

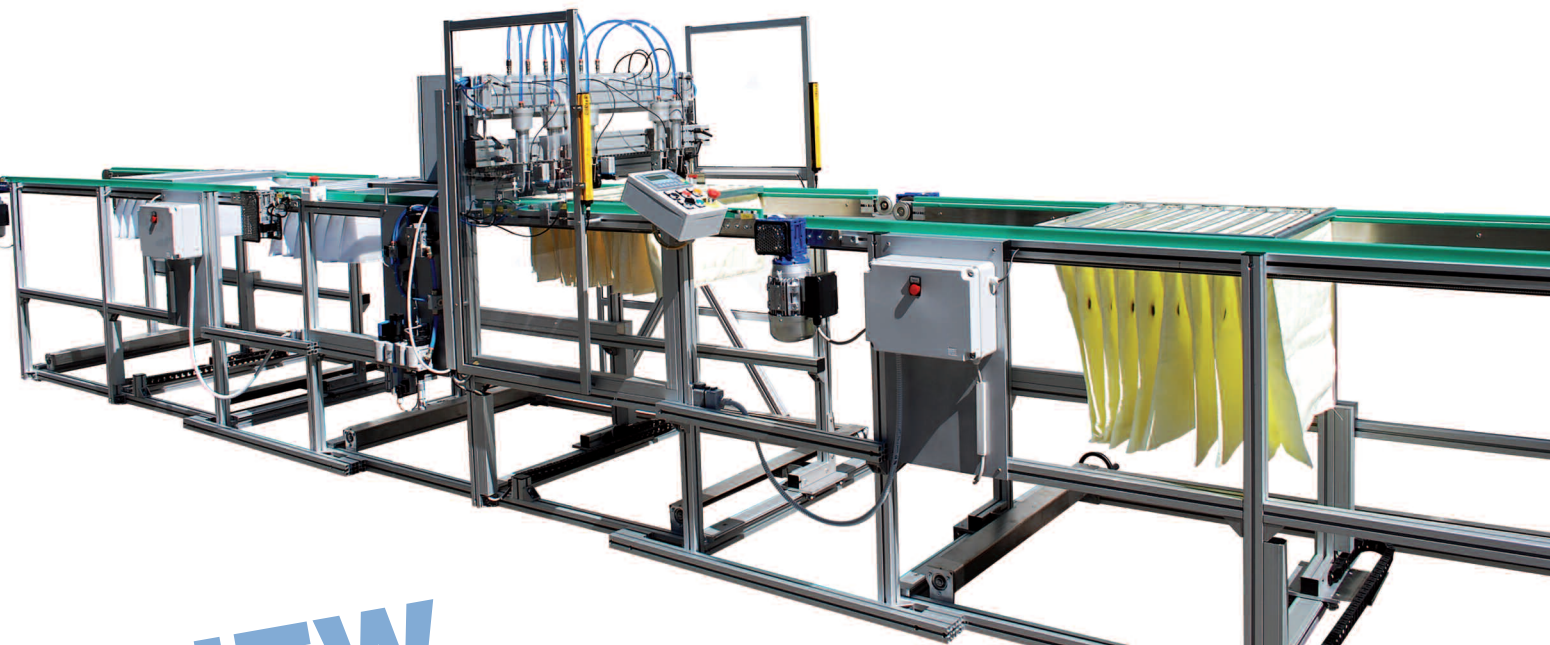
## RIVCLINCH® APF Solution

### Automatic Pocket Filters Solution

#### On time delivery - Reduced lead time - Quality control

The complete Automatic Pocket Filters Solution has been developed for bag filters manufacturers to:

- **Increase productivity:** up to 500 000 pocket filters a year (3 shifts depending on filters size)
- **Stabilize the final product with increased and controlled quality:** every 5 seconds the same clinching sequence guarantees the perfect clinching joint
- **Modular:** can be used manually or automatically for existing or new lines



**NEW**



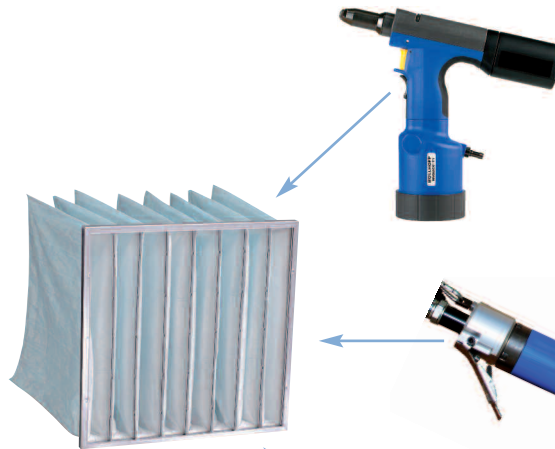
**BÖLLHOFF**  
**attexor**



# The complete solution to assemble pocket filters with metal frames

## To assemble the metal frames: assembly table for riveting and stitching

Specific assembly table designed to prepare filters frames for the automatic line or for complete assembly with optional clinching machine.



**Riveting with the RIVQUICK® P1000 or RIVQUICK® T1**

**Stitching with the RIVSTITCH® 0101**

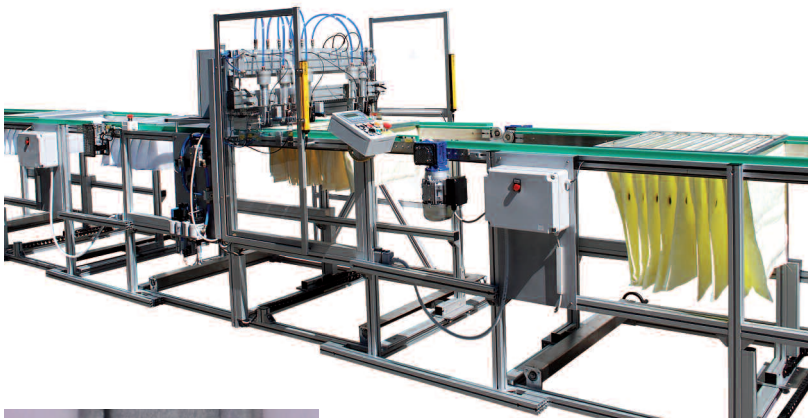


**Clinching manually with the RIVCLINCH® 0201 IP**  
Optional machine allowing to assemble the strips in the middle of the frame.  
Light and fast (<1sec to clinch)  
6 bar air pressure

### Assembly table:

- Adjustable table for different filters frame sizes from 270 x 270 mm up to 915 x 915 mm
- Equipped with air preparation unit and up to 3 connectors
- Quick locking system for better handling
- Adjustable height for the operator

## To assemble the bag filters: clinching manually or automatically



In order to boost your production, we have developed the RIVCLINCH® Automatic Clinching Station with motorized conveyors for up to 9 specific RIVCLINCH® 0202 IP.

### Loading and unloading conveyors (motorized)

- Length 3 m, overall width 1.6 m
- Adjustable for filters frames from 270 x 270 mm up to 915 x 915 mm

### RIVCLINCH® Automatic Clinching Station

- Standard configuration 6 x RIVCLINCH® 0202 IP tool equipped with tooling for filter
- Adjustable for filter frames from 270 x 270 mm to 915 x 915 mm
- Up to 9 x RIVCLINCH® 0202 IP possible (option)
- Mechanical strippers (option)
- Die cleaning (option)



**Assembled pocket filters clinching point**





## **AUTOMATIC CLINCHING ASSEMBLY**

OF VENTILATION POCKET FILTERS (HVAC)

**BÖLLHOFF**  
**attexor** 

## Filter clinching assembly automatic station

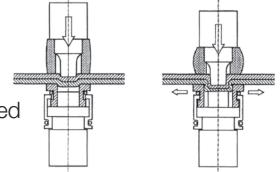
The automatic station is delivered complete ready operate, once connected to a 6 bar air and 220V supplies. Up to 9 clinch heads can be installed (6 by standard), the distance between them can be manually adjusted. The station can accommodate filter frames from 270 x 270 mm up to 915 x 915 mm.

The number of work heads can be changed by means of quick locking individual supports

### Sheet metal joining without fasteners

When clinching two or more layers of sheet metal, the material is plastically deformed inside a die through a squeezing process between the punch and the anvil. The joint is created as the material flows sideways pushing out the die walls.

Clinching is well suited for joining pocket filters, with the filter material in sandwich between two layers of thin galvanized sheets metal. Without fastener, without adding any alien material, it dramatically cut down the production costs and facilitates the elimination of worn out filters.

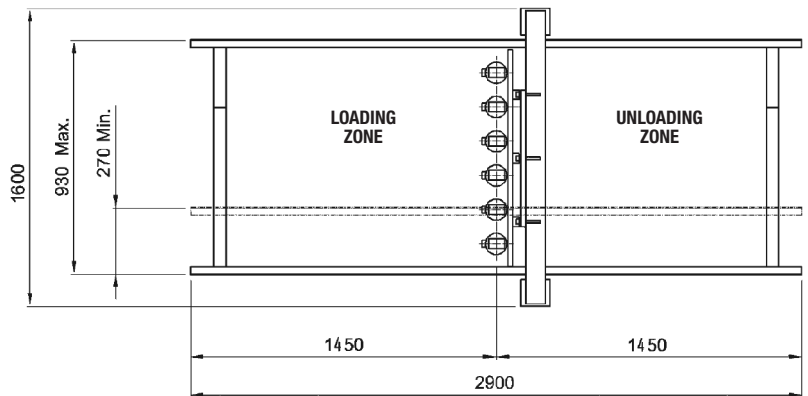
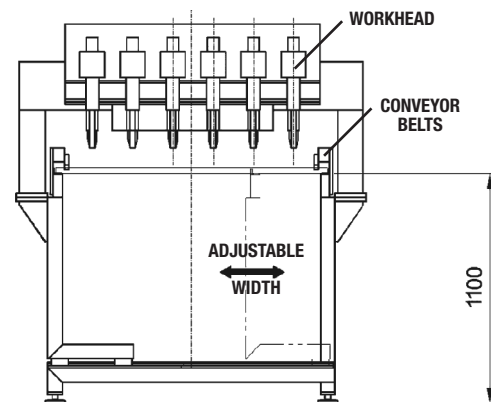


### Automatic operation

The operator places the filter frame with the pockets on the loading zone and activates the cycle. The filter frame is moved automatically under the work heads. Once the filter strip is in position (controlled by detectors), the PLC (Programmable Logic Controller) activates the downward motion of the work heads and activates the clinching cycle. Once the clinching process is fulfilled and automatically checked, the crossbeam is move upward for allowing the next row of filter strips to take place and so on. Once all filter strips are clinched, the assembled frame can be unloaded to the rear side.



## Technical specifications



Clinched joints

### Accessories

- Mechanical strippers (instead of polymer) in case of joining metal strips with sharp edges (in option)
- Automatic die cleaning (air blow) (in option)
- Loading or/and unloading conveyors, with automatic transfer to clinching station
- Additional workheads (in option)
- Up to 3 additional work heads can be added total of 9 instead of 6

Approx. Weight	250 kg
Working air pressure	6 bar
Electrical supply	220V
Average cycle time per pocket strip, including motion for re-placement	3s
Dimension of filter frame (mm)	270 x 270 up to 915 x 915
Filter media pocket depth (mm)	up to 915
Maximum clinching force (per workhead)	25 kN
Jaw opening (work stroke)	12 mm
Max. total sheet thickness, mild steel	2.5 mm
Max. total thickness, with filter fabric in sandwich	3.0 mm

### Tool kits

Standard tool kits specifically designed for filters are mounted on the workhead ST402 (rectangular joint). Other dimensions of tool kits are also available.

### Products numbers

Designation	Part No
RIVCLINCH® (SPOT CLINCH®) Filter clinching assembly automatic station (6 x SC 0201 IP)	<b>3 842 2112 576</b>
Punch ST402 for filters (included)	<b>3 924 2748 155</b>
Die ST402 for filters (included)	<b>3 924 2718 229</b>
Elastomer stripper ST (included)	<b>3 924 9831 711</b>





## **RIVCLINCH®**

Devices and systems for joining  
sheets and profiles without fasteners

# **BÖLLHOFF**

## RIVCLINCH® – *Joining without fastener!*

### *What is clinching?*

Upon clinching, double- or multi-layer joints of sheets and/or profiles are joined form-fittingly and non-positively in a push-button-like cold-forming process.

With the RIVCLINCH® joining technology, apart from steel and stainless steel materials, also aluminium and other non-ferrous materials can be joined efficiently and environment-friendly. Furthermore, coated as well as precoated sheets can be joined without any damage to the surface.

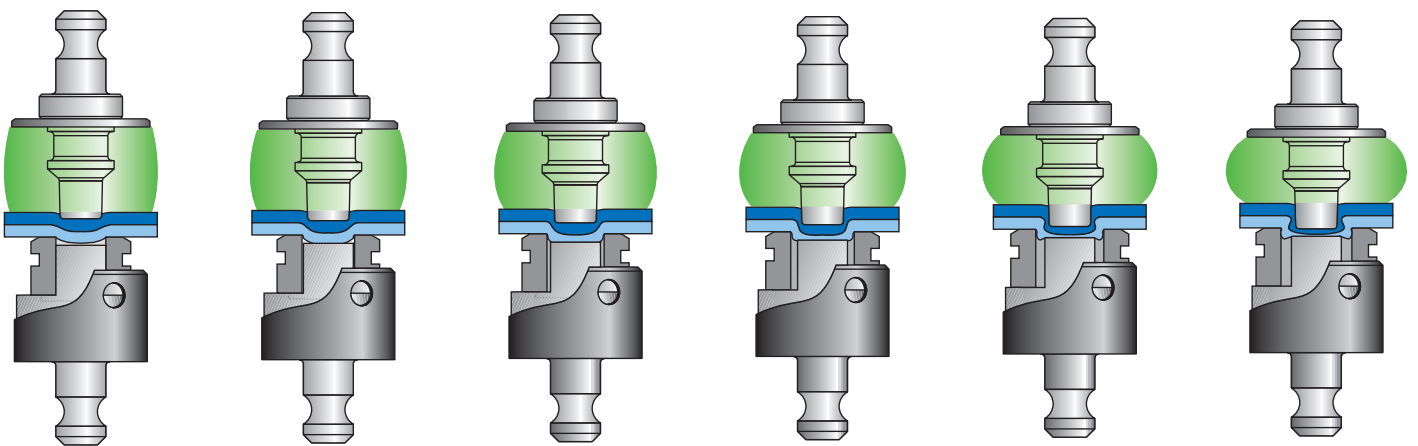
Depending on the chosen RIVCLINCH® joining tools, round or rectangular joint points result.

#### The advantages at a glance

- Form-fitting and non-positive joining of sheets and profiles in cold-forming
- No additional fasteners
- Low power consumption
- No thermal load on the joining zone
- No surface damage to coated workpieces
- Films or adhesive as intermediate layer possible in most cases
- No preworking or reworking required
- Very good reproducibility of the joint
- Environment-friendly at the workplace since there is no gas or noise emission
- Minimum maintenance costs
- Non-destructive testing of the joint possible

### *The joining technology*

The first step of RIVCLINCH® joining is to draw the materials to be joined through the punch into the die. As soon as the bottom material touches the die anvil, it starts flowing to the sides and forms a button. After that, the punch moves back into the initial position and the joined part can be removed. A form-fitting and non-positive joint results from local forming.



## Tailor-made solutions



### *The tool kits*

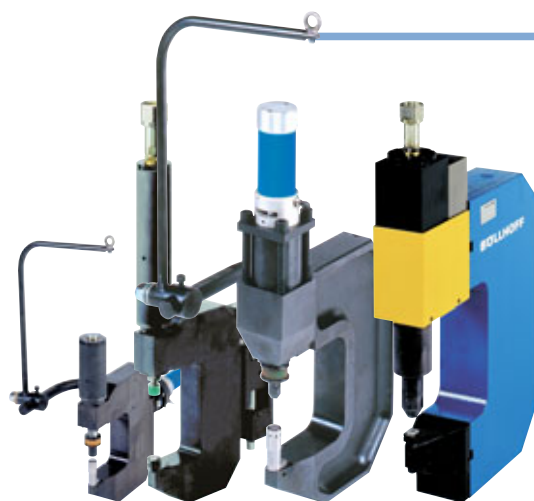
The central component of the RIVCLINCH® joining system is the tool kit. It is individually adapted to every application.

Böllhoff provides different possibilities of integration into a clinch unit, presses or multistage tools.



### *The hand tools*

Our comprehensive RIVCLINCH® hand tool program provides you as the user with the possibility to use clinching technology in your business without high investment costs. The program structure allows to find the right solution for almost every application.

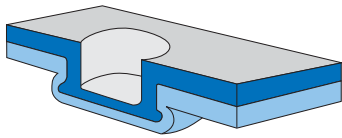


### *Modular systems*

With the “Modular systems” product series, we have set up a standard clinching program from which we can combine individual clinching tools according to your desired application from different modular systems.

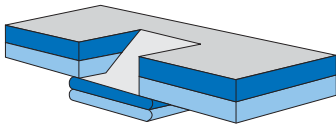
**Joining together!**

**Joint point geometry**



**Round point**

For round points, the workpieces to be joined are formed locally. A form-fitting and non-positive joint results which is also visually appealing.

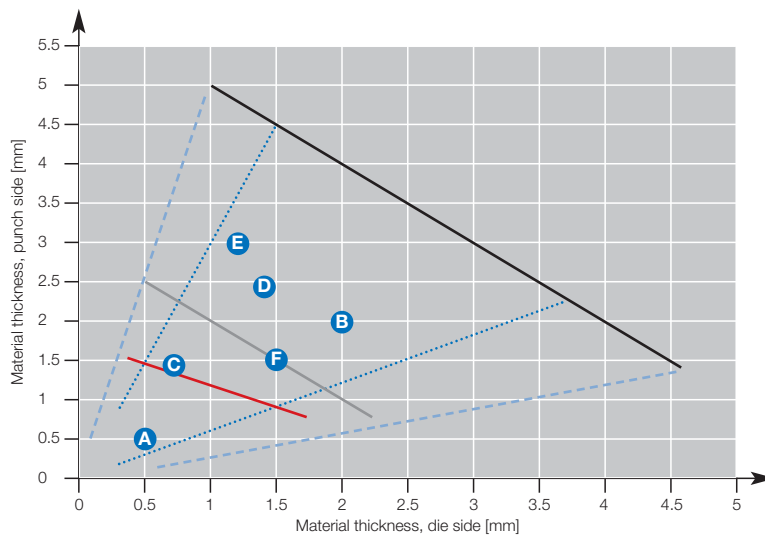


**Rectangular point**

The rectangular point results from a combined cutting and forming process. It is particularly suitable for hard materials as well as for stainless steel.

**Joinable materials**

With the RIVCLINCH® joining technology, apart from steel and stainless steel materials, also aluminium and other non-ferrous materials as well as hybrid joints with foil or adhesive intermediate layers can be joined. Furthermore, coated as well as pre-coated sheets can be joined without any damage to the surface.



Evaluation of suitability for clinching of different materials depending on the material thickness

- ..... Round point
- - - Rectangular point
- Higher-strength steel  
500 N/mm<sup>2</sup> < Rm < 700 N/mm<sup>2</sup>
- Austenitic, stainless steel
- Structural steel, aluminium

**Only rectangular point tools should be used for austenitic stainless steel.**



Steel 0.5 mm  
Steel 0.5 mm



Steel high-strength, 2.0 mm  
Steel high-strength, 2.0 mm



Steel 0.7 mm  
Adhesive  
2 x steel 0.7 mm



Aluminium 2.45 mm  
Steel 1.4 mm



Steel 3.0 mm  
Steel 1.25 mm

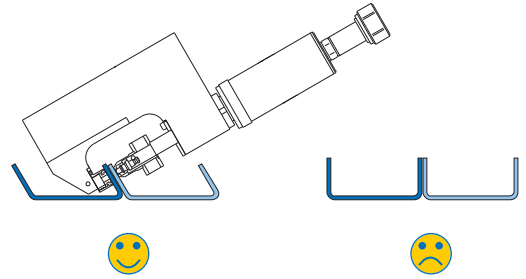


Aluminium 1.5 mm  
Aluminium 1.5 mm

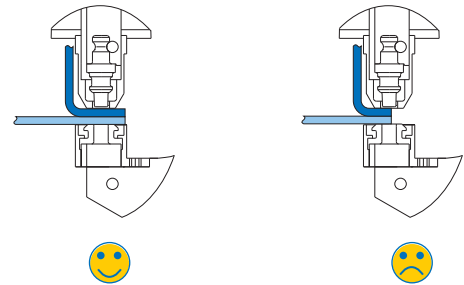


**Workpiece design**

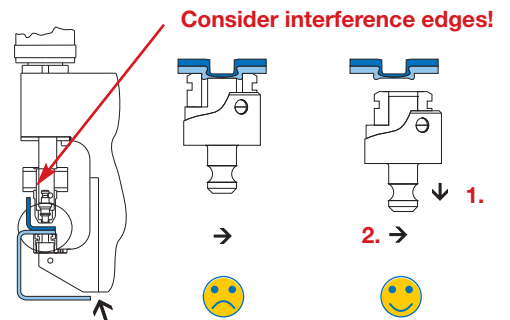
1. Consider accessibility for design!



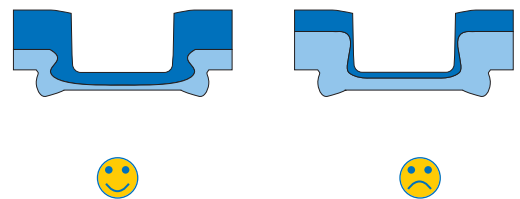
2. Provide for sufficient flange width!



3. Leave sufficient space for extension of die.  
First relieve the button from the die (1<sup>st</sup> step),  
then move the C-frame forward (2<sup>nd</sup> step)!



4. Preferable direction “thick into thin”



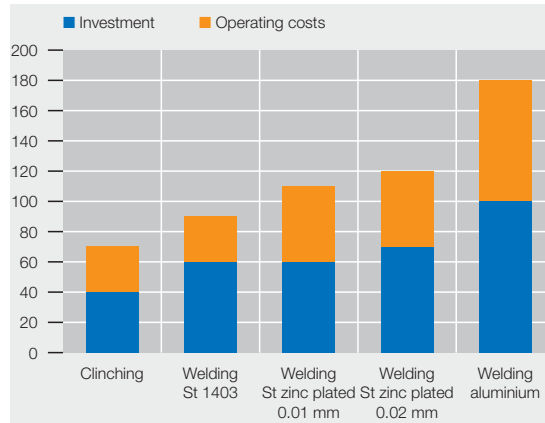
## Joining technologies – a comparison

	Clinching	Self-pierce riveting	Riveting	Screwing	Spot welding	Adhesion
Corrosion on coated material	low	low	low	low	high	none
Changes in structure and strength at the joining location	none	none	none	none	yes	none
Dynamic strength	very good	very good	suboptimal	suboptimal	suboptimal	good
Crash resistance	suboptimal	very good	suboptimal	suboptimal	suboptimal	good
Static strength: 1. Shear tension 2. Pull-out tension	good good	very good very good	very good very good	very good very good	very good very good	good good
Method in combination with adhesion	optimal	optimal	possible	possible	poor	–
Edges – burrs – chips	none	none	none	edges	none	none
Required fasteners	none	self-pierce rivet	rivet	screws nuts washers thread	none	adhesive
Additional process steps	none	feeding	feeding, caulking	feeding, screwing	coated surfaces	pressing curing
Costs per joint	very low	low	very high	very high	high	high
Energy input	low	low	high	high	very high	very high
Economic efficiency	very good	good	poor	poor	suboptimal	suboptimal
Environmental friendliness at the workplace	very good	very good	good	good	poor	very poor
Handling	very easy	easy	easy	easy	easy	complex
Reproducibility	very good	very good	good	good	satisfactory	good
Dependence of resulting joint on surface condition	low	none	none	low	high	very high
Pre-operation	none	none	drilling	drilling	washing pickling	washing pickling

**Economic efficiency of the RIVCLINCH® joining technology**

The primary aim of the clinching technology, apart from providing an up-to-date and innovative fastening technology, is to save production costs. Cost saving results from different factors:

Comparison of costs for different joining processes and materials



**Low investment costs**

- No exhausting devices required (toxic vapours of spot welding)
- No cooling water and thus no complex installation required
- No expensive electrical installations for welding transformers required
- Particularly when welding zinc plated steel sheets and aluminium, very high costs result (figure 1)

**Low operating costs**

- Low power consumption during operation of the tools
- No power consumption during idle time (operation with booster)
- Low costs for wear parts due to long life of the tool kits (figure 2)
- No additional power consumption resulting from operation of exhausting devices
- No cooling water required as medium

**No reworking costs**

- No damage to coating of, for example, zinc plated surfaces
- No “burn-off” as with spot welding and thus no resulting complex re-zinc-plating to avoid undesired corrosion (figure 3)

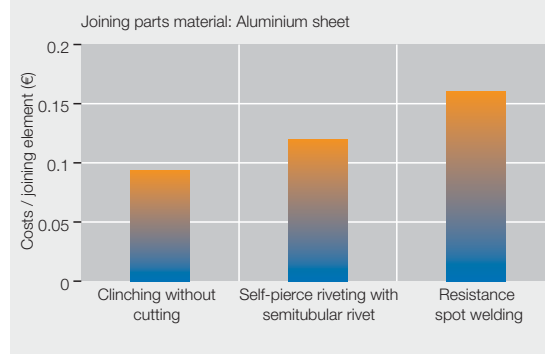
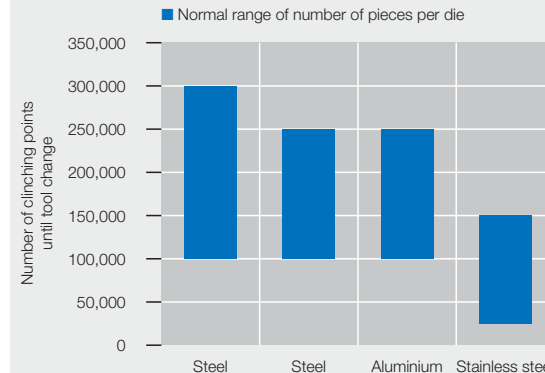
**Short cycle times**

- Short joining process (approx. 0.5 s for forming plus feed motions depending on feed stroke and design of the used system)
- High automation level – with high numbers of pieces and few personnel possible!

**Easy handling**

- No expensive highly qualified operating personnel required

Number of clinching points until tool change



**Total costs of a joint point**

The costs of a joining element result from three main factors:

- Operating costs (current, air, water, exhaustion, ...)
- Wear parts (tools, electrodes, ...)
- Costs of additional elements (self-piercing rivet)

As an example, a joint of two aluminium sheets was chosen. For other material combinations such as steel + steel, different weighting can result.

*A joint that lives up to its promise!*

**Strength parameters**

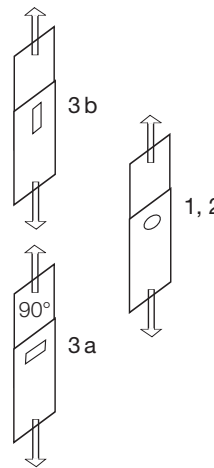
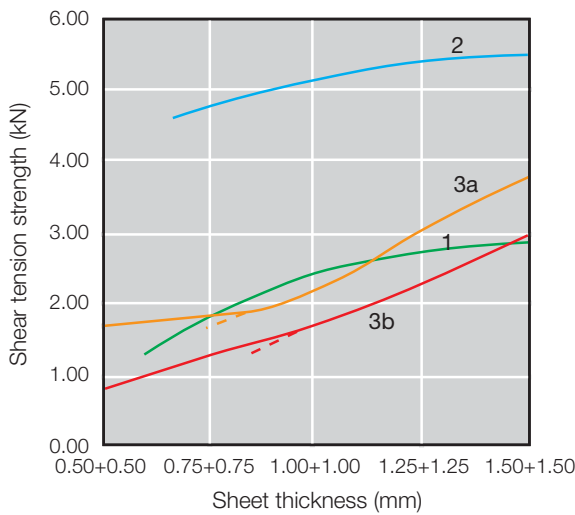
There are three areas when it comes to strength values:

1. Static strength (quasi-static shear and cross tension testing)
2. Dynamic strength (swinging load/fatigue test)
3. Crash resistance (impact load/impact test)

**Strength values of clinched joints mainly vary depending on the following factors:**

- Diameter of the clinching point
- Material type
- Material thickness
- Joining direction (“thin into thick” / “hard into soft”)
- Geometry of the clinching point

**Static shear tension strength depending on sheet thicknesses**



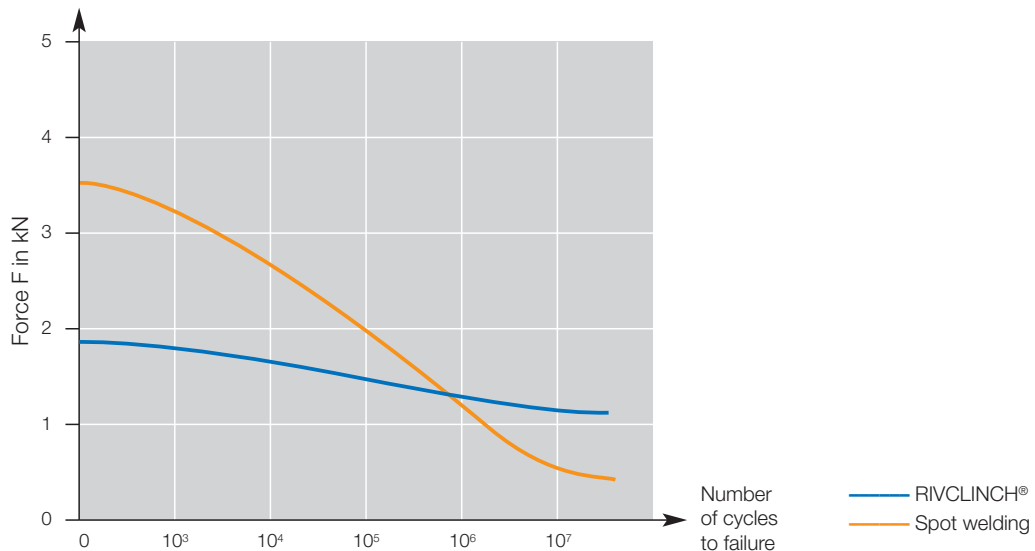
**RIVCLINCH® joining**

Static shear tension strength depending on sheet thicknesses  
 material: steel sheet,  
 tensile strength = ~ 300 N/mm<sup>2</sup>

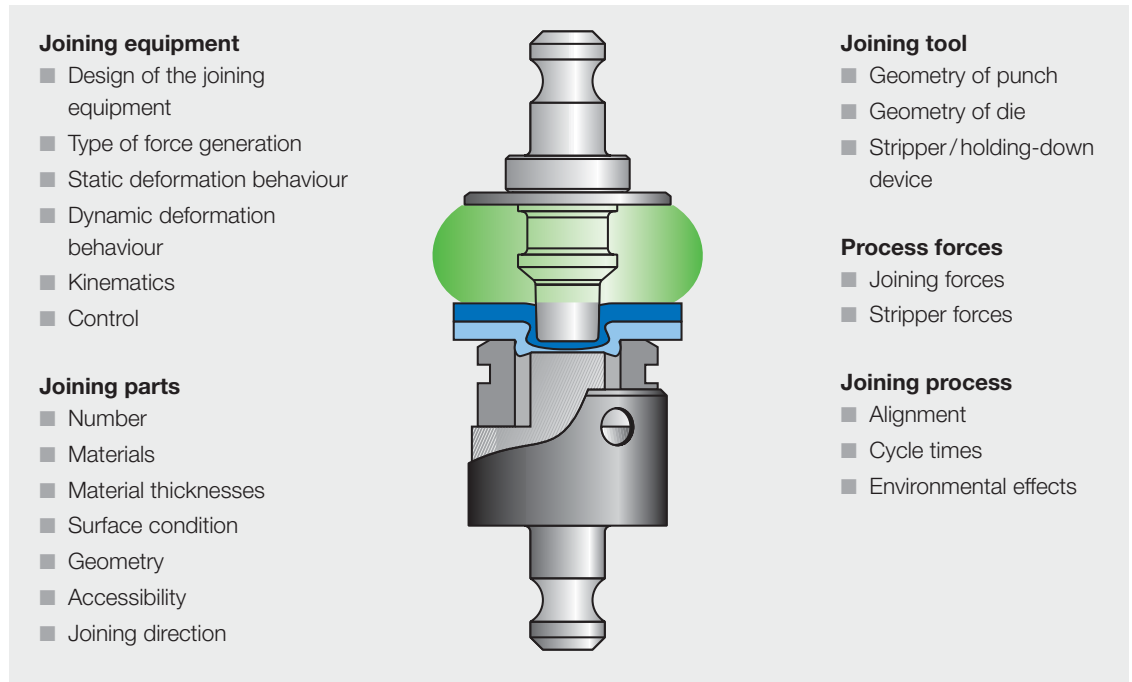
1. Round point, Ø 5 mm
2. Round point, Ø 8 mm
- 3a. Rectangular point diagonally to the direction of stress
- 3b. Rectangular point longitudinally to the direction of stress

**Dynamic strength of a RIVCLINCH® point**

Compared to spot welding, the dynamic strength of a clinching point is higher! Through mere mechanical forming without thermal load and accompanying edge zone carburisation, a permanently reliable fastener results. That means that a RIVCLINCH® joint point has a longer life than a welding spot.



**Factors determining the quality of a clinched joint**



**Quality check of the RIVCLINCH® joint**

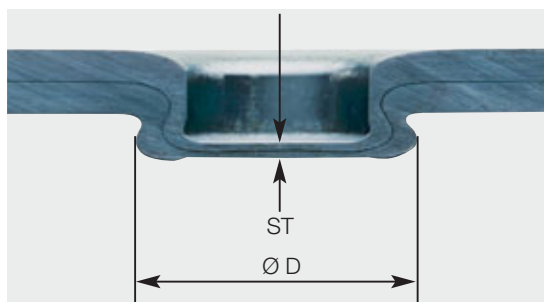
**Quality surveillance**

For clinching, there is a causal relationship between joint quality and the geometry of the joining element. It is therefore possible to estimate the quality of the joint from a visual evaluation of the joining element and by measuring geometric parameters.

**Testing the RIVCLINCH® joint**

Non-destructive testing of the RIVCLINCH® joint can be realised by measuring the residual material thickness (ST) and the joint point diameter D. Those values are determined in pre-tests for the corresponding application and documented in a test report with test report number. By simple measurement of those values at the component and a comparison with reference data, the quality of the RIVCLINCH® joint can be checked without damaging the component.

For a simple test of the residual material thickness, conventional quicktest gauges, as illustrated, can be used. This way, during production, quality surveillance can be performed in sampling tests without damaging the component which also improves the value-added process of your company.



Testing the residual material thickness ST

**RIVCLINCH® in action**

We offer the suitable joint for different target groups and industries.  
We are specialised in developing consistent and attractive solutions side by side with you.

Modular system, hand-held for subassemblies



Heat shield made with hand tool



Large component dimensions in energy and climatic engineering as illustrated here can be joined with semi-automated systems

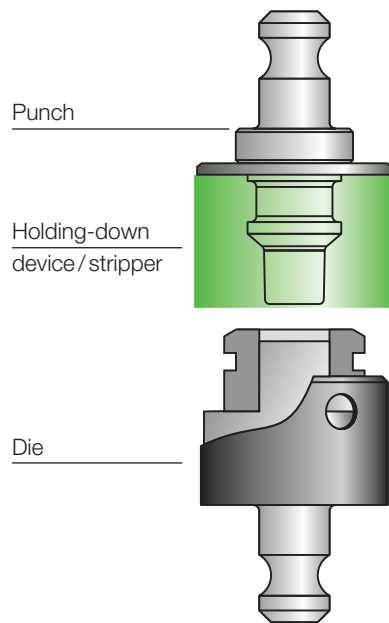
0706 IP hand tool with multi-axis suspension in door and gate manufacturing



Hand-held clinching systems, for example in the sheet metal industry, optimise your work processes

## The RIVCLINCH® modular system

### The tool kits



As a standard, tool kits for round points with nominal diameters of 3, 4, 5, 6, 7, 8 and 10 mm as well as for rectangular points with nominal dimensions of 4.3 mm, 5 mm and 6 mm are available.

The tool kit is integrated into a clinch unit depending on the application. Böllhoff offers many possible combinations, starting from a hand tool with a joining force of 25 kN to modular systems with a joining force of 50 kN to fully automatic systems and special machines. However, integration into presses or multi-stage tools is also possible.

### The dies



Example:  
tripartite  
RIVCLINCH®  
die SR 503

RIVCLINCH® dies comprise a basic die body and individual die segments that are held in position by a steel spring. The individual segments are captively fastened to the basic die body with a safety cage. Thus, the segments cannot fall out.

The ring can be divided into 2, 3 or 4 segments. The selection of the suitable die geometry depends on the individual application.

### Advantages over methods with not segmented die

#### RIVCLINCH® joining bears the following advantages thanks to the segmented die:

- Very high pull-out tension values due to improved flow behind the material because the die opens during clinching and the material can flow to the side.
- Higher flexibility for clinching of different sheet thicknesses with one tool kit.
- A flat button results from the RIVCLINCH® method (see figure).
- No material build-up inside the die (particularly for zinc plated or coated sheets), due to high radial forces. "Bursting" of the die due to a reduced die volume is therefore not possible. This also allows longer life of the die.
- No stripper required on the die side to remove material from the die — this can cause problems particularly for automation. Thus, the material cannot get stuck inside the die.
- This allows a thinner tool design on the die side resulting in an improved accessibility of the workpiece.

**Die design**

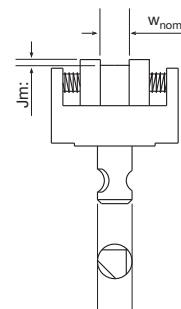
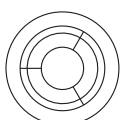
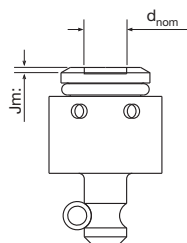
**The tool kits**

**Die for RIVCLINCH® round point**

The nominal diameter ( $d_{nom}$ ) of a RIVCLINCH® die is measured in closed no-load condition. During clinching, this diameter increases depending on the application. The following formula serves as a guide value for the button outside diameter ( $D_{button}$ ):

$$D_{button} = d_{nom} \times 1.4.$$

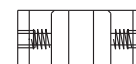
Compared to processes with not segmented die, a clinching point with nominal diameter  $d_{nom} = 6$  mm corresponds to a die inside diameter of approx. 8 mm for a not segmented die.



**Die for RIVCLINCH® rectangular point**

Just as for the round point, the nominal width ( $w_{nom}$ ) of the die for the RIVCLINCH® rectangular point is measured in closed no-load condition. During clinching, both die segments are pressed outwards. From that a button with an application-dependent width results. The following formula serves as a guide value for the button width ( $w_{button}$ ):

$$w_{button} = w_{nom} \times 1.4.$$



**The tool code**

**Codification of dies**

- S: Single
- D: Double
- R: Round point
- T: Rectangular point

**SR 504 14**

- Die depth mm/10
- Number of die segments
- Die diameter
- Die width (rectangular) in mm

**Codification of punches**

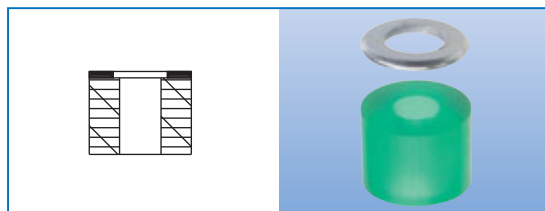
- S: Single
- D: Double
- R: Round point
- T: Rectangular point

**SR 60 10**

- Radius code
- Punch diameter
- Punch width (rectangular) in mm

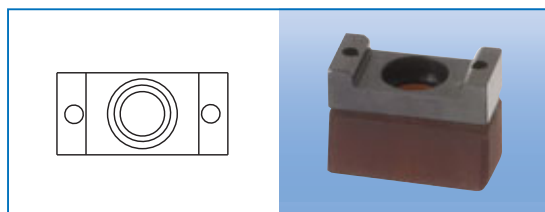
**The stripper**

Round polymer stripper



As a standard, polymer strippers with an outside diameter of  $d = 16$  mm are used. Due to the particularly small design, accessibility of the joint points and very smooth positioning of the stripper on the component surface are ensured. This can be of particular advantage for coated sheets, for example in the coil coating process. The use of a polymer stripper is the most cost-effective variant. Another advantage is that punch and die can usually be replaced.

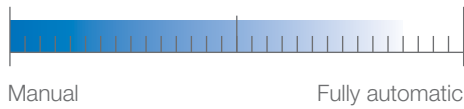
Rectangular polymer stripper



For bipartite dies and very narrow flanges, it can be useful to use a rectangular polymer stripper. The optimised design corresponds with the die design.



**RIVCLINCH® hand tools**



Our comprehensive hand tool program provides you as the user with the possibility to use clinching technology in your business without high investment costs, e.g. for special machines.

The program structure allows to find the right solution for almost each of your applications.

The same tool kits fit into almost every hand tool so that they can be interchanged.

Our technical marketing consultant in the field will help you to choose the optimised hand tool for your application.



**A complete RIVCLINCH® hand tool system consists of the following components:**

- A work head; design depends on series
- A handle or two-hand start (with feed stroke > 8 mm)
- A tool kit for the specific application
- A hose package 2 m (hydraulic and pneumatic hoses in protective conduit)
- A booster (with transformation ratio 1 : 60 = compressed air : hydraulic pressure) for pneumatic/hydraulic systems

**Available as an option:**

- Compressed-air conditioner
- Balancer for weight-reduced suspension
- Rotator ring for more flexible suspension of small hand tools
- Multi-axis suspension for C-frame hand tools
- Clinch cycle control
- Mechanical stripper on the plunger (system-specific)

Compressed-air conditioner



Booster



Balancer



Rotator ring



Clinch cycle control

*The FS series*

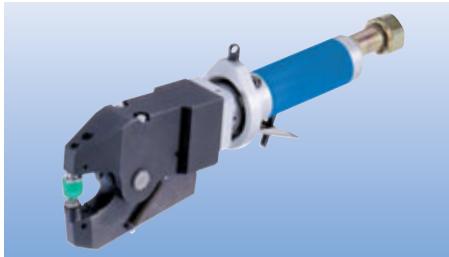
**RIVCLINCH® 0201 FS**



**Technical data**

Weight work head incl. handle	1.7 kg
Total weight incl. pressure intensifier	10 kg
Compressed-air connection min.	5 bar
Compressed-air connection max.	6 bar
Hydraulic pressure at 6 bar	360 bar
Joining force at 6 bar	25 kN
Opening (dist. betw. punch + die)	6.5 mm
Cycle time	0.7 to 1.0 s
Max. sheet thickness total, steel (SR, ST)	2.5 mm
Max. sheet thickness total, stainless steel (ST)	1.8 mm
Max. sheet thickness total, aluminium	2.5 mm

**RIVCLINCH® 0301 FS**



**Technical data**

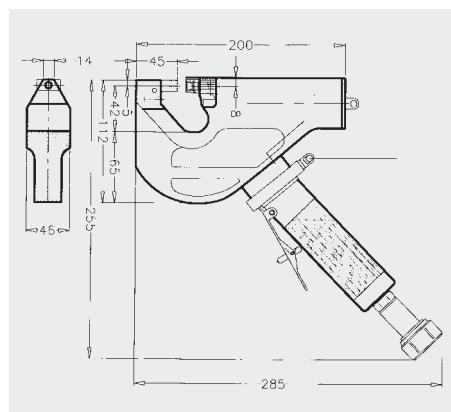
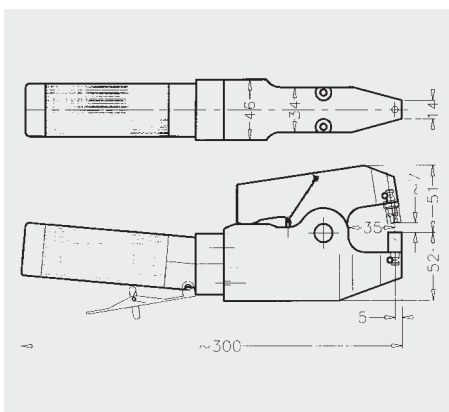
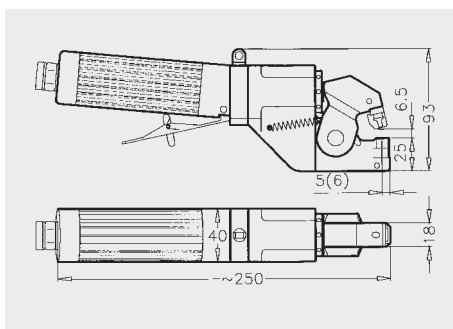
Weight work head incl. handle	3.5 kg
Total weight incl. pressure intensifier	12 kg
Compressed-air connection min.	5 bar
Compressed-air connection max.	6 bar
Hydraulic pressure at 6 bar	360 bar
Joining force at 6 bar	35 kN
Opening (dist. betw. punch + die)	6.5 mm
Cycle time	0.7 to 1.0 s
Max. sheet thickness total, steel (SR, ST)	3.0 mm
Max. sheet thickness total, stainless steel (ST)	2.0 mm
Max. sheet thickness total, aluminium	3.0 mm

**RIVCLINCH® 0501 FS**

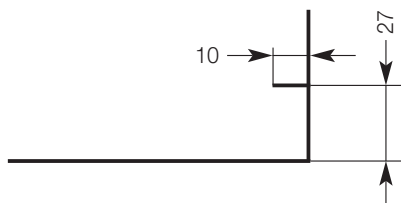


**Technical data**

Weight work head incl. handle	3.9 kg
Total weight incl. pressure intensifier	11.5 kg
Compressed-air connection min.	4 bar
Compressed-air connection max.	6 bar
Hydraulic pressure at 6 bar	360 bar
Joining force at 6 bar	35 kN
Opening (dist. betw. punch + die)	8 mm
Cycle time	0.8 to 1.2 s
Max. sheet thickness total, steel (SR, ST)	3.0 mm
Max. sheet thickness total, stainless steel (ST)	2.0 mm
Max. sheet thickness total, aluminium	3.0 mm



The figure below shows the extremely small fitting space in which the RIVCLINCH® 0201 FS can work.



**The advantages at a glance**

- Considerably reduced weight
- High dynamic
- Extreme power development
- Optimal accessibility due to reduced interferences
- Low operating costs and quick amortisation
- Cost-effective alternative to spot welding
- Use of round and rectangular points
- Laboratory-tested, joint-optimised tool selection
- No complex tool adjustment required
- Easy setting stroke adjustment
- Ready to operate immediately after connection to compressed-air supply

**Fields of application:**

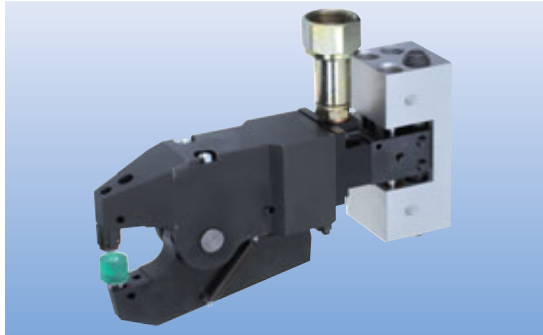
- Small and medium series
- Narrow flanges
- Corners
- Narrow installation space

**Technical modifications reserved.**  
**Data depend on variants.**  
**Dimensions on request.**



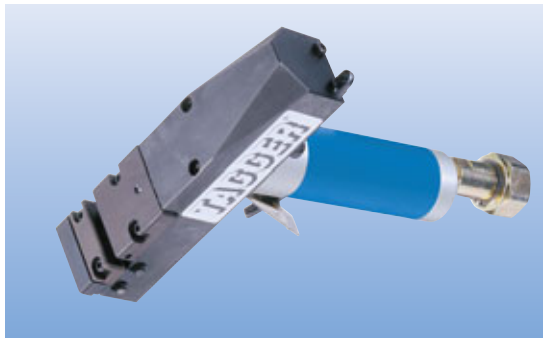
**Work head automation**

With many of our hand tools, the work head without handle can also be used in automated production. For that, a sliding support can, for example, be adapted to the rear of the corresponding work head to compensate positioning inaccuracies in the machine or device.

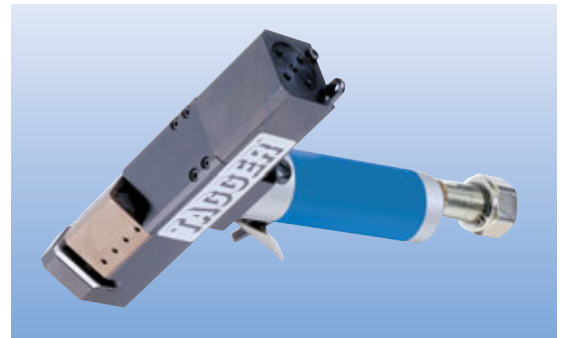


RIVCLINCH® 0301 FS  
with sliding support

**TAGGER®**



TAGGER® 320

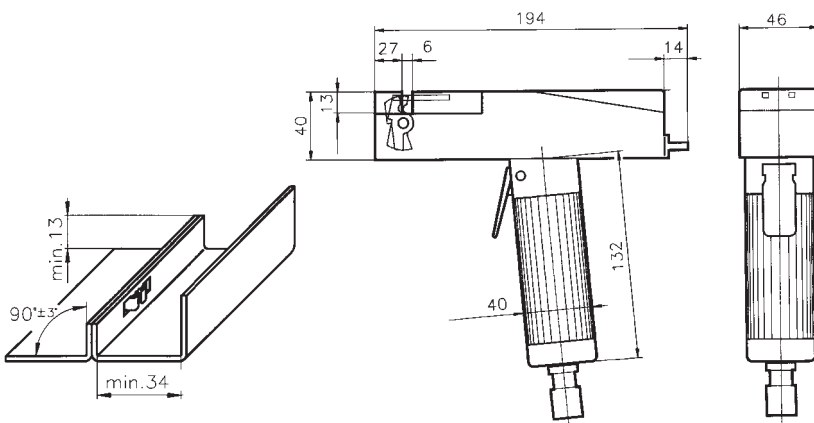


TAGGER® 320 V1 (for corner joints)

Technical data	
Tool weight	2.1 kg
Total weight incl. pressure intensifier	9.7 kg
Operating air pressure	6 bar
Hydraulic pressure at 6 bar	365 bar
Cycle time	0.9 s
Max. material strength, mild steel	0.9 mm
Max. material strength, stainless steel	0.6 mm

**The advantages at a glance**

- Quick, cost-effective joining of sheets
- Cycle time shorter than 1 second
- Easy access to narrow corners
- No separate holding devices or fixing tool
- One tool for all material thicknesses
- No sparks, smoke or toxic gases
- Low noise and no recoil
- User-friendly
- Suitable for coated, painted material and for sandwich sheet
- No drilling or pre-punching
- No preworking or reworking
- No auxiliary fasteners, no adhesive
- No combustion residues, no oil, no waste



**Fields of application:**

- Production of domestic appliances
- Heating, air-conditioning and ventilation technology
- Filter production
- Large, bulky components

## System components

### The booster

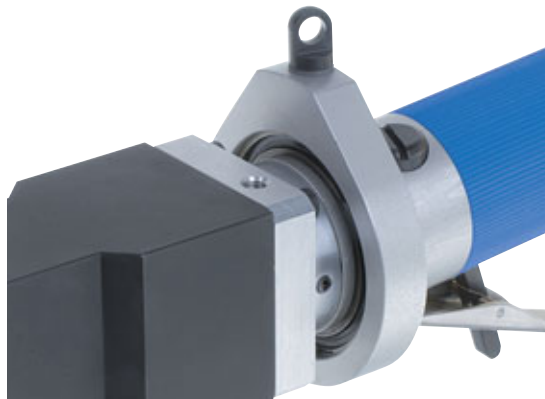


The booster is a pressure intensifier that increases conventional compressed air of 6 bar by the factor 60 so that an operating pressure of 360 bar is achieved on the hydraulic side.

#### Advantages over conventional hydraulic power packs:

- Closed, leak-proof hydraulic circuit
- No power consumption during idle time
- Particularly low-maintenance and easy-to-handle - power source
- High speed and therefore short riveting cycle times
- Simple mere pneumatic control
- Just connect compressed air and the RIVCLINCH® system is ready to operate

### The rotator ring



- Increased movability
- Joining in every position
- Ergonomic tool handling

## Accessories

### The balancer



To make life even easier for you, there is an adapted balancer for every RIVCLINCH® tool to compensate the tool weight. There are balancers for the different weight classes:

- Work head weight from 2 kg to 3 kg, 1.6 m cable length
- Work head weight from 4 kg to 6 kg, 2 m cable length
- Work head weight from 10 kg to 14 kg, 2 m cable length
- Work head weight from 14 kg to 18 kg, 2 m cable length
- Work head weight from 18 kg to 22 kg, 2 m cable length
- Work head weight from 22 kg to 25 kg, 2 m cable length
- Work head weight above 25 kg on request

*Accessories*

**Clinch cycle control OCC**



- "Minimum process monitoring"
- Just one brief trigger is sufficient
- Automatic clinching process
- Hydraulic pressure is controlled (pneumatically controlled pressure sensor)
- No maloperation by worker due to too brief triggering

**The compressed air conditioner**



RIVCLINCH® machine systems work with 6 bar conventional compressed air. In any case, a compressed-air conditioner with water separator and oiler must be connected in series. Required compressed air can be classified as follows:

humidity: ISO 8573-1 class 4  
 → water dew point +3° C

max. oil content: ISO 8573-1 class 2  
 → 0.1 mg/m<sup>3</sup> compressed air

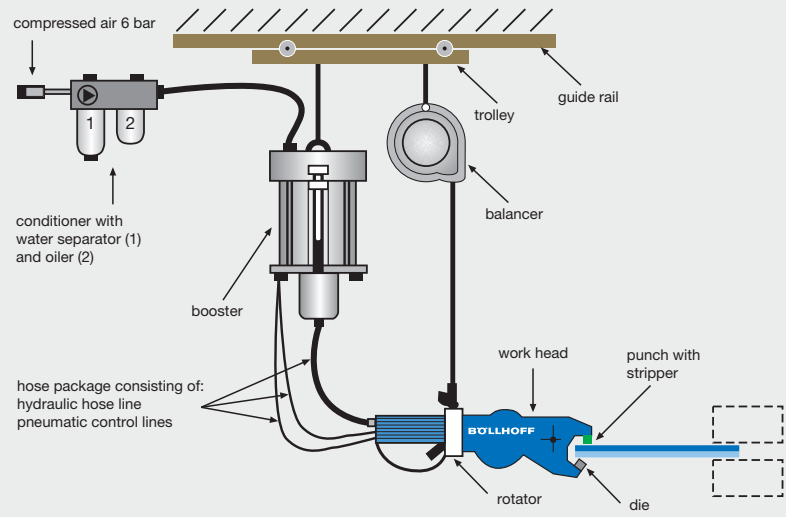
**Tip for practical use:**

Since the oil content cannot be measured in practical use, the residual oil content can be checked connecting an air gun downstream of the conditioner at a branch and blowing air against white paperboard from a distance of about 10 cm for 10 seconds.

Only a slight yellowish colouring shall be visible on the paperboard. Dropping oil is a definite proof that the residual oil content is too high — this can lead to plugging of the pneumatic system.

**The optimum suspension**

**In the illustration you can see the preferable suspension of RIVCLINCH® hand tools:**



To avoid collision at sudden movements, booster and balancer should be installed on one common trolley. Depending on the system, for more flexible handling, we recommend to also order a rotator ring or multi-axis suspension.

All hand tools are reduced-weight tools and designed according to ergonomic aspects. This particularly affects the acceptance of tools for production. Thanks to the easy handling of RIVCLINCH® hand tools, the machines become increasingly important, especially in small- and medium-series production.

## The modular systems



Semiautomatic

With the “Modular systems” product series, we have set up a standard clinching program from which we can combine individual clinching tools according to your desired application from different modular systems.

**According to the maximum joining force, the modular systems are subdivided into three main groups:**

- RIVCLINCH® P35 with 35 kN max. joining force
- RIVCLINCH® P50 with 55 kN max. joining force
- RIVCLINCH® P75 with 75–105 kN max. joining force

Together with our technical marketing consultants, you can choose the clinching systems suitable for your application from a great variety of possible combinations – and within no time start production.



**The P35 series**

The RIVCLINCH® P35 series can surely be described as the variant of our modular systems with most commonly used on the market. The focus of the series is definitely on the ratio of the lowest possible weight and small dimensions with at the same time a powerful and dynamic setting behaviour of the clinching tool.



P35 S cylinder

**General technical data:**

Required compressed-air connection	6 bar
Max. press force at 6 bar	35 kN
Cycle time	0.8 – 2 sec
Max. sheet thickness aluminium (SR)	3.0 mm
Max. sheet thickness aluminium (ST)	3.5 mm*
Max. sheet thickness steel (SR)	3.0 mm
Max. sheet thickness steel (ST)	3.5 mm*
Max. sheet thickness stainless steel (ST)	2.0 mm
Adapted tool kits	round point with die design: bipartite: SR 302, SR 402, SR 502 tripartite: SR 403, SR 503, SR 533 quadripartite: SR 504 rectangular point type ST 432
Standard stroke lengths	10 – 15 mm (selection below) 25 – 50 mm (selection below)

\* Above 3 mm only with mechanical stripper

**Technical modifications reserved.  
Data depend on design.**

**The P50 series**

Compared to the RIVCLINCH® P35 series, the RIVCLINCH® P50 series provides a joining force of 55 kN. Just like for the sister series, the focus of this series is definitely on the ratio of the lowest possible weight and small dimensions with at the same time a powerful and dynamic setting behaviour of the clinching tool.



P50 S with axle compensator slide mount

**General technical data:**

Required compressed-air connection	6 bar
Max. press force	50 kN
Cycle time	0.8 – 1.5 sec
Max. sheet thickness aluminium (SR)	4.0 mm
Max. sheet thickness aluminium (ST)	4.0 mm*
Max. sheet thickness steel (SR)	4.0 mm
Max. sheet thickness steel (ST)	4.0 mm*
Max. sheet thickness stainless steel (ST)	3.0 mm
Adapted tool kits	round point with die design: bipartite: SR 302, SR 402, SR 502 tripartite: SR 403, SR 503, SR 533 quadripartite: SR 504 rectangular point type ST 432
Standard stroke lengths	10 – 15 mm (selection below) 25 – 50 mm (selection below)

\* Above 3 mm only with mechanical stripper



Apart from the standard S cylinder, we also offer a PASS cylinder. See page 23.



**The P75 series**

The RIVCLINCH® P75 series is the most powerful variant of our modular systems. The focus of this series is on the high precision and the possibility to work with multistage tools. Apart from that, great sheet thicknesses, such as total steel thicknesses of up to 6 mm, can be joined with the corresponding tool kits.



P75 S spring single-acting



P75 S double-acting

**As the drive for the RIVCLINCH® P75 setting cylinder, there are two variants:**

**1. Variant with booster (single-acting)**

The tool is equipped with a hydraulic cylinder driven by a booster. The hydraulic cylinder is single-acting, i.e. the cylinder is moved down by the booster drive. Reverse motion of the setting cylinder is realised via spring force by a spiral spring in the setting cylinder.

**2. Variant with oil hydraulic system (double-acting)**

As opposed to the single-acting variant, the setting tool is hydraulically driven for the forward and the reverse motion. With respect to the hydraulic system, geometry data deviate from the single-acting variant.

General technical data:		
	Variant 1	Variant 2
Required compressed-air connection/hydraulic pressure	6 bar	350 bar (250 bar)
Max. press force	105 kN (75kN)	105 kN (75 kN)
Required oil volume	3.75 cm <sup>3</sup> / 1 mm stroke	3.12 cm <sup>3</sup> / 1 mm stroke
Max. total stroke	20 mm	50 mm (100 mm*)
Cycle time	0.8 – 2.0 s	depending on used hydraulic power pack 1 – 3 s
Max. sheet thickness aluminium (ST, SR)	6.0 mm	6.0 mm
Max. sheet thickness steel (ST, SR)	6.0 mm	6.0 mm
Max. sheet thickness stainless steel (ST)	4.0 mm	4.0 mm

\* Others on request

Data in brackets ( ) relate to the reduced joining force of 75 kN at a hydraulic pressure of 250 bar.

## System components

Since the basic design is identical for all series, we give you an overview of further system components.

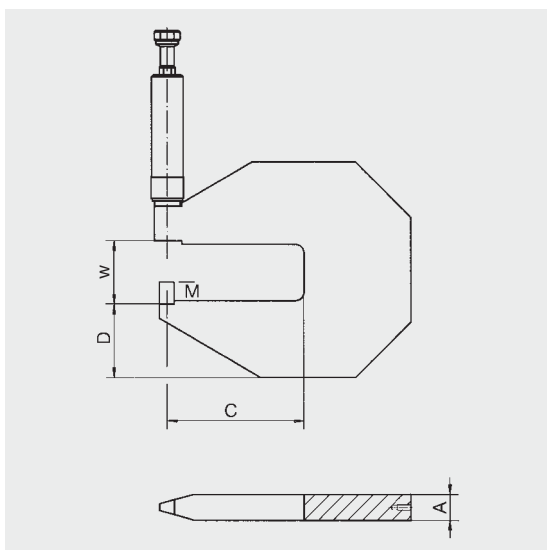
We offer the service of our technical marketing consultants who, together with you, can choose the suitable clinching system for you. We are looking forward to your request.

### Application analysis



To set up a complete RIVCLINCH® system, accessibility to the component must be thoroughly checked. After that, the appropriate tools are chosen for your application using the sampling in our test field. The tools are then documented in a test report. These data can later be used upon production as quality characteristics.

### C-frame



For a definite choice of the RIVCLINCH® work head, the throat depth of the C-frame must be defined. Here, we recommend to already consider future projects. Therefore, it may be useful to choose the C-frame slightly larger than absolutely required, even if this may not be necessary for the present application.

Window w = 91 mm				Window w = 126 mm				Window w = 161 mm			
A	C	D	Weight kg	A	C	D	Weight kg	A	C	D	Weight kg
47	35	40	7	47	35	40	9	47	35	40	10
47	70	55	11	47	70	55	13	47	70	55	14
47	110	70	12	47	110	70	20	47	110	70	22
47	205	108	32	47	205	108	37	47	205	108	36
47	305	150	70	47	305	150	78	47	305	150	77

### *PASS setting cylinder*



P50 PASS cylinder

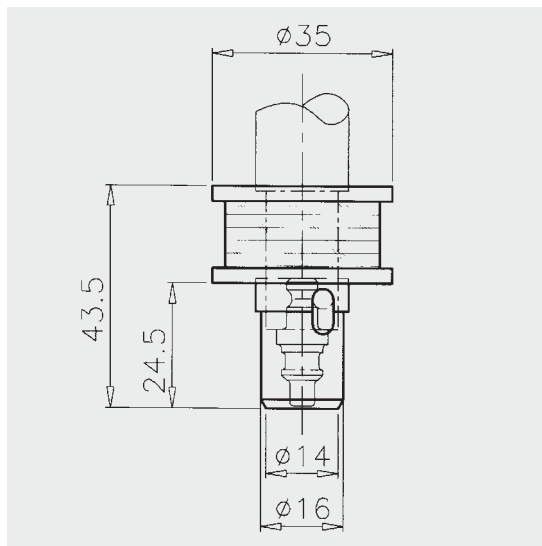
Particularly for opening strokes from 60 mm, we offer the innovative RIVCLINCH® PASS setting cylinder which allows to work with a foot pedal switch or in one-hand operation.

The patented powerless partial prestroke performs 53 mm of the total stroke at small force (50 N).

Triggering is performed with a 2-pedal foot switch or a small pushbutton on the trigger handle. If the setting piston is below 8 mm of remaining feed stroke, the pushbutton or the foot pedal switch can be actuated to trigger a working stroke of 35 kN or 50 kN as many times as desired. After that, the piston returns to the start position when the small pushbutton or the 2-pedal foot switch are actuated again.

As an additional safety feature, the partial prestroke allows to precisely position the tool with respect to the component without causing any damage since prestroke is performed at very small force.

### *Mechanical stripper*



It may in some cases happen that the stripper force of the polymer stripper is insufficient to pull the punch out of the joined material. This problem can occur particularly with soft materials such as aluminium. For this case, we offer especially adapted mechanical hold-down units with increased stripper force (of a maximum of 2.6 kN or 3.6 kN depending on the series).

**Drive**



Optional:  
compressed-air conditioner

The easiest and most common way to operate RIVCLINCH® systems is the drive with conventional compressed air of 6 bar.  
To control the operating pressure and for separation of water which can accumulate in the line system of your compressed-air system, a maintenance unit with water separator and oiler must be installed.

**Required compressed air can be classified as follows:**

- **Humidity:** ISO 8573-1 class 4 -> water dew point +3° C
- **Max. oil content:** ISO 8573-1 class 2 -> 0.1 mg/m<sup>3</sup> compressed air



Booster  
with distribution manifold  
and pressure sensor

To achieve an operating pressure of about 360 bar on the hydraulic side, a booster is used as a pressure intensifier which increases compressed air by the factor 60.

**Advantages over the conventional hydraulic power pack are the following:**

- Closed, leak-proof hydraulic circuit
- No power consumption during idle time
- Particularly low-maintenance and easy-to-handle power source
- High speed and therefore short riveting cycle times
- Simple mere pneumatic control
- Just connect compressed air and the RIVCLINCH® system is ready to operate.

Depending on the required oil volume, several clinching tools can be operated with one booster. For that, a distribution manifold with four suboutlets as a standard is connected to the outlet on the hydraulic side. The not required outlets are sealed with sealing plugs.

Please note that the tools connected to the same booster can only be operated together and at the same time.



Power Unit

If boosters cannot be used or if the technical design of the system does not allow to use a booster, modular clinching systems can also be driven with an oil hydraulic system. However, this requires the use of an electrical control, i.e. then, there is not the advantage of the mere pneumatic control.

## Handling



Multi-axis suspension

Apart from the integration into a system, most modular clinching tools can also be used as hand tools.

For that, the tools are additionally equipped with a multi-axis suspension as well as a handle or a two-hand start device. This allows you to perform manual clinching even at joining locations of difficult access.



Axle compensation

Particularly for automatic systems it is often necessary to achieve tolerance compensation of the tools towards the workpiece so that the component is not deformed in the clinching process.

For small- to medium-size clinching tools, we offer a standard axle compensation (up to 10 kg) which can easily be screwed to the rear of the standard C-frame.

For larger C-frames and for the pneumatically supported "active axle compensation", there are special application-specific solutions on request.

**Control**



Booster with OCC

The simple pneumatic control is integrated in the booster and controls the complete clinching process. Up to a total stroke of 8 mm, the clinching process can be triggered with a foot pedal switch (stationary systems) or a one-hand switch (hand-held systems). With a total stroke > 8 mm, two-hand operation or external protective devices are prescribed to prevent personnel from reaching into the tools and thus minimise the risk of injury. This does not apply to the use of RIVCLINCH® PASS setting cylinders. The pneumatic control is complemented with clinch cycle control.

A control box with integrated pneumatic logic control is installed on the corresponding booster. Via a hydraulic pressure switch installed between booster and compressed-air tubing, the control receives the signal that the required and previously set pressure has been reached. The control sends the signal to the main valve in the booster and the hydraulic cylinder returns to the initial position.

To trigger the complete riveting cycle, the trigger must only be actuated briefly to start a completely automatic clinching process. Maloperation by the worker due to too brief triggering, for example, can therefore be ruled out.



Piston return sensor

When RIVCLINCH® systems are integrated into another system, it must be ensured that the clinching process has been completed and the clinching tool has returned to the initial position. For that, a return sensor is installed on the cylinder of the clinching tool. It outputs a signal when the tool is in the start position.

To ensure that the force required for the clinching process is achieved at the joining location, a pressure sensor can be positioned on the hydraulic side of the booster. When the required pressure is reached, the sensor outputs a signal to the system control.

**The PLC sends a start signal for clinching to an external electro-pneumatic valve**



**The booster starts the clinching process via the internal pneumatic valve**



**The return outputs a "Tool in start position" signal to the PLC**



**Clinching process completed, "System clear"**

*This is what we offer you!*

## Optimum joints are no coincidence.

We are the partner for your projects — from the very first concept to the final realisation.

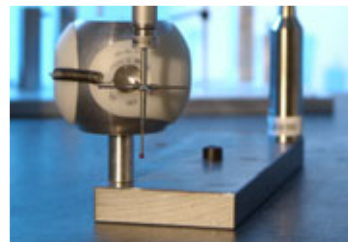
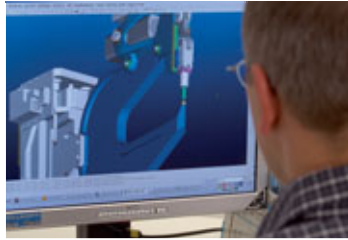
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Sampling for your components with competent application engineering.

**From A to Z**

**Technology**

**Analysis**



**Assembly**

**Quality**

**Service**

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Our quality management complies with EN ISO 9001 and ISO/TS 16949:2002.

Twenty-four-seven, our maintenance, repair and service personnel make your production a reliable process.

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