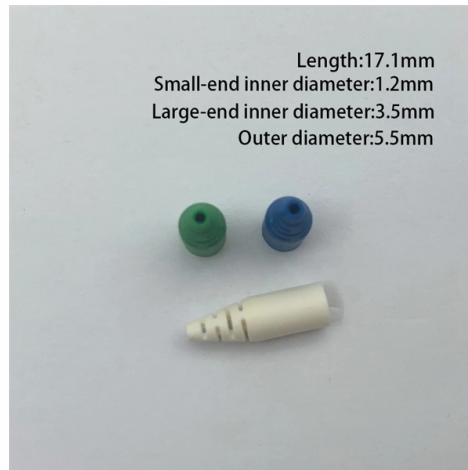


Cold Aisle Construction Case Study of Data Center in Belgium



Overview

This study proposes the container data center with the featured cold aisle containment (CAC) as effective thermal control strategy. In design, the overhead downward flow system is implemented with a heat exchanger arranged right above the data center on the air side and an evaporative water chiller on the water side to form the cooling approach. The cold airflows and hot exhausts of racks are separately transported by the contained cold an. This study proposes the container data center with the featured cold aisle containment (CAC) as effective thermal control strategy. In design, the overhead downward flow system is implemented with a heat exchanger arranged right above the data center on the air side and an evaporative water chiller on the water side to form the cooling approach. The cold airflows and hot exhausts of racks are separately transported by the contained cold and hot aisles to alleviate the problem of cold and hot air mixing. The measurements of air temperature and velocity of racks are used to validate the prediction accuracy of the computational fluid dynamics (CFD) model. The performance metrics in terms of the rack cooling index (RCI), return temperature index (RTI), supply heat index (SHI) are used to examine the design effectiveness of the proposed test data center. The simulations are then extended to assess the air distribution and thermal management at varied supply air temperatures and velocities for a large-scale data center to be built in the green energy technology demonstration site of the Shalun smart green energy science city. Overall, the calculated average PUE of 1.38 for the large-scale data center is notably less than the average PUE of 1.59 from the results of 2020 data center industry survey, indicating the potential savings of cooling energy and cost. This paper demonstrates a generalized approach as an easily adaptable, cost-effective solution for data centers to be deployed in tropical and su...

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Engineering Analysis and Implementation Methodology ...

Research Objective To develop and substantiate the optimal architecture for Hot/Cold Aisle Containment (HAC/CAC) systems in Data Centers ...

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