



**APPENDIX 12 –MINIMUM ASSESSMENT AND TESTING
REQUIREMENTS**

CONTENTS

1	FACTORY ACCEPTANCE TEST (FAT)	3
1.1	RESPONSIBILITY	3
1.2	HIGH LEVEL REQUIREMENTS	3
2	SITE INTEGRATION TEST (SIT)	6
2.1	RESPONSIBILITY	6
2.2	HIGH LEVEL REQUIREMENTS	6
3	COMMISSIONING TESTS	7
3.1	RESPONSIBILITY	7
3.2	HIGH LEVEL REQUIREMENTS	7
4	OPERATIONAL ACCEPTANCE TEST (OAT)	8
4.1	DEFINITION	8
4.2	RESPONSIBILITY	8
4.3	HIGH LEVEL REQUIREMENTS	8
5	OPTIMISATION	10
5.1	DEFINITION	10
5.2	RESPONSIBILITY	10
5.3	HIGH LEVEL REQUIREMENTS	10
6	CAPABILITY ACCEPTANCE TEST (CAT)	11
6.1	DEFINITION	11
6.2	RESPONSIBILITY	11
6.3	HIGH LEVEL REQUIREMENTS	11
6.4	ACCEPTANCE CRITERIA	13
6.5	LOAD RAMPS	14
6.5.1	<i>Ramp Down</i>	14
6.5.2	<i>Ramp Up</i>	14
6.6	STEADY LOAD TESTS	14
6.6.1	<i>Frequency Bias OFF</i>	14
6.6.2	<i>Frequency Bias ON</i>	14
6.7	CAPABILITY RUNBACK TESTS.....	14
6.7.1	<i>Power Island De-load (Mill Trip)</i>	14
6.7.2	<i>Power Island De-load (One Draught Group)</i>	15
6.7.3	<i>Power Island De-load (HP and LP Bypass)</i>	15
6.7.4	<i>Loss of 50% of Electrical Reticulation</i>	15
6.7.5	<i>Hot, Warm and Cold Successful start-up rates of >95%</i>	15
6.8	PRIMARY & SECONDARY FREQUENCY RESPONSE	16
6.8.1	<i>Primary Frequency response</i>	16
6.8.2	<i>Secondary Frequency response (Automatic Generation Control (AGC))</i>	16
7	AVAILABILITY TESTS	18
8	STANDBY CHANGE-OVER TESTS	18
	APPENDIX A : BFPT TRIP ACCEPTANCE CRITERIA	19
	APPENDIX B : ONE EFP CAPABILITY ACCEPTANCE CRITERIA	20
	APPENDIX C : BFPT TRIP, ONE EFP CAPABILITY ACCEPTANCE CRITERIA	21

1 FACTORY ACCEPTANCE TEST (FAT)

1.1 RESPONSIBILITY

- (1) The responsibility of the Factory Acceptance Test lies solely with the Contractor to demonstrate compliance with the specification, approved design documentation and product documentation.

1.2 HIGH LEVEL REQUIREMENTS

- (1) The FAT shall be conducted using AU cabinets and network cabinets with all internal components installed and all internal wiring completed. This excludes the cross marshalling and network cabinet cooling systems.
- (2) A single Power Island FAT will be conducted including the process automation systems as well as protection automation systems provided by the Contractor for the first Power Island.
- (3) The functional logic tests for the process automation system shall be conducted with IO simulation modules coupled with some additional logic within the controller (for example PTn functionality to close loops) and some loop back of analogues by the Contractor.
- (4) The functional logic tests of the protection automation system shall be conducted using an external simulation test system that models the behaviour of the plant with sufficient detail such that the testing conditions can be automatically setup and the full effect of the testing scenarios observed.
- (5) Visual and mechanical inspections are conducted on an AU cabinet with sample system cable (between marshalling cabinet and IO module) and power cables terminated and entering the AU cabinet as per the design requirement.
- (6) In addition to the FAT requirements specified in IEC 62381, the following tests and inspections as defined in this subsection are conducted during the FAT as a minimum:
 - a. Documentation checks
 - b. Inventory Checks
 - i. H/W Inventory (versions, serial numbers)
 - ii. S/W & Firmware Inventory (licenses, versions)
 - c. Mechanical Checks
 - i. Mechanical Inspection (cable entry, labelling, mounting, connections, earthing, shock protection, maintainability of fans, cabinet construction)
 - ii. Wiring and termination inspection (internal wiring, circuit breakers, labelling, segregation of wiring, wire crimp pull test, cable duct loading, connector labelling, system cable plug orientation)
 - iii. Visual Inspection
 - iv. Spare capacities (installed IO, physical space in cubicle, terminals, CPU utilisation)
 - d. HMI related checks

- i. HMI Display: Static parts (Symbols, Colours, Process Flow direction, Hierarchies, Linking of displays)
 - ii. Tag orientated tests (faceplate, functionality, text description, range, units, channel assignment, related group displays, related trend displays, position on HMI graphic, colour changes for tag, alarm priority, plant area assigned, user log-on level)
 - iii. HMI philosophy
 - e. System related checks
 - i. General (System start-up, recovery from failure, log-on strategy)
 - ii. Controller & Rack (Redundancy, Diagnostics, system performance, module hot-swap, switch over times, new module installation, configuration settings, generation of log files, identification of the source of failures, alarming of failures, redundancy swap over and logging)
 - iii. Cabinet internal power distribution (Redundancy, Diagnostics, system performance)
 - iv. Internal networks (Redundancy, Diagnostics, system performance, module hot-swap, switch over times, new module installation, configuration settings)
 - v. Automation Networks (Redundancy, Diagnostics, system performance, module hot-swap, switch over times, new module installation, configuration settings)
 - vi. Operating & Engineering Networks, Common Network (Redundancy, Diagnostics, system performance, module hot-swap, switch over times, new module installation, configuration settings)
 - vii. Bus Interfaces (redundancy, diagnostics, database structure, recovery from failure, system performance)
 - viii. Alarm handling system
 - ix. Alarm philosophy
 - x. Engineering Software
 - xi. Disaster recovery tests (backup, restore procedures)
 - xii. Printing functionality
 - f. I/O related Tests
 - i. H/W I/O (forcing of I/O via simulation at field terminals and verification at HMI)
 - ii. Bus I/O (forcing of I I/O via simulation at source system and verification at the HMI)
 - iii. I/O Handling Tests: Field devices will be simulated by use of special simulation cards.
 - iv. Historisation of Tags (storage resolution, frequency)
 - v. Data acquisition and line monitoring tests (short circuit detection, open circuit detection, parity checks, short circuit protection, power supply failure, simulated inputs, etc...)
 - g. Application Logic checks

- i. Function tests (input protection signals, protections activated, limits, functionality against FBDs, identification and labelling of loop/function in FUP)
- h. Design Philosophy Tests
 - i. Implementation of the AKZ Tagging philosophy
 - ii. Implementation of the Signal description philosophy
 - iii. Implementation of the VGB standards and other design codes
- i. Verification of all quality and performance requirements
- j. Verification of the plant coding philosophy
- k. Verification of the signal description philosophy
- l. Verification of the forward documentation system
- m. Verification of the functional distribution
- n. Verification of the expandability and spare capacity requirements
- o. Verification of scan cycles
- p. Verification of the cyber security requirements
- q. IT penetration test
 - i. An IT penetration test, i.e. a test in which a cyber-security expert tries to penetrate the C&I system with corresponding programs shall be performed in order to prove the effectiveness of the cyber security measures implemented.
 - ii. The IT penetration test shall attempt to exploit any vulnerabilities in the C&I system along and shall be concluded with recommended actions and measures to address the vulnerabilities found.
- r. Verification of the response times
- s. Verification of the protection system(s) against the safety requirements, IEC61511 and IEC61508 requirements
- t. Detailed testing of the protection automation system's safety instrumented functions (SIF) and functional logic.
- u. Verification that the configuration of the system is such that no single module failure or component failure causes a Power Island trip or load loss such that the Power Island goes below the requirement (e.g. 60% MCR)
- v. Verification of the Disaster recovery mechanisms of the Power Island C&I system

2 SITE INTEGRATION TEST (SIT)

2.1 RESPONSIBILITY

- (1) The responsibility of the Site Integration Test lies solely with the Contractor to demonstrate compliance with the specification.

2.2 HIGH LEVEL REQUIREMENTS

- (1) In addition to the FAT/SIT requirements specified in IEC 62381, the following tests and inspections as defined in this subsection are conducted during the SIT as a minimum:
- i. Verification that all enclosures are suitable for the applicable environmental conditions.
 - ii. Verification that that the standby time of the 24V battery chargers is 4 hours with the full load connected.
 - iii. Verification that that the standby time of the UPS is 4 hours with the full load connected.
 - iv. Verification of all 3rd party interfaces not tested during the FAT.
 - v. Verification of any tests from the FAT procedure not performed during the FAT.
 - vi. Verification of the C&I system with final power connected.
 - vii. Mechanical and visual inspection of the control system after installation of the control system has been completed.
 - viii. Full testing of the network cabinet cooling system.
 - ix. Re-verification of any FAT tests at the discretion of the Engineer.

3 COMMISSIONING TESTS

3.1 RESPONSIBILITY

- (1) The responsibility of the commissioning loops checks as defined by IEC 62382 lie with the Contractor.

3.2 HIGH LEVEL REQUIREMENTS

- (1) In addition to the loop check requirements defined by IEC 62382 and where relevant to the Contractor's own procedures, the Contractor shall:
- i. Coordinate and conduct the loop checks with the Employer's representatives.
 - ii. Conduct a blow through of the measurement line.
 - iii. Pressure test measurement lines and condensate pots.

4 OPERATIONAL ACCEPTANCE TEST (OAT)

4.1 DEFINITION

- (1) Operational Acceptance Testing (OAT) takes place at the Employer's site after hot commissioning has concluded and the control system is connected to the plant process. During this test the Employer gets the opportunity to witness the functionality of the system and ensure that the system is ready for operation in terms of reliability and suitability for plant and personnel safety.

4.2 RESPONSIBILITY

- (1) The responsibility of the Operational Acceptance Test lies solely with the Contractor to demonstrate compliance with the specification.

4.3 HIGH LEVEL REQUIREMENTS

- (1) The following tests and inspections are conducted during the OAT as a minimum:
- i. Control System Expandability Criteria as specified.
 - ii. Verification of the electromagnetic compatibility (EMC) of C&I system equipment.
 - iii. Verification of the standby time after a power loss.
 - iv. Verification of the communication redundancy.
 - v. Verification of the power supply redundancy.
 - vi. Verification of the control system server(s) redundancy.
 - vii. Verification of the hot-swapping of modules.
 - viii. Verification that no single fault or two concurrent faults endanger the safety of the plant or people.
 - ix. Verification that no individual control system fault or two concurrent faults cause a multi-Power Island trip.
 - x. Verification that no single control system fault causes the loss of an operator workstation or inhibits a real trip.
 - xi. Verification of the behaviour of the system in the event of field device faults.
 - xii. Verification of the fail safe design of applicable equipment.
 - xiii. Verification of the control system's Alarm philosophy such that the alarm performance criteria as specified in the technical guideline 240-56355466 Alarm Management System Guideline are complied with.
 - xiv. Demonstrate that analogue signals stored are scanned and archived with the resolutions required.
 - xv. Demonstrate that the detection, time stamping and storage of binary data state changes (sequence of event recording) as specified.
 - xvi. Demonstrate that the Operator response times meet the requirements.
 - xvii. Verify Actuator response times as required above.
 - xviii. Checking of all interlocks and protections, sequence controls and analogue controls.

- xix. The Contractor shall provide a report on the control and instrumentation system expandability confirming each of the parameters in the specification as tested by the Contractor.
- XX. The Contractor shall monitor the CPU and bus loading on a continuous basis from the Hot Commissioning to Completion of the relevant Unit. The report shall include the method utilised to monitor the CPU and bus communication loading as well as the loading for all operations. The normal and abnormal operation periods shall be clearly indicated in the report.

5 OPTIMISATION

5.1 DEFINITION

- (1) Optimisation takes place at the Employer's site after OAT has concluded. During optimisation the Employer gets the opportunity to witness the tuning of all individual control loops and the control system's interface to the overall process. An optimised individual control loop implies that the control loop meets the criteria stated in the specification. An optimised control system implies that the control system maintains all process variables within specified deviation criteria.

5.2 RESPONSIBILITY

- (1) The responsibility of Optimisation lies solely with the Contractor to demonstrate compliance with the specification.

5.3 HIGH LEVEL REQUIREMENTS

- (1) The following tests and inspections are conducted during the Optimisation as a minimum:
- i. Verification that all individual control loops are within specification. The performance of each control loop should be compared to the best running Power Island & should match or improve that loop.
 - ii. Verification that the control system maintains the overall process within specified limits for a period of 72 hours at 100% MCR.
 - iii. Verification that the control system maintains the overall process within specified limits for a period of 72 hours at varying load from minimum load to 100% MCR.
- (2) The total maximum number of Power Island trips resulting from C&I system error that are permitted during the optimisation and subsequent stages of the project is as follows:
- | | | |
|--------------------------------|---|---|
| i. First Power Island | : | 2 |
| ii. Second Power Island | : | 1 |
| iii. Remaining Power Island(s) | : | 0 |

6 CAPABILITY ACCEPTANCE TEST (CAT)

6.1 DEFINITION

- (1) This is defined as bringing into service all the items of this contract as specified, meeting the requirements of the specification including all necessary testing and verification of the stated performance.

6.2 RESPONSIBILITY

- (1) The responsibility of CAT lies solely with the Contractor to demonstrate compliance with the specification.
- (2) The Contractor supplies the commissioning, testing, optimisation and take-over documentation for the Engineer's acceptance and demonstrates compliance during the commissioning, testing and take-over phases.

6.3 HIGH LEVEL REQUIREMENTS

- (1) The following tests and inspections are conducted during the CAT as a minimum:
- i. Functional and sequence testing
 - ii. Verification of all safety functions
 - iii. All capabilities and run-backs tested
 - iv. Steady load testing
 - v. Ramp load testing
 - vi. Primary and Secondary frequency control
 - vii. Reliability test run
 - viii. Functional, capability and performance testing for compliance with the South African Grid Code (SAGC)
 - ix. Verification of Unit Co-ordination
 - x. Verification of Fuel master control
 - xi. Verification Boiler Pressure control
 - xii. Verification of Feed water master control
- (2) The following capability tests as a minimum shall be undertaken at full load with five mills in service without the Power Island tripping:
- i. Load swings of 60MW, 10% load swing at gradient 1, to determine the ability of the Power Island to adjust efficiently to minor changes, where no alterations of plant conditions take place
 - ii. Tripping a bottom, centre and top mill (one mill at a time)
 - iii. Tripping of two mills (any configuration)
 - iv. Tripping of three mills (any configuration)
 - v. Tripping of both draught groups, one at a time. (LH draught group trip then RH draught group trip).
 - vi. Tripping of one EFP (one at a time). Tripping of the BFPT.
 - vii. The Power Island will demonstrate stable control behaviour from 60% to 100% and back to 60% of MCR.
 - viii. 100% load rejection test

- ix. Full load reliability run for a minimum of 72 hours on AGC control
 - x. Pyros capability with oil burner support on specific mills
 - xi. Turbine HP Cylinder evacuation (HP COP operation) and HP/IP bias rundown.
 - xii. Governor valve exercising, on and off load
 - xiii. The Islanding test should be carried out successfully as per 240-56030600 Steam Turbine Unit Islanding Load Rejection and Speed Control Verification Standard and 240-86070694 Certification/Decertification Standard for Turbo-Generator Unit Islanding.
 - xiv. Physical testing of all boiler protections, including
 - xv. Combustion – one combustion related protection (pyro)
 - xvi. Steam pressure:
 - xvii. Test and prove on all the reheat safety valves (Reheat Safety Valve floating R/Heater Outlet all four at 4.7MPa each and R/Heater Inlet 1off x 4.40MPa each and 3off x 4.45MPa each).
 - xviii. Test and prove on all the superheater safety valves (SH Valve floating 1off x 18.3MPa and 3off x 18.4MPa each).
 - xix. Test and prove on all the drum safety valves (Drum Safety Valve floating all four valves at 20.07MPa each).
 - xx. The turbine control and protection systems should be tested online so as to be deemed sufficient to avoid the current mandatory turbine physical over speed protection tests in future, after the initial physical over speed test to prove the correct operation of the protection system. Physical testing of the system where the solenoids are actually activated must be manually initiated. Should there be any defects or alarms on the circuit the test should not be allowed to continue automatically.
 - xxi. Physical over speed test
 - xxii. Grid Code compliance
- (3) The above mentioned tests in points (1) to (2) shall be clarified and finalised during basic and detailed engineering
- (4) During all the capability tests, monitor and store trends of:
- i. Main steam pressure
 - ii. Furnace pressure
 - iii. Furnace temperature
 - iv. Superheater outlet temperature
 - v. MW generated and send out
 - vi. Feed water flow
 - vii. Feed water temperature
 - viii. Steam flow
 - ix. Total fuel
 - x. Total air
 - xi. Condenser pressure

- xii. O₂ – excess air
- xiii. Historical alarm log from 10 minutes before initiation of test to 25 minutes after the event

6.4 ACCEPTANCE CRITERIA

- (1) For all the tests conducted, the various main process parameters must stay within prescribed limits. Before any test the Power Island must be stable and running on full automatic with no standing alarms.
- (2) Process Performance requirements are specified in Eskom standard, 240-65821672 Performance and Capability Proof Testing.
- (3) The maximum permissible deviations for the capability runbacks shall be finalised during the technical clarification phase.

6.5 LOAD RAMPS

6.5.1 RAMP DOWN

- (1) **Purpose:** To prove that the Power Island can ramp down safely at a predetermined rate without exceeding the maximum permissible deviation limits.
- i. With the Power Island at 80% TMCR and conditions stable, reduce to 70% TMCR at a ramp rate of 2% TMCR/min.
 - ii. With the Power Island at 75% TMCR and conditions stable, reduce load to at a ramp rate of 2% TMCR/min to the turbine minimum load.

6.5.2 RAMP UP

- (1) **Purpose:** To prove that the Power Island can safely ramp up at a predetermined rate without exceeding the maximum permissible deviation limits.
- i. With the Power Island at 50% TMCR and conditions stable, increase load to 75% TMCR at a ramp rate of 2%/min.
 - ii. With the Power Island at 75% TMCR and conditions stable increase load to 100% TMCR at a ramp rate of 2%/min.

6.6 STEADY LOAD TESTS

6.6.1 FREQUENCY BIAS OFF

- (1) **Purpose:** To ensure that the Steam Temperatures and Pressures do not exceed the maximum permissible deviation limits during the test.
- i. With the Power Island at 100% TMCR and with the Frequency Bias OFF carry out a thirty minute constant load test. Five Mills have to be in service for the test

6.6.2 FREQUENCY BIAS ON

- (1) **Purpose:** To ensure that the steam temperatures and pressures do not exceed the maximum permissible deviation limits during the test.
- i. With the Power Island at 100% TMCR and with the Frequency Bias ON carry out a thirty minute constant load test. Five mills have to be in service for the test. This test should be carried out during a peak period when frequency changes are continuous.

6.7 CAPABILITY RUNBACK TESTS

6.7.1 POWER ISLAND DE-LOAD (MILL TRIP)

- (1) **Purpose:** To prove that the Power Island will de-load on Capability and stabilise without exceeding the maximum permissible deviation limits.
- i. With the Power Island at 90% TMCR and FOUR mills (in service), trip 1 mill (top, centre and bottom) – Power Island should be at stabilise at the required TMCR.

- ii. With the Power Island at 90% TMCR and FOUR mills in service trip 2 mills (different selections of top, centre and bottom). Power Island should de-load to stabilise at the required TMCR.
- iii. With the Power Island at 100% TMCR and FIVE mills in service trip 3 mills (different selections of top, centre and bottom). Power Island should de-load to stabilise at the required TMCR.

6.7.2 POWER ISLAND DE-LOAD (ONE DRAUGHT GROUP)

- (1) **Purpose:** To prove that the Power Island will de-load safely to 50% TMCR on one draught group without exceeding the maximum permissible deviation limits.
 - i. With the Power Island stable at 100% TMCR trip one Secondary Airheater, thus tripping that side draught group.

6.7.3 POWER ISLAND DE-LOAD (HP AND LP BYPASS)

- (1) **Purpose:** To prove the Turbine and Generator controls and protection systems and to ensure that the boiler remains on load steaming via the HP and LP Bypass system.
 - i. With the Power Island at 50% TMCR and stable carry out the 50 % load rejection test
 - ii. With the Power Island at 100% TMCR and stable carry out the 100 % load rejection test.

6.7.4 LOSS OF 50% OF ELECTRICAL RETICULATION

- (1) **Purpose:** To prove that Power Island operation is not disturbed during a loss of 50% of the Power Island reticulation and that the unit drives are functionally distributed.
 - i. With the Power Island at 100% TMCR and stable, trip the supply to 50% of the Power Island electrical reticulation.

6.7.5 HOT, WARM AND COLD SUCCESSFUL START-UP RATES OF >95%.

- (1) In addition to the above capability tests, the following capability tests shall be clarified during technical clarification and performed during CAT:

Type of start	Shut down duration - hours	Expected Start-up Time - hours
Cold	>72	7
Warm	>24<72	3
Hot	<24	1.5

- (2) Flexibility of Power Island:
 - i. Emergency Level 1 sent out
 - ii. Maximum Sent Out with no oil support, no restrictions
 - iii. Maximum Sent Out with no oil support, with restrictions (e.g. HP Heaters, coal quality, vacuum)

- iv. Minimum Sent Out with no oil support
- (3) Ability to load ramp at 5 different programmable ramp rates.
- (4) De-Loading due to Vacuum loss.
- (5) Verification of Operating Modes: Turbine Follow, Boiler Follow and Co-ordinated.
- (6) Pyrometer capability test with oil support on specific mills.
- (7) Turbine Governor valve on-line testing.
- (8) Stator Coolant Flow Low capability
- (9) Operation of Implosion dampers on the Fabric Filter Plant

6.8 PRIMARY & SECONDARY FREQUENCY RESPONSE

- (1) Instantaneous Reserve shall be tested according to 240-153438907 Power Stations Frequency Tests Guideline and shall be incorporated into the Capability Acceptance Testing (CAT).
- (2) The tests below should be performed with various mill combinations.

6.8.1 PRIMARY FREQUENCY RESPONSE

- (1) These tests verify the response of the Power Island to step changes up and down to support the primary frequency response requirements. Minimum requirements are as stipulated in the specification.
- (2) Simulate a frequency error (positive & negative) and verify that the Power Island responds in accordance with the SAGC. These tests should be performed at different load points with 2, 3 and 4 mills as well as with different mill combinations.
- (3) The following tests shall be undertaken:
 - i. Primary frequency response – A positive 0.1Hz frequency deviation after the deadband is simulated. The Power Island is to de-load a minimum 3% MCR (Recommended is 4.5 - 5%MCR) in 10 seconds and maintain this either from 10 mins or for the duration of the frequency deviation.
 - ii. Primary frequency response – A negative 0.1Hz frequency deviation after the deadband is simulated. The Power Island is to pick up 3% MCR (Recommended is 4.5 - 5%MCR) in 10 seconds and maintain this either from 10 mins or for the duration of the frequency deviation.
 - iii. Primary frequency response – A positive 0.5Hz frequency deviation is simulated. The Power Island is to drop 90MW in 10 seconds.
- (4) During these tests the Power Island shall remain within the bounds defined in Section 6.4 Acceptance Criteria

6.8.2 SECONDARY FREQUENCY RESPONSE (AUTOMATIC GENERATION CONTROL (AGC))

- (1) The following Test shall be undertaken by the Contractor:

- i. Secondary frequency response - The Power Island on AGC shall execute a load ramp of 10% MCR to full load at a minimum gradient of 1.67%MCR/Min. The Power Island shall immediately be ramped back down by 10% MCR at a minimum gradient of 1.67 MCR/Min and then immediately back down. The load ramps shall be initiated by National Control.
- (2) More detail surrounding the testing shall be made available during the basic engineering phase
- (3) During this test the Power Island shall remain within the bounds defined in Section 6.4 Acceptance Criteria

7 AVAILABILITY TESTS

- (1) The MTTF for all field equipment forming part of the Works shall be tested by the Contractor from sectional Completion for at least a period of one year to prove compliance to the MTTF specification and SIL 2 rating.
- (2) Different tests shall be done for each type, make and model of instruments and transmitters. For a total number of failures of a test of more than or equal to 10, the MTTF shall be calculated as:
 - i. $MTTF = (\text{number of devices tested multiplied by the test period in hours}) \text{ divide by the total number of failures.}$
- (3) For a total number of failures of <10, the MTTF shall be calculated assuming a single sided lower confidence of 70%.
- (4) The reports on the tested MTTF and SIL compliance shall be submitted as per Appendix 1 – Vendor Document Submittal Schedule (VDSS).

8 STANDBY CHANGE-OVER TESTS

Standby change-over tests for all equipment with redundancy should be specified to confirm the controls seamlessly changeover (Feed pumps, Feed reg valves, Condensate extraction pumps, etc.) The requirements for these tests should be listed.

APPENDIX A: BFPT TRIP ACCEPTANCE CRITERIA

	AKZ	Setpoint/ target value	Max deviation	Comments
Unit Load		>556MW		Load at start of test
Unit load to remain stable	SE11C210		±10MW	From start of test
Both EFP's to auto start				

APPENDIX B: ONE EFP CAPABILITY ACCEPTANCE CRITERIA

	AKZ	Setpoint/ target value	Max deviation	Comments
Unit Load		>556MW		Load at start of test
New unit load capability	SE11C210	318MW	±20MW	New capability limit
Boiler master	NA02C001	Switch to manual		Automatically switch to manual upon D/G trip
Load setpoint	SE11C051	Switch to manual and follow actual load to within capability		Automatically switch to manual upon D/G trip
Initial pressure controller	SE11C056	Switch on		Automatically switch on upon D/G trip
Mill sequential trip operated		Firing reduced to 3 mill firing		

APPENDIX C: BFPT TRIP, ONE EFP CAPABILITY ACCEPTANCE CRITERIA

	AKZ	Setpoint/ target value	Max deviation	Comments
Unit Load		>556MW		Load at start of test
New unit load capability	SE11C210	318MW	±20MW	New capability limit
Boiler master	NA02C001	Switch to manual		Automatically switch to manual upon D/G trip
Load setpoint	SE11C051	Switch to manual and follow actual load to within capability		Automatically switch to manual upon D/G trip
Initial pressure controller	SE11C056	Switch on		Automatically switch on upon D/G trip
Mill sequential trip operated		Firing reduced to 3 mill firing		