

热能工程

复合制冷循环间接冷系统制冷剂/工质的选择论证

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摘要: 该文旨在从目前80余种制冷剂(包括替代工质)中筛选出能满足复合制冷循环间接冷系统(以下简称复间冷)要求的中间传热介质(制冷剂/工质)。筛选步骤如下: 1) 按制冷剂的臭氧损耗潜势和全球变暖潜势挑选出满足环保要求的“环保型制冷剂”; 2) 根据环保型制冷剂的物性对复间冷要求的满足程度, 挑出合适度比较高的若干种; 3) 从前两轮筛选出的制冷剂/工质挑出做功能力最大者。最终氨成为3轮筛选唯一胜出的自然物质。考虑到氨的气味对人的呼吸道有刺激性, 条件具备时可燃可爆, 故再次仔细分析了其安全性, 指出其燃爆可防、易防, 拟定了相应防范措施, 并列出了应用实例。全文结论为: 氨物性对复间冷的合适度最高, 环境最友好, 安全可靠, 性价比高。作为复间冷的制冷剂/工质, 氨虽非最佳, 但目前尚无更佳的替代物。

关键词: 间接空气冷却系统 复合制冷循环 制冷剂 工质 氨 筛选

A Selection Demonstration of Refrigerant/Medium for Compound Refrigerating Cycle of Indirect Air Cooling System

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Abstract: This paper aims at sieving out the intermediate heat transfer medium (namely refrigerant/medium) for the compound refrigerating cycle from more than 80 refrigerants, which are capable of meeting the compound refrigerating cycle's demands. The sieve course are comprised of 3-steps: 1)According to the values of ozone depletion potential (ODP) and global warming potential (GWP) of refrigerants sifted the so called “environment protection type refrigerant” which meet the environment protection requirements; 2) Based on property parameters of the environment protection type refrigerants/ mediums select those refrigerants which are in accord with requirements of compound refrigerating cycle of indirect air cooling system; 3)The third criterion is that the power capability of medium in inverse refrigerating cycle is the maximum of all the mediums selected by the first and second round of the sifting. At last, the ammonia became the only natural materials which satisfy all requirements for compound refrigerating cycle of indirect air cooling system. Considering the smell of ammonia irritates the noses, and ammonia is capable of explosive and combustibile when the conditions are suitable, so this paper analyzed once more the service safety of ammonia very carefully, pointed out that the combustibility and explosive possibility are really avoidable and easy to avoid; worked out appropriate countermeasures for safety; enumerated the applied living examples. At last, this paper came to the conclusion that the suitability of thermophysics properties of ammonia for the compound refrigerating cycle are highest, and it is very friendly with environment, safety and reliable, as well as a quite high ratio of behavior/price. In other words, as refrigerant/medium of the compound refrigerating cycle, perhaps the ammonia is not the optimum, but no even more alternative at present.

Keywords: indirect air cooling system compound refrigerating cycle refrigerant medium ammonia sieve

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