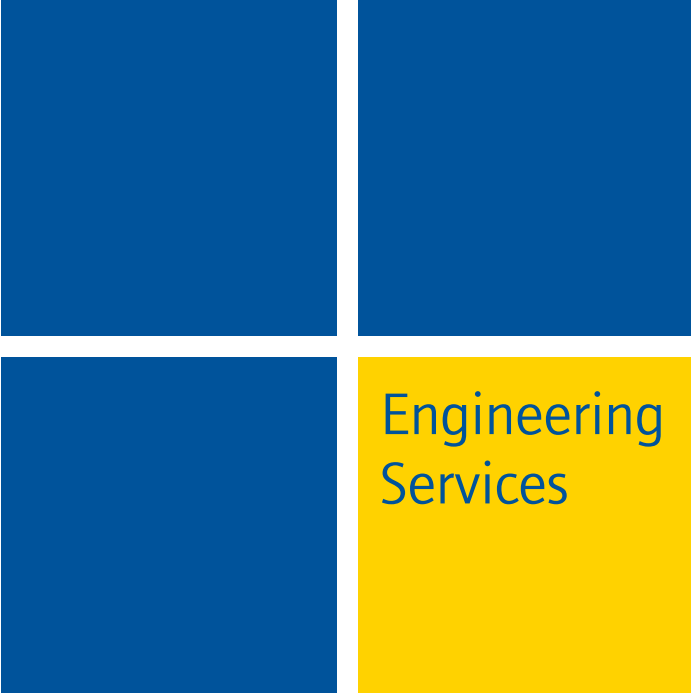


# Rod Cluster Control Assemblies



Engineering  
Services

## Background

Rod cluster control assemblies (RCCAs) use neutron-absorbing materials to control the rate of reactor power production. RCCAs provide years of service, but as active components of the reactor system, they are subject to conditions that may ultimately necessitate their replacement. The Westinghouse Enhanced Performance RCCA (EP-RCCA) has been developed to provide additional performance through enhanced resistance to wear and irradiation.

## Benefits

Westinghouse EP-RCCAs have three features that provide extended service:

- Industrial hard-chrome plating on the surface of the control rodlets provides protection against sliding and fretting wear. The plating is applied over the length of the rodlet that's in contact with the reactor's upper internals guide surfaces during operation. The ends of the rodlet are not plated in order to avoid end-plug weld contamination.
- High-purity rodlet material reduces the incidence of trace chemical impurities detrimental to extensive irradiation performance. Such impurities contribute to the susceptibility of the rodlet to irradiation-assisted stress corrosion cracking (SCC).
- A substantial gap between the absorber and the inside of the rodlet accommodates possible swelling to minimize absorber-rodlet interaction and lessen absorber-induced strain on the rodlet.

## Description

The RCCA consists of long finger-like rodlets connected through a spider fixture and a cylindrical stainless steel body to a control rod drive mechanism (CRDM). Individual RCCA rodlets contain the neutron-absorbing material that controls the rate of reactor power production. These rodlets are brazed to precise position on the arms of the spider assembly. The lower end plug of the rodlet is tapered to guide rodlet insertion into the fuel assembly. The multiple rodlet RCCA provides spatial distribution of absorber material within a fuel assembly in the reactor core.

CRDMs position the RCCAs for core reactivity control during reactor startup, shutdown, and power-level change. Operating the CRDMs moves RCCAs into and out of the core.

(Continued on back)

When the reactor is shut down, the RCCAs are inserted into thimble tubes in nuclear fuel assemblies, and are partly or fully withdrawn during reactor operation. When withdrawn, correct alignment and lateral support is provided to individual RCCA rodlets by a continuous guide and multiple individual "guide cards" in the reactor upper internals structure. The lower end of each rodlet remains partly inserted in the top of a fuel assembly thimble tube when the RCCA is fully withdrawn.

EP-RCCAs provide safe and reliable reactivity control over years of plant operation.

