

	<p align="center">Standard</p>	<p align="center">Technology</p>
---	---------------------------------------	---

Title: **On-Site Commissioning for Low Pressure Systems Standard** Unique Identifier: **240-56356376**

Alternative Reference Number: **N/A**

Area of Applicability: **Engineering**

Documentation Type: **Standard**

Revision: **2**

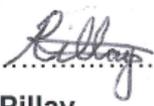
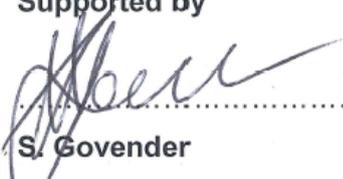
Total Pages: **82**

APPROVED FOR AUTHORISATION

TECHNOLOGY ENGINEERING
DOCUMENT CENTRE ☎ x4962

Next Review Date: **August 2023**

Disclosure Classification: **CONTROLLED DISCLOSURE**

<p>Compiled by</p> <p></p> <p>.....</p> <p>A. Pillay Senior Engineer</p> <p>Date: <u>8/8/2018</u></p>	<p>Approved by</p> <p></p> <p>.....</p> <p>A. Pillay Senior Engineer</p> <p>Date: <u>8/8/2018</u></p>	<p>Authorised by</p> <p></p> <p>.....</p> <p>A. Naidoo Low Pressure Services Manager</p> <p>Date: <u>2018/08/13</u></p>
		<p>Supported by</p> <p></p> <p>.....</p> <p>S. Govender SCOT/TC Chairperson</p> <p>Date: <u>19/08/2018</u></p>

PCM Reference : **240-53458738**

SCOT Study Committee Number/Name : **Design Low Pressure Services**

CONTENTS

	Page
1. INTRODUCTION	5
2. SUPPORTING CLAUSES.....	5
2.1 SCOPE	5
2.1.1 Exclusion	5
2.1.2 Purpose	5
2.1.3 Applicability.....	6
2.2 NORMATIVE/INFORMATIVE REFERENCES.....	6
2.2.1 Normative	6
2.2.2 Informative.....	6
2.3 DEFINITIONS.....	7
2.3.1 Definitions applicable to Pressure Equipment Regulations	7
2.3.2 Definitions of terms used in this document	8
2.3.3 Disclosure Classification	9
2.4 ABBREVIATIONS.....	9
2.5 ROLES AND RESPONSIBILITIES.....	11
2.5.1 Responsibilities over this document.....	11
2.5.2 Responsibilities for the COMMISSIONING PROCESSES	11
2.5.3 Contractor's Project/Commissioning Manager's Responsibilities	11
2.5.4 Eskom's Project Manager Responsibilities	11
2.5.5 Eskom's Site Discipline Engineering team and CoE Engineers' Responsibilities.....	12
2.5.6 Eskom Commissioning Manager.....	12
2.6 PROCESS FOR MONITORING.....	12
3. COMMISSIONING TEAM/WORKING PARTY	12
4. PRE-COMMISSIONING/COMPLETION OF CONSTRUCTION.....	12
4.1 PRE-COMMISSIONING	12
4.2 COMPLETION OF CONSTRUCTION.....	13
4.2.1 Documentation	13
4.2.2 Pre-commissioning checks.....	13
4.2.3 Electrical checks.....	13
4.2.4 Mechanical checks	14
4.2.5 C&I checks	15
4.2.6 Civil checks.....	15
4.2.7 Chemical Checks	16
5. FLUSHING AND CLEANING OF SYSTEM:.....	16
5.1.1 Water systems.....	16
5.1.2 Oil systems	16
5.1.3 LPG compressed air and other gas systems	16
6. COLD COMMISSIONING	17
6.1 DCUMENTATION TO BE COMPILED PRIOR TO COMMISSIONING	17
6.1.1 Statutory requirement.....	17
6.2 COLD COMMISSIONING COMMENCEMENT.....	17
6.2.1 Loop check	18
6.3 EQUIPMENT COMMISSIONING	18
7. HOT COMMISSIONING	18
7.1 PHASING OF THE HOT COMMISSIONING	19
7.2 SYSTEM FILL AND START UP	19
7.3 FUNCTIONAL CHECKS.....	19
7.4 PERFORMANCE CHECKS.....	19

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

8. ADDITIONAL WORK AND MODIFICATIONS 19

9. POST COMMISSIONING 19

10. SITE ACCEPTANCE TESTS 20

 10.1 SITE ACCEPTANCE TESTS CHECK POINTS 20

11. EQUIPMENT INSTALLATION CHECK LIST 20

12. CERTIFICATES..... 22

13. AUTHORISATION 22

14. REVISIONS 23

15. DEVELOPMENT TEAM 23

16. ACKNOWLEDGEMENTS 23

 ATTACHMENT 1 24

 ATTACHMENT 2 26

 ATTACHMENT 3 27

 ATTACHMENT 4 28

 ATTACHMENT 5 29

 ATTACHMENT 6 31

 ATTACHMENT 7 33

 ATTACHMENT 8 34

 ATTACHMENT 9 36

 ATTACHMENT 10 38

 ATTACHMENT 11 39

 ATTACHMENT 12 40

 ATTACHMENT 13 42

 ATTACHMENT 14 44

 ATTACHMENT 15 45

 ATTACHMENT 16 46

 ATTACHMENT 17 48

 ATTACHMENT 18 49

 ATTACHMENT 19 50

 ATTACHMENT 20 51

 ATTACHMENT 21 52

 ATTACHMENT 22 53

 ATTACHMENT 23 54

 ATTACHMENT 24 55

 ATTACHMENT 25 56

 ATTACHMENT 26 57

 ATTACHMENT 27 58

 ATTACHMENT 28 59

 ATTACHMENT 29 60

 ATTACHMENT 30 61

 ATTACHMENT 31 62

 ATTACHMENT 32 63

 ATTACHMENT 33 64

 ATTACHMENT 34 65

 ATTACHMENT 35 66

 ATTACHMENT 36 67

 ATTACHMENT 37 68

 ATTACHMENT 38 70

 ATTACHMENT 39 72

 ATTACHMENT 40 73

ACCEPTED/WITNESSED FOR ESKOM BY..... 73

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 41	75
ATTACHMENT 42	77
ATTACHMENT 43	79
ATTACHMENT 44	80
ATTACHMENT 45	81

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

1. INTRODUCTION

The procedure for commissioning of Low Pressure Services systems is written to clarify Eskom requirements for various stages of the commissioning process.

The document shall assist in successful bringing of LPS systems to operation.

The procedure is written with new installations in mind but can also be applied to refurbishment and modifications on existing installations. When applying the commissioning procedure it is important to understand the design approach used to the system to be commissioned

The commissioning of the system will be executed in a number of steps:

- Establishment a Commissioning Work Party
- Pre-commissioning Review Report
- Pre-commissioning checking of the system after construction, ,
- Flushing and Cleaning of the system,
- Cold commissioning:
- Hot commissioning,
- Additional work and modification
- Final Handover

2. SUPPORTING CLAUSES

2.1 SCOPE

The scope includes pre-commissioning check, testing, cold and hot commissioning process for all LPS systems. It also covers final optimization by the commissioning team and acceptance by Eskom into production

2.1.1 Exclusion

The following LPS systems are not part of this procedure:

- Lifts, lifting equipment and Cranes
- Nuclear plant services

2.1.2 Purpose

The intention of this procedure is to ensure that the following objectives are achieved:

- a. To classify and define the different phases of commissioning, the different parties involved their responsibilities and obligations at each stage.
- b. To provide a base procedure to enable agreement to be reached between Eskom and contractor(s)/supplier(s), as to the method to be used to formalize commissioning before handover.
- c. To ensure that Eskom receives from contractor(s)/supplier(s) an asset on the planned date that is capable of commercial operation, fit for its purpose and which is to the satisfaction of the intended end user.
- d. To establish communication links and interfaces between contractor(s)/supplier(s) and Eskom.
- e. To ensure that the requirements of the Occupational Health and Safety Act and Eskom's safety standards are effectively implemented by Eskom's and the contractor's personnel.

CONTROLLED DISCLOSURE

- f. To ensure that contractual requirements are met in a timely and cost effective manner and that Eskom is not put to any disadvantage by having to bear liabilities which are the responsibility of the contractor.
- g. To ensure that all appropriate quality related requirements are met through applicable quality management system practices such as inspection, testing, quality control and quality assurance.
- h. To ensure that the plant performance criteria matches that of the design.

2.1.3 Applicability

This document is limited to Low Pressure Services Systems.

2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] [240-53113685](#) Design Review Procedure
- [2] ISO 9001 Quality Management Systems
- [3] Act 85- 1993 Occupational Health and Safety Act
- [4] QM 58- Eskom requirement for quality management.
- [5] SANS 347 Categorisation and conformity assessment for pressure equipment
- [6] Government gazette 38505 Guidance Notes to the Pressure Equipment Regulations 17 July 2009
- [7] SANS 10228 Dangerous substances
- [8] PER: Pressure Equipment Regulations, 2009.
- [9] CIBSE Commissioning of HVAC systems
- [10] 474-10327 Vessels under Pressure and Pressure Equipment Regulations Compliance Management Position Paper
- [11] [240-44682732](#) Process Control Manual (PCM) for Provide Engineering during Commissioning
- [12] 36-681 Eskom Plant Safety Regulations

2.2.2 Informative

- [13] 32-365 Completion of Power Plant Projects, Commissioning, Take-over from Contractors and Handover to the Generation Business
- [14] 36-681 Generation Plant Safety Regulations
- [15] API 510 Pressure Vessel inspection Code: in service Inspection, Rating, Repair and Alteration
- [16] SANS 10227 operation of inspection authorities performing inspection in terms of the Pressure Equipment

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

2.3 DEFINITIONS

2.3.1 Definitions applicable to Pressure Equipment Regulations

Definition	Description
Accreditation Authority	South African National Accreditation System (SANAS) established by section 3 of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act No. 19 of 2006) [15]
Approved certification body	SANS 347 [5]
Approved inspection authority	SANS 347 [5]
Authorised person	Government gazette 38505 [6] Person who is registered as competent within the scope of work for which an organisation approved by the chief inspector has registered that person;
Certificate of conformity	SANS 347 [5]
Certificate of manufacture	Written declaration of conformance to the relevant health and safety standards
Conformity assessment	SANS 347 [5]
Dangerous substance	Substance defined in SANS 10228 [7]
Design pressure	Gauge pressure used in the design formulae to determine dimensions or component parts of pressure equipment
Design temperature	The temperature used in the design formulae to determine dimensions or component parts of pressure equipment
Design verification	Independent process to run separate calculations to confirm correctness of the original design (SANS 10227) [15]
Gas	Government gazette 38505 [6]
Gas system	Government gazette 38505 [6]
Hazard category	SANS 347 [5]
Health and safety standard	SANS 347 [5]
Inspection	SANS 347 [5]
Latent defect	Government gazette 38505 [6]
Manufacturer	Government gazette 38505 [6]
Modification	Government gazette 38505 [6]
Pressure accessory	SANS 347 [5]
Pressure equipment	Government gazette 38505 [6]
Pressure equipment requirements (PER)	SANS 347 [5]
Pressure vessels	SANS 347 [5]
Recertification	Government gazette 38505 [6]
Regulatory authority	SANS 347 [5]
Repair	Government gazette 38505 [6]
Re-rating	Government gazette 38505 [6]
Risk Based Inspection	Government gazette 38505 [6]
Safety accessories	SANS 347 [5]

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Definition	Description
Tan to tan	Tangent to tangent (dish end circular weld to circular weld distance)
Unique mark	Government gazette 38505 [6]. Mark and accreditation reference number of AIA
Unstable gas	SANS 347 [5]
Verification	SANS 347 [5]

2.3.2 Definitions of terms used in this document

Definition	Description
Commercial service	Operation of the equipment, under Eskom's responsibility, to convert energy, or state of readiness for such operation.
Commercial service period	Period starting after acceptance, including service periods as well as periods when the equipment may be out of operation for maintenance, inspection, repairs, etc.
Commissioning period	Period from the date that the safety clearance certificate is issued, until the date the completion certificate is issued. or The period from the date that the safety clearance certificate is issued until the date that hand-over is certified
Cold commissioning	Testing and preparation of the plant or system after construction and verify compliance with standards
Commissioning	Testing of new equipment to check its conformity with contractual specifications, as well as operation of the equipment until formally accepted by Eskom. The process of putting into service an item of plant, which has been successfully tested and safety cleared in accordance with the contractual and performance requirements
Commissioning manager	The person appointed by Eskom to be accountable for the plant during commissioning
Commissioning Working Party (CWP):	A body of persons who meet as appointed, to coordinate and implement appropriate commissioning activities required to establish the performance of machinery and equipment under its control. Also responsible for determining the adequacy of testing of plant for initial energising and controls the issuing of the safety clearance certificate. The CWP can be assembled at any time when requested to by the Commissioning Manager to attend to problems that may arise requiring the dedicated attention of specialist persons
Energizing	The application of voltage to machinery by electrical connection from other energised power systems or putting into operation by mechanical means or charging of pipe work or ducts, or loading of foundations
Engineer	Person or team responsible for technical assurance
Guarantee period	Time, extending through an agreed part of the commercial service period, during which the manufacturer has commercial obligations to correct defects of his equipment in order to bring it into conformity with the contract.
Hot commissioning	Putting into eservice plant which was safety cleared and checked for compliance with the specification
Inspection	Check on the condition of equipment.

CONTROLLED DISCLOSURE

Definition	Description
Life-saving Rules	RULE 1 : Open, Isolate, Test, Earth, Bond and/or Insulate before Touch RULE 2 : Hook up at Heights RULE 3 : Buckle Up RULE 4: Be Sober RULE 5: Ensure that you have a Permit to Work
Maintenance	Actively on the equipment directed to its conservation in a state of optimum operating condition.
Modification	Change intended to improve performance.
Operation	Utilization of the equipment to convert energy, or state of readiness for such utilization.
Permit to work	No person shall work without the required Permit to Work (PTW), which is governed by Plant Safety Regulations, Operating Regulations for High Voltage Systems (ORHVS), etc. No plant is to be returned to service without the cancellation of all permits on the plant in accordance with procedure A written declaration on the permit to work form, signed by the appointed person and issued to the responsible person in charge of the work, informing the latter that the plant to be worked on has been isolated as detailed.
Pre-commissioning	All testing prior to applying energy, excluding all power plant supplies required for pre-commissioning
Repair	Restoration after wear or damage.
Safety Clearance Certificate:	A certificate issued by the Employer to the Contractor that is mutually agreed with the Client's and Contractor's Representatives that from the time and date stated the specified machinery is under the Employer's control. Further access to machinery is only permissible through the Employer's plant / work permit system
Take-over	The process of transferring the responsibility for all, or part of a project, or its deliverables from the Contractor to the Project Manager before handing it over to the Client (i.e. certified completion)
Testing	The application of prescribed tests, loads or checks to ensure compliance with applicable requirements
Test operation period	Test period following initial run and followed by test service. It includes runs for checking plant equipment, as well as pumping and energy supply interruption tests.
Test service	Operation of the equipment for an agreed period, during which the manufacturer is generally responsible for the way in which it is operated.

2.3.3 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to External Parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
AIA	Approved Inspection Authority
AGC	Automatic Group Control
BOP	Balance of Plant

CONTROLLED DISCLOSURE

Abbreviation	Description
C&I	Control and Instrumentation
COMM	Commissioning
COC	Certificate of Conformance
CMD	Construction Management Department
CWP	Commissioning Working Party
DCS	Distributed Control System
ELEC	Electrical
GA	General Arrangement
HMI	Human Machine Interface
IDR	Integrated Design Review
ISOL	Isolation
KKS	Kraftwerk Kennzeichen System
LCP	Local Control Panel
LOTO	Locked out to open (i.e. valves)
LPG	Liquefied Petroleum Gas
LPS	Low Pressure Services
LV	Low Voltage
MECH	Mechanical
MV	Medium Voltage
NDT	Non Destructive test
OEM	Original Equipment Manufacturer
OHSA	Occupational Health and safety Act
PCR	Pre-Commissioning Review
PER	Pressure Equipment Regulation (OHSA)
PPE	Personal Protective Equipment
PTFD	Pressure Test Flow Diagram
PTW	Permit to Work
P&ID	Piping and Instrumentation Diagram
QCP	Quality Control Plan
RAT	Range, Alarm and Trip
RFC	Ready for Commissioning
RFO	Ready for Operation
SANAS	South African National Accreditation System
SANS	South African National Standard
SC	Study Committee
SCOT	Steering Committee of Technology
SFT	Sanction For Test
SUM	Start Up Meeting
TBA	To Be Advised

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Abbreviation	Description
URS	User Requirement Specification
VSD	Variable Speed Drive

2.5 ROLES AND RESPONSIBILITIES

2.5.1 Responsibilities over this document

Role	Responsibility
Compiler	The document compiler is responsible for ensuring that this document is up-to-date and that this document is not a duplication of an existing documentation, regarding the document's objectives and content
Functional Responsibility	The Functional Responsible Person shall determine if the document is fit for purpose, before the document is submitted for authorisation
Authoriser	The document authoriser is a duly delegated person with the responsibility to review the document for alignment to business strategy, policy, objectives and requirements. He/she shall authorise the release and application of the document
Care Group Members	Provide input to the document development
Document Support group	SC chairman to ensure that the document is reviewed and approved as per SCOT requirement

2.5.2 Responsibilities for the COMMISSIONING PROCESSES

The Process Control Manual (PCM) for Provide Engineering during Commissioning [11] gives high level guidance to the Eskom Engineer's role during commissioning.

2.5.3 Contractor's Project/Commissioning Manager's Responsibilities

The contractor's Project or Commissioning Manager prior to commencing commissioning shall produce the following procedures and documentation:

- a. Commissioning detail scope of work
- b. Planning network and manpower to be used during commissioning
- c. "Commissioning method procedures" for individual plant areas
- d. "Tagging Procedure" whereby plant items are tagged when live, direction tested, lubrication checked etc.
- e. "Commissioning Documentation Control Procedure" covering transmittal and filing of acceptance certificates.
- f. "Commissioning Cost Control Procedure" covering the methods for additional works and modifications are to be costed, approved and initiated on site. The cost will be reviewed, checked and controlled by the Eskom Project and Discipline Managers.

2.5.4 Eskom's Project Manager Responsibilities

The Project Manager shall review, check, approve and control cost for additional works and modifications occur during commissioning periods.

CONTROLLED DISCLOSURE

2.5.5 Eskom's Site Discipline Engineering team and CoE Engineers' Responsibilities

Eskom's site discipline engineering team shall prepare a pre-commissioning review report, participate in the inspection, testing and compiling of commissioning certificates together with the commissioning work party, contractors, and suppliers during the commissioning phases.

CoE engineer's responsibility is to provide technical support and assurance that the Engineering asset is fully functional and fit for purpose. See the reference 240-44682732 Process Control Manual (PCM) for Provide Engineering during Commissioning [11].

2.5.6 Eskom Commissioning Manager

The person appointed by Eskom to be accountable for the overall commissioning of the plant. A site specific Commissioning procedure will be created for the overall project/site.

On smaller projects at power stations the CMD will act in this role.

2.6 PROCESS FOR MONITORING

The primary process for monitoring will be governed by Design Review Procedure (240-53113685) [1].

3. COMMISSIONING TEAM/WORKING PARTY

The following personnel are responsible for on-site commissioning:

- a. Contractor's project Commissioning Manager, Site Manager and site discipline engineers and supervisors who were part of the site construction team.
- b. Eskom's Commissioning Manager, Project Manager, site discipline engineers/supervisors and discipline design engineers, i.e. LPS, Mechanical, C&I, Electrical and Configuration.
- c. Eskom's site operation and maintenance supervisors.
- d. Suppliers of major equipment working through the contractor's site management.
- e. One person from the commissioning team shall be made responsible for taking-out, issuing and return of access permits.

4. PRE-COMMISSIONING/COMPLETION OF CONSTRUCTION

4.1 PRE-COMMISSIONING

The pre-commissioning of a plant or system is verification that the system has been completed and that the systems fulfil all legal requirements and that the documentation has been completed to as built status. A Pre-commissioning review report will be created to assess the readiness for commissioning.

It is the responsibility of the contractor's Project/Commissioning Manager and his discipline engineers assisted by the Eskom discipline engineers to ensure that the above is carried out.

The phases of pre-commissioning are as follows:

- a. Inspection of individual plant items by the contractor's commissioning personnel and Eskom's discipline engineers as indicated in the annexed installation checklists in section 11.
- b. Rectification of the check list items by contractor.
- c. Compilation of check sheets such as megger, alignment and pressure by the contractor's discipline engineers, witnessed by the Eskom discipline engineers.

NOTE — Megger testing only to be carried out after consultation with Eskom's Project and Eskom's electrical engineers.

CONTROLLED DISCLOSURE

- d. Direction testing of equipment, interlocks and protective systems shall be checked and tested. All guards or covers removed to enable this work to be completed shall be replaced and the work inspected.
- e. Compile remedial punch lists, by discipline; on the total erection completion inspection certificate (annexed) by Eskom's and the contractor's discipline engineers.
- f. Clearing of compiled remedial punch list items by the contractor's engineers. Some work items may be carried forward to dry commissioning with the agreement of the Eskom commissioning engineers providing that the safety of the works and personnel is not compromised.
- g. Acceptance of the equipment from construction to commissioning. When this acceptance is signed on the total erection completion inspection certificate, it must be emphasized that it does not mean release of the contractors from their on-site commitment to final acceptance by Eskom.
- h. Clearing of construction rubbish from the plant.
- i. Complete system walk down by Eskom discipline engineers.

4.2 COMPLETION OF CONSTRUCTION

4.2.1 Documentation

The following minimum hydraulic and pneumatic test documentation is required:

- FAT for pumps and motors (pump curves and vibration where specified)
- Signed Quality Control Plan
- Calibration certificate of instruments;
- Test record of piping testing document
- Test pressure- as per design code requirements
- Piping remedial list;
- Submit PTFD (Master P&ID marked up showing pressures in tested points);
- As per OSH act requirements and accepted design and testing code

4.2.2 Pre-commissioning checks

- Review as built drawings, P&ID's and specifications for commissioning requirements
- Review O&M manuals
- Review installation drawings and technical submissions for commissioning requirements
- Produce detailed coordinated commissioning programme and procedures
- Create and review the PCR.
- Verify that all statutory requirements are met and all documentation are provided
- Verify that flushing procedures have been approved and that flushing is complete (if not within commissioning procedure)

4.2.3 Electrical checks

The successful testing and verification of compliance to standards of any electrical installations (Including motor direction checks) and electrical protections pertaining to the specific plant system prior to commissioning.

CONTROLLED DISCLOSURE

Table 1: Electrical Check Table

**Plant description/
Plant Unique number**

No.	Description	Responsibility	Checked	Date	Signature
1	Boards, motors and breaker buckets checked				
2	Cable Safety Clearance Certificate				
3	Motor Direction – bump test				
4	Electrical CoC (where applicable)				
5	HAZLOC CoC (where applicable)				
6	KKS codes installed				

Detailed testing of the electrical equipment to be covered under separate documentation to be presented for process commissioning.

4.2.4 Mechanical checks

The successful testing and verification of compliance to standards of any mechanical installations pertaining to the specific plant system prior to commissioning.

Table 2: Mechanical Check Table

**Plant description/
Plant Unique number**

No.	Description	Responsibility	Checked	Date	Signature
1	Mechanical Partial/Final inspection Certificate				
2	Mechanical Safety Clearance Certificate				
	System is flushed clean				
3	Strainers are clean				
4	All necessary valves are open				
5	All valves LOTO				
5	System is vented properly				
6	Oil levels in pumps				
7	Supports in place and all piping supported				
8	Motors are greased				
9	Motor vibrations are acceptable				
10	Motor alignment is correct				
11	All blinds removed or in place along with jumpers				

CONTROLLED DISCLOSURE

No.	Description	Responsibility	Checked	Date	Signature
12	All equipment has KKS codes				

4.2.5 C&I checks

The successful testing and verification of compliance to standards of any C&I installations and pertaining to the specific plant system prior to commissioning.

Table 4: C&I Table

**Plant description/
Plant Unique number**

No.	Description	Responsibility	Checked	Date	Signature
1	Pre-Commissioning i) QC Checklists (with Owner's QC representative) ii) Testing and Verification a) Cable Megger Tests & Test Certificates				
2	Instrumentation installed (Instrument Calibration Checks and Certificates; compliance to data sheets & area classification study/SIL Rating)				
3	Cable Safety (Clearance Certificate)				
4	Loop checks complete				
5	Control valves commissioned				
6	Control Panels Operation				
7	KKS codes installed				
8	Testing & Verification Cable (Megger Tests & Test Certificates; Instrument Loop Checks & Loop Check Certificates)				
9	Hot Commissioning i) Functionality Testing ii) Hot-Cutovers				

4.2.6 Civil checks

The successful testing and verification of compliance to standards of any Civil installations and pertaining to the specific plant system prior to commissioning.

CONTROLLED DISCLOSURE

Table 5: Civil Check Table

**Plant description/
Plant Unique number**

No.	Description	Responsibility	Checked	Date	Signature
1	Stability/Loading certificate signed				
2	All grouting complete and acceptable				

4.2.7 Chemical Checks

Table 6 Chemical check table

**Plant description/
Plant Unique number**

No.	Description	Responsibility	Checked	Date	Signature
1	System medium quality tested and acceptable				

5. FLUSHING AND CLEANING OF SYSTEM:

The system will be flushed and cleaned and all debris will be removed from the system. It must be noted that the Equipment supplier will clean and commission their equipment before commissioning of the whole system will start.

5.1.1 Water systems

The systems shall be flushed with water of the same quality as water in the system to remove all debris and via strainers with exception of demin water in the close circuit auxiliary cooling which is flushed with the potable water.

Water for system flushing and cleaning will be drained to the dirty drain system

5.1.2 Oil systems

The systems shall be flushed with oil of the same type and grade as oil to be used in the system operation, to remove all debris and shall be removed from site with suitable drums for recovery in the supplier’s regeneration facility. The remote pumps and, if necessary, heaters to lower oil viscosity shall be used. The velocity should be increased to create turbulent flow for easy removal of debris.

The practice of using lower grade oil for this purpose is not recommended.

Alternative methods may be proposed by the contractor for evaluation by Eskom

5.1.3 LPG compressed air and other gas systems

The system will be flushed and tested with air or nitrogen.

CONTROLLED DISCLOSURE

6. COLD COMMISSIONING

6.1 DOCUMENTATION TO BE COMPILED PRIOR TO COMMISSIONING

All required documentation has to be submitted prior to plant commissioning and shall include but not be limited to the following:

- Proof of compliance with OHSA Act 1993 (AIA certificate where applicable)
- Detailed drawing and calculations including P&ID diagrams and layout of boundary enclosure and pipe routes according to required standards as listed in item 2.4
- Vessel data book (Where applicable)
- HAZOP study (identification, evaluation and quantitative risk)
- AIA certificates as described in SANS 347
- FMEA study
- KKS coding. All code numbers shall be approved by Eskom
- O&M manual
- Test Certificates
- PTFD diagrams
- PCR report

6.1.1 Statutory requirement

The following is required:

- Ensure that pressure equipment have a certificate issued by manufacturer and with verification signature of the AIA
- Ensure that a gas piping system has a valid certificate issued by an authorised person

6.2 COLD COMMISSIONING COMMENCEMENT

Cold commissioning of a plant or system commences when a Safety Clearance Certificate (annexed) has been issued and is concluded when the total erection completion inspection certificate is issued for that section of plant or system.

The purpose of cold commissioning is that following completion of no-load checks, the equipment is run without load to certify that the plant is complete in all respects prior to the introduction of any media. The cold commission verifies that the signals and actions will be performed on demand

It is the responsibility of the contractor's Commissioning Manager and his discipline engineers, assisted by Eskom's discipline engineer and suppliers, to ensure that the above is carried out.

The phases of cold commissioning

Final inspection of the plant by commissioning engineers and compilation of a punch list by Eskom personnel on the cold commissioning acceptance certificate (annexed).

Clearing of remedial punch list items by the contractor's commissioning engineers assisted by Eskom's discipline engineers, with such exceptions that will not compromise the operability or safety of the works.

On clearing the punch list relating to an item or group of items, the equipment shall be direction tested and have all interlocks and protective systems thoroughly checked and tested.

Where safe and practical, provided the plant is not endangered, all equipment such as pumps, compressors, etc., shall be run individually or in groups, for short periods under the supervision of the contractor's commissioning engineers and suppliers. This running period shall be increased as the

CONTROLLED DISCLOSURE

supplier requires. Prior to any running of equipment the safety procedures agreed between Eskom and the Commissioning Manager shall be instituted and all personnel trained in such procedures.

During these stages Eskom operating staff may become involved as assistants to the commissioning team in order that they may commence training labour for operating the plant

The purpose of the following objectives should be:

Checking, calibration and rectification where necessary of all instrumentation such as level, pressure and flow switches.

Flushing and cleaning of all construction rubbish from the plant system.

The elimination, where practical, of leaks, splashing or spillage, and any other adverse operating features.

If it is found that equipment, such as pumps, does not behave as predicted, it is essential for the contractor prior to carrying out any modifications, to establish that the equipment behaviour will not be entirely different when operating with feedstock.

The elimination of any unacceptable vibrations in structures.

The completion of all but minor outstanding punch list items, especially in plants in which personnel security is a problem and where large numbers of contract personnel may not be present during operation of the plant.

Cold commissioning is an essential phase, and if thoroughly done it is invariably the key to successful hot commissioning. Do not skip cold commissioning, irrespective of short term time considerations.

On completion of cold commissioning the commissioning team shall be completely satisfied that the plant is ready for the introduction of feedstock. Only at this stage shall the cold commissioning acceptance certificate be signed thereby agreeing to that plant's readiness.

6.2.1 Loop check

Loop check - all cabling circuitry need to be checked

6.3 EQUIPMENT COMMISSIONING

- Equipment manufacturer test data shall be checked
- Installation check list for piping valves and instruments to be completed

It is essential that any equipment commissioning be performed. The specific OEM commissioning requirements for each piece of equipment must be met. If OEM commissioning assistance is required, they must be obtained.

7. HOT COMMISSIONING

During the commissioning the system performance will be checked including all specified characteristics of the plant, calibration of system instruments and recording of the results in the approved commissioning schedules. The results shall be taken of calibrated instruments permanently or temporarily installed, as requested and of control panel. Several reading at various ambient and plant operating conditions will be required. The readings shall be interpreted by the designer via plant simulated analysis and confirmed that the design parameters are met.

Each system will be tested with operational medium under the conditions specified for the operational conditions.

CONTROLLED DISCLOSURE

7.1 PHASING OF THE HOT COMMISSIONING

- a. Check the calibration, and rectify where necessary, of any instrumentation which is operating medium related. Verification of sequence controls and interlocks.
- b. Check all process flows and equipment throughput and add to the work-list any activity required to obtain correct flows and throughput.
- c. Building up and maintaining throughput at the required levels.
- d. Complete all outstanding remedial work-list items for acceptance by Eskom of the plant for production and maintenance. By specific agreement with Eskom some work-list items may be carried forward for completion after process acceptance of the plant.
- e. Train Eskom's operating staff.

7.2 SYSTEM FILL AND START UP

Table 7

**Plant description/
Plant Unique number**

No	Description	Responsibility	Operator	Date	Sign
	Ensure system is filled				
	List all valves to be opened				
	Open high point vent valves				
	Follow contractor instruction for filling the system prior to start the pumps				

7.3 FUNCTIONAL CHECKS

During this phase the Commissioning team activate components and will verify the correct operation thereof (e.g. pumps, electrical motors, etc.).

7.4 PERFORMANCE CHECKS

The system performance shall be checked including all specified characteristics of the plant, calibration of system instruments and recording of the results in the control room and on the local control panels.

The process shall be in agreement with the OEM recommendations.

All commissioning readings to be fully documented and stored in the approved project document repository

8. ADDITIONAL WORK AND MODIFICATIONS

Additional work and modifications will only be approved by Eskom by following the Engineering Change Procedure.

9. POST COMMISSIONING

For process handover of the plant to Eskom, the following activities remain to be completed and are the responsibility of the contractor's Commissioning Manager.

- a. Completion and acceptance of outstanding items, by the contractor to the satisfaction of Eskom.

CONTROLLED DISCLOSURE

- b. Updating of operating manuals and data sheets relating to any modifications which may have been made during construction and commissioning.
- c. Carrying out any test, optimization or other work relating to a process guarantee and obtaining Eskom acceptance in writing (using the Final Acceptance Certificate) that such guarantees have been fulfilled.
- d. Forward acceptances to the Eskom Project Manager for liaison between the contractor's after sales service manager and Eskom during the plant guarantee period and final Eskom acceptance at the end of such period (using period of maintenance/warranty expiry notification certificate).

NOTE — The guarantee period starts at the end of cold commissioning.

- e. The completion and issue to Eskom of any "as-built" drawings resulting from construction and commissioning modifications.
- f. Compilation of a commissioning "close out" report.

10. SITE ACCEPTANCE TESTS

10.1 SITE ACCEPTANCE TESTS CHECK POINTS

The following is a minimum tests required before plant can be accepted after completion of testing and commissioning processes.

- Pump and motor vibration tests according to BS ISO 10816
- Pump hydraulic performance acceptance tests according to BS EN ISO 9906;
- PTFD (Master P&ID marked with pressures and temperatures in testing points or other approved data capturing method.
- Calibration test of used instruments
- Confirm pump duty point;
- Confirm flow rate to each user;
- Confirm pressure at each user;
- System performance at minimum and maximum system flow rate;
- 1 month system reliability run;
- Confirm temperature parameters with at least one Unit working and with varies ambient temp (at least 5 measurements)
- Interpret the measurements adjusted for design condition

Acceptance forms at all stages of commissioning can be considered for either individual pieces of equipment, for groupings of equipment, or by process module, depending upon the nature of the works.

11. EQUIPMENT INSTALLATION CHECK LIST

The following equipment is included. The templates of minimum check points are part of this procedure

PUMPS	Attachment 1
GUARD PROTECTION OF MOVING PARTS	Attachment 2

CONTROLLED DISCLOSURE

MOTORS (MECHANICAL CHECK	0
VEE BELT ALIGNMENT	Attachment 4
COUPLINGS ALIGNMENT	Attachment 5
TANKS (NOT PRESSURE REGULATED)	Attachment 6
HEAT EXCHANGER	Attachment 7
PIPEWORK – INSTALLATION	Attachment 8
PIPEWORK - VALVES AND INSTRUMENTS	Attachment 9
PIPEWORK - GASKETS AND BOLTS	Attachment 10
PIPEWORK – SUPPORTS	Attachment 11
PIPEWORK – WELDING	Attachment 12
PIPEWORK – TESTING	Attachment 13
PIPEWORK - PAINTING AND GENERAL	Attachment 14
PIPEWORK-PRESSURE TESTING	Attachment 15
BREAKER	Attachment 16
STRAINERS/FILTERS	Attachment 17
VALVE	Attachment 18
GEARBOX	Attachment 19
COMPRESSOR OR BLOWER	Attachment 20
DIESEL ENGINE	Attachment 21
ACTUATOR FOR VALVE OR DAMPER	Attachment 22
BATTERY	Attachment 23
GAUGE RACKS, JUNCTION BOXES	Attachment 24
EARTHING	Attachment 25
BRAEKER	Attachment 26
BUS BURS	Attachment 27
CABLE	Attachment 28
ELECTRIC MOTORS	Attachment 29
CONTROL DESK-MIMIC PANEL	Attachment 30

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

INSTRUMENTATION	Attachment 31
ACCESS PLATFORMS	Attachment 32
GROUTING	Attachment 33
LAGGING	Attachment 34
DAMPER	Attachment 35
Heat Exchanger	Attachment 36
CONCRETE WORK	Attachment 37
REINFORCING	Attachment 38
SCREEDING AND PLASTERING	Attachment 39

12. CERTIFICATES

The following templates are part of this procedure

Total erection completion certificate	Attachment 40
Safety clearance certificate	Attachment 41
Cold commissioning acceptance certificate	Attachment 42
Hot commissioning acceptance certificate	Attachment 43
Final acceptance certificate	Attachment 44
Period of maintenance warranty certificate	Attachment 45

13. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Anasen Pillay	Senior Engineer LPS
Mfundo Verby	Manager Low Pressure Services
Hendrik Smith	LPE Low Pressure Services Medupi
Rayen Naidoo	LPE Low Pressure Services Kusile
Jan Strydom	Senior Engineer LPS
Marlize Andre	Senior Engineer LPS
Nemalen Chetty	Senior Engineer LPS
Nkosi Ndika	Senior Engineer LPS

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

14. REVISIONS

Date	Rev.	Compiler	Remarks
25 March 2013	1	Vasheer Ramdeen	Template and Standards updated, Final Document for Authorisation and Publication
March 2016	1.1	Cheshire Zdziarski	General update
April 2016	1.2	Cheshire Zdziarski	Draft Document for Comments Review
February 2017	1.3	Rayen Naidoo	General Update
February 2017	1.4	Rayen Naidoo	Final Draft Document for Formal Comments Review Process
June 2018	1.5	Anasen Pillay	Changes as per LPS SCOT Group
31 st July 2018	2	Anasen Pillay	Final Document for Authorisation and Publication (Rev 2)

15. DEVELOPMENT TEAM

- CB Zdziarski,
- Anasen Pillay,
- Frank Wessels
- Rayen Naidoo

16. ACKNOWLEDGEMENTS

- None

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 1

	<p>INSTALLATION CHECKLIST PUMP - GENERAL PROJECT..... No:</p>	<p>KKS/AKZ NO. PLANT AREA..... CONTRACTOR..... PAGE.....OF.....</p>	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM
1	Check unit KKS/AKZ number against drawing.		
2	Check baseplate level and properly grouted. Check jack screws removed and foundation bolts tightened.		
3	Align V belts to Eskom checklist Attachment 4		
4	Check motor and pump free to rotate at least one full revolution.		
5	Check motor nameplate kW.		
6	Check couplings and alignment to Eskom checklist Attachment 5		
7	Check motor rotation correct (uncoupled).		
8	Check all bolts tight, thread undamaged, washers installed and has sufficient thread protection above nuts.		
9	Check support structure complete		
10	Check inlet and discharge piping for strain on pump.		
11	Check gland packing and tightness		
12	Check mechanical seal (if required) is installed correctly.		

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

13	Check bearings for the correct type and amount of lubricant and make sure grease nipples and oil gaps are fitted where needed.		
14	Check balance/vibration of pump when running.		
15	Fit guards after alignment and ensure that drive does not foul guard when running.		
16	Check auxiliary (e.g. seal) piping is correct, undamaged and tightened.		
17	Check suction and discharge gaskets are fitted and flanges tight.		
18	Check pump and driver dowelled (when specified)		
19	Painting		
20	Check suction and discharge valves and proper opening and closing.		
21	Check Operating and Maintenance Manuals availability.		

REMARKS:

RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 2

 Eskom	<p>INSTALLATION CHECKLIST</p> <p>GUARD PROTECTION OF MOVING PARTS</p> <p>PROJECT No:</p>	KKS/AKZ NO..... PLANT AREA. CONTRACTOR. PAGE OF.....		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check guard installed (to drawing).			
2	Check mesh size correct.			
3	Check clearance between guard and moving parts to specification.			
4	Check security of locating bolts.			
5	Check relative positions of guard to permit safe clearance.			
6	Check access to lubrication points.			
7	Check nip angles fitted and their clearances.			
8				
9				
10				
REMARKS:				
LIST OF DEVIATION ATTACHED	YES	NO	DEVIATION LIST NO	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 3

		INSTALLATION CHECKLIST MOTOR – MECHANICAL		KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGEOF.....	
		PROJECT..... No:			
NO	ITEMS TO BE INSPECTED			INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM
A	MECHANICAL CHECKLIST BEFORE ELECTRICAL FIELD INSTALLATION CHECKLIST.				
1	Check level, location and orientation.				
2	Mounting bolts tight and/or slide rail jacking bolts tight and locked.				
3	Grease nipples installed and lubrication complete.				
4	Coupling alignment checklist 005 completed.				
5	Vee belts, pulleys and guards installed and visually aligned.				
B	MECHANICAL CHECKLIST BEFORE ELECTRICAL FIELD TEST RECORD				
1	Remove guard, belts or coupling connections to enable electrical contractor to perform directional check on motor.				
C	MECHANICAL CHECKLIST AFTER ELECTRICAL FIELD TEST RECORD				
1	Re-install guard, belts or coupling connections.				
2	Vee belt alignment record 004 completed.				
3	Check for damage and/or missing parts and that motor is clean and free of debris.				
4	Paint finish acceptable.				
REMARKS:					
LIST OF DEVIATION ATTACHED		YES	NO	DEVIATION LIST NO	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE
It is mandatory to comply with the requirements of 240-57617975 Procurement of Power Station Low Voltage Electric Motors Specification Standard and 240-50237155 New MV Motor Procurement Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 3.					

CONTROLLED DISCLOSURE

ATTACHMENT 4

	<p>INSTALLATION CHECKLIST VEE BELT ALIGNMENT RECORD</p> <p>PROJECT No:</p>	KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGEOF																					
VEE BELT TYPE..... VEE BELT SIZE..... NO OF VEE BELTS..... MOTOR kW..... MOTOR SPEED..... DRIVER DIA. D..... DRIVER DIA. d.....	BELT SECTION	FORCE REQUIRED TO DEFLECT BELT 16mm PER METRE OF SPAN																					
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:33%;">SMALL PULLEY DIA. (mm)</th> <th style="width:33%;">NEWTON (N)</th> <th style="width:33%;">KILOGRAM FORCE (kgf)</th> </tr> <tr> <td>160 to 244</td> <td>35 to 50</td> <td>3,5 to 5,1</td> </tr> <tr> <td>236 to 315</td> <td>50 to 65</td> <td>5,1 to 6,6</td> </tr> <tr> <td>224 to 355</td> <td>60 to 90</td> <td>6,1 to 9,2</td> </tr> <tr> <td>375 to 560</td> <td>90 to 120</td> <td>9,2 to 12,2</td> </tr> </table>	SMALL PULLEY DIA. (mm)	NEWTON (N)	KILOGRAM FORCE (kgf)	160 to 244	35 to 50	3,5 to 5,1	236 to 315	50 to 65	5,1 to 6,6	224 to 355	60 to 90	6,1 to 9,2	375 to 560	90 to 120	9,2 to 12,2						
SMALL PULLEY DIA. (mm)	NEWTON (N)	KILOGRAM FORCE (kgf)																					
160 to 244	35 to 50	3,5 to 5,1																					
236 to 315	50 to 65	5,1 to 6,6																					
224 to 355	60 to 90	6,1 to 9,2																					
375 to 560	90 to 120	9,2 to 12,2																					
BELT TENSION																							
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:60%;"></th> <th style="width:20%;">DESIGN</th> <th style="width:20%;">ACTUAL</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">1</td><td></td><td></td></tr> <tr><td style="text-align: center;">2</td><td></td><td></td></tr> <tr><td style="text-align: center;">3</td><td></td><td></td></tr> <tr><td style="text-align: center;">4</td><td></td><td></td></tr> <tr><td style="text-align: center;">5</td><td></td><td></td></tr> <tr><td style="text-align: center;">6</td><td></td><td></td></tr> </tbody> </table>				DESIGN	ACTUAL	1			2			3			4			5			6		
	DESIGN	ACTUAL																					
1																							
2																							
3																							
4																							
5																							
6																							
CHECK THAT BELTS ARE A MATCHED SET																							
REMARKS:																							
LIST OF DEVIATIONS ATTACHED	YES	NO	DEVIATION LIST NO	TO BE RECTIFIED BY (DATE)																			
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE																			
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE																			

CONTROLLED DISCLOSURE

ATTACHMENT 5

 Eskom	<p>INSTALLATION CHECKLIST COUPLINGS AND ALIGNMENT</p> <p>PROJECT..... No:</p>	KKS/AKZ NO..... PLANT AREA CONTRACTOR PAGE OF																					
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM																				
1	Check that seals are installed correctly																						
2	Check correct grade and level or amount of lubricant as specified in the lubrication schedule/ supplier information.																						
3	Check that the keys are fitted into keyways.																						
4	Check that orientation of coupling is correct.																						
5	Check for freedom of movement and direction of rotation.																						
6	Check that coupling bolts are secured.																						
7	Dimensions checked as per vendor data sheet.																						
8	Check torque on taper locking elements locating low speed coupling if installed.																						
9	Coupling guard in place and secured.																						
COUPLING BETWEEN..... AND COUPLING TYPE <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>COUPLING OUTSIDE DIA DIA..... mm DIA.....mm</p> </div> <div style="width: 45%;"> <p>..... mm INPUT SHAFT OUTPUT SHAFT ANGULAR MISALIGNMENT</p> </div> </div>																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">0°</td> <td style="width: 25%; text-align: center;">0,00 mm</td> <td style="width: 25%; text-align: center;">0°</td> <td style="width: 25%; text-align: center;">0,00 mm</td> </tr> <tr> <td style="text-align: center;">90°</td> <td style="text-align: center;">Mm</td> <td style="text-align: center;">90°</td> <td style="text-align: center;">mm</td> </tr> <tr> <td style="text-align: center;">180°</td> <td style="text-align: center;">Mm</td> <td style="text-align: center;">180°</td> <td style="text-align: center;">mm</td> </tr> <tr> <td style="text-align: center;">270°</td> <td style="text-align: center;">Mm</td> <td style="text-align: center;">270°</td> <td style="text-align: center;">mm</td> </tr> <tr> <td style="text-align: center;">360°</td> <td style="text-align: center;">Mm</td> <td style="text-align: center;">360°</td> <td style="text-align: center;">mm</td> </tr> </table>				0°	0,00 mm	0°	0,00 mm	90°	Mm	90°	mm	180°	Mm	180°	mm	270°	Mm	270°	mm	360°	Mm	360°	mm
0°	0,00 mm	0°	0,00 mm																				
90°	Mm	90°	mm																				
180°	Mm	180°	mm																				
270°	Mm	270°	mm																				
360°	Mm	360°	mm																				

CONTROLLED DISCLOSURE

MIN. OR MEASURED AT TOP COUPLING GAP..... mm

NOTE

- 1 COUPLING HALVES TO BE ARRANGED TO ROTATE TOGETHER TO THE MEASUREMENT POSITIONS (e.g. FIT ONE OF THE COUPLING BOLTS OR SIMILAR, PREVENT BINDING).
- 2 RECORD INDICATOR MOVEMENT AS POSITIVE WHEN COUPLING HALF MOVES TOWARDS THE INDICATOR.
- 3 0° POSITION IS AT TOP, ROTATION CLOCKWISE FROM DRIVING SIDE.

REMARKS:

LIST OF DEVIATIONS ATTACHED	YES	NO	DEVIATION LIST No	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 6

 Eskom	INSTALLATION CHECKLIST TANK		KKS/AKZ NO.....	
	PROJECT No:		PLANT AREA CONTRACTOR PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Nameplate data correct.			
2	Orientation correct i.e. tank on centerlines and level or plumb.			
3	Nozzle orientation correct.			
4	Ladders and platforms (if required) as per drawing.			
5	Hydrostatic test.			
6	Correct lining (if required)			
7	Rubber/neoprene lining spark tested for damage.			
8	Manholes according to drawing			
9	All bolts tightened			
10	Correct material for manhole gaskets			
11	Operation of vents and liquid level gauges checked			
12	Tank cleaned and free from debris			
13	Overflow installation			
14	Sight glasses fitted (if required)			
15	Painting			
16	Grouting			
17				
18				
19				
20				
REMARKS:				

CONTROLLED DISCLOSURE

RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 7

	<p>INSTALLATION CHECKLIST HEAT EXCHANGER</p> <p>PROJECT No:</p>	<p>KKS/AKZ NO.....</p> <p>PLANT AREA</p> <p>CONTRACTOR</p> <p>PAGE OF.....</p>		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Nameplate data correct.			
2	Orientation correct, exchanger on centrelines and level or plumb			
3	Hydrostatic test			
4	Access platform (if required) as per drawing.			
5	Insulation			
6	All bolts tightened			
7	Flanges as per drawing			
8	Other (specify)			
9				
10				
<p>REMARKS:</p>				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 8

		INSTALLATION CHECKLIST PIPEWORK - INSTALLATION		KKS/AKZ NO.....	
		PROJECT..... No:		PLANT AREA..... CONTRACTOR..... PAGE..... OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check all lines running true, vertically and horizontally (no humping on long runs).				
2	Check all slopes correct to drawing and specifications				
3	Check all branches in correct position with correct orientation				
4	Check pipes sitting on all supports				
5	Check installation of all components (location, orientation, flow direction etc.) according to drawing				
6	Check that stainless steel piping does not come into contact with carbon steel, (bolts, trestles, dogs, cleats etc.)				
7	Check vents and drains installed according to drawing and hydrotest requirements				
8	Check all steam traps installed and correct				
9	Check all shoes, saddles, wear pads correctly installed and welded				
10	Check all orifice plates installed and correct				
11	Check expansion joints installed correctly and undamaged				
12	Check all flanges bends and elbows have been installed to drawings and specs				
13	Check piping is not excessively cold sprung				
14	Check small bore lines not hitting supports etc.				
15	Check all caulking complete				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

 Eskom	INSTALLATION CHECKLIST PIPEWORK - INSTALLATION (Concluded) PROJECT..... No:	KKS/AKZ NO. PLANT AREA CONTRACTOR..... PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
16	Check expansion loops installed as per drawing and properly supported			
17	Check clearance for expansion			
18	Check that there is no stress in piping bolted to pumps and other equipment.			
19	Spacing of insulated pipework sufficient to allow for insulation			
20	Check that all bursting discs are correctly installed			
21	Check that there is sufficient headroom as specified under all applicable pipework			
22	Check all pipes and fittings have unimpeded runs			
23	Check all safety requirements are complied with			
24	Check that strainer is installed in line where required			
25	Identification of contents marked on pipes			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 9

		INSTALLATION CHECKLIST PIPEWORK - VALVES AND INSTRUMENTS		KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGE OF.....	
		PROJECT..... No:			
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check flow direction correct				
2	Check item code number correct				
3	Open and closing action smooth				
4	Diaphragm undamaged				
5	Valve spindles greased				
6	Gear valves greased				
7	All valves correctly labelled				
8	Valves fitted in accessible positions				
9	Auto valves calibrated				
10	Extended spindles installed correctly				
11	Chain wheel installed where required				
12	Check for damage				
13	Check orientation of valves correct				
14	Leaking valves rectified				
15	Check all instrument take offs installed and correct				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

 Eskom	INSTALLATION CHECKLIST PIPEWORK - VALVES AND INSTRUMENTS (Concluded) PROJECT..... No:	KKS/AKZ NO..... PLANT AREA CONTRACTOR..... PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
16	Pressure Relief valves installed and set correctly			
17	PRVs tested			
18	Correct control valves installed			
19	Meter runs properly installed (jacking screws included)			
20	Valves meter runs installed			
21	Pressure gauge valves installed			
22	Pressure gauges properly oriented			
23	Temperature connections properly oriented			
24	Sample connections installed			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 10

	<p>INSTALLATION CHECKLIST PIPEWORK - GASKETS AND BOLTS PROJECT No:</p>	KKS/AKZ NO..... PLANT AREA CONTRACTOR PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check all gaskets installed, correct material and size			
2	Check all bolts for correct material, grade, length, size, damage and tightness			
3	Check bolt torque and method on flanged joints correct			
4	Check that all bolts in one connection face the same direction			
5	Check that all washers are installed			
6				
7				
8				
9				
10				
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 11

 Eskom	INSTALLATION CHECKLIST PIPEWORK - SUPPORTS PROJECT..... No:	KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGE OF.....		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	All supports, hangers etc. installed and correct to drawing			
2	Sufficient support			
3	Correct material used			
4	Based grouted where applicable			
5	'U' bolts fitted where required			
6	Check all anchors and guides correctly installed and welded per drawing and specification.			
7				
8				
9				
10				
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 12

 Eskom	INSTALLATION CHECKLIST PIPEWORK - WELDING		KKS/AKZ NO.....		
	PROJECT..... No:		PLANT AREA.....		
			CONTRACTOR.....		
			PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check assembled piping and correctness to drawing before welding				
2	Uplift approved welding procedure				
3	Uplift valid welder qualification certificate				
4	Check that correct welding rods are used				
5	Check storing of welding rods				
6	Check that welding cables are not damaged and that all connections are properly secured				
7	Check preparation and alignment of bolts before welding				
8	Check heat application for corrective work is within specs.				
9	Check that welders are stamping their welds with an identification mark and that this i.d. mark is transferred to the applicable weld on drawing				
10	Ensure that preheating, nitrogen purge etc. is per welding procedure				
11	Tack welds, weld splatter dogs and cleats are removed				
12	Bad scars, stray arc strikes and gouge marks to be made good				
13	Check that heat treatment where required is carried out and that records are kept				
14	Check stress relieving complete				
15	Check all welds visually (cold lap, undercut, etc.)				
16	Check that all welding is complete				
17	Check that no welding is done on lined piping				
18					
19					
20					

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

REMARKS:

RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 13

		INSTALLATION CHECKLIST PIPEWORK - TESTING		KKS/AKZ NO.....	
		PROJECT..... No:		PLANT AREA CONTRACTOR PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check NDT records are kept, weld joint is marked on isometric drawings and site of NDT identified				
2	Check radiographs are available for client inspection				
3	Check NDT is carried out to specs. (radiography 0%, 10%, 100%).				
4	Check all underground lines inspected and tested prior to backfill				
5	Check that pneumatic testing where called for is completed and recorded				
6	Check drainage method and facilities adequate to drain lines before hydrotest				
7	Ensure that test pressure gauge has a valid certificate				
8	Check and record hydrotest pressure on test record				
9	Check water temp. above required minimum for hydrotesting				
10	Check chlorides in water within specification				
11	Check that instruments that cannot be hydrotested are removed and lines sealed prior to hydrotesting.				
12	Check spools have been fabricated and installed where necessary prior to hydrotesting				
13	Check that all valves (control valves in particular) are in the locked open position before hydrotesting				
14	Check that correct blinds are installed prior to hydrotesting				
15	Check all lines requiring hydrotest have been tested and recorded				
16	Check after hydrotest that all temporary blinds plugs and supports have been removed				
17	Check after hydrotest that line is reinstated as per drawing and correct gaskets and bolts are installed				
18	Check that all lines are free of water after hydrotest				
19	Check all necessary hot work/access permits				
REMARKS:					

CONTROLLED DISCLOSURE

RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 14

		INSTALLATION CHECKLIST PIPEWORK - PAINTING AND GENERAL		KKS/AKZ NO..... PLANT AREA CONTRACTOR..... PAGE OF	
		PROJECT..... No:			
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check paints are used within storage time prescribed by manufacturer.				
2	Check surface preparation according to specification.				
3	Check application of primer and/or undercoat(s) and top coat according to manufacturer's recommendation.				
4	Check pipework is painted correctly to Eskom's colour coding.				
5	Check adhesion of paint satisfactory.				
6	Check for holiday defects in paintwork.				
7	Check dry coat paint thickness according to specification.				
8	Check finished work satisfactory i.e. no tears or brush marks.				
9	Check ventilation adequate when painting in confined spaces.				
10	Check adequate protection of floors and plant against paint spillage or splashing.				
GENERAL					
1	Check that all construction aids have been removed				
2	Other (specify)				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 15

	INSTALLATION CHECKLIST PIPING PRESSURE TEST			KKS/AKZ NO. PLANT AREA CONTRACTOR PAGEOF
	PROJECT No:			
FLOW DIAGRAM				AREA
FLOW DIAGRAM TEST PRESSURE				ACTUAL TEST PRESSURE
TEST MEDIUM				TEST NUMBER
LINE NO.	SHEET NO.	TEST ORIGIN	TEST TERMINATION	REMARKS
ACCEPTED FOR CONTRACTOR BY		PRINT NAME	SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME	SIGNATURE	DATE
TEMPORARY BLINDS, PLUGS & SUPPORTS HAVE BEEN REMOVED. ITEMS WHICH WERE REMOVED FOR TEST HAVE BEEN REINSTALLED WITH PROPER BOLTS & GASKETS. LINES HAVE BEEN CHECKED TO VERIFY THAT SYSTEM IS FREE OF WATER.				
ACCEPTED FOR CONTRACTOR BY		PRINT NAME	SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME	SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 16

		INSTALLATION CHECKLIST BREAKER - INSTALLATION		KKS/AKZ NO.....	
		PROJECT No:		PLANT AREA CONTRACTOR..... PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check all equipment serial numbers recorded and all items labelled with KKS/AKZ numbers.				
2	Check that control and protective cables are installed according to approval drawings.				
3	Check feeder circuit breakers cables connected and the cable numbers the same at both ends.				
4	Check cable termination torque certificate.				
5	Check pressure test certificate for the cable.				
6	Check all power and control fuses rating current.				
7	Check operating and maintenance manuals.				
A	TEST BREAKER INTERLOCKS				
1	The links closed - the earth is applied.				
2	The earths applied - the links are closed.				
3	The breaker closed - the links are applied.				
4	The breaker closed - the earth is applied.				
5	The earths applied - the breaker is closed.				
B	TEST BUS SECTION				
1	Any earth is applied while the breaker is closed.				
2	Any earth is applied while the corresponding links are closed.				
3	Any links are closed while the corresponding earth is applied.				
REMARKS:					

CONTROLLED DISCLOSURE

RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE
<p>It is mandatory to comply with the requirements of 240-57617975 Procurement of Power Station Low Voltage Electric Motors Specification Standard and 240-50237155 New MV Motor Procurement Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 16.</p>				

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 17

		INSTALLATION CHECKLIST STRAINER/FILTER		KKS/AKZ NO.....	
		PROJECT No:		PLANT AREA..... CONTRACTOR PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check for damage before installation				
2	Check flow direction				
3	Check air release and drains are installed as per drawing				
4	Check sand grade and quantity is to specification in case of sand filters				
5	Check paintwork as per checklist 014				
6	Check maintenance access is acceptable				
7	Check mesh size correct				
8	Check differential pressure gauge impulse line installed				
9	Check differential pressure gauge properly orientated				
10	Check KKS/AKZ number against drawing				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 18

	<p>INSTALLATION CHECKLIST VALVE</p> <p>PROJECT No:</p>	<p>KKS/AKZ NO.....</p> <p>PLANT AREA.....</p> <p>CONTRACTOR.....</p> <p>PAGE OF</p>		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check valve assembly according to drawing and valve schedule			
2	Check valve position to drawing and schedules			
3	Check valve KKS/AKZ labelling according to schedule and specification			
4	Check valve indicator and handwheel according to specification			
5	Check valve access for manual operation			
6	Check gland seal supply where applicable			
7	Check extended spindles in accordance with specification where applicable			
8	Check integral bypass where applicable			
9	Check flow direction where applicable			
10	Check locking facilities			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 19

 Eskom	INSTALLATION CHECKLIST GEARBOX PROJECT No:	KKS/AKZ NO..... PLANT AREA..... CONTRACTOR PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check gearbox according to specification			
2	Check levels and alignment according to drawing			
3	Check coupling alignment to specification			
4	Check coupling assembly guards and safety features			
5	Check lubrication devices as per specification and drawings			
6	Check gearbox holding down bolts and dowels (where applicable)			
7	Check general soundness of design and construction			
8	Check paintwork according to specification and schedules			
9	Check direction of rotation with motor			
10	Check for oil leaks			
11	Draining facilities			
12	Check for correct oil grade			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 20

	<p>INSTALLATION CHECKLIST COMPRESSOR OR BLOWER</p> <p>PROJECT No:</p>	<p>KKS/AKZ NO.....</p> <p>PLANT AREA.....</p> <p>CONTRACTOR.....</p> <p>PAGE OF</p>		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check installation according to drawings and specification			
2	Check rating complies with data sheet			
3	Check tightness of baseplate holding down bolts			
4	Check motor coupling alignment to checklist 005 and record			
5	Check electric or diesel motor according to checklists 021 or 029			
6	Check local control panel installation and cabling according to drawings			
7	Check cooling water pipework where applicable, and compressed air pipework connections			
8	Check lubrication system according to drawings and specification			
9	Check instrumentation according to drawings and specification			
10	Check earthing to checklist 025			
11	Check painting according to checklist 014			
12	Check KKS/AKZ number against drawing			
13	Check access for safety and cleanliness			
14	Check operating and maintenance manuals' availability			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 21

	INSTALLATION CHECKLIST DIESEL ENGINE			KKS/AKZ NO..... PLANT AREA..... CONTRACTOR PAGE OF	
	PROJECT No:				
NO	ITEMS TO BE INSPECTED			INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM
1	Check diesel engine according to drawings and data sheet				
2	Check holding down bolts and level of base plate				
3	Check v. Belts alignment and tension to checklist 004 and record				
4	Check battery connections or air start connection whichever is applicable				
5	Check exhaust system as per drawing and specification				
6	Check cooling water system as per drawing				
7	Check alignment to checklist 005 and record				
8	Check guards and other safety features				
9	Check battery charger or air start system as per specification				
10	Check instrumentation as per checklist 031				
11	Check local control panel as per checklist 030				
12	Check paintwork as per checklist 014				
13	Check KKS/AKZ number identification and labelling of diesel engine against drawing				
14	Check diesel fuel tank and lines				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE
It is mandatory to comply with the requirements of 240-62772907 Power Station Standby Diesel Generators Specification Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 21.					

CONTROLLED DISCLOSURE

ATTACHMENT 22

 Eskom	INSTALLATION CHECKLIST ACTUATOR FOR VALVE OR DAMPER		KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGE OF		
	PROJECT No:				
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR		INSPECTED BY ESKOM	
1	Check position according to drawing				
2	Check alignment and supports according to drawings				
3	Check manual lock out device				
4	Check KKS/AKZ labelling according to schedules and specifications				
5	Check motor rating and gearbox ratio according to schedules				
6	Lubrication points according to drawing and specifications				
7	Check limit and torque switch settings, instruments, etc.				
8	Check paintwork according to checklist 014				
9	Check power and control cabling according to checklist 028				
10	Check safe access to actuator				
11	Megger motor				
12	Check inspection seal installed/damaged				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 23

 Eskom	INSTALLATION CHECKLIST BATTERY PROJECT No:	KKS/AKZ NO..... PLANAREA..... CONTRACTOR..... PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check location of battery stand according to drawing			
2	Check battery according to specification			
3	Check battery terminal interconnections for tightness and grease			
4	Check SG and electrolyte levels			
5	Check polarity of each cell			
6	Check KKS/AKZ number of battery against drawing			
7	Check room ventilation adequate			
8				
9				
10				
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE
It is mandatory to comply with the requirements of 240-56360034 Lead Acid Battery Stands Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 23.				

CONTROLLED DISCLOSURE

ATTACHMENT 24

	<p>INSTALLATION CHECKLIST GAUGE RACKS, JUNCTION BOXES AND PANELS</p> <p>PROJECT..... No:</p>	<p>KKS/AKZ NO.....</p> <p>PLANT AREA.....</p> <p>CONTRACTOR.....</p> <p>PAGE OF</p>		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check panels/racks are mounted securely as per specification. (anti-vibration pads, etc.)			
2	Check KKS/AKZ labelling according to schedules and drawings			
3	Check wiring and termination according to drawing			
4	Check cable identification			
5	Check impulse line routing, security and labelling			
6	Check water proofing of junction boxes and panels where applicable			
7	Check paintwork according to checklist 014			
8	Check for cleanliness			
9	Check access for other equipment			
10				
<p>REMARKS:</p>				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 25

		INSTALLATION CHECKLIST EARTHING		KKS/AKZ NO.....	
		PROJECT No:		PLANT AREA..... CONTRACTOR..... PAGE OF	
NO	ITEMS TO BE INSPECTED			INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM
1	Check that earth route is as per drawing				
2	Check that earth size is as per drawing and specification				
3	Check all riveted joints are as per standard				
4	Check that all brazing is as per drawing				
5	Check that bolts, washers and nuts are galvanized to specification				
6	Check that connection to painted structures are sound and paint made good after earthing				
7	Check that the earth tail is connected to the earth terminal of electrical equipment where applicable				
8	Check that excavation and backfilling is done as per specification				
9	Check that fences are earthed where applicable				
10	Check continuity				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE
It is mandatory to comply with the requirements of 240-56356396 Earthing and Lighting Protection. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 25.					

CONTROLLED DISCLOSURE

ATTACHMENT 26

	<p>INSTALLATION CHECKLIST BREAKER</p> <p>PROJECT No:</p>	<p>KKS/AKZ NO.....</p> <p>PLANT AREA</p> <p>CONTRACTOR.....</p> <p>PAGEOF</p>		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check alignment of switchgear			
2	Check breaker rating according to schedules			
3	Check earthing device			
4	Check labelling according to schedules and specifications			
5	Check coil resistances and voltages rating			
6	Check racking of switchgear			
7	Check spring charge motor voltage			
8	Check arc chutes installed and satisfactory			
9	Check function of breaker by manually charging			
10	Check tripping function of breaker by manually charging			
11	Check breaker for cleanliness			
12	Check position and mechanical indicator operation			
13	Protection equipment check carried out			
14	Check earthing of switchgear to station earth			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE
<p>It is mandatory to comply with the requirements of 240-57617975 Procurement of Power Station Low Voltage Electric Motors Specification Standard and 240-50237155 New MV Motor Procurement Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 26.</p>				

CONTROLLED DISCLOSURE

ATTACHMENT 27

 Eskom	INSTALLATION CHECKLIST BUS BARS PROJECT No:	KKS/AKZ NO..... PLANT AREA CONTRACTOR PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check installation according to drawing			
2	Check welding of busbars and busducts according to drawings and specifications and check non destructive examination of welds			
3	Check busbar insulated supports satisfactory and correctly adjusted			
4	Check busduct supports			
5	Check torque on all bolts at busbar connections set to manufacturer's specification			
6	Check torque on all bolts of flexible connections set to manufacturer's specification			
7	Check cleanliness of busbars			
8	Check installation of rubber bellows on busducts			
9	Check installation of busducts air pressurization system according to drawing and specification			
10	Check out electrical pressure test to specification			
11	Carry out air pressure test on busducts and check leakage rate within specification requirements			
12	Check busduct earthing according to drawing			
13	Check painting of busduct supports and air pressurization system according to specification and schedules			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE
<p>It is mandatory to comply with the requirements of 240-57617975 Procurement of Power Station Low Voltage Electric Motors Specification Standard and 240-50237155 New MV Motor Procurement Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 27.</p>				

CONTROLLED DISCLOSURE

ATTACHMENT 28

 Eskom	INSTALLATION CHECKLIST CABLE PROJECT No:	KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check type of cable according to drawings and schedules			
2	Check type of cable terminations (lugs, crimping and colour code or ferrule numbers) according to drawings and specifications			
3	Check cable KKS/AKZ identification label installed according to drawings and schedules			
4	Check cable earthing according to specifications			
5	Check routing and clipping of cables (segregation of power and control cables) complies with drawings and specifications)			
6	Check cable bends are according to manufacturer's specification			
7	Megger test LV cable or, in case of MV cable, witness pressure test			
8	Check phase sequence or colour sequence for correct rotation			
9	Verify cable pressure test certificates issued (where applicable)			
10	Check racking as per specification secureness, ridged, edges, radia, clamps, earthing or racking			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE
It is mandatory to comply with the requirements of 240-56227443 Requirements for Control and Power Cables for Power stations Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 28.				

CONTROLLED DISCLOSURE

ATTACHMENT 29

		INSTALLATION CHECKLIST ELECTRIC MOTOR		KKS/AKZ NO.....	
		PROJECT No:		PLANT AREA..... CONTRACTOR..... PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check non distortion of baseplate on tightening down				
2	Check motor holding down bolts and dowelling				
3	Check motor dry out sheet has been received and is according to specification. (Medium Voltage)				
4	Check motor resistance. (Low Voltage)				
5	Check motor fan protection cover and coupling guard are satisfactory				
6	Check bearings and lube system in accordance with specification				
7	Check terminal box and auxiliary terminal box sealed and correct, and cabling according to checklist 028				
8	Check commutator and brushgear on d.c. motors are in good condition				
9	Check motor alignment				
10	Check cooling system for cleanliness				
11	Check painting according to checklist 014				
12	Check motor air gap				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE
It is mandatory to comply with the requirements of 240-57617975 Procurement of Power Station Low Voltage Electric Motors Specification Standard and 240-50237155 New MV Motor Procurement Standard. The requirements delineated in these standards take precedence over the requirements stipulated in Attachment 29.					

CONTROLLED DISCLOSURE

ATTACHMENT 30

		INSTALLATION CHECKLIST CONTROL DESK AND MIMIC PANEL		KKS/AKZ NO.....		
		PROJECT..... No:		PLANT AREA CONTRACTOR PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM			
1	Check desk or panel secured and position according to drawings					
2	Check paintwork according to specification					
3	Check instruments/recorders control stations and alarm fascias positioned correctly					
4	Check instruments/recorders have correct scale range and corrected for non-linearity of transmitter where applicable					
5	Check instruments, control stations, indicators and alarm fascias engraved to specification					
6	Check power cables are terminated and correctly identified					
7	Check signal cables do not run in proximity to power cables					
8	Check signal cables are terminated and correctly identified					
9	Check desk and panel are correctly earthed					
10	Check desk and panel for cleanliness					
REMARKS:						
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER		TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE		DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE		DATE

CONTROLLED DISCLOSURE

ATTACHMENT 31

		INSTALLATION CHECKLIST INSTRUMENTATION		KKS/AKZ NO.....		
		PROJECT No:		PLANT AREA CONTRACTOR PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM			
1	Check calibration certificate supplied by contractor					
2	Check instrument range according to schedule					
3	Check mounting of instruments according to drawing					
4	Check instrumentation cabling and wiring refer cable check					
5	Check KKS/AKZ labelling according to schedule					
6	Check equalizing vent and blowdown valves and pipework where applicable					
7	Check impulse line route, security and erection is satisfactory					
8	Check safe access to instruments					
9	Check that instrument is connected to correct primary elements					
10	Check safe access to actuator					
REMARKS:						
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER		TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE		DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE		DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 32

		INSTALLATION CHECKLIST ACCESS PLATFORMS AND STAIRWAYS		KKS/AKZ NO.....	
		PROJECT..... No:		PLANT AREA CONTRACTOR PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check stairways and platforms installed according to drawings and specifications				
2	Check welding of steelwork supporting gusset plates according to drawings and specifications				
3	Check the fit and fixing of steel floor panels				
4	Check bolts for length, washers and tightness				
5	Check vastrap flooring is adequately stiffened				
6	Check open grid flooring main bars span in the shortest direction				
7	Check handrails and stanchions				
8	Check kick-plates				
9	Check preparation for final paintwork				
10	Check paintwork to checklist 014				
11	Check galvanizing				
12	Check final finish				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 33

 Eskom	INSTALLATION CHECKLIST GROUTING PROJECT No:	KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check mixture			
2	Ensure that the release note has been issued prior to grouting			
3	Check preparedness of area to be grouted as per specification			
4	Ensure grouting is placed as per specification			
5	Check likelihood that all cavities will be filled			
6	Check finish			
7	Agree and check curing procedure			
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 34

 Eskom	<p>INSTALLATION CHECKLIST LAGGING</p> <p>PROJECT No:</p>	KKS/AKZ NO..... PLANT AREA..... CONTRACTOR..... PAGE OF		
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM	
1	Check lagging and cladding is done according to drawings and specifications			
2	Check that pipes, valves, ducts, etc. to be lagged, are protected according to specification before lagging.			
3	Check that paintwork is carried out in accordance with checklist 014			
4	Check thickness of lagging according to specification and schedules			
5	Check colour coding on cladding conforms with Eskom specification for colour coding of pipework			
6	Check clearance for expansion			
7				
8				
9				
10				
REMARKS:				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 35

		INSTALLATION CHECKLIST DAMPER		KKS/AKZ NO..... PLANT AREA..... CONTRACTOR PAGE OF	
		PROJECT No:			
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check safe access is available				
2	Check KKS/AKZ labelling according to specification and schedules				
3	Check shaft seals according to drawing				
4	Check mechanical end stops				
5	Check linkage construction and geometry				
6	Check lubrication facilities according to drawing and specifications				
7	Check freedom of action — full open to close				
8	Check general soundness of design and construction				
9	Check electrical supplies, earthing and drives				
10	Check identification of damper				
11	Check shearing pins				
12	Check mechanical indicator				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 36

		INSTALLATION CHECKLIST HEAT EXCHANGER		KKS/AKZ NO.....	
		PROJECT No:		PLANT AREA..... CONTRACTOR..... PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check heat exchanger according to drawings and specification				
2	Check holding down arrangement and provision for expansion				
3	Check installation as per drawing				
4	Check drain and vent facilities as per drawing and specifications				
5	Check tapping points as per drawing				
6	Check access and inspection door fitting (where applicable)				
7	Check sight glass as per drawing and specification				
8	Check safety valves as per specification				
9	Check paintwork according to checklist 014				
10	Check internal protection (where applicable) and cleanliness				
11	Verify hydraulic test certificate available to carry out hydraulic test				
12	Check corrosion protection system where applicable according to specification				
13	Check KKS/AKZ identification of heat exchanger according to drawing				
14	Check direction of flow				
15	Check removability for maintenance				
16	Check bundles, fins for damage				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY		PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

ATTACHMENT 37

		INSTALLATION CHECKLIST CONCRETE WORK		KKS/AKZ NO..... PLANT AREA CONTRACTOR PAGE OF	
PROJECT		No:			
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check drawing.				
2	Check foundations and compaction of in-situ material below foundation				
3	Check foundations and compaction of backfill material.				
4	Check that surface of previously placed concrete has been prepared as per specification.				
5	Check reinforcing as per checklist no. 038 before placing concrete.				
6	Check correct method of casting operation. (See also item 16).				
7	Check correct position and preparation of construction joints.				
8	Check whether the use of admixtures has been approved.				
9	Check class of concrete correct.				
10	Check shuttering as per specification.				
11	Check air, ground and concrete temperatures are above the specified minimum.				
12	Ensure that placing of subsequent layers of concrete takes place before initial set.				
13	Ensure that aggregates do not segregate at any stage.				
14	Ensure vibration is carried out as per specification.				
15	Obtain concrete test cubes and slump tests at the rate specified by contract.				
16	Check the concrete finish after the formwork has been removed.				
17	Ensure that specification curing conditions are observed.				
18	Check concrete test cube results and/or SABS curing time before stripping.				
19	Check finished levels as per drawings and limits according to specifications.				
20	Check built-in items.				
21	Check water bars.				
22	Check joint sealing water reticulation structures.				
23	Check coatings.				

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

	<p>INSTALLATION CHECKLIST CONCRETE WORK</p> <p>PROJECT No:</p>	<p>KKS/AKZ NO.....</p> <p>PLANT AREA</p> <p>CONTRACTOR</p> <p>PAGE OF</p>		
<p>REMARKS:</p>				
RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 38

NO	ITEMS TO BE INSPECTED	INSPECTED	
		BY CONTRACTOR	BY ESKOM
1	Are the number, size and location of rebar as per drawings and specification?		
2	Has rebar proper clearance from previous placement, forms and subgrade?		
3	Are all anchor bolts, inserts, pipes, conduits, ladder supports, flashing, instruments and electrical earth cables included as per drawing?		
4	Are reinforcing steel supports of approved size and type and adequate to prevent deflection of bars in the proper places as per drawings?		
5	Is reinforcing free from mud, dried mortar, sand blast material or organic matter?		
6	Is the reinforcing free from heavy rust or scale?		
7	Is adequate protection provided for anchor bolt threads?		
8	Are floor drains at the proper elevation as per drawings?		
9	Is stainless pipe in contact with carbon steel?		
10	Does drain pipe have the proper slope and support?		
11	Has all embedded piping been tested, inspected and accepted by QC and Eskom?		
12	Are all embeddments supported to prevent displacement during concrete operations?		
13	Is reinforcement tied together at proper intervals to maintain strength and rigidity?		
14	Is all structural reinforcing steel free of welding or arc strikes?		
15	Has the QC inspector inspected and accepted the reinforcing steel and other embedded items?		

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

REMARKS:

RECTIFICATION INSTRUCTION ATTACHED	YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY	PRINT NAME		SIGNATURE	DATE
ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME		SIGNATURE	DATE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 39

		INSTALLATION CHECKLIST SCREEDING AND PLASTERING		KKS/AKZ NO.....	
		PROJECT..... No:		PLANT AREA CONTRACTOR PAGE OF	
NO	ITEMS TO BE INSPECTED	INSPECTED BY CONTRACTOR	INSPECTED BY ESKOM		
1	Check preparation prior to plastering walls brushed dam and damped.				
2	Check that plaster is fresh.				
3	Check application of plaster.				
4	Ensure granolithic finished concrete work is as per specification.				
5	Check granolithic colouring for uniformity.				
6	Screed preparation checked.				
7	Expansion joints where required.				
8	Finish and thickness to be checked.				
9	Curing time.				
10	Check that the screed has bonded properly to the floor. (tap with wood).				
REMARKS:					
RECTIFICATION INSTRUCTION ATTACHED		YES	NO	R.I. NUMBER	TO BE RECTIFIED BY (DATE)
ACCEPTED FOR CONTRACTOR BY		PRINT NAME		SIGNATURE	DATE

*DELETE IF NOT APPLICABLE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 40

ACCEPTED/WITNESSED FOR ESKOM BY	PRINT NAME	SIGNATURE	DATE			
 Eskom	TOTAL CONSTRUCTION COMPLETION INSPECTION CERTIFICATE		NO. REVISION DATE..... PAGEOF			
	*MECHANICAL/*ELECTRICAL/*PROCESS CONTROL					
PROJECT PROJECT NUMBER:..... PLANT AREA MODULE EQUIPMENT/INSTALLATION NUMBERS AND DESCRIPTION						
ITEM KKS/AKZ NUMBER	DESCRIPTION OF ITEM INSPECTED					
No	Remedial worklist description	Category	Action by	Due date	Completion signature	
					Contractor	Eskom
EXCEPTIONS/OUTSTANDING ITEMS						
THE PERMANENT WORKS AND EQUIPMENT IDENTIFIED ABOVE HAS BEEN INSPECTED, TESTED AND RECTIFIED IN ACCORDANCE WITH THE TOTAL ERECTION COMPLETION INSPECTION PROCEDURE, THE APPLICABLE ERECTION CHECKLIST AND IS RELEASED FOR INITIAL ENERGIZING AND THEREAFTER COLD/HOT COMMISSIONING BY THE COMMISSIONING TEAM, SUBJECT TO THE EXCEPTIONS LISTED ABOVE						

CONTROLLED DISCLOSURE

REPRESENTATIVE OF ESKOM: CIVIL MECHANICAL ELECTRICAL PROCESS CONTROL CONTRACTOR SUPPLIER	PRINT NAME:	SIGNATURE:	DATE:
---	---	--	---

NB: USE CONTINUATION SHEET IF REQUIRED.

*DELETE IF NOT APPLICABLE

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 41

 Eskom	<p>SAFETY CLEARANCE CERTIFICATE</p>	NO. REVISION..... DATE PAGE OF
NOTIFICATION		
ESKOM HEREBY NOTIFIES: NAME OF ONTRACTOR: PROJECT: POWER STATION PROJECT NUMBER: AND ALL OTHER SIGNATORIES THAT THE PLANT DESCRIBED BELOW MUST BE REGARDED AS BEING ALIVE AND/OR IN SERVICE, AND CAN BE PUT INTO OPERATION WITHOUT WARNING AS FROM..... HOURS ON (DATE) FROM THIS TIME AND DATE, THE SAID PLANT IS UNDER THE CONTROL OF ESKOM AS PER ESKOM'S OPERATING AND PLANT SAFETY REGULATIONS. NO FURTHER WORK SHALL BE CARRIED OUT UNLESS THE RESPONSIBLE PERSON IN CHARGE OF THIS WORK IS IN POSSESSION OF A PLANT OR WORK PERMIT ISSUED BY ESKOM'S GENERATION REPRESENTATIVE. . FURTHER, THE RESPONSIBILITY AS USER OF THE PLANT, IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, ACT NO. 85 OF 1993, IS ACCEPTED BY ESKOM. THIS CERTIFICATE DOES NOT IN ANY OTHER WAY AFFECT THE CONTRACTOR'S CONTRACTUAL RESPONSIBILITIES AND OBLIGATIONS TOWARDS EKSOM. THE CONTRACTOR AND ALL OTHER SIGNATORIES HEREBY ACKNOWLEDGE THEIR RESPONSIBILITIES TO ADVISE ALL THEIR PERSONNEL AND SUB-CONTRACTORS OF ESKOM'S PLANT, OR WORK PERMIT SYSTEM TO ENSURE COMPLIANCE.		
PLANT DESCRIPTION		
UNIT NUMBER : DESCRIPTION OF PLANT : LOCATION/KKS CODE(S) :		

CONTROLLED DISCLOSURE

 Eskom	SAFETY CLEARANCE CERTIFICATE	NO. REVISION..... DATE PAGE OF	
SIGNATORIES			
REPRESENTATIVE OF:	PRINT NAME:	SIGNATURE:	DATE:
CONTRACTOR :
GENERATION :
OTHER CONTRACTORS INVOLVED (IF APPLICABLE):			
CONTRACTOR'S NAME:	REPRESENTATIVE'S NAME:	SIGNATURE:	DATE:
.....
.....

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

CIRCULATION

*Delete if not applicable

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

ATTACHMENT 45

 Eskom	PERIOD OF MAINTENANCE/ WARRANTY EXPIRY NOTIFICATION		NO. REVISION..... DATE..... PAGE OF
	Notice is hereby given to the Power Station Manager by the Project Manager that the Permanent Works described below has been operating satisfactorily for the period of maintenance/warranty in terms of the Conditions of Contract. Further, the plant meets the specified operational requirements; defects and listed exceptions have been cleared; and the Contractor has completed the work in accordance with the terms of the Contract.		
PROJECT:..... POWER STATION		PROJECT NUMBER:	
NAME OF CONTRACTOR :			
TITLE OF CONTRACT/ORDER :			
REFERENCE DETAILS : Contractual Completion	 Actual Completion Handing-over Maintenance/ Warranty Expiry	
CONTRACT ITEM NO.	LOCATION/ KKS/AKZ CODE(S)	UNIT NUMBER: APPLICABLE SERIAL NUMBER AND DESCRIPTION OF CONTRACT WORKS:	

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

COMMENTS:			
NB: This document is issued without prejudice to Eskom's rights in terms of the Contract.			
REPRESENTATIVE OF :	PRINT NAME:	SIGNATURE :	DATE:
PROJECT MANAGER :			
POWER STATION MANAGER:			

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.