

Abstract Submitted
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Color Rendering and Power Factor Trade-offs in Rare Earth Containing Ceramic Discharge Metal Halide Lamps RAY GIBSON, Philips Lighting Company — Medium power ceramic discharge metal halide lamps that contain rare earth iodides have been designed to operate on existing pulse start metal halide magnetic ballast systems intended for quartz lamps that utilize the NaI-ScI₃ salt system. One problem encountered was that the rare earth containing ceramic lamps operated well below rated power on commercial ballasts with the consequence of lower luminous flux than expected. Lower power operation is characterized electrically as a lower lamp power factor. Experiments were carried out with several different discharge tube dimensions and salt chemistries, which showed a strong correlation between color rendering (CRI) and lamp power factor. Higher CRI lamps had lower power factors. One-dimensional modeling of the arc plasma using the Elenbaas-Heller equation confirmed that by increasing the radiation contribution from the rare earth salts to model a higher lamp CRI resulted in larger swings in the central arc temperature. Consequently, a high re-ignition voltage during current reversal occurs and the lamp power factor is lowered.

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