



Corrosion control and passivation quality evaluation method for stainless steel rail vehicles

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Stainless steel is widely used in rail vehicle manufacturing due to its excellent mechanical properties and corrosion resistance. However, corrosion failures, such as pitting and crevice corrosion, still occur in harsh service environments, primarily influenced by chloride ions, humidity, surface contaminants, and microstructural defects. To enhance surface corrosion resistance, advanced surface treatment technologies have been developed. Electrolytic passivation improves the stability and integrity of the passive film through optimized electrochemical parameters, while laser surface treatment refines surface morphology and microstructure, reducing susceptibility to localized corrosion. Research on evaluation methods, particularly using ferroin testing, are also introduced to improving the corrosion control and passivation quality of stainless steel rail vehicles, extending service life and ensuring operational safety.