

(MIG/MAG) - Metal Transfer

Introduction:

This work has as main objective the contact with the weld processes (MIG/MAG), MIG (metal inert gas) when the gas of protection used is inert and it does not have physical activity with the fusing puddle and MAG (Metal Active Gas) when the gaseous protection is made with an active gas; the familiarization with the different forms of transference of metal and also of its importance for this process of welding and in the current industry.

Description of the Process/Subject Technician:

It is called for metal transference, the flow of metal from the tip of the wire electrode for the fusing puddle. The main factors that lead to the determination of the type of metal transference can be: the type of gas, the position of weld and the thickness of the material to cast, among others. There are three ways to begin the metal transference in the process GMWA (Gas Metal Arc Welding):

- Transference by short circuit: the name is due to metal drop that forms at the tip of the wire electrode, it grows until it touches (the 20, 200 times for second) in the fusing puddle provoking a short circuit. This way of transference is used when the welder needs to work in different positions of the plain position and when the plates to be welded are thin and asks for low values of tension (small length of the arc) and of chain. This type of transference is something unstable; therefore it generates a certain amount of melted metal projection in the end of each short circuit. However it can be prevented if the transference frequency is maxed, varying the welding tension (it is verified by the noise of the process).

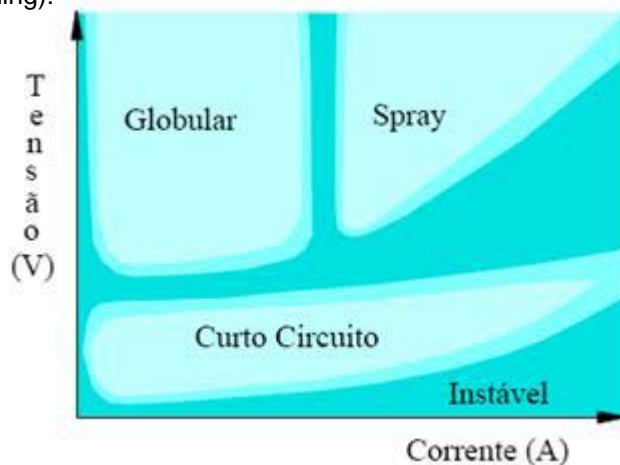


Figure 1: Conditions of current and voltage for different forms of transfer

A sufficiently important factor for the success of this process is the “inductance”. This term says respect to an adjustment that must be made in the machine for welding GMAW, to keep the stability of the process in the transference for short circuit, through the tax of growth (A/s) of the current. If the current raises of a very fast form, the disruption of the wire at the end of a short circuit tends to be explosive and there is lots of protection. On the other hand to increase itself very slowly, the disruption of the wire cannot occur and the welding process is interrupted.

- Globular transference: The wire electrode is melting transforming into drops of bigger diameter than the diameter of the wire electrode, through the action of the gravity without the action of the short circuit. This way of transference is used in the plain position and is characteristic of the welding of current decrease (magnetic force small) and raised tension (great length of arc). In the steel welding, with protection of CO₂, where the conditions for spray transference do not exist, the globular transference also occurs with high currents. This form of transference tends to be unstable, because of the arc disturbances caused by melted metal projection to the arc for the detachment of great drops and the occurrence of aspersion.

- Transference for Spray: There is a spraying of the casting drops with lesser diameters that the diameter of the wire electrode. This form of transference extremely tends to be steady (since the arc is long enough to prevent the short circuit occurrence) and does not depend on the force of the gravity. The necessity of a raised current, however, restricts its use for the welding of meetings of bigger thickness and for the welding in the plain position (the fusing puddle tends to have a volume and fluidity that makes it difficult its control is of the plain position). This is one more way of transference that can only be used in the plain position.

Applications:

Nowadays, with the development of electronic controlled welding machines, the process of weld in cause has become very common. Process MIG/MAG in the three forms of transference consists of a half-automatic operation and without slag, conferring bigger productivity and satisfactory properties. Given the significant influence of the welding on the time of the weld process and, then, on the raised cost of the workmanships, one justifies the study and the development of this technology, in order to make it available to the national companies for a low cost, increasing its competitiveness in a globalized sector as the oil for example.