Consulting for contact technology and standardization
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DIN/VDE · EN · IEC

BIZON pat. press-fit technique

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Guide for determining the size of the contact, the circuit board and application guidelines

1. **BIZON-Contact**
   The BIZON-contact complies with the IEC 60352-5 and higher requirements for applications in automotive.

   Normally, the cross-section of the BIZON-contact is square. This means, the size of the contact and the borehole arise from the required or selected thickness of the sheet material. The BIZON-contact can be adjusted in predetermined, larger holes (compatibility with competition). E.g. instead of hole 1,2 mm, hole 1.45 mm to 0.8 mm thickness

   The stamping technically minimum contact distance (grid) arises from pin width plus pin thickness. For square pins is the grid equal to the double thickness or customized pins (a + b). This grid is smaller than the meaningful hole distances on the printed circuit board (rest material between the bore holes), so no limitation for compact design.

   For high-current applications, the sheet thickness resulting from the possible design dimensions of the supply line (busbar) and the conductivity of the material. Each sheet thickness up to 2 mm is possible, so that the electric conductor cross-section required can be selected accurately and no material is wasted.

   The number of contacts per connection should be selected according to the available space on the circuit board so that the current is distributed extensively. Better a contact more than one too few. Several contacts per member also improve the mechanical safety and cost little more.

   The power dissipation in the contact feed should be less than in the contact, or the conductor cross-section in the contact feed should be greater than the sum of the press-fit contact sections.

   Especially with large contacts the position tolerances between multiple contacts and the PCB-holes generate considerable lateral forces during pressing. These forces are unavoidable in practice and should be considered. A correspondingly long, detached connection of contacts to the base point reduces these bending forces. They should be significantly smaller than the deformation forces of the contacts. So each contact adapts to the circuit board and cannot damage it. These construction measures must be agreed with the contact manufacturer.

   The material strength and length of contact is matched by the manufacturer, so that the contact pressure on the board hole lies within the permissible range.

   Prototypes can be realized quickly through **laser cutting**.

2. **Printed circuit board (PCB).**
   The board has to meet the requirements of IEC 60352-5.
   With proper design of the power management and power distribution standard PCB with two or more layers are sufficient for very high currents. The BIZON-contact is particularly suitable for thinner boards.

The **hole diameter** (finished hole) results from the contact size. The determination of the drill diameter before the metallization should be made by the PCB manufacturer since a linear calculation with FR4 boards is not possible. Only the final diameter and the thickness of the metal layers are relevant and tested.
For **MID-components** to the proper contact pressure is important, which may be considerably lower than FR4.
The BIZON-contact can be continuously adjusted in its plug-in power. From hand insert (connector) until automated press-in.

The risk of **Whiskers** is low with BIZON contacts. The less tin is on the contact and in the bore, the smaller that risk. The BIZON contact works even without tin. The thickness of the tin layer should generally be in the range of 0.8 to 1.5 microns, thus only serve as protection against corrosion. Since PCBs a nickel underlayer is not common, whiskers grow mainly from the tin the PCB.

3. Processing, contact insertion

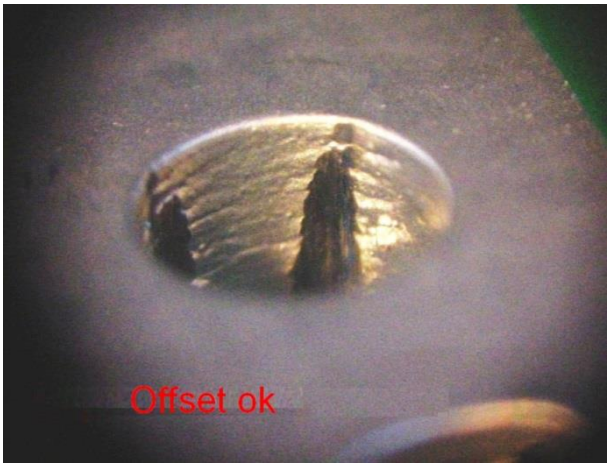
The fixation of the contact in the press-in device must be such that the contact is held securely and pressed perpendicular to the printed circuit board.

In general, the component with press-in contacts is pressed from above into the PCB. If the component to be pressed firmly held in the press-in device, it has to ensure that the board is floating within the capture circle of contact tips to the hole. The printed circuit board and the press-in contacts should be able to freely align themselves to one another.
The press-in force should not generate any torque on the contact and no sag, so rectilinear. Important in bends at the contact part, even at injection-molded parts.

The PCB should only lie in the paint-free area right around the holes on the press pad. For this purpose, the dimensions of the floating mounting of the PCB should be considered. The overhang of the contact at the bottom of the LP is observed.
Full-surface support of the PCB is not allowed.

4. Insertion depth

for PCBs up to 1.6 mm thickness, the thickest part of the BIZON-contact (contact center) should be in the middle of the circuit board thickness plus 0.2 mm. For thicker boards, such as 2.4 mm or thicker, the center of the contact should be at least 0.8 mm away from the lower or upper surface. The press-in tolerance increases accordingly. Large contacts must not be pressed too far. A landing shoulder can be helpful.



The pressing in is too deep, when pointing to the LP bottom bulges.
The maximum depth is when the contact track ends with the hole.

5. **Presence inspection of contacts inserted**
   There are two methods to prove that all contacts are present and have been pressed-in correctly: Optical camera and tactile with test probes.
   For test probes, it is necessary that the contact tips to stand out on the circuit board surface. For small contacts and center type pressing this overhang can be absent or too small. In this case, it is possible to press the contacts deeper until a sufficient overhang is reached. The limit depth is achieved when the track in the contact hole, the hole edge achieved (Figure 2). By measuring a sample that depth can be easily determined.

6. **Press-in speed**
   The press-in speed affects the press-in force and the process time. It should not come to a welding during pressing. The usual, very low speeds, however, it comes to welds. This increases the press-in forces and interferes with the desired scale cold welding after the pressing process.
   To take full advantage of, should be at least 1500 mm / min for the BIZON contact the press-in speed. This shortens the production process considerably, particularly with large contacts. At high speed, the initial holding force may be reduced slightly. This is due to the smoother contact surfaces, but improves the contact reliability.

   In the IEC 60352-5 standard, although very little press-speeds are given (25 - 50 mm / min), however, the contact manufacturers can set different speeds.

   Of course BIZON contacts can also be injected with the standard speeds. Here too, the press-in forces are just about as high as the holding forces.

7. **Specification of the user**
   - Design of individual press-fit member
   - Current (A)
   - Sheet thickness, this results the contact size
   - measure middle PCB - Press-shoulder or reference edge on contact
   - Material, operating temperature
   - surfaces
   - Holding forces
   - Position and geometrical tolerances on the component
   - catching circuit of the contact tip
   - Printed circuit board material and thickness
   - Hole diameter only if otherwise specified
   - grid

   and more

8. **Agreements between the user and manufacturer of press-in contacts**
   - Materials, strength
   - surfaces
   - Holding forces
   - Position and geometrical tolerances on the component
   - catching circuit of the contact tip
   - Contact size, sheet thickness
   - Hole diameter
   - grid
   - insertion depth
   - Printed circuit board material and thickness

Furthermore see also **www.bizon-kontakt.de** **info@veigelnorm.de**