



# RESISTANCE WELDING EQUIPMENT & SUPPLY CO.

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FFA # 3

## MINIMUM SURFACE MARKING WELD DATA SHEET

Many times it is desirable to produce the best possible appearance welds on one "show" side of a part. Using standard dia. tips of the proper size for the material being welded causes indentation on both pieces when the two tips are of equal dia. and after a normal weld schedule setting, there is a slight heat shrink mark due to the proper welding settings. This would be a standard weld for maximum strength.

To provide minimum marking on one side a larger electrode can be used to diffuse the current to prevent excessive indentation. To provide this minimum marking requires very careful selection of Weld Time, Weld Pressure, and particularly Weld Currents (or % heat). After a proper tip set up is made with a large "flat electrode, or larger swivel electrode on the show" side, welding time should be set as short as practical for the material thickness. Weld Pressure should be set approx 10-15% higher than the chart settings for that material gauge being welded. Weld Currents should be adjusted by an accurate percent heat control to be no higher than required to make the minimum strength weld for the part. (Excessive over welding is not compatible with minimal marking)

Thus, after properly selecting tips, weld time and pressure, the current must be adjusted to provide your exact weld penetration. In some cases it may be necessary to measure the current with the proper tip dia. to determine the maximum amount of current required without causing excessive indentation. Shoot for the lower left corner of the lobe curve.

As an example: On .030 CRS material which is welded at 13,500 amps, the indentation is only about 2%, whereas, at 14,000 amps it is 10%. Thus the optimum current becomes approx. 13,500 amps for a 1/4" dia. spot using 1,000 LBS. Weld Force. As a general rule, pressures lower than 15,000 LBS per Square inch (weld force over the sq. inch area of tip dia.) on thin materials is a minimum value to prevent expulsion or spitting of the weld.

If the pressure increases above 1,500 LBS. per sq. inch to say 3,000 PSI, the indentation jumps from 6% at 14,000 amps to approx. 25% at 14,500 amps as compared to an increase from 2% to 10% indentation at the lower pressure for the same 3 1/2% change in weld current. Therefore, even though we wish to use higher pressures, we do not desire to go extremely high and the slightly higher pressures, requires higher weld current at slightly longer weld time.

Making a minimum mark weld also requires a very finely polished weld tip on the show side and careful balancing of your current and pressure using the minimum weld times for the particular material thickness. Plan on changing tips 2 to 3 times as often.

Various weld samples will have to be carefully made and pull tested to determine which is the best combination of settings for your particular material thicknesses and

appearance requirements. Remember, that as the “show” side tip is larger than the smaller tip dia. larger weld currents maybe required to make the weld, and thus a very complex compromise situation has developed. (Min. current for Min. marking, Max current due to larger tip dia.)

Using either swivel weld tips or large flat faced back-up tips with a weld table to properly position the parts are other ideas to help provide less marking on a larger part. In some instances, series welding with a back-up bar on special machines can help provide minimum marking on one side. Some experimentation on weld tips will be to your advantage and could be done on a trial and error basis to see if they would be helpful on your particular application. Don’t make the large “show” electrode too large or you’ll loose current density and have other issues. 50% more area is enough!

All of the above variables can be measured with proper instrumentation, a weld force gauge, current monitor and weld time checker can be important if you are to determine exactly what is the best setting for a particular material thickness. The ideal situation is to make a proper lobe curve for the application.

There are many weld settings of current, pressure and time, which will weld a certain particular metal thickness, thus, you could be using long weld times with low heat or short weld times with high heat. Also, depending on the pressure, various combinations of weld current and time are possible to provide almost the same results. In general, spot welding should be done with relatively short weld times, in the range of 10-25 cycles weld time for gauges of 14 ga. or less, and utilize proper pressures from the weld chart.

Use relatively high currents to provide a quick efficient weld. In other words, don’t over heat the whole mass; just heat the weld area quickly. These guidelines are only a suggestion for aid and set-up of a spot welder to arrive at a desired spot weld condition in a relatively short amount of time. Remember to log your settings for repeat set- ups which will save time, improve weld quality and provide a reference to determine if the machine is continuing to operate at its proper settings. This is the advantage of recording and measuring with instruments, the WELD CURRENT, WELD TIME & FORCE.

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