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## Purpose

Defines the criteria and procedures for testing Black Start Resources.

## 1. Responsibilities

<b>CAISO Operations Planning</b>	<ul style="list-style-type: none"> <li>• Review and approve Black Start Test Plan and one line electrical diagram showing the electrical system configuration.</li> <li>• Coordinate with PTO Operations Engineers to determine PTO Black Start testing requirements and results.</li> <li>• Approve or deny Black Start test results.</li> </ul>
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<b>CAISO Resource Test Administrator</b>	<ul style="list-style-type: none"> <li>• Ensure that Black Start tests are conducted at least once every three (3) years.</li> <li>• Ensure a nondiscriminatory test process.</li> <li>• Coordinate Black Start Resource tests and maintain test material and data submitted by the Scheduling Coordinator.</li> <li>• Coordinate exchange of data between the Black Start Resource Owner, Scheduling Coordinator, System Operations, and Outage Coordination.</li> <li>• Maintain the CAISO list of Black Start resources (CAISO Operating Procedure 4610A Black Start Dual Fuel Units and Generator Operator).</li> </ul>
<b>Participating Transmission Owner (PTO) Outage Coordinator</b>	<ul style="list-style-type: none"> <li>• Approve/Deny Outage Requests.</li> </ul>
<b>Black Start Resource Owner</b>	<ul style="list-style-type: none"> <li>• Submit test plans, requests, and results to the CAISO.</li> <li>• Submit outage requests to CAISO and PTO for approval.</li> <li>• Conduct Black Start Resource tests.</li> </ul>
<b>Scheduling Coordinator (SC)</b>	<ul style="list-style-type: none"> <li>• Submit test plans, requests, and results to the CAISO.</li> <li>• Coordinate between CAISO and Black Start resources regarding test scheduling and details.</li> </ul>
<b>CAISO Generation Desk</b>	<ul style="list-style-type: none"> <li>• Approve initiation of Black Start tests in Real-Time.</li> <li>• Initiate Exceptional Dispatch for Black Start Test.</li> <li>• Manage Outage status in the Outage Management System (OMS).</li> <li>• Maintain adequate regulating margin.</li> </ul>

## 2. Scope/Applicability

### 2.1. Background

Black Start Resources must meet certain criteria as specified by NERC and WECC Standards. Additionally, these Standards stipulate that the California ISO (CAISO) must oversee the testing of Black Start resources.

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## 2.2. Scope/ Applicability

This operating procedure applies to all resources designated by the CAISO and the PTOs as Black Start Resources according to the CAISO System Restoration Plan and the respective Black Start agreements between the CAISO, PTOs, and Black Start Resource Owners.

Black Start tests shall be completed at least once every three (3) years.

## 3. Procedure Detail

### 3.1. Test Criteria

The minimum criteria for testing a Black Start Resource are as follows:


1. The Black Start Resource must have the capability to start when isolated with no support from the Bulk Electric System or remain energized without connection to the remainder of the system.
2. The Black Start Resource must have the capability to energize the high-side bus using one of the following methods:
  - Energize the high-side bus for a minimum of five minutes from the time of breaker closing, to demonstrate that resource can remain energized and stable, or
  - Affirm the capability to energize the high-side bus where operational conditions do not allow energization of the high-side bus solely for testing purposes.
3. The Generator shall verify that the resource breaker can be closed using one of the following methods:
  - The resource breaker shall be isolated with the resource at rated voltage and frequency, closed for five minutes to demonstrate that the resource will remain stable when the breaker is closed.
  - The resource breaker close coil relay can be energized with the voltage and frequency monitor controls disconnected from the synchronizing circuits.

### 3.2. Submit Test Plan

Perform the following steps to develop and submit a Black Start Resource Test Plan.

**Note:** *Once a test plan has been approved by the CAISO, the plan applies to all subsequent Black Start Resource testing. However, if circumstances dictate a change to the test plan,*

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*the Black Start Resource Owner must submit an updated test plan to the CAISO prior to the planned test date.*

<b>Black Start Resource Owner</b>
<ol style="list-style-type: none"> <li>1. <b>Complete</b> a (CAISO Operating Procedure) <a href="#">5360C Black Start Test Plan Template</a> for the Black Start Resource.</li> <li>2. <b>Submit</b> an electronic copy to <a href="mailto:ASNotifications@caiso.com">ASNotifications@caiso.com</a> at least thirty (30) calendar days prior to the planned test date.</li> </ol>

<b>CAISO Resource Test Administrator</b>
<ol style="list-style-type: none"> <li>1. <b>Send</b> Test Plan to the CAISO Operations Planning for the applicable PTO area.</li> </ol>

<b>CAISO Operations Planning</b>
<ol style="list-style-type: none"> <li>1. <b>Review</b> the Black Start Test Plan <u>and</u></li> <li>2. <b>Route</b> approval or denial of the Plan through the CAISO Resource Test Administrator.</li> <li>3. If denied, <b>include</b> instructions on how to correct any deficiencies.</li> </ol>


<b>CAISO Resource Test Administrator</b>
<ol style="list-style-type: none"> <li>1. Once a response has been received from CAISO Operations Planning, do one of the following: <ul style="list-style-type: none"> <li>• <b>Contact</b> the SC and formally approve the test plan.</li> <li>• <b>Request</b> any additional information needed to approve the test plan. <ul style="list-style-type: none"> <li>○ Upon receipt, <b>send</b> to CAISO Operations Planning to repeat step above.</li> </ul> </li> </ul> </li> </ol>

### 3.3. Schedule Test

Perform the following actions to schedule a Black Start test.

<b>Scheduling Coordinator (SC), Black Start Resource Owner</b>
<ol style="list-style-type: none"> <li>1. <b>Submit</b> an electronic copy of a <a href="#">5360A Black Start Resource Test Request Form</a> (CAISO Operating Procedure) to <a href="mailto:ASNotifications@caiso.com">ASNotifications@caiso.com</a> at least two (2) weeks prior to the planned test date.</li> </ol> <p><b>Note:</b> <i>The Scheduling Coordinator (SC) or Black Start Resource Owner shall communicate the above information to the applicable Participating Transmission Owner (PTO) to which the Black Start Resource is connected.</i></p>

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<b>Black Start Resource Testing</b>		<b>Distribution Restriction:</b> <b>None</b>	

CAISO Resource Test Administrator
<ol style="list-style-type: none"> <li><b>Verify</b> an approved Black Start Test Plan for the Black Start Resource is on record. <ul style="list-style-type: none"> <li>If there is no approved Test Plan on file, <b>request</b> a Test Plan.</li> </ul> </li> <li><b>Review</b> <u>and</u> <b>route</b> test request to CAISO Operations Planning for the applicable PTO area.</li> </ol>


CAISO Operations Planning
<ol style="list-style-type: none"> <li><b>Review</b> test request <u>and</u> <b>coordinate</b> with applicable PTO Operations Engineer to determine requirements of the PTO for the Black Start performance test.</li> <li><b>Route</b> approval or denial of request for Black Start Resource test request through the CAISO Resource Test Administrator.</li> </ol>

CAISO Resource Test Administrator
<ol style="list-style-type: none"> <li>Once a response has been received from CAISO Operations Planning, do one of the following: <ul style="list-style-type: none"> <li><b>Contact</b> the SC <u>and</u> <b>approve</b> the test request.</li> <li><b>Request</b> any additional information needed to approve the test request. <ul style="list-style-type: none"> <li>Upon receipt, <b>route</b> to CAISO Operations Planning to repeat steps above.</li> </ul> </li> </ul> </li> </ol>

Scheduling Coordinator (SC), Black Start Resource Owner
<ol style="list-style-type: none"> <li>Once the test request has been approved, <ul style="list-style-type: none"> <li><b>Schedule</b> the Black Start test per CAISO Outage requirements.</li> <li><b>Refer</b> to CAISO Operating Procedure <a href="#">3220 Generation Outages</a>.</li> <li><b>Submit</b> an outage request to the CAISO for the Black Start Test <b>using</b> the “Unit Testing” nature of work.</li> <li><b>Submit</b> an outage request to the applicable PTO. This request is for the outages required to facilitate the Black Start Test (i.e., transmission equipment controlled by the PTO and/or the CAISO).</li> <li>If applicable, the PTO should then <b>request</b> appropriate clearances from the CAISO in accordance with CAISO Outage requirements. <ul style="list-style-type: none"> <li><b>Refer</b> to CAISO Operating Procedure <a href="#">3210 Transmission Outages</a>.</li> </ul> </li> </ul> </li> </ol>

Participating Transmission Owner (PTO) Outage Coordinator, CAISO Operations Planning
<ol style="list-style-type: none"> <li><b>Approve</b> <u>or</u> <b>deny</b> outage request for Black Start Resource testing.</li> </ol>

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<b>Scheduling Coordinator (SC), Black Start Resource Owner</b>
<ol style="list-style-type: none"> <li>If the outage is not approved by the CAISO and PTO, <ul style="list-style-type: none"> <li><b>Determine</b> a new test date and time; <u>and</u></li> <li><b>Resend</b> an updated <a href="#">5360A Black Start Resource Test Request Form</a> (CAISO Operating Procedure) for approval.</li> </ul> </li> </ol>

### 3.4. Conduct Test


Perform the following actions to conduct a Black Start Resource test.

<b>Scheduling Coordinator (SC), Black Start Resource Owner</b>
<ol style="list-style-type: none"> <li><b>Contact</b> the applicable PTO to coordinate switching on the desired test date.</li> <li><b>Notify</b> the CAISO Generation Desk at least one (1) hour before the start of the test <u>and</u> <b>confirm</b> the test can start as scheduled.</li> </ol>

<b>CAISO Generation Desk</b>
<ol style="list-style-type: none"> <li><b>Confirm</b> whether Black Start Resource testing can be conducted as scheduled. <ul style="list-style-type: none"> <li>If “Yes,” do the following: <ul style="list-style-type: none"> <li><b>Issue</b> verbal Exceptional Dispatch for the unit to go to PMin.</li> <li><b>Create</b> ED in the ED tool with the start time equal to the time of the verbal dispatch <b>using</b> Instruction Type of “TEST”.</li> <li><b>Manage</b> Outage Card status in OMS.</li> <li><b>Maintain</b> adequate regulating margin.</li> </ul> </li> <li>If “No”, do the following: <ul style="list-style-type: none"> <li><b>Cancel</b> the Outage Card <u>and</u></li> <li><b>Request</b> Scheduling Coordinator and Black Start Resource Owner to identify another date <u>and</u></li> <li><b>Repeat</b> test request steps.</li> </ul> </li> </ul> </li> </ol>

<b>Scheduling Coordinator (SC), Black Start Resource Owner</b>
<ol style="list-style-type: none"> <li>If the test must be postponed, <ul style="list-style-type: none"> <li><b>Notify</b> the PTO <u>and</u></li> <li><b>Determine</b> a new test date and time; otherwise, <b>continue</b> to next step.</li> </ul> </li> <li><b>Start</b> the outage in OMS.</li> </ol>

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Scheduling Coordinator (SC), Black Start Resource Owner
<ol style="list-style-type: none"> <li>3. <b>Conduct</b> the Black Start Test according to the approved Black Start Test Plan for the Black Start Resource. <ul style="list-style-type: none"> <li>• The test should be <b>monitored</b> by the Scheduling Coordinator, PTO, and CAISO.</li> </ul> </li> <li>4. <b>Schedule</b> energy in the CAISO markets as appropriate per CAISO Tariff and BPMs.</li> <li>5. Once the test has been completed, <ul style="list-style-type: none"> <li>• <b>Terminate</b> the outage in OMS <u>and</u></li> <li>• <b>Request</b> the CAISO to end the Black Start Test Exceptional Dispatch <u>and</u></li> <li>• <b>Instruct</b> the Black Start Resource to return to its previously determined schedule.</li> </ul> </li> </ol>

CAISO Generation Desk
<ol style="list-style-type: none"> <li>1. <b>End</b> the Black Start Exceptional Dispatch in the ED Tool.</li> <li>2. <b>Notify</b> the CAISO Resource Test Administrator that the test has been completed by <b>emailing</b> <a href="mailto:ASNotifications@caiso.com">ASNotifications@caiso.com</a>.</li> </ol>

### 3.5. Evaluate Test Results

Upon completing the Black Start Resource testing, as defined in Section 3.4, perform the following actions:

Scheduling Coordinator (SC), Black Start Resource Owner
<ol style="list-style-type: none"> <li>1. <b>Analyze</b> the test results for the Black Start Resource. <ul style="list-style-type: none"> <li>• If the test results meet or exceed all aspects of the Black Start Test Plan, <ul style="list-style-type: none"> <li>○ <b>Go to Step 2</b>; otherwise, <b>go to Step 3</b>.</li> </ul> </li> </ul> </li> <li>2. <b>Submit</b> electronic copies of a <a href="#">5360B Black Start Resource Test Report Form</a> (CAISO Operating Procedure) to <a href="mailto:ASNotifications@caiso.com">ASNotifications@caiso.com</a> within fourteen (14) days of test completion: <ul style="list-style-type: none"> <li>• <b>Skip</b> Step 3.</li> </ul> <p><b>Note:</b> CAISO will share the entire Black Start Test Package with the applicable PTO to which the Black Start Resource is connected.</p> </li> <li>3. <b>Reschedule</b> any failed tests. <p><b>Note:</b> Failure to implement corrective actions and successfully complete the retest within 90 days will result in the loss of Black Start capability status.</p> </li> </ol>

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**Black Start Resource Testing**

**Distribution Restriction:**  
**None**

**CAISO Resource Test Administrator**

1. **Route** the test results of [5360B Black Start Resource Test Report Form](#) to CAISO Operations Planning for review.

**CAISO Operations Planning**

1. **Route** test results to PTO engineering team for review.
2. **Review** test results.
3. After review,
  - If both CAISO Ops Planning and PTO Engineering teams approved,
    - **Alert** the CAISO Resource Test Administrator and
    - **Complete** DocuSign task once received.
  - If denied, **include** instructions on how to correct any deficiencies.


**CAISO Resource Test Administrator**

1. **Route** the test results for the Black Start Resource if approved, via DocuSign to Ops Planning for signature.
2. **Submit** electronic copies of test results to the Black Start Testing email distribution list, CAISO Operations Planning, and the respective SC.
3. If the Resource has passed all Black Start testing:

Newly Certifying Resource	Existing Resource Re-Certifying
<ul style="list-style-type: none"> <li>• <b>Route</b> Black Start Acceptance Letter via DocuSign CAISO Ops Planning and CAISO Contracts.</li> <li>• <b>Ensure</b> that all required Black Start agreements have been finalized.</li> <li>• <b>Confirm with</b> CAISO Operations Planning to verify that the Resource has been studied <u>and</u></li> <li>• <b>Confirm</b> PTO approves test results.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Update</b> CAISO Operating Procedure <a href="#">4610A Black Start and Dual Fuel Units</a>.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Update</b> CAISO Operating Procedure <a href="#">4610A Black Start and Dual Fuel Units</a></li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Notify</b> MF to update Black Start Flag Y <u>and</u> include <a href="mailto:OperationsCompliance@caiso.com">OperationsCompliance@caiso.com</a></li> </ul>	

4. If the Resource failed Black Start testing:
  - **Work with** the SC to **schedule** a Black Start retest within 90 days.



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CAISO Resource Test Administrator	
5. If the Resource <u>fails all</u> Black Start testing <u>within 90 days</u> :	
Newly Certifying Resource	Existing Resource Re-Certifying
<ul style="list-style-type: none"> <li>• <b>Send</b> an email notification to the Black Start Testing email distribution list.</li> <li>• <b>Work</b> with SC to <b>retest</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Update</b> CAISO Operating Procedure <a href="#">4610A Black Start and Dual Fuel Units</a> to indicate the Resource cannot provide Black Start capability.</li> <li>• <b>Notify</b> MF to update Black Start Flag N.</li> </ul>

## 4. Supporting Information

### Operationally Affected Parties


Shared with the Public.

### References

Resources studied in the development of this procedure and that may have an effect upon some steps taken herein include but are not limited to:

CAISO Tariff	Section 8.3.4, Certification and Testing Requirements. Appendix K Ancillary Service Requirements Protocol (ASRP)
CAISO Operating Procedure	<a href="#">4610 System Restoration</a> <a href="#">4610A Black Start and Dual Fuel Units</a> <a href="#">5360A Black Start Resource Test Request Form</a> <a href="#">5360B Black Start Resource Test Report Form</a> <a href="#">5360C Black Start Resource Test Plan Template</a>
NERC Requirements	EOP-005-3 R1
WECC Criterion	
Other References	

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## Definitions

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the CAISO Tariff shall have that meaning when capitalized in this Operating Procedure.

The following additional terms are capitalized in this Operating Procedure when used as defined below:

**None**

## Version History


Version	Change	Date
2.5	Changed ED Instruction Type from BS to TEST. Minor format and grammar updates.	7/20/18
3.0	Periodic Review: Updated review criteria to every three years, added document controlled footer, minor grammar and format updates.	7/24/20
3.1	Responsibilities Section and Section 3.5: Clarifications of process and requirements related to Black Start testing results (submission, review, and approvals). Operationally Affected Parties: Removed "and the RC." References: Updated NERC reference. Replaced all instances of ISO with CAISO and Blackstart with Black Start. Removed history prior to 5-years. Minor format and grammar updates.	4/01/21
3.2	Section 2.1: Minor edit spelling out first instance of CAISO. Updated all procedure references for 5360B with link, as they were incorrect.	7/28/22
3.3	Periodic Review: Minor formatting, updated procedure references and removed history prior to five years.	7/13/23

## 5. Periodic Review Procedure

### Review Criteria & Incorporation of Changes

There are no specific criteria for reviewing or changing this document, follow instructions in CAISO Operating Procedure 5510.

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### Frequency

Every three (3) years.

### Appendix

- 5360A Black Start Resource Test Request Form
- 5360B Black Start Resource Test Report Form
- 5360C Black Start Resource Test Plan Template