

THE EFFECTS OF VANADIUM ON THE PARENT PLATE AND WELDMENT PROPERTIES OF ACCELERATED COOLED API 5LX100 STEELS

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SUMMARY

The effects of rolling schedule, finish rolling temperature, cooling rate through the transformation and vanadium level, with and without an addition of 0.25%Mo, on the properties of 15mm thick, accelerated cooled, plate of base composition 0.08%C/1.85%Mn/0.45%Si/0.05%Nb/Cu, Ni, Ti have been determined.

It has been demonstrated that plate of yield strength 100ksi, with >170J Charpy vee-notch energy absorption at -20°C, coupled with an 85% BDWTT transition temperature <-20°C, can be obtained using steel containing 0.08%V + 0.25%Mo, rolled by a schedule incorporating 20-21% deformation/pass in the temperature range 850-800°C, to finish rolling at 800°C, followed by cooling between 800 and 550°C at a rate exceeding 30°C/sec.

In expanded pipe, scope exists to reduce the vanadium level and cooling rate required for achievement of tensile properties.

An initial examination of the weldability, based on simulation of the longitudinal weld, indicates a satisfactory level of HAZ toughness, particularly in steel containing 0.08%V + 0.25%Mo. In addition, the preheating requirements for field welding appear to be similar to, but slightly higher than, those of existing API 5LX-80 steels.

1. INTRODUCTION

Since the launching of accelerated cooling after rolling of plate, in the early 1980's, there has been continuous development of the linepipe grades to which accelerated cooling is applied. Among other things this has led to the successful development of API 5LX65 for sour gas applications^(1,2) and API 5LX80⁽³⁾ for overland applications. Now that API 5LX80 has become an established grade, attention is being focused on even higher strength API 5LX100 linepipe.^(4,5)