電気室における高効率排熱システムの開発

Development of a highly efficient heat exhaust system for electrical rooms

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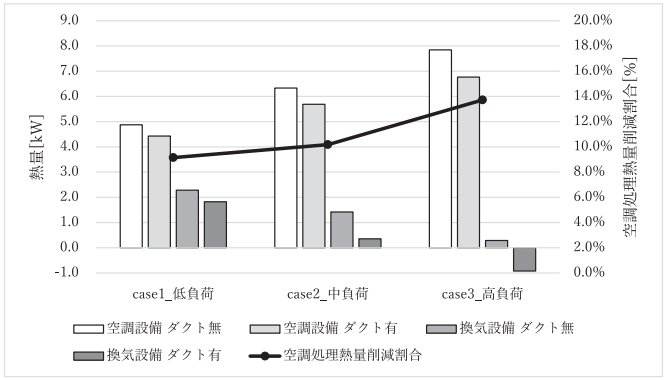

空調設備処理熱量および換気による熱負荷

概 要

新築建築物では2030年までにZEB水準の省エネ性能が求められ、特に電気室は常に熱負荷が発生するため、空調・換気設備の稼働が長く、エネルギー消費量が大きい。本研究では、配電盤の排気口にダクトを取り付け、排熱を効率的に排気するシステムを開発し、ダクトの有無による温度環境や処理熱量の違いを検証した。夏期には、ダクトの使用により空調設備の還気口への高温空気の流入が抑えられ、空調処理熱量の低下が確認された。一方、冬期は換気設備のみの運用では省エネ効果は得られなかった。中間期では、配電盤の熱を効率的に排気することで空調処理熱量は減少した。また、CFD解析から配電盤の熱負荷が大きい時ほど空調処理熱量は大きくなり、高負荷時には最大13.7%の削減効果が示された。

Newly constructed buildings will be required to achieve ZEB-level energy-saving performance by 2030. Electrical rooms, in particular, continuously generate heat loads, resulting in frequent operation of air conditioning and ventilation equipment and significant energy consumption. In this study, a system was developed to efficiently exhaust heat by attaching ducts to the exhaust ports of distribution panels, and differences in temperature conditions and heat load processing with and without ducts were examined.

In the summer, the use of ducts prevented the inflow of hot air into the return vents of air conditioning equipment, resulting in a reduction in the air conditioning heat load. In the winter, however, operating ventilation equipment alone did not produce energy-saving effects. In the intermediate seasons, efficiently exhausting heat from the distribution panels reduced the air conditioning heat load. Furthermore, CFD analysis showed that the larger the heat load of the distribution panels, the greater the air conditioning heat load, with a maximum reduction of 13.7% observed during high-load periods.