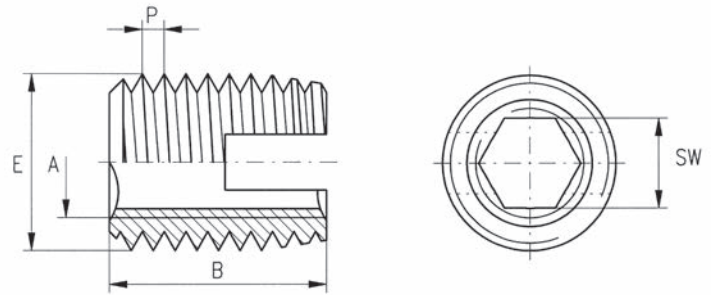
Application

The threaded insert Ensatz®-SI with cutting slot is a self-tapping fastener for the creation of wear-free, vibration resistant screw joints with high loading capacity in materials with low shearing strength.

Hexagonal socket

The Ensatz® is inserted via the hexagonal socket, permitting the achievement of short installation time.
Other benefits: More simple driving tools and machines which require only clockwise rotation.

The Ensatz® can be extracted without problems before the recycling process.



Dimensions in mm

Article number	Internal thread	External thread		Length	Hexagonal socket	Minimum borehole depth for blind holes
	A	E	P		SW +0,1	
302 200 040 ...	M 4	6,5	0,75	8	3,2	10
302 200 050 ...	M 5	8	1	10	4,1	13
302 200 060 ...	M 6	10	1,5	14	4,9	17
302 200 080 ...	M 8	12	1,5	15	6,6	18
302 200 100 ...	M 10	14	1,5	18	8,3	22
302 200 120 ...	M 12	16	1,5	22	10,1	26

Example for finding the article number

Self-tapping threaded insert with hexagonal socket Ensatz®-SI to Works Standard 302 2 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensatz®-SI 302 200 050. 110

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel (M4 to M8)
Brass

Article no. (**fourth** group of digits) ... 110
Article no. (**fourth** group of digits) ... 143
Article no. (**fourth** group of digits) ... 160
Article no. (**fourth** group of digits) ... 500
Article no. (**fourth** group of digits) ... 800

Other materials, designs and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: as per KKV standard

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).

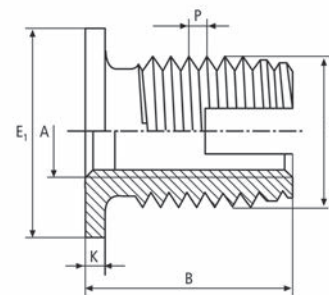
Application

Threaded insert Ensats®-SK 302 1 with cutting slot and head is a self-tapping fastener for the creation of wear-free, vibration-resistant screw joints with high loading capacity in materials with low shearing strength. Head, the pull-through force is.

It is suitable for installation in the following materials:

- Light alloys
- Cast iron, brass, bronze, NF metals
- Plastics, laminates
- Hardwoods

The head serves as a support for electrical contacts when fastening several parts simultaneously; when stress is applied against the head, the pull-through force is significantly increased.



Dimensions in mm

Article number	Internal thread	External thread		Head diameter	Head height	Length	Minimum borehole depth for blind holes
	A	E	P	E ₁	K	B	T
302 100 040 ...	M 4	6,5	0,75	9	1	9	10
302 100 050 ...	M 5	8	1	11	1	11	12
302 100 060 ...	M 6	10	1,5	13	1,5	15,5	16
302 100 080 ...	M 8	12	1,5	15	1,5	16,5	17
302 100 100 ...	M 10	14	1,5	17	1,5	19,5	20

Example for finding the article number

Self-tapping threaded insert Ensats®-SK to Works Standard 302 1 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-SK 302 100 050. 110

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (**fourth** group of digits) ... 110
Article no. (**fourth** group of digits) ... 143
Article no. (**fourth** group of digits) ... 160
Article no. (**fourth** group of digits) ... 500
Article no. (**fourth** group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: as per KKV standard
Internal thread UNC, UNF, Whitworth on request

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).



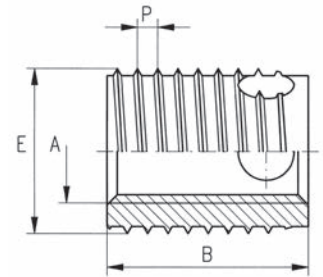
Threaded insert self-tapping

Ensatz®-SB
Works Standard
307 0 and 308 0

Application

Threaded insert Ensatz®-SB with cutting bores is a selftapping fastener for the creation of wear-free, vibration resistant

screw joints with high loading capacity in materials with higher shearing strength.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length B	Minimum borehole depth for blind holes T
	A	E	P		
307 000 030 ...	M 3	5	0,6	4	6
308 000 030 ...	M 3	5	0,6	6	8
307 000 035 ...	M 3,5	6	0,8	5	7
308 000 035 ...	M 3,5	6	0,8	8	10
307 000 040 ...	M 4	6,5	0,8	6	8
308 000 040 ...	M 4	6,5	0,8	8	10
307 000 050 ...	M 5	8	1	7	9
308 000 050 ...	M 5	8	1	10	13
307 000 060 ...	M 6	10	1,25	8	10
308 000 060 ...	M 6	10	1,25	12	15
307 000 080 ...	M 8	12	1,5	9	11
308 000 080 ...	M 8	12	1,5	14	17
307 000 100 ...	M 10	14	1,5	10	13
308 000 100 ...	M 10	14	1,5	18	22
307 000 120 ...	M 12	16	1,75	12	15
308 000 120 ...	M 12	16	1,75	22	26
307 000 140 ...	M 14	18	2	14	17
308 000 140 ...	M 14	18	2	24	28
307 000 160 ...	M 16	20	2	14	17
308 000 160 ...	M 16	20	2	24	28
307 000 180 ...	M 18	22	2	18	21
308 000 180 ...	M 18	22	2	24	28
308 000 200 ...	M 20	26	2	27	31
308 000 220 ...	M 22	26	2	30	34
308 000 240 ...	M 24	30	2	30	34

Example for finding the article number

Self-tapping threaded insert Ensatz®-SB to Works Standard 307 0 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensatz®-SB 307 000 050. 110

Short design Long design

Works Standard 307
Works Standard 308

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard.
Internal thread UNC, UNF, Whitworth on request

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).

Animation



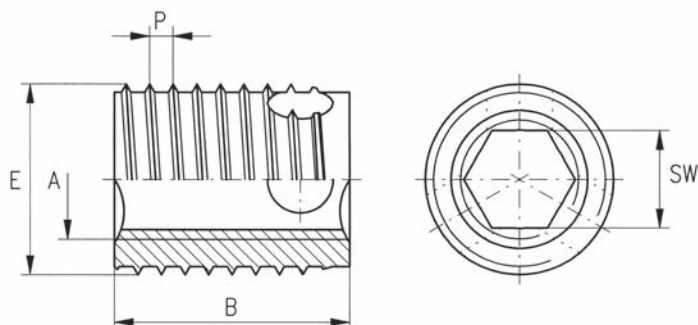
Application

Threaded insert Ensats®-SBI with cutting bores is a self-tapping fastener for the creation of wear-free, vibration resistant screw joints with high loading capacity in materials with higher shearing strength.

Hexagonal socket

The Ensats® is inserted via the hexagonal socket, permitting the achievement of short installation time.
Other benefits: More simple driving tools and machines which require only clockwise rotation.

The Ensats® can be extracted without problems before the recycling process.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length B	Hexagonal socket	Minimum borehole depth for blind holes T
	A	E	P		SW +0,1	
307 200 040 ...	M 4	6,5	0,8	6	3,2	8
308 200 040 ...	M 4	6,5	0,8	8	3,2	10
307 200 050 ...	M 5	8	1	7	4,1	9
308 200 050 ...	M 5	8	1	10	4,1	13
307 200 060 ...	M 6	10	1,25	8	4,9	10
308 200 060 ...	M 6	10	1,25	12	4,9	15
307 200 080 ...	M 8	12	1,5	9	6,6	11
308 200 080 ...	M 8	12	1,5	14	6,6	17
307 200 100 ...	M 10	14	1,5	10	8,3	13
308 200 100 ...	M 10	14	1,5	18	8,3	22
307 200 120 ...	M 12	16	1,75	12	10,1	15
308 200 120 ...	M 12	16	1,75	22	10,1	26

Example for finding the article number

Self-tapping threaded insert with hexagonal socket Ensats®-SBI to Works Standard 307 2 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-SBI 307 200 050. 110

Short design Long design

Works Standard 307
Works Standard 308

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel (M4 to M8)
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).



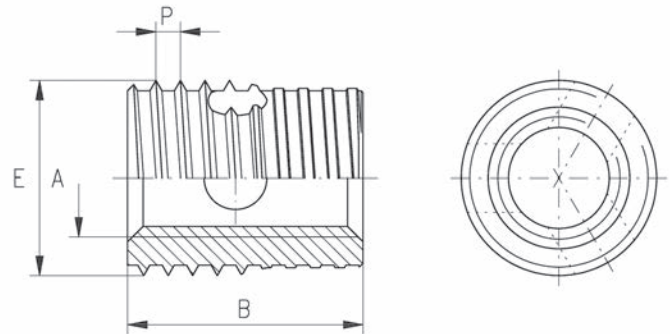
Threaded insert self-tapping with pilot thread

Ensats®-SBE
Works Standard
307 4 and 308 4

Application

The special threaded insert Ensats®-SBE with cutting bore and pilot thread is a self-tapping connecting element for the creation of wear-proof and vibration-proof screw connections with a high loading capacity in materials with high shear strength.

The Ensats®-SBE was developed to reliably prevent skewing during manual installation. The special threaded insert is particularly suitable for processing positions in which automated processing is not possible.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length	Minimum borehole depth for blind holes
	A	E	P	B	T
307 400 050 ...	M 5	8	1	9	12
308 400 050 ...	M 5	8	1	12	15
307 400 060 ...	M 6	10	1,25	12	15
308 400 060 ...	M 6	10	1,25	16	19
307 400 080 ...	M 8	12	1,5	13	16
308 400 080 ...	M 8	12	1,5	18	21
307 400 100 ...	M 10	14	1,5	14	17
308 400 100 ...	M 10	14	1,5	22	26
307 400 120 ...	M 12	16	1,75	16	19
308 400 120 ...	M 12	16	1,75	26	30
307 400 140 ...	M 14	18	2	18	21
308 400 140 ...	M 14	18	2	28	32
308 400 160 ...	M 16	20	2	28	32

Example for finding the article number

Self-tapping threaded insert Ensats®-SBE to Works Standard 307 4 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-SBE 307 400 050. 110

Short design Long design

Works Standard 307
Works Standard 308

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard
Internal thread UNC, UNF, Whitworth on request

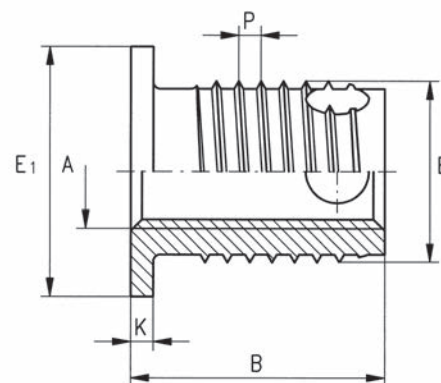
Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).

Application

The Threaded insert Ensats®-SBK based on the part geometry of the threaded insert Ensats®-SB.

The head serves as a support for electrical contacts when fastening several parts simultaneously; when stress is applied against the head, the pull-through force is significantly increased.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Head diameter	Head height	Length	Minimum borehole depth for blind holes
	A	E	P	E ₁	K	B	T
307 100 050 ...	M 5	8	1	11	1	8	9
308 100 050 ...	M 5	8	1	11	1	11	13
307 100 060 ...	M 6	10	1,25	13	1,5	9,5	10
308 100 060 ...	M 6	10	1,25	13	1,5	13,5	15
307 100 080 ...	M 8	12	1,5	15	1,5	10,5	11
308 100 080 ...	M 8	12	1,5	15	1,5	15,5	17
307 100 100 ...	M 10	14	1,5	17	1,5	11,5	13
308 100 100 ...	M 10	14	1,5	17	1,5	19,5	22

Example for finding the article number

Self-tapping threaded insert Ensats®-SBK to Works Standard 307 1 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-SBK 307 100 050. 110

Short design Long design

Works Standard 307
Works Standard 308

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard
Internal thread UNC, UNF, Whitworth on request

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).



Threaded insert

self-tapping / with hexagonal socket

Ensatz®-SBKI
Works Standard
307 3 and 308 3

Application

The Threaded insert Ensatz®-SBKI based on the part geometry of the threaded insert Ensatz®-SB.

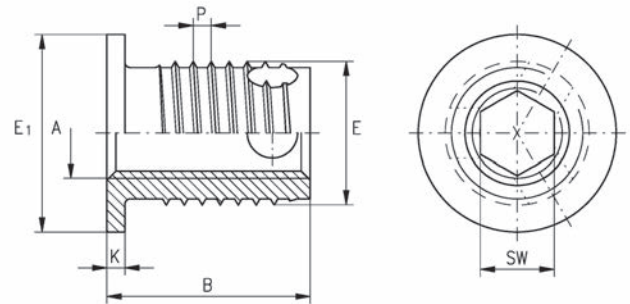
The head serves as a support for electrical contacts when fastening several parts simultaneously; when stress is applied against the head, the pull-through force is significantly increased.

Hexagonal socket

The Ensatz® is inserted via the hexagonal socket, permitting the achievement of short installation time.

Weitere Vorteile: einfachere Ein
Other benefits: More simple driving tools and machines which require only clockwise rotation.

The Ensatz® can be extracted without problems before the recycling process, resulting in lower costs.



Dimensions in mm

Article number	Internal thread	External thread Special Thread		Head diameter	Head height	Length	Hexagonal socket	Minimum borehole depth for blind holes
	A	E	P	E ₁	K	B	SW +0,1	T
307 300 050 ...	M 5	8	1	11	1	8	4,1	9
308 300 050 ...	M 5	8	1	11	1	11	4,1	13
307 300 060 ...	M 6	10	1,25	13	1,5	9,5	4,9	10
308 300 060 ...	M 6	10	1,25	13	1,5	13,5	4,9	15
307 300 080 ...	M 8	12	1,5	15	1,5	10,5	6,6	11
308 300 080 ...	M 8	12	1,5	15	1,5	15,5	6,6	17
307 300 100 ...	M 10	14	1,5	17	1,5	11,5	8,3	13
308 300 100 ...	M 10	14	1,5	17	1,5	19,5	8,3	22

Example for finding the article number

Self-tapping threaded insert hexagonal socket Ensatz®-SBKI to Works Standard 307 3 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensatz®-SBKI 307 300 050. 110

Short design Long design

Works Standard 307
Works Standard 308

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard

Borehole diameter

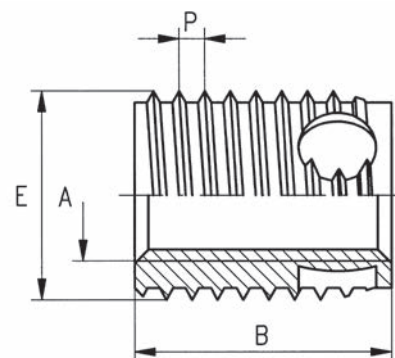
Guideline values for borehole diameter see table page 6 (Fig. 6).

Application

This special insert Ensats®-SBS was developed primarily for applications in which chips – created by the self-tapping process – exert a detrimental effect and could cause serious damage or failure during subsequent operation of the installed assembly – for example in electronic equipment.

The three cutting bores distributed around the periphery are formed as chip reservoirs.

The coarse chips created during the installation process are stored in these reservoirs and cannot drop into sensitive equipment components.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length	Borehole diameter	Minimum borehole depth for blind holes
	A	E	P		L -0,1	T
337 000 030 ...	M 3	5	0,6	4	4,8	6
338 000 030 ...	M 3	5	0,6	6	4,8	8
337 000 035 ...	M 3,5	6	0,8	5	5,7	7
338 000 035 ...	M 3,5	6	0,8	8	5,7	10
337 000 040 ...	M 4	6,5	0,8	6	6,2	8
338 000 040 ...	M 4	6,5	0,8	8	6,2	10
337 000 050 ...	M 5	8	1	7	7,7	9
338 000 050 ...	M 5	8	1	10	7,7	13
337 000 060 ...	M 6	10	1,25	8	9,6	10
338 000 060 ...	M 6	10	1,25	12	9,6	15
337 000 080 ...	M 8	12	1,5	9	11,5	11
338 000 080 ...	M 8	12	1,5	14	11,5	17
337 000 100 ...	M 10	14	1,5	10	13,5	13
338 000 100 ...	M 10	14	1,5	18	13,5	22
337 000 120 ...	M 12	16	1,75	12	15,4	15
338 000 120 ...	M 12	16	1,75	22	15,4	26
337 000 140 ...	M 14	18	2	14	17,4	17
338 000 140 ...	M 14	18	2	24	17,4	28
337 000 160 ...	M 16	20	2	14	19,4	17
338 000 160 ...	M 16	20	2	24	19,4	28

Example for finding the article number

Self-tapping threaded insert Ensats®-SBS to Works Standard 337 0 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-SBS 337 000 050. 110

Short design Long design

Works Standard 337
Works Standard 338

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard
Internal thread UNC, UNF, Whitworth on request



Threaded insert

self-tapping with chip reservoirs
and hexagonal socket

Ensat®-SBSI
Works Standard
337 2 and 338 2

Application

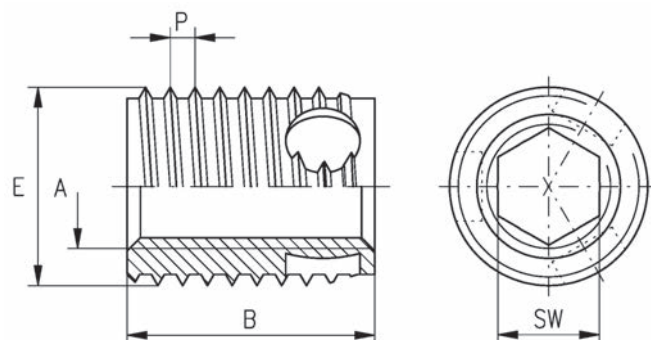
The Threaded insert Ensat®-SBSI based on the part geometry of the threaded insert Ensat®-SBSI additionally with hexagonal socket.

Hexagonal socket

The Ensat® is inserted via the hexagonal socket, permitting the achievement of short installation time.

Other benefits: More simple driving tools and machines which require only clockwise rotation.

The Ensat® can be extracted without problems before the recycling process, resulting in lower costs.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length	Hexagonal socket	Borehole diameter	Minimum borehole depth for blind holes
	A	E	P	B	SW +0,1	L -0,1	T
337 200 040 ...	M 4	6,5	0,8	6	3,2	6,2	8
338 200 040 ...	M 4	6,5	0,8	8	3,2	6,2	10
337 200 050 ...	M 5	8	1	7	4,1	7,7	9
338 200 050 ...	M 5	8	1	10	4,1	7,7	13
337 200 060 ...	M 6	10	1,25	8	4,9	9,6	10
338 200 060 ...	M 6	10	1,25	12	4,9	9,6	15
337 200 080 ...	M 8	12	1,5	9	6,6	11,5	11
338 200 080 ...	M 8	12	1,5	14	6,6	11,5	17
337 200 100 ...	M 10	14	1,5	10	8,3	13,5	13
338 200 100 ...	M 10	14	1,5	18	8,3	13,5	22
337 200 120 ...	M 12	16	1,75	12	10,1	15,4	15
338 200 120 ...	M 12	16	1,75	22	10,1	15,4	26

Example for finding the article number

Self-tapping threaded insert with hexagonal socket Ensat®-SBSI to Works Standard 337 2 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensat®-SBSI 337 200 050. 110

Short design Long design

Works Standard 337
Works Standard 338

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel (M4 to M8)
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard

Animation

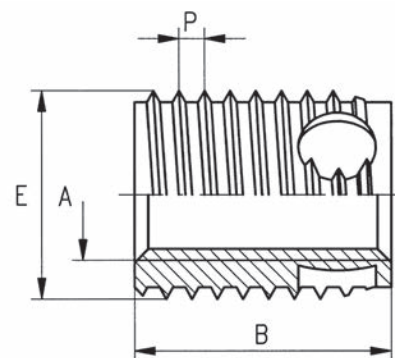


Application

Particularly where a connecting element is required to offer a high level of resistance to acids and corrosion, the Ensats®-SBS made of the material **1.4404** provides an important missing link in the field of stainless steels.

Due to its extremely good material properties – **good resistance to most media containing chloride and non-oxidizing acids** – this threaded insert offers additional scope for application. The three cutting bores distributed

around the periphery are shaped to create a chip reservoir. The coarse chips created during the screw-in process rest there and cannot drop into sensitive collect equipment parts.



Before application, we recommend performing tests using the appropriate media.

Dimensions in mm

Article number	Internal thread	External thread Special thread		Length B	Borehole diameter L -0,1	Minimum borehole depth for blind holes T
	A	E	P			
337 000 030 504	M 3	5	0,6	4	4,8	6
338 000 030 504	M 3	5	0,6	6	4,8	8
337 000 040 504	M 4	6,5	0,8	6	6,2	8
338 000 040 504	M 4	6,5	0,8	8	6,2	10
337 000 050 504	M 5	8	1	7	7,7	9
338 000 050 504	M 5	8	1	10	7,7	13
337 000 060 504	M 6	10	1,25	8	9,6	10
338 000 060 504	M 6	10	1,25	12	9,6	15
337 000 080 504	M 8	12	1,5	9	11,5	11
338 000 080 504	M 8	12	1,5	14	11,5	17

Example for finding the article number

Self-tapping threaded insert Ensats®-SBS to Works Standard 337 0 with internal thread A = M5 made of, acid and rust-resistant steel: Ensats®-SBS 337 000 050. 504

Short design Long design

Works Standard 337
Works Standard 338

Materials

Acid and rust-resistant steel 1.4404 (A4 grade)

Other, designs (e. g. fine thread) on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard
Internal thread UNC, UNF, Whitworth on request





Thin-walled threaded insert self-tapping, with cutting bores

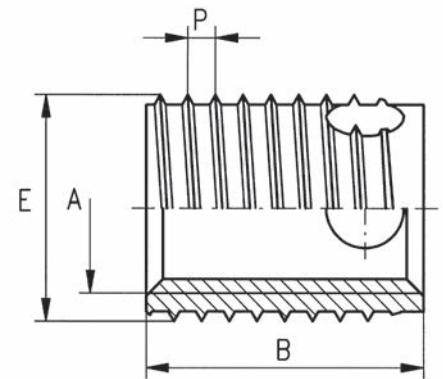
Ensatz®-SBD
Works Standard
347 0 and 348 0

Application

Threaded insert Ensatz®-SBD with three cutting bores in a special thinwalled version developed primarily for applications with thin residual walls and for lightweight constructions.

These version are designed primarily for processing on thread tapping machines, as the pitch of the outside and inside thread is identical.

For processing thinwalled inserts in metal, the tensile strength / hardness of the base material is always the determining factor. In critical cases, we recommend lubricating with suitable media in order to prevent fracture of the thinwalled inserts.



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length B	Borehole diameter	Minimum borehole depth for blind holes T
	A	E	P			
347 000 035 ...	M 3,5	5	0,6	5	4,7 to 4,8	7
348 000 035 ...	M 3,5	5	0,6	8	4,7 to 4,8	10
347 000 040 ...	M 4	6	0,7	6	5,6 to 5,7	8
348 000 040 ...	M 4	6	0,7	8	5,6 to 5,7	10
347 000 050 ...	M 5	6,5	0,8	7	6,1 to 6,2	9
348 000 050 ...	M 5	6,5	0,8	10	6,1 to 6,2	13
347 000 060 ...	M 6	8	1	8	7,5 to 7,7	10
348 000 060 ...	M 6	8	1	12	7,5 to 7,7	15
347 000 080 ...	M 8	10	1,25	9	9,4 to 9,6	11
348 000 080 ...	M 8	10	1,25	14	9,4 to 9,6	17
347 000 100 ...	M 10	12	1,5	10	11,2 to 11,5	13
348 000 100 ...	M 10	12	1,5	18	11,2 to 11,5	22
347 000 120 ...	M 12	14	1,75	12	13,2 to 13,4	15
348 000 120 ...	M 12	14	1,75	22	13,2 to 13,4	26

Example for finding the article number

Self-tapping thin-walled threaded insert Ensatz®-SBD to Works Standard 347 0 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensatz®-SBD 347 000 050. 110

Short design Long design

Works Standard 347
Works Standard 348

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel (M3,5 to M8)
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs and finishes on request.

Tolerance

ISO 2768-m

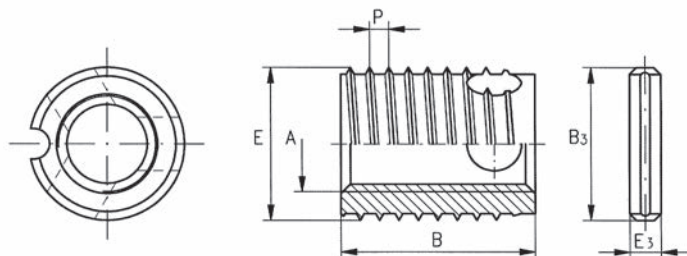
Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard
Internal thread UNC, UNF, Whitworth on request

Application

This special threaded insert is used to absorb extreme torsional and vibration stress.

The antirotation function is achieved by means of a parallel notched stud to DIN EN ISO 8740 (pre-drill with diameter E_3 , depth = $B_3 + 1\text{mm}$).



Dimensions in mm

Article number	Internal thread	External thread Special thread		Length	Minimum borehole depth for blind holes	Notched stud	
	A	E	P	B	T	B ₃	E ₃
317 000 040 ...	M 4	6,5	0,8	6	8	4	2
318 000 040 ...	M 4	6,5	0,8	8	10	6	2
317 000 050 ...	M 5	8	1	7	9	4	2
318 000 050 ...	M 5	8	1	10	13	6	2
317 000 060 ...	M 6	10	1,25	8	10	6	2
318 000 060 ...	M 6	10	1,25	12	15	10	2
317 000 080 ...	M 8	12	1,5	9	11	6	2
318 000 080 ...	M 8	12	1,5	14	17	10	2
317 000 100 ...	M 10	14	1,5	10	13	6	2
318 000 100 ...	M 10	14	1,5	18	22	16	2
317 000 120 ...	M 12	16	1,75	12	15	10	2
318 000 120 ...	M 12	16	1,75	22	26	16	2
317 000 140 ...	M 14	18	2	14	17	10	2
318 000 140 ...	M 14	18	2	24	28	16	2
317 000 160 ...	M 16	20	2	14	17	10	2
318 000 160 ...	M 16	20	2	24	28	16	2

Example for finding the article number

Self-tapping threaded insert Ensat®-SBN to Works Standard 317 0 with safety groove A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensat®-SBN 317 000 050. 110

Short design Long design

Works Standard 317
Works Standard 318

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500

Other materials, designs (e. g. fine thread) and finishes on request.

Material of the notched stud: Ensat® made of steel = Steel, zinc plated
Ensat® made of stainless steel = Stainless steel

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard.
Internal thread UNC, UNF, Whitworth on request

Borehole diameter

Guideline values for borehole diameter see table page 6 (Fig. 6).

Remark

Alternatively also available: Ensat® with locking coating on the male thread (microencapsulated adhesive).



Threaded insert

Self-tapping with chip reservoirs
and closed floor

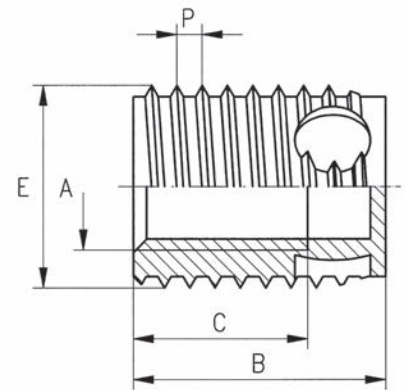
Ensats®-SBT
Works Standard
357 0 and 358 0

Application

This special Ensats®-SBT was developed primarily for applications in which chips – created by self-tapping process – exert a detrimental effect and could cause serious damage or failure during subsequent operation of the installed assembly – for example in electronic equipment.

The chips created during the installation process are stored in these reservoirs and cannot drop into sensitive equipment components.

The closed floor additionally prevents the penetration of chips into the female thread.



The three cutting bores distributed as chip reservoirs.

Dimensions in mm

Article number	Internal thread	External thread Special thread		Length	Thread depth min.	Borehole diameter	Minimum borehole depth for blind holes
	A	E	P	B	C	L - 0,1	T
357 000 040 ...	M 4	6,5	0,8	6	3,2	6,2	8
358 000 040 ...	M 4	6,5	0,8	8	4,5	6,2	10
357 000 050 ...	M 5	8	1	7	4	7,7	9
358 000 050 ...	M 5	8	1	10	6	7,7	13
357 000 060 ...	M 6	10	1,25	8	4,8	9,6	10
358 000 060 ...	M 6	10	1,25	12	7	9,6	15
358 000 080 ...	M 8	12	1,5	14	8,8	11,5	17
358 000 100 ...	M 10	14	1,5	18	11	13,5	22
358 000 120 ...	M 12	16	1,75	22	14	15,4	26

Example for finding the article number

Self-tapping threaded insert Ensats®-SBT with chip reservoir and closed floor, to Works Standard 357 0 with internal thread A = M5 made of case-hardened, zinc plated and blue passivated steel: Ensats®-SBT 357 000 050. 110

Short design Long design

Works Standard 357
Works Standard 358

Materials

Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Stainless steel (M4 to M8)
Brass

Article no. (fourth group of digits) ... 110
Article no. (fourth group of digits) ... 143
Article no. (fourth group of digits) ... 160
Article no. (fourth group of digits) ... 500
Article no. (fourth group of digits) ... 800

Other materials, designs (e. g. fine thread) and finishes on request.

Tolerance

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, as per KKV standard
Internal thread UNC, UNF, Whitworth on request

Mubux®-Z – press-in threaded inserts ...



Mubux®-Z is a press-in threaded insert made of hardened and zinc-plated steel with helical annular gear around the outside.

Application range

For screw fasteners in cast components made of NF metal – primarily light alloy, for through holes and blind holes.

Mounting

Mubux®-Z is simply pressed into a normal borehole. The retaining hole is drilled or provided for during the casting processes.

Mubux®-Z is inserted with the guiding shoulder pointing downwards into the borehole. The press die should be smooth (if applicable polished) in order not to impede the rotary movement of the Mubux®-Z during the pressin process.

Product features

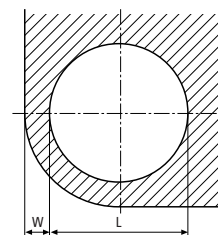
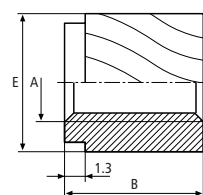
Wear-resistant, rustproof thread with sufficient pull-out strength. Fast, simple press-in without the use of special tools and without the need for a "thread tapping" process.

Press-in threaded insert

Mubux®-Z
Works Standard
890

Application

For the creation of wear-resistant screw joints with high load capability in cast alloy components. Suitable for through holes and blind holes.



Dimensions in mm

Article number	Internal thread A	External diameter E	Length B	Recommended retaining hole ¹⁾ L +0,1	Minimum spacing W
890 000 040.100	M 4	7,7	6,9	7,2	2,4
890 000 050.100	M 5	7,7	6,9	7,2	2,4

¹⁾ Reference values only. Trials on the resp. materials are recommended.

Example for finding the article number

Press-in threaded insert Mubux®-Z with internal thread A = M4 made of hardened, zinc plated and yellow chromated steel: Mubux®-Z 890 000 040.100

Material

Hardened steel, zinc plated, yellow chromated

Thread

Internal thread: ISO 6H

Tolerances

ISO 2768-m

Mubux®-MO – the coated threaded insert ...

Threaded insert Mubux®-MO is made of zinc-plated steel, with internal and external threads. It is coated on the outside with precote 80.

Application range

Mubux®-MO is used wherever a vibration- free firm fit and extremely good sealing properties are required in addition to a high thread load capacity and wear resistance. It is suitable for a wide range of different materials from plastic to steel, for minimal wall thicknesses and extremely brittle materials.

Product features

- Low installation costs
- Simple installation without the need for costly special tools
- Exchange of threaded inserts without tool damage

precote 80 coating

precote 80 is a microcapsule acrylic-based pre-coating. When screwed into a nut thread, the capsules break open and the plastic flux begins to harden. This creates a firm, water-tight joint. Hand-tight after approx. 20 minutes, full loading capability after 24 hours.

precote 80 coating is also available in different kind of colours.

Other coating variants for screw locking and thread sealing are described in more detail in our publication no. 60.

Installation

1. Drill the retaining hole.
2. Tap the thread with a standard thread tap.
3. Screw in the MO with simple tools; either manually, semi-automatically or fully automatic.

All Ensaf® driving tools and machines can also be used for Mubux®-MO.

Installing under pre-tension increases the breakaway torque.

Important: The parts must be free of oil and grease prior to installation.

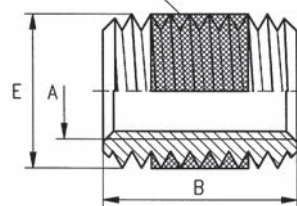


Application

For the creation of wear-resistant screw joints with good load capability in formend components made of light alloy, cast iron and steel.

Suitable for through holes and blind holes.

360° precote 80 coated



Dimensions in mm

Article number first group of digits	Length 1) B	Article number second and third group of digits	Internal thread A	External thread E	Standard length 1) B			
					1 A	1,5 A	2 A	2,5 A
971	1 A	... 000 030 ...	M 3	M 5		4,5	6	
972	1,5 A	... 000 040 ...	M 4	M 6		6	8	10
973	2 A	... 000 050 ...	M 5	M 7		7,5	10	12,5
974	2,5 A	... 000 060 ...	M 6	M 8		9	12	15
		... 000 080 ...	M 8	M 12		12	16	20
		... 000 100 ...	M 10	M 14		15	20	25
		... 000 120 ...	M 12	M 16	12	18	24	30

1) Tolerance $\pm 0,25$ mm

Example for finding the article number

Threaded insert Mubux®-MO with internal thread A = M6, length B = 12 mm made of zinc plated and blue passivated steel and coated with microcapsule-based adhesive precote 80: Mubux®-MO 973 000 060.101, without coating: Mubux®-M 973 000 060. 110

Materials

Zinc plated, yellow chromated steel; coated with precote 80
Zinc plated, blue passivated steel; coated with precote 80
Zinc plated, blue passivated steel; without coating
Zinc plated, yellow chromated steel; without coating

Article no. (fourth group of digits) 100
Article no. (fourth group of digits) 101
Article no. (fourth group of digits) 110
Article no. (fourth group of digits) 120

Other materials, designs (e. g. fine thread) and finishes on request.

Thread

Internal thread A: as per ISO 6H • External thread E: screwable in standard thread

Coating

Microcapsule pre-coating on an acrylic basis precote 80, maximum storage capability 4 years at room temperature.

Recommended length

Dimensions in mm

Workpiece shear strength N/mm ²	Tensile strength of screw	Recommended length				
		M 3	M 4	M 5	M 6/M 8/M 10	M 12
≥ 70	4,8	2 A	1,5 A	2 A	2 A	—
≥ 140	4,8	2 A	1,5 A	2 A	1,5 A	1 A
	6,8	2 A	1,5 A	2 A	1,5 A	1,5 A
	8,8	2 A	1,5 A	2 A	2 A	2 A
≥ 210	6,8	2 A	1,5 A	2 A	1,5 A	1 A
	8,8	2 A	1,5 A	2 A	1,5 A	1,5 A
	12,9	2 A	1,5 A	2 A	1,5 A	2 A
	14,9	2 A	2 A	2 A	2 A	2,5 A
≥ 280	6,8	2 A	1,5 A	2 A	1,5 A	1 A
	8,8/12,9	2 A	1,5 A	2 A	1,5 A	1,5 A
	14,9	2 A	1,5 A	2 A	1,5 A	2 A

Example

Shearing strength of the workpiece appr. 140 N/mm², screw M6, strength class 8.8
Recommended length: 2A = 2x6 mm = 12 mm.



Spark plug threaded insert self-tapping

Gripp®
Works Standard
304

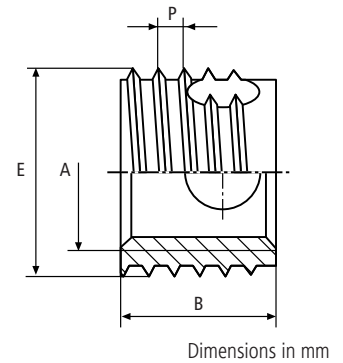
Application

The Ensatz®-Gripp threaded insert with cutting bores is a self-tapping fastener for the repair of torn and damaged spark plug retaining threads in cylinder heads.

The Ensatz®-Gripp is designed to enhance the pull-out strength of the thread.

Installation

Gripp® is installed in the same way as Ensatz®, but screwed in deeper until the upper rim comes to rest around 1.8 mm under the surface of the cylinder head. The sealing ring of the spa plug is then able to work effectively.



Article number	Internal thread			External thread Special thread		Length	Borehole diameter ¹⁾
	A	P	DIN	E	P	B	L
304 000 140.160	M 14	1,25	72502	17,7	1,25	9	17,0
304 000 141.160	M 14	1,25	72502	17,7	1,25	15	17,0
304 000 180.160	M 18	1,5	72501	21,7	1,25	9	21,0

¹⁾ Guideline values for normal applications. Deviations, depending on the strength of the cylinder head alloy, $\pm 0,1$ mm

Example for finding the article number

Spark plug insert with internal thread A = M14 x 1,25 mm, length B = 9 mm made of hardened, zinc plated and yellow chromated steel: Ensatz®-Gripp 304 000 140.160

Material

Hardened steel, zinc plated, yellow chromated



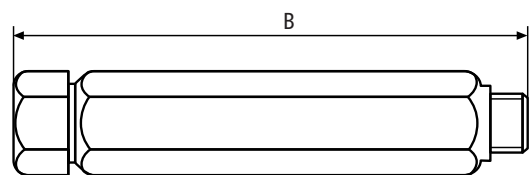
Installation tools for Gripp installation

Works Standard
619/629

Dimensions in mm

Article number	Suitable for Gripp	Tool SW	Lentgh
		D	B
619 000 140	304 000 140.160	22	97
619 000 140	304 000 141.160	22	97
619 000 180	304 000 180.160	22	97

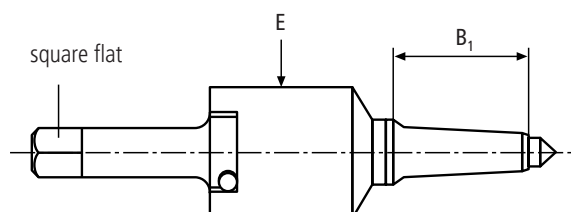
Installation tool 619 for manual installation



Dimensions in mm

Article number	Suitable for Gripp	Maximum diameter	Lentgh
		E	B ₁
629 000 146	304 000 140.160	50	72
629 000 146	304 000 141.160	50	72
629 000 187	304 000 180.160	50	73

Installation tool 629 for machine installation



Ensats[®] – driving tools...

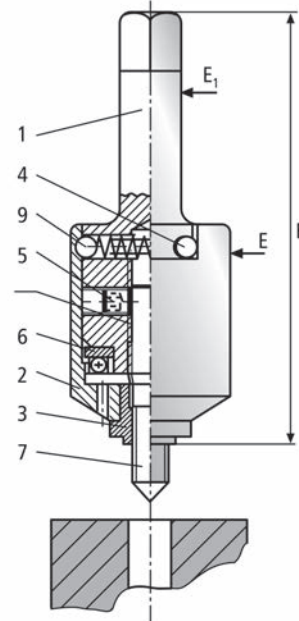
On this page, you can configure the optimum tool for your application. A configuration is provided in the following as an illustrative example.

The article number is composed of two sequences of numbers and starts with the tool shank (Fig. 9) which should be selected in accordance with your output.

Also encrypted in this number are the special versions for thin-walled Ensats[®] (620 1 and 621 1) and for very high driving torques (622 0 and 623 0) which are available as standard only as a square shank. Other non-standard geometries can be evaluated as standard besides the tools illustrated. The second sequence of numbers in the table (Fig. 10) indicates the thread code of the female thread. The tightened dimensions of the tools are shown on the next page.

Tool for accessible retaining boreholes (short)

- 1 Shank
- 4 Stop pin
- 9 Ball
- 5 Fixing screw
- 6 Ball bearing
- 2 Shell
- 3 Guide bush
- 7 Stud



Tool for deep located retaining boreholes (long)

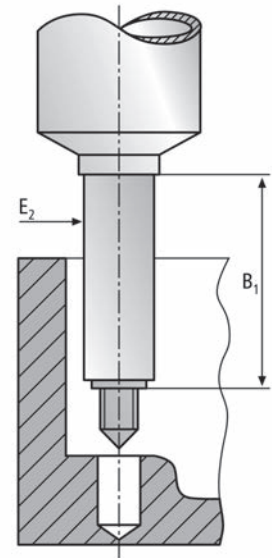


Fig. 8

Example:

You wish to insert an Ensats[®] 308 000 050. 110. For the installation process, you have selected a driving tool with spindle hexagon socket to DIN ISO 1173 and have to mount the insert into a deep positioned borehole.

Shank: **636 0...** (long for deep positioned borehole)
 Thread code: **...00 050...** (for thread M5)
 Suffix numbers: **.... 000** (with always the same tools)

Order no: **636 000 050.000**

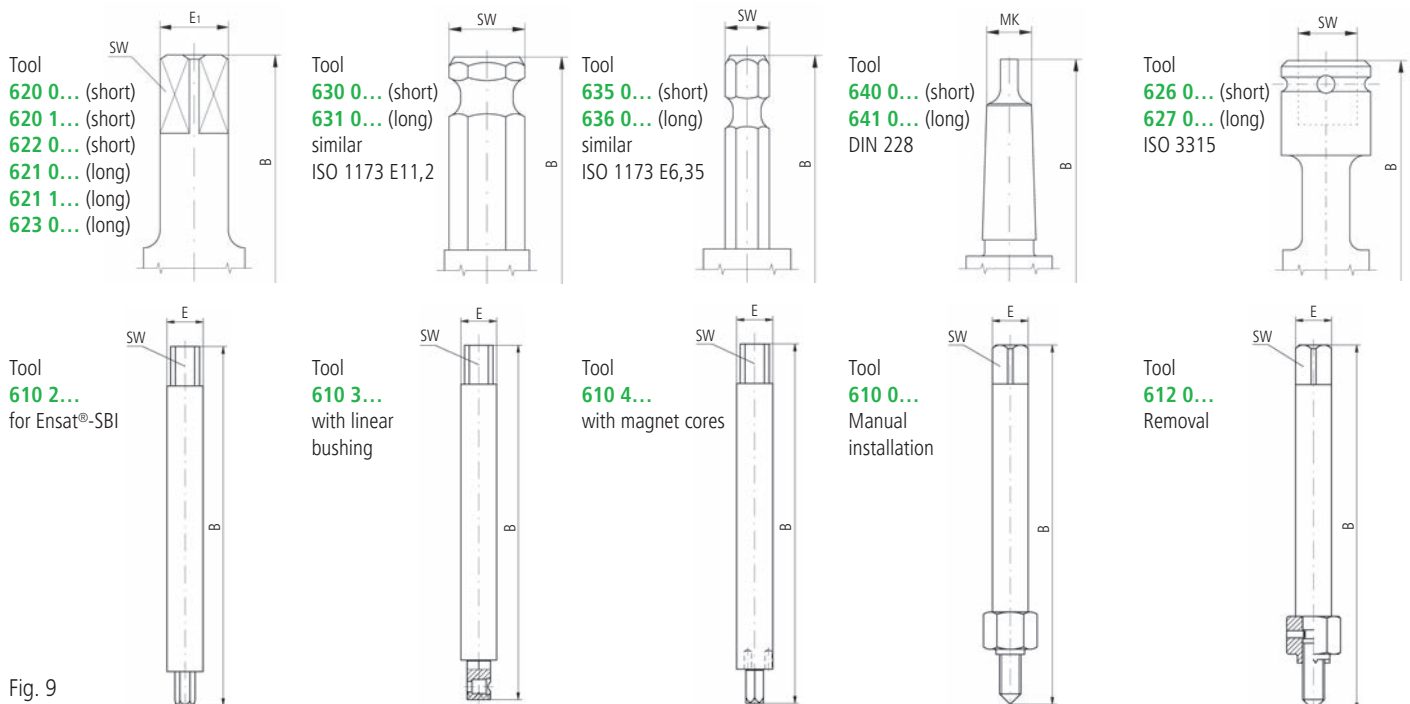


Fig. 9

For Ensaf®	M 2	M 2,5	M 3	M 3,5	M 4	M 5	M 6	M 8	M 10	M 12	M 14	M 16	M 18	M 20	M 22	M 24	M 27	M 30
Metric	...00 020.000	...00 025.000	...00 030.000	...00 035.000	...00 040.000	...00 050.000	...00 060.000	...00 080.000	...00 100.000	...00 120.000	...00 140.000	...00 160.000	...00 180.000	...00 200.000	...00 220.000	...00 240.000	...00 270.000	...00 300.000
Whit worth	—	—	—	—	—	—	...00 525.000	...00 531.000	...00 537.000	...00 544.000	...00 550.000	...00 562.000	—	—	—	—	—	—
UNC	—	—	...00 604.000	...00 606.000	...00 608.000	...00 610.000	...00 625.000	...00 631.000	...00 637.000	...00 644.000	...00 650.000	...00 662.000	—	—	—	—	—	—
UNF	—	—	...00 704.000	...00 706.000	...00 708.000	...00 710.000	...00 725.000	...00 731.000	...00 737.000	...00 744.000	...00 750.000	...00 762.000	—	—	—	—	—	—
Measurement table																		
Tool type 620 0... (short version), 620 1... (Variant for thin-walled ENSAF®) und 621 0... (long version), 621 1... (Variant for thin-walled ENSAF®)																		
E ₁	8	8	8	8	8	12,5	12,5	12,5	16	16	25	25	25	25	25	30	30	30
SW	6,3	6,3	6,3	6,3	6,3	10	10	10	12,5	12,5	20	20	20	20	20	25	25	25
B	78	78	78	78	78	95	95	95	118	118	145	145	145	169	169	198	198	198
B ₁	40	40	40	40	40	50	50	50	60	60	60	60	60	60	60	60	60	60
E	18	18	18	18	18	24	24	24	32	32	50	50	50	58	58	70	70	70
E ₂	7	7	7	7	7	9	10	12	15	18	20	22	24	26	28	32	35	38
Tool type 622 0... (short version, reinforced version for high installation torques) and 623 0... (long version, reinforced version for high installation torques)																		
E	○	○	○	○	○	36	36	36	43	43	○	○	○	○	○	○	○	○
Tool type 630 0... (short version, hexagonal shaft) and 631 0... (long version, hexagonal shaft)																		
SW	11,11	11,11	11,11	11,11	11,11	11,11	11,11	11,11	11,11	11,11	11,11	11,11	11,11	—	—	—	—	—
B	71	71	71	71	71	83	83	83	98	98	118	118	118	—	—	—	—	—
Tool type 635 0... (short version, hexagonal shaft) and 636 0... (long version, hexagonal shaft)																		
SW	6,35	6,35	6,35	6,35	6,35	6,35	6,35	6,35	6,35	6,35	—	—	—	—	—	—	—	—
B	66	66	66	66	66	78	78	78	93	93	—	—	—	—	—	—	—	—
Tool type 640 0... (short version, morse taper shaft) and 641 0... (long version, morse taper shaft)																		
MK	MK0	MK0	MK0	MK0	MK0	MK2	MK2	MK2	MK3	MK3	MK4	MK4	MK4	MK4	MK4	MK4	—	—
B	○	○	○	○	○	○	○	○	○	176,5	○	222,5	○	○	○	○	—	—
Tool type 626 0... (short version, square socket shank) and 627 0... (long version, square socket shank)																		
SW	—	—	—	—	—	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
B	—	—	—	—	—	94,5	94,5	94,5	117,5	117,5	140,5	140,5	140,5	168,5	168,5	197,5	197,5	197,5
Tool type 610 2..., 610 3... (from M 8), 610 4... (from M 6) – (for ENSAF® with hexagon socket)																		
E	—	—	—	—	6	8	10	10	12	14	16	18	—	—	—	—	—	—
B	—	—	—	—	80	90	100	100	110	125	125	125	—	—	—	—	—	—
SW	—	—	—	—	4,9	6,2	8	8	9	11	12	15	—	—	—	—	—	—
Tool type 610 0..., 612 0... (manual driving tools)																		
E	—	6	6	6	6	10	10	10	16	16	16	—	—	—	—	—	—	—
B	—	55	55	60	60	75	75	75	95	95	95	—	—	—	—	—	—	—
SW	—	5	5	5	5	8	8	8	12,5	12,5	12,5	—	—	—	—	—	—	—

In order to obtain the length dimension of the extended tool versions, the specified dimensions B must be added in each case to the dimension B₁.

○ = available on request

Fig. 10

Manual Ensat®- installation ...

Manual installation with driving tool and tap wrench:

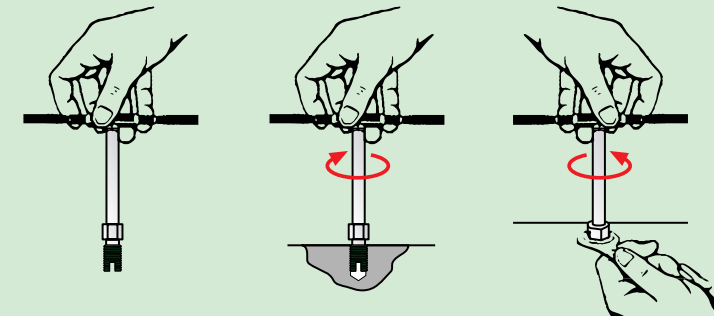


Fig. 11

Emergency installation using screw and nut:

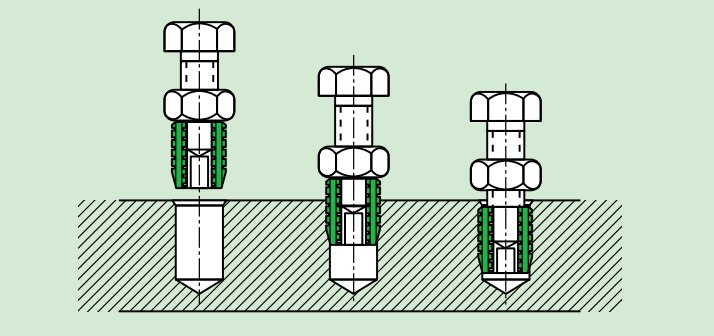


Fig. 12

The right length of the threaded pin for the Ensat® with cutting slot or with cutting bore is calculated from the pitch of the female thread (see also Fig. below; P = pitch of the female thread).

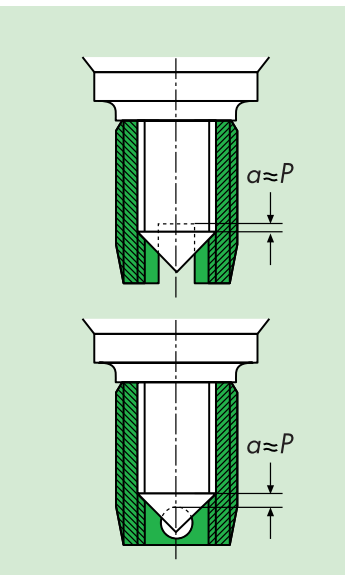


Fig. 13

Setting or exchanging the stud

- Pull the shell (2) downwards off the shank (1).
- Release the locking screws (5).
- Screw the stud (7) in or out. Yellow colour marking indicates flattened surfaces for the locking screws.
- When assembling, tighten both screws (5) evenly.
- Insert the ball bearing (6).
- Push on the shell (2) until the ball stop locks into place. For the tool to function perfectly, the shell must be very easy to rotate. Shorten the thread of tool 610 accordingly for short Ensat®.

Manual installation

Manual installation usually takes place using the manual driving tools 610 0... at the female thread or when using tools 610 2... at the hexagonal socket. The machine tools can naturally also be used for manual installation. However, here it is important to ensure that the rotatable shell (2) is positioned correctly (see Fig. 17 process description).

1. Drill the hole: Diameter, countersink if necessary (see page 6)
2. Screw the Ensat® onto the driving tool, with the cutting slot or cutting bore pointing downwards.
3. Take care not to tilt sideways. In machine tools, the rotatable shell (2) must rest against the externally visible stop pins so that it is driven by the pins in the clockwise direction. Screw in the Ensat® until around 0.1 – 0.2mm under the workpiece surface.
4. Back out the driver tool. This causes the machine tool to become automatically released from the Ensat®. With tool 610 0..., the shoulder must be held by means of a spanner until the lock breaks.

Conditions for flawless tool function

- Unscrew the guide bush (3) at the front if the Ensat® is to be installed deeper than 0.2 mm under the surface of the workpiece. Diameter: 0.1 to 0.2 mm smaller than Ensat® retaining hole.
- Locking and unlocking the tool on the Ensat® surface is guaranteed by a thrust bearing (6).
- The stop pins (4) execute the impact at the shell (2) which unlocks the tool.
- Wear at the stud (7) can result in unlocking problems.

For mounting thin-walled Ensat® (page 19), special guide bushes must be used (tools 620 1 and 621 1).

The components are also offered as single parts to allow you to carry out your own repairs to the tool. Simply give us a call.



Fig. 14

Machine Ensatz® - installation...

Machine driving process

1. Precisely position the workpiece so that the bore and machine spindle are at right angles to each other (do not tilt).
Set the machine to the precise installation depth (appr. 0.1 to 0.2 mm below the surface of the workpiece see page 6).
2. Actuate the operating lever of the machine.
The rotatable outer shell of the tool must be resting against the outer visible stop pins at the beginning of the turning process so that it is driven by the pins in the clockwise direction.
3. Feed the Ensatz® towards the tool (slot or cutting hole facing downwards) and grip for the duration of 2 to 4 revolutions.
4. Continue to actuate the operating lever of the machine and to guide the tool to the hole until the Ensatz® cuts into the borehole. The remainder of the driving process takes place without actuating the feed.
5. Switch on the reversing function (depending on the type and structure of the device, this takes place automatically by means of a limit switch / depth sensor). Avoid setting the tool down hard on the workpiece as this can lead to breakage of both the tool and the Ensatz®. It can also damage the play-free fit of the Ensatz® and so reduce the pull-out strength. If necessary, adapt the driving speed in line with the necessary reversal time.

Machine installation takes place using the driving tools illustrated on page 27, mounted in:

1. Thread tapping machine

2. Drill press

with reversing system by means of depth stop or thread cutting head. Without guide cartridge, without feed.
Important: Do not exceed tightening torques.

3. Manual machine

With depth sensor and reversing system. See Fig. 13.

4. Single or multiple installation machines

With pneumatic or electric drive; semi or fully automatic, computer controlled (CNC).
Note different pitches.

Guideline speed values for light alloy:

Ensatz® female thread	Speed rpm [min ⁻¹]
M 2,5 / M 3	650 – 900
M 4 / M 5	400 – 600
M 6 / M 8	280 – 400
M 10 / M 12	200 – 300
M 14 / M 16	150 – 200
M 18 / M 20	120 – 200
M 22 / M 24	100 – 160
M 27 / M 30	80 – 140

Fig. 15

Torque M_D

The maximum admissible torque is dependent on:

1. The axial load capacity of the tool stud
2. The pressure resistance capacity of the Ensatz® in the axial direction

Guideline values for driving torques

Ensatz® M 2,5	1,5 Nm
Ensatz® M 3	2,5 Nm
Ensatz® M 4	5,5 Nm
Ensatz® M 5	10 Nm
Ensatz® M 6	15 Nm
Ensatz® M 8	28 Nm
Ensatz® M 10	40 Nm
Ensatz® M 12	60 Nm
Ensatz® M 14	100 Nm
Ensatz® M 16	160 Nm
Ensatz® M 18	220 Nm
Ensatz® M 20	310 Nm
Ensatz® M 22	420 Nm
Ensatz® M 24	530 Nm
Ensatz® M 27	770 Nm
Ensatz® M 30	1050 Nm

Fig. 16

Lubrication

Only in the case of materials with difficult cutting properties.

For medium-hard light alloys:
Cutting oil, spirit or petroleum.

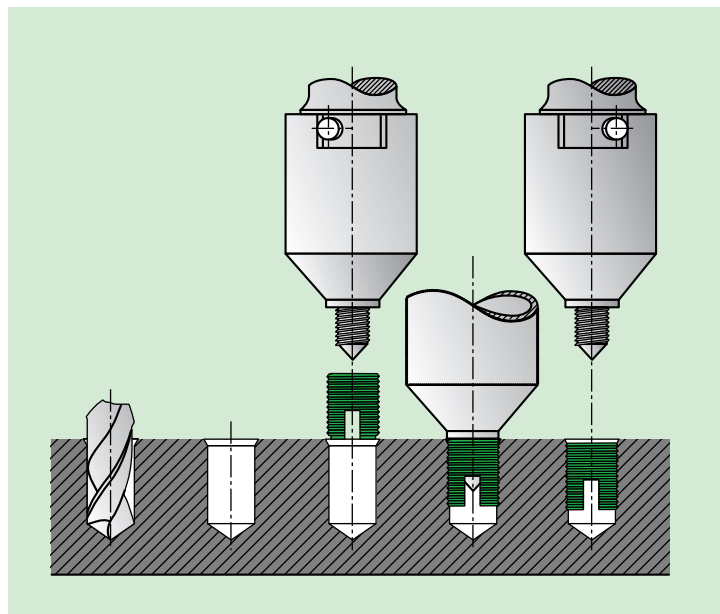


Fig. 17

Thread repair with Ensat® ...

The Ensat® repair set

The Ensat® repair set was put together specifically for repairing broken threads.

It comprises:


- 1 tap wrench
- 1 HSS drill
- 1 manual driving tool
- 10 threaded inserts

Available with the following Ensat® types

- Ensat®-SB* M 4 to M 12
- Ensat®-SBE* M 5 to M 12

*Information: Ensat®-SB see page 11; Ensat®-SBE see page 13



		Ensats® repair set	Ensats® Works Standard 300
Article number (repair set)	Thread	Number of threaded inserts	Article number (Threaded insert)
300 308 040 ...	M 4	10	308 000 040 ...
300 308 050 ...	M 5	10	308 000 050 ...
300 308 060 ...	M 6	10	308 000 060 ...
300 308 080 ...	M 8	10	308 000 080 ...
300 308 100 ...	M 10	10	308 000 100 ...
300 308 120 ...	M 12	10	308 000 120 ...
Article number (repair set)	Thread	Number of threaded inserts	Article number (Threaded insert)
300 307 050 ...	M 5	10	307 400 050 ...
300 307 060 ...	M 6	10	307 400 060 ...
300 307 080 ...	M 8	10	307 400 080 ...
300 307 100 ...	M 10	10	307 400 100 ...
300 307 120 ...	M 12	10	307 400 120 ...
Materials	Steel, case hardened, galvanized, blue passivated Steel, case hardened, galvanized, yellow chromated Stainless steel		Article no. (fourth group of digits) ... 110 Article no. (fourth group of digits) ... 160 Article no. (fourth group of digits) ... 500
Thread	Female thread: ISO 6H		
Tolerances	ISO 2768-m		



Ensatz® assortment box

Ensatz®
Works Standard 300

The Ensatz® assortment box comprises 315 different threaded inserts type Ensatz®-S of works standard series 302 in 12 dimensions from M2.5 to M16.



Article number	Thread	Number of threaded inserts	Thread	Number of threaded inserts	Thread	Number of threaded inserts
300 000 003 ...	M 2,5	50	M 5	40	M 10	8
	M 3	50	M 6(a)	25	M 12	5
	M 3,5	50	M 6	20	M 14	3
	M 4	50	M 8	12	M 16	2

Materials

Steel, case hardened, galvanized, blue passivated
Steel, case hardened, galvanized, yellow chromated
Stainless steel

Article no. (**fourth** group of digits) ... 110
Article no. (**fourth** group of digits) ... 160
Article no. (**fourth** group of digits) ... 500

Thread

Female thread: ISO 6H

Tolerances

ISO 2768-m



Ensatz® installation assortment box

Ensatz®
Works Standard 300

The Ensatz® installation assortment box comprises 260 different threaded inserts type Ensatz®-S of works standard series 302, in 4 dimensions from M4 to M8 with the relevant driving tool.



Article number	Thread	Number of threaded inserts	Tool	Tap wrench
300 000 007 ...	M 4	80	1	1
	M 5	80	1	
	M 6	50	1	
	M 8	50	1	

Materials

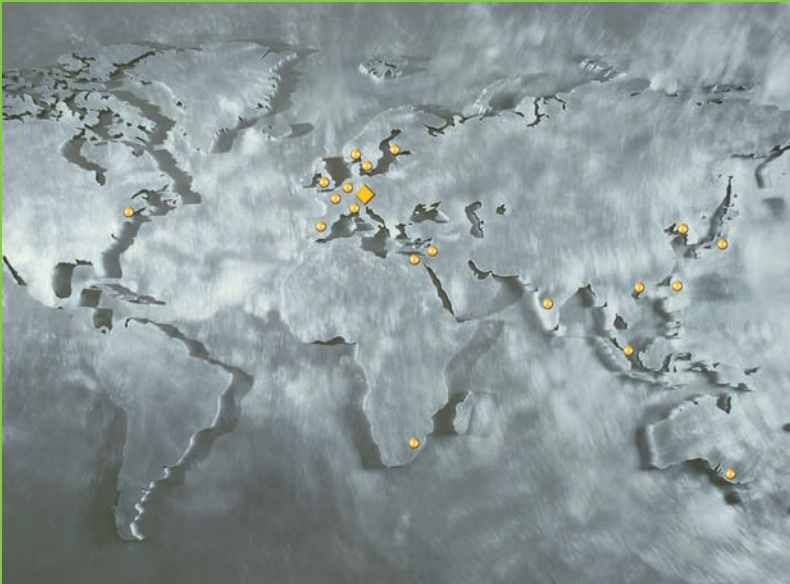
see Ensatz® assortment box

Thread

Female thread: ISO 6H

Tolerances

ISO 2768-m



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Kerb-Konus-Vertriebs-GmbH
P.O.Box 1663
92206 Amberg

Phone +49 9621 679-0
Fax +49 9621 679444
e-mail KKV-Amberg@kerbkonus.de

internet www.kerbkonus.de

... in Germany

Amberg Headquarters Production and Sales Kerb-Konus-Vertriebs-GmbH Wernher-von-Braun-Straße 7 92224 Amberg	Production plant Hadamar
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