Blind rivet technology

General information

Blind rivet technology is an easy-to-use and cost-effective technique originally developed for metal construction but also suitable for the wood-based panel sector.
Blind rivet nuts have been successfully used in lisocore®'s lightweight construction material.

For example, a blind rivet nut (M8) in lisocore® achieves twice as high pull-out forces as a threaded screw-in socket (M8) in standard chipboard (P2)[1].

Structure

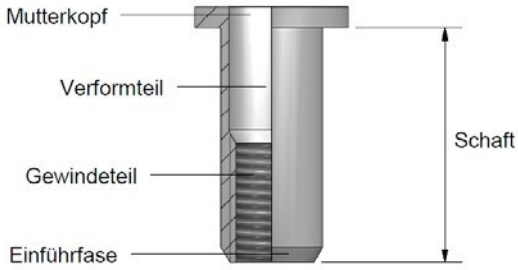

Fig.: Functional areas of a blind rivet nut

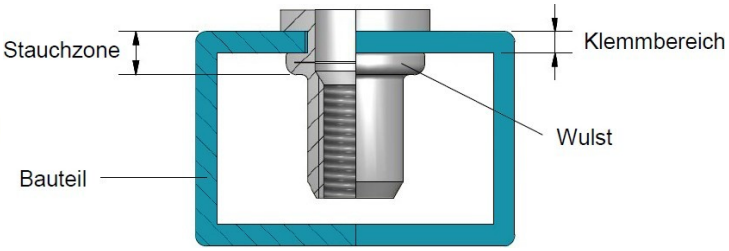

Fig.: Cross-section of a set blind rivet nut

Benefits

- The blind rivet nut can be set from one side (“blind application”)
- High pull-out strength thanks to rivet bead or tabs that form on the underside of the top layer during the setting process
- Creates a form-fit connection due to the plastic deforming
- Can be used on parts that have already been surface-treated
- Efficient processing using manual or hydraulic pneumatic setting tools

Blind rivet nut variations

Blind rivet nuts can differ in the shape of their head, bead and shaft and the material from which they are made, as well as on the area of application, load and field of application. Rivet variations are available in thread sizes from M3 to M16. They are usually made of materials such as steel, aluminium alloys, brass or stainless steel.

The following two types of rivet are suitable for use in lisocore® (see overview Appendix 1):

- Blind rivet nut with slotted shaft:
  e.g. Go-Split with flat head and slotted round shaft, manufactured by GOEBEL[2]
- Blind rivet nut with controlled deformation range:
  e.g. FILKO with flat head and knurled shaft, manufactured by KVT[3]

[1] The tests were carried out in our own testing laboratory.
[2] Goebel GmbH: www.goebel-group.com (GOEBEL)
[3] KVT-Fastening GmbH: www.kvt-fastening.de (KVT)

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Assembly instructions

Blind rivet technology enables a rational working method. However, the following instructions need to be followed to ensure a perfect screw connection in lisocore®.

Determining the clamping range thickness

Depending on the clamping strength, the clamping range of the blind rivet nut as well as the thread size and material of the blind rivet nut both need to be selected correctly.

Preliminary tests should be carried out if the clamping strength is at the limit of the clamping range.
For example, different plate thicknesses or drilled hole tolerances may need a blind rivet nut with a larger or smaller clamping range.

Nut head

If the blind rivet nut is to sit flush in the component when set, a corresponding countersink is required (see Appendix 2, Fig. 1). If properly countersunk, panel materials can be stacked without damaging the surface.[4]

Hole size

The hole size should normally be only slightly larger than the shaft diameter of the blind rivet nut to be used. If a corresponding hole tolerance is maintained, the shaft expansion that occurs during the setting process gives the nut a high degree of resistance to torsion.

Shaft shapes

Blind rivet nuts with slotted shaft (see Appendix 2, Fig. 3) or knurled shaft (see Appendix 2, Fig. 4) are recommended for the use of blind rivet technology with wood-based materials.

The slots in the shaft weaken the cross-section in the formed part in a targeted way. Lugs are created when the rivet is compressed, which offer a larger contact surface. This allows higher pull-out forces to be achieved than with standard blind rivet nuts.

In blind rivet nuts with a controlled deformation range, the holes in the shaft also ensure that the formed part is weakened in a targeted way in order to form an even and defined bead, even without support on the component. The knurled shaft is particularly suitable for special torsional strength requirements and should be used in particular for very soft cover layers.

[4] Machining instructions for the blind hole of the respective thread size can be provided on request.

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Setting devices / setting tools

Special setting tools are required to process blind rivet nuts. A distinction is made between manual and automatic setting systems depending on the area of application and production quantity. The machine setting systems are divided into semi- and fully automatic systems.

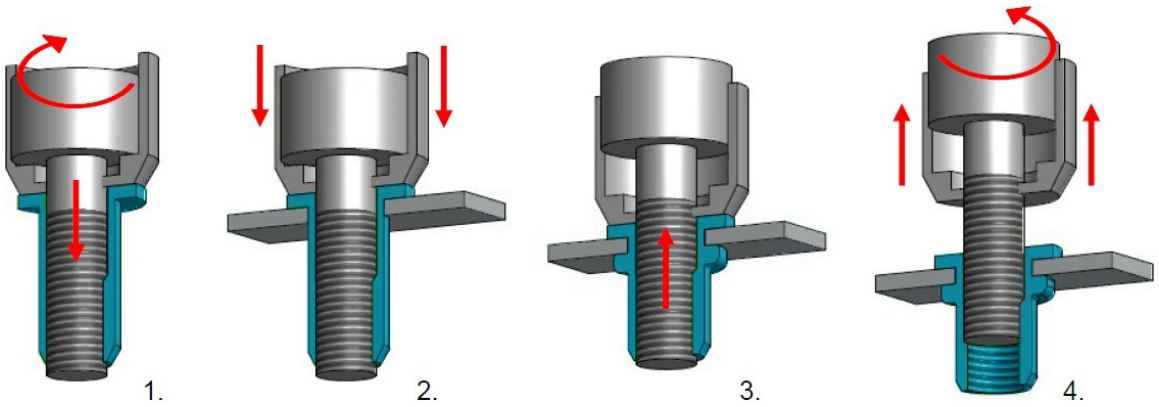
Semi-automatic setting tools are recommended for medium to large series, which can be operated via a hydraulic pneumatic drive or with an accumulator. Hydraulic pneumatic setting tools are able to process blind rivet nuts with threads ranging from M3 to M16.

A fully automatic setting tool is recommended if large series are to be produced cost-effectively or a high level of reproducibility is required.

Setting process

Setting systems can be force-controlled or displacement-controlled. For force-controlled setting tools with hydraulic pneumatic drive, a pressure reducer is used to pre-set the pressure and thus the maximum tensile force of the setting tool. When the set pressure is reached, the tool switches off automatically.

The stroke of the setting tool must be set for path-controlled setting tools. After the setting process is completed, the tool automatically unscrews after reaching the set stroke. There are process combinations and setting tools with electronic support. Depending on the application, a suitable process must be selected.[5]



Stage 1
Screw blind rivet nut onto the mandrel

Stage 2
Insert the blind rivet nut into the assembly hole

Stage 3
Compressing – the nut is pulled against the mouthpiece of the setting tool

Stage 4
Remove mandrel

Fig. setting process of a blind rivet nut

[5] The technical data and corresponding pre-settings of the setting tool can be found in the manufacturer's operating instructions

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Appendix 1

Size chart – application in lisocore® [1]

Thread	Manufac-turer	Clamping area	Drill diameter[2]	Nut head diameter	Material strength of nut head	Length	Item no.	Top layer in mm				
								3.0	4.0	5.0	6.0	8.0
M5	KVT	3.0 – 7.0	8.0	11.0	1.0	19.0	M5-70 RBM FK ST 300162794	•	•	•	•	
	GOEBEL	-										
M6	KVT	0.5 – 6.0	9.0	13.0	1.5	19.0	M6-60 RBM FK ST 300160674	•	(•)	(•)	(•)	
		4.0 – 9.0				22.5	M6-90 RBM FK ST 300160673		•	•	•	•
	GOEBEL	0.5 – 7.1	9.8	16.4	1.6	25.8	GO-Split 7540600300		•	•		
		7.1 – 12.7				31.7	GO-Split 7540600301					•
M8	KVT	0.5 – 0.8	11.0	16.0	1.5	23.0	M8-80 RBM FK ST 300160671		•	(•)	(•)	
		4.5 – 11.0				26.0	M8-110 RBM FK ST 300160671			•	•	•
		6.5 – 13.00				28.0	M8-130 RBM FK ST 300205578					•
	GOEBEL	0.5 – 7.1	13.0	19.5	1.6	29.6	GO-Split 7540800300			•	•	
		7.1 – 12.7				35.3	GO-Split 7540800301					•

(• recommended by manufacturer due to larger bead formation / • blind rivet nut with smaller bead)

[1] These instructions are the manufacturer's recommendations and serve as general information. Depending on the intended use, we generally recommended you carry out your own processing tests. We recommend you consult with our application technology department and the blind rivet nut manufacturer if you have any further questions.
[2] Tolerance of the drilling diameter must be in the positive range (-0 / +2 mm)

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Appendix 2

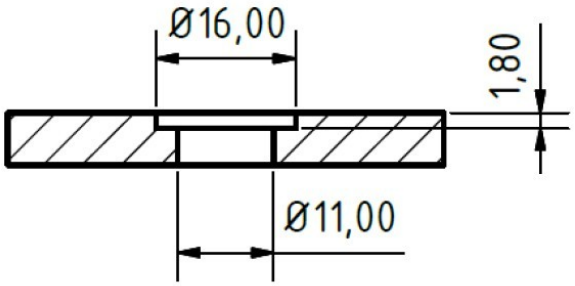

Fig. 1: Cross-section of a hole for a FILKO blind rivet nut with controlled deformation range (M8)

Fig. 2: Drill hole with countersink for the flat head of the blind rivet nut

Fig. 3: Go-Split blind rivet nut (M8) with slotted shaft

Fig. 4: FILKO blind rivet nut (M8) with controlled deformation range

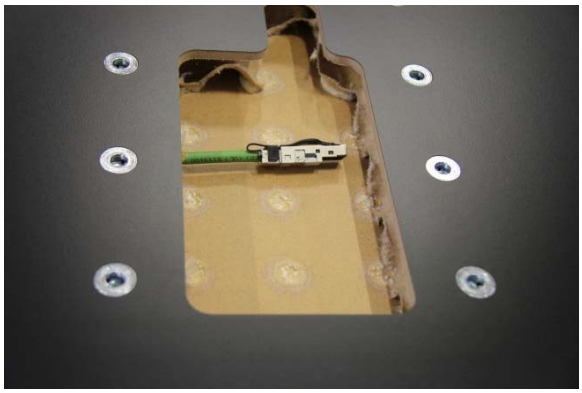

Fig. 5: Blind rivet nuts in lisocore® as fixing points for table legs

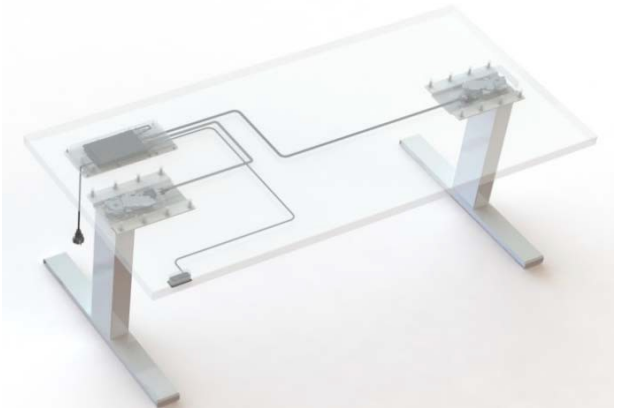

Fig. 6: Application example: mounting of telescopic legs for a stand-up table system

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Appendix 3

Battery-powered blind rivet nut and blind rivet stud setting tool – NutBee®

The NutBee® setting tool from KVT – Fastening GmbH[1], for example, can be used to set blind rivet nuts in lisocore®. This setting tool is a tool which is operated by an accumulator. The NutBee® setting tool is able to process expanding blind rivet nuts as well as compression blind rivet nuts. There are two different models:

NutBee® HST-NR

Features

- Force-controlled setting
- Maximum force 25,000 N
- Quick change mouthpiece M3 – M10
- Setting speed control based on force value
- Setting the setting force by confirming the buttons on the display (more than 90 stages)
- Brushless high-performance motor
- OLED display with symbol and plain text displays
- 18 V premium Li-Ion battery

NutBee® Pro-M

Features

- Force-controlled setting
- Maximum force 25,000 N
- Quick change mouthpiece M3-M10
- High-speed setting process possible
- Brushless high-performance motor
- 18 V premium Li-Ion battery

and

- Integrated rivet counter
- Memory for 150,000 setting curves
- Multi-stage programming via USB interface
- IO/NIO evaluation with display of measured values in OLED display

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[1] Detailed operating instructions are provided by the setting tool manufacturer.