

# Development and Application of V, Ti and Nb Microalloyed Steel in AnShan Iron & Steel Group Co.

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## 1. Preface

With the development of national resources and improvement of scientific research level since 1970's, alloying elements like V, Ti, Nb, N have been found to be efficient elements widely applied to low alloyed steels. China reserves abundant resource of microalloying elements and has great advances in resource for the development of microalloyed steels, for it reserves  $V_2O_5$  up to 25 million tons – the third place in the world,  $TiO_2$  628.9 million tons – accounting for 45.58% of total global reserves, and  $Nb_2O_5$  3.88 million tons. With innovations of metallurgical production equipment and process technology, the utilization of microalloying elements has led to fundamental changes in product mix of HSLA steels, and indeed their development and application concretises the metallurgical technology as well as the toughness-strengthening conception of low alloyed steel. As vanadium has been widely used nationwide, there are now many types of vanadium bearing steel and V microalloyed steel in China, to be exact, 139 vanadium bearing steel grades accounting to 57% of all the steel grades approved according to China national standards, which, as per statistics,

will consume over 2000 tons of vanadium annually in Chinese steel industry. In addition to this, China's production of microalloyed steel still stays in quantity development type, and in the view of the product mix, 20MnSi and U71Mn heavy duty rail products and 16Mn steel plate constitute the majority of microalloyed steel grades. According to the international popular calculation methods, the production of low alloyed and microalloyed steel grades especially for flat products may actually take only a very small fraction of the total national steel production. Table 1 shows the proportion of low alloyed and microalloyed steel grades in China's total steel production, which means, in respect to the production and structure of low alloyed and microalloyed steel products, China still lags faraway behind the most advanced countries in the world.

Under the background of nowadays' globalized economy and nearly saturated steel production worldwide, it undoubtedly comes to be an inevitable way to largely develop and adjust product structure of low alloyed and microalloyed steel. The development and application of Vanadium bearing steel as well as V, Ti and Nb microalloyed steel promises a very broad future.