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Characterization of PHS 22MnB5 steel spot welded in single operation and with additional pre and post heating steps.

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The hot pressing hardened steel known as “Press Hardened Steel – PHS”, is a steel of extreme importance for the automotive industry. The application of this type of steel in the structure of vehicles promotes the improvement of safety, mass reduction and lower fuel consumption. The increase in the use of this type of steel, culminated in the need to deepen knowledge about the joining processes, more specifically about the electrical resistance welding process known as “Resistance Spot Weld – RSW”, which is one of the most used processes in automotive structural construction. The objective of the present work is to evaluate the spot welding of PHS 22MnB5 steel hardened through heat treatment in the laboratory, simulating the hot pressing process commonly applied in automotive industrial practice. A study is carried out on spot welding of similar materials, that is, the welding of 22MnB5 steel with itself, an autogenous weld. Welding was carried out under two different conditions, the first of which considers a single step of joining the sheets and the second with the application of additional steps of pre and post heating. The characterization of the welds was done through mechanical tests and microstructural analysis. The mechanical strength was evaluated based on the effectively resistant area, considering the effective dimensions of the spor welds obtained in the ultrasound measurement, already discounting the area values of possible flaws/voids existing inside the spot welds that have been detected in the ultrasound. The results showed that the welds performed in the single step condition generally presented higher values of mechanical strength in relation to those in which additional pre and post-heating steps were applied. These results suggest that the additional steps of pre and post heating act to promote annealing or tempering of the weld material and adjacent regions, increasing the region affected by heat, modifying the microstructure, reducing the hardness and consequently the mechanical strength in these regions.