



Threaded insert
self-tapping
metric inner thread

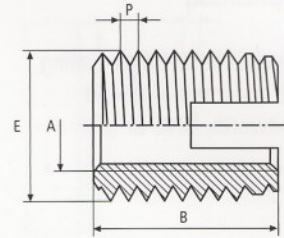
Ensat®-S
Works Standard
302

Application

The threaded insert 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:

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



Dimensions in mm

Article no.	Internal thread A	External thread		Length B	Minimum borehole depth for blind holes T
		E	P		
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	27
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 Ensat-S of Works Standard series 302 with internal thread A = M5 made of steel, hardened, zinc-plated and yellow chromated: Ensat-S 302 000 050.160

Materials

- Unhardened steel
- Case-hardened steel, zinc-plated, yellow chromated
- Brass
- Rust-proof steel 1.4105
- Rust-proof steel 1.4305
- Other materials, designs and finishes on request.

- Article no. 100
- Article no. 160
- Article no. 800
- Article no. 400
- Article no. 500

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.

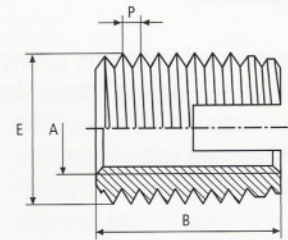
For details of bore diameter guideline values, see the table on page 6

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
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 Ensat-S from Works Standard series 302 with internal thread UNF 1/4"-28 made of hardened, zinc-plated and yellow chromated steel: Ensat-S 302 000 725.160

Materials

Unhardened steel
Case-hardened steel, zinc-plated, yellow chromated
Brass
Rust-proof steel 1.4105
Rust-proof steel 1.4305
Other materials, designs and finishes on request.

Article no. 100
Article no. 160
Article no. 800
Article no. 400
Article no. 500

Tolerances

ISO 2768-m

Thread

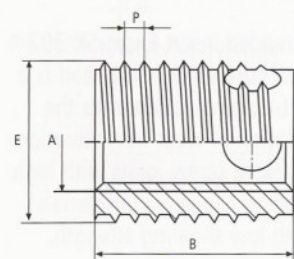
External thread E: metric, tolerances in accordance with Works Standard

Application

Threaded insert Ensats-SB 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 and aluminium alloys
- Magnesium alloys
- Duroplastics, thermoplastics (with the exception of rubber-soft thermoplastics < 100 Shore A)



Dimensions in mm

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

Example for finding the article number

Self-tapping threaded insert Ensats-SB from Works Standard series 307 with internal thread A = M5 made of hardened, zinc-plated and yellow chromated steel: Ensats-SB 307 000 050.160

Short design Long design

Works Standard 307
Works Standard 308

Materials

Unhardened steel
Case-hardened steel, zinc-plated, yellow chromated
Rust-proof steel 1.4105
Rust-proof steel 1.4305
Brass
Other materials, designs and finishes on request.

Article no. 100
Article no. 160
Article no. 400
Article no. 500
Article no. 800

Tolerances

ISO 2768-m

Thread External thread E

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

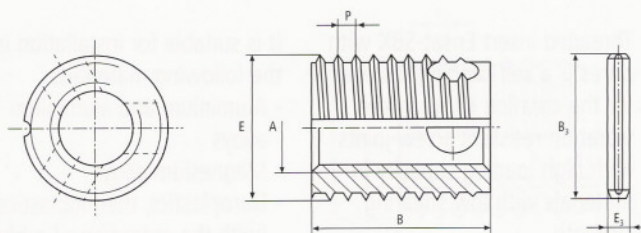
For details of bore diameter guideline values, see the table on page 6

Special applications

For chip-sensitive applications (e.g. electronic appliances): Also available **with 3 closed cutting bores serving as chip reservoirs**. Works Standard 337 / 338 - Page 13

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 A	External thread Special thread		Length B	Minimum borehole depth for blind holes T	Notched stud	
		E	P			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 from Works Standard series 318 with safety groove and internal thread A = M5 made of 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
Rustproof material 1.4105
Rustproof material 1.4305
Brass
Other materials, designs and finishes on request.

Article no. 160

Article no. 100

Article no. 400

Article no. 500

Article no. 800

Material of the notched stud: Steel 6.8 to DIN 267, 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.

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



Threaded insert
self-tapping with chip reservoirs

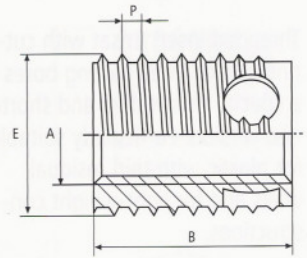
Ensats®-SBS
Works Standard
337 and 338

Application

This special Ensats 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.



Dimensions in mm

Article no.	Internal thread A	External thread Special thread		Length B	Minimum borehole depth for blind holes T
		E	P		
337 000 030 ... 338 000 030 ...	M 3	5	0,6	4 6	6 8
337 000 035 ... 338 000 035 ...	M 3,5	6	0,8	5 8	7 10
337 000 040 ... 338 000 040 ...	M 4	6,5	0,8	6 8	8 10
337 000 050 ... 338 000 050 ...	M 5	8	1	7 10	9 13
337 000 060 ... 338 000 060 ...	M 6	10	1,25	8 12	10 15
337 000 080 ... 338 000 080 ...	M 8	12	1,5	9 14	11 17
337 000 100 ... 338 000 100 ...	M 10	14	1,5	10 18	13 22
337 000 120 ... 338 000 120 ...	M 12	16	1,75	12 22	15 26
337 000 140 ... 338 000 140 ...	M14	18	2	14 24	17 28
337 000 160 ... 338 000 160 ...	M 16	20	2	14 24	17 28

Example for finding the article number

Self-tapping threaded insert Ensats-SBS with chip reservoirs, from Works Standard series 338, B = 12 mm, with internal thread A = M6 made of rustproof material 1.4105: Ensats-SB 338 000 060.400

Short design
Long design

Works Standard 337
Works Standard 338

Materials

Unhardened steel
Case-hardened steel, zinc-plated, yellow chromated
Rust-proof steel 1.4105
Rust-proof steel 1.4305
Brass
Other materials, designs and finishes on request.

Article no. 100
Article no. 160
Article no. 400
Article no. 500
Article no. 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.

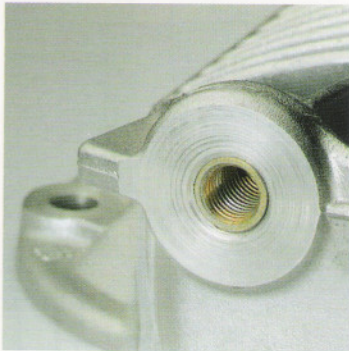
Bore diameter

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 versions

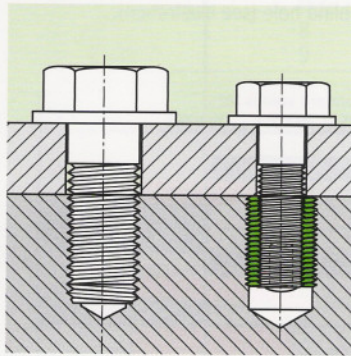
For closed and sealed applications, available with chip reservoirs and closed floor (tank version); Works Standard 357 / 358. Or with head: Ensats-SBSK, Works Standard 337 1 / 338 1.

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



Connections using Ensats 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.

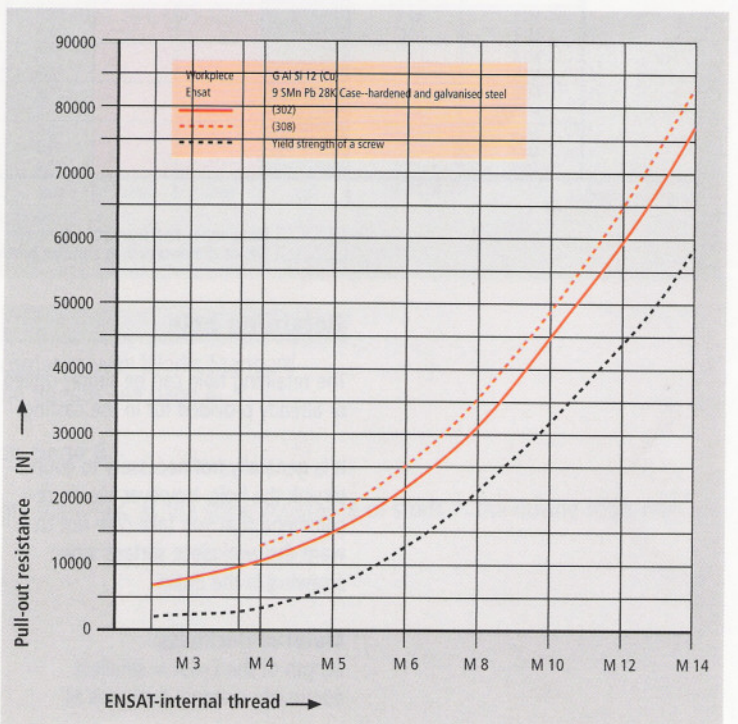
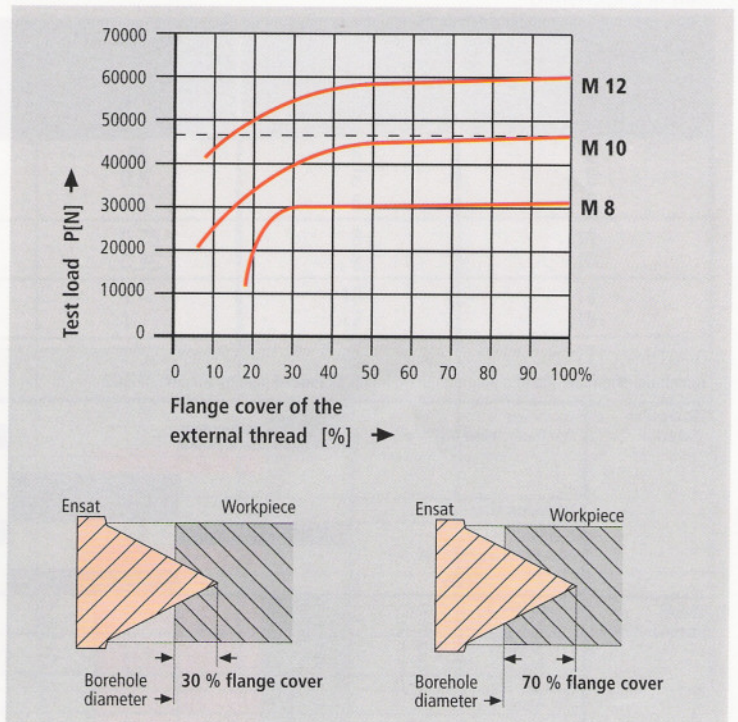


Flange cover

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

Pull-out strength

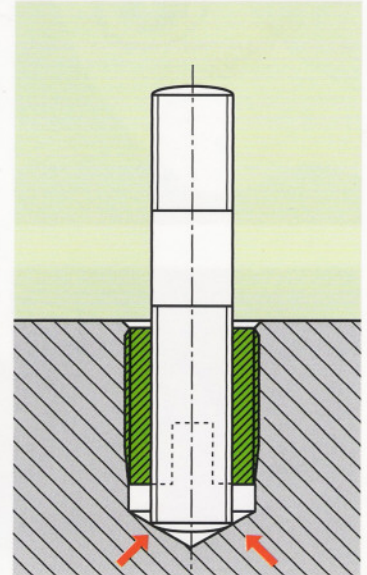
The Ensats is capable of withstanding high loads. When used in light alloys, for example, a degree of pull-out strength is achieved which far exceeds the yield strength of the mating screw 8.8.



The Ensats® in the workpiece ...

Installation recommendation

Avoid any tilting between the Ensats and the screw – under the head or in the thread. For this reason, in the case of adjusting screws the Ensats is driven in to a depth of ≥ 1 mm. Studs are countersunk to the floor surface of the blind hole (see illustration).




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-S 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.

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

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

Retaining hole

The retaining hole can be simply drilled or already provided for in the casting.

It is generally not necessary to countersink the hole. However, we do recommend that you take care not to warp the workpiece surface when screwing in the Ensats.

Material thickness:

Length of the Ensats = smallest admissible material thickness M.

Depth of the blind hole:

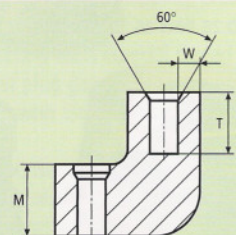
Minimum depth -T see Works Standard sheets, page 7 to 20.

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 light alloys:

$W \geq 0.2$ to ≥ 0.6 E

Guideline values for cast iron:

$W \geq 0.3$ to ≥ 0.5 E

E = Outside diameter of the Ensats [mm]-