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MODULE Q

Welding machines for resistance welding

Electrodes and electrode maintenance



Electrodes and Electrode Maintenance

- ▶ In all kinds of resistance welding electrodes have an immediate impact on the quality of welded joints.
- ▶ They are parts of the secondary circuit, the current is supplied to them, but at the same time and transmits the force to the welded parts.
- ▶ Important as the electrode geometry and the material of which they are made.
- ▶ Welding the electrodes are made of copper electrolytically produced copper alloy or chromium.
- ▶ Electrodes they have channels for cooling water to prevent the deterioration of their material overheating.
- ▶ Face electrodes is influenced by the purpose of use.
- ▶ Except there are also direct electrodes shaped electrodes tailored welded panels of.

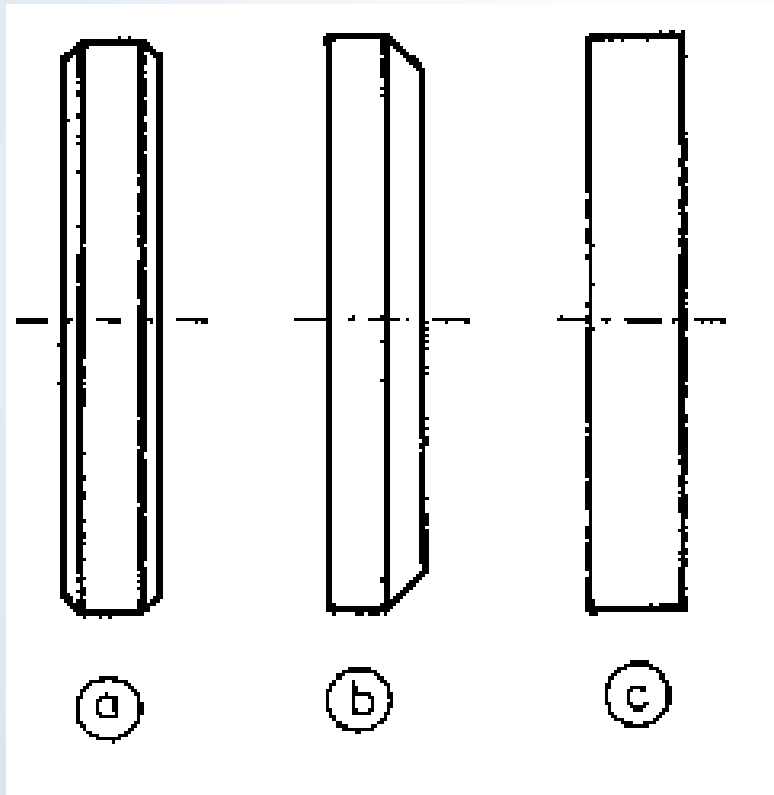


Electrodes and electrode maintenance

- ▶ Material the electrode must be sufficiently resistant to wear and deformation not only cold, but also at elevated temperatures. In addition, it must be sufficiently electrically conductive.
- ▶ Used the copper alloys with various additives according to the type of material to be welded.
- ▶ For welding steel, low carbon sheet, it is e.g. alloy CuCrZr, Welding stainless steels CuBeCo, Welding of aluminum alloys CuCd etc.



Circular seam welding electrodes

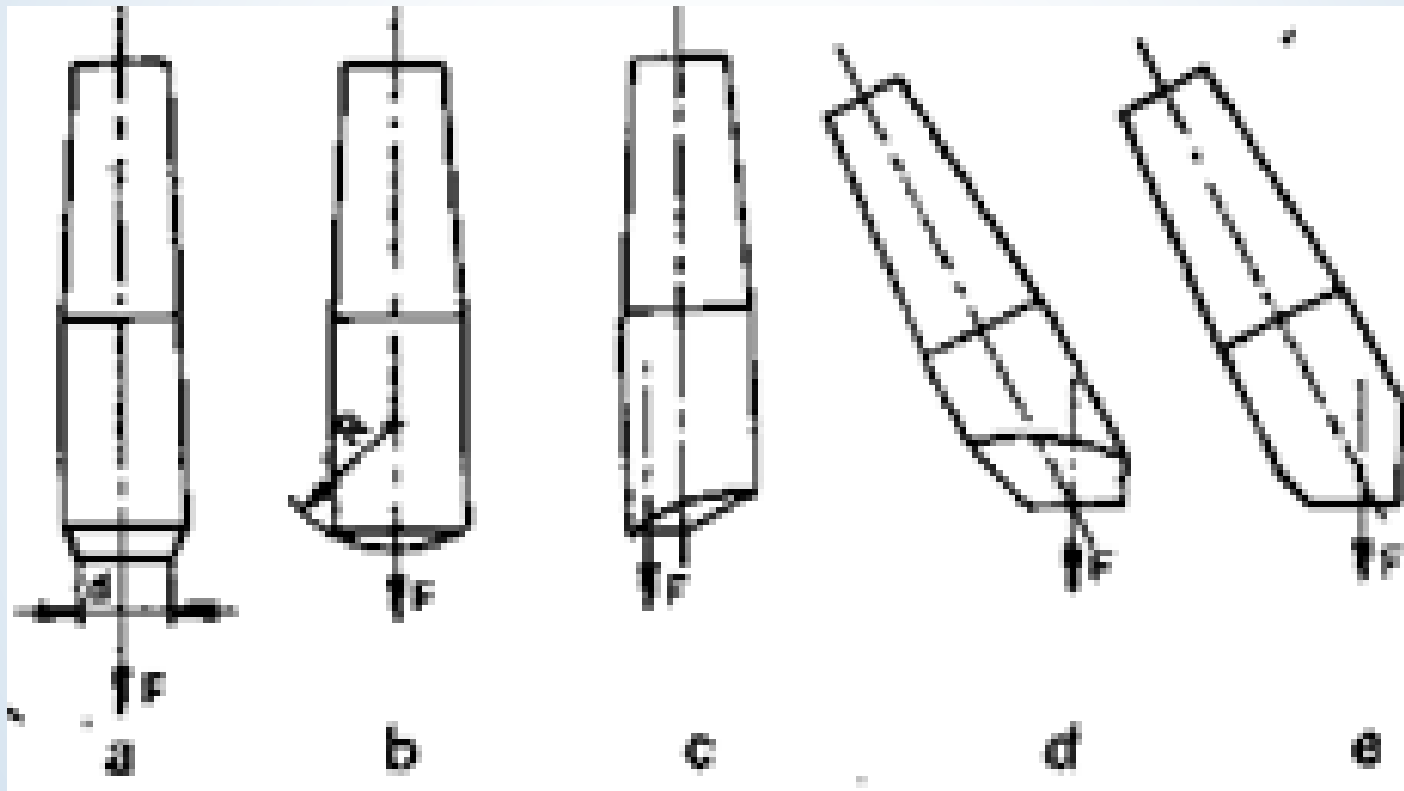


*a - mutually skewed,
b - unilaterally beveled,
c - rectangular*

KUBÍČEK, J. DANĚK, L. KANDUS, B. *Technologie svařování a zařízení. Učební texty pro kurzy svařovacích inženýrů a technologů.* Plzeň: ŠKODA WELDING, s. r. o., 2011. s. 133.



Electrodes

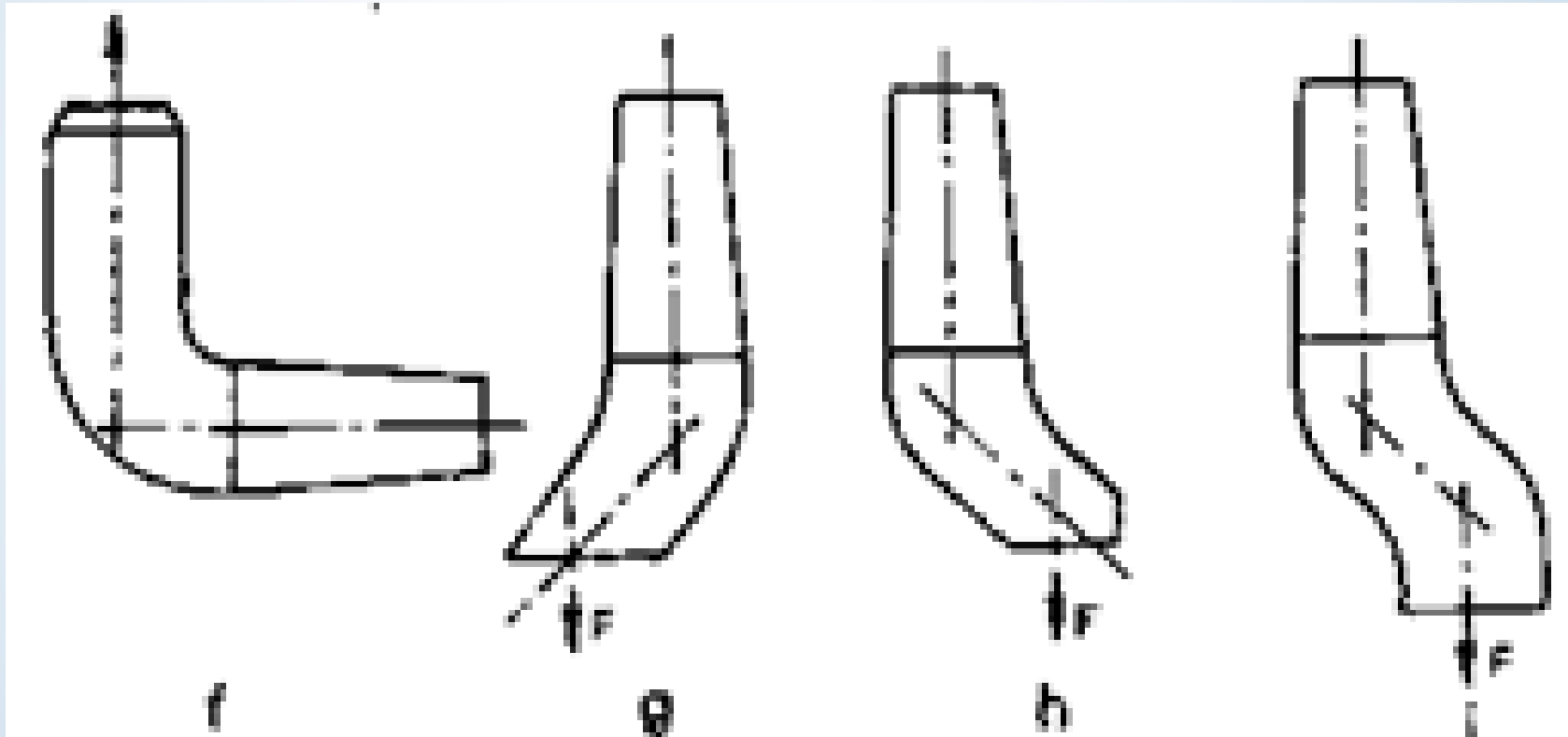


*a, b - for conventional welded joints,
C - for spot welds in the corners,
dE - the point weldings lying outside the axis of the clamping electrode (electrode solution oblique clamping)*

KUBÍČEK, J. DANĚK, L. KANDUS, B. *Technologie svařování a zařízení. Učební texty pro kurzy svařovacích inženýrů a technologů.* Plzeň: ŠKODA WELDING, s. r. o., 2011. s. 134.



Electrodes



f - the support electrode;
 G, H, I - the point weldings lying outside the axis of the clamping electrode (electrode solution bending)

KUBÍČEK, J. DANĚK, L. KANDUS, B. *Technologie svařování a zařízení. Učební texty pro kurzy svařovacích inženýrů a technologů.* Plzeň: ŠKODA WELDING, s. r. o., 2011. s. 134.



Maintenance electrodes

- ▶ When welding devices for welding resistance tan ends of copper electrodes.
- ▶ Yippee must end during welding edited.
- ▶ Recommended to those activities using coarse files due to shortening electrode life.
- ▶ To adjustment is used emery cloth.
- ▶ Important it is that the working electrode surfaces remain flat and smooth.
- ▶ Otherwise risk that the working pressure does not transmit the entire working surface of the electrode.



Specific problems weldability

Weldability for resistance welding



Weldability for resistance welding

- ▶ Carbon steel can be welded without problems in the spot, projection and the contact pressure welding in the carbon content of 0.22%.
- ▶ Over this limit is needed to use a soft welding mode, preheating or pulsatile welding cycle particularly when welding large thicknesses.
- ▶ Mainly austenitic stainless steels stabilized steel is suitable in hard weld welding procedure, to prevent the precipitation of carbides of chromium.
- ▶ With weldable austenitic steels are stabilized with suitable parameters usually no problems.



Weldability for resistance welding

- ▶ Plated steel sheets particularly galvanized sheets require adjustment of the welding parameters.
- ▶ For spot and seam welding parameters are increased by about 30%.
- ▶ Necessary calculate the reduction in electrode life.
- ▶ Tracks After the electrodes can be adjusted to metal coating.
- ▶ Copper is not due to its electrical conductivity suitable spot welding, seam welding and lobed with the exception of very small thickness when using ultratvrdeho welding mode.
- ▶ contact pressure welding and butt deposition welding can be used.



Weldability for resistance welding

- ▶ Alloys especially copper brass can be welded because they have higher electrical and thermal resistance.
- ▶ Aluminium and its alloys can be welded with higher currents in hard welding mode.
- ▶ Biggest welding obstacle is the presence of aluminum oxide on the surface of a material having a high electrical resistance and a melting point above 2000 ° C.
- ▶ Therefore it has to be from the surface of the material removed before welding.