

RESEARCH AND DEVELOPMENT ON HRB400 REINFORCED BARS IN HANDAN STEEL

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Abstract: In this article, the research and development on the production process of HRB400 reinforced bars in Handan Steel are presented. The process control of the smelting, continuous cast and rolling as well as the product quality are introduced. The properties and chemical compositions of HRB400 reinforced bars are analyzed when VN and FeV are applied in production. The amount of vanadium to be added is determined when varieties of alloys are used in practice.

Key Words: HRB400 reinforced bars; microalloying; FeV; VN

1 Preface

The hot - rolled ribbed bars for reinforced concrete is most widely used material in construction. At present, about 95% of the construction projects are using the low - strength HRB335 hot - rolled ribbed bar. Only 5% of those use the high - strength HRB400 (or HRB 500) hot - rolled ribbed bars. In comparison with the situations overseas, there exists a big gap. The hot - rolled ribbed bars for reinforced concrete outside China are mainly of 400 MPa grade with high strength and tend to 500 MPa or higher grades. The bars of 335 MPa grade with low strength have almost fallen into disuse in the concrete. Having entered the WTO, China is becoming anastomosed with the world in the construction sector. As the raw material used in the construction, the hot - rolled ribbed bars for the reinforced concrete have to be anastomosed as well. Therefore the inevitable development tendency in China is to substitute the low - strength HRB335 grade reinforced bars with high - strength HRB400 grade (or

HRB500 grade).

To upgrade the reinforced bars for the construction use, Handan Steel, a large scale steel complex in China, has had an active research and development on the HRB400 reinforced bars and achieved success. At the moment the HRB400 reinforced bars have been put into mass production. The excellent toughness, good weldability and low strain aging of the products are commonly accepted by customers after the application. Their fame and market share are gradually increasing. When the research on the HRB400 reinforced bars was commenced, the company took into account that our country is in an active earthquake zone and the hot - rolled ribbed bars for reinforced concrete are mainly used in high building and important facility constructions, the aseismic performance of the bars is strictly required. Thus when designing the HRB400 reinforced bars, the vanadium microalloying is applied to ensure its mechanical properties based on the existing chemical compositions of grade HRB335.