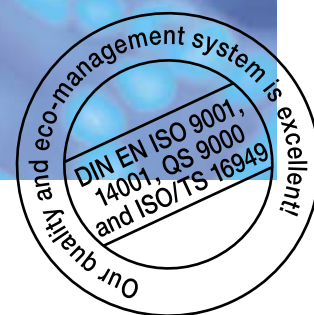


Competence in Miniaturisation



Fasteners for Electronics and IT



BÖLLHOFF

Böllhoff-Precision – a
GRAND
master of s m a l l parts

The rapid developments in IT are breathtaking to watch. Cellphone, Camera, video panel, PDA, Laptop, watch – yesterday's six devices have evolved into the single units of today, stressing one feature or the other. Growing in performance – shrinking in size! Makes you wonder: what holds these technological miracles together?

AMTEC® threaded inserts make the apparently impossible possible.

AMTEC® = AFTER-MOULDING-TECHNOLOGY
stands for inserting fastener components into formed or drilled tapped-holes.



A technical revolution within two generations of mobile phone technology 1995/1999

High-performance miniature fasteners

- Metric / inch-based coarse-pitched thread Unscrewed any number of times
- High tensile strength with insert lengths less than 1.5 mm Minimal total height
- Secure tight-fit even with wall strength less than 0.6 mm (e.g. polycarbonate/ABS) Avoiding sink marks in thin plastic casings
- Thread inserts with screw clamps Security under dynamic loads
- Thread inserts with distancers Balancing level differences; electric contacting; assembly support
- Thread size M 1.2 / M 1.4 Minimal required space
- Threaded and unthreaded rivet couplings Fixtures to shield-plates; printed circuits; SIM-card fixtures
- Embedded by induction Mounting precision up to ± 0.03 mm
- SNAPLOC® mini High-strength plastic lock/release snap-fit of minimized total height (e.g. metal coating for spherical shells)

Selection support

Criterion	SONICSERT®	HITSERT® 3	Rivet coupling	Purp.-made fixture
Thermoplastic components	++	++	+	++
Heat/inductive embedding (low-strain)	++	+	-	+
Self-centering	+	++	+	+
Insert moulding	+	+	-	++
Antenna coupling	++	+	-	-
Plates and cards	-	-	++	-
Embed ultrasonically **	+	-	-	++

** Critical procedure with respect to metal inserts: abrasive wear, process monitoring, stress cracks

++ excellent suitability; + suitable; - unsuitable

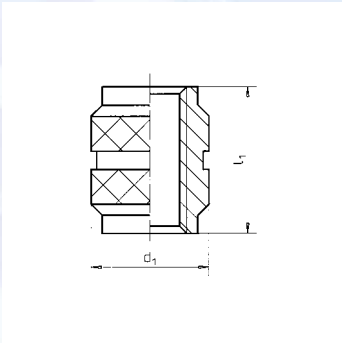
Effective principle



SONICSERT®

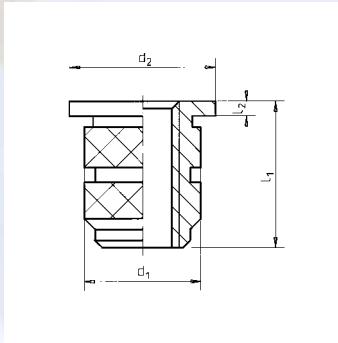
SONICSERT® is a cylindrical threaded insert with knurled surface and groove, subsequently to be heat- or inductively embedded in thermoplastic synthetic materials. The external diameter is oversized in relation to the insertion bore. Applying radiant heat or an electromagnetic field, the metallic body is brought to melting temperature of the synthetic material. The heat transfer plasticizes the synthetic material within a small threshold-range, filling the cavities and undercuts. A low-strain tight fit is the result after cooling.

Symmetric type 0730



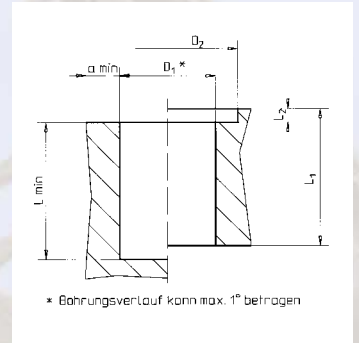
Advantage:
Easy feed

Flange type 0734



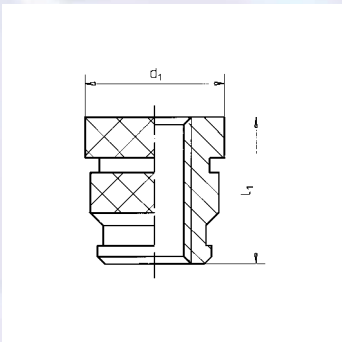
Advantage:
Large contact area, sorting criterion when processing automatically, limited mounting depth

Reference value/assembly

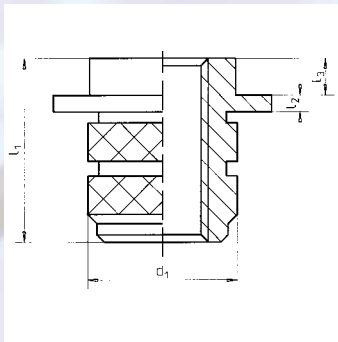


Maximum demolding draft 1°

Asymmetric type 0734



Clinch type 0734



Advantage:
Spacer functions, centering aid, contacting

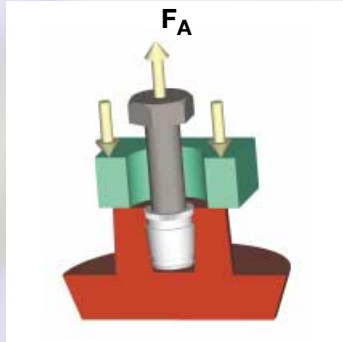
Measurements	Type 0730	Type 0733	Type 0734	Type 0734	d ₁	d ₂	l ₁	l ₂	l ₃	D ₁	D ₂	a _{min.}
M 1.2 x 2.9	-	-	0734 1120 290	-	2.0	2.6	2.9	0.4	-	1.6 ^{+0,1}	2.8	0.6
M 1.4 x 3.1	-	-	0734 9140 001	-	2.2	2.8	3.1	0.4	-	1.8 ^{+0,1}	3.0	0.7
M 1.4 x 2.5	0730 9140 003	-	-	-	2.2	-	2.0	-	-	1.9 ^{+0,1}	-	0.7
M 1.6 x 2.5	0730 9160 005	-	-	-	2.5	-	2.5	-	-	2.1 ^{+0,1}	-	0.8
M 1.6 x 2.5	-	-	0734 9160 009	-	2.5	2.9	2.5	0.4	-	2.1 ^{+0,1}	-	0.8
M 1.6 x 3.0	0730 9160 004	-	-	-	2.5	-	3.0	-	-	2.1 ^{+0,1}	-	0.8
M 1.6 x 3.0	-	-	0734 9160 029	-	2.5	2.9	3.0	0.4	-	2.1 ^{+0,1}	-	0.8
M 1.6 x 3.3	-	-	0734 9160 010	-	2.5	2.9	3.3	0.4	-	2.1 ^{+0,1}	-	0.8
M 1.6 x 4.85	-	-	-	0734 9160 024	2.5	3.8	4.85	0.4	1.55	2.1 ^{+0,1}	-	0.8
M 1.6 x 4.1	-	-	-	0734 9160 026	2.5	2.9	4.1	0.4	0.6	2.1 ^{+0,1}	-	0.8
M 2	0730 1020 004	-	-	-	3.65	-	4.0	-	-	3.2 ^{+0,1}	-	1.5
M 2	-	0733 1020 004	-	-	3.6	-	4.0	-	-	3.2 ^{+0,1}	-	1.5
M 2	-	-	0734 1020 046	-	3.6	5.0	4.6	0.6	-	3.2 ^{+0,1}	-	1.5

For tapped hole bores a L_{min.} = insert length + 0.3 mm is recommended

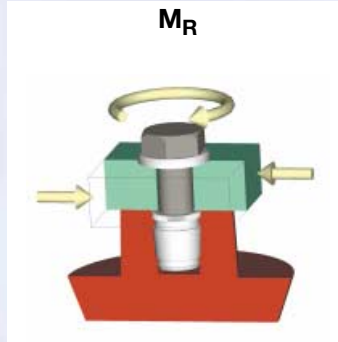
Tight-fit values

Determining the mechanical values is done in close agreement with the respective client on the basis of a Böllhoff company standard.

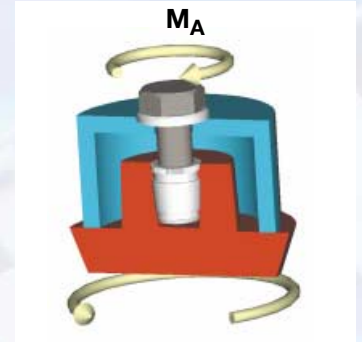
Test procedure in accordance Böllhoff company standard



Pull out force [N]



Torque [Nm]



Jack out [Nm]



Original components, or trial plates furnished with original Böllhoff materials in the context of advance quality planning, may be used in these required setting trials.

Materials	PC/ABS			PC			PMMA			PA GF		
approx. installation temperature	230° C			280° C			270° C			310° C		
Measurement category	F _A	M _R	M _A	F _A	M _R	M _A	F _A	M _R	M _A	F _A	M _R	M _A
M 1.2 x 2.9	260	0.16*	0.1	299	0.16*	0.13	275	0.16*	0.14	361	0.16*	0.15
M 1.4 x 3.1	300	0.2*	0.12	336	0.21*	0.16	379	0.21*	0.17	431	0.21*	0.18
M 1.6 x 2.5	320	0.38*	0.17	331	0.38*	0.20	354	0.38*	0.24	396	0.38*	0.25
M 1.6 x 3.3	360	0.38*	0.2	409	0.38*	0.24	487	0.38*	0.29	573	0.38*	0.32

* = screw fracture

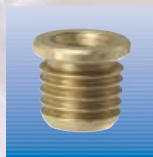
Aforementioned reference values, mean values on the basis of 20 measurements at 20° C!

Apart from SONICSERT® thread inserts, other anchoring concepts in the realm of AMTEC® miniature inserts have proven their value.

HITSERT® 3



SLIDE PIN Ø 1.0 (stainless steel)



HITSERT® 3 M 1.6 x 2.5

Conical insert (universal) for heat or inductive embedding, tapping, cold insert, optimized feed, self-centering, dismantlable

Rivet coupling RIVNUT®



M 1.6 x 2.8 (brass)



0.6 x 1.4 (nickel silver)

Rivet and flared tube end couplings for thin-walled sheet metal components (e.g. shield plate, SIM card fixture or PCB's, PWB's)

SNAPLOC® mini



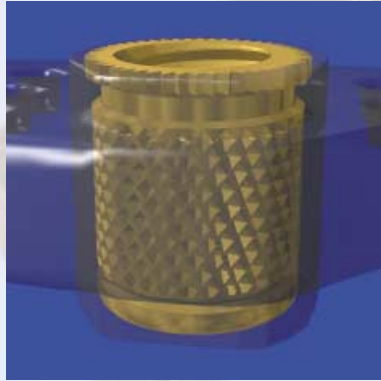
SNAPLOC® pin (PCGF) friction welding



SNAPLOC® coupling (PAGF) heat rivet

Small synthetic fasteners, made of fibre glass reinforced plastic, subsequent joining with friction welding, heat rivets, purpose-made design, snap-fit connection

Limits and risks of "Mould-in" technology



In individual cases AMTEC® threaded inserts are also insert-moulded. When this historically "older" mould-in technology is applied, the thread inserts are put into their form prior to producing the component itself (e.g. injection moulded, pressed) and are embedded during the process of moulding. Placing may occur manually or using a handling system.


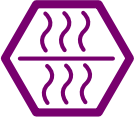

Unproductive ancillary time of the injection moulding machine is increased.

Technically speaking, there are three major risks involved in the mould-in process: sealing the insert opening to prevent plasticized material from penetrating and the inserted parts falling. This may result in rejects or cause damage to tools.

With respect to synthetic materials sensitive to load (e.g. PC, PMMA, plexiglass) there is another aspect to consider. If hot, plasticized material comes into contact with "cold", i.e. not pre-heated inserts, the temperature difference causes quenching and thus an embedded tension, facilitating subsequent crack formation in the component.

Advantages apply to smaller piece numbers or with respect to appliances where handling systems already in use.

Installation methods and equipment

Processing	Precision	Installation time	Dimensions	Multiple installation
EWS / inductive 	± 0,05	approx. 2 – 4 sec	M 1 – M 4	<ul style="list-style-type: none"> ● excellent suitability Comment: also suitable for metallized surfaces, low-strain installation
HES / heat 	± 0,1	approx. 3 – 4 sec	M 1.2 – M 8	<ul style="list-style-type: none"> ● well suited Comment: Low-strain installation
USS / ultrasonic 	± 0,1	approx. 1 – 2 sec	M 2 – M 6	<ul style="list-style-type: none"> ○ unsuitable Comment: high noise emission, potential abrasion, danger of crack formation caused by load with respect to amorphous thermoplastics



Technical limits?

Continuous innovations prohibit the concept of absolute limits. While thread sizes of M 1 and less are technically feasible, the minimum size for large batch production is currently M 1.4 due to the limits of economical bolting.

The minimum wall-thickness of synthetic domes is 0.6 mm. Insert lengths of less than 1.8 mm can be realized.

Examples for application



SNAPLOC® mini demonstration sample, small-scale constructions snap-fits



HITCERT® 2, M 2 in base stations for cordless telephones



SONICCERT®, M 1.4 Typ 0730 in chronometric systems

Special purpose design



SONICCERT®, M 3 (stainless steel) in battery casings



SONICCERT® 0730, M 4 x 0.5 (fine pitch thread) for antenna fixtures in mobile phones



QUICKLOC®, quarter turn-lock fastener (3-part, stainless steel) for battery-box covers (outdoor cell phones)



Rivet couplings, M 1.6 with increased torsional strength for shield plates (0.3 mm thickness of material)



SONICCERT®, antenna pin, low-strain tight fit by means of inductive embedding



SONICCERT®, M 1.6 x 4.8 (nickel silver) with integrated spacer



Mounting plate for telecommunications base stations, magnesium precision casting, HELICOIL® plus Threaded inserts M 3 made of aluminum alloy, artificial ageing, hard coating, coated with lubricant. Material: Al Zn Mg Cu 1.5



HITCERT® 3, Slidepins Ø 1.0 mm (stainless steel), guide for cell phone covers

Our services:

- test settings
- sampling
- problem solution
- processing
- 100 % control
- electronic process data

Application data sheet

Should you require further information, particular test data for your advance quality/development plan or special designs, please fill in the form below (not forgetting to provide address) and send by post or fax to:

Böllhoff GmbH

Archimedesstraße 1 – 4 · 33649 Bielefeld · Telephone +49 (0)521 / 44 82 - 319 · Fax +49 (0)521 / 44 82 - 512

Material:

Insert measurements:

Ø mm:

Length:

Bore:

Wall strength:

Application:

Type, name / description:

Required mechanical properties:

(also see page 4)

F_A in N:

M_R in Nm:

M_A in Nm:

Test settings with:

- Original components Böllhoff test plates
- Supply and delivery of proprietary granules
- Use of Böllhoff granules

Amounts:

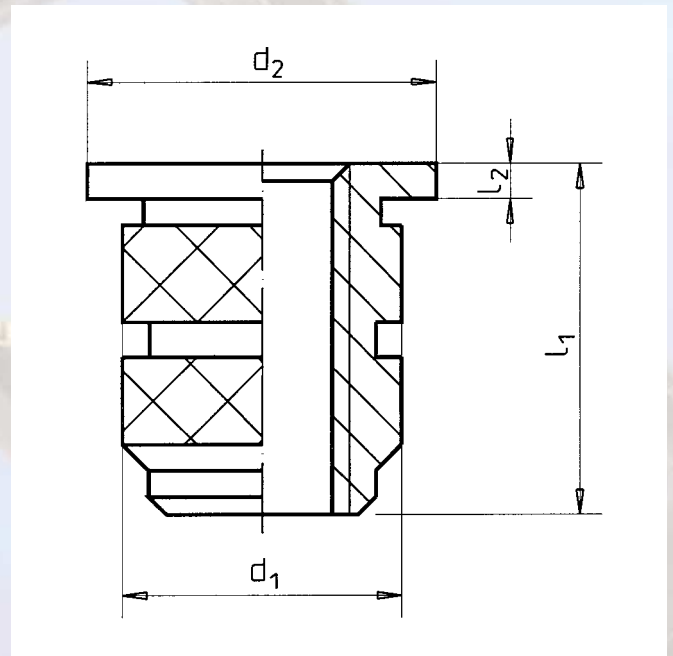
Series:

Pilot production:

Test settings:

Comment:

Fill in measurement detail



Drawing of your application



Contact name / address



Böllhoff International



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*Joint-Ventures

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BÖLLHOFF

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