

AUTOMOTIVE

Front end / Rear end

Innovative joint solutions for the front and rear end module

BÖLLHOFF

Car

Cars have been manufactured for more than a century. There is no other invention of comparable influence on our life and economy such as the car. It was the car that first granted universal and individual mobility.

Since cars were first invented, there have always been milestones of innovation.



Front end/Rear end

In this overview, the great variety of possible uses of our joint solutions and assembly systems is pointed out. By the example of the front and rear end module, we illustrate a selection of specific applications from practice on the following pages.

We join in!

As a leading system supplier for fastening and assembly technology, we are a recognised partner for automotive manufacturers and their suppliers. No matter in which of the car modules you search, you will find one of our solutions there. After exploring the door module, let us continue the expedition with the front and rear end module.

The following are among the main functional elements of the front and rear end:

Front end:

- Bumper system
- Crash management system
- Lighting
- Cooling system
- Carrier structure
- Wheel housings
- Mounting parts

Rear end:

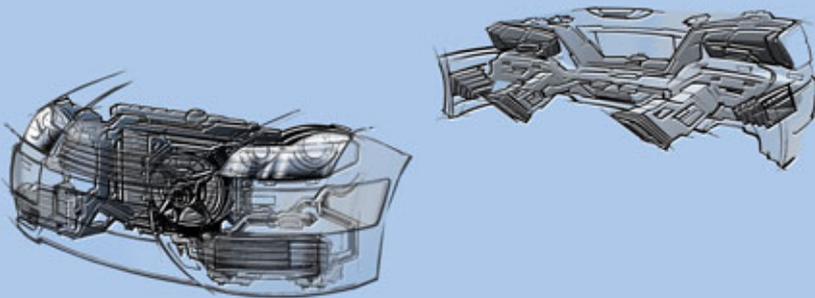
- Bumper system
- Boot lid
- Lighting
- Carrier structure
- Wheel housings
- Floor
- Mounting parts

Cars appeal to us through emotions and aesthetics. Particularly the front and rear end characterise the modern design of a vehicle.

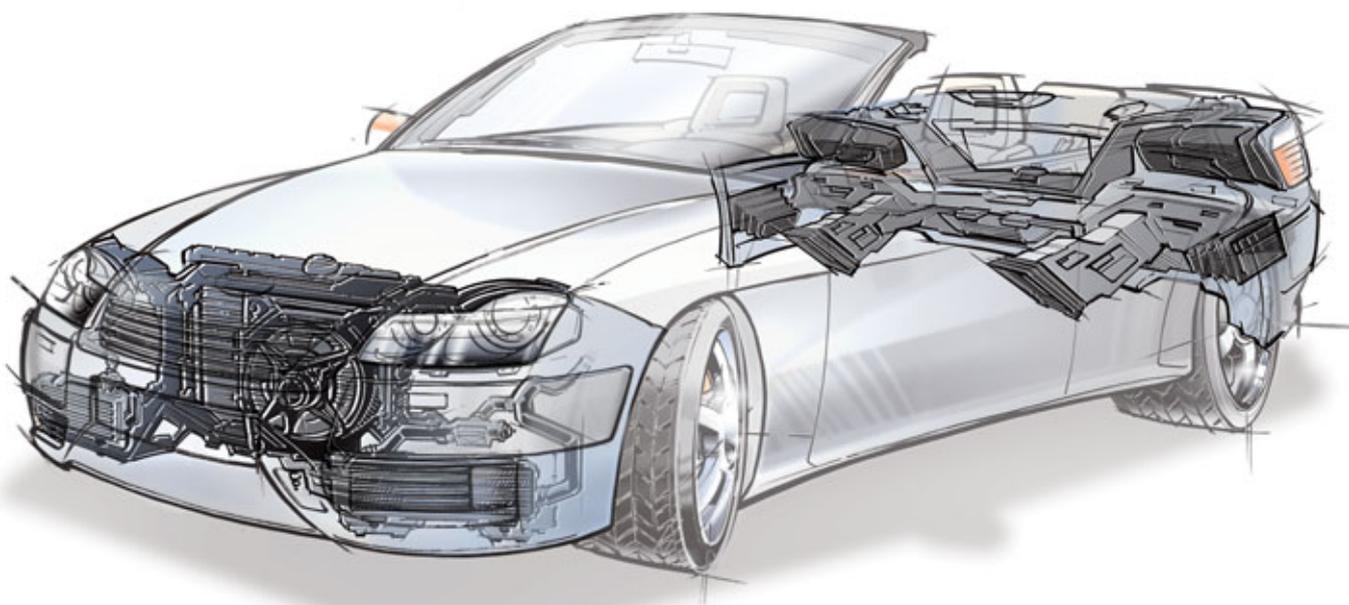
On the other hand, there are the technical requirements in this sector which are growing from generation to generation. Here, the focus is on comfort, safety, reliability and driving performance.

The employment of up-to-date materials and composite designs immediately calls for an expert in the field of joining technology: the Böllhoff Group.

Front and rear end bear much potential for innovative products.



Böllhoff – your automotive expert.





HELICOIL®

Thread inserts for thread reinforcement in lightweight materials.



RIVKLE®

The solution for fastening a high-strength nut or stud thread to a thin-walled component.



AMTEC®

Metal inserts for thread reinforcement of plastic parts.



FLEXITOL®

Systems for compensation of production tolerances.



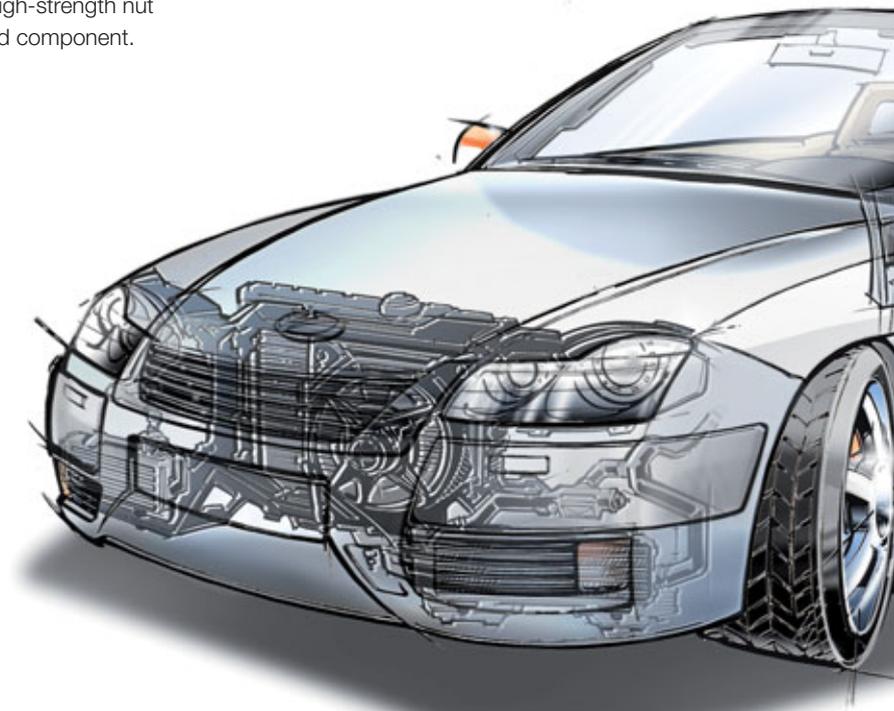
SNAPLOC®

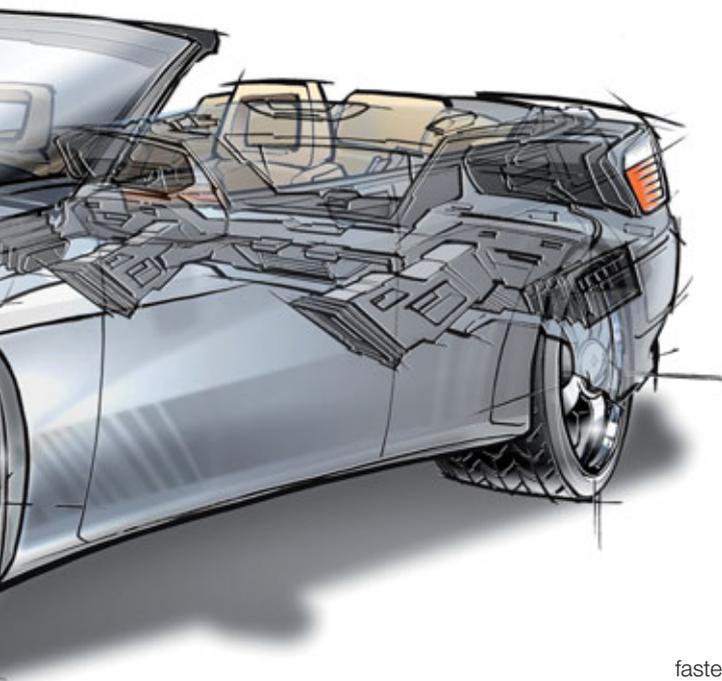
Vibration- and noise-decoupling fastening system.



RIVKLE® Elastic

A detachable blind rivet joint with vibration- and noise-decoupling function.





TEPRO®

High-precision technical moulded parts and components.



TEPRO® K' in K'

Screws and screw driving systems as a plastic fastening solution.



QUICKLOC®

Quarter turn pressure locks for quick and repeatedly detachable joints and quick assemblies.



ONSERT®

Quick and process-reliable bonding of fastening elements with light-curing adhesives.



RIVSET®

High-strength joining of steels, aluminium and plastics without loss of performance.



Assembly systems

As the leading system supplier in fastening and assembly technology, we also supply the matching assembly solutions for the fasteners.

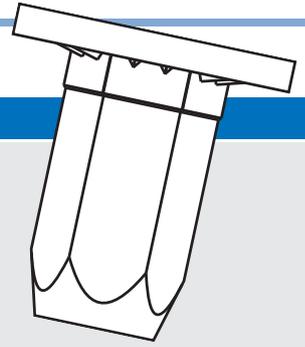


Fastening of diverse components with **RIVKLE®**

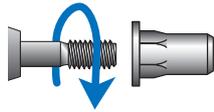


Your advantages – an overview:

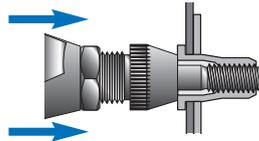
- Optimum fastening solution for composite and lightweight construction
- Stable thread on thin-walled components
- Installation with one-sided accessibility



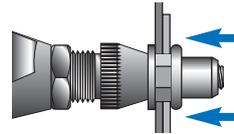
1 Spinning on



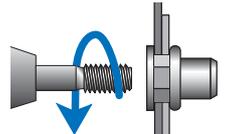
2 Inserting



3 Upsetting



4 Spinning off

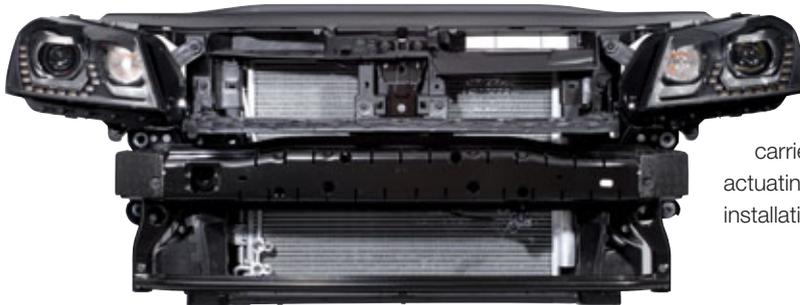


RIVKLE® blind rivet nuts are the most versatile solution for fastening high-strength nut threads to thin-walled workpieces.

They are used for example on the VW Passat, VW Passat CC and VW Tiguan to fasten mounting parts such as lock carriers, wings, etc.

The Böllhoff solution is a M6 RIVKLE® blind rivet nut with knurls under the head. Upon assembly, those knurls form-closely emboss in the component surface. In combination with the hexagon design, this provides for very good screw locking performance.

The blind rivet nuts on the front end body component are also installed using Böllhoff installation tools.



RIVKLE® blind rivet nuts are set at flexible manual assembly workstations using RIVKLE® P2007, multi-dimensional pneumatic-hydraulic tools. Spinning on is carried out with touch automatic, while only one actuating switch is required for riveting. During installation, the force is monitored.



Screw fastening of the front end with **UNIQUICK®**



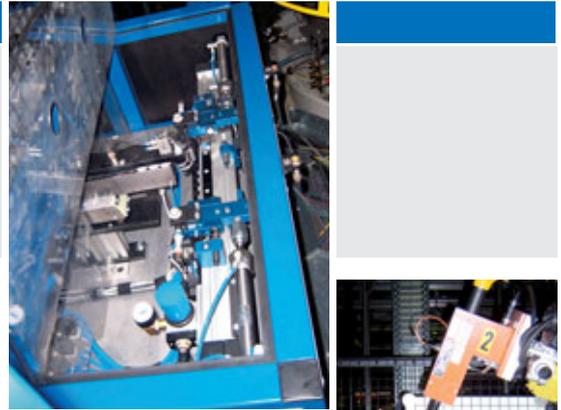
Your advantages – an overview:

- Fully automatic screw fastening
- No loss of performance
- Reduced assembly times

Screw driving systems of the UNIQUICK® Vario product group are used in the screw fastening process of the Opel Zafira front end. The UNIQUICK® Vario family meets the requirements for an increased degree of automation, fully automatic assembly and use of robots – as in this case here. Robot-controlled screw driving systems with electrical screwdrivers are used in this process. Although the installation space is rather small, M 12 x 46 screws can be screw fastened at eight joint points with angle control at a torque of 110 Nm. The Böllhoff UNIQUICK® screw driving systems with automatic screw feed requires reliable feeding technology to meet the high demands of industrial production with respect to availability.

So as not to restrict robot mobility through hoses, the feeder with linear conveyor section and twin transfer unit is used as pick-and-place system for this application. The feeder is located outside the robot cell. The fasteners are supplied into the cell by means of a linear conveyor section. This ensures easy refilling of the feeder and screw transport to the screw driving systems in the danger zone of the cell. The long parts buffer allows very short cycle times. Level control is a non-contact system.

Screwdrivers with automatic feed are used in production leading to a much more economic process.

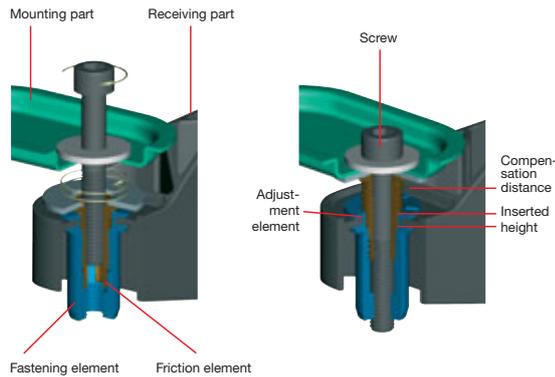
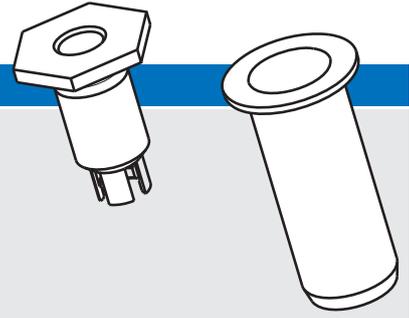


Fastening of the front end to the car with **FLEXITOL® Metal**



Your advantages – an overview:

- Tension-free front end installation
- Reduced costs for component production
- Assembly from one side only
- Easy installation thanks to blind rivet technology



Especially the automotive industry is ever more becoming an assembly industry with a significant share in the added value. High demands on reliable function and quality require smart solutions. This does also apply to the installation of plastic front ends which must be tension-free.

Nothing is easier with FLEXITOL® Metal M6. This metal system consists of an adjustment element and a fastening element. In the first step, the tolerance compensation in front of the strut support must be mounted with a RIVKLE® blind rivet nut. After that, the front end is aligned in the desired assembly position. Upon screwing, the compensation distance between the fastening point of the strut support and the front end is steplessly and automatically compensated. The friction element serves to move the adjustment element.

A left-hand thread connects adjustment element and fastening element. While screwing in the screw in clockwise direction, the adjustment element drives out until touching the front end. Afterwards, the screw is further screwed in until the entire subassembly is secured by the screw preload force. The front end is then installed tension-free.



Fastening of the bumper with **FLEXITOL® Hybrid**

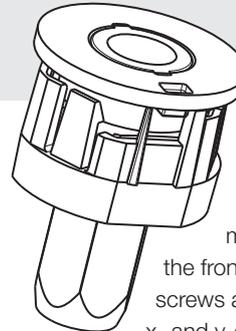
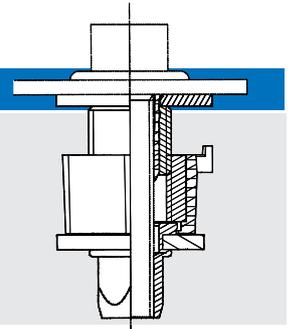


Your advantages – an overview:

- Automatic tolerance compensation between bumper and front end
- Easy blind riveting
- Quick installation thanks to automatic tolerance compensation

FLEXITOL® Hybrid is another technically and economically optimised solution concept from Böllhoff. It is a multi-component system mainly designed for use in large-scale production. An example for such a production is the fastening process of the bumper to the front end on the SEAT Exeo.

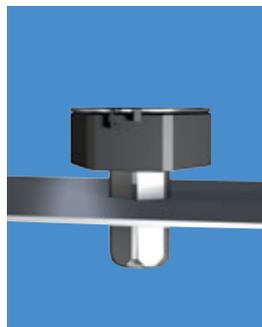
The FLEXITOL® Hybrid is delivered as a pre-assembled unit to be installed at the front end manufacturer's premises. It is installed in a blind riveting process using a retainer on the front end. The FLEXITOL® Hybrid is processed by means of a stroke-controlled setting tool, the RIVKLE® P2005 with push-pull control. The tool is forcibly guided to allow easier installation. Locating the riveting positions is also easier.



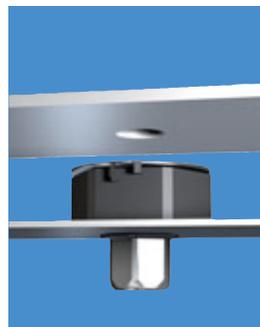
M8 hexagon screws for final mounting are also pre-assembled. The bumper is mounted at two fastening points on the front end. It is centred with the screws and thus obtains its position in x- and y-direction.

After the bumper has been aligned with the headlights, screwing in starts. By screwing in the screw in clockwise direction, the adjustment element drives out until touching the bumper.

Tolerances in z-direction are automatically compensated without deformation. The screw is screwed in to the stop so that the bumper installation to the front end is complete.



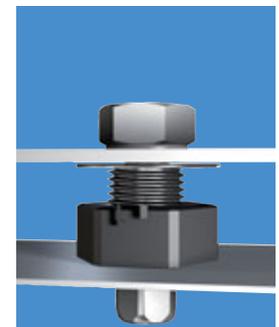
Insertion and riveting



Positioning of components



Compensation of tolerances



Fastening the subassembly



Fastening of the headlight with **FLEXITOL® Plastic**



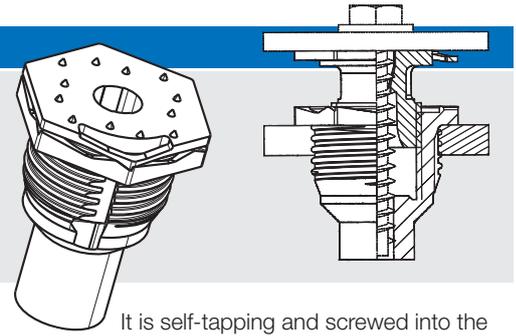
Your advantages – an overview:

- Automatic tolerance compensation between headlight and front end
- Ideal joint pattern between headlight, hood and wing
- Quick installation thanks to automatic tolerance compensation

Automotive manufacturers' and customers' demands on reliable function and first-grade quality, such as small gap widths, are still high.

To be able to also meet these demands in today's highly automatic assembly industry in the future, as a specialist in fastening and assembly technology, Böllhoff has developed another economical assembly solution with tolerance compensation: the FLEXITOL® Plastic.

It is for instance employed in the Opel Corsa to fasten the headlights. The FLEXITOL® Plastic consists of a plastic adjustment element and a plastic fastening element and is supplied as a complete subassembly.

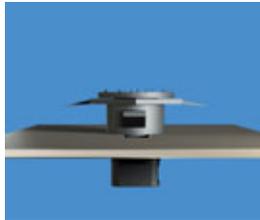


It is self-tapping and screwed into the mounting hole of a plastic tab on the front end.

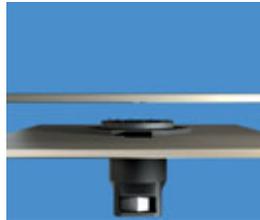
First the headlight is mounted to the front end at two points without tolerance compensation (fixed). Then the headlight is aligned with the hood so that an ideal joint pattern results.

In the next step, screwing in with a self-tapping metal screw starts. By screwing in the screw in clockwise direction, the adjustment element drives out until touching the mounting part. The variance in the gap caused by tolerances is automatically compensated without deformation. Finally, the screw is further screwed in to the stop. The headlight is then attached to the front end.

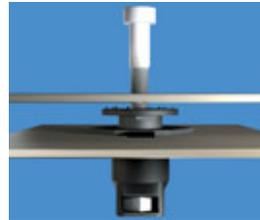
Function in the bayonet version



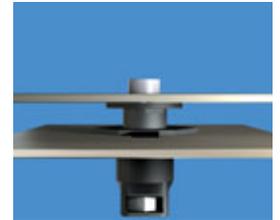
Insertion and twisting



Positioning of components



Compensation of tolerances



Fastening the subassembly

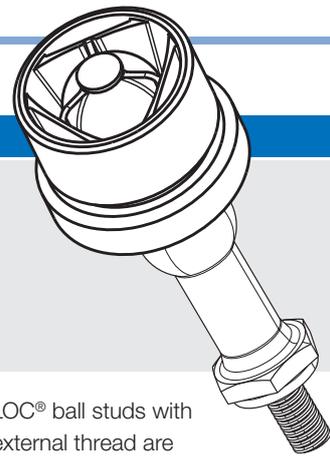


Fastening of the radiator with **SNAPLOC®**



Your advantages – an overview:

- Fast and easy assembly
- Vibration- and noise-decoupling attachment
- Easy integration into components
- No corrosion



SNAPLOC® ball studs with metal external thread are available with most diverse thread shapes. These include for example metric threads, American and British threads, self-tapping threads and others compliant with the respective standards as well as special designs.

For the final assembly to the front end, the radiator is snapped on. To do so, the ball studs are snapped on to the front end couplings.

Joining by snapping on and removing by pulling ensure an ideal fit. The joint can be repeatedly opened and closed.

The SNAPLOC® system has established itself for use in further applications such as to fasten headlights and rear lights as well as design covers.

SNAPLOC® is based on the simple principle of a snap connection. Inside the coupling, there is a ball socket which the ball stud as the counterpart can snap into.

On the plastic front end of the Mercedes M-Class, there is a cup-shaped receptacle into which the SNAPLOC® coupling, with a ball diameter of 15, is inserted and where it is held form-closedly.

The ball stud with a M 6 x 9 external metric thread is pre-assembled directly to the radiator at the supplier's premises.

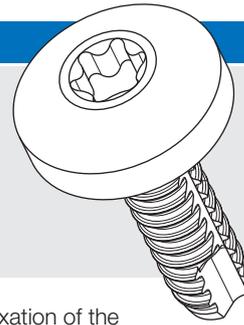


Screw fastening of the carrier with **TEPRO® K' in K'**



Your advantages – an overview:

- Screw joint with very good reverse locking performance
- Self-forming
- No corrosion
- Reduced weight due to full-plastic solution



Whether plastic components can be screw fastened with plastic screws mainly depends on the mechanical requirements for the force- and form-closed joint.

The material combinations of component and screw play a major role in this. DIN/ISO screws and nuts are preferably used for force-closed metal component screw joints. However, their characteristics for fastening plastic components are generally oversized and less suitable due to their material incompatibility. So what could be more logical than to fasten a plastic component with plastic screws?

The solution is the development of the plastic in plastic (German abbreviation: K' in K') screwing principle. Specially developed thread profiles allow specially tailored solutions for force- and form-closed fastenings which are self-locking, self-tapping, self-forming, adjustable and tolerance-compensating.

For the VW Touareg, both guide profiles as well as the support are fastened to the carrier using self-tapping plastic screws. The K' in K' screw forms the thread in the existing cylindrical bore hole in the carrier.

The relaxation of the base material (carrier) into the longitudinal groove of the screw achieves reverse locking. Clamping ribs below the screw head ensure automatic centring of the assembled parts.

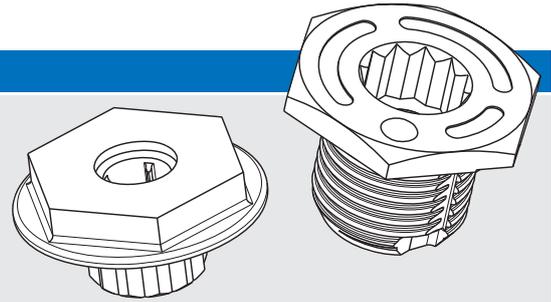


Fastening of the headlight with **FLEXITOL® K' in K'**



Your advantages – an overview:

- Any screw to fasten the component
- x-/y-level adjustment independent of z-direction
- z-adjustment remains unchanged – even in case of disassembly
- Readjustment by simply loosening the screw



Specially developed thread profiles of this K' in K' screw joint allow specially tailored solutions for force- and form-closed fastenings which are self-locking, self-tapping, self-forming, adjustable and tolerance-compensating.

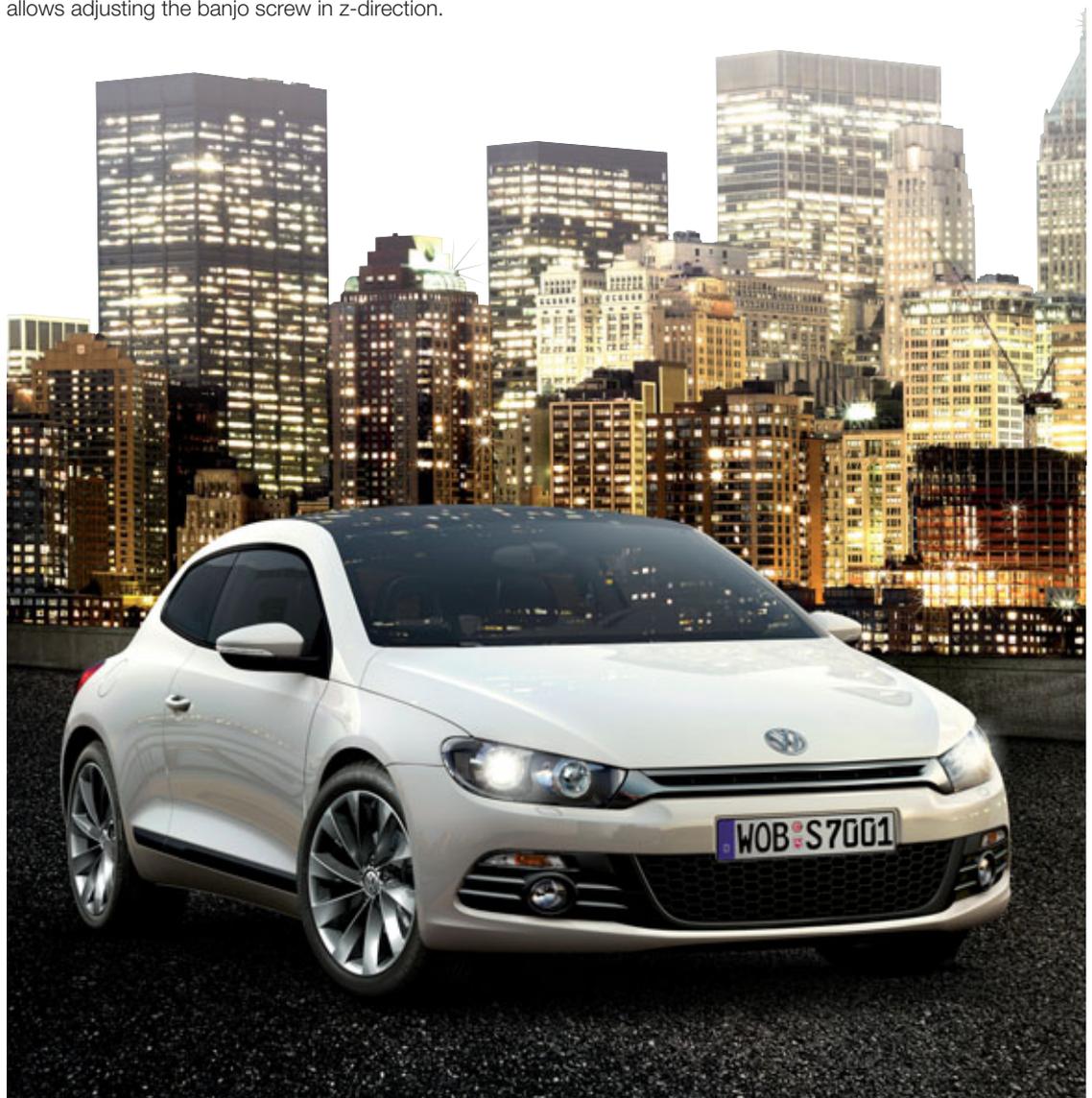
To attach the headlight on the VW Scirocco, the first step is to screw fasten the self-tapping banjo screw with brass insert at two fastening points in cylindrical bore holes in the headlight. Then the headlight is positioned so that it touches the cross-beam from below.

The adapter is inserted through the cross-beam and mounted in the banjo screw. The form-closed joint allows adjusting the banjo screw in z-direction.

A metric screw that is inserted through the adapter and screw fastened to the brass insert of the banjo screw clamps the cross-beam between adapter and banjo screw.

The difference in diameter between the bore hole in the cross-beam and the adapter allows an adjustment on the x-/y-level. On this level, a tolerance compensation of ± 3 mm can also be realised.

The TEPRO® K' in K' thread is used for the adjustment in z-direction.

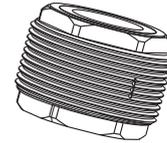
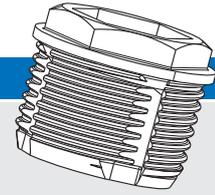


Fastening of the headlight with **FLEXITOL® K' in K'**



Your advantages – an overview:

- Central accessibility from above
- Adjustment under load possible
- Independent adjustment of x-, y- and z-direction of the headlight
- Reduced weight



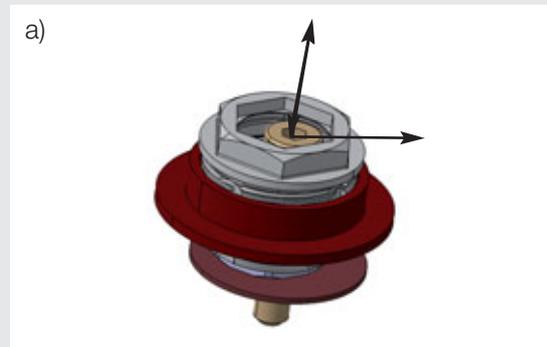
All customer requirements addressed to the product development department set the aims for the development and selection of product functions and materials. The following adjustment element to fasten headlights is one of the resulting developments.

The element consists of four parts: a K' in K' banjo screw, a washer, a threaded bush and a sleeve.

It is supplied to the headlight manufacturer. The manufacturer screws the subassembly with the self-tapping K' in K' external thread into a cylindrical bore hole in a plastic retainer of the headlight.

Then the headlight is installed so that the headlight retainer with adjustment element is placed on the front end sheet.

A metal screw is then screwed through the adjustment element into a holding thread in the front end sheet.



a) As long as the screw has not been tightened to the torque, the headlight can be aligned in x-/y-direction within ± 2.5 mm. The position is fixed when the screw is tightened.



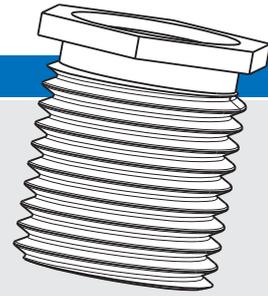
b) Despite block screwing, the headlight can still be aligned in z-direction (axially). This is done by adjusting the K' in K' banjo screw toward the headlight retainer and the threaded bush.

Due to the left-hand thread of the threaded bush (pitch of 1 mm) and the right-hand thread of the K' in K' banjo screw (pitch of 2 mm), the adjustment distance is added to 3 mm at one turn. This amounts to a total adjustment distance of 14 mm. Thanks to the K' in K'

thread, the banjo screw does not have to be additionally secured.

Fastening of the headlight with **AMTEC®****Your advantages – an overview:**

- Tolerance-compensating due to adjustability
- High strength values
- Chemical resistance



AMTEC® banjo screws are used to fasten the headlight to the front end of a VW Golf.

At two screw points, the self-tapping banjo screw is directly screwed into the front end.

In the next step, the moulded-on retainer on the headlight is positioned above the banjo screw and a screw with washer is screwed into the banjo screw. The clamped retainer firmly joins headlight and front end.

Since the banjo screw can be adjusted, production and assembly tolerances (z-adjustment ± 5 mm) are manually compensated.



Fastening of the lock carrier with **RIVKLE®**

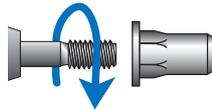


Your advantages – an overview:

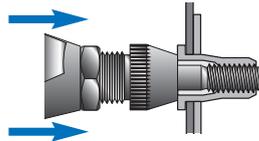
- Optimum fastening solution for composite and lightweight construction
- Stable thread on thin-walled components
- Installation with one-sided accessibility



1 Spinning on



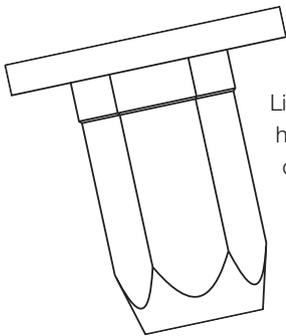
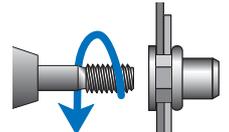
2 Inserting



3 Upsetting



4 Spinning off



With the up!, Volkswagen has written a new chapter in small car history.

Lightweight construction is one of the main focuses here. That is why there are no metal reinforcements on the compact plastic front end, for example. The front end is completely made of structural plastics.

The only exception is the lock carrier fastening. Riveting is carried out from the metal side (lock carrier) to the plastic side (front end). That is why the previously used blind rivet nut with knurls under the head was not suitable.

The requirements of relaxation compensation of the plastic material and the special clamp area called for a new joint solution.

Böllhoff supplied the solution: a specially developed RIVKLE® M6 blind rivet nut. This blind rivet nut has a larger head diameter counteracting the relaxation of the plastic material due to the enlarged contact surface. The very large clamp area ranging from 2.6 to 5.4 mm could also be realised. In addition, the hexagon design provides for very good screw locking performance. The blind rivet nuts are also installed with Böllhoff installation tools. RIVKLE® blind rivet nuts are set at flexible manual assembly workstations using RIVKLE® P2007, multi-dimensional pneumatic-hydraulic tools.

Spinning on is carried out with touch automatic, while only one actuating switch is required for riveting. During installation, the force is monitored.

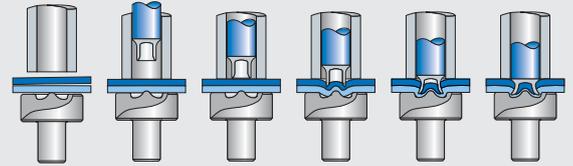


Body construction joints on the front end with **RIVSET®**



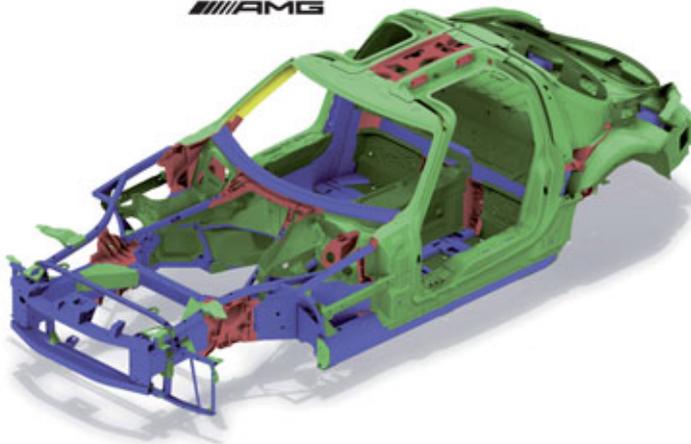
Your advantages – an overview:

- High-strength joint even under dynamic load
- No pre-punching
- Reliable and reproducible

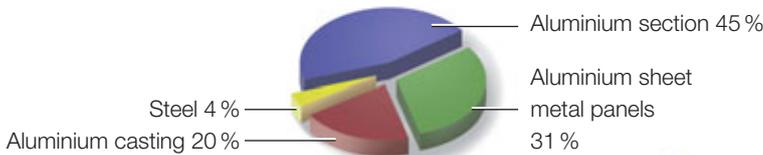


Weight-optimised material combination:

Torsionally stiff structure weighing 241 kg.



Part by weight



It is a high-performance car in aluminium space frame construction with steel parts in the area of the A-pillar and roof.

The customer-specific self-pierce riveting systems RIVSET® Vario developed for the production of the Mercedes SLS AMG offer high flexibility. Due to that, different types of rivets can be processed with different assembly tools, for example. The rivet setting tools are used manually as well as with robots.

The joining parts are joined with a semitubular rivet in one step: without pre-punching in a low-noise, low-emission process to result in a form- and force-closed joint. The rivet punches through the top material layers and is spread out in a die in the bottom layer. Since the bottom layer is not punched through, a gas- and liquid-tight, punctual joint is formed.

RIVSET® self-pierce rivets are exclusively manufactured at Böllhoff production plants. They are subject to most stringent quality checks in every single production step.



The SLS AMG inspires through puristic design, superior vehicle dynamics and sophisticated lightweight construction.

Fastening of rear axle with **HELICOIL®**



Your advantages – an overview:

- High wear resistance
- Low thread friction within small tolerances
- Corrosion and heat resistance



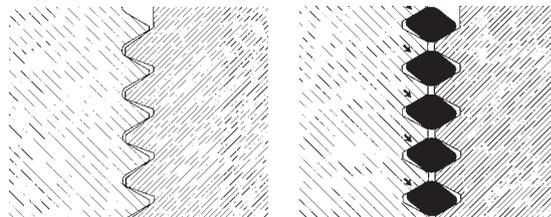
Wherever low-strength materials (e.g. aluminium, aluminium-magnesium alloys and fibre-reinforced plastics) are used, HELICOIL® Plus is indispensable for thread reinforcement.

That is why HELICOIL® Plus Free Running of dimensions M10 x 25 and M12 x 1.5 x 30 are used to fasten the rear axle, for example.

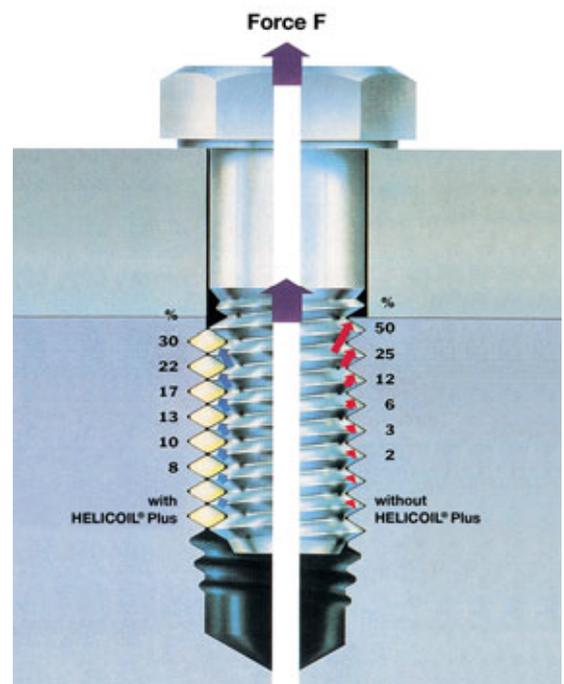
Every thread of the thread insert with precision-formed, rhombic profile is free running. The result is an internal thread true to gauge that can be used on both sides. The dimensional stability of the ISO thread complies with DIN 13 6H and for special requirements with 5H.

HELICOIL® thread inserts are made of austenitic chrome-nickel steel (minimum tensile strength of 1,400 N/mm²). The rolled nut thread has a high surface quality. This ensures a high-strength, wear-resistant thread with an extremely small and constant thread friction torque.

In case of repeated screwings and if the same tightening torque is applied, a higher and even preload force is therefore achieved. This also leads to an improved utilisation of the yield point of high-strength screws. Torsion stress is considerably reduced.



The improved distribution of the preload force increases the fatigue strength of dynamically loaded screws. That is why HELICOIL® is also suitable for high-strength holding thread materials, e.g. steel or cast iron alloys.

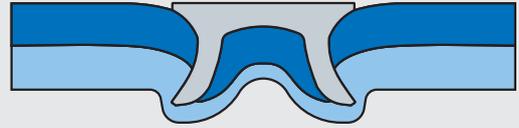


Body construction joints on the rear end with **RIVSET®**



Your advantages – an overview:

- High-strength joint even under dynamic load
- No pre-punching
- Reliable and reproducible



Weight reduction played an important role in the development of the Porsche Panamera body. The body-in-white is a hybrid design with different steel and aluminium materials as well as plastics.

Innovative lightweight construction in automotive engineering requires accordingly innovative fastening technologies. The use of up-to-date material and composite designs has given new impulse to the self-pierce riveting technology. With this innovative method, different materials can be joined in a single production step without pre-punching. The result is a high-strength as well as gas- and liquid-tight joint on the side of the die.

The customer-specific RIVSET® self-pierce riveting systems developed for Porsche offer high flexibility. Due to that, different assembly tools can be operated with compact supply units and different types of rivets can be processed.

RIVSET® setting tools are used as stationary units as well as with robots. Process data of several rivet setting tools are displayed, evaluated and correspondingly archived at one central visualisation control station. This is how process data for the entire production period are documented for the customer. The process monitoring interfaces of the systems have been adapted to the particular customer requirements.



- 2% Magnesium
- 22% Aluminium
- 1% Plastics
- 20% Readily formable deep-drawing steels
- 25% Higher-strength steels
- 11% Multiphase steels
- 16% Super high-strength boron-alloyed steels
- 3% Stainless steels



Fastening of the rear light with **SNAPLOC®** and **TEPRO®**

Your advantages – an overview:

- Adapted to angle of body-in-white
- Splashproof joint
- Previously used assembly tool (socket A/F 17 mm) is suitable as well as is the vehicle tool (screwdriver) for service use



As a partner in the development process, we closely cooperate with our customers and together develop the corresponding joint solutions.

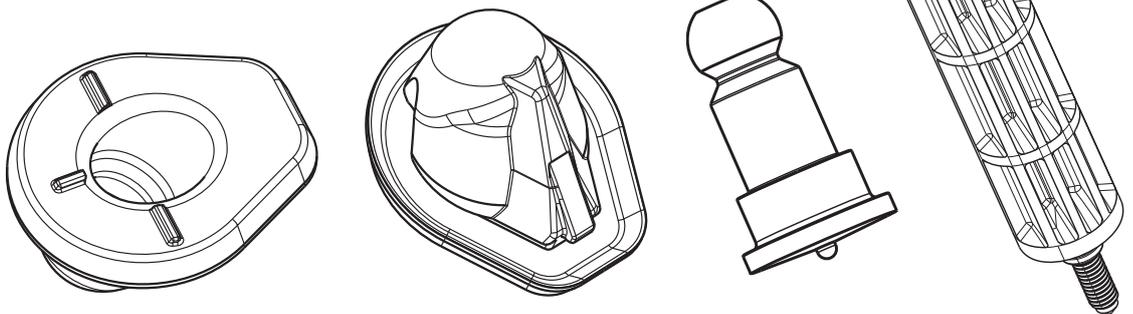
For the rear light fastening on the Audi A4 Avant, the result is a SNAPLOC® angled coupling, a moulded-in SNAPLOC® ball stud and a screw joint.

As it is well known, the SNAPLOC® is based on the simple principle of a snap connection. Inside the coupling is a ball socket which the ball stud as the counterpart can snap into. For this application, two ball studs are moulded in in the rear light housing.

The SNAPLOC® couplings have been adapted to the installation space the body provides (angle) and can be fastened by simply pushing them into corresponding openings in the body. Rear light and body are joined by simply inserting and loosened by pulling.

The third fastening point is a screw joint. The TEPRO® fastening element has a circumferential surface. For assembly, the fastening element is inserted through a bore hole in the body until the surface holds the element. In addition, the thread blank has a coned dog point to allow easier positioning. Then the rear light is screw fastened from the boot so that it is attached to the body-in-white.

The joint is then sealed with a sponge rubber seal from the rear light side.



Fastening of the rear light with **SNAPLOC®** and **FLEXITOL®**

Your advantages – an overview:

- Decoupling
- Advantages for service
- Replacement of screw joints
- Manual tolerance compensation
- Quick installation
- Manual trigger for loosening and fastening
- Self-forming
- No corrosion
- Screw joint with very good reverse locking performance



On the new Ford B-Max, the rear light is fastened with SNAPLOC® and FLEXITOL® fasteners from Böllhoff.

SNAPLOC® is based on the simple principle of a snap connection. Inside the coupling there is a ball socket which the ball stud as the counterpart can snap into.

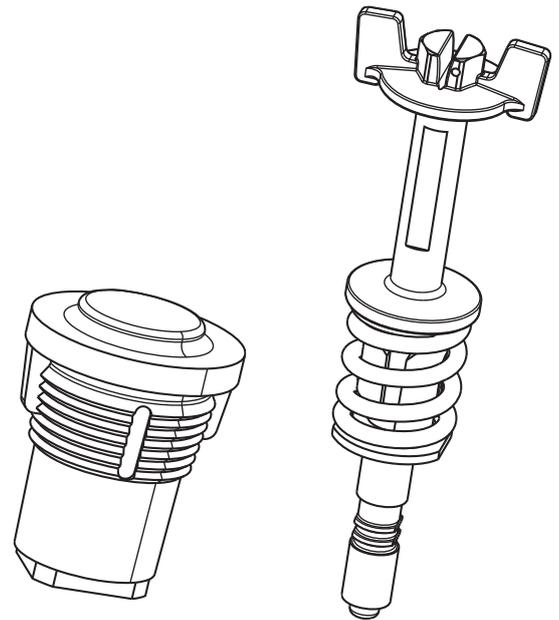
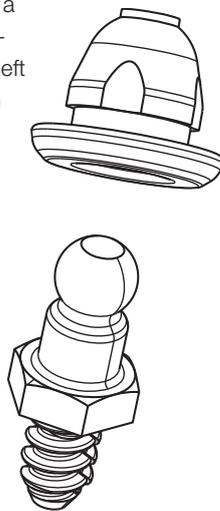
In the first step, three SNAPLOC® ball studs with a ball diameter of 7 and a length of 10 mm are screwed into the rear panel of the rear light. The corresponding SNAPLOC® couplings are located – after having been installed by simply pushing them in – in the “fake panel” of the body.

The rear light is joined by simply snapping it on and removed by pulling it off.

The third fastening point is a screw joint serving as tolerance compensation and theft protection. A high-strength

plastic thread insert is inserted into the plastic housing of the rear light by spin welding or ultrasonic welding. A centre screw with integrated spring is used for the screw joint of body and rear light.

The spring action allows a body-in-white tolerance compensation of +/- 2 mm. The wings permit manual loosening and tightening, while the integrated thread lock is another plus.



Fastening of the rear light with **TEPRO®** and **FLEXITOL®**

Your advantages – an overview:

- Easy installation
- Reduced production time due to just one screw point
- No corrosion due to full-plastic solution
- Adjustment of clearance after installation



In this section, we would like to introduce another interesting solution to fasten rear lights. On the VW Golf, there are four Böllhoff joint solutions all used to fasten the rear light.

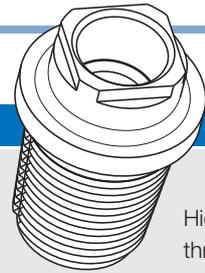
In the first step, two self-tapping adjustment elements, which are supplied as a pre-assembled unit, are screwed through the 'K' in 'K' thread into the domes of the grey area cover of the rear light housing.

The screw of the adjustment element serves to compensate possible tolerances between rear light and bonnet. Adjustment is limited to ± 2 mm.

To avoid that the rear light protrudes on the side of the body, a clip is used as a limitation on the outside of the rear light housing. A swelling gasket serves as a splash guard. The square shape avoids twisting.

Z-tolerances of the rear light can be compensated by means of the sliding support.

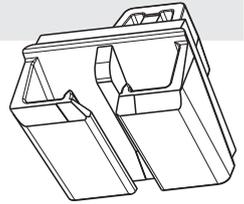
A high-strength plastic thread insert is inserted into the plastic rear light housing through ultrasonic welding to fasten the rear light in the final position. A spring unit with integrated pressure spring is used to screw fasten body and rear light from the boot side.



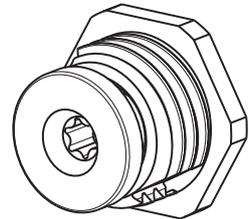
High-strength thread insert



Spring unit with pressure spring



Clip



Adjustment element with 'K' in 'K' thread screw

It allows tightening the rear light to the body-in-white under application of a defined force by using the adjustment elements.

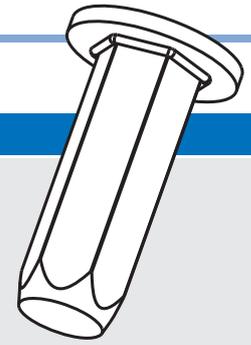


Fastening the gas spring to the bonnet with **RIVKLE® HRT**



Your advantages – an overview:

- Increased preload forces due to increased torques in the joint
- Reduced weight
- Corrosion resistance



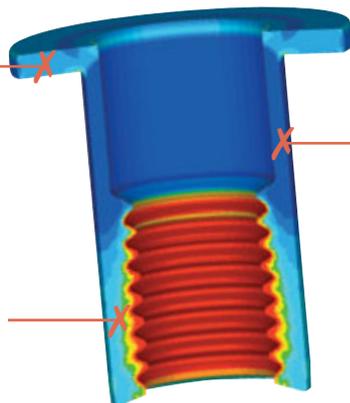
The HRT process (High-Resistance Thread) resulted from the further development of the RIVKLE® technology. Progressive materials and processes allow a reinforced, higher-strength thread which considerably improves the mechanical properties of the RIVKLE® blind rivet nut.

The nuts are set into the magnesium bonnet. Then a steel ball stud into which a gas spring is inserted is screw fastened. What is so special about RIVKLE® HRT blind rivet nuts is that they have a cathodic dip coating to protect the magnesium in the wet area against contact corrosion and that they are 100 % waterproof.

Weight reduction plays an important role for the Mercedes E-Class. That is why the rear door, for example, is made of magnesium. Böllhoff RIVKLE® HRT aluminium blind rivet nuts are used to achieve the high required screw forces.

In addition, the hexagon design provides for very good process reliable screw locking performance.

Cold-worked head for maximum stiffness under load



Ductile area for setting with RIVKLE® setting tools

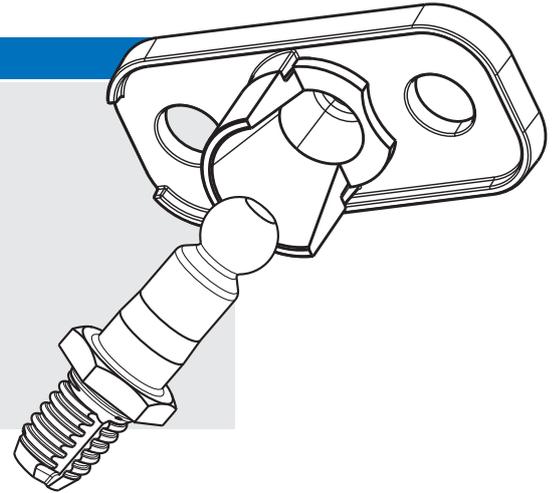
Higher-strength area for maximum thread resistance





Your advantages – an overview:

- Reduced assembly time due to easy handling
- Tolerance compensation
- Lightweight due to plastic solutions
- Screw joint with very good reverse locking performance
- Self-forming
- No corrosion
- Reduced weight due to full-plastic solution



Headlights and rear lights have a significant influence on the appearance of a vehicle. Therefore, it is not surprising that rear lights as well as headlights are ever more becoming design elements. New, sophisticated fastening solutions are the result.

That is why an innovative joint solution is also used on the rear lights of this vehicle. In the first step, a SNAPLOC® K' in K' ball stud is screwed into the housing dome of the rear light. Thanks to its special geometry (K' in K' thread), the ball stud forms the holding thread. The head is spherical.

The fixture with coupling is simultaneously fastened to the body with two screws. The bore hole diameters of 10 mm each allow to compensate production and assembly tolerances in y- and z-direction. Inside the coupling is a ball socket which the ball stud as the counterpart can snap into.

The rear light with pre-assembled ball stud is thus simply snapped on to the body. It can be removed by simply pulling.



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IMTEC® Moulded inserts



The continuous further development in the field of technology has led to constantly increasing requirements for components and respective applications. In many cases, those requirements are so high, that they cannot be fulfilled with one material. Therefore, combining specific advantages of different materials is of particular interest.

If used appropriately, combinations of metal and plastics provide for advantages such as reduced weight, improved corrosion resistance and component cleanliness. Hence, in many fields of application, in-moulding of metal fasteners with plastics is the solution.

As an expert in the field of joining technology, Böllhoff has detected the advantageous synergy effect of high-strength metals in combination with plastics and has included thread inserts for in-moulding in its product portfolio.

These innovative IMTEC® moulded inserts are particularly suitable for thermoset and thermoplastic materials.

IMTEC® CO



Your advantages – an overview:

- Maximum usable thread length
- Corrosion and acid resistance
- Increased technical cleanliness (residual dirt minimisation)
- High extraction force due to an optimisation of flank covering in plastics
- Weight reduction of the component

The IMTEC® CO thread insert for in-moulding is an asymmetric rolled stainless steel A2 (option A4) wire which is mainly used for customer components with blind hole threads. That wire is coiled to form a fixed bushing with at least one flange-type extension.

In the forming process, the fasteners are also sufficiently magnetised and can be placed on magnetic core pins manually or by means of handling systems.

IMTEC® CF



Your advantages – an overview:

- Very large flange diameters possible
- Deformation area for length adjustment of the insert; close length tolerances $< L \pm 0.05 \text{ mm}$
- Torque resistance by hexagonal design or knurls
- Pull out resistance by providing significant under cuts
- No metal-cutting operation
- Also feasible as compression limiter



The IMTEC® CF thread inserts with “double flange” are produced from steel by cold forming. The in-moulding technology requires particularly accurate thread inserts.

the length of the component ($L \pm 0.05 \text{ mm}$). IMTEC® CF is primarily intended for components with through hole threads.

The deformation area on the IMTEC® CF allows precisely adjusting the length of the thread insert according to the mould dimension. Upon closing, the parts of the mould compress the IMTEC® CF and precisely adjust

From A to Z...

Sales

Innovative ability and technical potential are becoming increasingly important to decide over a company's success.

Our expertise and experience is reflected by a comprehensive distribution network.

Every customer has a personal contact person who will be glad to discuss all wishes and requirements. So you save precious time.

Our dialogue with you is the thread of our working process.

Thanks to smart innovation management and intensively taking your wishes into account we develop tailor-made joint solutions along your supply chain – module after module.

Get to know us in person!



Project management

We are satisfied whenever we can exceed your expectations.

The foundation of our competence is an efficient concept of counselling, development and support. The joint aim is to realise the technically optimal and economically most attractive solution. That is also the standard of our project management. Our project management supports you with management- and product-specific expertise.

Our personnel can look back on many years of experience in planning automation solutions for assembly systems and realise tailor-made solutions according to your requirements. We think in systems: process optimisation, cost reduction, strengthening of market positions.

Our project management stands for interdisciplinary coordination of complex activities. That means planning, controlling and monitoring in all project phases.



Design and development

To recognise future trends and manage innovations is part of automotive-suitable engineering, as are our own prototype construction and test fields. This way, products can already be optimised in the development phase.

We focus on the design and application of production systems to process Böllhoff fasteners. We consider the process device as well as the feed technology for fasteners our core competence.

The main requirements for such systems are reproducible processes, industrial quality availability and short process times.

To make ideas reality, we employ modern CAD systems complying with today's requirements in the automotive sector. Data transfer is agreed individually with each customer.



Passion for

Production

Production with up-to-date technical equipment comprises heterogeneous fields – two of which are plastics engineering and metal working.

Our fasteners are exclusively manufactured at Böllhoff production facilities. They are subject to most stringent quality checks in every single production step.

The manufacture of important mechanical components (know-how parts) is a main part of our manufacturing expertise.

Our potential in assembly technology starts with the installation of individual parts to a final product culminating to subassemblies.

All final assemblies and commissioning activities of the assembly machines are in-house operations that are not subcontracted.



Quality

Our focus is always on sophisticated production processes and modern measurement and monitoring technology. Good quality is no coincidence, but the result of systematic planning and implementation.

In our own certified laboratory, which fulfils the requirements of DIN EN ISO 17025, we carry out mechanical and physical tests as well as material analysis.

To us – continuous improvement is a constant process.

So we regularly take part in audits by our customers as well as accredited certifiers to ensure the highest quality.



Service

We are there when you need us.

Also in regard to customer-specific procurement and supply systems to optimise purchase and logistics.

To help you protect the value of your investment and ensure the economic efficiency of your production is what the Böllhoff Service Team specialises in.

That is why we can offer you service agreements to even extend the long life of our technically advanced machines.



successful joining.

Böllhoff International with companies in:

Argentina
Austria
Brazil
Canada
China
Czechia
France
Germany
Hungary
India
Italy
Japan
Mexico
Poland
Romania
Russia
Slovakia
South Korea
Spain
Switzerland
Thailand
Turkey
United Kingdom
USA

Apart from these 24 countries, Böllhoff supports its international customers in other important industrial markets in close partnership with agents and dealers.

Böllhoff Group
Please find your local contact on www.boellhoff.com
or contact us under fasteningtechnology@boellhoff.com

