



HEMATIC  
BOLZENSCHWEISS  
SYSTEME



and cost savings  
design potentials  
massed economy

# Stud Welding

*What is stud welding and how does it work?  
The 12 most important questions and answers ...*

# Stud Welding

## Advantages ...

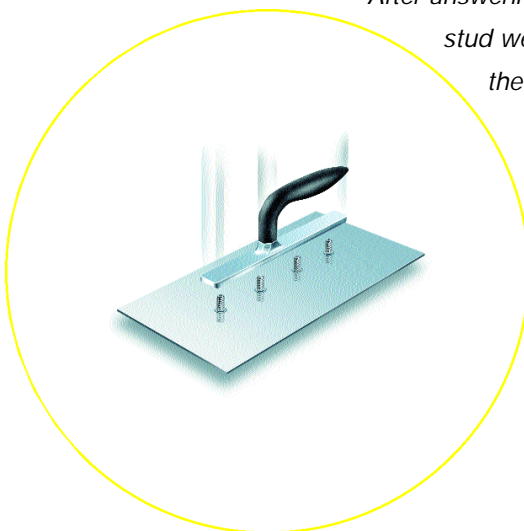
*In many areas stud welding is the **most economic** fastening method for components.*

*If using thin plates, stud welding is often the **only** technical solution.*

*With this **HBS** information brochure we want to show you the advantages of our technology.*

*After answering the 12 most important questions about stud welding, we provide you with an overview of the standard and **HBS** special processes.*

***Have fun reading it!***



## Tremendous time and cost savings

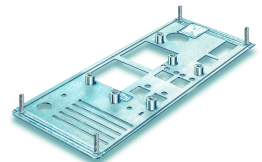
**No:** drilling – punching – threading – gluing  
riveting – screwing – finishing

## New design potentials

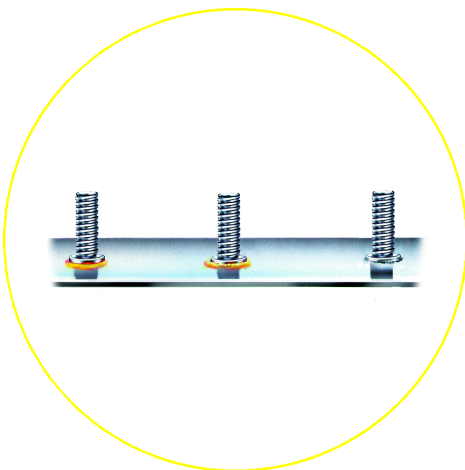
- ➔ *Very low distortion by extremely short welding time*
- ➔ *No leaking caused by drilled holes*
- ➔ *High strength*
- ➔ *One-sided accessibility of the component is sufficient*
- ➔ *Weldable even onto very thin plates*
- ➔ *Joining of different materials is possible*

## Unsurpassed economy

- ➔ *Can be automated to a very high degree*
- ➔ *Very short welding time (1-990 ms), fast weld rates*
- ➔ *Fast and easy handling leads to high productivity*
- ➔ *No marks on backside of coated or high alloyed plates*
- ➔ *Low prices for standard studs*



# The 12 most important questions and answers ...



## 1. What is stud welding?



*Threaded studs, pins, tapped pads, clips etc. are welded by an arc without additional material*

## 2. How does stud welding work?



*An arc is ignited between the face of the stud and the surface of workpiece; once both parts are melted, the stud is gently pressed against the workpiece and then joined together*

### 3. What kind of processes are available?

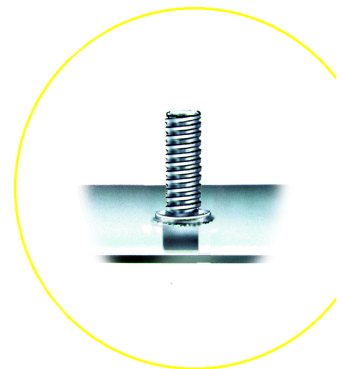
- ➔ **Capacitor discharge stud welding** with tip ignition (TS) according to DIN <sup>1)</sup>. Especially suited for welding on thin plates from about 0.6 mm minimum; plate thickness: 1/10 of stud diameter. Welding range: M3-M8 (M10)
- ➔ **Drawn arc stud welding** (DS) according to DIN <sup>1)</sup>, process variations: drawn arc stud welding with ceramic ferrule or shielding gas; short cycle drawn arc stud welding; capacitor discharge drawn arc stud welding. Especially suited for welding on thicker plates of 2 mm and above. Minimum plate thickness: 1/8 of stud diameter. Welding range: Ø 2-22 mm (M24)

See page 10-11; **HBS** special processes see page 12-14

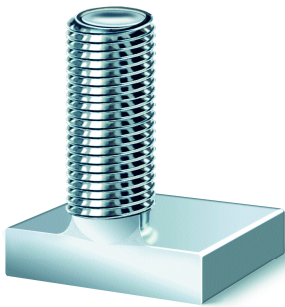
### 4. Where is stud welding used?

- ➔ **Capacitor discharge stud welding:** sheet metalwork, electronic industries, switchboard cabinets, laboratory and medical equipment, food industry, household appliances, communications engineering, vending machines, windows, glass constructions, insulation technology, industrial kitchens etc.
- ➔ **Drawn arc stud welding:** steel construction, mechanical engineering, shipbuilding, structural and civil engineering, power plants and combustion systems, boiler and plant equipment, insulation and windows, buildings

<sup>1)</sup> DIN EN ISO 14555







## 5. How strong is the joint?



*Because the stud is joined with the workpiece over the whole surface of the stud, the strength of the joint is even higher than the base material or the stud*

## 6. Which materials are weldable?

*Generally materials of the same kind should be welded\**



**Capacitor discharge stud welding** according to DIN <sup>1) 3)</sup> :  
steel (mild and alloyed steel), aluminum, brass



**Drawn arc stud welding** according to DIN <sup>1) 2)</sup> :  
steel (mild and alloyed steel)

*\* Other materials/combinations on request*

<sup>1)</sup> DIN EN ISO 14555 <sup>2)</sup> DIN EN ISO 13918 (formerly DIN 32500) <sup>3)</sup> DIN EN ISO 13918 (formerly DIN 32501)

## 7. Which stud diameter and stud length can be welded?

- ➡ **Capacitor discharge stud welding** according to DIN <sup>3)</sup>:

M3-M8 (M10),  $\varnothing = 2-10 \text{ mm}$

- ➡ **Drawn arc stud welding** according to DIN <sup>2)</sup>:

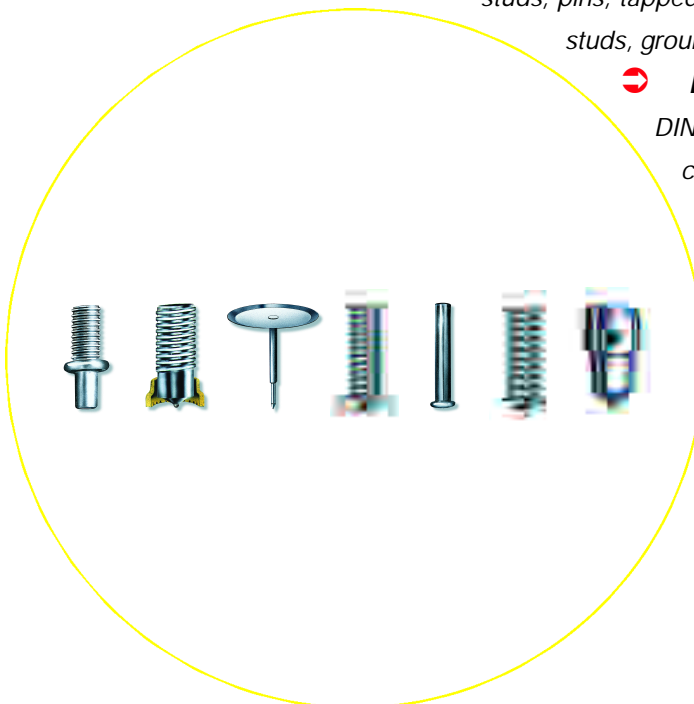
$\varnothing = 2-22 \text{ mm}$  (M24)

**Lengths:** Ask for the **HBS**-brochure "Product Range – Welding Studs"

## 8. Which stud shapes are available?

- ➡ **Capacitor discharge stud welding** according to DIN <sup>3)</sup>: threaded studs, pins, tapped pads, christmas tree studs, paint clearing studs, grounding clips, cupped head pins, insulation pins

- ➡ **Drawn arc stud welding** according to DIN <sup>2)</sup>: threaded studs, pins, tapped pads, christmas tree studs, concrete anchors, collar studs, insulation pins



HBS also delivers custom made fasteners and studs

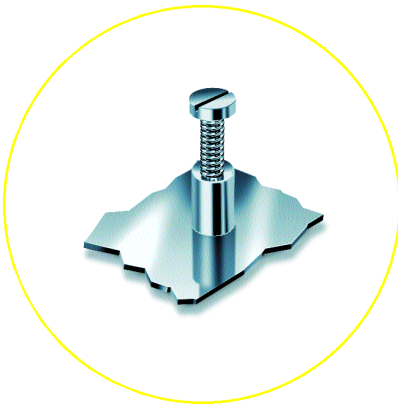
Ask for the **HBS**-brochure "Product Range – Welding Studs"

<sup>2)</sup> DIN EN ISO 13918 (formerly DIN 32500)

<sup>3)</sup> DIN EN ISO 13918 (formerly DIN 32501)

## 9. How long does the welding process last?

- *Capacitor discharge stud welding: 1-3 ms*
- *Drawn arc stud welding: 5-990 ms*



## 10. Which quality of the plate surface is required?

- *The surface of the plate must be electrically conductive*
- *Varnish, aluminium layers, scale, rust and plastic surfaces are to be removed. Check galvanized and oily plates for their weldability*

## 11. How many studs per minute can be welded?

- *Manual stud feeding: 5-6 studs per minute\* (average)*
- *Automatic stud feeding: 20 studs per minute\* (average)*

\* Production rate depends on application and type of **HBS** studwelders



## 12. How to automate stud welding?

➡ **HBS** delivers a wide product range: Starting with a hand held welding gun with automatic stud feeding, semi-automatic systems, up to fully automated stud welding units and robotic applications.

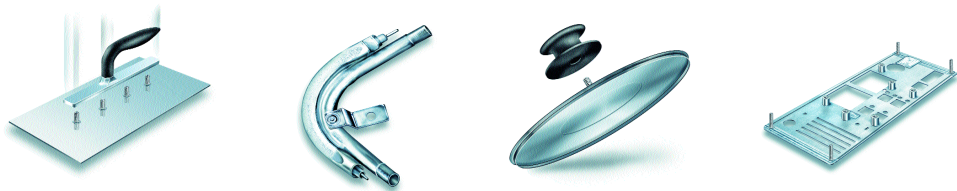
Single source – by **HBS**

Ask for our **HBS**-brochure "Product Range – Automatic Stud Welding"



# The stud welding

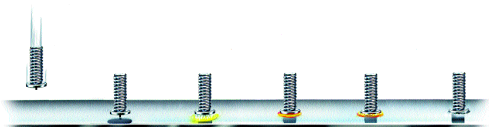
## processes ...

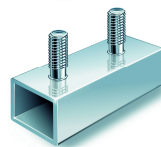
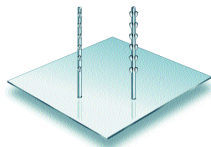
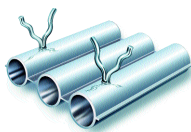


### Capacitor discharge stud welding with tip ignition – CD

1. The capacitors are charged
2. The CD-stud in the gun is moved by a spring to the workpiece surface
3. The tip touches the workpiece and closes the electrical circuit. The rapidly increasing current melts the tip instantly and ignites the arc
4. Stud and workpiece surface melt
5. When the stud touches the workpiece, the arc extinguishes, the welding pools merge and solidify

Ask for our **HBS**-brochure "CD – Stud Welding Systems For CD-Welding"

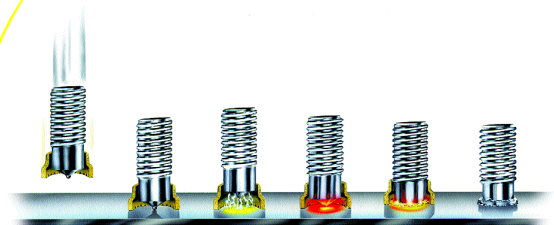




## Drawn arc stud welding – ARC

1. The stud is lifted up in the gun by a lifting device and a secondary arc (pilot arc) with low current is ignited
2. Then the main arc is ignited between the tip of the stud and the workpiece
3. The surface of the stud and the workpiece melt
4. After the end of adjusted welding time the stud is moved to the workpiece; both welding pools merge. The power unit is switched off; the weldpool solidifies and cools down

Ask for our **HBS**-brochure "ARC – Stud Welding Systems For ARC-Welding"



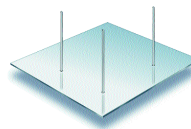
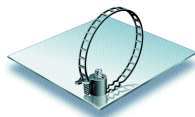
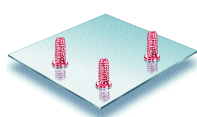
HBS-Advantages

HBS-Questions+Answers

HBS-Processes

HBS-Special Processes

# And more: HBS- special processes ...



## Stud welding by Short Cycle – SC

*Drawn arc short cycle stud welding*

**Mains supply: 230 V single phase only**

**2 sizes of power units**

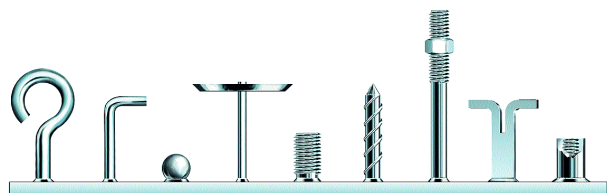
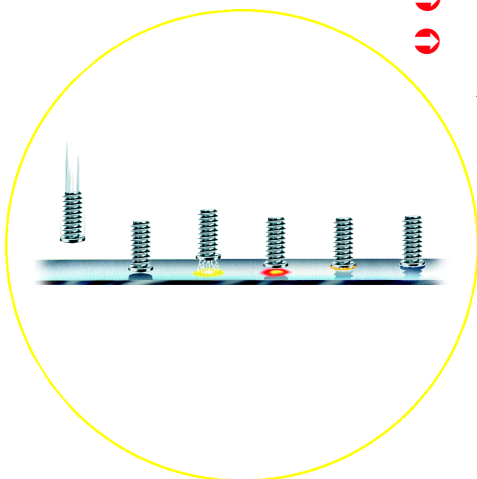


**SC 2400:** ideally suited to fasten insulation pins (e.g. refractory insulation)

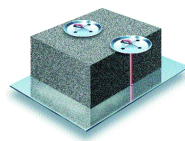
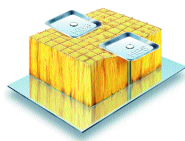
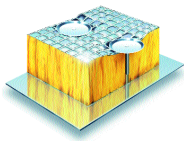


**SC 3200:** christmas tree studs (e.g. cable fasteners)

Ask for our **HBS**-brochure "SC – Stud Welding Systems For SC-Welding"



*Additional applications for SC 2400*

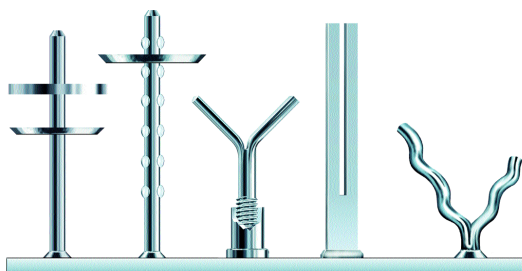


## Fastening of insulation material using cupped head pins – ISO

*Specially designed power unit by **HBS** for welding cupped head pins to fasten insulation material (heat, cold, noise and fire)*

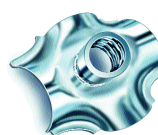
- ➔ The insulating mat is fastened in one step
- ➔ Very cost effective fastening system
- ➔ No welding marks on backside  
(even on galvanized sheet) > 1 mm

*Ask for our **HBS**-brochure "ISO – Fastening Systems For The Insulation Market"*



*Ask for **HBS**-“Catalogue High Temperature Insulation”*





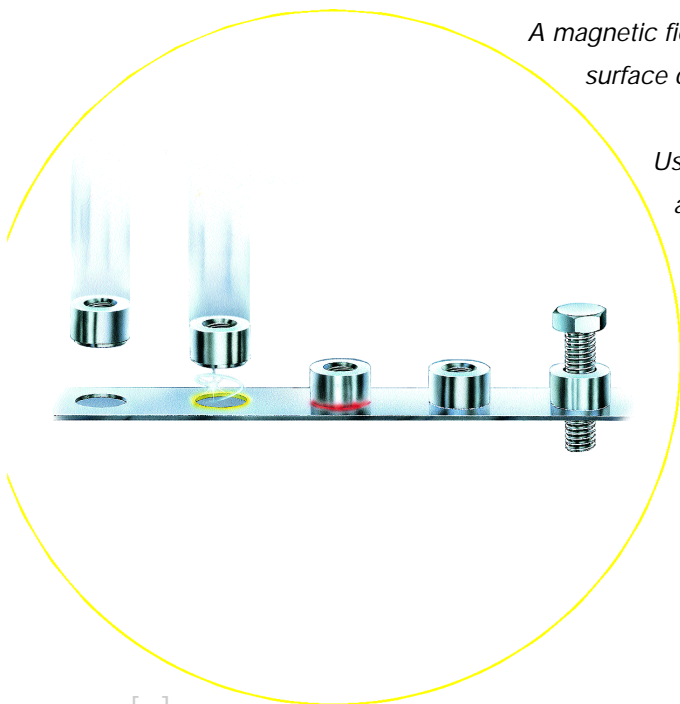
## Nuts and pads welding by magnetic rotated arc – MARC

*MARC welding is a variation of drawn arc stud welding.*

*A magnetic field is rotating the arc and a weld pool on the entire surface of the cylindrical pad is generated.*

*Using this procedure, you can weld on through-hole and dead end-hole applications, as well as on curved workpiece surfaces.*

*Ask for our **HBS**-brochure "Rotamat 800"*





# HBS – Your partner for fastening methods

## Product range and quality

- ➔ *Reliable manual stud welding machines*
- ➔ *Cost efficient semi-automated machines*
- ➔ *Industrial, computerized, fully-autom. CNC-machines*
- ➔ *Complete range of welding studs and fasteners*
- ➔ *HBS has been certified in 1994 according to DIN EN ISO 9001*



## Research and development



- ➡ Innovative research and development department
- ➡ Close cooperation with several universities and research institutes for welding techniques and metallurgy to increase our leadership in technology. As a result we are proud to hold numerous patents and awards

## Company profile and worldwide sales

- ➡ Founded in 1975, 50 employees. Our strength: development, design, assembly, own software for CNC-machines
- ➡ HBS sells its products to more than 40 countries, export share: 50%





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