

POSSIBILITIES OF IMPROVING PROPERTIES OF MICROALLOYED STEEL WELD METAL BY CHOICE OF WELDING PROCESS AND TECHNOLOGY

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ABSTRACT

In this paper is shown the influence of welding process and technology on the weld metal properties. Microalloyed steel, low alloyed by Ti, Nb and V, is welded by MMA process and MIG/MAG process in the shielding atmospheres 5%CO₂+Ar and 15%CO₂+Ar. The testing results of weld metal toughness, hardness and microstructural analysis are presented. It was shown that weld metal obtained by MIG/MAG process in shielding atmosphere 5%CO₂+Ar has the best properties.

Keywords: microalloyed steel, MMA, MIG/MAG, toughness, microstructure

1. INTRODUCTION

The choice of welding process and technology significantly affects on the weld metal properties. Beside conventional MMA process, welding by metal arc process with mixture of shielded gases has been increasingly popular in recent years. A compound of gas mixture significantly affects weldment properties, especially weld metal toughness. Namely, increased presence of oxide inclusions in weld metal, promotes nucleation of acicular ferrite, which is well-known for its beneficial effect to both weld metal toughness and strength [1,2,3]. In welding in protective gas mixture atmosphere, as a rule, comes to droplet refinement [4,5]. Welding in protective gas mixtures Ar + CO₂ provides better weld forming and less spattering than those obtained by welding in pure CO₂, and comparing with welding in protective atmosphere of pure argon provides better penetration [6].

2. EXPERIMENTAL PROCEDURE

Hot rolled sheets of microalloyed steel, 7.18 mm thick, were used for welding. Welding is performed by MMA process using EVB Ni electrode, Ø3.25 mm, and by MIG/MAG process, using VAC 60Ni, Ø1.2 mm, with protective atmosphere 5%CO₂+Ar i 15%CO₂+Ar. Chemical composition and mechanical properties of base metal and filler material are given in Table 1 and 2.

