

低温环境下ISG技术柴油机起动机性能分析 Analysis on Starting System of ISG Diesel Engine under Low-temperature

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摘要: 分析了低温环境下ISG技术柴油机起动机性能的主要影响因素, 结合柴油机的起动阻力矩、最低起动转速和ISG电机工作特性等因素, 确定了ISG电机的最大输出功率; 考察了极板结构、电解液温度对蓄电池容量的影响, 研究了起动阻力矩与ISG电机功率、蓄电池容量之间的匹配关系, 得到了起动阻力矩随环境温度、起动转速的变化规律。试验表明: 减少板极厚度、增加板极高度, 适当提高电解液密度, 可以提高蓄电池容量; 在相同的环境温度下, 起动阻力矩随起动转速的提高而增大, 当转速高于200 r/min时, 转速每提高50 r/min, 起动阻力矩增加4~11 N·m; 当环境温度低于0℃, 转速不变时, 环境温度每降低5℃, 起动阻力矩增加约3~5 N·m; -25℃下ISG技术柴油机的起动着火转速可达350 r/min以上, 起动时间缩短, 且起动过程中转速过渡较为平滑, 有利于提高起动机工况下的动力性、改善排放性。 The main influencing factors of starting system under low temperature were analyzed, while maximum output power of the ISG motor was determined. According to starting resistance torque, minimum start-up speed, electrical operating characteristics, electric transmission coefficient and thermal effects, the influence of plate structure on battery capacity was also reviewed. The match relationship among starting resistance torque, ISG motor power and storage battery capacitance was summarized, and the changes of starting resistance torque along with ambient temperature and starting speed has been measured. The experiment result shows that as far as the environment temperature decreases by 5℃, starting resistance torque increases by 3~5 N·m at above 200 r/min; keeping speed constant, starting resistance torque increases by 4~11 N·m with every enhanced 50 r/min. The first fire speed of ISG diesel engine at -25℃ is increased, which is up to more than 350 r/min. The starting time is shorter than original diesel engine, and fluctuations in speed is smaller.

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