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To centrally recycle and treat the solid-liquid two-phase flow waste containing rust and paint chips generated when high-pressure water jets clean the surface of ships and reduce the pollution of direct discharge to the ecological environment, the process flow of ship high-pressure water descaling vacuum recovery system is established according to the working principle of the vacuum system. Through the calculation of the main design parameters of the vacuum system, the selection of the vacuum pump, the function and structure of the vacuum box, etc., the design of the special solid-liquid flow vacuum recovery device for the ship's high-pressure water rust removal operation is completed. The results show that the main technical parameters (effective pumping speed and vacuum degree, etc.) of the integrated device for vacuum recovery and separation and slag discharge of high-pressure water descaling waste meet the requirements of generating the necessary vacuum adsorption force and recovery efficiency. The vacuum box has enough buffer and storage space and has the functions of solid-liquid separation and convenient slag discharge, which meets the requirements of solid-liquid flow recovery in ship high-pressure water rust removal operations.

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According to the feedback from the operation of a 50,000 t semi-submersible carrier for many years, combined with the requirements of new regulations and new specifications, it is optimized and upgraded in terms of line type, subdivision layout, superstructure layout, and environmental protection emissions, which greatly improve its safety, comfort, and environmental protection. The optimization scheme has certain reference significance for the research and development and design of the same type of ships.

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