

SUMMARY ON 20MnSiV PRODUCTION TEST

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Abstract: In this report, 20MnSiV production test with a 20 ton converter will be briefed, which testified many advantages of vanadium microalloying and discussed ways of the production of economical steel bar of class III.

Key words: test, V-Fe microalloying, residual nitrogen, strengthened precipitation, refinement of grain, cost

1 Introduction

Ever since the start of production, Shuicheng Iron & Steel has been concentrating its work on the production of 20MnSiV class II construction concrete steel bar which, compared with class III steel bar, is poor in strength, anti-seismic capability and security redundancy. What is more, its performance is not stable either. To cater to the requirement of market and global integration, Shuicheng Iron & Steel actively carried out test on hot-rolled class III steel bar. Since March 2000, 150 tons, 6 heats microalloyed class III steel bar of 7 specifications were trial-produced. It is found that its strength, plasticity is higher than that is required by national standards. By the way, it also enjoys good anti-seismic capability and stable performance. This new type of steel bar is considered for delivery to the Hongkong market as well.

2 Test Arrangement

2.1 Adoption of test arrangement
Vanadium microalloying is adopted in the test.

Steel produced in the converters of Shuicheng Iron & Steel is high in nitrogen, about 60-80 ppm. Owing to high nitrogen content, embrittlement occurred before 1998. Vanadium microalloying may avoid similar accident. According to the microalloying element's principle of precipitation in solid solution, vanadium is inclined to enter into steel via solid solution, and precipitates from the steel which, besides the combination with carbon into VC, is more liable to combine with the residual nitrogen in steel into VN. VN is known to be able to refine grain and strengthen precipitation.

In the test, 50% V-Fe alloy is used.

2.2 Design of chemical composition

Statistics and analysis of chemical composition and mechanical performance were applied on class II steel bar made in 1999 via sampling, Table 1.

Table 1 Average Performance Index of 20MnSiV

Item			Mec.Performance			Chemical Composition (%)					
Spec.(mm)			σ_s	σ_b	$\sigma_{5\%}$	C	Si	Mn	P	S	Ceq
$\Phi 16$	$\Phi 18$	$\Phi 20$	365~	550~	23~	0.18~	0.40~	1.25~	<	<	<
$\Phi 22$	$\Phi 25$	$\Phi 28$	420	610	30	0.23	0.70	1.50	0.035	0.035	0.48