

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 pre-coated sheets can be joined without any damage to the surface.

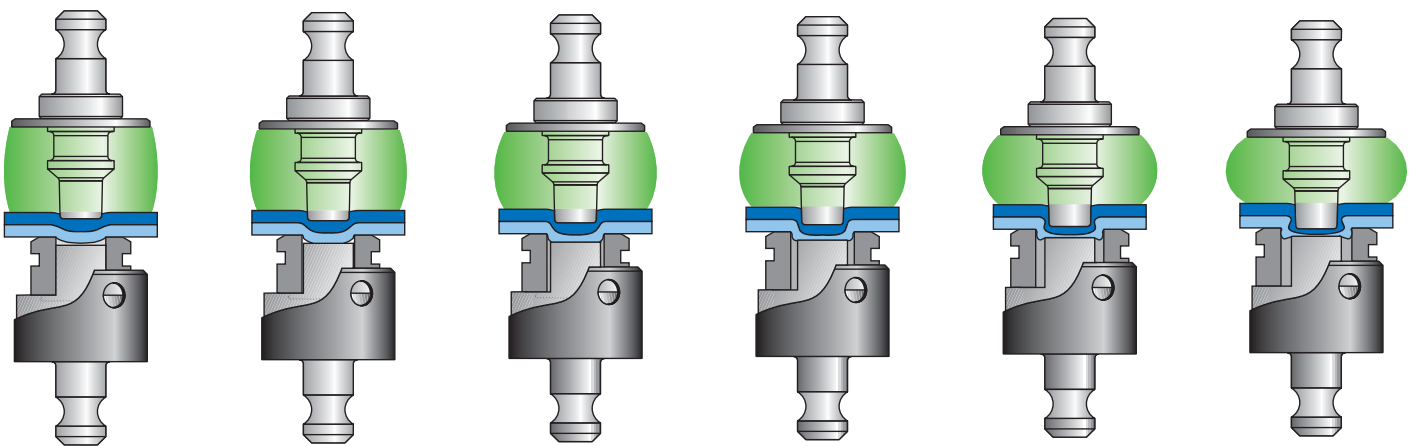
Depending on the chosen RIVCLINCH® joining tools, round or rectangular joint points result.

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.



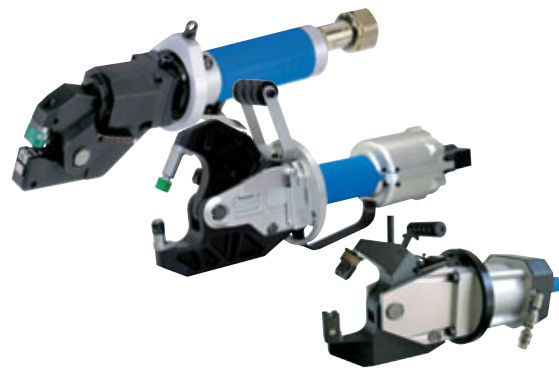
Tailor-made solutions



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.

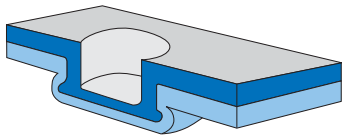


Modular systems

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.

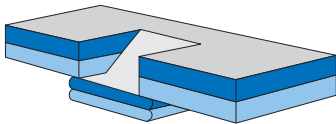
Joining together!

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.

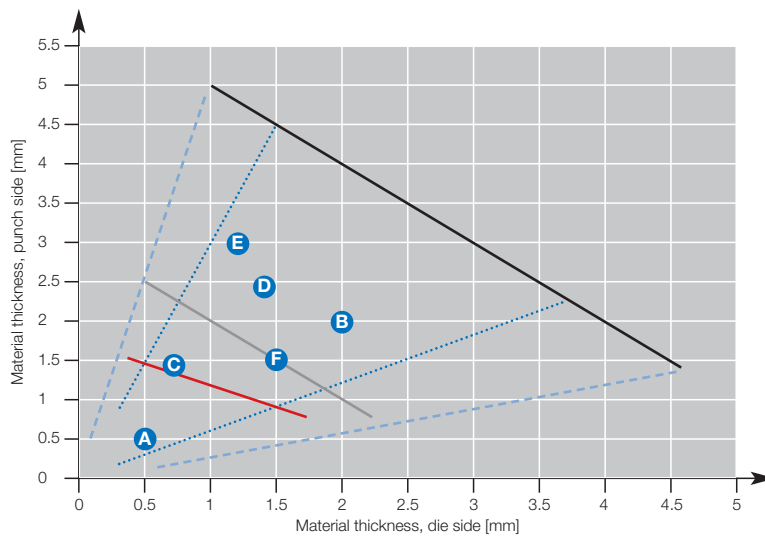


Rectangular point

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/mm² < Rm < 700 N/mm²
- 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



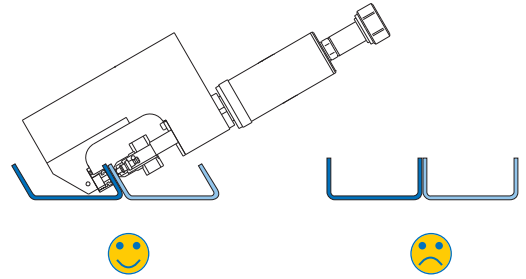
Steel 3.0 mm
Steel 1.25 mm



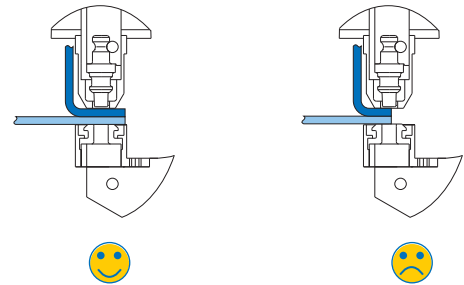
Aluminium 1.5 mm
Aluminium 1.5 mm

Workpiece design

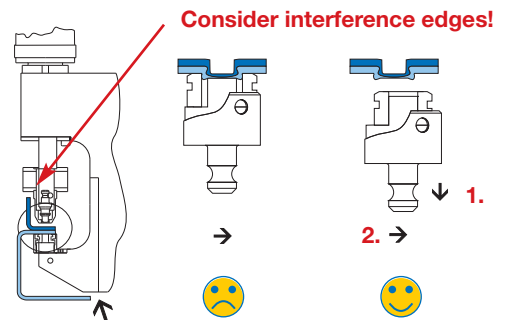
1. Consider accessibility for design!



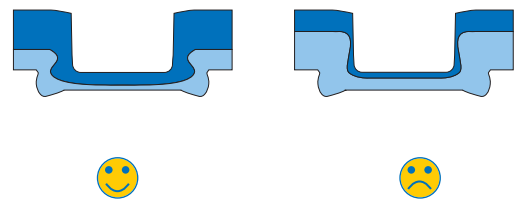
2. Provide for sufficient flange width!



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



4. Preferable direction “thick into thin”



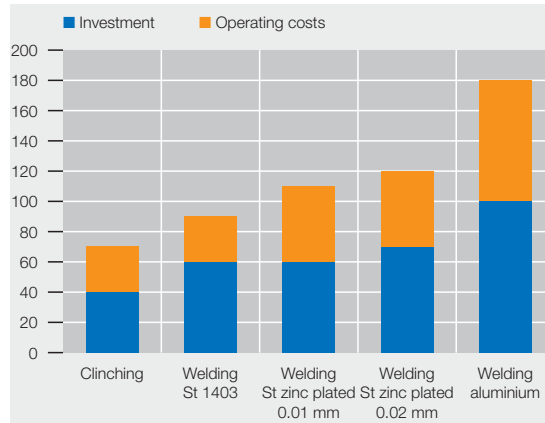
Joining technologies – a comparison

| | 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)

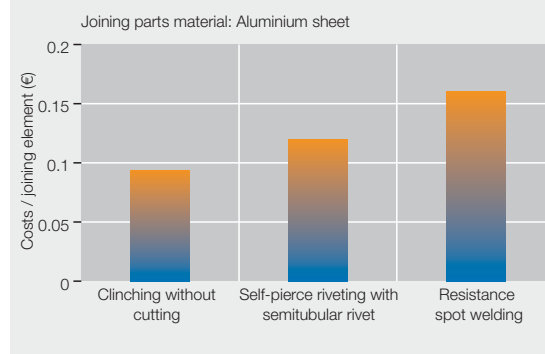
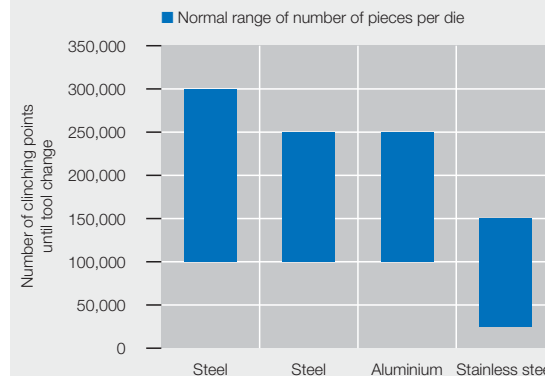
Short cycle times

- 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

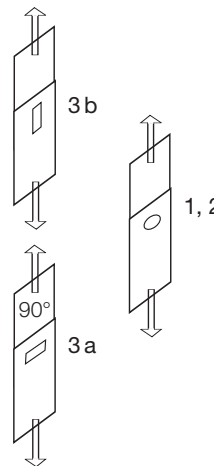
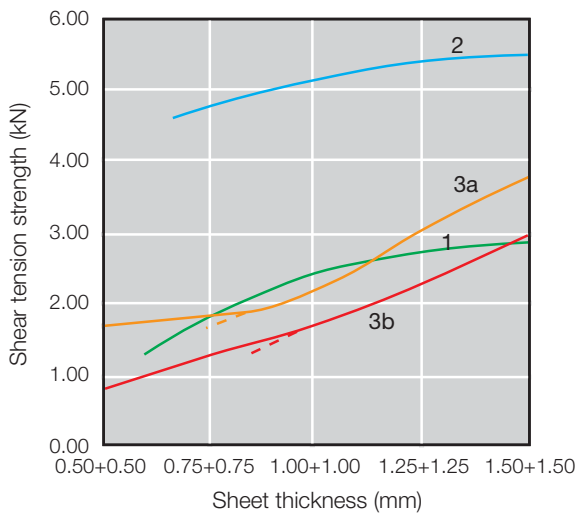
There are three areas when it comes to strength values:

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



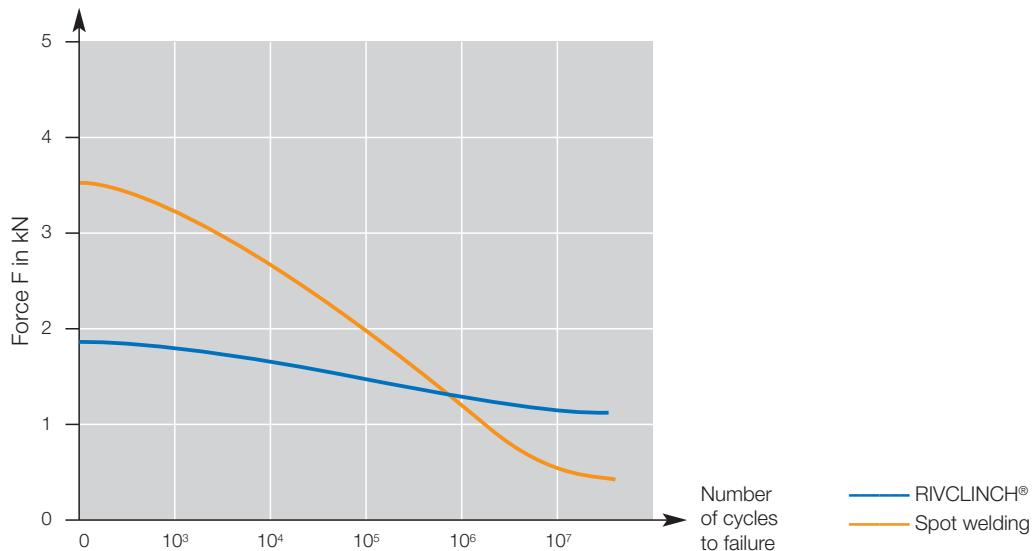
RIVCLINCH® joining

Static shear tension strength depending on sheet thicknesses
material: steel sheet, tensile strength = ~ 300 N/mm²

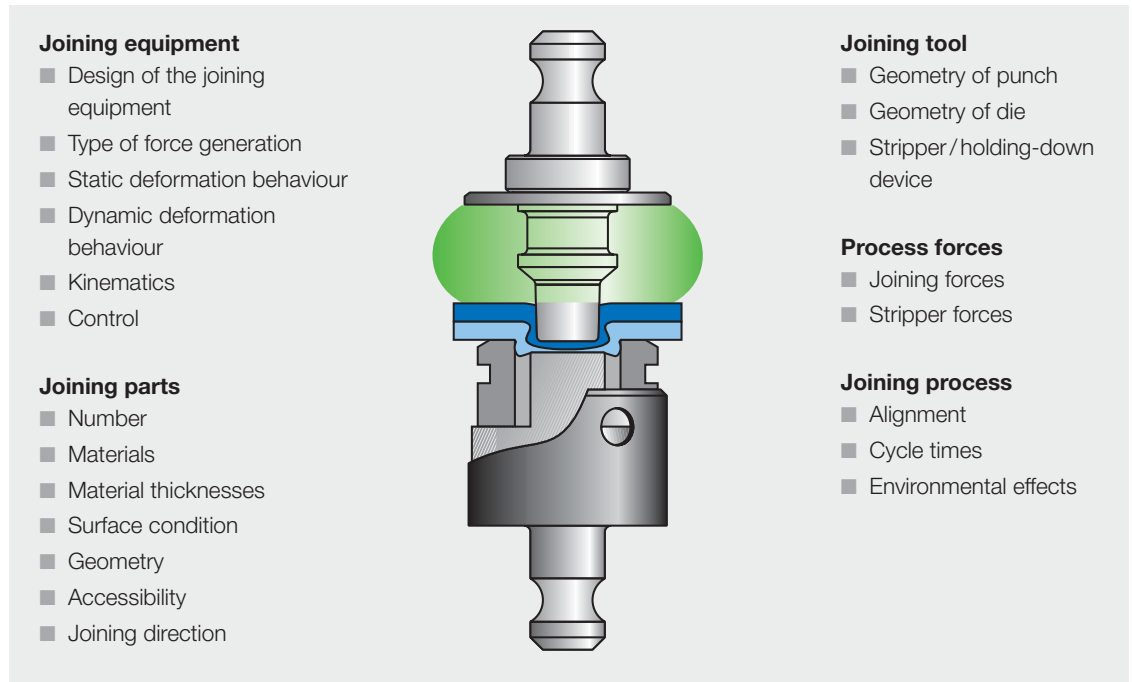
1. Round point, Ø 5 mm
2. Round point, Ø 8 mm
- 3a. Rectangular point diagonally to the direction of stress
- 3b. Rectangular point longitudinally to the direction of stress

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

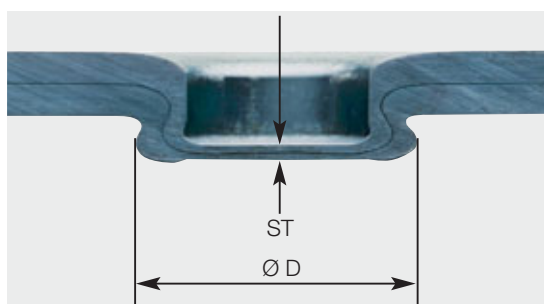
Quality surveillance

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

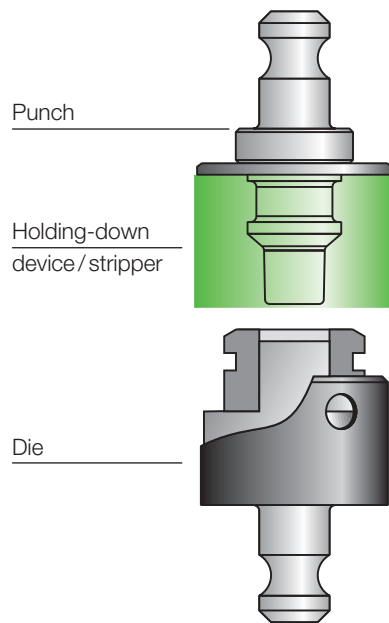
0706 IP hand tool with multi-axis suspension in door and gate manufacturing



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

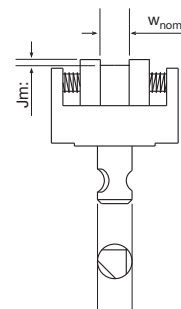
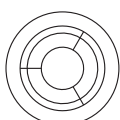
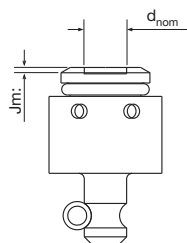
The tool kits

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}):

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

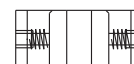
Compared to processes with not segmented die, a clinching point with nominal diameter $d_{nom} = 6$ mm corresponds to a die inside diameter of approx. 8 mm for a not segmented die.



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

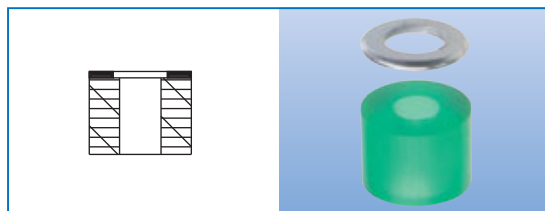
- S: Single
- D: Double
- R: Round point
- T: Rectangular point

SR 60 10

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

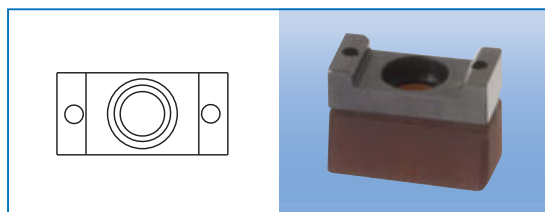
The stripper

Round polymer stripper



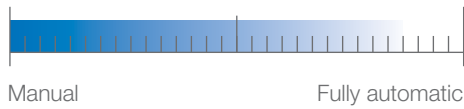
As a standard, polymer strippers with an outside diameter of $d = 16$ mm are used. Due to the particularly small design, accessibility of the joint points and very smooth positioning of the stripper on the component surface are ensured. This can be of particular advantage for coated sheets, for example 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

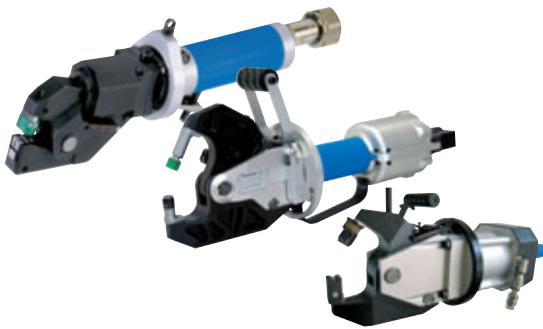


Our comprehensive hand tool program provides you as the user with the possibility to use clinching technology in your business without high investment costs, e.g. for special machines.

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



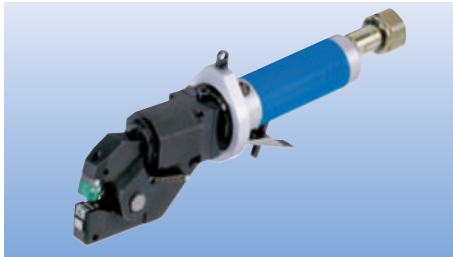
Rotator ring



Clinch cycle control

The FS series

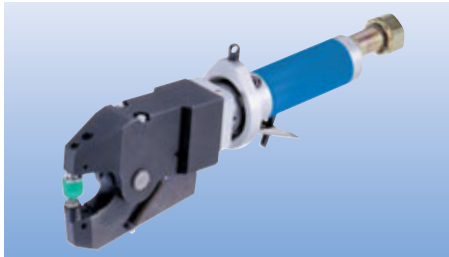
RIVCLINCH® 0201 FS



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

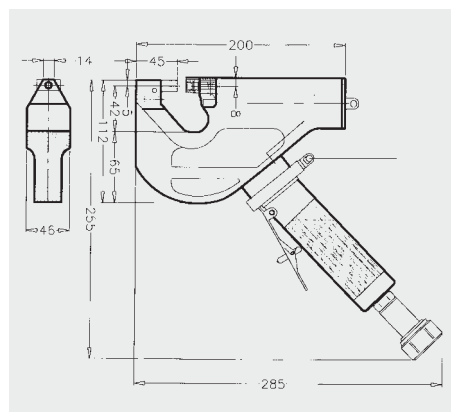
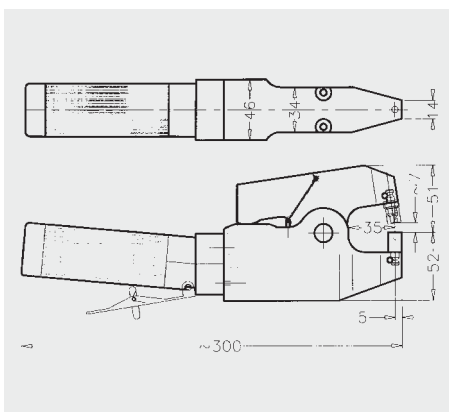
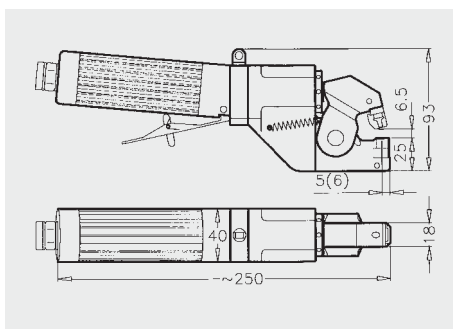
| | |
|--|--------------|
| Weight work head incl. handle | 3.5 kg |
| Total weight incl. pressure intensifier | 12 kg |
| Compressed-air connection min. | 5 bar |
| Compressed-air connection max. | 6 bar |
| Hydraulic pressure at 6 bar | 360 bar |
| Joining force at 6 bar | 35 kN |
| Opening (dist. 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

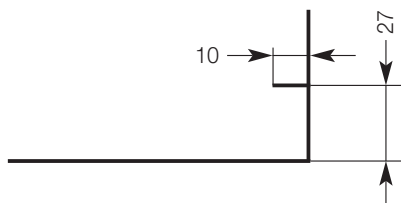


Technical data

| | |
|--|--------------|
| 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

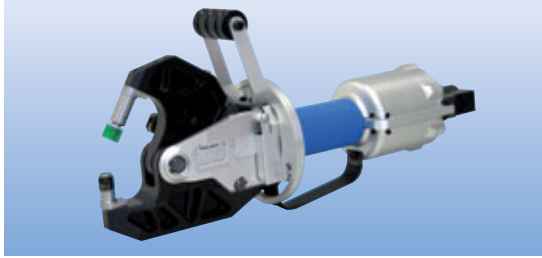
Fields of application:

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

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

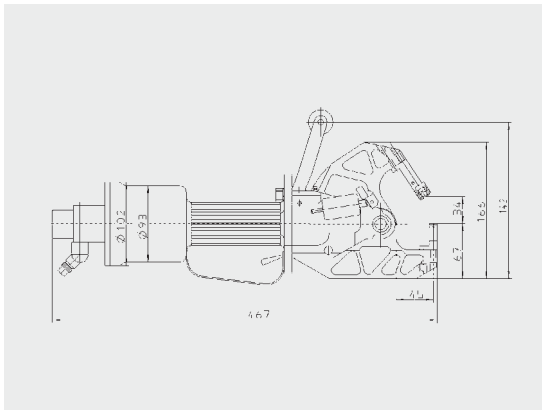
The IP series

RIVCLINCH® 0404IP

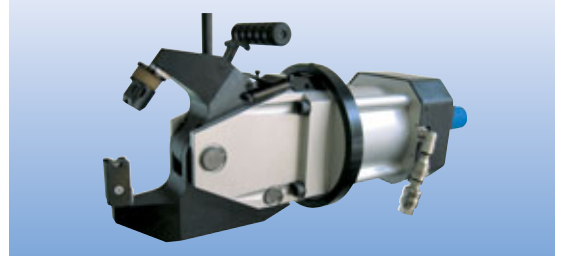


Technical data

| | |
|--|--------------|
| Weight work head incl. handle* | 4.7 kg |
| Compressed-air connection min. | 5 bar |
| Compressed-air connection max. | 6 bar |
| Joining force at 6 bar | 35 kN |
| Cycle time | 0.9 to 1.5 s |
| Working stroke, closed | 6.5 mm |
| Total stroke, open | 35 mm |
| Opening depth | 44 mm |
| Max. sheet thickness total, mild steel | 3.0 mm |
| Max. sheet thickness total, stainless steel (ST) | 2.0 mm |
| Max. sheet thickness total, aluminiumz | 3.0 mm |

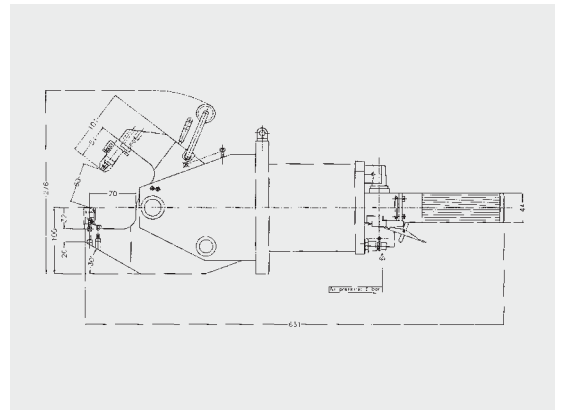


RIVCLINCH® 0706 IP50



Technical data

| | |
|--|--------------|
| Weight work head incl. booster | 22 kg |
| Compressed-air connection min. | 4 bar |
| Compressed-air connection max. | 6 bar |
| Joining force at 6 bar | 50 kN |
| Opening (distance betw. punch + die) | 8 mm |
| Cycle time | 0.8 to 1.0 s |
| Max. sheet thickness total, steel (SR, ST) | 4.5 mm |
| Max. sheet thickness total, stainless steel (ST) | 3.0 mm |
| Max. sheet thickness total, aluminium | 4.5 mm |



* Different designs with slightly different weight

The advantages at a glance

- Mere pneumatic drive
- Increased joining force at reduced tool interference
- Tiltable C-frame for joining over interference edges
- Ready to operate within minutes
- Cost-effective alternative to spot welding
- Use of round and rectangular points
- Laboratory-tested, joint-optimised tool selection
- Easy setting stroke adjustment with parameter screw
- Flexible and mobile use, also open air
- Integrated rotator ring as a standard

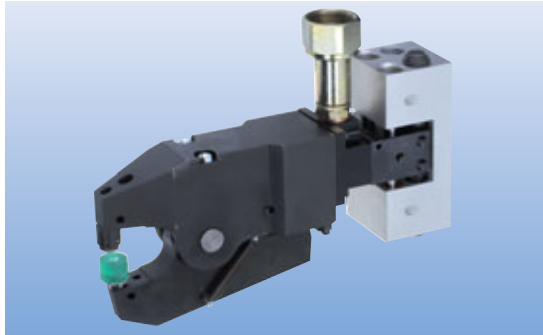
Fields of application:

- Lightweight and finished steel construction engineering
- Corners
- Narrow flanges
- Reaching over interferences

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

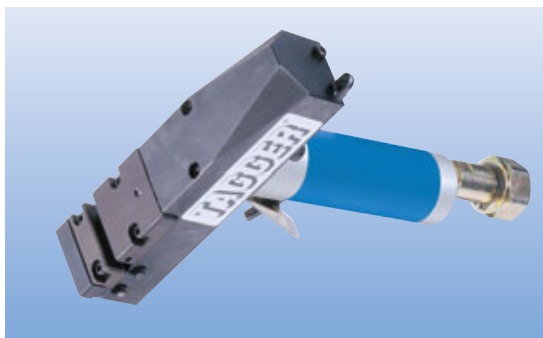
Work head automation

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.

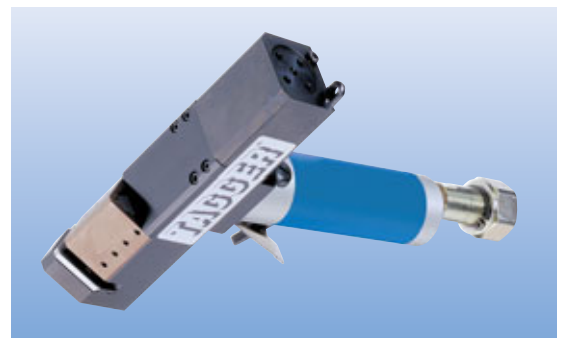


RIVCLINCH® 0301 FS
with sliding support

TAGGER®



TAGGER® 320

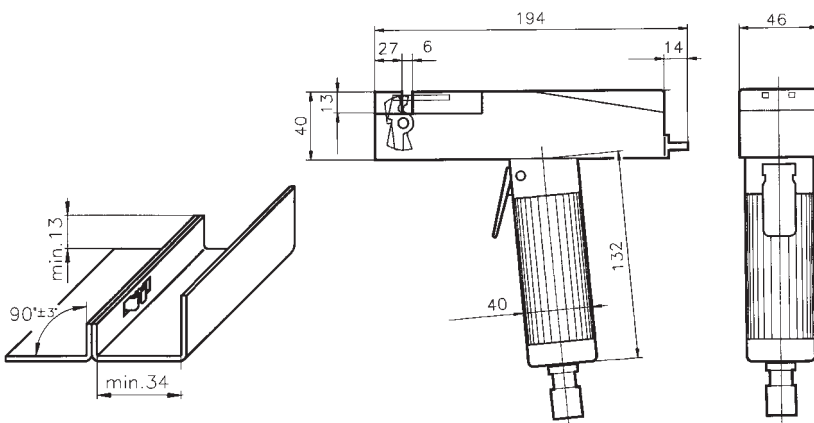


TAGGER® 320 V1 (for corner joints)

| 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

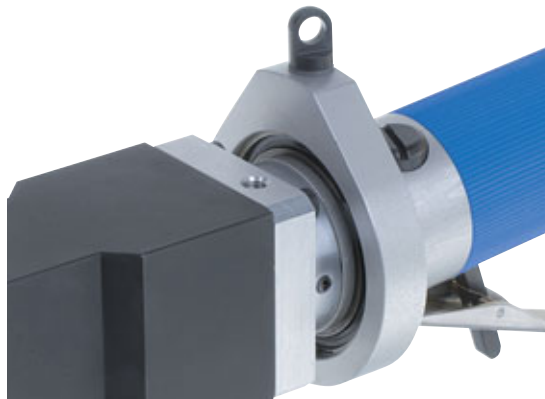


The booster is a pressure intensifier that increases conventional compressed air of 6 bar by the factor 60 so that an operating pressure of 360 bar is achieved on the hydraulic side.

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/m³ compressed air

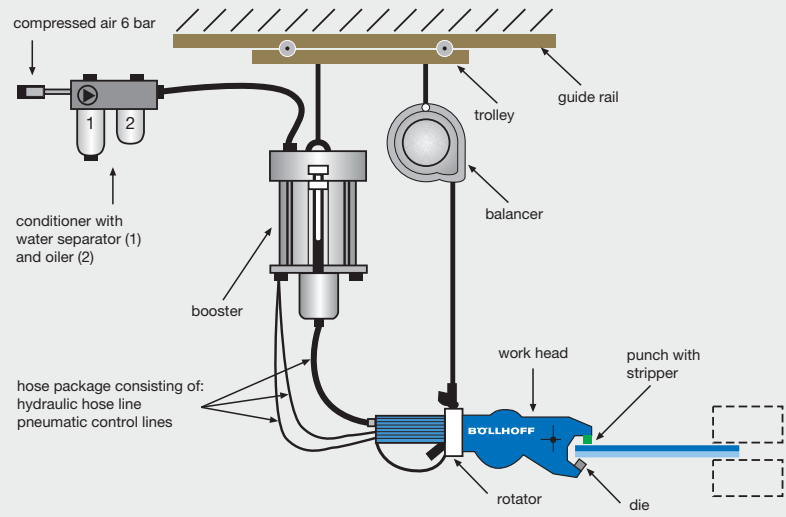
Tip for practical use:

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



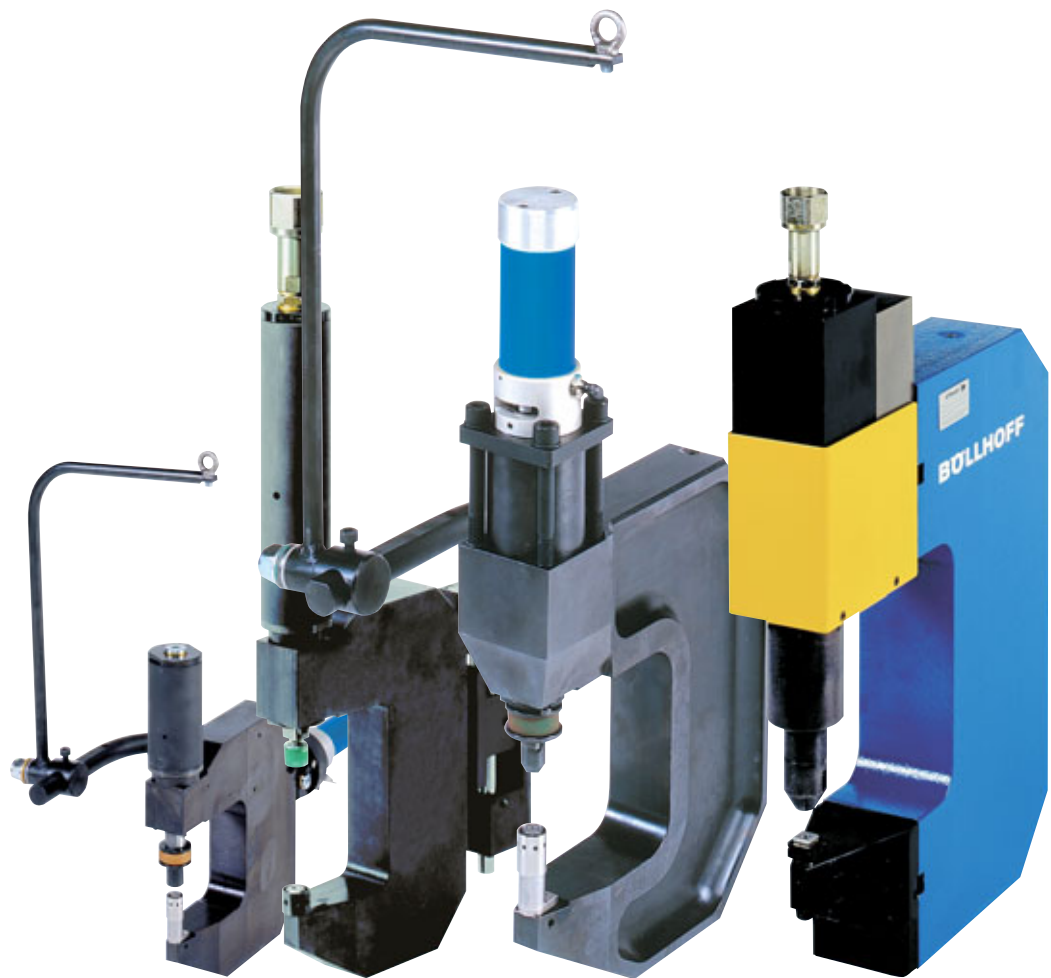
Semiautomatic

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

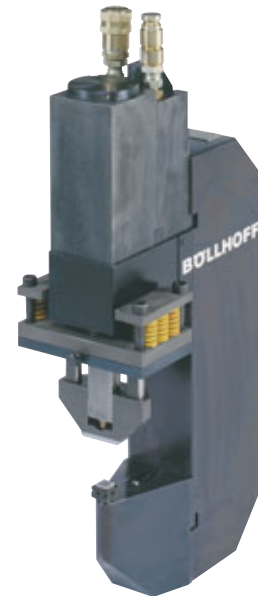
i Apart from the standard S cylinder, we also offer a PASS cylinder. See page 23.

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 ³ / 1 mm stroke | 3.12 cm ³ / 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.

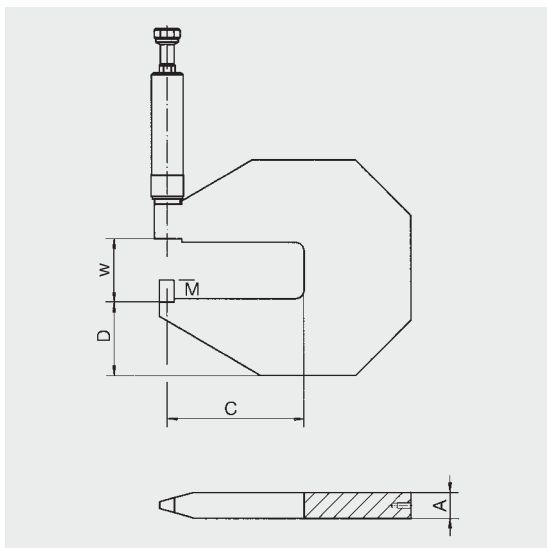
We offer the service of our technical marketing consultants who, together with you, can choose the suitable clinching system for you. We are looking forward to your request.

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

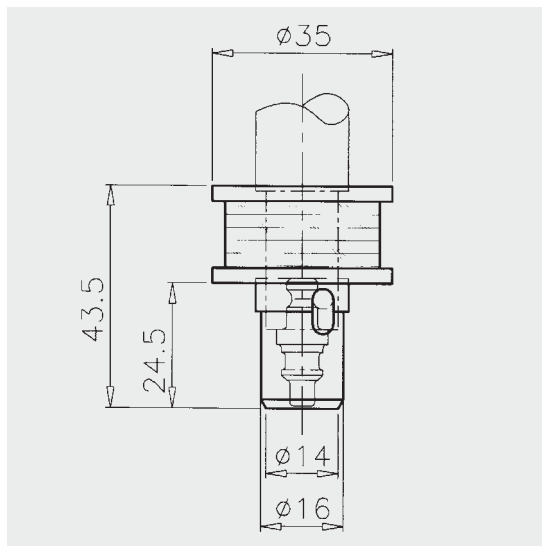
Particularly for opening strokes from 60 mm, we offer the innovative RIVCLINCH® PASS setting cylinder which allows to work with a foot pedal switch or in one-hand operation.

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/m³ 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

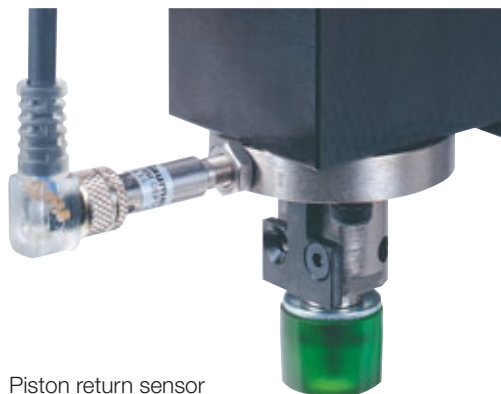


Booster with OCC

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.

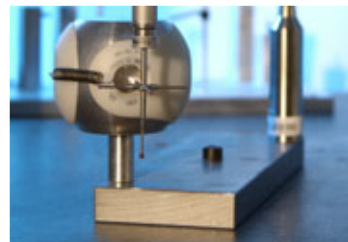
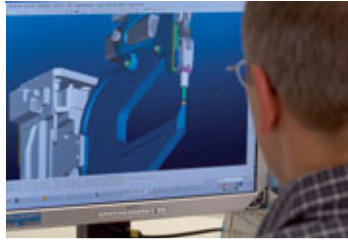
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Sampling for your components with competent application engineering.

From A to Z

Technology

Analysis



Assembly

Quality

Service

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United Kingdom
USA

Apart from these 21 countries, Böllhoff supports its international customers in other important industrial markets in close partnership with agents and dealers.

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