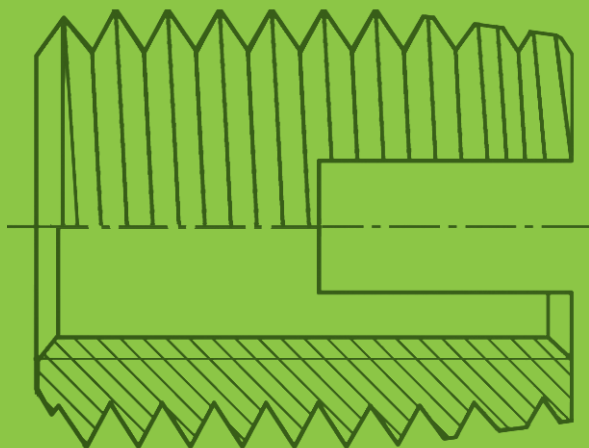


Threaded inserts for metal

Ensats[®]
Gripp[®]
Mubux[®]-Z
Mubux[®]-M0



Technical publication

Nr.20

**Kerb
Konus** 



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.

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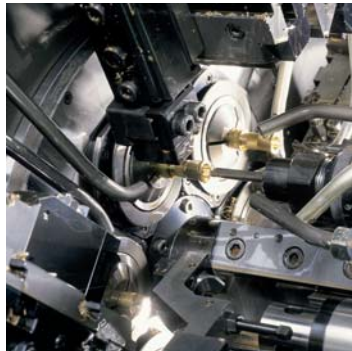
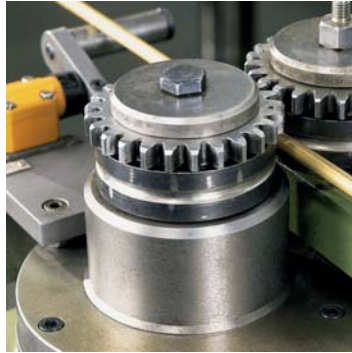
Internet www.kerbkonus.de

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.



	Dimensions	Product features	Retaining hole	Pull-out strength	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	self-tapping with cutting slot	Form cast or drilled	very high	Works Standard 302	Page 7 and 8
	M4 to M12	with hexagonal socket			302 2	
	M4 to M10	cutting slot and head			302 1	Page 9
	Ensats®-SB 307 / 308 and Ensats®-SBI 307 2 / 308 2					
	M3 to M16	self-tapping with 3 cutting bores	Form cast or drilled	very high	Works Standard 307 / 308	Page 10
	M4 to M12	with hexagonal socket			307 2 / 308 2	
	Ensats®-SBK 307 1 / 308 1 and Ensats®-SBKI 307 3 / 308 3					
	M5 to M10	self-tapping with 3 cutting bores, with head	Form cast or drilled	very high	Works Standard 307 1 / 308 1	Page 11
	M5 to M10	with hexagonal socket			307 3 / 308 3	
	Ensats®-SBN 317 / 318					
	M4 to M16	self-tapping with 3 bores and safety groove nut, grooved stud as a locking element	Form cast or drilled	very high	Works Standard 317 / 318	Page 12
	Ensats®-SBS 337/338 and Ensats®-SBSI 337 2 / 338 2					
	M3 to M16	self-tapping with 3 cutting bores as chip reservoirs	Form cast or drilled	very high	Works Standard 337 / 338	Page 13
	M4 to M12	with hexagonal socket			337 2 / 338 2	
	Ensats®-SD 303 and Ensats®-SBD 347 / 348					
	M3 to M10	as 302/307/308 but in a special thin-walled version	Form cast or drilled	high	Works Standard 303	Page 14
	and M3,5 to M12				Works Standard 347/348	
	Ensats®-SBT 357/358					
	M4 to M12	self-tapping with 3 cutting bores as chip reservoirs and closed floor	Form cast or drilled	very high	Works Standard 357 0 / 358 0	Page 15
	Mubux®-Z 890					
	M4 and M5	Threaded inserts for embedding	Form cast or drilled	medium	Works Standard 890 / 896	Page 16
	Mubux®-MO 970					
	M3 to M12	Outside coated with precote 80 for anti-rotation and sealing	drilled and tapped thread (standard thread)	very high	Works Standard 970	Page 17 and 18
	Gripp® 304					
	M14 x 1,25/9 mm	drilled for spark plugs	drilled	very high	Works Standard 304	Page 19 and 20
	M14 x 1,25/15 mm	Retaining thread, self-tapping, with cutting bore				
	M18 x 1,5/9 mm					
Eindreh-Werkzeuge ...						
Tools 620 / 621 / 610 / 6102						Page 21
Ensats-Montage ...						
Manual installation						Page 22
Machine installation						Page 23



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.



What really counts: tested quality.

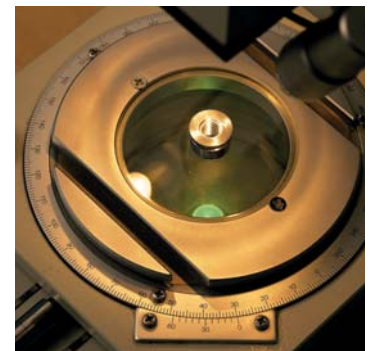
But our high-volume production output in no way compromises flexibility. We are able to quickly and efficiently produce even small batches of non-standard items.

Our state of the art stock control system permits the reliable, prompt delivery of standard products, keeping your production running to schedule at all times 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 marketplace.

Quality and environment are top 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.



Quality System
DEKRA Certificat in accordance with
ISO 9001:2008 Reg.No. 30507428/2
ISO/TS 16949:2009 Reg.No. 160507011/2
ISO 14001:2004 Reg.No. 170507049/2

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 environmentally friendly production both in our process engineering and our product range.

Applications on the test stand ...



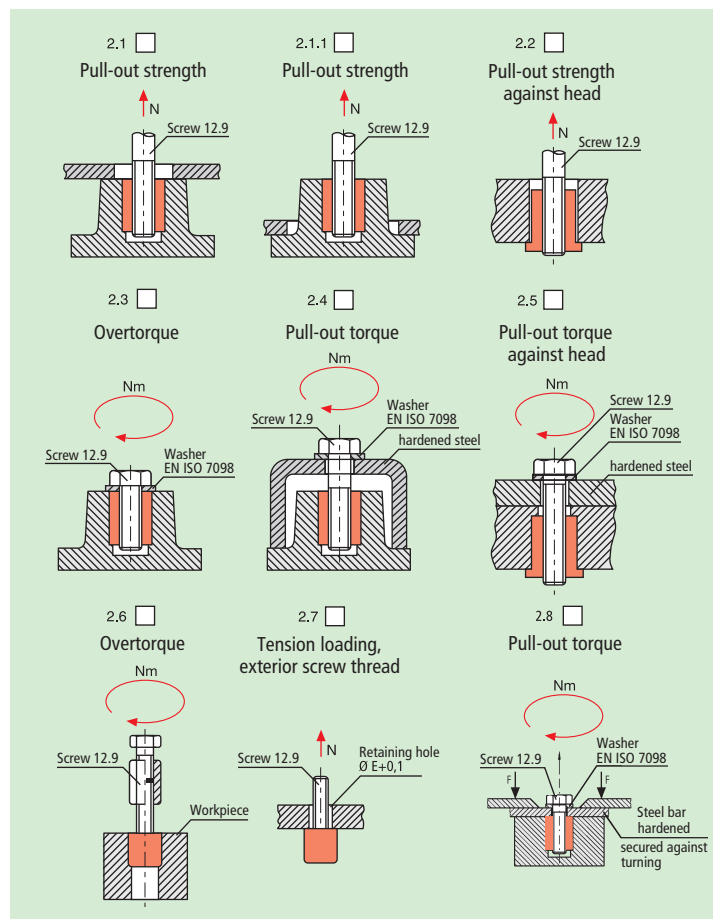
Threaded inserts from KerbKonus are manufactured in large piece numbers. And human lives and safety can often depend upon just these tiny components, for instance in the case of airbag retaining fasteners.

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.

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.



The Ensat® self-tapping threaded insert ...



Ensats 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. These inserts are protected by German and also foreign patents.

Ensats®-S 302

(with cutting slot) is recommended for most application cases. In certain materials, this Ensats demonstrates a minimal inward springing action, so creating a certain screw locking effect. If this effect is not required, we recommend using Ensats-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 Ensats 307 is particularly suitable where minimal material thicknesses are involved.

Thin-walled Ensats®-SD/SBD

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).

Slot version: Works Standard 303

Three-hole version: Works Standard 347/348 (see page 14).

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 13).

Ensats®-SBT 357/358

with closed floor for additional sealing from below. (see page 15)



Fields of application

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

Automotive industry, passenger and commercial vehicles

Engines, transmissions, wide range of supply parts such as wing mirrors, radiators, bumpers etc.

Plant and equipment construction

Flange joints, construction equipment, oil burners etc.

Household appliance and office machinery production

Vacuum cleaners, cameras, sun lamps, drills etc.

Electrical and laboratory supplies

Capacitors, heavy current, radio and telecommunication systems, dental technology equipment.

Military applications

Tanks, aircraft etc.

Product features

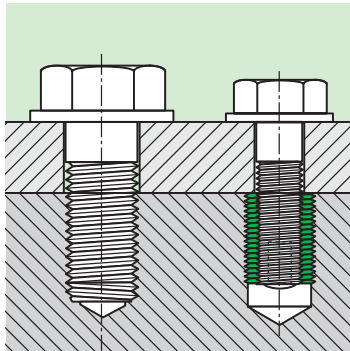
- The Ensats has a large effective shearing surface ($E \pi B$), so ensuring a higher degree of pull-out strength, i.e. an Ensats M4 is often sufficient instead of a cut M5 thread (see page 5).
- The Ensats is driven subsequently into the finished workpiece. This means a higher casting machine output, 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 Ensats. The thread is always precisely positioned.
- The work steps required with wire inserts – thread tapping, breaking off trunnions etc. as well as costly wearing tools (special thread drills, limit plug gauges etc.) are not needed with the Ensats-system.
- The Ensats is insensitive to small areas of shrinkage. The Ensats-system prevents damage caused by torn threads.

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



Connections using Ensat threaded inserts permit substantially smaller overall dimensions and thus pave the way for material-saving and weight-saving designs.

The illustration below shows two screw connections with equal pull-out strength.

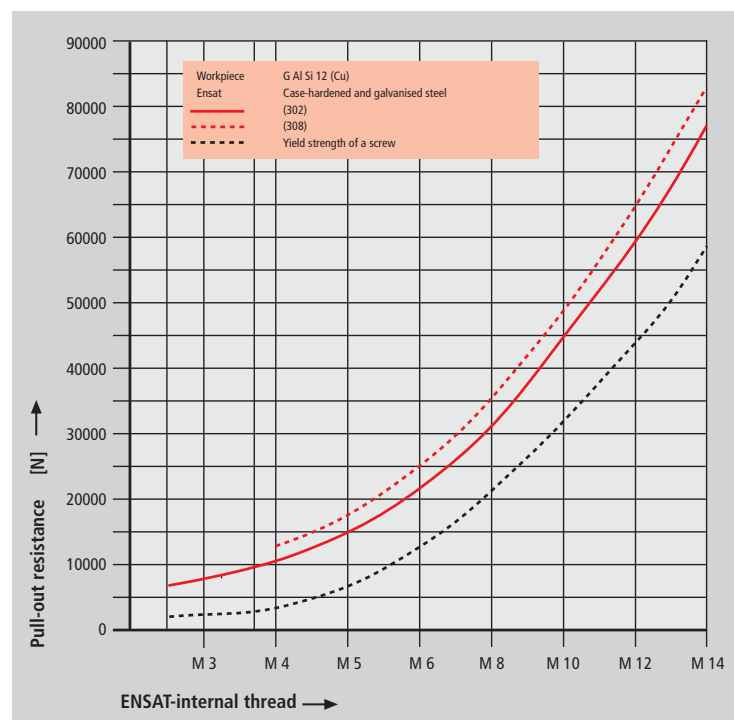
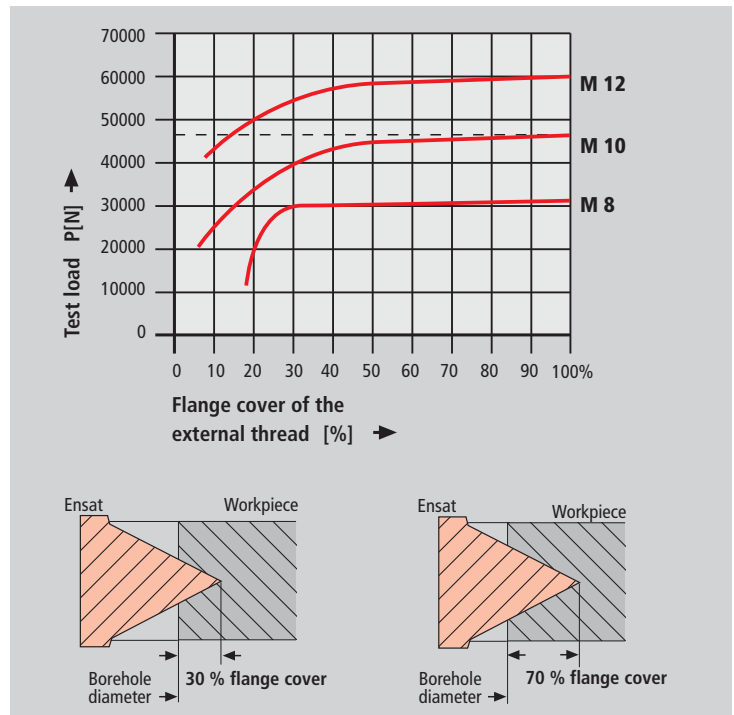


Flange cover

In a workpiece made of a light alloy, the Ensat 302 achieves almost maximum pull-out strength with only 30 % flange cover.

Pull-out strength

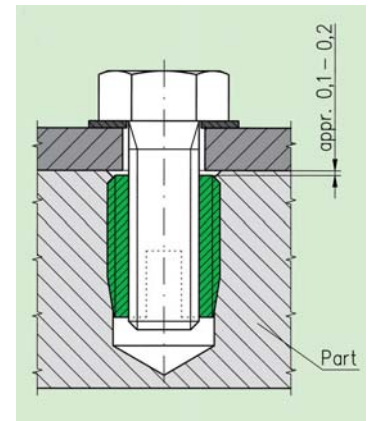
The Ensat is capable of withstanding high loads. When used in light alloys, for example, a degree of pull-out strength is achieved which far exceeds the yield strength of the mating screw 8.8.



The Ensats® in the workpiece ...

Installation recommendation

The Ensats should be processed approx. 0,1 - 0,2 mm recessed. 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.



Borehole diameter [mm]			Standard values for ENSAT 302				Standard values for ENSAT 307/308 ... 337/338			
Workpiece material	Light alloys R _m =tensile strenght [N/mm²]		R _m < 250				R _m < 300			
			R _m < 300				R _m < 350			
			R _m < 350				R _m < 350			
			R _m > 350				R _m > 350			
Workpiece material	Ms, bronze, NF-metall		< 150 HB				< 150 HB			
			< 200 HB				< 200 HB			
			> 200 HB				> 200 HB			
			> 200 HB				> 200 HB			
ENSAT internal thread	M2/M2,5	Zoll N° 4		4,1	4,2	4,3	-	-	-	-
	M3	N° 4		4,6	4,7	4,8	4,6	4,7	4,8	4,8
	M3,5	N° 6	5,4	5,5	5,6	5,7	5,5	5,6	5,7	5,7
	M4	N° 8	5,9	6,0	6,1	6,2	6,0	6,1	6,2	6,2
	M5	N° 10	7,2	7,3	7,5	7,6	7,4	7,5	7,6	7,7
	M6(a)	-	8,2	8,3	8,5	8,6	-	-	-	-
	M6	1/4"	8,8	9,0	9,2	9,4	9,3	9,4	9,5	9,6
	M8	5/16"	10,8	11,0	11,2	11,4	11,1	11,2	11,3	11,5
	M10	3/8"	12,8	13,0	13,2	13,4	13,1	13,2	13,3	13,5
	M12	7/16"	14,8	15,0	15,2	15,4	15,0	15,1	15,2	15,4
	M14	1/2"	16,8	17,0	17,2	17,4	17,0	17,1	17,2	17,4
	M16	5/8"	18,8	19,0	19,2	19,4	19,0	19,1	19,2	19,4
	M18	-	20,8	21,0	21,2	21,4				
	M20/22	3/4"	24,8	25,0	25,2	25,4				
	M24	-	28,8	29,0	29,2	29,4				
	M27	-	32,8	33,0	33,2	33,4				
	M30	-	34,8	35,0	35,2	35,4				
Flange cover approx.			60%	50%	40%	30%	80%	70%	60%	50%

 Recommended borehole diameter for easy assembly.
Other diameters may require lubrication.

These specifications are only recommendations and apply to ENSAT made of steel, hardened and plated.

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
(R_m=280 N/mm²),
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.

Retaining hole

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

Countersinking the borehole 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:

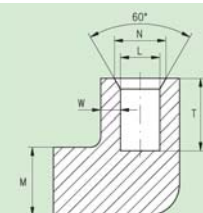
Minimum depth -T see Works Standard sheets, page 7 to 20.

Borehole diameter:

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

Edge distance:

The smallest still admissible edge distance depends on the planned stress level and the elasticity of the material into which the Ensats is screwed.



Guideline values for countersink:

$N = (0,06 \text{ to } 0,08 \times E) + E$

Guideline values for light alloys:

$W \geq 0,2 \text{ to } \geq 0,6 E$

Guideline values for cast iron:

$W \geq 0,3 \text{ to } \geq 0,5 E$

E = Outside diameter of the des Ensats® [mm]-



Threaded Insert

self tapping / with hexagonal socket
metric inner thread

Ensats®-S/SI
Works Standard
302 0 / 302 2

Application

The threaded insert Ensats-S/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.

It is suitable for installation in the following materials:

- Aluminium and aluminium alloys
- Magnesium alloys
- Cast iron, brass, bronze
- Duroplastics, thermoplastics (with the exception of rubber-soft thermoplastics < 100 Shore A)

Ensats-SI

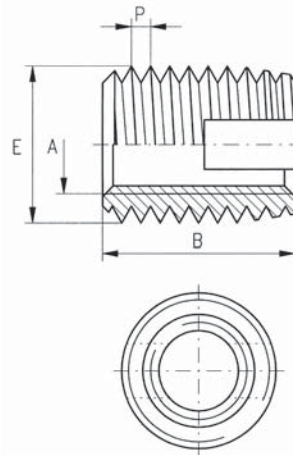
The Ensats is inserted via the hexagonal socket, permitting the achievement of short installation times.

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

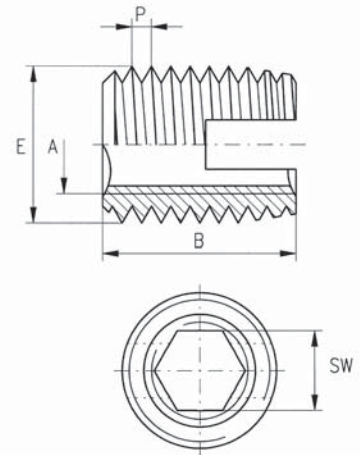
The Ensats can be extracted without problems before the recycling process, resulting in lower costs.

Available M4 to M12

Ensats-S 302 0



Ensats-SI 302 2



Dimensions in mm

Article no. second group of digits ... 000 ...	Internal thread A	External thread		Length B	Hexagonal socket SW _{+0,1} second group of digits ... 200 ...	Minimum borehole depth for blind holes T
302 ... 020 ...	M 2	4,5	0,5	6	—	8
302 ... 025 ...	M 2,5	4,5	0,5	6	—	8
302 ... 030 ...	M 3	5	0,5	6	—	8
302 ... 035 ...	M 3,5	6	0,75	8	—	10
302 ... 040 ...	M 4	6,5	0,75	8	3,2	10
302 ... 050 ...	M 5	8	1	10	4,1	13
302 ... 061 ...	M 6 (a)	9	1	12	—	15
302 ... 060 ...	M 6	10	1,5	14	4,9	17
302 ... 080 ...	M 8	12	1,5	15	6,6	18
302 ... 100 ...	M 10	14	1,5	18	8,3	22
302 ... 120 ...	M 12	16	1,5	22	10,1	26
302 ... 140 ...	M 14	18	1,5	24	—	28
302 ... 160 ...	M 16	20	1,5	22	—	27
302 ... 180 ...	M 18	22	1,5	24	—	29
302 ... 200 ...	M 20	26	1,5	27	—	32
302 ... 220 ...	M 22	26	1,5	30	—	36
302 ... 240 ...	M 24	30	1,5	30	—	36
302 ... 270 ...	M 27	34	1,5	30	—	36
302 ... 300 ...	M 30	36	1,5	40	—	46

Example for finding the article number

Self-tapping threaded insert Ensats-S to Works Standard series 302 0 with internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-S 302 000 050. 160;
with hexagonal socket: Ensats-SI 302 200 050. 160

Materials

Unhardened steel
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
Other materials, designs and finishes on request.

Article no. (fourth group of digits) ... 100
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

Tolerances

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: metric, Tolerances in accordance with Works Standard
Internal thread UNC, UNF, Whitworth or fine threads see page 8.

Bore diameter

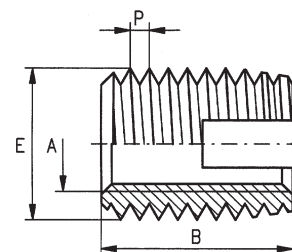
For details of bore diameter guideline values see the table on page 6.

Please note

M2 / M2,5 are only suitable for low-strength materials, as the shear resistance of studs in the driving tools may be insufficient.

Application

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



Dimensions in mm

	Article no.	Internal thread inch	External thread mm		Length mm	Minimum bore-hole depth for blind holes
			E	P		
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	27
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	28
	302 000 662 ...	5/8 - 11	20	1,5	22	27
UNF Unified Fine Thread ANSI B1.1/B 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	28
	302 000 762 ...	5/8 - 18	20	1,5	22	27

Example for finding the article number

Self-tapping threaded insert Ensats-S to Works Standard series 302 with internal thread UNF 1/4"-28 made of case-hardened, zinc plated and yellow chromated steel: Ensats-S 302 000 725.160

Materials

Unhardened steel
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
Other materials, designs and finishes on request.

Article no. (fourth group of digits) ... 100
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

Tolerances

ISO 2768-m

Thread

External thread E: metric, tolerances in accordance with Works Standard



Threaded insert self-tapping

Ensats®-SK
Works Standard
302 1

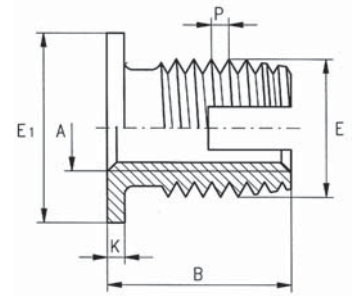
Application

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.

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, for simultaneous fixture of several parts; when stress is applied against the head, the pull-through force is significantly increased.



Dimensions in mm

Article no.	Internal thread	External thread		Head diameter	Head height	Length	Minimum borehole depth for blind holes
	A	E	P	E1	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 with head to Works Standard series 302 1 with internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-SK 302 100 050.160

Materials

Unhardened steel
Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Brass
Other materials, designs and finishes on request.

Article no. (**fourth** group of digits) 100
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 digit)s 800

Tolerances

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: metric, tolerances in accordance with Works Standard
Internal thread UNC, UNF, Whitworth or fine thread on request

Bore diameter

For details of bore diameter guideline values, see the table on page 6.

Application

Threaded insert Ensats-SB/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. It is suitable for installation in the following materials:

- Aluminium and aluminium alloys
- Magnesium alloys
- Cast iron, brass, bronze
- Duroplastics, thermoplastics (with the exception of rubber-soft thermoplastics < 100 Shore A)

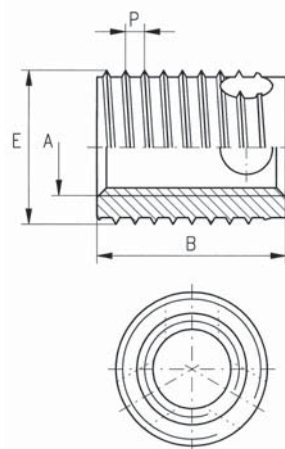
Ensats-SBI

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

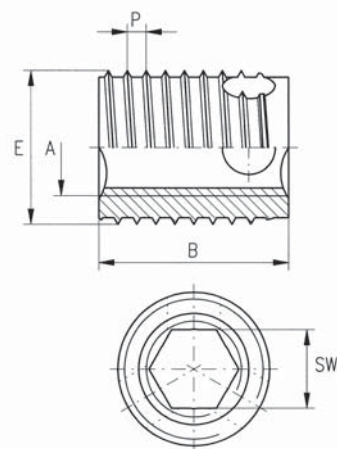
The Ensats can be extracted without problems before the recycling process, resulting in lower costs.

Available M4 to M12

Ensats-SB 307 0 / 308 0



Ensats-SBI 307 2 / 308 2



Dimensions in mm

Article no. second group of digits	Internal thread	External thread Special thread		Length	Hexagonal socket SW _{+0,1} second group of digits ... 200 ...	Minimum borehole depth for blind holes
... 000 ...	A	E	P	B		T
307 ... 030 ... 308 ... 030 ...	M 3	5	0,6	4 6	—	6 8
307 ... 035 ... 308 ... 035 ...	M 3,5	6	0,8	5 8	—	7 10
307 ... 040 ... 308 ... 040 ...	M 4	6,5	0,8	6 8	3,2	8 10
307 ... 050 ... 308 ... 050 ...	M 5	8	1	7 10	4,1	9 13
307 ... 060 ... 308 ... 060 ...	M 6	10	1,25	8 12	4,9	10 15
307 ... 080 ... 308 ... 080 ...	M 8	12	1,5	9 14	6,6	11 17
307 ... 100 ... 308 ... 100 ...	M 10	14	1,5	10 18	8,3	13 22
307 ... 120 ... 308 ... 120 ...	M 12	16	1,75	12 22	10,1	15 26
307 ... 140 ... 308 ... 140 ...	M 14	18	2	14 24	—	17 28
307 ... 160 ... 308 ... 160 ...	M 16	20	2	14 24	—	17 28

Example for finding the article number

Self-tapping threaded insert Ensats-SBK to Works Standard series 307 0 with internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-SB 307 000 050.160; with hexagonal socket: Ensats-SBI 307 200 050. 160

Short design Long design

Materials

Unhardened steel
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
Other materials, designs and finishes on request.

Article no. (fourth group of digits) ... 100
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

Tolerances

Thread

ISO 2768-m
Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, tolerances in accordance with Works Standard
Internal thread UNC, UNF, Whitworth or fine thread on request.

Bore diameter

For details of bore diameter guideline values see the table on page 6.

Special applications

For chip-sensitive applications (e.g. electronic appliances): Also available **with three closed cutting bores serving as chip reservoirs**. Works Standard 337 / 338 - Page 13.



Threaded insert

self-tapping / with hexagonal socket

Ensats®-SBK/SBKl
Works Standard
307 1 / 307 3 and 308 1 / 308 3

Application

Threaded insert Ensats-SBK/SBKl 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 low shearing strength. It is suitable for installation in the following materials:

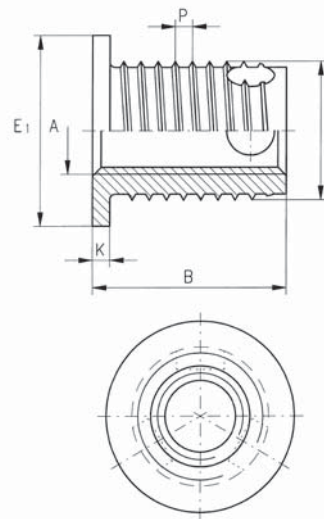
- Aluminium und aluminium alloys
- Magnesium alloys
- Cast iron, brass, bronze
- Duroplastics, Thermoplastics (with the exception of rubber-soft thermoplastics < 100 Shore A)

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

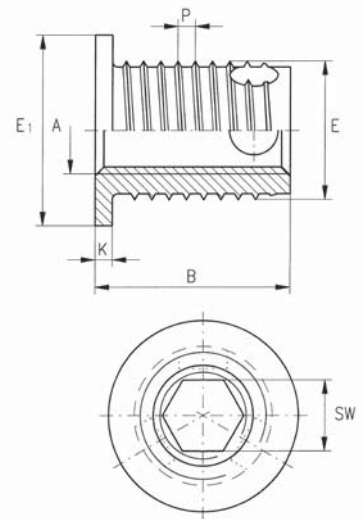
Ensats-SBKl

Information for installation and extracting see page 10.

Ensats-SBK 307 1 / 308 1



Ensats-SBKl 307 3 / 308 3



Dimensions in mm

Article no. second group of digits	Internal thread	External thread Special thread		Head diameter	Head height	Length	Hexagonal socket SW _{+0,1} second group of digits	Minimum borehole depth for blind holes
... 100 ...	A	E	P	E ₁	K	B	... 300 ...	T
307 ... 050 ... 308 ... 050 ...	M 5	8	1	11	1	8 11	4,1	9 13
307 ... 060 ... 308 ... 060 ...	M 6	10	1,25	13	1,5	9,5 13,5	4,9	10 15
307 ... 080 ... 308 ... 080 ...	M 8	12	1,5	15	1,5	10,5 15,5	6,6	11 17
307 ... 100 ... 308 ... 100 ...	M 10	14	1,5	17	1,5	11,5 19,5	8,3	13 22

Example for finding the article number

Self-tapping threaded insert Ensats-SBK to Works Standard series 307 1 with internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-SBK 307 100 050. 160; with hexagonal socket: Ensats-SBKl 307 300 050. 160

Short design Long design

Works Standard 307
Works Standard 308

Materials

Unhardened steel
Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Case-hardened steel, zinc plated, yellow chromated
Brass
Other materials, designs and finishes on request.

Article no. (**fourth** group of digits) ... 100
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) ... 800

Tolerances

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, tolerances in accordance with Works Standard
Internal thread UNC, UNF, Whitworth or fine thread on request.

Bore diameter

For details of bore diameter guideline values see the table on page 6.

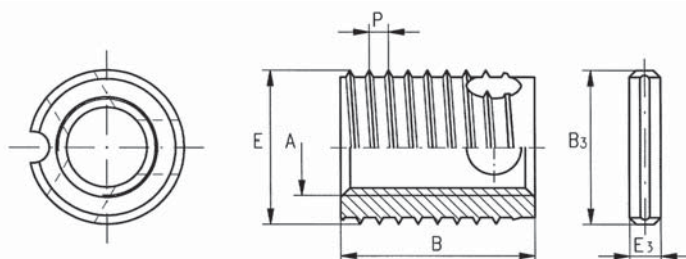
Special applications

For chip-sensitive applications (such as electronic appliances): Also available **with three closed cutting bores serving as chip reservoirs**. Works Standard 337 1 / 338 1.

Example: Ensats with head and closed cutting bores, internal thread M10, length 19,5 mm, case-hardened, yellow chromated steel = Ensats-SBSK 338 100 100.160

Application

This special threaded insert is used to absorb extreme torsional and vibration stress. The anti-rotation function is achieved by means of a parallel notched stud to DIN 1473 (pre-drill with diameter E3, depth = B3+1mm).



Dimensions in mm

Article no.	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 ... 318 000 040 ...	M 4	6,5	0,8	6 8	8 10	4 6	2 2
317 000 050 ... 318 000 050 ...	M 5	8	1	7 10	9 13	4 6	2 2
317 000 060 ... 318 000 060 ...	M 6	10	1,25	8 12	10 15	6 10	2 2
317 000 080 ... 318 000 080 ...	M 8	12	1,5	9 14	11 17	6 10	2 2
317 000 100 ... 318 000 100 ...	M 10	14	1,5	10 18	13 22	6 16	2 2
317 000 120 ... 318 000 120 ...	M 12	16	1,75	12 22	15 26	10 16	2 2
317 000 140 ... 318 000 140 ...	M 14	18	2	14 24	17 28	10 16	2 2
317 000 160 ... 318 000 160 ...	M 16	20	2	14 24	17 28	10 16	2 2

Example for finding the article number

Self-tapping threaded insert Ensats-SBN to Works Standard series 318 with safety groove and internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-SBN 318 000 050.160

Short design Long design

Works Standard 317
Works Standard 318

Materials

Case-hardened steel, zinc plated, yellow chromated
On request:
Unhardened steel
Case-hardened steel, zinc plated, blue passivated
Case-hardened steel, zinc-nickel plated, transparent passivated
Stainless steel
Brass
Other materials, designs and finishes on request.

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

Article no. (**fourth** group of digits) 100

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

Article no. (**fourth** group of digits) 143

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

Article no. (**fourth** group of digits) 800

Material of the notched stud: Steel, zinc plated.

Tolerances

ISO 2768-m

Thread

Internal thread A: as per ISO 6H

External thread E: Special thread with flattened thread root, tolerances in accordance with Works Standard
Internal thread UNC, UNF, Whitworth or fine thread on request.

Bore diameter

For details of bore diameter guideline values, see the table on page 6.



Threaded insert

self-tapping with chip reservoirs / with hexagonal socket

Ensats®-SBS/SBSI
Works Standard
337 0 / 337 2 and 338 0 / 338 2

Application

This special insert Ensats-SBS/ SBSI 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 chips created during the installation process are stored in these reservoirs and cannot drop into sensitive equipment components.

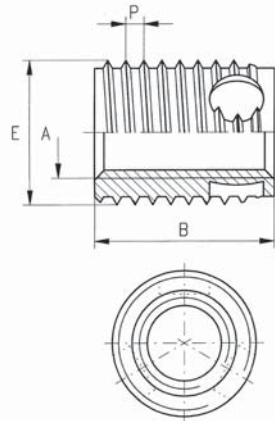
Ensats-SBSI

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

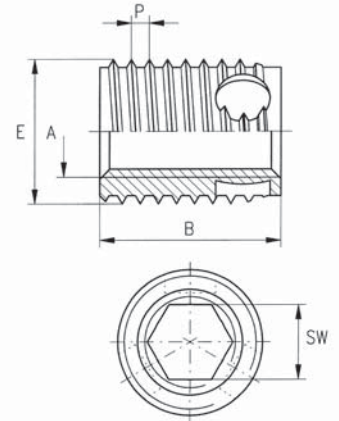
The Ensats can be extracted without problems before the recycling process, resulting in lower costs.

Available M4 to M12

Ensats-SBS 337 0 / 338 0



Ensats-SBSI 337 2 / 338 2



Dimensions in mm

Article no. second group of digits ... 000 ...	Internal thread A	External thread Special thread E P		Length B	Hexagonal socket SW _{+0,1} second group of digits ... 200 ...	Minimum borehole depth for blind holes T
337 ... 030 ... 338 ... 030 ...	M 3	5	0,6	4 6	—	6 8
337 ... 035 ... 338 ... 035 ...	M 3,5	6	0,8	5 8	—	7 10
337 ... 040 ... 338 ... 040 ...	M 4	6,5	0,8	6 8	3,2	8 10
337 ... 050 ... 338 ... 050 ...	M 5	8	1	7 10	4,1	9 13
337 ... 060 ... 338 ... 060 ...	M 6	10	1,25	8 12	4,9	10 15
337 ... 080 ... 338 ... 080 ...	M 8	12	1,5	9 14	6,6	11 17
337 ... 100 ... 338 ... 100 ...	M 10	14	1,5	10 18	8,3	13 22
337 ... 120 ... 338 ... 120 ...	M 12	16	1,75	12 22	10,1	15 26
337 ... 140 ... 338 ... 140 ...	M 14	18	2	14 24	—	17 28
337 ... 160 ... 338 ... 160 ...	M 16	20	2	14 24	—	17 28

Example for finding the article number

Self-tapping threaded insert Ensats-SBS with chip reservoirs, to Works Standard series 337 0 with internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-SBS 337 000 050. 160; with hexagonal socket: Ensats-SBSI 337 200 050. 160

Short design Long design Materials

Works Standard 337
Works Standard 338
Unhardened steel
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
Other materials, designs and finishes on request.

Article no. (fourth group of digits) ... 100
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

Tolerances Thread

ISO 2768-m
Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, tolerances in accordance with Works Standard
Internal thread UNC, UNF, Whitworth or fine thread on request.

Bore diameter

Due to the limited capacity volume of the chip reservoirs, select the largest bore diameter.
For details of bore diameter guideline values, see the table on page 6.

Special applications

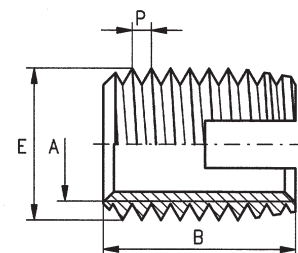
For threaded insert with chip reservoirs and head: Ensats SBSK; Works Standard 337 1 / 338 1, available from M5.
Example for article number: Ensats with head and chip reservoir, internal thread M10, length 19,5 mm made of case-hardened, zinc plated and yellow chromated steel = Ensats-SBSK 338 100 100. 160

Application

Threaded insert Ensats with cutting slot in a special thin-walled and shortened version. Particularly suitable for plastic with thin residual walls and for light-weight constructions. These versions are designed pri-

marily for processing on thread tapping machines, as the pitch of the outside and inside thread is identical. For processing thin-walled 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 thin-walled inserts.



Dimensions in mm

Article no.	Internal thread	External thread		Length	Location hole diameter, non-ductile alloys, NF metals			Minimum bore-hole depth for blind holes
	A	E	P		L			
303 000 030 ...	M 3	4,5	0,5	6	4,2	bis	4,3	8
303 000 035 ...	M 3,5	5	0,6	6	4,7	bis	4,8	8
303 000 040 ...	M 4	6	0,7	6	5,6	bis	5,7	8
303 000 050 ...	M 5	7	0,8	8	6,6	bis	6,7	10
303 000 060 ...	M 6	8	1,0	10	7,5	bis	7,6	13
303 000 080 ...	M 8	10	1,25	12	9,2	bis	9,4	15
303 000 100 ...	M 10	12	1,5	15	11,2	bis	11,4	18

Example for finding the article number

Self-tapping thin-walled insert Ensats-SD slot to Works Standard series 303 with internal thread A = M5 made of hardened and yellow chromated steel: Ensats-SD 303 000 050.160

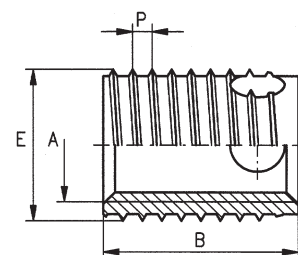
Materials, tolerances, thread, see Works Standard 302, Page 7 and 8; material ... 500 on request.

Application

Threaded insert Ensats with three cutting bores in a special thin-walled version. Particularly suitable for plastic with thin residual walls and for light-weight constructions. This version is designed primarily for processing on thread tapping

machines, as the pitches of the external and internal threads are identical. For processing thin-walled 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 thin-walled inserts



Dimensions in mm

Article no.	Internal thread A	External thread Special thread		Length B Works Standard		Location hole diameter, non-ductile alloys, NF metals L	Minimum borehole depth for blind holes Works Standard	
		E	P	347	348		347	348
3.. 000 035 ...	M 3,5	5	0,6	5	8	4,7 bis 4,8	7	10
3.. 000 040 ...	M 4	6	0,7	6	8	5,6 bis 5,7	8	10
3.. 000 050 ...	M 5	6,5	0,8	7	10	6,1 bis 6,2	9	13
3.. 000 060 ...	M 6	8	1	8	12	7,5 bis 7,7	10	15
3.. 000 080 ...	M 8	10	1,25	9	14	9,4 bis 9,6	11	17
3.. 000 100 ...	M 10	12	1,5	10	18	11,2 bis 11,5	13	22
3.. 000 120 ...	M 12	14	1,75	12	22	13,2 bis 13,5	15	26

Short design Works Standard 347

Long design Works Standard 348

Materials, tolerances, thread see Works Standard 307/308, Page 10; material ... 500 on request.



Threaded insert

Self-tapping with chip reservoirs
and closed floor

Ensats®-SBT
Works Standard
357 0 and 358 0

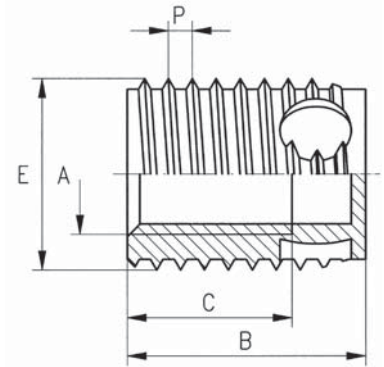
Application

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 three cutting bores distributed as chip reservoirs.

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 the chips which can drop into the retaining hole during the turning process (when drilling blind holes).



Dimensions in mm

Article no. first group of digits	Internal thread	External thread Special thread		Length	Thread depth min.	Minimum borehole depth for blind holes
	A	E	P	B	C	T
357 000 040 ... 358 000 040 ...	M 4	6,5	0,8	6 8	3,2 4,5	8 10
357 000 050 ... 358 000 050 ...	M 5	8	1	7 10	4 6	9 13
357 000 060 ... 358 000 060 ...	M 6	10	1,25	8 12	4,8 7	10 15
358 000 080 ...	M 8	12	1,5	14	8,8	17
358 000 100 ...	M 10	14	1,5	18	11	22
358 000 120 ...	M 12	16	1,75	22	14	26

Example for finding the article number

Self tapping threaded insert Ensats-SBT with chip reservoirs and closed floor, to Works Standard series 357 0, with internal thread A = M5 made of case-hardened, zinc plated and yellow chromated steel: Ensats-SBT 357 000 050. 160

Short design Long design

Works Standard 357
Works Standard 358

Materials

Unhardened steel
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
Other materials, designs and finishes on request.

Article no. (fourth group of digits) ... 100
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

Tolerances

ISO 2768-m

Thread

Internal thread A: as per ISO 6H
External thread E: Special thread with flattened thread root, tolerances in accordance with Works Standard.
Internal thread UNC, UNF, Whitworth oder fine thread on request

Bore diameter

Due to the limited capacity volume of the chip reservoirs, select the largest bore diameter.
For details of bore diameter guideline values, see the table on page 6.

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

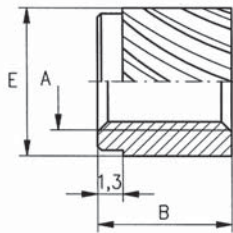
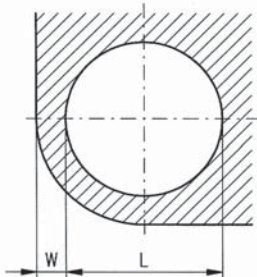
For screw fasteners in cast components made of NF metal - primarily light alloy, for through holes and blind holes.

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 press-in 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 no.	Internal thread	External-ø	Length	recommended retaining hole ¹⁾	Distance from edge ¹⁾
	A	E	B	L + 0,1	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 2768m			

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

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.

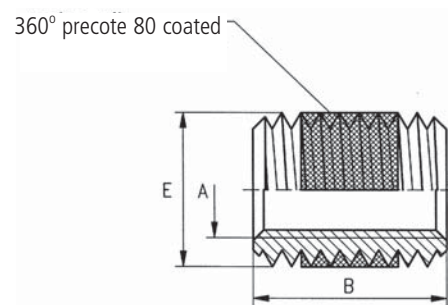
Installing under pre-tension increases the breakaway torque.

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 light alloy castings.
Suitable for through holes and blind holes



Dimensions in mm

Article no. first group of digits	Length ¹⁾ B
971	1 A
972	1,5 A
973	2 A
974	2,5 A

Article no. second and third group of digits	Internal thread A	External thread E	Standard length ¹⁾ B			
			1A	1,5A	2A	2,5A
... 000 030 ...	M 3	M 5		4,5	6	
... 000 040 ...	M 4	M 6		6	8	10
... 000 050 ...	M 5	M 7		7,5	10	12,5
... 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 yellow chromated steel and coated with microcapsule-based adhesive precote 80: Mubux-MO 973 000 060.100

Material

Zinc plated, yellow chromated steel; coated with precote 80
Zinc plated, yellow chromated steel; without coating
Other materials on request.

Article no. (**fourth** group of digits) 100
Article no. (**fourth** group of digits) 120

Thread

Internal thread A: ISO 6H
External thread E: capable of being screwed into a standard thread.

Coating

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

Recommended length

Workpiece shear strength N/mm ²	Tensile strength of screw (DIN)	Recommended length				
		M 3	M 4	M 5	M 6/M 8/M 10	M 12
≥ 70	4.8	2A	1,5A	2A	2 A	—
≥ 140	4.8	2A	1,5A	2A	1,5A	1 A
	6.8	2A	1,5A	2A	1,5A	1,5A
	8.8	2A	1,5A	2A	2 A	2 A
≥ 210	6.8	2A	1,5A	2A	1,5A	1 A
	8.8	2A	1,5A	2A	1,5A	1,5A
	12.9	2A	1,5A	2A	1,5A	2 A
	14.9	2A	2 A	2A	2 A	2,5A
≥ 280	6.8	2A	1,5A	2A	1,5A	1 A
	8.8/12.9	2A	1,5A	2A	1,5A	1,5A
	14.9	2A	1,5A	2A	1,5A	2 A

Example Shearing strength of the workpiece appr. 160 N/mm², screw M6, strength class 8.8
Recommended length: 2A = 2x6 mm = 12 mm.

Thread repair with Ensats® and Gripp®

Ensats®

is ideally suited for the fast repair of torn and damaged threads. The same screw size can be used again. This gives threads a markedly higher load capacity.

Gripp® is used for the repair of torn spark plug retaining threads in light alloy cylinder heads.

Gripp is installed in the same way as Ensats, 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 spark plug is then able to work effectively.

Mini-packs for minor repair requirements are available from tool retailers or from the manufacturer.

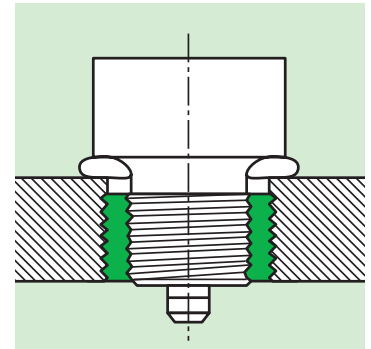


The basic Ensats® kit

The basic kit contains 315 self-tapping threaded inserts Ensats-S 302 made of case-hardened, zinc-plated, yellow chromated steel with internal thread from M2,5 to M16.

The Ensats® installation kit.

The installation kit contains 270 self-tapping threaded inserts Ensats-S 302 made of case-hardened, zinc-plated, yellow chromated steel with internal thread from M4 to M8 and the tools required for manual installation (for a more detailed description see page 22).



The Gripp® kit

The Gripp kit was put together specifically for the repair of torn and damaged spark plug retaining threads and comes complete with tools for manual installation in two thread sizes:

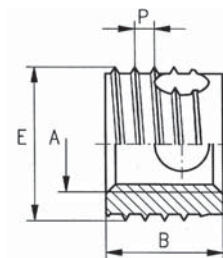
- Standard: M14 long and short
- Universal: additionally M18



Application

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



Dimensions in mm

Article no.	Internal thread			External special thread		Length B	Hole size-diameter 1)
	A	P	DIN	E	P		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: Ensat-Gripp 304 000 140.160

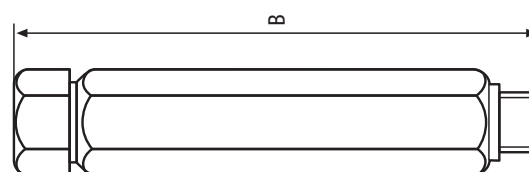
Material

Hardened steel, zinc plated, yellow chromated

Dimensions in mm

Article no.	Suitable for Gripp	Tool SW D	Length
			B
619 000 140	304 000 140.160 304 000 141.160	22	97
619 000 180	304 000 180.160	22	97

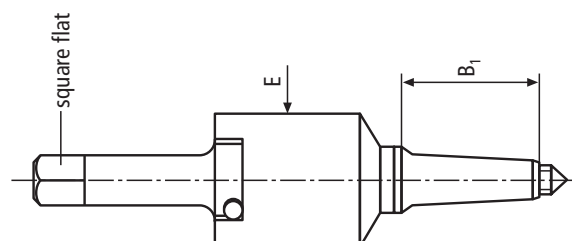
Installation tool 619 for manual installation



Dimensions in mm

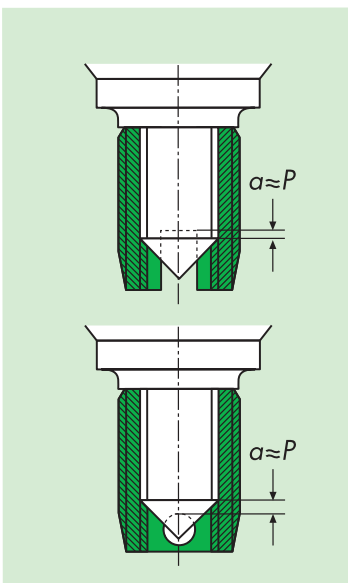
Article no.	Suitable for Gripp	Maximal diameter E	Length
			B ₁
629 000 146	304 000 140.160 304 000 141.160	50	72
629 000 187	304 000 180.160	50	73

Installation tool 629 for machine installation



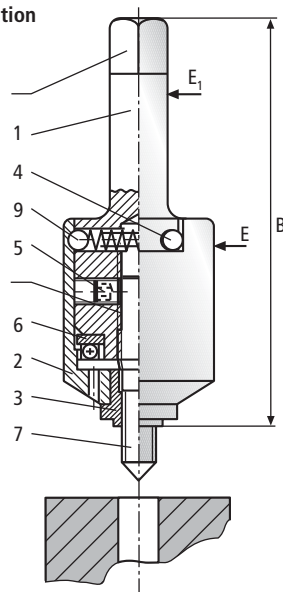
The correct length of the stud for the Ensats with cutting slot / cutting bore results from the pitch of the internal thread (see also illustration below; P=pitch of the internal thread).

Ensats® – driving tools ...

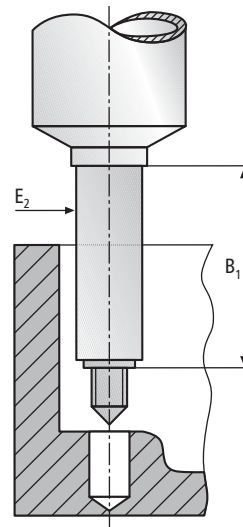


Tool 620
for flush installation

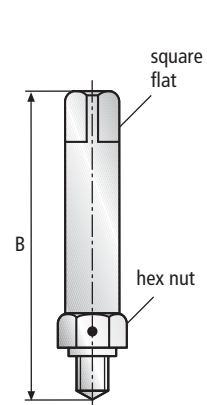
- Square flat
- 1 Shaft
- 4 Pin
- 9 Ball
- 5 Locking screw, colour marking
- 6 Ball bearing
- 2 Shell
- 3 Guide bush
- 7 Stud



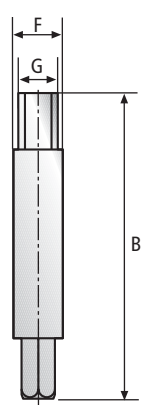
Tool 621
For deep retaining holes



Tool 610
for manual instal-
lation



Tool 6102
for Ensats-SBI



Set or exchange the stud

- Pull off the shell (2) downwards off the shaft (1).
- Release the locking screw (5).
- Screw the stud (7) in or out. The yellow colour marking indicates the 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.
- To ensure that the tool functions perfectly, it must be possible to easily rotate the shell. For short Ensats, grind down the thread of tool 610 accordingly.
- If you wish the Ensats to be driven deeper than 0,2 mm below the workpiece surface, screw off the guide bush (3) at the front.
- Diameter: 0,1 to 0,2 mm smaller than the Ensats retaining hole.

For mounting the thin-walled Ensats (Page 14), modified guide bushes (available on request) should be used.

Dimensions [mm]

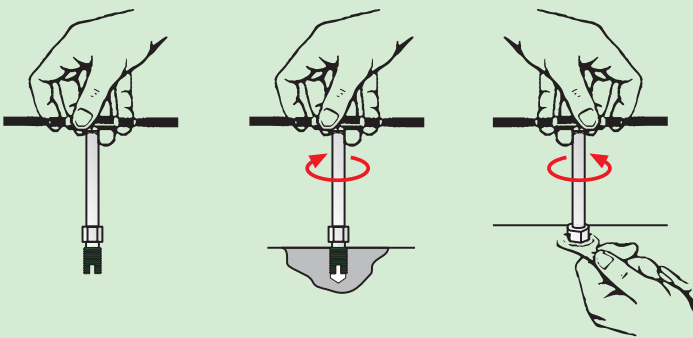
For Ensat®	Tool 620								Tool 621			Manual assembly tool 610				For Ensat®-SBI	Tool 6102 Machine/Hand				
	Article-no.		Whitworth	UNC	UNF	E	E ₁	Square SW D	Length B	Article-no.	B ₁	E ₂	Article-no.	Length B	Square SW D		Collar SW D	Article-no.	Length B	Square SW G	Shank Ø F
M 2	-	620 000 020	-	-	-	18	8	6,3	78	621 000 020	40	7	610 000 020	55	5	7	M 2	-	-	-	-
M 2,5	-	620 000 025	-	-	-	18	8	6,3	78	621 000 025	40	7	610 000 025	55	5	7	M 2,5	-	-	-	-
M 3	Nr. 4	620 000 030	-	620 000 604	620 000 704	18	8	6,3	78	621 000 030	40	7	610 000 030	55	5	7	M 3	-	-	-	-
M 3,5	Nr. 6	620 000 035	-	620 000 606	620 000 706	18	8	6,3	78	621 000 035	40	7	610 000 035	60	5	7	M 3,5	-	-	-	-
M 4	Nr. 8	620 000 040	-	620 000 608	620 000 708	18	8	6,3	78	621 000 040	40	7	610 000 040	60	5	7	M 4	610 200 040	80	4,9	6
M 5	Nr. 10 1/4" 5/16"	620 000 050	-	620 000 610	620 000 710	24	12,5	10	95	621 000 050	50	9	610 000 050	75	8	13	M 5	610 200 050	90	6,2	8
M 6		620 000 060	620 000 525	620 000 625	620 000 725	24	12,5	10	95	621 000 060	50	10	610 000 060	75	8	13	M 6	610 200 060	100	8	10
M 8		620 000 080	620 000 531	620 000 631	620 000 731	24	12,5	10	95	621 000 080	50	12	610 000 080	75	8	13	M 8	610 200 080	100	8	10
M 10	3/8" 7/16"	620 000 100	620 000 537	620 000 637	620 000 737	32	16	12,5	118	621 000 100	60	15	610 000 100	95	12,5	19	M 10	610 200 100	110	9	12
M 12		620 000 120	620 000 544	620 000 644	620 000 744	32	16	12,5	118	621 000 120	60	18	610 000 120	95	12,5	19	M 12	610 200 120	125	11	14
M 14	1/2" 5/8" -	620 000 140	620 000 550	620 000 650	620 000 750	50	25	20	145	621 000 140	60	20	610 000 140	95	12,5	19	M 14	-	-	-	-
M 16		620 000 160	620 000 562	620 000 662	620 000 762	50	25	20	145	621 000 160	60	22	-	-	-	-	M 16	-	-	-	-
M 18		620 000 180	-	-	-	-	50	25	20	145	621 000 180	60	24	-	-	-	-	M 18	-	-	-
M 20	-	620 000 200	-	-	-	58	25	20	169	621 000 200	60	26	-	-	-	-	M 20	-	-	-	-
M 22		620 000 220	-	-	-	-	58	25	20	169	621 000 220	60	28	-	-	-	-	M 22	-	-	-
M 24	-	620 000 240	-	-	-	70	30	25	198	621 000 240	60	32	-	-	-	-	M 24	-	-	-	-
M 27	-	620 000 270	-	-	-	70	30	25	198	621 000 270	60	35	-	-	-	-	M 27	-	-	-	-
M 30	-	620 000 300	-	-	-	70	30	25	198	621 000 300	60	38	-	-	-	-	M 30	-	-	-	-

Tools 620 and 621 also fit within the coloured lines for other thread dimensions, if the guide bush and stud are exchanged.

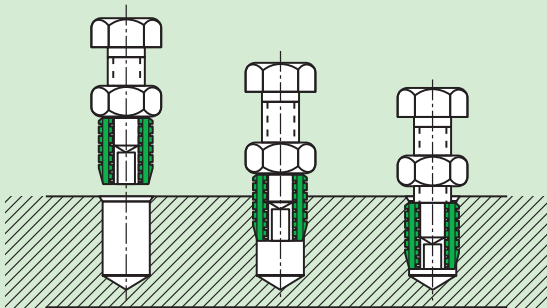
Manual Ensat® Installation ...



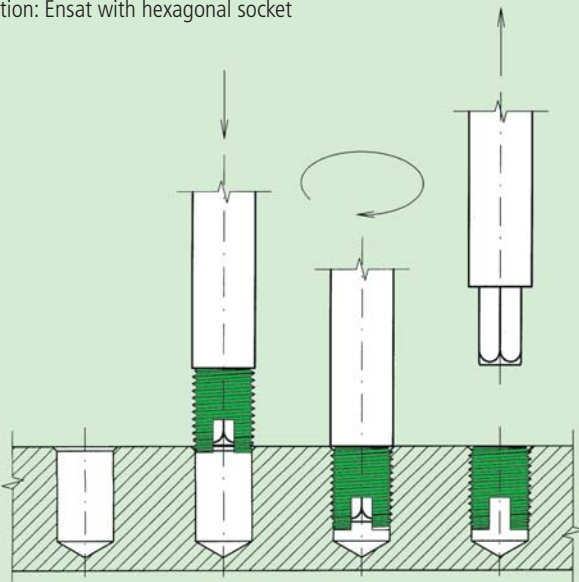
Manual installation with driving tool and tap wrench:



Emergency installation using screw and nut:



Installation: Ensat with hexagonal socket



Manual installation

Manual driving takes place using the driving tools 620, 621 or 610 and a tap wrench:

1. Drill the hole: see page 6 for the correct diameter, countersink if necessary.
2. Screw the Ensat onto the driving tool with the cutting slot or cutting bore pointing downwards.
3. Drive in the Ensat until appr. 0,1 - 0,2 mm below the surface of the workpiece. Ensure that it does not tilt! When using tool 620 and 621, the rotatable shell must rest against the externally visible stop pins in such a way that it is driven round clockwise by the pins.
4. Back out the driver tool. During this process, tool 620 or 621 is automatically released from the Ensat. Tool 610: Hold the hex nut using a spanner until the lock breaks.

Driving into steel

With Ensat®-S 302:

Pre-cut the thread using the drill (max. centre cutter), set the threaded stud of the tool to the full Ensat length (tool 610 cannot be adjusted).

With Ensat®-SB 307 / 308:

In steel up to medium strength, pre-cutting is not required.

Up to M12, we recommend for high-strength steel the use of **Mubux®-M**.

Mubux®-M installation

Pre-cut the retaining thread with customary thread tapping tool, then drive in as for the Ensat.





Machine installation ...

Machine driving process

1. Precisely position the workpiece to ensure that the hole and machine spindle are in exact alignment (do not tilt). Set the machine to the precise driving depth (appr. 0,1 – 0,2 mm below the surface of the workpiece).
2. Turn the machine to clockwise rotation. At the start of the driving process, the rotatable external shell of the tool must be resting against the external visible stop pins in such a way that it is driven by the pins in the clockwise direction.
3. Feed the Ensats towards the tool (slot or cutting hole facing downwards) and grip for the duration of 2 to 4 revolutions.
4. Actuate the operating lever of the machine until the Ensats cuts into the borehole. The remainder of the driving process takes place without actuating the feed.
5. Switch on the reversing function. Always avoid setting the tool down hard on the workpiece, as this can lead to breaking both the tool and the Ensats.

Excessively hard contact of the tool can damage the play-free fit of the Ensats and so reduce the pull-out strength. If necessary, the driving speed may have to be adapted in line with the necessary reversal time.

Machine installation takes place with production tool 620 or 621, integrated in a:

1. Thread tapping machine

2. Use a drill press fitted with a reversing tapping attachment or a tapping machine which is not pitch controlled.
Important: Never exceed the maximum admissible driving torque.

3. Special manual machine with bit stop and reversing system.

For large-scale series:

4. Single or multiple installation machines

with pneumatic or electric drive, semi or fully automatic (CNC). Attention of different pitches.

Recommended speed values for light alloys:

Ensats® Internal thread	Speed [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

Guideline value for installation torque

Ensats® M 2,5	1,5 Nm
Ensats® M 3	2,5 Nm
Ensats® M 4	5,5 Nm
Ensats® M 5	10 Nm
Ensats® M 6	15 Nm
Ensats® M 8	28 Nm
Ensats® M 10	40 Nm
Ensats® M 12	60 Nm

Lubrication

Only in the case of materials with difficult cutting properties.

For medium-hard light alloys:

Cutting oil, spirit or petroleum.

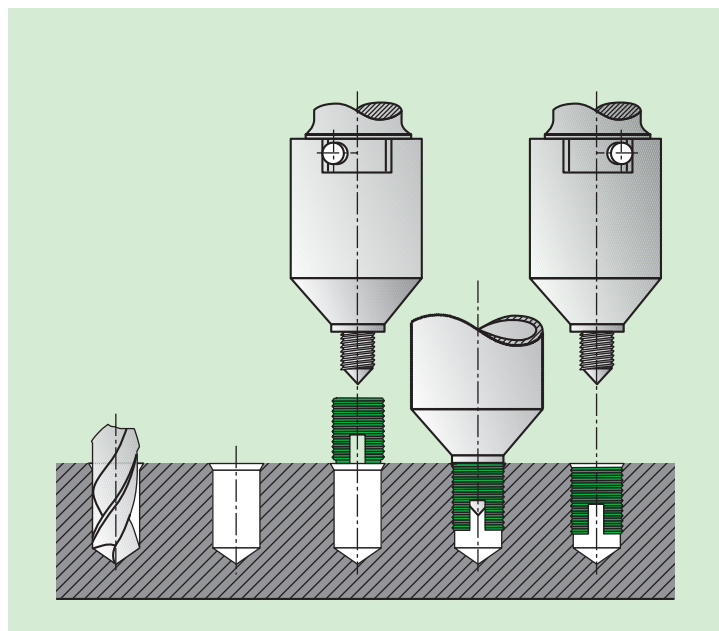
For tough light alloys and cast iron:

Cutting oil with appr. 5 – 8% molybdenum sulphide.

Torque M

The maximum admissible torque depends on:

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





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... in Germany

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