

High demands on material, dimensions and tools

Narrow tolerances and accurately controlled materials, together with connectors, cables and tools made to fit one another, are indispensable in achieving a reliable crimp connection. The requirements of the crimp inserts are:

- exact maintenance of size
- high strength and hardness
- fine surface finish

As can be seen in Fig. 5, the best results were obtained with square dimensions of 2.35–2.45 mm. Permissible tolerances of ± 0.05 mm can be derived therefrom. For smaller square dimensions (e.g. for subminiature connectors of the Series SMA, SMB, SMC, SMS) tolerances of ± 0.03 mm are in fact necessary.

The demands upon the crimp inserts are very high. With crimping forces of 300–700 kp (Fig. 10), surface pressures up to 70 kp/mm² occur. Oil or air-hardened steels must therefore be used, which are profile ground in the hard state. This process permits maintenance of size and high surface finish.

The most important requirements of the contact parts are:

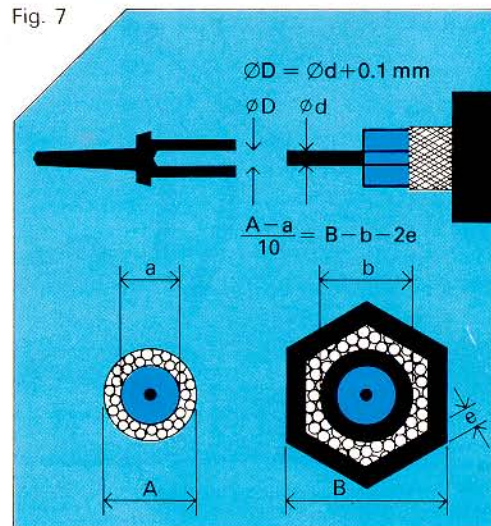
- matched exactly to the cable to be crimped
- close tolerances
- use of soft materials with controlled hardness

The dimensions of the crimping components must be individually adjusted to

the different RF cables. The formulas shown in fig. 7 are valid as a basis for dimensioning. In order to guarantee a constant quality of the crimped joint, the dimensions of the inner conductor must be maintained to 0.03 mm, those of the outer conductor to 0.05 mm.

- D = pin hole
d = diameter of the inner conductor
A = outside diameter of screen
a = dielectric diameter
B = hexagonal width of the crimp ferrule
b = outside diameter of the crimp spigot
e = wall thickness of crimp ferrule

Fig. 7



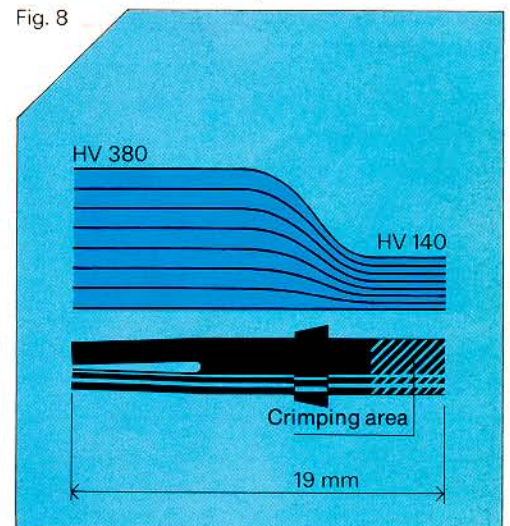
Basic rules for dimensioning crimp components

The components to be deformed should be made of the softest possible material. This allows a strong deformation without embrittlement or formation of cracks. Further, the necessary crimping forces can be kept low, which facilitates the construction of lighter and handier crimp tools.

Soft-annealed copper (HV 40–50) is specially suitable for crimp ferrules. The use of drawn tubes permits the maintenance of a diameter tolerance of ± 0.025 mm, which is difficult to achieve with free-cutting machining.

Centre contacts must be manufactured from a hard, non-abrasive material in order to provide a durable working life. Most coaxial connector specifications specify brass for contact pins and heat-treated beryllium copper (HV 380) for contact sockets. To make satisfactory crimping possible despite this, these parts are either made of different materials or partially annealed. This

Fig. 8



Hardness profile of a partially annealed contact socket

partial annealing involves complicated methods (e.g. RF induction heating), results however in contacts with greater conductivity and higher reliability than bonding various metals.