

2.4.13 Control Rod Drive Control System

1.0 Description

The control rod drive control system (CRDCS) controls the actuation of power to the control rod drive mechanisms (CRDM).

The CRDCS has the following safety-related functions:

- Interrupts power to the CRDMs via the reactor trip contactors.
- Provides signals that report the status of the reactor trip contactors to the SCDS.

The CRDCS provides the following non-safety-related functions:

- Actuates the rod cluster control assemblies through the CRDMs.

2.0 Arrangement

2.1 The CRDCS equipment is located as listed in Table 2.4.13-1—Control Rod Drive Control System Equipment.

3.0 Mechanical Design Features

3.1 Equipment identified as Seismic Category I in Table 2.4.13-1 can withstand seismic design basis loads without loss of safety function.

4.0 I&C Design Features, Displays and Controls

4.1 The CRDCS equipment classified as Class 1E in Table 2.4.13-1 can perform its safety function when subjected to electromagnetic interference (EMI), radio-frequency interference (RFI), electrostatic discharges, and power surges.

4.2 The CRDCS receives inputs from the sources listed in Table 2.4.13-2.

4.3 Each reactor trip contactor opens when a RT signal is received from the corresponding PS division.

4.4 The CRDCS limits the rod cluster control assembly (RCCA) bank withdrawal rate to a maximum value.

5.0 System Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.13-3 lists the CRDCS ITAAC.

**Table 2.4.13-1—Control Rod Drive Control System Equipment
(3 Sheets)**

Description	Tag Number ⁽¹⁾	Location	Seismic Category	IEEE Class 1E
Reactor trip contactors	31BUA1BZ001	Safeguard Building 1	I	Yes
	31BUA1BZ002			
	31BUA1BZ003			
	31BUA1BZ004			
	31BUA2BZ001			
	31BUA2BZ002			
	31BUA2BZ003			
	31BUA2BZ004			
	31BUA3BZ001			
	31BUA3BZ002			
	31BUA3BZ003			
	31BUA3BZ004			
	31BUA4BZ001			
	31BUA4BZ002			
	31BUA4BZ003			
	31BUA4BZ004			
	31BUA5BZ001			
	31BUA5BZ002			
	31BUA5BZ003			
	31BUA5BZ004			
	31BUA6BZ001			
	31BUA6BZ002			
	31BUA6BZ003			
	31BUA6BZ004			
	31BUA7BZ001			
	31BUA7BZ002			
	31BUA7BZ003			
	31BUA7BZ004			
	31BUA8BZ001			
	31BUA8BZ002			
	31BUA8BZ003			
	31BUA8BZ004			
	31BUA9BZ001			
	31BUA9BZ002			
	31BUA9BZ003			
	31BUA9BZ004			
	31BUA10BZ001			
	31BUA10BZ002			

**Table 2.4.13-1—Control Rod Drive Control System Equipment
(3 Sheets)**

Description	Tag Number ⁽¹⁾	Location	Seismic Category	IEEE Class 1E
	31BUA10BZ003 31BUA10BZ004 31BUA11BZ001 31BUA11BZ002 31BUA11BZ003 31BUA11BZ004			
Reactor trip contactors	34BUA1BZ001 34BUA1BZ002 34BUA1BZ003 34BUA1BZ004 34BUA2BZ001 34BUA2BZ002 34BUA2BZ003 34BUA2BZ004 34BUA3BZ001 34BUA3BZ002 34BUA3BZ003 34BUA3BZ004 34BUA4BZ001 34BUA4BZ002 34BUA4BZ003 34BUA4BZ004 34BUA5BZ001 34BUA5BZ002 34BUA5BZ003 34BUA5BZ004 34BUA6BZ001 34BUA6BZ002 34BUA6BZ003 34BUA6BZ004 34BUA7BZ001 34BUA7BZ002 34BUA7BZ003 34BUA7BZ004 34BUA8BZ001 34BUA8BZ002 34BUA8BZ003 34BUA8BZ004	Safeguard Building 4	I	Yes

**Table 2.4.13-1—Control Rod Drive Control System Equipment
(3 Sheets)**

Description	Tag Number ⁽¹⁾	Location	Seismic Category	IEEE Class 1E
	34BUA9BZ001			
	34BUA9BZ002			
	34BUA9BZ003			
	34BUA9BZ004			
	34BUA10BZ001			
	34BUA10BZ002			
	34BUA10BZ003			
	34BUA10BZ004			
	34BUA11BZ001			
	34BUA11BZ002			
	34BUA11BZ003			
	34BUA11BZ004			
	34BUA12BZ001			
	34BUA12BZ002			
	34BUA12BZ003			
	34BUA12BZ004			

1) Equipment tag numbers are provided for information and are not part of the design certification.

Table 2.4.13-2—Control Rod Drive Control System Input Signals

Item #	Signal	Source	# Divisions	IEEE Class 1E
1	Reactor Trip Limitation Signal	PS	4	Yes

Table 2.4.13-3—Control Rod Drive Control System ITAAC

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The CRDCS equipment is located as listed in Table 2.4.13-1.	Inspections will be performed of the location of the CRDCS equipment.	The equipment listed in Table 2.4.13-1 is located as listed in Table 2.4.13-1.
3.1	Equipment identified as Seismic Category I in Table 2.4.13-1 can withstand seismic design basis loads without loss of safety function.	<p>a. Type tests, , analyses or a combination of type tests and analyses will be performed on the equipment listed as Seismic Category I in Table 2.4.13-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements.</p> <p>b. Inspections will be performed of the Seismic Category I equipment listed in Table 2.4.13-1 to verify that the equipment including anchorage is installed as specified on the construction drawings.</p>	<p>a. Tests/analysis reports exist and conclude that the equipment listed as Seismic Category I in Table 2.4.13-1 can withstand seismic design basis loads without loss of safety function.</p> <p>b. Inspection reports exist and conclude that the Seismic Category I equipment listed in Table 2.4.13-1 including anchorage is installed as specified on the construction drawings.</p>
4.1	The CRDCS equipment classified as Class 1E in Table 2.4.13-1 can perform its safety function when subjected to EMI, RFI, ESD, and power surges.	Type tests or type tests and analysis of these will be performed for the Class 1E equipment listed in Table 2.4.13-1.	A report exists and concludes that the equipment listed as Class 1E in Table 2.4.13-1 can perform its safety function when subjected to EMI, RFI, ESD, and power surges.
4.2	The CRDCS receives input signals from the sources listed in Table 2.4.13-2.	Tests will be performed to verify the existence of input signals.	The CRDCS receives input signals from the sources listed in Table 2.4.13-2.
4.3	Each reactor trip contactor opens when a RT signal is received from the corresponding PS division.	Tests will be performed on the as-built reactor trip contactors using test signals.	Each reactor trip contactor listed in Table 2.4.13-1 opens in response to a RT test signal from the corresponding PS division.
4.4	The CRDCS limits the RCCA bank withdrawal rate to a maximum value.	Tests will be performed to determine the maximum RCCA bank withdrawal rate.	The CRDCS limits the RCCA bank withdrawal rate to 30 inches per minute or less.

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