1.2 The Threshold Welding Current for Large Area Closed Contacts with ‘n’ Points of Contact for Short Duration, High Fault Currents
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A model is developed to determine the peak current required to weld large area closed contacts with ‘n’ points of contact when passing short duration, high fault currents. The model also predicts the threshold welding current for parallel contact structures used to carry large currents in high current switching devices. The model considers: (1) the total contact resistance of the closed contacts by including the expected constriction resistance as well as the resistance resulting from the high temperature of the contact spots; (2) the effect of the ‘blow-off’ force from the passage of the current through the contact spots; and (3) the reduction of the hardness of the contact metal in the vicinity of the high temperature at the contact spots. A discussion of the model shows how it can be used in practice to analyze not only welded contact structures, but also to determine the contact force required to prevent them from welding during the passage of overload currents.