

## 2.10 Other Systems

### 2.10.1 Cranes

#### 1.0 Description

The containment polar crane and the auxiliary crane provide for the lifting of heavy loads. The cranes can be operated during shutdown and refueling conditions. Some components of the cranes may be operated during plant operation.

#### 2.0 Arrangement

2.1 The component locations of the cranes are as listed in Table 2.10.1-1—Crane Equipment Mechanical Design.

#### 3.0 Mechanical Design Features

3.1 Deleted.

3.2 The containment polar crane main hoist is equipped with a dual load path reeving system, redundant holding brakes, and other key attributes to provide for a single failure proof design.

3.3 The auxiliary crane is equipped with a dual load path reeving system, redundant holding brakes, and other key attributes to provide for a single failure proof design.

#### 4.0 Equipment and System Performance

4.1 The containment polar crane prevents the uncontrolled lowering of a heavy load.

4.2 The auxiliary crane prevents the uncontrolled lowering of a heavy load.

#### 5.0 Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.1-2 lists the cranes ITAAC.

**Table 2.10.1-1—Crane Equipment Mechanical Design**

<b>Description</b>	<b>Tag Number<sup>(1)</sup></b>	<b>Location</b>	<b>Function</b>	<b>Seismic Category</b>
Containment Polar Crane	SMJ-01	Containment Building	Avoid uncontrolled lowering of heavy load.	II
Auxiliary Crane	SMF-01	Fuel Building	Avoid uncontrolled lowering of heavy load.	II

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

Table 2.10.1-2—Cranes ITAAC

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	The component location of the cranes are listed in Table 2.10.1-1.	Inspection of the as-built system will be performed.	The components of the cranes are located as listed in Table 2.10.1-1.
3.1	Deleted.	Deleted.	Deleted.
3.2	<p>The polar crane system has the following features:</p> <ul style="list-style-type: none"> <li>• The reeving system has two separate load paths.</li> <li>• Sheaves are contained.</li> <li>• Hoist blocks have upper limit switches.</li> <li>• Hooks either have two attachment points each capable of lifting three times the load or one attachment point capable of lifting six times the load.</li> <li>• Single hoist drive is provided with 2 holding brakes; or dual hoist drives are provided with 1 holding brake for each drive train. – Torque setting for brake is 125% of full load torque.</li> <li>• Hoist drum provides load control in event of shaft or bearing failure</li> </ul>	<p>a. An inspection of the polar crane system design will be performed.</p> <p>b. Vendor tests and inspections will be performed to verify features credited in the design inspection report:</p> <ul style="list-style-type: none"> <li>• Test to verify capability of each of two load paths to support the load and maintain vertical alignment.</li> <li>• Inspection of sheaves to verify containment.</li> <li>• Tests to verify operation of upper limit switches.</li> <li>• Test of load capability of the hooks.</li> <li>• Tests to verify operation of the hoist drive brakes.</li> <li>• Test to limit load drop due to hoist drum component failure.</li> </ul>	<p>a. An inspection report exists and concludes that the design provides the following functions:</p> <ul style="list-style-type: none"> <li>• <u>Reeving system</u> – two separate load paths are provided such that either path can support the load and maintain vertical alignment in the event of rope breakage.</li> <li>• <u>Hoist blocks and sheaves (upper and lower)</u> – each attachment point supports 3 times the load. Sheaves are contained in event of pin failure. Upper limits switches (separate/independent) for two blocking considerations are provided.</li> <li>• Hooks – 2 attachment points are provided with each designed for 3 times load or 1 attachment point provided designed for 6 times lifted load.</li> <li>• <u>Hoist Drives</u> – Single hoist drive is provided with 2 holding brakes; or dual hoist drives are provided with 1 holding brake for each drive train. – Torque setting for brake is 125% of full load torque.</li> </ul>

Table 2.10.1-2—Cranes ITAAC

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
			<ul style="list-style-type: none"> <li>• <u>Hoist Drum</u> – Remain on trolley in event of shaft or bearing failure all the while retaining ability to maintain engagement of gearing or brake necessary to retain the load.</li> <li>b. Test and inspection results confirm: <ul style="list-style-type: none"> <li>• <u>Reeving system</u> – two separate load paths are provided such that either path can support the load and maintain vertical alignment in the event of rope breakage.</li> <li>• <u>Hoist blocks and sheaves (upper and lower)</u> – each attachment point supports 3 times the load. Sheaves are contained in event of pin failure. Upper limits switches (separate/independent) for two blocking considerations are provided.</li> <li>• <u>Hooks</u> – 2 attachment points are provided with each designed for 3 times load or 1 attachment point provided designed for 6 times lifted load.</li> <li>• <u>Hoist Drives</u> – Single hoist drive is provided with 2 holding brakes; or dual hoist drives are provided with 1 holding brake for each drive train. – Torque setting for brake is 125% of full load torque.</li> </ul> </li> </ul>

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	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
			<ul style="list-style-type: none"> <li>• <u>Hoist Drum</u> – Remain on trolley in event of shaft or bearing failure and maintain engagement of gearing or brake necessary to retain the load.</li> </ul>
3.3	<p>The auxiliary crane system has the following features:</p> <ul style="list-style-type: none"> <li>• The reeving system has two separate load paths</li> <li>• Sheaves are contained.</li> <li>• Hoist blocks have upper limit switches.</li> <li>• Hooks either have two attachment points each capable of lifting three times the load or one attachment point capable of lifting six times the load.</li> <li>• Single hoist drive is provided with 2 holding brakes; or dual hoist drives are provided with 1 holding brake for each drive train. – Torque setting for brake is 125% of full load torque.</li> <li>• Hoist drum provides load control in event of shaft or bearing failure</li> </ul>	<p>a. An inspection of the auxiliary crane system design will be performed.</p> <p>b. Vendor tests and inspections will be performed to verify features credited in the design inspection report:</p> <ul style="list-style-type: none"> <li>• Test to verify capability of each of two load paths to support the load and maintain vertical alignment.</li> <li>• Inspection of sheaves to verify containment.</li> <li>• Tests to verify operation of upper limit switches.</li> <li>• Test of load capability of the hooks.</li> <li>• Tests to verify operation of the hoist drive brakes.</li> <li>• Test to limit load drop due to hoist drum component failure</li> </ul>	<p>a. An inspection report exists and concludes that the design provides the following functions:</p> <ul style="list-style-type: none"> <li>• <u>Reeving system</u> – two separate load paths are provided such that either path can support the load and maintain vertical alignment in the event of rope breakage</li> <li>• <u>Hoist blocks and sheaves (upper and lower)</u> – each attachment point supports 3 times the load. Sheaves are contained in event of pin failure. Upper limits switches (separate/independent) for two blocking considerations are provided.</li> <li>• <u>Hooks</u> – 2 attachment points are provided with each designed for 3 times load or 1 attachment point provided designed for 6 times lifted load.</li> <li>• <u>Hoist Drives</u> – Single hoist drive is provided with 2 holding brakes; or dual hoist drives are provided with 1 holding brake for each drive train. – Torque setting for brake is 125% of full load torque.</li> </ul>

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Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
			<ul style="list-style-type: none"> <li>• <u>Hoist Drum</u> – Remain on trolley in event of shaft or bearing failure and maintain engagement of gearing or brake necessary to retain the load.</li> </ul>
4.1	The containment polar crane prevents the uncontrolled lowering of a heavy load.	a. “No Load” Test. b. Full Load Test (100% static load test) and Rated Load Test (125% (+5%, -0%) dynamic load test). c. 150% load test of crane special lifting devices.	a. Correct motor rotation; limit switches (including hoist two blocking protection), interlocks, and stops are adjusted and set. b. Crane lifts the test load, lowers, stops, and holds the load with the hoist holding brakes. c. NDE reveals sound weld metal; no permanent deformation in base metal.
4.2	The auxiliary crane prevents the uncontrolled lowering of a heavy load.	a. “No Load” Test. b. Full Load Test (100% static load test) and Rated Load Test (125% (+5%, -0%) dynamic load test). c. 150% load test of crane special lifting devices.	a. Correct motor rotation; limit switches (including hoist two blocking protection), interlocks, and stops are adjusted and set. b. Crane lifts the test load, lowers, stops, and holds the load with the hoist holding brakes. c. NDE reveals sound weld metal; no permanent deformation in base metal.