Title: **Service Contracts for Running Maintenance and Outages**

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Content

Page

LIST OF FIGURES

LIST OF TABLES

1. Introduction

1.1 Objectives

- Turbo-Generator Services (TGS) will provide services to Eskom with enhanced process performance in terms of both effectiveness (meeting the organisations objectives) and efficiency (using resources strategically well). (Davis & Heineke, 2005) Maintenance Projects which can vary from General Overhauls (GO's), Mini-General Overhauls (MGO's), and Interim Repairs (IR's) will be completed in 50 days or less.
- The content of this Scope of Work (SOW) defines the commercial aspects of contract management within TGS, technical work to be done on power stations relating to the TGS departments, and specifically defined requirements needed in order for Contractors to perform a full service for TGS. Figure 1 below shows the general departments within Turbo-Generator Services (TGS), one of the Product Group's within Eskom Rotek Industries (ERI). The word 'Contractor' is interchangeable with the word 'Service Provider'.

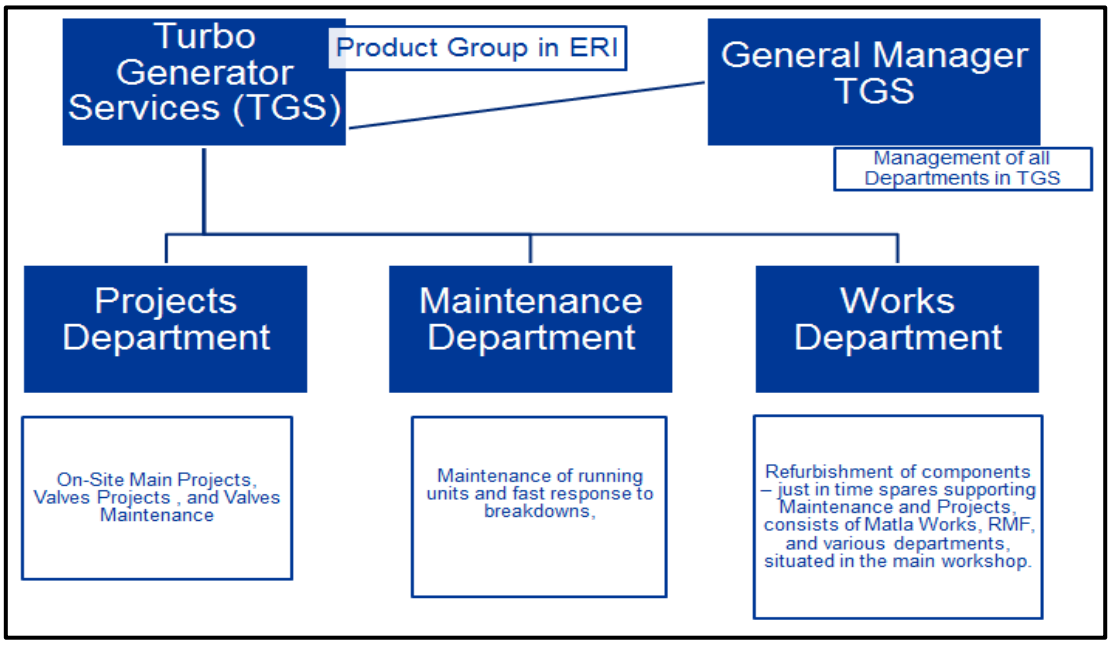


Figure 1: TGS Departments. (ERI - TGS, 2018)

1.2 Capacity Planning Department (CPD) Processes

Background

- The management of resources is controlled through the CPD Department. Each Contractor will be assigned to a specific outage. Power Stations are assigned to an individual Capacity Planner. The role of the Capacity Planner is to ensure the following:
- Provide effective resource planning, administrative services, efficient project capacity planning, and scheduling services.
- Key relationship management between all stakeholders.

- Optimise permanent ERI resources for maximum utilisation and advise the relevant Project Manager/ Site Manager any shortfall requiring the sourcing of external resources through the Services Contracts.
- Allocate resources to all projects on final scope by name as per the approved Services Request Form (SRF).
- Co-ordinate the compiling of Portfolio of Evidence (POE) Files for all permanent and contracted resources as well as Safety Files, which will be presented at various sites for approval 30 days before the start of the project.
- Co-ordinate general/mandatory training for resources and co-ordinate leave scheduling based on resource availability with all stakeholders.
- Apply for Task Order (TO) approvals 6 weeks in advance of establishing a finalised SRF. Load and ensure approval of the subsequent Purchase Order (PO) within 1 week of the approval of the TO.
- Chair Meetings with Contractors and follow-up on TO's, PO's, list of available resources from Contractors, concerns with payments to employees, concerns with payments to Contractors, planning for upcoming outages, safety related issues, training and other general related items to the management of the service contracts.
- On-board all Contractors and ensure all processes are understood and followed.
- All Contractors will be required to complete the following documentation/reports, inclusive but not limited to, as changes in execution processes will define additional submissions, the Contractor will be guided through the submission process upon the on-boarding sessions.
- Receive SRF's and provide subsequent pricing based on a standardised quotation template. Standardised pricing per module will be used, and Rates Tables will be used for additional requests. Pricing will be based on a duration of 50 days.
- Month-End Reports (Submission Lists based on number of resources assigned to various sites)
- Standardised Execution Strategy Reports based on supply of specialised skills, per project. Separate technical improvement reports (lessons learnt/ recommendations), 5-S implementation, and skills-transfer reports.
- Training Matrices with percentage completion based on requirements outlined in the 'pre-qualifications work instruction", per project.
- Safety Matrices with percentage completion based on Safety File completion, appointments, Covid 19 safety execution plans, per project etc.
- Portfolio of Evidence Files – specific requirements met in order for the employee to perform his/her duties.
- Resource Commitment Forms (RCF's) templates 30 days prior to start of an outage.
- Commercial Reports based on project budgets verses actual spend, per project. No Contractor will be allowed to work outside of the defined TO dates, and associated costs per project.
- Standardised payment assessments template for reviews upfront, and to be produced upon facilitating the payment process.

- Standardised timesheet templates will be provided from sites. All employees must be accounted for on timesheets, that will be signed off by relevant stakeholders, confirming the hours worked.
- Stakeholder Management Reports for directives to be provided – power station specific and surrounding community specific.

2. Portfolio of Evidence Information (POE Files)

2.1 Generic Requirements

- All external courses must be via an accredited service provider.
- Evidence of external course attendance must be submitted.
- Evidence of service provider accreditation must be submitted.
- Medical “fit to work” certificates must be submitted for all staff.
- Further relevant in-house courses will be presented as and when required.
- A confidentially agreements must be signed by the employees.
- All trade tools to comply with the TGS tool list as per the BMS.
- All qualifications must be verified by an accredited service provider.
- A Declaration of Interest form must be signed by employees.
- Proof of criminal checks, Managed Integrity Evaluations (MIE) checks, ensure all qualifications provided are true and validated.
- English language proficiency.
- Evidence of legal and legislative compliance.
- Practical/Theoretical Evaluation to be executed by ERI Training Department.
- The latest revision of all internal training is to be used.

2.2 Pre-Verification Process

Each employee shall be required to have a current POE file.

- A Verification certificate based on compliance with the criteria set out in section 2 and 3 must be submitted as proof to the ERI Training Department.
- The Portfolio of Evidence (POE) must contain all the required proof and incomplete submissions will be highlighted and rejected.
- The Training Department shall preview the POE for compliance and sign off a pre-verification notification.
- Only once the employer has received the pre verification notification may the employee be recommended to TGS for employment. Validity of certificate must be monitored.
- The TGS line departments may not accept a contract worker for employment unless there is a pre verification notification in place.
- A confidentiality agreement will be signed.

2.3 Artisan Ratings

- C1 – 0 ≤ CWD ≤ 84 (CWD: Cumulative Working Days on an Outage)
- C2 – 85 ≤ CWD ≤ 210 (CWD: Cumulative Working Days on an Outage)
- C3 – 211 ≤ CWD ≤ 336 (CWD: Cumulative Working Days on an Outage)
- C4 – 337 CWD or more (CWD: Cumulative Working Days on an Outage).

2.4 Specific Criteria per Skill Type

2.4.1 Artisan / Fitters

CRITERIA	DETAILS
Minimum Qualification and Experience	2 Years relevant post qualification experience.
Trade Certificate	Fitter/Fitter & Turner Trade Qualification The Service Provider will be expected to show evidence of verification from an accredited service provider.
Precision Measuring Course	Employees must attend training by an accredited service provider, as being competent in the use of precision measuring equipment.
Precision Measuring Evaluation	Employees to be evaluated by ERI Training Department
Basic Rigging and Pendent Control	The employees must have passed a basic rigging course as stipulated by document TWQ-F-38.
240-99158624 (Site Execution Work)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training

Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	
Generic Clean Condition Process	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Site specific training will also be given to the employees as and when required. Service provider can train their resources if they have ERI authorised instructor
Basic Alignment	Employees must be tested by an accredited service provider as being competent.
Safe Operation of Electrical Equipment	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. (TT-A-01)
Hydraulic Curriculum (Pilgrim, Mock, Hytorc, Bolt tight, SKF, Basic Hydraulic Safety)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Turbine Fundamentals	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Modular Training	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Generator Principles	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
PSR Awareness Course	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.2 Supervisor

CRITERIA	DETAILS
Minimum Qualification and Experience	At least 3 years' experience on Turbine Generator plant and its auxiliaries. At least 2 years supervision experience with strong organizational, interpersonal, communication &

	supervision skills with the ability to manage subordinates to achieve the required objective.
Trade Certificate	Mechanical Fitting Trade and NTC4 or equivalent. The Service Provider will be expected to show evidence of verification from an accredited service provider.
Precision Measuring Course	Employees must attend training by an accredited service provider, as being competent in the use of precision measuring equipment.
Precision Measuring Evaluation	Employees to be evaluated by ERI Training Department
Basic Rigging and Pendent Control	The employees must have passed a basic rigging course as stipulated by document TWQ-F-38.
240-99158624 (Site Execution Work)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Generic Clean Condition Process	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Site specific training will also be given to the employees as and when required.
Basic Supervisory Certificate	The Service Provider can arrange for this course via an accredited service provider.
Safe Operation of Electrical Equipment	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. (TT-A-01)
Hydraulic Curriculum (Pilgrim, Mock, Hytorc, Bolt tight, SKF, Basic Hydraulic Safety)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Supervisors.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Turbine Fundamentals	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

Modular Training	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Generator Principles	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
PSR Awareness Course	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Basic Alignment	Employees must be tested by an accredited service provider as being competent.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604) Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training

2.4.3 Expeditor

CRITERIA	DETAILS
Qualification	NTC4 & recognised Apprenticeship and/or any relevant Tertiary Qualifications Trade Certificate
Trade Certificate	The trade certificate must have been received from a recognized service provider. 5 Years related experience on turbine maintenance and auxiliaries. The Service Provider will be expected to show evidence of verification.
240-99158624 (Site Execution Work)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.

240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Generic Clean Condition Process	This is an in-house course, and it is expected of the Service Provider to arrange with the TGS Training Department or the training. Site specific training will also be given to the employees as and when required.
Computer Literacy	Basic MS Word and Excel including SAP.
Experience	5 years of sound Procurement, Expediting & Planning Experience Sound Interpersonal, Organisational and Communication Skills Must be able to work independently or with little supervision Computer Literate (MS Projects, Word, Excel, Power Point and SAP A customer-oriented approach with the ability to liaise effectively at all levels
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604) Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training

2.4.4 Rigger

CRITERIA	DETAILS
Qualification	Rigger Trade Test Equivalent Rigger Qualification registered and recognised by the Government of RSA
Recognized Trade Certificate	The trade certificate must have been received from a recognized service provider. The Service Provider will be expected to show evidence of verification.
Pendant Crane Driver Course	The employees must have passed a crane driving course by an accredited service provider.
Qualifications and Training on Rigging and Crane Driving	The employees must have passed a basic rigging course as stipulated by document TWQ-F-38.
Site specific rigging procedure. Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Rigging check sheet (240-94067136)	In house OJT (On-Job Training). This is a site-specific lifting procedure.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Rigging Evaluation	To be done by an accredited service provider.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Experience	2 years relevant Post Qualification experience
Literate in English – Speak, Read and Write	Ability to speak, read and write in English.

2.4.5 Crane Driver

CRITERIA	DETAILS
Qualification	N2 or Std 9 or ABER level 4 Maths and English. Relevant Crane Driving Qualification/Certificate
Qualifications and Training on Rigging and Crane Driving	The employees must have passed a basic rigging course as stipulated by document TWQ-F-38.
Crane Driver Course including CAB Cranes	The employees must have passed a crane driving course by an accredited service provider.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.

Site specific rigging procedure. Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Crane Logbook (240-94063746) Rigging check sheet (240-94067136)	In house OJT (On-Job Training). This is a site-specific lifting procedure.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Basic Rigging	The employees must have passed a basic rigging course by an accredited service provider.
Experience	At least 3 years' experience on operating cranes and 2 years exposure to an engineering plant
Literate in English – Speak, Read and Write	Ability to speak read and write in English.

2.4.6 Quality Inspector

CRITERIA	DETAILS
Qualification. All to be obtained via an accredited service provider	SAQA level 1 Quality Control Accreditation
	SAQA Visual Inspection Certification
	N4 Mechanical /Heavy Current Electrical Certificate
Trade Certificate	Mechanical/Heavy Current Electrical Trade Certificate
Precision Measuring Course	Employees must attend training by an accredited service provider, as being competent in the use of precision measuring equipment.
Precision Measuring Evaluation	Employees to be evaluated by ERI Training Department
Experience	3 years related experience: Inspections Metrology inspection methods Electrical testing
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Supervisors.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Literate in English – Speak, read and write	Evaluation to be done at an accredited service provider. ABET level 4
240-99158624 (Site Execution Work)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Quality Workflow Assessments and Tracking for Outages (240-94067752)	
Generic Clean Condition Process	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the Training.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604) Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	

2.4.7 Clerk

CRITERIA	DETAILS
Qualification	Grade 12 or ABET level 4 or an administration qualification
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Computer Literacy; Word; and Excel	External Service Provider
Literate in English – Speak, Read and Write	Evaluation to be done at an accredited service provider.
Experience	Two years administration experience
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.8 Storeman

CRITERIA	DETAILS
Qualification	ABET level 4 or grade 12 or Standard 10
Knowledge of Tools and Equipment	Basic hand tools courses are available at accredited training centres.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Generic Clean Condition Process	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Site specific training will also be given to the employees as and when required.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Literate in English – Speak, Read and Write	Evaluation to be done at an accredited service provider.
Experience	8 years related to Turbo-Generator plant
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.9 Bolt Heater Operators for Mannings Units Only

CRITERIA	DETAILS
Qualification	Trade test (Electrical or Mechanical) - Artisan
Literate in English – Speak, Read and Write	Evaluation to be done at an accredited service provider.
Experience	Five years in the relevant trade
Bolt Heating Course	In house course to be presented after appointment
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.10 Quality Technician

CRITERIA	DETAILS
Qualification	N6/ National diploma SAQA Level 1 Quality Control accreditation
Experience	5 Years power station projects and technician with good Quality background
ISO accredited	In house course
Trade Certificate	Mechanical/Heavy Current Electrical Trade Certificate
Precision Measuring Course	Employees must attend training by an accredited service provider, as being competent in the use of precision measuring equipment.
Precision Measuring Evaluation	Employees to be evaluated by ERI Training Department
Experience	3 years related experience: Inspections Metrology inspection methods Electrical testing
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Supervisors.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Literate in English – Speak, read and write	Evaluation to be done at an accredited service provider. ABET level 4
240-99158624 (Site Execution Work)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Quality Workflow Assessments and Tracking for Outages (240-94067752)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the Training.
Generic Clean Condition Process	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the Training.

Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604) Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training

2.4.11 Utility Men

CRITERIA	DETAILS
Qualification	Grade 10 or ABET level 2 (8 years' experience) or N1 (with 5 years related experience preferably on Turbo-Generator plant) Grade 12
Experience	ABET level 4 (8 years' experience) and/or N1 (with 5 years. Experienced in the cleaning of workshops 1-2 years' experience with Technical Field
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Knowledge of Tools and Equipment	Basic hand tools courses are available at accredited training centres.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Generic Clean Condition Process	This is an in-house course, and it is expected of the Service Provider to arrange with the TGS Training Department or the training. Site specific training will also be given to the employees as and when required.
Literate in English – Speak, Read and Write	Evaluation to be done at an accredited service provider.

Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.12 Hygiene Services: Cleaner

CRITERIA	DETAILS
Qualification	Grade 10 or Adult Basic Education Level 5
Experience	2 years related experience
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Generic Clean Condition Process	This is an in-house course, and it is expected of the Service Provider to arrange with the TGS Training Department or the training. Site specific training will also be given to the employees as and when required.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.13 SAP Scheduler / Planner

CRITERIA	DETAILS
Qualification	Recognised trade (Engineering) with N4
Experience	3 Years Generator and Turbine experience including Auxiliaries.
Literate in English – Speak, Read and Write	Evaluation to be done at an accredited service provider.
Computer Literacy; (All intermediate) Access; MS Word; Power Point; Excel; MS Projects; SAP PM1 & 2	External Service Provider
Technical Report Writing	Must be done via an accredited service provider.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Supervisors.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.

Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

2.4.14 Safety Coach

CRITERIA	DETAILS
Qualification	Grade 12/N3 (NQF Level 4) SAMTRAC/SHEMTRAC or equivalent Driving License (Code 08) National Diploma Safety Management
Experience	One year experience in the HSE field
Skills	Being able to demonstrate ability, proficiency, knowledge and understanding to: Observes employee's work habits. Conducts Safety Health and Environmental inspections. Assists with the implementation of all relevant Safety, Health and Environmental initiatives in the workplace. Compiles and submits reports on Safety, Health and Environmental system deficiencies, findings, incidents, accidents, etc.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Supervisors.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604) Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training

2.4.15 Safety Officer

CRITERIA	DETAILS
Qualification	Grade 12

	National Diploma Safety Management
Experience	One year experience as the Safety Officer or Assistant Safety Officer
Skill	Being able to demonstrate ability, proficiency, knowledge and understanding to: Monitor SHE (Safety, Health and Environment) legal compliance. Advise and support SHE implementation, functioning and sustainability. Assist with SHE campaigns and initiatives. Assist with implementation of SHE policies and procedures. Ensure that proper SHE planning is done for the projects. Prepare SHE files for projects and submit to Client for approval. Provide appointed contractors with SHE Specifications, review and approve, approved contractor SHE files before projects are started. Conduct SHE induction for employees and visitors at site. Ensure all legal appointments are in place for the area of control as per OHS Act 85 of 1993 and BMS requirements. Report all incidents to the SHEQ Manager. Prepare and report on Initial Notifications. Ensure that all incidents are preliminary investigated effectively as per procedure and legislation. Ensure that incidents are followed up and all corrective actions are closed. Maintain all incident documentation as per procedures. Conduct daily walk-about and report unsafe acts and conditions to the SHEQ Manager in writing. Follow up on all reported unsafe acts and conditions. Conduct site SHEQ inspections and provide a report to the SHEQ Manager. Be available for all audits or ensure that adequate representation is provided.

	Follow up on audit findings and create action plans following audits conducted in your area and ensure closure of action plans derived from your audits. Follow up on SDR's raised during the audits and ensure closure. Submit proof of close out on a Document Transmittal form. Ensure that all documentation for reporting of Occupational Injuries and Diseases is forwarded to the SHEQ CoE Clerk following an incident.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Supervisors.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Flogging procedure (see tender presentation) (240-94068826) Hydraulic equipment specifications, operation and maintenance requirements (240-94067604) Rigging procedures (Basic TE-F-14; Site Specific; 240-126606734 - Lifting Working Practices) Turbine FME (TTQ-F-06) Standard for Control of Blanks and Foreign Material Exclusion Covers (240-94069330)	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training

2.4.16 Turbine Access Controllers

CRITERIA	DETAILS
Qualification	N1 plus 10 years' experience or N2 plus 5 years' experience.
Experience	2-3 years practical on job experience of Generator/Turbine Access Control within CC&FME group or TGS group.
Safety Courses (Mandatory) – SMAT, HIRA, Unsafe Acts and Near Misses, Safety for Skilled.	These are in-house courses, and it is expected of the OSC to arrange with the ERI Training Department for the training.
Knowledge of Tools and Equipment	Basic hand tools courses are available at accredited training centres.

240-125904456 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Projects resources.
240-144380417 (Management and control of tools in a Tool Store)	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training. Applicable to Valves services.
Generic Clean Condition Process	This is an in-house course, and it is expected of the Service Provider to arrange with the TGS Training Department or the training. Site specific training will also be given to the employees as and when required.
Literate in English – Speak, Read and Write	Evaluation to be done at an accredited service provider.
Disciplinary and Grievance Procedures	This is an in-house course, and it is expected of the OSC to arrange with the ERI Training Department for the training.

3. General Rules when placing Resources

- Employees testing positive for Covid 19 must be quarantined at home and must be paid for the quarantine period. It is the duty of the Contractor to discuss arrangements for replacement of the resource with the assigned Project Manager/ Site Manager, if a replacement resource is deemed necessary. Cost for the replacement resource must be charged to the Employer.
- Resources from local communities around power stations that meet the set requirements must be given preference in placement on projects.
- Resources placed as trade assistants/ utility men must be provided from local communities having met the set requirements. Employees placed locally must not be provided with transportation.
- Transportation provided must be safe, in accordance with traveling requirements governed by ERI requirements.
- Objections to the general rules above must be communicated to the CPD Team, and changes to the rules above must be approved by the Contract's Manager.

4. Specialised Resources

- The specialised resources that will be provided on outages must understand the roles and responsibilities highlighted below. Specialised resources will report to the Site Team and will integrate into the Team. It is the duty of the Contractor to ensure smooth integration of Teams and smooth execution between all stakeholders. Figure 2 below is an example of the reporting structure that can be used. It will be the responsibility of the ERI Site Team to validate the specialised resources needed on site, per project, per Task Order. This will be agreed upon in the execution Strategy between the Project Manager/ Site Manager, and Contractor. The Contractor will need to ensure that he agrees to applicable Key Performance Indicators (KPI's) upfront, based on the resources he provides. Figure 3 below refers to the internal reporting structure of the

ERI Site Project Manager, aligned to procedure 240-137025973, which remains applicable aligned to ERI PCMS.

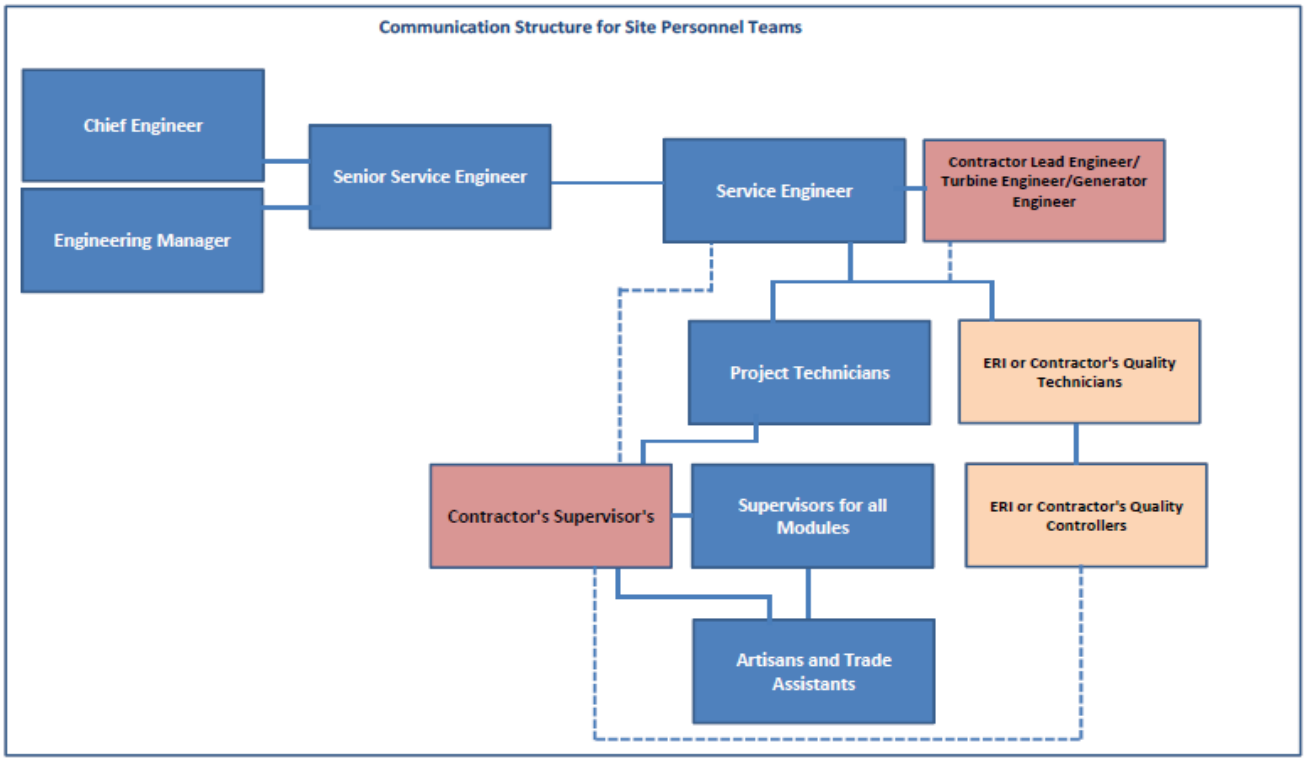


Figure 2: Generic Reporting Structure for Specialised Skills.

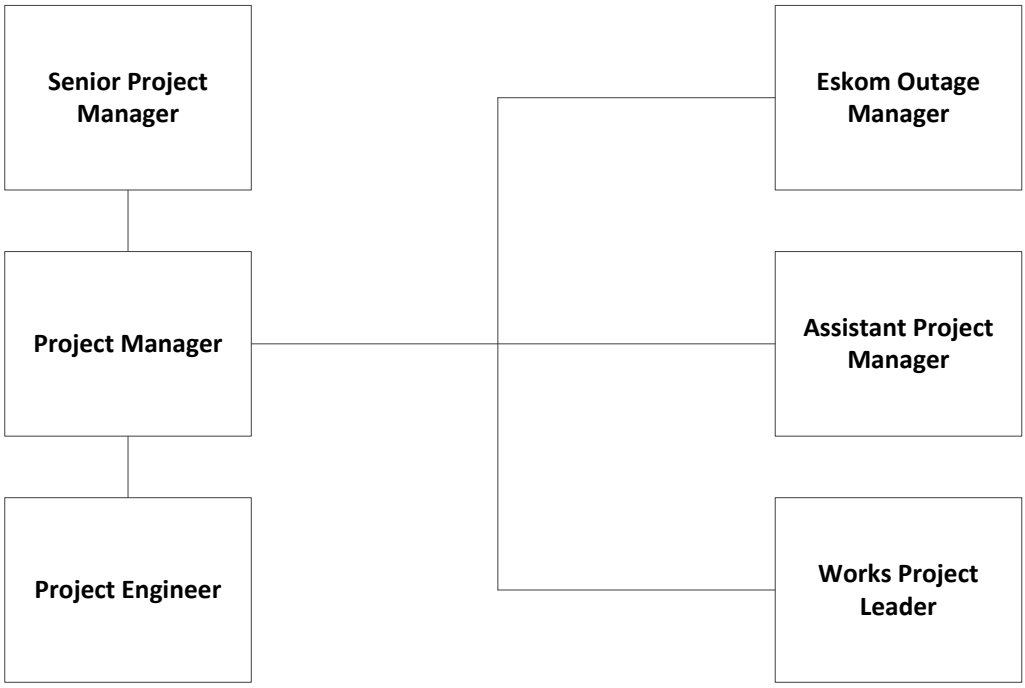


Figure 3: ERI Site Project Manager Reporting Structure.

- 4.1 Field Service Technical Advisor (generator and turbine)/ Service Engineer/ Technical Lead Engineer (herein referred to as the Field Service Technical Advisor)
- Field Service Technical Advisor to provide professional Field Service advice using his network for support if necessary on the full maintenance cycle from development of scopes of work, spares identification, inputs into planning, execution of scope, close out, routine maintenance monitoring for input into the next cycle scope of work, and the development of Service Engineering skills and experience to ensure plant availability, reliability and performance improvements on Turbine Centreline, Feed Pump Turbines, Generators, Mechanical and associated auxiliaries of Turbo Generator plant.
- Provide a technical field service support
- Evaluate and interpret technical reports, specifications and deviations and make recommendations on repair procedures, scopes of work and instructions timely.
- Review and compile processes, procedures and specifications
- Compilation of engineering specific work instructions, procedures and specifications
- Review and authorise as per delegation of authority technical work instructions.
- Technical development and improvement of procedures, quality plans and maintenance plans
- Ensure quality plans and check sheets in line with Contractor procedures, specifications and OEM/Rotek training manuals
- Review of previous problem areas and solutions required and incorporate into quality plans
- Technical development and improvement of contract plans, scopes of work, procedures, quality and maintenance plans.
- Investigate and develop improved and alternative repair and refurbishment processes and methods.
- Perform technical investigations and root cause analyses and report. Recommendations to be backed up with technical calculations, references, etc.
- Investigate and make recommendations on new tooling and equipment, and to improve on existing tooling and equipment efficiency
- Provide a quality advisory service
- Ensure Quality Planning in accordance with scopes of work
- Ensure that the quality plans developed by the Technician is in according to the scopes of work for acceptance by the Customer
- Ensure quality plans are in sufficient detail to control the execution process and refers to relevant processes, procedures and specifications.
- Ensure that check sheets are correct, current and approved in accordance with documented Contractor and Customer specifications.
- Establish Internal Engineering Hold and Witness points on quality plans on site as well as in the Works and at Subcontractors

- Ensure Quality plans in place for Site, Works, Subcontractors and Customer supplied items.
- Ensure Quality is controlled during execution
- Ensure correct handling of PQP's and check sheets in accordance with company procedures
- Ensure clean conditions is managed according to procedure
- Ensure that the floor plan is in place and managed accordingly
- Ensure that all work carried out will be in accordance with the approved quality plan.
- Ensure adherence to quality through technical vigilance and good engineering practices, follow through on deviations reported to ensure corrective action implemented
- Ensure out of specification plant identified and corrective scopes recommended
- Ensure initial fact-finding results obtained and recommendation on corrective scopes of work submitted in writing to the Project Manager to obtain Customer approval.
- Out of specification sizes referred to the Service Engineer to be followed up with recommended scopes of work and technical notifications to the Customer.
- Technical notifications to be followed through and closed out
- Ensure Quality Records available and utilised on site
- Ensure a register of all drawings required on site with latest revision status
- Ensure that all the required drawings are on site and utilised.
- Ensure work instructions, procedures and Contractor manuals on site and utilised during execution
- Ensure drawings are stored adequately and readily retrievable.
- Ensure a register of check sheets are in place.
- Give input to the development of new check sheets and Improvement of existing check sheets.
- Ensure master check sheets are controlled.
- Ensure working copy check sheets are controlled.
- Development of scopes of work and input into planning process
- Scope of work development.
- Starting at least 24 months in advance and produce a draft scope of work 18 months before the outage utilising inputs from operating trends and previous outage reports, lessons learnt, best practice experiences, etc. starting with a complete scope of work and recommended spares list available 18 months before the outage.
- On receipt of the customer scope of work, 18 months before the outage, verify the technical completeness and correctness and make recommendations in writing.
- Highlight Employer recommended scopes of work that was NOT incorporated into the Customer's scope of work and report on the risk factors to the Project Manager and Senior Engineer.
- Identify special spares requirements and incorporate into the scope of works.

- Verify scope execution methods against Contractor prescribed methods for inclusion in the scope of work.
- Input into Project Panning
- Review project plans for logics and realistic durations for approval
- Evaluate plant history to assess possible deviation and special conditions for incorporation into the scope and project plan
- Attend tender presentation and ensure technical compliance to scopes of work.
- Provide a turbo generator advisory field service on outages
- Provide a Field Service Technical advisory service during outages in accordance with this job description and the relevant company procedures for site execution.
- The Field Service Technical advisor will be reporting to the Project Manager and be responsible for the quality of the work carried out during the project and the technical success thereof.
- Review the daily and weekly scope milestones and targets to be achieved by the Supervisory staff to improve on the overall program completion date.
- Monitor the Project Programme and ensure milestone dates are met in order to achieve the contractual due dates.
- Field Service advisory decision making and solutions to be quick and effective including consideration of time, cost and alternative methods/technology.
- All decisions that will impact on the time or cost of the project are to be communicated with the PM, and NO scope changes implemented unless an approved Compensation Event have been received.
- Monitor technical process and progress of components throughout the outage cycle, from disassembly, through the Works / Subcontractor and ensure that receive and dispatch inspections are carried out
- Assist Project Manager with technical feedback for Post Contract Review.
- Ensure control processes in place utilising written instructions, quality plans, check sheets, deficiency and non-conformance reports.
- Attend Post Contract Reviews and report on technical issues.
- Ensure Service Reports are compiled within the required timeframes.
- Verify & authorise service reports and data books.
- Issue recommendations.
- Scrutinize data books for compliance to specifications and completeness.
- Expedite the corrections required.
- Ensure the development and enhancement of technical field service skills
- Provide practical hands-on training on technical activities including scopes of work, dismantling, inspection & reporting, refurbishment, reassembly, alignment, commissioning, and return to service.
- Transfer of technical know-how, information, experience and skills to Employer’s technical skills designated to the program
- Give input to enhance relevant development programs.

- Evaluate skills, knowledge and competency of the Employer's designated technical representatives and submit a report at the end of the outage or job.
- The training committee shall identify mentees allocated to each Technical Field Advisor.
- Customer and interdepartmental
- Liaise closely with the customer turbine engineering representative and Contractor representative in all areas of the project relative to area of responsibility.
- Liaise with clients and site staff regarding improvement of plant availability, reliability and performance.
- Foster and maintain sound relationships with members of the Engineering, Project Services, Steam Maintenance, and Works Service Departments to ensure Engineering and Business objectives are achieved.
- Ensure compliance with safety health environment and quality
- Ensure compliance with the Occupational Health and Safety Act and Rotek Engineering SHE System requirements.
- Ensure compliance with the Eskom Plant Safety Regulations.
- Stop unsafe work activities and report to the Project / Site Manager for rectification.
- Ensure rigging activities are performed in accordance with rigging procedures.
- Ensure continuous control and maintenance of ISO Quality system in accordance with the Rotek Business Management System (BMS).
- Ensure compliance with policies, procedures and instructions.

4.2 ERI – TGS Project Manager (herein referred to as Project Manager, in section 4.2)

- The Project Manager herein referred to as the PM will be ultimately responsible for the planning, controlling, organising and safe execution of all activities during the project in accordance with the relevant procedures to meet the key criteria of due date, quality, cost and safety. This will include all the work done by sub-contractors.
- All interfaces between the Contractor, its subcontractors and the Employer regarding the project, must be done in writing through or with the consent of the project manager.
- The Project Manager is responsible for the daily co-ordination of the Contract.
- He/she will manage all project personnel as per the project organogram
- The Project Manager will ensure that the project program is adhered to.
- The PM will be responsible for the control and authorisation of all overtime and cost associated with the project. No cost can be incurred on the Project without the written consent of the PM.
- Ensure daily toolbox talks on topics related to daily activities are performed and ensure that Hazard Identifications and Risk Assessments (HIRA's) are in place, adhered to, and ensure compliance to Personal Protective Equipment (PPE) requirements.
- Will ensure that all performance reviews and site clearance forms are signed of before vacating the site.
- Ensure that time keeping is adhered to as required and all signs on at the start of the shift, and off at the end of the shift.

- Provide practical hands-on training on technical activities.
- Transfer of technical know-how, information, experience and skills the Employer's designated technical skills
- Evaluate skills, knowledge and competency of the designated technical skills and submit a report at the end of the outage/job
- Compile work instructions / procedures as required.

4.3 Turbine St/Gen Supervisor.

- The roles and responsibilities will be those of a Project Turbine Supervisor of which specific duties inter alia include but not limited to:
- The Supervisor is responsible for the planning, leading and controlling of activities in accordance with the PQP, work instructions, Contractor specifications, site regulations and specified time frames on a project, including the following.
- The Supervisors report to the Employer's engineer via the Employer's Technician.
- Conduct daily toolbox talks on topics related to daily activities and ensure that Hazard Identifications and Risk Assessments (HIRA's) are in place, communicated and adhered to, and ensure compliance to Personal Protective Equipment (PPE) requirements.
- Ensure the work areas are safe in terms of housekeeping, storage, stacking, barricading and scaffolding before work is allowed.
- Responsible for all lifts on their respective modules, ensure all rigging and lifting are performed with a valid rigging and crane driving certificates for the applicable lift capacity.
- Will receive their shift targets from the operations meeting and will ensure the planning, leading and controlling of daily shift activities to ensure the execution of the daily shift activities meet the specified project plan and targets.
- Overall responsible for quality of work, and ensuring subordinates comply to quality standards in accordance with company procedures
- Ensure compliance with the access control on turbines, and clean and controlled conditions on Generators as per company procedure and the applicable Site Procedure.
- Carry out inspections to ensure that work performed meets the required quality requirements.
- Seek advice if required before continuance with an activity which needs clarification.
- They will compile daily log entries to report progress and hand over to Project Technicians 30 min before end of shift.
- Attend a shift handover meeting to receive the daily scope as set by the engineer.
- Ensure that plant safety regulations, quality standards & procedures, work instructions are always adhered to.
- Ensure the effective utilization, care and control of tools and equipment as per company procedure

- Communicate Roles and Responsibilities with Subordinates at the start of the outage, conduct a performance review on subordinates when the project enters re-assembly stage, and on completion of all work and submit the performance review reports to their Project Technician.
- Provide practical hands-on training on technical activities including scopes of work, dismantling, inspection & reporting, refurbishment, reassembly, alignment, commissioning, and return to service.
- Transfer of technical know-how, information, experience and skills the Employer's designated technical skills
- Evaluate skills, knowledge and competency of the Employer's designated technical skills and submit a report at the end of the outage/job
- Compile work instructions / procedures as required

4.4 ERI – TGS Planners (herein referred to as Planner in section 4.4)

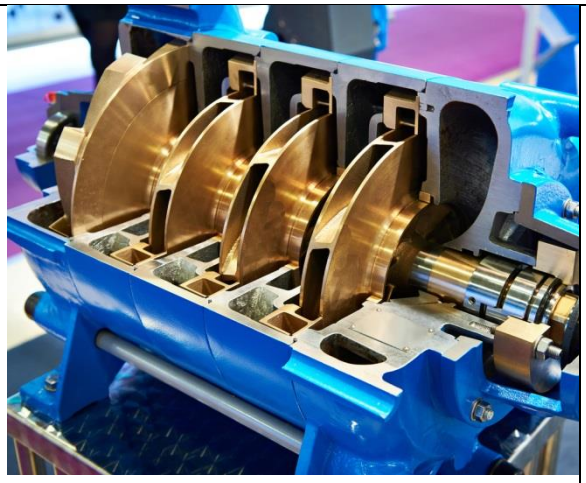
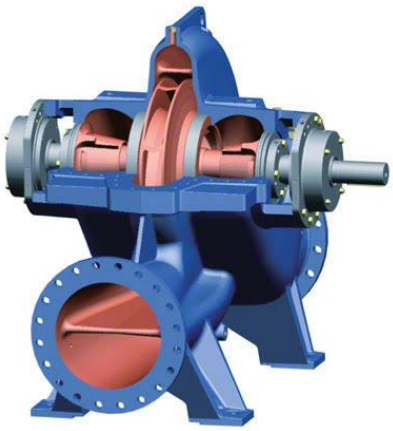
- Compiling the program based on the scope of work received from the client
- Cost and resource every program on the calculation sheet to get an estimated quotation
- Obtain all the required signatures on the calculation sheet once validated by the Planning manager
- Assist the Project Manager to develop Commercial tender documents such as WBS, Commercial register etc.
- Supply an overall network for the Project Modular programs.
- Follow change management during a project to address any variation in Scope of Work
- Provide a progress update as required based on consolidation of daily reports obtained in the morning meetings
- Verify the Supervisor's progress reports that they match the actual plant progress
- Updating and re-scheduling bar charts when appropriate and/or on request from the Project manager and the client
- Conduct financial audits on projects
- Provide practical hands-on training on technical
- Transfer of technical know-how, information, experience and skills the Employer's designated technical skills
- Evaluate skills, knowledge and competency of the Employer's designated technical skills and submit a report at the end of the outage/job
- Ensure compliance with the Occupational Health and Safety Act and Rotek Engineering SHE System requirements
- Ensure compliance with the Eskom Plant Safety Regulations.
- Stop unsafe work activities and report to the Project / Site Manager for rectification
- Ensure compliance with policies, procedures and instructions.
- Attend all toolbox talks, safety videos and related safety activities within the Works Engineering Department.

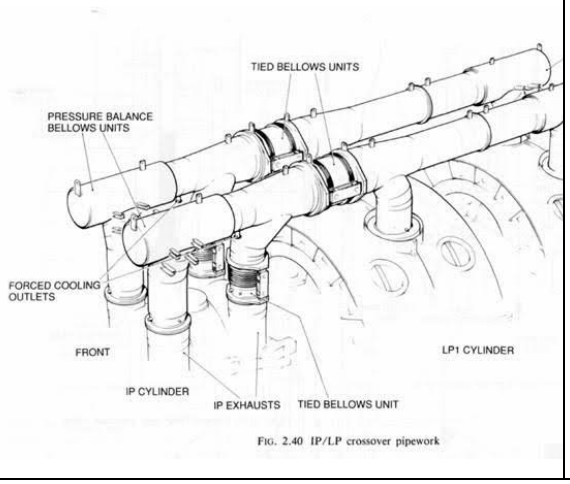
5. Running Maintenance – Technical Scope of Work (RMSOW)

Table 1 below shows the major categories for running maintenance.

Table 1: Running Maintenance SOW under the TGS - Maintenance Department.

PLANT	SCOPE	Drawing / Sample	DURATION
Main Cooling Water Pump	Decommission the pump system Rig and remove the drive motor Remove the pump from the pond Refurbish the pump and its bearings (top & bottom) Assemble the pump Assemble and align the motor to the pump Commission the pump system		7 days
Boiler Feed Pump Turbines	Decommission the BFPT System Strip the machine Inspect and refurbish the machine (casings, rotor, diaphragms, bearings, steam inlet valves, oil valves, servos, coolers, barring gear) Assemble the machine and its auxiliary components (including alignment) Commission the BFPT System		30 days

Condensate Extraction Pumps	Decommission the pump system Open and inspect the pump internals Refurbish the pump and the bearings Install it back to the plant and perform alignment Commission the pump system		10 days
Oil Pumps	Remove the pump from the plant Open, inspect and refurbish Install it back to the plant and do alignment Commission the pump		5 day
Oil Coolers	Decommission the coolers Remove them from the plant Open, inspect, high pressure clean and refurbish (including the tube nest) Box up and install in the plant Commission the coolers (including pressure testing)		6 days

Generator Hydrogen Coolers	Decommission the cooler system Remove the coolers for the machine Open, inspect, refurbish the coolers Install them back to the plant Pressure test and commission		7 days
Governor valves	Decommission the valve system Remove, inspect and refurbish the servo motor (oil system) Remove, inspect and refurbish the valve mechanical components (steam side) Inspect the sealing faces and machine if required Install the valve and servo Commission the system (including stroke test)		6 days
Cross Over Pipes	Open and inspect the cross over pipes and bellows Inspect the sealing faces for steam cuts and indications (and indications from the gaskets) Machine or grind the faces if necessary Assemble the crossovers back to the machine (including gaskets consumables) Test for steam leaks	 FIG. 2.40 IP/LP crossover pipework	3 days

6. Outages/ Maintenance Projects Technical Scope of Work (SOW) – Relevant to both the Projects and Maintenance Department for TGS

- The objective of this section is to outline the services that are required from turbo generator maintenance companies to service the Eskom Power Stations. It seeks to ensure that the proposed services required are executed in a planned and structured manner, and that all quality requirements during disassembly, inspection, refurbishment and reassembly are met. These include Outage preparation activities in the pre-outage deliverables, spares and resource identification, quality management, efficient outage execution, plant reliability and determination of refurbishment scope. The processes should ensure that the outage due dates are met, spares are readily available and serviceable, refurbishment scope is clear and executed efficiently, plant is commissioned anThd d continues to operate until the next maintenance cycle. All scope needs to be executed in a way that supports the critical path of the full outage duration, which must not exceed a period of 50 calendar days for a GO, 35 calendar days for a MGO, 21 calendar days for an IR and 14 calendar days for an IN.

Scope of Services

The Service provider's services are limited to the Eskom power stations and limited to the turbine centreline (See Table 2 for battery limits) and associated auxiliaries. The required services are engineering and maintenance services to the turbine centreline and associated auxiliaries. The scope of responsibility includes the overhaul, refurbishment, assembly and commissioning of turbine and generator components comprising high pressure modules (HP), intermediate pressure modules (IP), low pressure modules (LP), main steam valves, generator module (Gen), Exciter and the permanent magnet module. All systems of the Turbo Gen Island including the lube oil systems, control oil systems, jacking oil systems, gland steam system, and the seal oil system.

Table 2: Battery Limits defined in Section 6 above.

Plant	Start Point	End Point
Steam admission valves (HP and IP, Including IP/LP Bypass)	Pipe connection weld upstream of valve chest	Weld downstream of valve chest (Connection to Loop Pipe)
Loop pipes and Steam penetrations (HP and IP)	Weld downstream of valve chest (Connection to Loop Pipe)	Inlet Weld to Turbine casing
HP Cylinder	Inlet Weld to Turbine casing	Downstream weld on Cold reheat NRV's
IP Cylinder	Inlet Weld to Turbine casing	Crossover pipe flange connections to LP Turbine
LP1 and LP2	Crossover flange at LP casing	Condenser neck
IP Bypass station	Connection weld between Hot reheat and IP bypass station	Cone to header weld

Centreline & Pedestals	HP pedestal	Gen/Exciter (Coupling) Exciter/PMG PMG/ETG

The applicable power stations include:

Arnot, Kriel, Kusile, Medupi (ABB Technology)

Duvha, Tutuka, Majuba (GEC Technology)

Lethabo, Matla, Matimba, Grootvlei (MAN Technology)

Camden, Hendrina, Kendal, Komati (AEG, Siemens)

Koeberg (Alstom, Nuclear)

Peaking Stations – Acacia, Drakensberg, Palmiet, Gariep, Ingula, Vanderkloof, Ankelig, Gourikwa – Mossel Bay, and Port Rex.

A high level description of the plants is as follows:

CAMDEN POWER STATION, 190MW, H2 cooled

For reference, this machine comprises of a two cylinder Steam Turbine coupled to a Generator. This Parsons Turbine-Generator train consists of 6 bearings supporting HP, LP, and Generator.

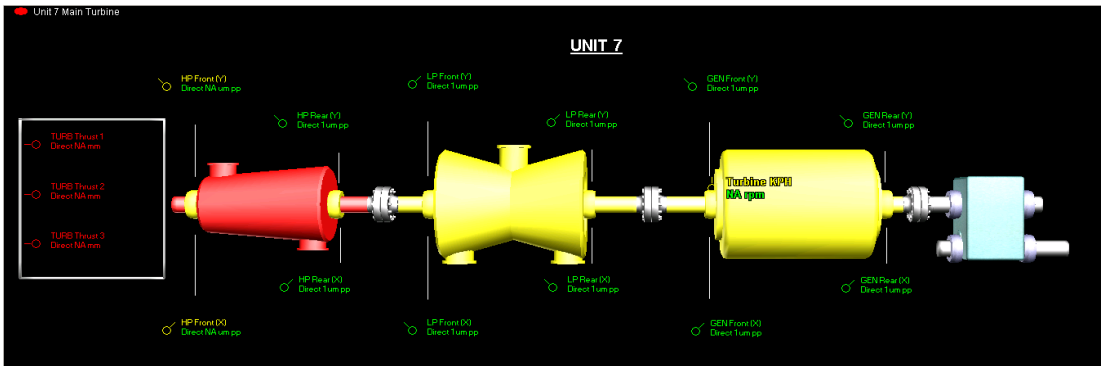


Figure 4: CAMDEN POWER STATION, 190MW, H2 cooled. (ERI - TGS, 2018)

HENDRINA POWER STATION, 200MW, H2 cooled

For reference this machine train comprises of two steam turbines cylinders coupled to a generator and supported by six bearing pedestals. For a simplified general overview of the machine train, and measured locations – refer to the diagram below.

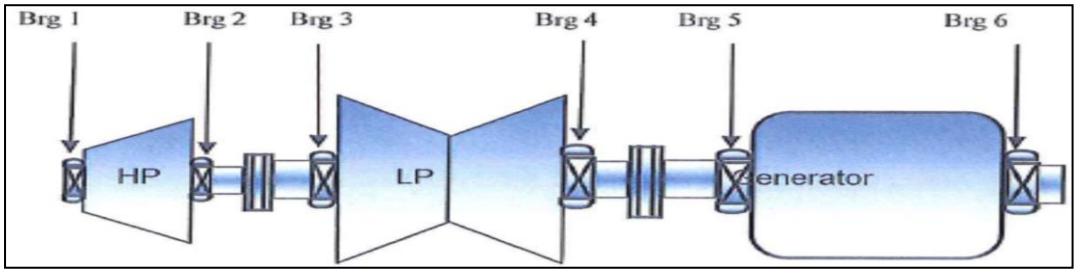


Figure 5: HENDRINA POWER STATION, 200MW, H2 cooled. (ERI - TGS, 2018)

KENDAL POWER STATION, 720MW, H2 cooled

For reference, this machine comprises of a four cylinder Steam Turbine coupled to a Generator rated at 810MVA. This Siemens/KWU Turbine-generator train consists of 8 bearing pedestals supporting HP, IP, two LP Turbines, Generator and Exciter. For a simplified general overview of the machine train and measuring locations – Refer to diagram below:

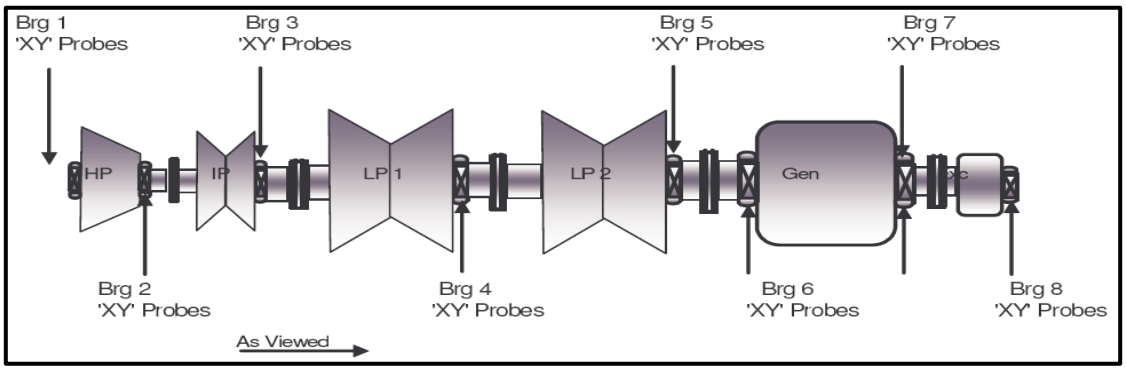


Figure 6: KENDAL POWER STATION, 720MW, H2 cooled. (ERI - TGS, 2018)

ARNOT POWER STATION, 400MW, H2 cooled

For reference, this machine comprising a four cylinder Steam Turbine coupled to Generator rated at 400 MVA. This Turbine-generator train consists of 7 bearing pedestals supporting HP, IP, two LP's, Generator. For a simplified general overview of the machine train and measuring locations – refer to diagram below.

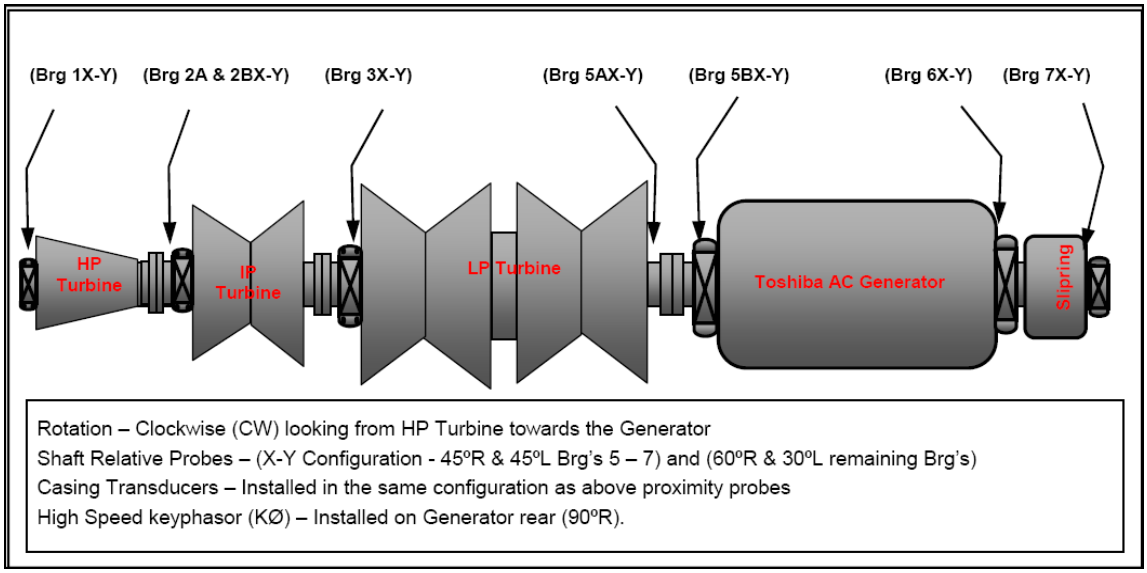


Figure 7: ARNOT POWER STATION, 400MW, H2 cooled. (ERI - TGS, 2018)

DUVHA POWER STATION, 550MW, H2 cooled

For reference, this machine comprises of a four cylinder Steam Turbine coupled to a Generator, exciter and PMG. This GEC Turbine-Generator train consists of 12 bearing pedestals supporting HP, IP, 2 LP's, Generator, Exciter and PMG. Below is a simplified diagram showing the bearing positions and probe layout:

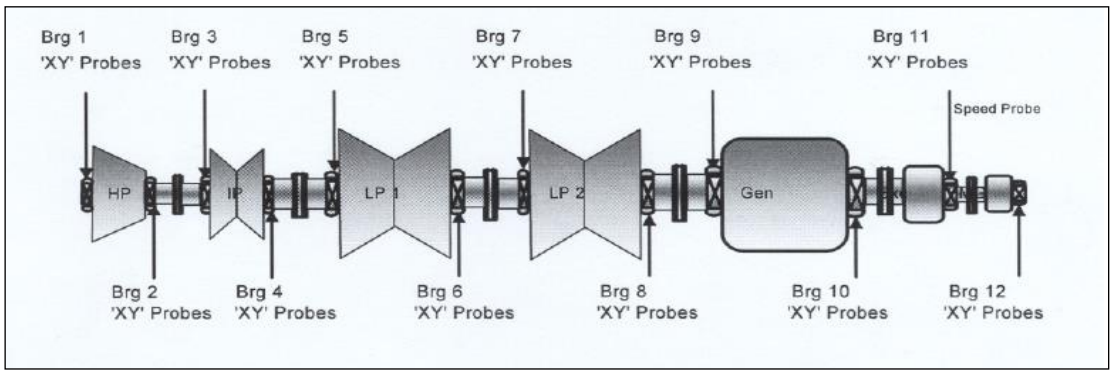


Figure 8: DUVHA POWER STATION, 550MW, H2 cooled. (ERI - TGS, 2018)

GROOTVLEI POWER STATION, 190MW, H2 cooled

For reference, this machine data comprises of High Pressure (HP), Low Pressure (LP) and Generator. For the simplified general overview of the machine train and measured locations, refer to diagram below:

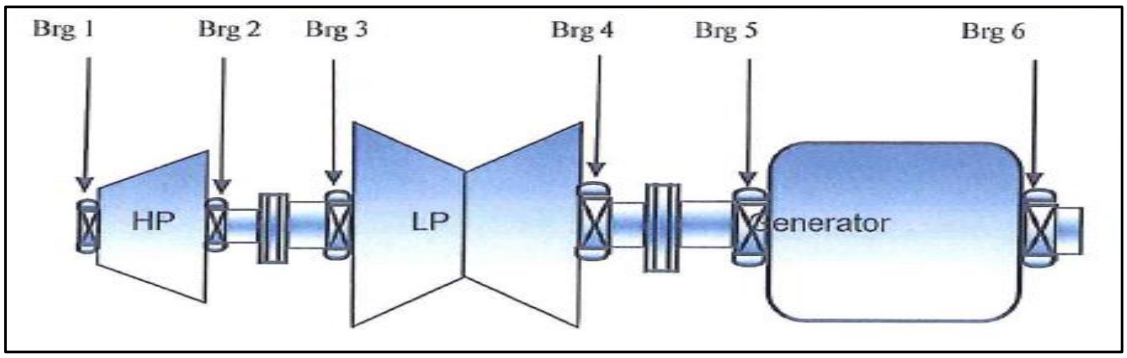


Figure 9: GROOTVLEI POWER STATION, 190MW, H2 cooled. (ERI - TGS, 2018)

KRIEL POWER STATION, 550MW, H2 cooled

For reference, this machine comprising a four cylinder Steam Turbine coupled to Generator rated at 550MW. This Turbine-generator train consists of 7 bearing pedestals supporting HP, IP and two LP Turbines, Generator and Slip Ring. For a simplified general overview of the machine train and measuring locations – Refer to diagram below.

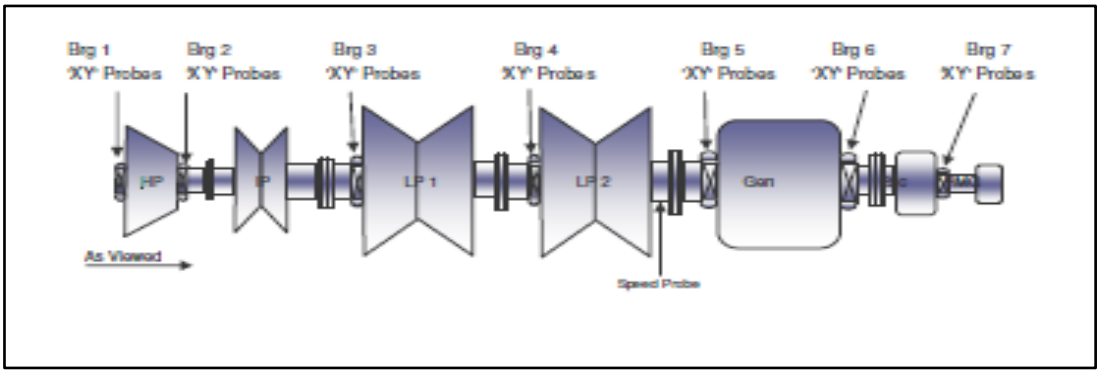


Figure 10: KRIEL POWER STATION, 550MW, H2 cooled. (ERI - TGS, 2018)

KUSILE POWER STATION, 860MW, H2 cooled

For reference, this machine comprises of a four cylinder Steam Turbine coupled to a Generator rated at 800MW. This Turbo-Generator train consists of 7 bearing pedestals supporting HP, IP, two LPs, Generator and Brush Gear. For a simplified general overview of the machine train, and measured locations – refer to the diagram below:

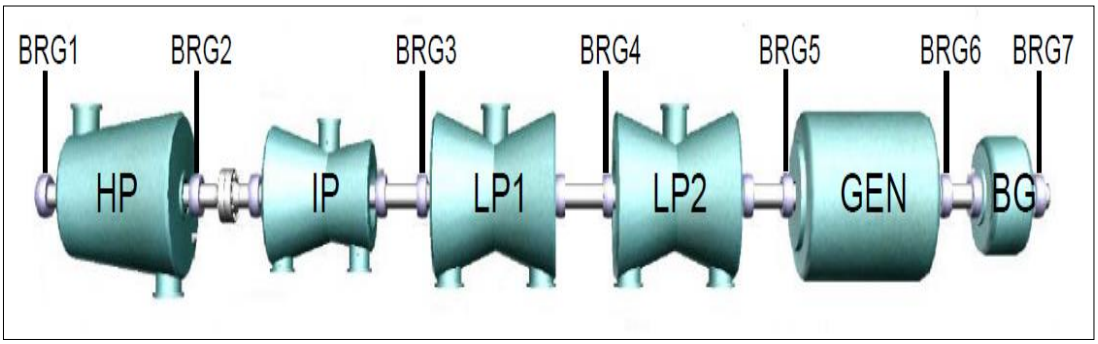


Figure 11: KUSILE POWER STATION, 860MW, H2 cooled. (ERI - TGS, 2018)

LETHABO POWER STATION, 600MW, H2 cooled

For reference, this machine data comprises of a HP, IP, two LPs, Generator and Exciter. For the simplified general overview of the machine train, and measured locations, refer to diagram below:

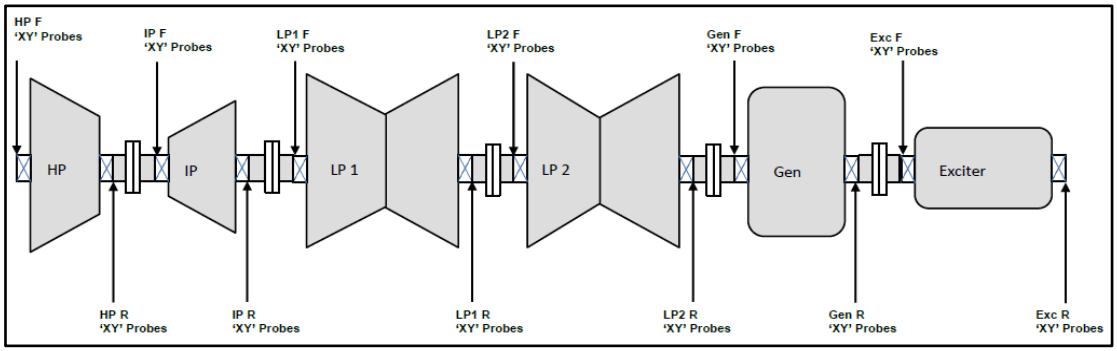


Figure 12: LETHABO POWER STATION, 600MW, H2 cooled. (ERI - TGS, 2018)

MAJUBA POWER STATION, 600MW, H2 cooled

This machine train comprises of four Steam Turbine cylinders coupled to a Generator and supported by twelve bearing pedestals. For a simplified general overview of the machine train, and measured locations – refer to the diagram below

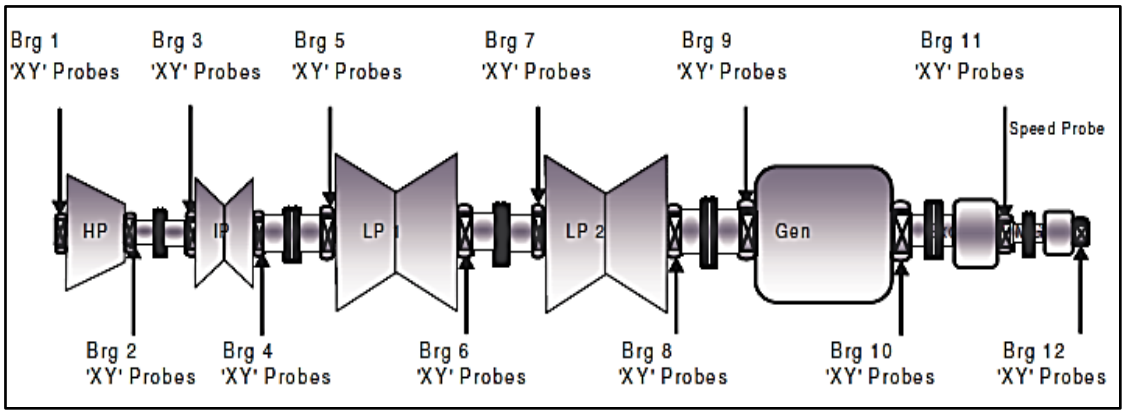


Figure 13: MAJUBA POWER STATION, 600MW, H2 cooled. (ERI - TGS, 2018)

MATIMBA POWER STATION, 600MW, H2 cooled

For reference, this machine comprising a four cylinder Steam Turbine coupled to Generator. This Alstom Turbine-generator train consists of 10 bearing pedestals supporting HP, IP, two LP's, and a Generator.

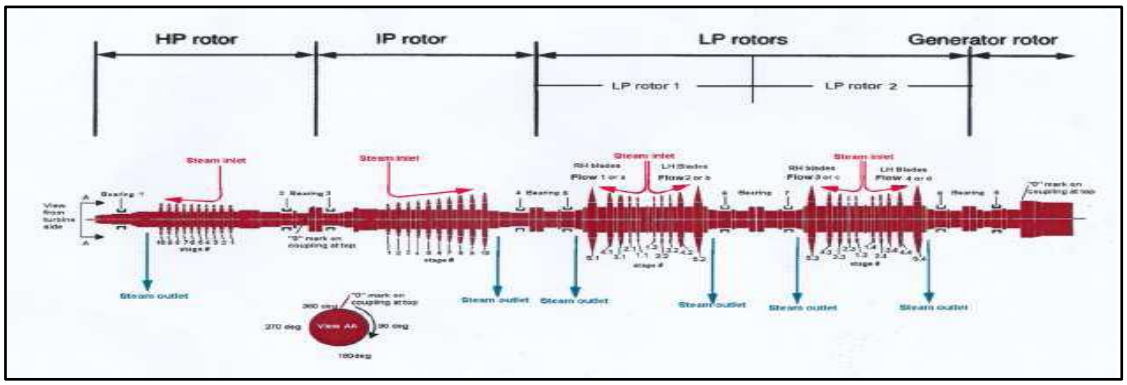


Figure 14: MATIMBA POWER STATION, 600MW, H2 cooled. (ERI - TGS, 2018)

MATLA POWER STATION, 600MW, H2 cooled

For reference, this machine comprising a four cylinder Steam Turbine coupled to Generator. This Turbine-generator train consists of 10 bearing pedestals supporting HP, IP, two LP's and a Generator.

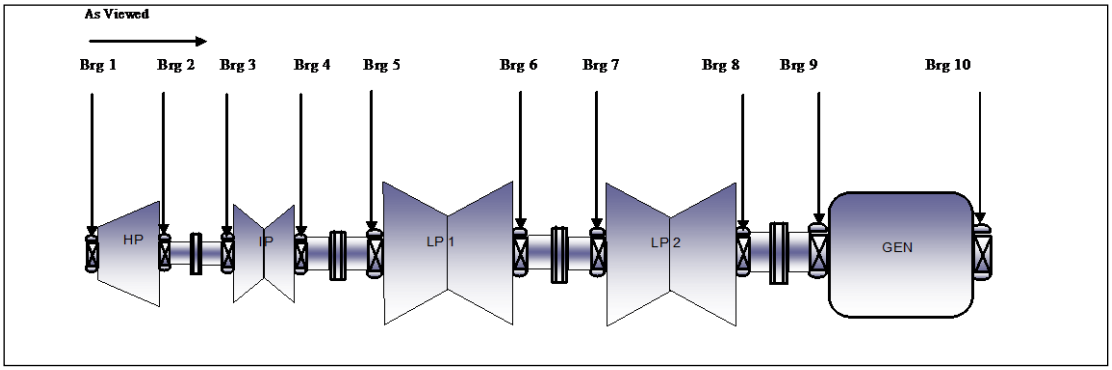


Figure 15: MATLA POWER STATION, 600MW, H2 cooled. (ERI - TGS, 2018)

MEDUPI POWER STATION, 860MW, H2 cooled

For reference, this machine comprises of a four cylinder Steam Turbine coupled to a Generator rated at 800MW. This Turbo-Generator train consists of 7 bearing pedestals supporting HP, IP, two LPs, Generator and Brush Gear. For a simplified general overview of the machine train, and measured locations – refer to the diagram below:

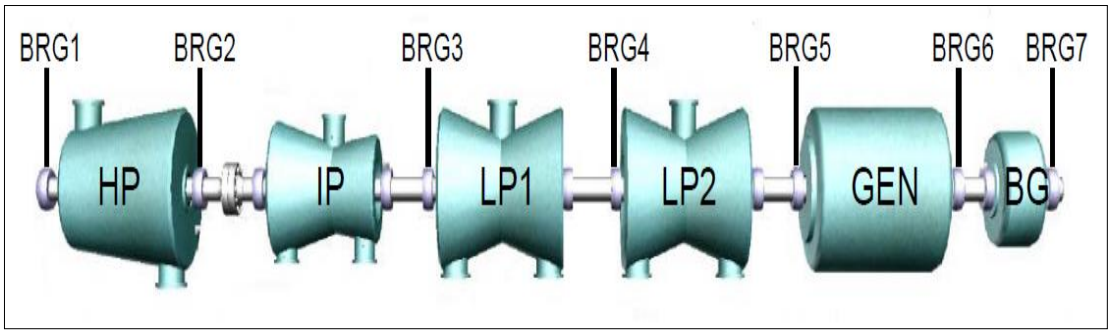


Figure 16: MEDUPI POWER STATION, 860MW, H2 cooled. (ERI - TGS, 2018)

TUTUKA POWER STATION, 600MW, H2 cooled

For reference, this machine comprises of a HP, IP, two LPs, a Generator and Exciter. The Turbine Generator train consists of 12 bearings. For a simplified general overview of the machine train and measuring locations – refer to diagram below.

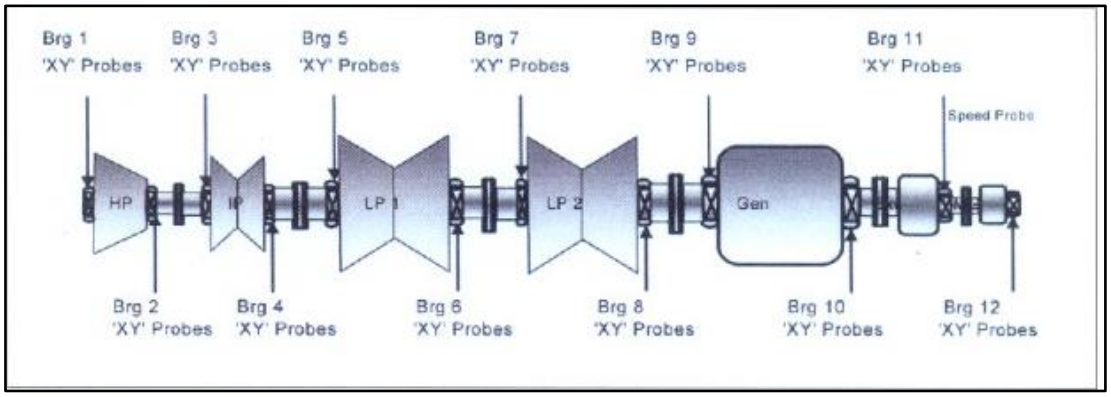


Figure 17: TUTUKA POWER STATION, 600MW, H2 cooled. (ERI - TGS, 2018)

KOEBERG NUCLEAR POWER STATION, 900MW, H2 cooled

For reference, this machine comprises of four cylinders Steam Turbine coupled to Generator rated at 960MVA. This Alstom Turbine-generator train consists of 10 bearing pedestals supporting HP, three LP's, Generator and Exciter.

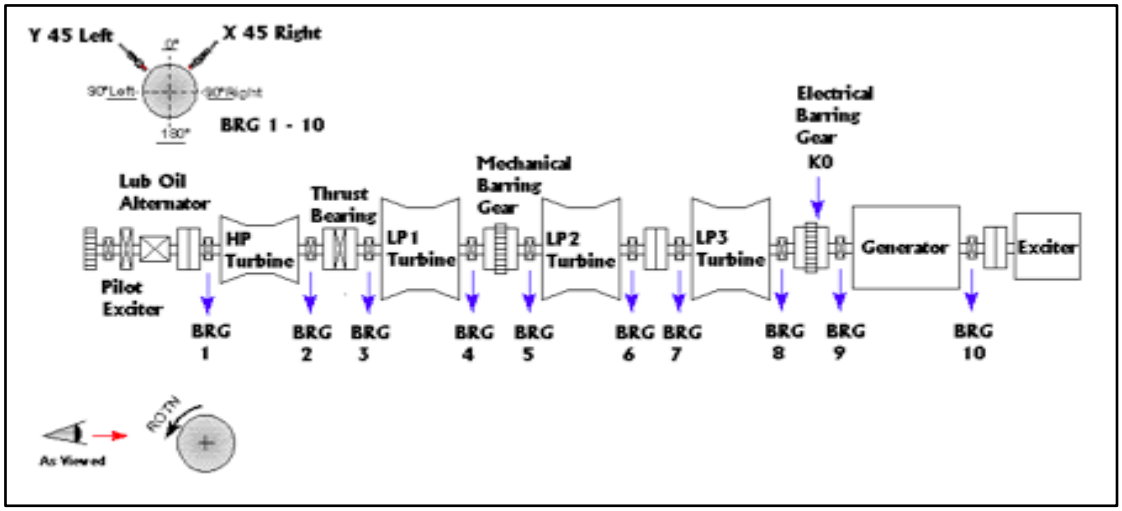


Figure 18: KOEBERG NUCLEAR POWER STATION, 900MW, H2 cooled. (ERI - TGS, 2018)

General Requirements

Quality

- Inspections to be carried out in accordance with check sheets and master quality plan provided by ERI in line with the Eskom requirements, which should be compiled from the Scope of Work (SOW) and approved by Engineering (Eskom and ERI TGS). The document must contain all the Product Quality Plans (PQP's) of work that will be done on site and off site. Disassembly and assembly values to be recorded for all check

sheets. Repair or replace all damaged/worn components out of specification or obtain a concession from engineering staff. All abnormalities to be recorded and reported with Technical Notifications (TNs).

- All work carried out will be in line with the applicable ESKOM standards. Where nothing exists, good engineering practise will be followed. This includes but is not limited to the covering of all openings and the use of approved chemicals.
- All quality documents, procedures, check sheets and PQP to be supplied by ERI TGS
- Contractor is given at least 1 month for preparation unless a shorter time is mutually agreed.
- Experience of staff
- The service requested will determine the skill levels and number of specific skills that will be required to execute the service.
- The service provider will work together with the ERI TGS personnel to ensure the KPIs are achieved.
- All staff shall be adequately qualified and competent of performing all work within safe and correct technical specifications.
- Short CV's of all specialist, engineers, supervisors, technicians, artisan, NDE inspectors, stating qualifications and relevant experience must be provided at least four weeks before commencement of outage.
- All standard tools and equipment identified during the preparation phase will be supplied by ERI TGS. All special tools required for the outage will be supplied by ERI TGS.
- Spares
- All spares that would have been pre identified in the pre planning of the outage will be sourced and supplied by the ERI.
- The refurbishment of spares during the outage execution will be carried out at ERI TGS workshops. The service provider will be expected to determine refurbishment scope for approval by the TGS engineering team.
- All Transport requirements for spares and components will be provided by ERI
- Some Employer's obligations are stated in the Scope of Work above and these will be detailed in the Plan

Documentation

- A full service report will be compiled and provided to Eskom and TGS in duplicate, to the ERI TGS standard. The report will contain a high level description of the work done during the refurbishment. It will contain the approved PQP of work on site and all related check sheets and NDE reports. All technical notifications will be shown as well. It will contain a section on spares used report.
- PQP to be compiled and presented to Engineering (Eskom and TGS) for approval before start of outage. Duplicate service report provided to the client within 14 days of the completion of the work. Report to be accepted by ERI TGS Engineering.

Pre – Outage Activities

- Upon receipt of the scope of work, it is the service provider's responsibility to ensure that the scope is clear and a program to support the outage philosophy durations must be provided by the service provider.
- Highlight recommended scopes of work that was NOT incorporated into the Customer scope of work and report on the risk factors to the Customer
- Identify critical spares requirements and incorporate into the scope of works.
- Verify scope execution methods against ERI prescribed methods for inclusion in the scope of work.
- Advice and guide on best practises to repair, refurbish and rehabilitated through machining of outage components in shortest possible duration to meet outage deadlines.
- Active involvement in the compilation of Project Plans in Primavera
- Develop and review project plans for logics and detail as per scope of work for approval
- Evaluate plant history to assess possible deviation and special conditions for incorporation into the scope and project plan

Decommissioning

- Record the following measurements as a minimum during the run down of the machine
- Vibrations
- Absolute expansions
- Differential expansions
- Eccentricity
- Shaft position
- White metal bearing temperature
- Bearing oil pressures
- Record run down time from barring

DIS-ASSEMBLY

HP Turbine

- Remove all instrumentation including diff expansion, absolute expansion and starting probe, thermocouples, etc.
- Establish reference positions for the valves and support
- Loosen and remove loop pipes.(bolt heating may be required)
- Measure all cold datum sizes
- Bolt heat and remove top outer casing ((ERI to bolt heat, supplier to do marking and measurements).
- Bolt heat and remove top inner casing (ERI to bolt heat, supplier to do marking and measurements).
- Loosen and remove diaphragm and gland carriers
- Measure all axial and radial clearances

- Remove rotor
- Remove bottom half diaphragm and gland carriers
- Remove bottom half inner casing
- Remove bottom half outer casing
- Blank off all extractions and open flanges (FME controls)

IP Turbine

- Remove all instrumentation including diff expansion, absolute expansion and starting probe, thermocouples, etc.
- Establish reference positions for the valves and support
- Loosen and remove loop pipes.(bolt heating may be required)
- Loosen and remove X-over pipes
- Measure all cold datum sizes
- Bolt heat and remove top outer casing (ERI to bolt heat, supplier to do marking and measurements).
- Bolt heat and remove top inner casing (ERI to bolt heat, supplier to do marking and measurements).
- Loosen and remove diaphragm and gland carriers
- Measure all axial and radial clearances
- Remove rotor
- Remove bottom half diaphragm and gland carriers
- Remove bottom half inner casing
- Remove bottom half outer casing
- Blank off all extractions and open flanges (FME controls)

LP Turbines

- Loosen and remove X-over pipes
- Loosen front and rear gland boxes
- Loosen and remove LP hood
- Disconnect all fire and spray water pipes
- Loosen and remove LP inner casing
- Loosen and remove top half gland boxes
- Loosen and remove top half diaphragms and carriers
- Measure all axial and radial clearances
- Remove LP rotor
- Remove bottom half diaphragms and carriers
- Remove bottom half inner casing

Centreline

- Remove all pedestal instrumentation safely

- Open all coupling guards (HP/IP; IP/LP1; LP1/LP2; LP2/Gen; Gen/Exc; Exc/PMG, PMG/ETG)
- Open top half pedestal covers
- Remove top half bearings
- Record rotor running positions
- Carry out concentricity measurements and record
- Loosen coupling bolts and split couplings
- Measure and record alignment
- Remove bottom half bearings
- Remove bottom half baffles

Turbine Valves (HP ESV, IP ESV, HP CV, IP CV, LP/IP Bypass)

- Perform stroke check with servos connected
- Block HP valve supports
- Remove heat shields, pipe covers and split servo coupling.
- Remove servo motor oil pipes, orifices and mark accordingly.
- Remove servo motors and record pre-tension.
- Manually stroke the valves and record.
- Bolt heat and remove valve bonnets (ERI to bolt heat, supplier to do marking and measurements).
- Strip the valve internal assemblies

Servo motors

- Strip open servo motors for inspections
- Remove power block and control blocks
- Remove control valve (Moog)
- Removed power pistons and spindles

Generator

- Perform soap test to establish any H2 leaks before de-pressurisation on stator frame, H2 drier, coolers, on all levels
- Ensure compliance to all levels of clean conditions applicable
- Drain the stator cooling water, blank and perform vacuum dry out
- Perform stator bar vacuum and pneumatic test
- Disconnect CW pipes and remove all hydrogen coolers
- Uncouple and disassemble exciter
- Remove exciter
- Open top half end-shields
- Open top half bearings
- Remover winding covers
- Loosen and remove gas guides

- Remove gen rotor fan blades
- Remove H2 seal carrier and remove H2 seals
- Remove airgap diaphragms
- Lower bottom half components and support rotor
- Remove gen rotor
- Remove bottom half bearing
- Remove bottom half carriers and guides

REFURBISHMENT

HP Turbine

- Carry out visual inspections on sealing faces before cleaning
- Inspect the rotor for any deposits and send for analysis if found
- Protect all critical areas of the turbine components for sandblasting
- Carry out visual inspections on steam path components
- Inspect all flanges and hand clean
- Measure permanent elongations of all HP outer casing studs
- Lap all bolt and nut contact faces
- Carry out distortion measurements on HP outer casing, inner casing, diaphragms, oil baffles, nozzle and carriers
- Correct distortions through hand scraping (If machining is required, it will be executed by ERI accordingly)
- Blue check and Lap in spherical on all casing supports

IP Turbine

- Carry out visual inspections on sealing faces before cleaning
- Inspect the rotor for any deposits and send for analysis if found
- Protect all critical areas of the turbine components for sandblasting
- Carry out visual inspections on steam path components
- Inspect all flanges and hand clean
- Measure permanent elongations of all IP outer casing studs
- Lap all bolt and nut contact faces
- Carry out distortion measurements on IP outer casing, inner casing, diaphragms, oil baffles, nozzle and carriers
- Correct distortions through hand scraping (If machining is required, it will be executed by ERI accordingly)
- Blue check and Lap in spherical on all casing supports

LP Turbine

- Carry out visual inspections on sealing faces before cleaning
- Inspect the rotor for any deposits and send for analysis if found
- Protect all critical areas of the turbine components for sandblasting

- Carry out visual inspections on steam path components
- Inspect all flanges and hand clean LP hood half joints and flanges
- Inspect and pressure test LP X-over pipes
- Inspect and replace all explosion diaphragms
- Clean LP expansion bellows for PT inspections
- Carry out distortion measurements on LP inner casing, diaphragms, oil baffles, nozzle and carriers
- Correct distortions through hand scraping (If machining is required, it will be executed by ERI accordingly)

Couplings

- Hand Clean all coupling faces and reference bands
- Carry out distortion measurements on the sandwich plates
- Clean all coupling bolts, ensure threads and nuts are serviceable
- Clean all windage plates and coupling guards
- Inspect all coupling locking screws and replace where necessary

Bearings

- Clean all bearings for NDT inspections
- Assemble and record diametrical measurements on the bearings
- Clean / scrape white metal if necessary.
- Lap bearing in bearing carrier to get good carrying surface.
- Blue bearing to journal
- Create wedge according to drawing and carrying print

Thrust bearing

- Clean thrust bearing pads for NDT inspections
- Measure thrust pad thicknesses and record
- Assemble thrust and record all clearances
- Baffles
- Clean and carry out diametrical measurements on all baffles
- Blue check baffles half joints for maximum sealing
- Ensure baffles axial face is square to the bore
- Restore sharp edges on the baffle strip otherwise replace

Valves

- Hand clean all sealing faces and carry out visual inspections
- Carry out distortion check measurements on valve chest
- Blue check seats and valve heads
- Lap and blue to achieve 100% sealing
- Record all spindle sizes and carry out spindle run out checks
- Record all fits clearances, bushes and valve heads

Servo Motors

- Measure cylinder bore sizes and record
- Measure piston sizes and record
- Replace thrust, O-rings, seals, piston rings and springs
- Lap control parts and blue check
- Manual test servo operation

Generator

- Clean H2 coolers water boxes and corro coat
- Pressure test H2 coolers
- Dimensional inspections on baffles, bearings and H2 seals
- Blue check on end shields half joints and face
- Blue check H2 seals carriers and seals

REASSEMBLY

HP Turbine

- Prepare bottom half inner casing and clear all extraction lines
- Fit bottom half inner casing
- Carry out camera inspection on the reheat and extraction lines
- Fit bottom half gland boxes and segments
- Fit bottom half diaphragms and carriers on keys
- Fit segments and wedge for steam path alignment
- Fit rotor on datum and record radial and axial clearances
- Pre assemble top halves and fit for radial clearances
- Prepare rotor for final box up
- Fit all segments and box rotor final
- Final box top halves diaphragms and inner casing
- Bolt heat and lock inner casing studs (ERI to bolt heat, supplier to do marking and measurements).
- Final fit outer casing
- Bolt heat and lock outer casing studs, measure pre stretch (ERI to bolt heat, supplier to do marking and measurements).
- Fit loop pipe and tighten flanges
- Record cold pull and release valves
- Measure all running datum and record
- Perform bump check and record

IP Turbine

- Prepare bottom half inner casing and clear all extraction lines
- Fit bottom half inner casing
- Carry out camera inspection on the reheat and extraction lines

- Fit bottom half glandboxes and segments
- Fit bottom half diaphragms and carriers on keys
- Fit segments and wedge for steam path alignment
- Fit rotor on datum and record radial and axial clearances
- Pre assemble top halves and fit for radial clearances
- Prepare rotor for final box up
- Fit all segments and box rotor final
- Final box top halves diaphragms and inner casing
- Bolt heat and lock inner casing studs ((ERI to bolt heat, supplier to do marking and measurements).
- Final fit outer casing
- Bolt heat and lock outer casing studs, measure pre stretch (ERI to bolt heat, supplier to do marking and measurements).
- Fit loop pipe and tighten flanges
- Record cold pull and release valves
- Install all applicable mechanical instrumentation outside of C&I's scope.
- Measure all running datum and record
- Perform bump check and record

LP Turbines

- Prepare bottom half inner casing and clear all extraction lines
- Fit bottom half diaphragms with keys and segments
- Install bottom half gland carriers.
- Install rotor and record running position
- Record axial and radial clearances.
- Install top diaphragms
- Install top gland carriers.
- Install top inner casing, tighten and lock.
- Perform axial and radial bump check
- Lock casing in position after steam path alignment is complete
- Install LP hood and tighten.
- Measure and record hold down bolts
- Replace LP Hood Spray Nozzles and test
- Measure last stage blade clearances
- Centreline
- Ensure all FME covers are removed
- Install bottom half bearings and thrust
- Measure shaft inclinations to bearing and pedestal
- Measure and record horn sizes
- Measure and record all cold datum sizes
- Perform jacking oil lift readings

- Turn the shafts and record, correct coupling alignment (NB Coupling machining and honing services to be provided by the service provider).
- Set rotor train axial position
- Perform open and closed thrust float
- Close couplings and carry out concentricity checks
- Fit and set bottom half baffles
- Measure bearings top clearances
- Final box bearing top halves
- Check nip on top bearing keep, adjust and final box-up
- Set top half baffles and box pedestals

Valves

- Fit all strainer and lock in position
- Assemble valve stem, fit valve inserts and centralise
- Fit pressure seals and tighten to tension
- Manual stroke the valves
- Fit servo motors and couple
- Connect all hydraulic pipes and tighten
- Servo stroke valves and record
- Install heat shields and pipe covers

Generator

- Install winding covers
- Carry out final inspections and vacuum clean the stator and rotor
- Install rotor and support
- Install bottom half end shields and bearing keeps
- Install bottom half bearings
- Lower rotor onto the bearings
- Measure air gap and bearing horn sizes
- Install fan blades and gas guides
- Install seal carriers and seals
- Box up generator internal access
- Set all baffles to specifications
- Install all coolers and connect CW pipes
- Measure insulation resistance on all components
- Install exciter and couple to generator
- Carry out coupling alignment, concentricity and axial face movement
- Perform stator frame pressure test

Seal Oil System

- Clean all seal oil tanks, gauges and drip trays

- Open and clean all seal oil filters and change over mechanisms
- Open and inspect seal oil pumps and replace bearings
- Replace bearings and mechanical seal on the vent fan
- Open inspect and replace rubbers on vapour fan
- Inspect diff pressure controller and replace diaphragm
- Inspect seal oil valves seats and replace gaskets
- Perform functionality test on safety valves
- Flush seal oil system and set level correctly

Lube oil System

- Clean lube oil tank, including bulk storage tank
- Remove the main oil cooler changeover valve
- Strip, clean and inspect main oil cooler valve
- Fit new seals and replace damaged/worn components
- Remove the main oil filter changeover valve
- Strip, clean and inspect main oil filter valve
- Fit new seals and replace damaged/worn components
- Open and inspect main lube oil return strainer
- Clean main oil tank breather, replace filters
- Clean recovery tank breather filter
- Inspect all purifier filters, replace if needed
- Open, inspect and refurbish booster oil pump
- Open, inspect and refurbish AC bearing oil pump
- Open, inspect and refurbish DC bearing oil pump
- Open, inspect and refurbish FRF/control oil recovery pump
- Clean and test lube oil cooler bundles, record if any is plugged
- Remove, strip, clean and inspect main oil tank vent fans
- High pressure flushing of main lube oil system
- Gland steam system
- Clean and inspect gland steam condenser
- Open and inspect gland steam recovery valve
- Open and inspect gland steam vent fans
- Open and inspect gland steam vent fans suction NRVs
- Clean or replace gland steam cooler filters
- Clean gland steam cooler
- Measure gland steam vacuum during commissioning

Stator water system

- Open and clean stator water coolers water boxes
- Inspect water boxes and corro coat if necessary
- Open and clean stator water filters

- Open, inspect and refurbish stator water pumps and motors
- Open and inspect de-ioniser NRV
- Open and clean buffer tank
- Functional check and calibrate safety valves
- Perform tightness test and replace stuffing box of the control valves
- Open and inspect check valves
- Flush stator water system

Main Oil Pump

- Measure tooth back lash between pinion and pump drive
- Check tooth bearing surface contact
- Measure tooth back lash between pump gear wheel and intermediate gear.
- Remove main lube oil pump.
- Dismantle the pump and check for defects
- Check the bearing bushes for scratches and clearance.
- Measure axial clearance of the pump gear wheel, HP gears, and LP gears and pump drive.
- Check contact surface of teeth.
- Check fit of thrust collars
- Check clearance of thrust collar and gear wheel
- Repair the defects and re-assemble the pump
- Check contact surface between pump casings.
- Check concentricity of pump drive.
- Install the main lube oil pump
- The pre-assembly of modular spares in the ERI TGS workshops must be supplied as a service by the service provider. Machining of keys and supports onsite and in the workshop will be the service provider’s responsibility.

Responsibilities during outages

- It is required from the service provider to provide a full service for a planned GO, of which the specific service required will be requested by ERI TGS. This may include all or part of GOs scope of activities. The service provider will be expected to comply with the ERI TGS procedures and processes covering the following areas:
- Quality Control procedures
- Process Quality Plan development and management
- Execution and Control of All Site Work
- Management and Control of Tools in a Tool Store or a Container
- PQP Workflow Assessment
- Technical Notification Work Instruction
- Clean Conditions and Contract Plan
- Control of blanks and foreign material exclusion covers

- Rotor lockable components inspections
- Hydraulic equipment management and safe work procedures
- Compilation of data books and service reports
- Lifting equipment, machine and tackle safe work procedure
- Check sheet management and control
- Project Management process and control
- Control of non-conformance/service and preventative actions
- Coding and management of documentation
- Reporting of any rework
- The service provider's Engineer will be responsible for the quality of the work carried out as per service request and the technical success reporting through the ERI Engineer.
- The service provider's Engineer has a responsibility and duty to inform the Outage/Project Manager of all daily activities including engineering commitments and responsibilities.
- Provide Engineering proposals and alternative methods to optimise project plans towards achieving the project due dates (outages durations to be not more than 50 days)
- Monitor the Project Programme and ensure milestone dates are met in order to achieve the contractual due dates.
- Engineering Decision making and solutions to be effective, timeously and feasible.
- All decisions that will impact on the time or cost of the project are to be communicated with the Outage Manager, and NO scope changes implemented unless an approved Compensation Event have been received.
- Monitor technical process and progress of components throughout the outage cycle, from disassembly, through the Supplier and ensure that detailed inspections are carried out upon receipt or dispatching of all components
- Focusing efforts on reducing technical risk and improving reliability through root cause identification and resolution
- Ensuring the inclusion of ergonomic engineering, safety engineering and system engineering during all projects and compliance to all safety rules and regulations.
- Ensure control processes in place utilising written instructions, quality plans, check sheets, deficiency and non-conformance reports.
- Attend Post Contract Reviews and report on Technical issues
- Ensure Service Reports are compiled
- Verify & authorise service reports and data books
- Issue recommendations
- Scrutinize data books for compliance to specifications and completeness
- Provide a Quality Engineering Service
- Ensure Quality Planning in accordance with scopes of work.

- Ensure that the quality plans developed is in according to the scopes of work for acceptance by the Client. Development of floor plans should be part of the Quality Plan.
- Ensure quality plans are in sufficient detail in order to control the execution process and makes reference to relevant processes, procedures and specifications.
- Check Sheets to be approved by the TGS Engineer, ensuring that check sheets are correct, current and in accordance with documented OEM and/or Customer specifications.
- Establish Internal Engineering Hold and Witness points on critical activities on the quality plans on site, and at Subcontractors, to be signed off by the client Engineer.
- Ensure Quality plans are in place for Site and Subcontractors and Customer supplied items.
- Ensure Quality is controlled during execution
- Ensure correct handling of PQP's and check sheets in accordance with company procedures.
- Ensure that all work carried out will be in accordance with the approved quality plan.
- Ensure adherence to quality through technical vigilance and good engineering practices, follow through on deviations reported to ensure corrective action implemented
- Ensure out of specification plant identified and corrective scopes recommended
- Ensure initial fact finding results obtained and recommendation on corrective scopes of work are submitted in writing to the client technical representative to obtain Customer approval.
- Out of specification sizes referred to the TGS Engineer to be followed up with recommended scopes of work and technical notifications to Clients.
- Technical notifications to be followed through and closed out.
- Ensure Quality Records available and utilised on site
- Ensure work instructions, procedures, drawings and OEM manuals on site are utilised during execution
- Give input to the development of new check sheets and Improvement of existing check sheets.

Provide an Engineering Support Service

- Evaluate and interpret technical reports, specifications and deviations and make recommendations on repair procedures, scopes of work and instructions timely.
- Review and compile Processes, procedures and specifications
- Compilation of Engineering specific work instructions, procedures and specifications
- Review and Authorize technical work instructions.
- Technical development and improvement of procedures, quality plans and maintenance plans
- Ensure quality plans and check sheets are in line with OEM procedures, specifications and training manuals

- Review of previous problem areas and solutions required and incorporate into quality plans
- Assist with Technical development and improvement of contract plans, scopes of work, procedures, quality and maintenance plans.
- Investigate and develop improved and alternative repair and refurbishment processes and methods
- Perform technical investigations and root cause analysis and report. Recommendations to be backed up with technical calculations, references, etc, where applicable.
- Investigate and make recommendations on new tooling and equipment, and to improve on existing tooling and equipment efficiency.

Comply With Safety Health Environment and Quality Requirements

- Comply with the Occupational Health and Safety Act and Eskom Rotek Industries Engineering SHE System requirements
- Comply with the Eskom Plant Safety Regulations.
- Stop unsafe work activities and report to the Project / Site Manager for rectification
- Control and maintenance of ISO Quality system in accordance with the Business Management System in relation to this Job Function.
- Comply with policies, procedures and instructions.

ERI TGS Services

- The following services will be provided by ERI TGS with support where applicable from the Eskom sites
- Rigging activities – The rigging manuals will be made available during outage activities.
- Crane Operation and control
- Sandblasting
- Scaffolding
- Insulation/lagging
- Cleaning services
- Tools issuing and control
- Clean conditions controls
- Access control
- FME controls
- Transportation of components
- Workshop services

7. SHEQ Requirements

- All service providers are expected to comply with, but not limited to the following:
- Compliance to the requirements of Eskom Contractor Management Standard (32-736).

- Comply with the requirements of SHE file submissions as per SHE specification prior to the commencement of any contracted Work or Service.
- Statutory SHE competencies (known as portfolio of Evidence) is a prerequisites as outlined in the Occupational Health and Safety act of 1993 and Regulations ;including applicable Eskom Rotek Industries requirements for persons at work.
- Comply with the legal and other requirements within the Republic of South Africa as promulgated by the Department of Employment and Labour.
- Cooperate with the Eskom Rotek Industries in complying with the requirements of the Department of Employment and Labour Inspectorate.
- Compliance to Eskom Incident Management procedure and Standard (32-95) is compulsory at all Eskom Rotek Industries sites.
- Provide necessary SHE resources to enhance health and Safety of personnel at Work.
- Cooperate with Eskom Rotek Industries to achieve ZERO harm Safety Value.
- Compliance with the Occupational Health and Safety Act 85 of 1993 is compulsory.
- Adherence to Quality Management System Policies, Procedures and related requirements of ISO 9001.
- Adherence to Occupational Health and Safety Policies, Procedures and related requirements of the OHSAS 18001 ISO 4500:2018.
- Adherence to environmental aspects, related impacts and legal requirements associated with work activities in accordance with ISO 14001.
- Adherence to Life Saving Rules.
- Compliance with the Eskom Plant Safety Regulations.
- Only authorised documents and processes are to be used in the execution of duties.
- Continuously seek methods for improvements from a process, quality and safety perspective.
- Obey all instructions.
- Familiarize with:
- The applicable work instructions and procedures in place.
- Safe working conditions and procedures.
- All legal and contractual requirements.
- Discipline and integrity.
- Compliance to all ERI Work Instructions, processes, procedures, and standards
- Adherence to ERI’s disciplinary code or practice.
- Set example to co-workers and others.
- Participate in Risk Assessments.
- Responsible for own safety.
- Responsible for Personal Protective Equipment issued.
- Execute duties promptly and safely.
- Safeguard tools and safety equipment issued.
- Keep good relationship with all personnel.
- Compile a HIRA for each and every activity that needs to be performed.

- Ensure the activities are carried out following a Works Instructions and Procedure.
- Adhere to clean condition policy where required.
- All activities to be carried out as per the documented processes and comply with the applicable ISO standards and SANS standards.
- Service provider to comply to Eskom PPE (Personal Protective Equipment) Policy with regards to issuing of PPE to resources
- Proper use of PPE to be followed
- Ensure that tools and equipment are stored correctly in a safe place.

8. Key Deliverables

The following deliverables are to be met by the service provider:

- During the project duration:
- No customer complaints
- Compliance to all ERI Work Instructions, processes, procedures, and standards
- No SHEQ incidents
- Project Milestones are to be achieved on time, or earlier

During reassembly:

- Reassembly of components to be within specification
- Commissioning of systems effectively

General:

- Eskom's fleet reaching midlife means the service provider needs to have specific experience handling aging plants like those from ABB, Siemens, GEC, and MAN. Having a service provider with experience in these particular fleets is crucial for effective maintenance and servicing.
- OSC TFA’s and Engineers provided by the contractor should have at least 3years experience as a minimum working on Eskom Turbo-Gen machines operating on mid-life cycle. The experience would help in accurate scoping and components repair strategies.
- The Service provider should also share the lessons learned from previous outages executed validating that the contractor is a learning organisation for continuous improvement.
- The service provider will be responsible for the successful commissioning of the unit where services were required.
- The unit must operate for a continuous 14 days without any defects to be effectively rendered a success.
- Any defects caused by the Contractor that are noted within the 14 days on the service areas requested, will be corrected by the Contractor at own cost.”

9. Procedure Adherence Requirements

The ERI TGS Quality Management System consists of various procedures and processes that are utilized to manage and control the level of quality of maintenance activities during an outage to an acceptable standard. These procedures and processes are employed during the planning and execution of maintenance activities with a focus of meeting the customer's requirements and enhancing their satisfaction. These procedures shall be adhered to by the service provider and will be made available on request by the service provider.

- Execution and Control of All Site Work (240-137025973)
- Quality Control
- PQP Workflow Assessment and Tracking for Outages (240-94067752)
- Technical Notification Work Instruction (240-94067868)
- Control of Blanks and Foreign Material Exclusion Covers (240-94069330)
- Rotor Lockable Components Inspections (E-67)
- Hydraulic Equipment Specifications, Operation and Maintenance Requirements (F-465)
- Compilation of Service Reports and Data Books (F-737)
- Lifting Machines and Lifting Tackle Safe Working Practices (240-126606734)
- Management and Control of Tools in a Tool Store or a Container (240-125904456)
- Correcting of Checksheets Engineering Instruction (X-1384391-033)
- Project Management Product/Process Quality Plan (240-130329202)
- Control of Non-Conforming Product/Service, Corrective and Preventive Action (240-103649507)
- Business Management System Audit (240-94027195)
- Coding of Business Management System Documentation (240-94027233)
- Development and Management of the Product/Process Quality Plan for Outages (240-142892057)
- Generator Clean Conditions Requirements Work Instruction (240-56178527)
- Turbo Gen Services - Outage Quality Control Cabin (240-142894278)
- Turbo Gen Services Rework Work Instruction (240-147200671)
- Flogging procedure (240-94068826)
- Safe operation of electrical equipment (TT-A-01)
- Plant Safety Regulations

10. Peaking Stations

Siemens SGT5-2000E Major Inspection Philosophy:

Table 3: Scope of Work Description for Peaking Stations - Siemens SGT5-2000E Major Inspection Philosophy.

Stage	Area	Components	Action
	Complete unit	Turning Gear	(V) oil leakage

Stage	Area	Components	Action
Preliminary Measures	Turbine-Generator	IGV Rotational angle transmitter	(V) mechanical connection
			(V) condition
			(F) Function
	Documentation of Operational Status	Ops Logs	(M) Irregularities
		Measuring Systems	(Pa) Document Operating Logs
			(F) Function
		Operating Instruments	(M) Zero Point
		Plant Operating Behaviour	(Pa) Enquiry regarding last operating irregularities
			(M) Irregularities
	Leak Tests	Lube/Jacking Oil System	(V) leakage
		Hydraulic Oil System	(V) leakage
		Fuel Oil System	(V) leakage
		Fuel Gas System	(V) leakage
		Ignition Gas System	(V) leakage
		Sealing Air System	(V) leakage
		Compressed Air Instrument System	(V) leakage
		Purge Water System	(V) leakage
	Oil Analysis	Lube Oil	(Pa) Take Sample
			(M) Oil Quality
		Hydraulic Oil	(Pa) Take Sample
			(M) Oil Quality
		Fuel Oil	(Pa) Take Sample
			(M) Oil Quality
	Generator	Shaft Grounding Brushes	(Pa, m) Enquiry to customer regarding past operating irregularities
			(V) Damage
			(V) Completeness of clamping pins

Stage	Area	Components	Action
			(V) Damage of clamping pins
		Carbon brushes on the slip ring	(V) Damage
			(Pa) Enquiry to customer regarding past operating irregularities
	Before Disassembly	Compressor and Turbine Blading	(V) Damage
		VIGV	(M) Aerofoil angle
			(V) Unimpaired motion
			(M) Settings
		Compressor and Turbine Bearings	(V) oil leakage
			(M) Radial Clearances
			(M) Axial Dimensions
		Gas Turbine Insulation	(V) Damage
		Centreline	(M) Alignment
		Exhaust Casing Lining	(V) Radial offset relative to TB4 root
			(V) Deformation
Disassembly	Dismantling of Outer Casings and Combustion Chamber	Joint Bolts of Outer Casing	(V) Damage
		Combustion Chamber Flange Bolts	(M) Bolt Elongation
			(V) Damage
		Mixing Chamber / Inner Casing Transition	(M) Clearances
		Outlet Casing at Casing Joints after loosening the casing joint bolts and before uncovering	(M) Gapping
	Uncovering of Guide Vane assemblies	Compressor and Turbine Blades, Disks	(M) Axial Clearances
			(M) Radial Clearances
Compressor Inlet	Air Intake System	All	Overview Photo
		Filter Compartment, Dirty Side	(V) Deposits

Stage	Area	Components	Action
			(V) Damage to Filters
			(V) Completeness of Filter
			(V) Detached Parts
			(V) Soiling
			(V) Non-uniform alignment
			(V) Filters outside specification
			(Pa) Replace Filters
		Filter Compartment, Clean Side	(V) Deposits
			(V) Damage to Filters
			(V) Detached Parts
			(M) Formation of Gaps
			(V) Formation of Gaps via Light Test
			(V) Flaking of paint, corrosion
			(V) Locking
		Filter Compartment, Leak Tightness	(V) Damage to Door Seal
			(V) Damage to Door Lock
			(V) Damage to Seals in the Wall Region
			(V) Damage, Holes in Wall
		Filter Compartment to Intake Section, Stiffeners	(V) Damage
			(V) Cracks
			(V) Corrosion
		Filter Compartment/Intake Section, Other Internals	(V) Irregularities
			(V) Deposits

Stage	Area	Components	Action
		Intake Region, General, Upstream of Compressor	(V) Foreign Objects
			(V) Damage to Door Seal
			(V) Damage to Door Lock
			(V) Damage to Seals in the Wall Region
			(V) Damage, Holes in Wall
			(V) Flaking of paint, corrosion
			(V) Irregularities in Drainage System
		Intake Region, Compressor Isolation element	(V) Damage
			(V) Corrosion
			(V) Deformation
		Intake Region, Compressor Cleaning Equipment	(V) Deposits, Clogging
			(V) Damage, Deformation
			(V) Detached Parts
			(V) Corrosion
		Intake Region, Dehumidifier	(V) Damage
			(V) Soiling
			(V) Corrosion
			(V) Deformation
		Filter Compartment, Silencer	(V) Loose Elements
			(V) Deposits
			(V) Cracks
			(V) Damage
	Vane Pitch Adjustment Device	Actuator Ring Support Rollers	(V) Wear
		Adjusting Ring	(V) Mechanical Material Thinning
			(V) Deformation
		Adjusting Ring, Roller Support Bracket	(V) Tight Fit

Stage	Area	Components	Action
		Linkage Mechanism including Pushrod	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Corrosion
			(V) Unimpaired motion
			(V) Correct Seating
			(T) Tight Fit
		Adjustment of Pushrod	(V) Wear
			(V) Deformation
			(PT/MP) Cracks
		Pivot Heads	(V) Corrosion
			(V) Play
			(V) Correct Installation
			(V) Position
		Linkage Mechanism Stop	(V) Pressure Marks
		Bushings of Vanes and Intermediate Shaft	(V) Corrosion
		O-rings in the Vane Pivot Bearings	(V) Damage
	Inlet Casing, Compressor Inlet	Rubber Seal between Compressor Inlet and Inlet Structure	(V) Damage
		Compressor Washing System Stop Welds on Washing Nozzles	(V) Cracks
			(V) Completeness
		Compressor Washing System Pipe Clamps	(V) Damage
			(V) Cracks
		Compressor Washing System Nozzles	(V) Incorrect Alignment
Bearings	Compressor Bearing	Bearing Casing Centre Guide	(V) Mechanical Material Thinning
		Bearing Casing Centre Guide Shims	(V) Scoring Marks
		Bearing Casing Surface	(V) Deposits
			(V) oil leakage
			(V) Attachment
		Bearing Casing Anti-Corrosion Paint	(V) Deposits
			(V) Oil Residue

Stage	Area	Components	Action
			(V) Foreign Objects
			(V) Flaking of paint, corrosion
		Bearing Casing Cross Section Transitions at the Bearing Casing Support	(V) Cracks
		Gasket at Inner Cone on Horizontal Joint	(V) Damage
		Bearing Casing, Bearing Supports	(V) Cracks
		Bearing Casing, Bearing Support in Half Joint	(V) Mechanical Material Thinning
			(V) Cracks
		Bearing Casing, Shims	(V) Scoring Marks
		Bearing Casing, Hose for Hydraulic Jacking Oil System	(V) Wear, Cracks
			(V) Oil Leakage
			(V) Permanent Line Connection
		Bearing Casing, Leakage Oil Line	(V) Deposits, Clogging
		Shaft Position Monitor, Pawl	(V) Damage
		Bearing Casing, Guide Slot for Insertion of the Oil Seal Ring	(V) Hammer Marks
		Bearing Casing, Guide Slot for Insertion of the Gland	(V) Hammer Marks
		Bearing Seal Ring, Seal Strips to Intermediate Shaft	(V) Rubbing Marks
			(V) Material Break Out, Cracks
			(V) Bending Deformation
			(V) Height of Seal Strip
		Shaft Seal Ring, Seal Strips to Front Hollow Shaft	(V) Rubbing Marks, Material Thinning
			(V) Material Break Out, Cracks
			(V) Bending Deformation
			(V) Height of Seal Strip

Stage	Area	Components	Action
		Oil Seal Ring, Seal Strips to Front Hollow Shaft	(V) Rubbing Marks, Material Thinning
			(V) Material Break Out, Cracks
			(V) Bending Deformation
			(V) Height of Seal Strip
		Oil Seal Ring, Oil Bore	(V) Deposits, Clogging
		Oil Seal Ring, Anti-rotation Pin	(V) Pressure Marks
			(V) Fracture
		Shaft Seal, Seal Strips to Front Hollow Shaft	(V) Rubbing Marks, Material Thinning
			(V) Material Break Out, Cracks
			(V) Bending Deformation
			(V) Height of Seal Strip
		Shaft Seal, Sealing Air Ducts	(V) Deposits, Clogging
		Shaft Seal, Shims	(V) Scoring Marks
		Combined Thrust and Journal Bearing, Thrust Bearing Pads, Babbitt Metal	(V) Coking
			(V) Mechanical Material Thinning
			(V) Deformation
			(V) Damage
			(PT/UT) Bonding
			(PT) Cracks
		Combined Thrust and Journal Bearing, Oil Bores in Bearing Shell Support Sleeve	(V) Clogging
		Combined Thrust and Journal Bearing, Bearing Pad Support Structure, Contact Surface for Spring	(V) Wear
			(V) Pressure Marks
			(V) Wear

Stage	Area	Components	Action
		Combined Thrust and Journal Bearing, Spring Bridges for Thrust Bearing Pad	(V) Pressure Marks
			(V) Plastic Deformation
		Combined Thrust and Journal Bearing, Radial Running Surfaces, Babbitt Metal	(V) Coking
			(V) Mechanical Material Thinning
			(V) Material Break Out
			(V) Scoring Marks
			(PT/UT) Bonding
			(PT) Cracks
			(V) Contact Pattern
	Turbine Bearing	Bearing Housing, Center Guide	(V) Mechanical Material Thinning
		Bearing Housing, Center Guide Shims	(V) Mechanical Material Thinning
		Bearing Housing, Shims for Height Adjustment	(V) Scoring Marks
		Bearing Housing, Hose for Hydraulic Jacking Oil System	(V) Damage
			(V) Embrittlement
			(V) Permanent Line Connection
			(V) oil leakage
		Bearing Housing, Leakage Oil Line	(V) Deposits, Clogging
		Bearing Housing, Oil Drain Pipe	(V) Coking
			(V) Tight Fit
			(V) Oil Residue
			(V) Damage
		Bearing Housing, Guide Slot for Insertion of the Oil Seal Ring	(V) Hammer Marks
		Bearing Housing, Guide Slot for Insertion of the Gland	(V) Hammer Marks
		Bearing Housing, Insulation	(V) Damage
		Bearing Shell Support Sleeve Cover	(V) oil leakage

Stage	Area	Components	Action
		Bolts between Bearing Housing and Casing 3	(M) Bolt Elongation
			(V) Damage
		Oil Seal Ring, Seal Strips to Rear Hollow Shaft	(V) Rubbing Marks
			(V) Mechanical Material Thinning
			(V) Cracks
			(V) Bending Deformation
		Oil Seal Ring, Oil Bore	(V) Deposits, Clogging
		Oil Seal Ring, Anti-rotation Pin	(V) Pressure Marks
			(V) Mechanical Material Thinning
			(V) Fracture
		Shaft Gland, Seal Strips to Rear Hollow Shaft	(V) Rubbing Marks
			(V) Mechanical Material Thinning
			(V) Cracks
			(V) Bending Deformation
			(V) Height of Seal Strip
		Shaft Gland, Sealing Air Bores	(V) Deposits, Clogging
		Shaft Gland, Shims	(V) Hammer Marks
		Journal Bearing, Oil Bores in the Bearing Shell Support Sleeve	(V) Clogging
		Bearing Shell Support Sleeve, Trunnions in Joint Face	(V) Mechanical Material Thinning
		Journal Bearing, Radial Running Surfaces, Babbitt Metal	(V) Coking
			(V) Mechanical Material Thinning
			(V) Material Break-out
			(V) Scoring Marks
			(PT/UT) Bonding
			(PT) Damage

Stage	Area	Components	Action
			(PT) Cracks
			(V) Contact Pattern
Compressor	Compressor Vane Carrier I	Vertical Contact Flange and Horizontal Joint Faces	(V) Scoring Marks
			(V) Marks indicating that hot air has escaped
			(V) Cracks
		Internal walls	(V) Deposits
	Compressor Vane Carrier (all) incl. Inner Rings and Outer Rings	Center guide bolts/height adjustment bolts	(V) Mechanical Material Thinning
			(V) Cracks
		Support Paws	(V) Mechanical Material Thinning
			(V) Cracks
		Joint bolts	(M) Bolt Elongation
			(V) Damage
		Compressor Vane Carriers in the Region of Compressor Blades	(V) Rubbing Marks
		Compressor Vane Carrier I-III, Contact and Support Surfaces to Outer Casing 2 as well as Joint	(V) Gauling Marks
			(V) Cracks
		Compressor Vane Carriers, Guide slots for outer rings	(V) Wear
			(V) Cracks
			(PT/MP) Cracks
		Vane Ring, Outer Rings, Recess Facing Compressor Vane Carrier	(V) Wear
		Seal Strips in the Inner Ring, incl. VLe0	(V) Wear
			(V) Material Break-out
			(V) Cracks
			(V) Bending Deformation
			(V) Height of Seal Strip
		Inner Rings of Vane Rings	(V) Rubbing Marks

Stage	Area	Components	Action
		Inner ring slot for casing joint connecting element (parallel key) (if present)	(V) Mechanical Material Thinning
		Connecting element in the inner ring joint face (if provided)	(V) Mechanical Material Thinning
			(V) Tight Fit
		Inner Rings, Teeth in Joint Face	(V) Mechanical Material Thinning
		Inner Rings, Weld Beads at Cross Seal Plate	(V) Cracks
			(V) Damage
		Inner Rings, Circumferential Weld Beads	(V) Cracks
			(MP) Cracks
		Compressor Vane Carrier I-III, Cross Section Transitions in the Region of Paws	(V) Cracks
		Compressor Vane Rings, Bolt Locking Device (if provided)	(V) Damage
		Inner Ring, Position of Aerofoils	(V) Offset
		Inner Ring, Radial Burrowing of Vanes	(V) Wear
		Caulking in the Inner Ring at Vane Hook	(V,M) Clearances
		Inner Ring, Axial Burrowing of Vanes (only after opening the inner ring)	(V) Wear
		Compressor Guide Vanes, Vane Hooks (only after opening the inner rings)	(V) Wear
			(V) Cracks
		Seal Ring (Split) between Compressor Vane Carrier II+III and Casing 2	(V) Mechanical Material Thinning
			(V) Cracks
	Compressor Vanes	Compressor Vane Carrier, Support Paws	(V) Mechanical Material Thinning
			(V) Cracks
		Aerofoil, all rows	(V) Deposits
			(V) Corrosion
			(MP,ET) Cracks
			(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks

Stage	Area	Components	Action
		Aerofoil, rows with coated aerofoils	(V) Coating thinning
			(V) Damage
		Transitions from Aerofoil to Hook at the Inner Ring	(MP) Cracks
	Compressor Blades	Aerofoil, all stages	(V) Deposits
		Aerofoil, Rows with coated aerofoils	(V) Coating thinning
		Aerofoil, all rows	(V) Corrosion
			(MP) Cracks
			(V) Damage
			(V) Mechanical Material Thinning
			(V) Cracks
			(V) Deformation
		Aerofoil, Tip Crown/Tip, all rows	(V) Rubbing Marks
		Blade Root End Faces on Leading and Trailing Edge Ends	(V) Cracks
			(MP) Cracks
		Blade Root, Axial Locking Strip (Blades Fitted with Locking Strips)	(V) Damage
			(V) Deformation
			(V) Cracks
			(MP) Cracks
		Blade Root, Position Facing Wheel Disk, All Rows	(M) Offset
			(V) Rubbing Marks
Combustion Chambers	Burner Support	Burner support	(V) Corrosion
			(V) Damage
			(V) Discoloration
			(V) Signs of overheating
			(V) Cracks
		Igniter	(V) Damage
		Burner Assembly	(M) Installation Depth
		FO PB Oil Supply Line, Expansion Joint	(V) Damage

Stage	Area	Components	Action
	Fuel Oil Diffusion Burners (for machines run on fuel oil)	Fuel Oil Burner, Burner Cap	(V) Discoloration
			(V) Erosion
			(B) Erosion
			(V) Cracks
			(V) Seal fit
			(V) Scaling
			(V) Deposits
			(M) Dimensional Accuracy
		Fuel Oil Burner, Burner Needle	(V) Signs of Overheating
			(V) Cracks
			(B) Cracks
			(V) Correct Installation
			(B) Correct Installation
		Fuel Oil Burner, Water Injection, Water Lance Cap	(V) Deposits
			(V) Clogging
			(V) Discoloration
			(V) Mechanical Material Thinning
			(V) Scaling
			(V) Cracks
			(V) Tolerances fit Seat
	Premix burner nozzles	Premix burner nozzles	(V) Deposits
			(V) Coking
			(V) Plugging
		Hub in the Region of Premix Burner Nozzles	(V) Deposits
			(V) Coking
			(V) Tight Fit
		Axial Swirler	(V) Deposits

Stage	Area	Components	Action
	Gas Diffusion Burner, Axial Swirler		(V) Clogging
			(V) Deformation
			(V) Scaling
			(V) Erosion
			(V) Cracks
			(V) Wear
		Pilot Gas Burner	(V) Scaling
			(V) Signs of Overheating
			(V) Deposits
			(V) Cracks
	Gas Premix Burner, Hr3 Burner	Diagonal Swirler, Entire Surface	(V) Deposits
			(V) Corrosion
			(V) Deformation
			(V) Material Break-out
			(V) Hammer Marks
			(V) Tight Fit
			(V) Misalignment
			(V) Clogging
			(V) Signs of Overheating
			(V) Scaling
			(V) Cracks
		Gas Distributor, Weld Beads	(V) Cracks
			(PT/MP) Cracks
		Gas Distributor, Tubes	(V) Cracks
			(V) Corrosion
			(PT) Cracks
			(M) Wall Thickness
			(UT) Wall Thickness
			(V) Deposits
			(B) Deposits

Stage	Area	Components	Action
	Flame Cylinder End Plate	Burner Support Insert	(V) Spalling
			(V) Scaling
			(V) Cracks
			(V) Corrosion
			(V) Mechanical Material Thinning
		Hold-downs for Diagonal Swirler	(V) Wear
			(V) Cracks
			(V) Tight Fit
		Flame Cylinder End Plate, Plate Segment	(V) Hammer Marks
			(V) Scaling
			(V) Cracks
			(M) Clearances
		Flame Cylinder End Plate on cold gas side	(V) Cracks
	Flame Cylinder	Flame Monitors, Sight Glass	(V) Soiling
			(V) Damage
		Guide and Supports	(V) Scoring Marks
		Flame Cylinder, with heat shield removed	(V) Discoloration
			(V) Scaling
			(V) Wear
			(V) Cracks
		Pressure Sensing Lines	(V) Cracks
			(F) Unobstructed cross section
		Tile Support Ring	(V) Scaling
			(V) Mechanical Material Thinning
			(V) Scuffing Marks
			(V) Hammer Marks
			(V) Cracks
		Flame Cylinder, Protective Liner Plates (Butterfly Plates) above the Combustion Chamber Tiles, if present	(V) Scaling
			(V) Cracks
			(V) Tight Fit

Stage	Area	Components	Action
		Ceramic Heat Shield in the Installed Condition	(V) Tight Fit
			(V) Cracks
			(V) Material Break-out
			(V) Erosion
			(V) Atypical Findings
		Tile Holder, with Heat Shield Removed	(V) Scaling
			(V) Wear
			(V) Hammer Marks
			(V) Cracks
		Ceramic heat shield, back side, during tile removal.	(V) Cracks
			(V) Material Break-out
			(V) Signs of Burrowing
		Bolted Tile Holders	(V) Tight Fit
			(V) Deformation
			(V) Scaling
			(V) Wear
			(V) Cracks
		Flame Cylinder, Transition from Flame Cylinder Region to Combustion Chamber Shield (F-ring)	(V) Scaling
			(V) Cracks
	Mixing chamber	Mixing Casing Surface	(V) Corrosion
			(V) Scaling
			(V) Mechanical Material Thinning
			(V) Cracks
			(V) Deformation
		Mixing Casing, in the Region of Reinforcement Plates and Guide Plates	(V) Corrosion
			(V) Scaling
			(V) Mechanical Material Thinning

Stage	Area	Components	Action
			(V) Cracks
		Mixing Casing, Weld Beads	(V) Cracks
			(PT) Cracks
		Mixing Casing, Guides (Integral Keys)	(V) Wear
			(V) Cracks
			(PT) Cracks
		Mixing Casing, Bushings for Fitting Support Bolts	(V) Wear
			(V) Cracks
			(PT) Cracks
		Mixing Casing, Cooling Air Ring	(V) Hammer Marks
			(V) Wear
			(V) Cracks
			(PT) Cracks
		Mixing Casing, Transition to Tile Support Ring (Cone Half)	(V) Scoring Marks
			(V) Wear
			(V) Cracks
			(PT) Cracks
			(V) Deformation
		Mixing Casing, Manhole Insert	(V) Mechanical Material Thinning
			(V) Scaling
			(V) Cracks
			(PT) Cracks
		Mixing Casing, Manhole Insert and Cover Assembly, if Provided	(V) Wear
			(V) Scaling
			(V) Cracks
			(PT) Cracks
		Mixing Casing, Manhole Collar	(V) Scaling
			(V) Cracks
	Combustion Chamber Shell and Dome	Combustion Chamber Shell, Flange Bolts to Casing 2	(M) Bolt Elongation
			(V) Damage

Stage	Area	Components	Action
		Combustion Chamber Dome, Flange Bolts to Combustion Chamber Shell	(M) Bolt Elongation
			(V) Damage
		Combustion Chamber Dome, Bolted Connection between Dome and Gas Distributor	(M) Bolt Elongation
			(V) Damage
		Combustion Chamber Dome, Complete Surface	(V) Cracks
		Combustion Chamber Shell, Complete Surface	(V) Cracks
		Combustion Chamber Shell, Guide Recesses for Flame Cylinder (Yokes)	(V) Wear
			(V) Cracks
			(PT) Cracks
		Guide bolt for Mixing Casing	(V) Wear
			(V) Cracks
			(PT) Cracks
		Combustion Chamber Shell, Support Bolts for Mixing Casing	(V) Wear
			(V) Cracks
			(PT) Cracks
		Pushrod, Articulated Lever, Anti-rotation Pin	(V) Damage
			(V) Correct Installation
	Pipes outside the Combustion Chamber	Piping	(V) Cracks
			(V) Abraded regions
		Fuel Gas Line outside the Combustion Chamber	(V) Damage
			(V) Discoloration
		Thread Lockers, Lock Washers, and Nord-Lock Positive Lock Washers	(V) Locking
		Fuel Gas Expansion Joints	(V) Damage
			(V) Corrosion
			(V) Deformation
			(V) Stress-free installation

Stage	Area	Components	Action
		Fuel Oil Return Line on the Combustion Chamber	(V) Signs of Overheating
			(V) Discoloration
			(V) Paint burnt off
			(V) Coking
			(V) Soot
Rotor	Intermediate Shaft	Coupling Flange Face, Compressor End	(V) Pressure Marks
			(V) Mechanical Material Thinning
		Coupling Flange Face, Compressor End/Centering Contour	(V) Mechanical Material Thinning
		Coupling Flange Face, Generator End	(V) Mechanical Material Thinning
		Intermediate Shaft, Sealing Surfaces	(V) Scoring Marks
		Intermediate Shaft, Spot Face for Coupling Bolts	(V) Scoring Marks
			(V) Wear
		Intermediate Shaft, Bores for Shear Pins	(V) Scoring Marks
			(V) Wear
			(V) Toleranced Fit Seal
		Coupling Bolts between Generator/Intermediate Shaft and Intermediate Shaft/Compressor	(V) Gauling Marks
			(M) Bolt Elongation
			(V) Deformation
			(V) Cracks
			(MP) Cracks
			(V) Wear
			(V) Scoring Marks
		Shear pins at flange	(V) Gauling Marks
			(V) Hammer Marks
			(V) Cracks
			(MP) Cracks
		Locking Pins of Coupling Bolts and Shear Pins	(V) Deformation
			(V) Cracks
			(MP) Cracks

Stage	Area	Components	Action
		Turning gear restart	(V) Contact Pattern
			(V) Mechanical Material Thinning
			(V) Sluggishness
	Rotor Runout Check	Rotor Runout Check	(M) Concentricity
	Compressor Wheel Disks, All Stages	Seal Tips	(V) Mechanical Material Thinning
		Disk Faces Inlet/Outlet End Close to Rotor Disk Slot (with Blades Installed)	(V) Rubbing Marks
			(V) Cracks
			(MP) Cracks
		Rotor Disk Slot (with Blades Removed)	(V) Scoring Marks
			(V) Damage
			(V) Deposits
	Turbine Wheel Disk, Stage 1	Rotor Disk Slots, after Removal of Blades	(V) Deposits
			(V) Mechanical Material Thinning
	Turbine Wheel Disk, Stage 2	Rotor Disk Slots, after Removal of Blades	(V) Deposits
			(V) Hammer Marks
	Turbine Wheel Disk, Stage 3	Rotor Disk Slots, after Removal of Blades	(V) Deposits
			(V) Hammer Marks
			(V) Cracks
			(MP) Cracks
	Turbine Wheel Disk, Stage 4	Rotor Disk Slots, after Removal of Blades	(V) Deposits
			(V) Hammer Marks
			(V) Cracks
			(MP) Cracks
	Compressor Wheel Disks and Front Hollow Shaft (Field Rebalancing Weights)	Compressor Wheel Disks and Front Hollow Shaft (Field Rebalancing Weights)	(V) Tight Fit
			(V) Smooth Rotation
			(V) Damage
	Turbine Wheel Disks and Rear Hollow Shaft (Field	Turbine Wheel Disks and Rear Hollow Shaft (Field Rebalancing Weights)	(V) Tight Fit

Stage	Area	Components	Action
	Rebalancing Weights)		(V) Smooth Rotation
			(V) Damage
	Compressor/Turbine Wheel Disks, All Stages, Front and Rear Hollow Shaft, Entire	Compressor/Turbine Wheel Disks, All Stages, Front and Rear Hollow Shaft, Entire	(V) Discoloration
			(V) Corrosion
	Front Hollow Shaft	Seal Tips	(V) Mechanical Material Thinning
		Rotor, Front Hollow Shaft, Radial and axial bearing	(V) Corrosion
			(V) Scoring Marks
			(V) Rubbing Marks
			(V) Cracks
			(MP) Cracks
		Coupling Surface and Bolt Holes	(V) Pressure Marks
			(V) Mechanical Material Thinning
		Toleranced-fit Seat for Centering Ring	(V) Mechanical Material Thinning
	Rear Hollow Shaft	Seal Tips	(V) Mechanical Material Thinning
		Radial Running Surfaces	(V) Corrosion
			(V) Scoring Marks
			(V) Rubbing Marks
		Centering surface for tie rod	(V) Corrosion
			(V) Scoring Marks
			(M) Toleranced fit surface
	Front/Rear Hollow Shaft	Front/Rear Hollow Shaft	(V) Tight Fit
	Compressor Wheel Disk, Manufacturing Plant Balancing Weights	Compressor Wheel Disk, Manufacturing Plant Balancing Weights	(V) Tight Fit
	Turbine Wheel Disk, Manufacturing Plant Balancing Weights	Turbine Wheel Disk, Manufacturing Plant Balancing Weights	(V) Tight Fit

Stage	Area	Components	Action
	Rotor, Compressor and Turbine Section	Rotor, Compressor and Turbine Section	(V) Deposits
	Tie Rod	Entire Surface	(V) Corrosion
			(V) Discoloration
		Seats for Truncated Conical Springs/Compressor Wheel Disks and the Rear Hollow Shaft	(V) Scoring Marks
			(V) Fretting Corrosion
			(V) Hammer Marks
			(V) Mechanical Material Thinning
			(M) Diameter
			(V) Cracks
			(MP) Cracks
		Thread for Shaft Nut	(V) Mechanical Material Thinning
			(V) Discoloration
			(V) Cracks
			(MP) Cracks
	Truncated Conical Springs, Contact Surfaces between Spring and Tie Rod and between	Truncated Conical Springs, Contact Surfaces between Spring and Tie Rod and between	(V) Scoring Marks
			(V) Corrosion
			(V) Hammer Marks
			(V) Gauling Marks
			(M) Diameter
	Compressor and Turbine Wheel Disks, All Stages, Entire Surface	Compressor and Turbine Wheel Disks, All Stages, Entire Surface	(V) Discoloration
			(V) Corrosion
	Compressor Wheel Disks/Turbine Wheel Disk TLa4/Rear Hollow Shaft, Slots for	Compressor Wheel Disks/Turbine Wheel Disk TLa4/Rear Hollow Shaft, Slots for	(V) Mechanical Material Thinning
			(V) Rubbing Marks
			(V) Deformation

Stage	Area	Components	Action
			(V) Hammer Marks
			(V) Cracks
			(MP) Cracks
			(M) Diameter
	Wheel Disks and Hollow Shafts, Hirth-type Serrations	Wheel Disks and Hollow Shafts, Hirth-type Serrations	(BC) Contact Pattern
			(V) Cleanliness
			(V) Mechanical Material Thinning
	Compressor/Turbine Wheel Disk, Manufacturing Plant Balancing Weights	Compressor/Turbine Wheel Disk, Manufacturing Plant Balancing Weights	(V) Tight Fit
	Turbine Wheel Disks, Inner Cooling Air Bores	Turbine Wheel Disks, Inner Cooling Air Bores	(V) Deposits
			(V) Discoloration
	Compressor Wheel Disk 16 and Turbine Wheel Disk 1; Slots for Inserting Cooling Air	Compressor Wheel Disk 16 and Turbine Wheel Disk 1; Slots for Inserting Cooling Air	(V) Mechanical Material Thinning
			(M) Dimensional Deviation
			(V) Cracks
			(MP) Cracks
	Center Hollow Shaft, Surface and Seal Tips	Center Hollow Shaft, Surface and Seal Tips	(V) Deposits
			(V) Rubbing Marks
			(V) Mechanical Material Thinning
			(V) Material Break-out
			(V) Cracks
			(V) Bending Deformation
			(V) Height of Seal Strips
	Shaft Nut, Thread	Shaft Nut, Thread	(V) Scoring Marks
			(V) Mechanical Material Thinning

Stage	Area	Components	Action
			(V) Fretting Damage
			(V) Cracks
			(MP) Cracks
	Rotating Cooling Air Partition Pipe	Rotating Cooling Air Partition Pipe	(V) Corrosion
			(V) Mechanical Material Thinning
			(M) Dimensions
	Turbine Wheel Disks, Anti-rotation Pin for L- and X-rings (if/when dismantled)	Turbine Wheel Disks, Anti-rotation Pin for L- and X-rings (if/when dismantled)	(V) Mechanical Material Thinning
			(V) Fracture
	Dimension check of L-rings and X-rings and/or corresponding slots in stage 1 to 4	Dimension check of L-rings and X-rings and/or corresponding slots in stage 1 to 4	(M) Dimensional Deviation
			(V) Cracks
	L- and X-rings, Centering Contours/Toleranced -fit and Guide Surfaces for Wheel	L- and X-rings, Centering Contours/Toleranced-fit and Guide Surfaces for Wheel	(V) Mechanical Material Thinning
			(V) Cracks
	L- and X-rings, Seal Tips	L- and X-rings, Seal Tips	(V) Scoring Marks
			(V) Cracks
			(V) Damage
	L- and X-rings, Anti-rotation Slot	L- and X-rings, Anti-rotation Slot	(V) Pressure Marks
			(V) Mechanical Material Thinning
	Compressor and Turbine Wheel Disks/Tie Rod/Front, Center, and Rear Hollow	Compressor and Turbine Wheel Disks/Tie Rod/Front, Center, and Rear Hollow	(V) Cracks
			(UT) Cracks
			(MP) Cracks
			(ET) Cracks
Casing	Internal Parts, Shaft Guard	Compressor Diffuser Vanes, Lock Washers	(V) Damage
			(V) Correct Installation

Stage	Area	Components	Action
			(V) Loosened Parts
			(V) Offset
		Shaft Guard, Centering Bolt for Cooling Air Ring of Inner Casing (if accessible)	(V) Mechanical Material Thinning
		Compressor Diffuser Vane	(V) Deformation
			(V) Foreign Object Damage
			(V) Cracks
		Compressor Diffuser Vanes, Screws	(T) Tight Fit
		Compressor Diffuser, Seal Tips	(V) Wear
			(V) Cracks
			(V) Material Break-out
			(V) Deformation
			(V) Height of Seal Strips
		Bolts between the upper and lower section of the shaft guard	(T) Tight Fit
		Compressor Diffuser, Slot for Shaft Guard	(V) Mechanical Material Thinning
		Compressor Outlet Diffuser, Anti-rotation Pin for Shaft Guard	(V) Pressure Marks
			(V) Wear
			(V) Fracture
		Compressor Outlet Diffuser, Cross Section Transitions	(V) Cracks
		Shaft Guard, Centering Contours for Seal Rings to TLe1	(V) Wear
		TLe1 inner shroud seal rings, sealing faces to TLe1 and protective shell	(V) Mechanical Material Thinning
			(V) Cracks
		Shaft Guard, Guide Slot for Cooling Air Ring of Inner Casing	(V) Wear
			(B) Wear
		Shaft Guard, Recess for Diffuser	(V) Mechanical Material Thinning
		Shaft Guard, Accessible Weld Beads	(V) Cracks

Stage	Area	Components	Action
	Inner Casing and Hub if applicable	Inner Casing, Support Paws	(V) Mechanical Material Thinning
		Inner Casing, Hold-downs	(V) Mechanical Material Thinning
			(PT) Cracks
		Inner Casing, Shims for Hold-downs	(V) Mechanical Material Thinning
			(V) Cracks
		Inner Casing, Center Guide	(V) Mechanical Material Thinning
			(PT) Cracks
			(M) Dimensional Deviation
		Inner Casing, Surface	(V) Corrosion
			(V) Scaling
			(V) Mechanical Material Thinning
			(V) Cracks
			(V) Dents, Bulges
			(V) Nests of Cracks
		Casing Lining, Weld Beads	(PT) Cracks
		Inner Casing, Surface	(V) Cracks
			(V) Spalling
			(V) Mechanical Material Thinning
		Inner Casing, Inlet Shell	(V) Erosion
			(V) Scaling
			(V) Cracks
		Inner Casing, Inlet Shell at Shrink-fit Connection	(V) Mechanical Material Thinning
		Inlet Shell, Anti-rotation Pin	(V) Mechanical Material Thinning
			(V) Cracks
			(V) Fracture
		Inlet Shell, Guide for Clamping Ring (K-ring)	(V) Mechanical Material Thinning

Stage	Area	Components	Action
			(V) Cracks
			(PT) Cracks
		Inner Casing, Guide Rib for Shaft Guard (Cooling Air Ring)	(V) Mechanical Material Thinning
			(V) Mechanical Material Thinning
			(PT) Cracks
			(V) Cracks
		Inner Casing, Clamping Bolt for Protective Liner and Flow Baffle	(V) Wear
			(V) Thermal Stress Cracks
			(V) Cracks
		Inner Casing, Inner and Outer Spacer Disks for Protective Liner and Flow Baffle	(V) Tight Fit
			(V) Clearances
	Casing 2	Vertical Contact Flange and Horizontal Joint Faces	(V) Scoring Marks
			(V) Marks indicating that hot air has escaped
			(V) Cracks
		Slots for Axial Guides of Guide Vane Assemblies/Seal Strips	(V) Mechanical Material Thinning
		Eccentric Bolts and Sliding Bushing Blocks for Compressor Vane Carrier	(V) Mechanical Material Thinning
			(V) Scoring Marks
		Flanges for Pipes, Support Surfaces	(V) Scoring Marks
		Interior walls	(V) Deposits
		Drainage bores	(V) Clogging
		Outer Casing, Contact Surfaces for Shims	(V) Mechanical Material Thinning
			(V) Scoring Marks
	Bearing Spider, Exhaust Casing, Casing Liner	Exhaust Casing at Joint Face Intersection and Joint Faces (Flanges)	(V) Scoring Marks
			(V) Marks indicating that hot air has escaped

Stage	Area	Components	Action
			(V) Gapping
		Casing Lining, Weld Beads	(V) Cracks
			(PT) Cracks
		Exhaust casing, partition plate to the turbine vane carrier	(V) Mechanical Material Thinning
			(V) Scoring Marks
		Casing Lining, Surface of Inside Walls	(V) Deposits
			(V) Deformation
		Exhaust Diffuser, Cover Plate for Expansion Joint	(V) Dent
			(V) Foreign Object Damage
			(V) Cracks
		Exhaust Diffuser, Four-wave Expansion Joint, Weld Bead to Cone	(V) Scuffing Marks
			(V) Lack of Overlap
			(V) Cracks
			(V) Deformation
		Hub Cover Plate, Sheet Metal Jacketing on Transition to Casing Lining and Regions at Bolts	(B) Cracks
			(V) Scuffing Marks
		Hub Cover Plate, Weld Beads	(V) Cracks
		Hub Cover Plate, Insulation	(V) Damage
		Spot Facing on Vertical Flange of Exhaust Casing	(V) Gauling Marks
		Casing Lining, Hub, Transition to Hub Cover	(V) Wear
		Exhaust Diffuser, Cover Plate for Expansion Joint, Weld Bead	(V) Cracks
	Regions downstream of turbine outlet	Exhaust Diffuser, Surface of Inside Walls	(V) Deformation
			(V) Dents
			(V) Foreign Object Damage
			(V) Cracks
		Exhaust Diffuser, Weld Beads	(V) Cracks

Stage	Area	Components	Action
		Exhaust Diffuser, Flanges for Pipes and Manhole, Contact Surfaces	(V) Scoring Marks
		Exhaust Diffuser, Expansion Joint Cover Plate	(V) Scuffing Marks
			(V) Cracks
Turbine	Clamping ring (K-ring)	Casing Lining, Weld Beads	(V) Cracks
		Casing Lining, Anti-rotation Pin	(V) Pressure Marks
			(V) Fracture
			(V) Mechanical Material Thinning
		Casing Lining, Guide Surfaces	(V) Mechanical Material Thinning
			(V) Cracks
	Turbine Vane Carriers and Seal Rings, if necessary	Eccentric Bolts and Sliding Bushing Blocks, Center Guide	(V) Mechanical Material Thinning
			(V) Scoring Marks
		Eccentric Bolts and Sliding Bushing Blocks, Height Adjustment	(V) Mechanical Material Thinning
			(V) Scoring Marks
		Turbine Vane Carriers, Contact Surface for Sliding Bushing Blocks/Eccentric Bolts	(V) Mechanical Material Thinning
			(V) Scoring Marks
		Turbine Vane Carriers, Guide Slots for Insertion of Vanes	(V) Mechanical Material Thinning
		Turbine Vane Carriers, Guide Slot Facing the Outer Casing	(V) Mechanical Material Thinning
		Split Seal Rings between Turbine Vane Carrier and Outer Casing	(V) Mechanical Material Thinning
			(V) Damage
		Turbine Vane Carriers, Joint Bolts	(M) Bolt Elongation
			(V) Damage
		Turbine Vane Carriers, Cooling Air Bore	(V) Deposits
		Turbine Vane Carriers, Inside Surface	(V) Deposits
			(V) Scaling
			(V) Cracks
			(V) Corrosion

Stage	Area	Components	Action
		Turbine Vane Carrier, Recess for Clamping Ring (K-ring)	(V) Mechanical Material Thinning
			(V) Hammer Marks
		Turbine Vane Carrier, Fixing pin bores	(V) Wear
		Seal Ring Segments, Bore for Insertion of Fixing Pins, Stage 2 to 4	(V) Proper Securing with a prick punch is no longer possible
		TLe1 Seal Ring Segments, Slots for Seal Rings and for TLe1 Inner Shroud	(V) Mechanical Material Thinning
		Seal Ring Segments, Seal Tips, Stage 2 to 4	(V) Rubbing Marks
			(V) Height of Seal Strips
			(V) Deformation
		Seal Ring Segments, Cooling Air Bores, Stage 2-4 and TLe1 Seal Ring	(V) Deposits
			(V) Clogging
		Seal Ring Segments, Slots for Insertion of Circumferential Seal Strips, Stage 2-4	(V) Mechanical Material Thinning
		Seal Ring Segments, Slots for Insertion of Vane Inner Shroud, Stage 2-4	(V) Mechanical Material Thinning
			(V) Scaling
			(PT) Cracks
		Seal Ring Segments Stage 2-4, Fixing Pins	(V) Wear
			(V) Shear Marks
		Seal Ring Segments Stage 2-4	(V) Rubbing Marks
	Turbine Vanes	Turbine Vane 1 to Turbine Vane 4, Removal and Reinstallation	(V) Transport Damage
			(Pa) Record details of installation plan
		TLe1 Aerofoil, Surface	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Foreign Object Damage

Stage	Area	Components	Action
			(V) Material Break-out
			(V) Corrosion
			(V) Erosion
			(V) Deformation
		TLe1, Outer Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe1 Inner Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe1 Aerofoil, incl. Leading and Trailing Edge as well as Outer and Inner Shroud	(V) Cracks
			(ET) Cracks
		TLe1 Outer Shroud, Fixing Slot and Anti-rotation Pin	(V) Mechanical Material Thinning
			(V) Cracks
			(PT) Cracks
		Turbine Vane 1, Outer Shroud, Centering and Contact Surfaces for Vane Carrier and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks
		TLe1 Outer Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		Turbine Vane 1 Outer Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		TLe1 Inner Shroud, Centering and Contact Surfaces for TLe1 Seal Ring and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks

Stage	Area	Components	Action
		TLe1 Inner Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		TLe1 Inner Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		Turbine Vane 2, Aerofoil	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Foreign Object Damage
			(V) Fracture
			(V) Material Break-out
			(V) Erosion
			(V) Corrosion
		Turbine Vane 2, Outer Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe2 Inner Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe2 Aerofoil, incl. Leading and Trailing Edge as well as Outer and Inner Shroud	(V) Cracks
			(PT) Cracks
		TLe2 Outer Shroud, Fixing Slot and Anti-rotation Pin	(V) Mechanical Material Thinning
			(V) Cracks

Stage	Area	Components	Action
			(PT) Cracks
		TLe2 Outer Shroud, Centering and Contact Surfaces for Vane Carrier and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks
		TLe2 Outer Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		Turbine Vane 2 Outer Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		TLe2 Inner Shroud, Centering and Contact Surfaces for TLe2 Seal Ring and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks
		TLe2 Inner Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		TLe2 Inner Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		Turbine Vane 3, Aerofoil	(V) Cracks
			(PT) Cracks
			(ET) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Fracture
			(V) Erosion
			(V) Corrosion
			(V) Deformation
		Turbine Vane 3, Outer Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating

Stage	Area	Components	Action
			(V) Rubbing Marks
		TLe3 Inner Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe3 Aerofoil, incl. Leading and Trailing Edge as well as Outer and Inner Shroud	(V) Cracks
			(PT) Cracks
		TLe3 Outer Shroud, Fixing Slot and Anti-rotation Pin	(V) Mechanical Material Thinning
			(V) Cracks
			(PT) Cracks
		TLe3 Outer Shroud, Centering and Contact Surfaces for Vane Carrier and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks
		TLe3 Outer Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		Turbine Vane 3 Outer Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		TLe3 Inner Shroud, Centering and Contact Surfaces for TLe3 Seal Ring and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks
		TLe3 Inner Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		TLe3 Inner Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		TLe4 Aerofoil, incl. Leading and Trailing Edge	(V) Cracks
			(PT) Cracks
			(V) Erosion

Stage	Area	Components	Action
			(V) Corrosion
			(V) Signs of Overheating
			(V) Foreign Object Damage
			(V) Fracture
			(V) Material Break-out
			(V) Deformation
		Tle4, Outer Shroud	(V) Cracks
			(PT) Cracks
			(V) Erosion
			(V) Corrosion
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe4 Outer Shroud, Centering and Contact Surfaces for Vane Carrier and Adjacent Vanes	(V) Mechanical Material Thinning
			(V) Cracks
			(PT) Cracks
		TLe4 Outer Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		Turbine Vane 4, Outer Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		TLe4 platform, weld beads to aerofoil	(V) Cracks
			(PT) Cracks
		TLe4 Outer Shroud, Fixing Slot and Anti-rotation Pin	(V) Cracks
			(V) Mechanical Material Thinning
			(PT) Cracks
		TLe4 Inner Shroud	(V) Cracks
			(PT) Cracks
			(V) Erosion

Stage	Area	Components	Action
			(V) Corrosion
			(V) Signs of Overheating
			(V) Rubbing Marks
		TLe4 inner shroud, centering and contact surface of seal ring on side face of inner shroud facing	(V) Mechanical Material Thinning
			(V) Cracks
			(PT) Cracks
		TLe4 Inner Shroud, Slots for Circumferential Seal Strips	(V) Wear
			(V) Cracks
		TLe4 Inner Shroud, Circumferential Seal Strip	(V) Deformation
			(V) Mechanical Material Thinning
			(V) Cracks
		TLe4 inner shroud, weld beads to aerofoil	(V) Cracks
			(PT) Cracks
	Turbine Blades	Turbine Blade 1 to Turbine Blade 4, Removal and Reinstallation	(V) Transport Damage
			(Pa) Record Details of Installation
		TLa1 Aerofoil, Tip Crown	(V) Cracks
			(V) Rubbing Marks
			(V) Oxidation
			(V) Deformation
			(V) Material Break-out
		TLa1 Blade Root, Slots for Seal and Locking Strip	(V) Wear
			(V) Cracks
			(PT) Cracks
		Turbine Blade 1, Aerofoil and Platform	(V) Cracks
			(PT) Cracks
		TLa1 Aerofoil and Platform, incl. Leading and Trailing Edge	(V) Cracks
			(V) Coating Thinning
			(V) Corrosion

Stage	Area	Components	Action
			(V) Erosion
			(V) Signs of Overheating
			(V) Foreign Object Damage
			(V) Fracture
			(V) Material Break-out
		TLa1 Aerofoil, Leading and Trailing Edge	(V) Cracks
			(ET) Cracks
		TLa1 Blade Root, Load-bearing Flanks/Radius on Lateral Root Surface as well as Locking Slot	(V) Mechanical Material Thinning
			(V) Cracks
			(ET) Cracks
		TLa1 Blade Root, Axial Locking Strip	(V) Damage
			(V) Deformation
		TLa2 Aerofoil, Tip Crown	(V) Cracks
			(V) Rubbing Marks
			(V) Oxidation
			(V) Deformation
			(V) Material Break-out
		TLa2 Aerofoil and Platform, incl. Leading and Trailing Edge	(V) Cracks
			(V) Coating Thinning
			(V) Erosion
			(V) Corrosion
			(V) Signs of Overheating
			(V) Foreign Object Damage
			(V) Fracture
			(V) Material Break-out
		Turbine Blade 2, Aerofoil and Platform	(V) Cracks
			(PT) Cracks

Stage	Area	Components	Action
		TLa2 Aerofoil, Leading and Trailing Edge	(V) Cracks
			(PT) Cracks
		TLa2 Blade Root, Load-bearing Flanks/Radius on Lateral Root Surface as well as Locking Slot	(V) Cracks
			(V) Mechanical Material Thinning
			(PT) Cracks
		TLa2 Blade Root, Axial Locking Strip	(V) Deformation
			(V) Damage
		TLa3 Aerofoil, Tip Crown	(V) Cracks
			(V) Rubbing Marks
			(V) Oxidation
			(V) Deformation
			(V) Material Break-out
		Turbine Blade 3, Aerofoil and Platform	(V) Cracks
			(V) Coating Thinning
			(V) Erosion
			(V) Corrosion
			(V) Signs of Overheating
			(V) Foreign Object Damage
			(V) Fracture
			(V) Material Break-out
		TLa3 Aerofoil, Leading and Trailing Edge	(V) Cracks
			(ET) Cracks
		TLa3 Blade Root, Load-bearing Flanks/Radius on Lateral Root Surface as well as Locking Slot	(V) Mechanical Material Thinning
			(V) Cracks
			(ET) Cracks
		TLa3 Blade Root, Axial Locking Strip	(V) Deformation
			(V) Damage

Stage	Area	Components	Action
		TLa4, Aerofoil, Tip Crown	(V) Cracks
			(V) Rubbing Marks
			(V) Oxidation
			(V) Deformation
			(V) Material Break-out
		TLa4 Turbine Blades, Aerofoil Deflection	(M) Dimensional Deviation
		Turbine TLa4 Blades, Aerofoil	(M) Contour Deviation
		TLa4, Aerofoil and Platform	(PT) Cracks
			(V) Erosion
			(V) Corrosion
			(V) Signs of Overheating
			(V) Foreign Object Damage
			(V) Fracture
			(V) Material Break-out
		TLa4 Aerofoil, Leading and Trailing Edge	(V) Cracks
			(PT/ET) Cracks
		TLa4 Blade Root, Load-bearing Flanks/Radius on Lateral Root Surface as well as Locking Slot	(V) Mechanical Material Thinning
			(V) Cracks
			(PT/ET) Cracks
		TLa4 Blade Root, Axial Locking Strip	(V) Deformation
			(V) Damage
Protection and Control System Equipment, Fuel Supply	Protective Devices	Fuel Oil Emergency Stop Valve with Actuator, Diffusion Mode	(V) Damage
			(V) Leakage
			(F) Function
			(Pa) Disassemble, replace all seals

Stage	Area	Components	Action
		Fuel Oil Emergency Stop Valve with Actuator, Premix Mode	(V) Damage
			(V) Correct Seating
			(F) Operating Pressure
			(V) Leaks
			(F) Lift
			(F) Closing Time
			(F) Function
			(Pa) Disassemble, replace all seals
		Fuel Oil Return Line Valve with Actuator	(V) Damage
			(V) Leaks
			(F) Lift
			(F) Closing Time
		Temperature Measuring Points, Thermocouples downstream of Turbine	(V) Corrosion
			(V) Loosened, detached
			(V) Cracks
			(V) Damage
		Compressor Bearing Measuring Instruments, Cable Connection	(V) Loosened, detached
		Shaft Vibration Transmitter	(V) Correct Installation
		Blow off System, Shutoff Damper with Actuator	(V) Damage
			(F) Opening and Closing Time
	Control Devices	Actuator for Variable Guide Vanes	(V) Damage
	Hydraulic System for Fuel Valves	Booster Pump	(V) Damage
			(V) Leaks
			(F) Operating Pressure
		Booster Pump, Hydraulic Accumulator	(V) Leaks
			(F) Operating Pressure

Stage	Area	Components	Action
		Filter	(V) Clogging
	Lube Oil Supply	Main Lube Oil Pump and Drive Motor	(V) Damage
		Auxiliary Lube Oil Pump and Drive Motor	(V) Damage
		Emergency Lube Oil Pump and Drive Motor	(V) Damage
		Jacking Oil Pump and Drive Motor	(V) Damage
		Swing Check Valves downstream of Main Lube Oil Pump, Auxiliary Lube Oil Pump and downstream	(V) Unimpaired motion
		Lube Oil Temperature Control Valve	(V) Leaks
			(V) Unimpaired motion
		Lube Oil Tank, Level Measurement	(V) Damage
			(V) Settings
	Lube and Control Oil Supply	Motor for Main Oil Pump	(Pa) Disassemble
			(V) Damage
			(Pa) Replace Rolling Contact Bearings
		Full Load Auxiliary Oil Pump	(Pa Disassemble
			(V) Damage
		Auxiliary Lube Oil Pump	(Pa Disassemble
			(V) Damage
		Jacking Oil Pump	(Pa Disassemble
			(V) Damage
	Fuel and Ignition Gas Systems	Ignition gas piping	(V) Corrosion
			(V) Damage
			(V) Leaks
		Fuel Oil Pump Package, Pumps	(F) Function
			(V) Lubrication
		Fuel Oil Pump Package, Start-up Pressure Limiting Valve	(V) Leaks
			(F) Function
			(F) Lower and Upper Pressure Point

Stage	Area	Components	Action
		Fuel Oil Pump Package, Overpressure Safety Valve	(F) Response Pressure
		Fuel Oil Valve Package, Piping Rack	(V) Damage
			(V) Leaks
		Fuel Oil Pump Package, Leakage Oil Tank, Level Switch, Leakage Oil Pump	(V) Damage
			(F) Function
		Fuel Oil Line on the Combustion Chamber	(V) Corrosion
			(V) Damage
			(V) Leaks
		Fuel Oil Ball Valve Assembly, Left Combustion Chamber	(V) Leaks
			(F) Function
		Fuel Oil Ball Valve Assembly, Right Combustion Chamber	(V) Leaks
			(F) Function
		Ignition Gas Lines	(V) Leaks
		Ignition Gas Valves	(V) Leaks
Other Components	Cooling-air and blow-off pipes	Sealing-air line, turbine bearing	(V) Corrosion
			(V) Damage
			(V) Leaks
		Cooling Air and Blow off Lines, Expansion Joints	(V) Damage
			(V) Corrosion
			(V) Deformation
			(V) Dents
		Cooling air and Blow off Pipes, Accessible Weld Beads	(V) Cracks
Reassembly	Installation of Lower Sections	Lower Sections	(V) Foreign Object Damage
	Dimension Checks during Rotor Installation	Rotor	(M) Specify Dimensions
			(M) Shifting axial
		Rotor Runout Check	(M) Concentricity
		Coupling between Generator, Intermediate Shaft, and Front Hollow Shaft	(M) Concentricity
			(M) Alignment

Stage	Area	Components	Action
		Compressor and Turbine Blades and Wheel Disks	(M) Clearances
	Dimension Checks during Intermediate Shaft Installation	Coupling Bolts between Rotor, Intermediate Shaft, and Generator (if disassembled)	(M) Bolt Elongation
			(V) Damage
	Dimension Checks during Installation of Upper Sections	Turbine Vane Carriers, Joint Bolts	(M) Bolt Elongation
			(V) Damage
		Inner Casing	(M) Clearances
		Compressor Vane Carriers I-III, Joint Bolts	(M) Bolt Elongation
			(V) Damage
		Compressor bearing, oil box, shaft glands and shaft seal ring	(M) Clearances
		Turbine Bearing, Bearing Housing, Shaft Gland and Oil Seal Ring	(M) Clearances
		Outer Casing, Center Guide	(M) Alignment
		Intermediate Bearing, Bearing Housing, Gland and Oil Seal Ring	(M) Clearances
		Variable Inlet Guide Vanes VLe 0	(M) Aerofoil angle
	Dimension check on final assembly	Turbine Vane Carriers	(M) Clearances
		Compressor Vane Carriers	(M) Clearances
		Compressor Vane Carrier I, Joint Bolts	(M) Bolt Elongation
			(V) Damage
		Casing 2, Vertical and Horizontal Joint Bolts	(M) Bolt Elongation
			(V) Damage
		Compressor Bearing	(M) Clearances
		Compressor Bearing, Bearing Seal Ring	(M) Clearances
		Compressor/Turbine Vane Carriers	(M) Clearances
		Combustion Chambers, Flange Bolts	(M) Bolt Elongation
			(V) Damage
Recommissioning	Operating Logs	Operating data	(Pa) Prepare Test Record
		Measuring Systems and Settings	(F) Function
			(M) Specified Values

Stage	Area	Components	Action
	Commissioning Report	Commissioning Report	(Pa) Compile Report
	Open-loop Control, Closed-loop Control and Protection Equipment	Revised Open-loop Control, Closed-loop Control and Protection Equipment	(Pa) Reset
		Open-loop Control, Closed-loop Control and Protection Equipment	(Pa) Prepare Test Record
Final measures	Spare Parts	Spare Parts Installed	(Pa) List Spare Parts Used
			(Pa) Prepare Test Record
			(Pa) Document
		Variable Inlet Guide Vanes VLe 0	(M) Aerofoil angle
			(V) Aerofoil angle
			(V) Unimpaired motion
			(M) Settings
	Outage Inspection Documents	Documents to be Compiled	(Pa) Prepare Test Record

Inspection Key	
Symbol	Inspection Type
(V)	Visual Inspection
(M)	Measurement
(B)	Boroscopic Inspection
(F)	Functional Check
(Pa)	Perform Action
(T)	Torque Check

Siemens SGT5-2000E Minor Inspection Philosophy:

Table 4: Scope of Work Description - Siemens SGT5-2000E Minor Inspection Philosophy.

Stage	Area	Components	Action
Preliminary Measures	Complete unit	All	Pre-Outage Walk-Down
	Compressor	Compressor Bearing	(V) Leaks
		Compressor Bearing Pedestal	(V) Leaks

Stage	Area	Components	Action
		Oil Lines & Flanges	(V) Leaks
	Turbine	Turbine Bearing	(V) Leaks
		Turbine Bearing Pedestal	(V) Leaks
		Oil Lines & Flanges	(V) Leaks
	Operating logs	All	Check For Irregularities
	Turbine-generator	Insulation	(V) Loose Parts
			(V) Smoke Residue, Burning Marks
			(V) Completeness
	Exhaust duct	Sheet Metal Insulation	(V) Shifting
			(V) Clearances
			(V) Oil Leakage
			(V) Smoke Residue, Burning Marks
	Compressor CVC 2	Centre Guide	(V) Wear
	IGV Pitch adjustment device	All	(V) Damage
		Locknuts	(V) Loose Components
		IGV Actuation	(V) Unimpaired Motion {Manual}
		IGV Air Foils	(V) Looseness
			(V) Looseness Rings
		Levers	(V) Loose Components
	IGV Rotational angle transmitter	All	(V) Mechanical Connection
			(V) Condition
			(F) Function
	Pipes outside CC	Piping	(V) Discoloration
			(V) Collision
		Fuel Gas Line	(V) Damage
			(V) Discoloration
		Fuel Gas Expansion Joints	(V) Damage
			(V) Dents
			(V) Deformation
			(V) Stress-Free Installation
	Endoscopic	Compressor Vanes	(B) Damage

Stage	Area	Components	Action
		Compressor Blades	(B) Damage
		Tle1 Vanes Internal Cooling {Contingency - External Corrosion}	(B) Deposits
			(B) Clogging
		Tle1 Vanes Aerofoil {Contingency - From Visual}	(B) Damage
			(B) Cracks
			(B) Coating Thinning
			(B) Clogging Of Bores
		Tle2 Vanes Aerofoil {Contingency - Significant Tle1 FOD}	(B) Damage
			(B) Cracks
			(B) Coating Thinning
		Tle2 Vanes Internal Cooling {Contingency - External Corrosion}	(B) Deposits
			(B) Clogging
		Tle3 Vanes Aerofoil	(B) Damage
			(B) Cracks
			(B) Coating Thinning
		Tle4 Vanes Aerofoil	(B) Damage
			(B) Cracks
		Tla1 Blades Aerofoil {Contingency - FOD}	(B) Damage
			(B) Cracks
			(B) Deposits
		Tla2 Blades Aerofoil {Contingency - FOD}	(B) Damage
			(B) Cracks
		Tla3 Blades Aerofoil {Contingency - FOD}	(B) Damage
			(B) Cracks
		Turbine Bearing Oil Return Line	(B) Deposits
		Bearing Housing & Support Struts	(V) Cracks
	Generator	Shaft Grounding Brushes	Query Regarding Irregularities
			(V) Damage
			(V) Completeness
			(V) Damage

Stage	Area	Components	Action
		Carbon Brushes On Slip Ring	(V) Damage
			Query Regarding Irregularities
		Generator Bearing	(V) Oil Leakage
		Cabling	(V) Tight Fits
			(V) Damage
Compressor inlet	Air intake system	Filter Compartment Dirty Side	(V) Deposits, Soiling
			(V) Damage
			(V) Completeness
			(V) Detached Components
		Filter Compartment Clean Side	(V) Deposits, Soiling
			(V) Damage
			(V) Detached Parts
			(V) Formation Of Gaps
			(V) Flaking Of Paint, Corrosion
			(V) Locking
		Filter Compartment Leak Tightness	(V) Damage To Door Seal
			(V) Damage To Seals In Wall Region
			(V) Damage To Door Lock
			(V) Damage/ Holes In The Wall
		Filter Compartment Stiffeners	(V) Damage, Deformation
			(V) Cracks
			(V) Corrosion
		Intake Region	(V) Deposits , Foreign Objects
			(V) Damage To Door Seal
			(V) Damage To Seals In Wall Region
			(V) Damage To Door Lock
			(V) Damage To Wall
			(V) Flaking Of Paint, Corrosion
			(V) Drainage System Irregularities
		Compressor Isolation Elements	(V) Damage, Deformation
			(V) Corrosion

Stage	Area	Components	Action
		Compressor Cleaning Equipment	(V) Irregularities
		Dehumidifier	(V) Damage
			(V) Soiling, Clogging
			(V) Corrosion
			(V) Pipe Damage, Deformation
		Filter Compartment Silencer	(V) Detached Parts, Loose Elements
			(V) Deposits, Corrosion
			(V) Damage, Cracks At Inlet Clamps
			(V) Damage To Filling
	Inlet casing	All	(V) Deposits
			(V) Damage To Rubber Seal
Bearing	Compressor bearing	Bearing Casing	(V) Deposits
			(V) Foreign Objects
			(V) Flaking Of Paint, Corrosion
		Gasket At Inner Cone	(V) Damage
Compressor	Compressor vanes	Aerofoil To Pivot Pin	(V) Cracks
		IGV To Hub	(V) Rubbing Marks
		Vle1 To Vane Hook	(V) Cracks
			(V) Fracture
		IGV Aerofoils	(V) Deposits
			(V) Coating Thinning
			(V) Corrosion
			(V) Erosion
			(V) Deformation
		Vle1 Caulking	(V) Gaps At Hook
		Vle1 Aerofoil	(V) Irregularities
	Compressor blades	Vla1 Aerofoil	(V) Deposits
			(V) Coating Thinning
			(V) Corrosion
			(V) Erosion
			(V) Deformation

Stage	Area	Components	Action
			(V) Rubbing Marks
			(M) Tip Clearance
		Vla1 Root	(V) Rubbing Marks
			(V) Offset
Combustion Chambers	Burner support	Igniter	(V) Damage
	Fuel Oil diffusion burners	Burner Cap	(V) Discoloration
			(V) Erosion
			(B) Tangential Slits
			(B) Nozzle
			(V) Cracks
			(V) Seat
			(V) Scaling
			(V) Deposits
		Burner Needle	(V) Signs Of Overheating
			(V) Cracks
			(B) Cracks
			(V) Correct Installation
			(B) Correct Installation
		Water Lance Cap	(V) Deposits, Clogging
			(V) Discoloration
			(V) Cracks
			(V) Material Thinning
	Fuel oil premix burners	Nozzles	(V) Deposits, Coking
			(V) Fit
		Hub	(V) Deposits, Coking
	Gas diffusion burner	Axial Swirler	(V) Deposits
			(V) Deformation
			(V) Scaling
			(V) Erosion
			(V) Cracks
			(V) Wear On Fitting Surface
		Pilot Gas Burner	(V) Scaling

Stage	Area	Components	Action
			(V) Signs Of Overheating
			(V) Erosion
			(V) Cracks
		Thermocouples	(V) Cracks
			(V) Damage
			(F) Function
	Gas premix burner	Diagonal Swirler	(V) Deposits
			(V) Signs Of Overheating
			(V) Corrosion
			(V) Deformation
			(V) Cracks
			(V) Material Break-Out
			(V) Fitment Of Vanes
			(V) Hammering Marks To Support Ring
			(V) Hammering Marks To Diffusion Burner
			(V) Coking
	Burner support Inserts	Hot Side	(V) Hammering Marks
			(V) Scaling
			(V) Cracks
	Flame cylinder end plate	Burner Support Inserts	(V) Spalling
			(V) Scaling
			(V) Cracks
			(V) Corrosion
	Flame cylinder	Flame Monitors, Sight Glass	(V) Soiling
			(V) Damage
		Guide And Supports	(V) Scoring Marks
			(V) Wear
			(V) Clearances
		Flame Cylinder {Contingency - Heat Shield Removed}	(V) Discoloration
			(V) Scaling
			(V) Wear

Stage	Area	Components	Action
			(V) Cracks
		Tile Support Ring	(V) Scaling, Material Thinning
			(V) Scuffing Marks, Hammering Marks
			(V) Cracks
		Ceramic Heat Shield	(V) Tight Fit
			(V) Cracks
			(V) Material Break Out
			(V) Erosion
			(V) Atypical Findings
		Tile Holder {Contingency- Tile Removal}	(V) Scaling
			(M) Preloading
			(V) Wear, Hammering Marks
			(V) Cracks
		Ceramic Heat Shield {Contingency - Tile Removal}	(V) Cracks
			(V) Material Break Out
			(V) Burrowing
		Bolted Tile Holders	(V) Tight Fit
			(V) Deformation
			(V) Scaling
			(V) Wear
			(V) Cracks
		F-Ring	(V) Scaling
			(V) Cracks
	Mixing chamber	Inner Surface	(V) Corrosion
			(UT) Wall Thickness {Contingency}
			(V) Scaling
			(V) Mechanical Material Thinning
			(V) Cluster Of Cracks
			(V) Bulges
			(V) Cracks
		Welds	(V) Cracks

Stage	Area	Components	Action
		Centre Guide	(V) Wear
		Cooling Air Ring	(V) Wear
			(V) Cracks
		Castellations	(V) Wear
			(V) Deformation
			(V) Cracks
		Manhole Insert And Collar	(V) Wear
			(V) Cracks
		Manhole Collar	(V) Scaling
			(V) Cracks
	Inner casing	Inlet Shell	(V) Cracks
		Mating Surface With MC	(V) Wear
		Tbc	(V) Spalling
		Inner Surface	(V) Corrosion
			(UT) Wall Thickness {Contingency}
			(V) Scaling
			(V) Mechanical Material Thinning
			(V) Dents, Bulges
			(V) Cracks
		Welds	(V) Cracks
	Inner casing at compressor outlet	End Support Paws	(V) Mechanical Material Thinning
		End Hold-Downs	(V) Mechanical Material Thinning
		Spacer Discs	(V) Tight Fit
			(V) Wear
	Pipes outside CC	Fuel Oil Return Line	(V) Signs Of Overheating
			(V) Coking, Soot
Casing	Internal parts	Compressor Outlet Diffusor	(V) Cracks
		Compressor Outlet Diffusor Vane Lock Washers	(V) Damage
			(V) Installation
			(V) Loose Parts
			(V) Offset
		Compressor Outlet Vanes	(V) FOD

Stage	Area	Components	Action
			(V) Deformation
			(V) Cracks
		Compressor Outlet Vane Screws	(T) Torque
	Inner casing	Complete	(V) General
	Bearing spider, exhaust casing and casing liner	Casing Liner, Inner Wall Surface	(V) Deposits
			(V) Deformation, Dents
			(V) FOD
			(V) Cracks
		Hub Cover Plate	(V) Damage
			(V) Wear
		Hub Enclosure, Hub Cover	(V) Damage
			(V) Wear
		Hub Enclosure Bolts	(V) Completeness
			(V) Tight Fit
		Hub Enclosure Welds	(V) Cracks
		Casing Lining, Outer Welds	(V) Cracks
		Casing Lining, Inner Welds	(V) Cracks
		Joint Slide Plate Welds	(V) Cracks
		Insulation Near Joints	(V) Completeness
		Expansion Joint Cover Plate	(V) Scuffing Marks, Hammering Marks
			(V) Cracks
			(V) Restrained Expansion
		Hub Shroud	(V) Offset With Tla4 Platform
			(V) Deformation
			(V) Axial Gap Uniformity
		Outer Spacer Blocks	(V) Clearances
			(B) Clearances
	Downstream of outlet	Transition Of Ring Segment	(V) Offset To Outer Shroud
			(V) Deformation
			(V) Wear

Stage	Area	Components	Action
		Exhaust Gas Diffusor	(V) Foreign Objects
			(V) Damage
		Thermocouples	(V) Damage
			(V) Tight Fit
			(V) Deposits
Turbine	Turbine vanes	Tle1 Aerofoil	(V) Deposits
			(V) Coating Thinning
			(V) Corrosion, Erosion
			(V) Signs Of Overheating
			(V) Fod
			(V) Material Break-Out
			(V) Cracks
		Tle1 Outer Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs Of Overheating
			(V) Rubbing Marks
			(V) Contact Marks
		Tle1 Inner Shroud	(V) Cracks
			(V) Coating Thinning
			(V) Signs Of Overheating
			(V) Contact Marks
		Tle1 Outer Shroud Circumferential Seal & Face	(V) Coating Thinning
			(V) Corrosion, Erosion
			(V) Cracks
			(V) Clearance Coverage
			(V) Completeness
		Tle1 Inner Shroud Circumferential Seal & Face	(V) Coating Thinning
			(V) Corrosion, Erosion
			(V) Cracks
			(V) Clearance Coverage
			(V) Completeness
		Tle4 Aerofoil	(V) Corrosion, Erosion

Stage	Area	Components	Action
			(V) Signs Of Overheating
			(V) Fod
			(V) Material Break-Out
			(V) Cracks
		Tle4 Outer Shroud	(V) Cracks
			(V) Rubbing Marks
			(V) Contact Marks
		TLE4 Outer Shroud Circumferential Seal & Face	(V) Completeness
			(V) Clearance Coverage
		Tle4 Inner Shroud	(V) Rubbing Marks
			(V) Cracks
		Tle4 Inner Shroud Circumferential Seal & Face	(V) Completeness
			(V) Clearance Coverage
			(V) Cracks
			(V) Wear
		Stage 4 Seal Ring Segments	(V) Axial Offset
			(V) Radial Offset
			(V) Clearance Coverage
		Tle4 Vane Segments	(V) Cracks
			(B) Radial Offset
	Turbine blades	Tle1 Aerofoil	(V) Rubbing Marks
			(V) Oxidation
			(M) Radial Clearances
			(V) Deposits
			(V) Coating Thinning
			(V) Coating Erosion
			(V) Signs Of Overheating
			(V) FOD
			(V) Cracks
			(V) Material Breakout
		Tle4 Aerofoil	(V) Rubbing Marks
			(V) Oxidation

Stage	Area	Components	Action
			(V) Material Thinning
			(M) Radial Clearances
			(V) Corrosion, Erosion
			(V) Signs Of Overheating
			(V) FOD
			(V) Material Breakout
			(V) Cracks
		Tla4 Root	(V) Rubbing Marks
			(V) Position
Other components	Hydraulic turning gear	All	(V) Wear

Inspection Key	
Symbol	Inspection Type
(V)	Visual Inspection
(M)	Measurement
(B)	Boroscopic Inspection
(F)	Functional Check
(T)	Torque Check

11. Key Performance Indicators (KPI's)

- The performance of the Contractor will be evaluated on the KPIs in Table 5 below. Definitions are provided in Table 6. Upfront agreements will be outlined through the Execution Strategies between the Employer's Site Team and the Contractor's Team. KPI's that will be applied upfront will be assessed, throughout the relevant project. The Contractor is responsible to provide all evidence in achieving the KPI's. A combination or modification of the KPI's below can be accepted during the Execution Strategy phase, in which case all parties must agree on the modifications upfront, and must be signed-off as a part of the Execution Strategy. (Some KPI's may not be applicable for a specific project, however all parties must agree)
- A retention value of 5% of Task Order value will be withheld from the Contractor per Task Order issued. If 100% of the selected KPI's are achieved, then the final payment of the full retention value will be paid. If the Contractor does not provide evidence of KPI's having been met, then it will not be assessed by the assigned ERI Site Manager/ Project Manager, and the 5% of Task Order value will not be paid to the Contractor. Once the ERI Site Manager/ Project Manager has assessed the percentage of KPI's that was achieved by the Contractor, per Task Order, then a related percentage

payment will be made from the 5% portion that was withheld. Disputes in performance of the Contractor against agreed KPI's must be discussed with the Contract's Manager for final agreement, unless the Contractor wishes to pursue the matter further, under the NEC terms and conditions.

Table 5: Key Performance Indicators

Key Performance Indicators (KPI's) for Services Contracts			Target Percentages					Final Weighting (Percentage)
Item No.	Obj.	Description of KPI	0% (Target)	25% (Target)	50% (Target)	75% (Target)	100% (Target)	
1	Q	Percentage of Resources Assigned to an Outage prior to the Outage Starting Date (2 months before the outage) Average percentage for all outages will be calculated. Once resources are promised/committed, these resources must be available at the time of execution. (Specific to Execution Resources.)	60% of Resources Assigned	70% of Resources Assigned	80% of Resources Assigned	90% of Resources Assigned	100% of Resources Assigned	10%
2	Q	Resource Turnover during the execution of the outage for any reason. Number for all outages will be tracked. (Headcounts over all relevant outages during assessment period.)	8	7	6	5	0	5%
3	Q	Technical Competency - all resources supplied by the Contractor will be in possession of the required qualifications to perform the assigned work, and will have the necessary experience. Poor Performance will be evaluated based on demobilisation of resources due to a lack of competence to perform the assigned work. (Measurement on number of resources demobilised.) Number of demobilised perosnnel will be tracked during the assessment periods.	4	3	2	1	0	10%
4	T, Q	Time of Engineering Decisions through the Technical Notification (TN) process. Average calendar days to TN response. The TN Register will be the designated evidence.	5	4	3	2	1	5%
5	Q	Audits conducted on Outages, criteria for achievement as outlined below. Average percentage for all outages will be calculated. (Definition of Audits - SDR's/NCR's - Outage Technical Audits - under Definitions Sheet) 1. Audit Objectives Met = 100% 2. Audit Objectives Satifactorily Met = 90% 3. Audit Objectives only partially Satifactorily Met = 80% 4. Audit Objectives not Satisfactorily Met = 70%	N/A	70	80	90	100	5%
6	Q	Continuous Improvement - Lessons Learned - Reports (Risks outlined and mitigating factors - standard template - content to be approved by quality/service engineer) received during the different phases of the outages. Measurement will be based on the number of reports received. Assumptions: over a 6 month period, on average maximum amount of outages = 6, and two reports per outage based on planning and after execution.	64	66	68	70	72	5%
7	Q	No LTI's - zero injuries on all projects. Number of LTI's for all outages falling within the assessment period will be tracked. (Lagging Indicator) If the number is above zero, then the KPI is not achieved, and zero target percentage will be obtained. If the number is zero, 100% target percentage will be achieved.	>0	N/A	N/A	N/A	0	15%
8	Q	Return to Service - All completed outages must be free from defects and vibration. The vibration behaviour at different load conditions will be compared to international standards to determine if the performance is acceptable or not. (Measurement on number of defects.)	4	3	2	1	0	10%
9	Q	No rework incidents. (Will be assessed on number of incidents, incidents will be classified.)	4	3	2	1	0	10%
10	T	Completion of the Outage within the initial agreed upon timeframe by all parties. (Criteria based on number of days late) Average percentage for all outages will be calculated. (To a maximum of 50 days, for a GO.)	4	3	2	1	0	10%
11	T	Upfront Planning through the ORI Tool - based on two indicators as follows. (Criteria based on: Achieved = 1, Not Achieved = 0) Average percentage for all outages will be calculated. ~ ORI Dashboard validated at 80% at T (-6). [50% of Total] ~ ORI Dashboard validated at 100% at T (-1). [50% of Total]	60%	65%	70%	75%	100% T (-1) and 80% T (-6)	10%
12	Q	Skills Transfer either through on the job training or through orientated guided training. Assessment for this KPI will be based on the number of signed reports by both Trainee and Trainer. Number of reports for all outages will be tracked.	10	13	15	18	20	5%
							Grand Total =	**100%**

*Specific to Point 4 in Table 5 above: A: Average time in calendar days, excluding weekends and public holidays, of engineering decisions from the DATE of INSPECTION recorded on the Engineer level TN to the DATE when the TN with scope of work is RESPONDED to by the Customer Engineer, and when the TN was escalated, then inclusive to the DATE when the escalated TN to Senior Level was RESPONDED to by the Customer Engineer with agreed scope or the DATE ESCALATED to Chief level. Applicable to Engineers and Senior Engineers on site. Source = TN register, CS/IR register, Logbooks, Actual Programs, and TN's. Submissions and Responses to be signed.

Table 6: Definitions of KPI's, will form part of the Execution Strategy.

Item No.	Written Word	Definition
1	KPI's	Key Performance Indicators - This will be the key deliverables on the project that will be tracked and assessed by both parties'. It will be the responsibilty of the Supplier/Service Provider/ Contractor to ensure that all necessary evidence is prepared and packaged for presentation to the necessary Contracts Manager/ Project Manager. Agreement must be met by all parties' concerned before finalisation on assessments.
2	Outage	Shall refer to any assigned SOW relating to full GO's, IR's, MGO's, IN's, ST's, alternatively all work issued under an official Task Order to the OEM.
3	Weighting	The Supplier will gain a maximum percentage of the retained value once evidence has been presented and agreed upon between both parties. If the Suppier fails to meet the KPI then 0% will be assigned. If the Supplier meets the KPI in full, then 100% will be assigned. Variations in gains are provided on a Table where all KPI Categories are displayed.
4	Assessment period	All KPI's will be assessed twice a year - at the end of June and December. Transition Periods is when overlapping work cannot fall into one of the assessment periods.
5	Overlapping work during Transition Periods.	Work that is overlapping will fall into the next assessment period, and will not be assessed in the prior period.
6	Average	The rating will be based on an average of work perofrmed as follows. Average values will be calculation based on the criteria during these periods. 1. January - June - KPI Assessment 1 (Average based on 6 months, including January and June). 2. July - December - KPI Assessment 2 (Average based on 6 months, including July and December).
7	Mobilisation Date	Date agreed upfront by all parties' of when resources will start execution work on site.
8	Assigned Resources for Planning	These are resources that have been agreed up front before planning of work by all parties' concerned. These resources will be responsible for planning work on site/off site once mobilised.
9	Assigned Resources for Execution	These are resources that have been agreed up front before execution of work by all parties' concerned. These resources will be responsible for execution work on site/off site once mobilised.
10	Resource Turnover	Resources that are changed during execution of work for reasons outside of agreed terms and conditions. (Terms and Conditions shall refer to the normal leave cycle, sick leave, etc.) Changes in resources causes instabilty during execution of work.
11	Technical Competency	All Resources will be accepted based on the initial criteria outlined, and after review of preliminary requirements, however during execution if these resources are not performing as outlined in the preliminary criteria, ERI will reserve the right to demobilse resource/resources'.
12	Techical Notification (TN)Process	This process is outlined under the ERI Engineering Processes. During outage execution a particular amount of TN's will be issued within an amount of days. This KPI will be based on a fast response measure.
13	Audit Ratings	1. Audit Objectives Met - The system of internal control is adequate and effective to provide reasonable assurance that objectives will be met. 2. Audit Objectives Satifactorily Met - There are incidents that are not material and need to be corrected. Except for immaterial incidents that need to be corrected, the system of internal control is adequate and effective to provide reasonable assurance that objectives will be met. These incidents are not likely to expose the organisation to significant risk. 3. Audit Objectives only partially Satifactorily Met - There are significant weaknesses that need to be corrected. Due to materal incidents that need to be corrected, the system of internal control can only be partly relied uponto provide assurance that objectives will be met. Alternatively the system of internal control may be adequate but will not provide reasonable assurance that objectives will be met if material incidents are not correted. 4. Audit Objectives not Satisfactorily Met - becasue of the total breakdown of controls or absence of a system of internal control, objectives will not be met.
14	Lessons Learned	Lessons Learned is reviewed for outages/work executed. This is based on reviewing the requirements against set criteria on work conducted. Lessons Learned are necessary for identifying the problems in the processes, implementing changes to correct the problems and thus ensuring that reoccurrence is mitigated. The expectation is that Lessons Learned Reviews will take place during the planning phase of the outages - reviewing past information specific to that unit/power station and providing reports to implement during execution. After execution of the outage, further Lessons Learned Reports must be completed.