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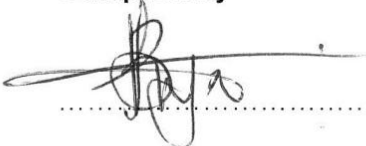
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Compiled by	Functional Responsibility	Authorised by
		
T. Njapha	T. Railo	P. Madiba
Engineer	Middle Manager (Acting)	Senior Manager
Electrical Plant CoE	Electrical Plant CoE	Electrical and C&I
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1. INTRODUCTION

This document describes a process to be followed by Electrical Centre of Excellence (CoE) while planning and conducting an Internal End-of-Phase Design Review (IEPDR). The review shall be done in preparation for a multidisciplinary version of the review organised for the project under auspices of the Engineering Design Work Lead (EDWL).

The work instruction also covers the review to be conducted with Control and Instrumentation (C&I) CoE aimed at resolving interface requirements concerning Electrical and C&I specifications and designs.

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

The objective of the work instruction is to provide assurance that the electrical engineering solutions proposed by Electrical Centre of Excellence (CoE) are technically sound, complete, align and comply with applicable standards prior to declaring Design Baseline at the end of project stages of the Eskom Project Life-Cycle Model (PLCM). The reviews conducted will also ensure alignment within electrical and C&I engineering teams.

In addition, the work instruction seeks to improve the review process thus allowing for alignment and consistency through the use of a defined process as well as associated templates and checklists. This will also ensures alignment of Electrical Design Baseline with the requirements of End-of-Phase Design Review conducted with all the engineering stakeholders on a project in accordance with Design Review Procedure, 240-53113685

2.1.2 Applicability

This work instruction shall apply to the Electrical and C&I (EC&I) Department.

The work instruction is aimed at providing governance for Internal End-of-Phase Design Review (IEPDR) used to establish Design Baselines and does not necessarily apply to review of individual designs or documentation. Interim Design Review process as per Design Review Procedure 240-53113685 shall be used for other reviews.

2.1.3 Normative

- [1] Design Review Procedure [240-53113685]
- [2] Electrical Concept Design Baseline Checklist [240-75004727]
- [3] Electrical Basic Design Baseline Checklist [240-75004743]
- [4] Electrical Detail Design Baseline Checklist [240-75004765]
- [5] Electrical Hand-Over Package Checklist [240-7699198]
- [6] Meeting Agenda Template [240-59083227]
- [7] Meeting Minutes Template [240-56356288]
- [8] Engineering Policy [240-4332798]
- [9] End-of-Phase Design Review Report Template [240-57934588]

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2.1.4 Informative

[10] Eskom Internal Audit Procedure [240-53114190]

[11] Eskom Standard PLCM [32-1155]

2.2 DEFINITIONS

All definitions as indicated in the Design Review Procedure [1] shall apply to this document

Definition	Description
Engineering Work	As per Engineering Policy [240-4332798]
Project Database	Database containing a list of all projects registered with Engineering Work Delivery Unit.
Quorum	Minimum number of members of an assembly that must be present at a meeting for the decisions made to be considered valid and binding.
Microsoft SharePoint	Web application platform developed by Microsoft. The application uses web based tools to provide intranet portals, document and file management, collaboration, enterprise search, and business intelligence

2.2.1 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.3 ABBREVIATIONS

Abbreviation	Description
CoE	Centre of Excellence
C&I	Control and Instrumentation
DRP	Design Review Procedure
EC&I	Electrical and Control and Instrumentation (C&I)
EDWL	Engineering Design Work Lead
IEPDR	Internal End –of- Phase Design Review
LDE	Lead Discipline Engineering practitioner
MDR	Multi-Disciplinary review
MoM	Minutes of Meeting
PLCM	Project Life-Cycle Model
ROD	Record of Decision
SME	Subject Matter Expert
SSME	Supporting Subject Matter Expert

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2.4 ROLES AND RESPONSIBILITIES

The following are specific roles and responsibilities defined for participants during IEPDR:

a) Electrical Design Application CoE Manager

The Electrical Design Application CoE Manager shall ensure that each project has a competent Lead Discipline Engineering practitioner (LDE).

The Electrical Design Application CoE Manager shall be accountable for the integrity of the design application solutions provided by the project team. Upon completion of the IEPDR the manager shall sign the Record of Decision (ROD) which shall be an annexure of the IEPDR Minutes of Meeting (MoM) to confirm support to the LDE.

Electrical Design Application CoE Manager shall provide guidance to the LDE and assist in resolving any dispute that might arise during design reviews; this shall be conducted in conjunction with the Electrical Plant CoE Manager. The CoE Managers shall consult the LDE and Supporting Subject Matter Expert (SSME) during dispute resolution process.

b) Electrical Plant CoE Manager

The Electrical Plant CoE Manager shall ensure that each project has a competent Support Subject Matter Expert (SSME). The choice of SSME shall be based on how close the area of expertise matches the scope of work.

The Electrical Plant CoE Manager shall be accountable for the technical compliance of the Engineering Work in accordance with technical governance framework as per Engineering Policy [240-4332798]. Upon completion of IEPDR the manager shall sign the ROD of the IEPDR to confirm support to the SSME.

c) Lead Discipline Engineering practitioner

The Lead Discipline practitioner is a professionally registered engineer/technologist delegated by the CoE to manage the technical integrity of designs during asset creation and modification. The LDE is also held accountable for the management of all interfaces within their specific engineering discipline.

The LDE shall ensure that the IEPDR is scheduled in line with the project schedule to ensure that alignment is achieved within the electrical discipline prior to multidisciplinary End-of-Phase Design Review.

It is the responsibility of the LDE to chair the IEPDR. In his/her responsibility as the chair of the meeting he will facilitate the discussions and provide clarity where necessary. The LDE also carries the responsibility to approve the minutes of the design review meeting to confirm that they represent the proceedings accurately.

d) Design Review Secretariat

The chairperson of the design review meeting, which is normally the LDE, shall appoint the secretariat that will assist him or her to capture the minutes of the meeting.

Design review secretariat shall preferably be someone that understands the subject under discussion. This could be a project team member or anyone in the department

e) Subject Matter Expert

The CoE Engineering is a domain for knowledge experts focused on providing subject matter expertise to the engineering disciplines for design base creation and maintenance.

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Subject Matter Experts (SMEs) are responsible for providing the necessary assurance to the LDE and the project team that the engineering work performed is in accordance with best engineering practices and adheres to the relevant standards.

f) Support Subject Matter Expert

The Support Subject Matter Expert (SSME) shall act as a liaison between the LDE and the SMEs from Electrical Plant CoE as delegated by the Electrical Plant CoE Manager. SSME shall ensure that the relevant SMEs are invited to participate in reviews depending on the scope of work for the project.

SSME shall support the LDE throughout the project providing technical expertise and also assisting with the preparations for the design reviews. Where necessary, the SSME shall accompany the LDE to the discussions and design reviews conducted with other disciplines.

g) Design Review Panel

Design Review Panel shall be formed for each IEPDR. The panel shall be composed of engineering practitioners from Electrical Plant CoE and Electrical Design Application CoE. The panel shall be appointed by both LDE and SSME depending on the scope of work for the review concerned. The LDE and SSME shall consult their respective CoE managers prior to confirmation of the panel members.

All the members of the Design Review Panel shall sign-off the ROD of the IEPDR to declare acceptance of the minutes, hence confirming support of the resolutions taken.

h) Senior Manager EC&I

As the CoE Principal, the Senior Manager Electrical and Control and Instrumentation (EC&I) shall ensure that proper governance of Engineering Work is in place for technical assurance.

The Senior Manager EC&I shall be accountable for overall technical integrity of the engineering solution provided by the electrical project team while developing design baselines. This extends to the interfaces between electrical and C&I designs.

The minutes compiled in meetings held to review interfaces between electrical and C&I designs in preparation to for design baseline shall be issued to the Senior Manager EC&I for confirmation of support. If necessary, the senior manager shall chair the design review meetings between electrical and C&I project teams aimed at resolving interfaces.

The Senior Manager EC&I shall act as an adjudicator should a dispute arise between Electrical Design Application and Electrical Plant CoE with regards to the IEPDR.

2.5 PROCESS FOR MONITORING

This process shall be monitored by means of self-assessments.

2.6 RELATED/SUPPORTING DOCUMENTS

Supporting documents include:

1. Concept Design Report Template [240 – 49910679]
2. Basic Design Report Template [240 – 49910705]

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3. INTERNAL DESIGN REVIEW WORK INSTRUCTION

3.1 PROCESS FLOW DESCRIPTION

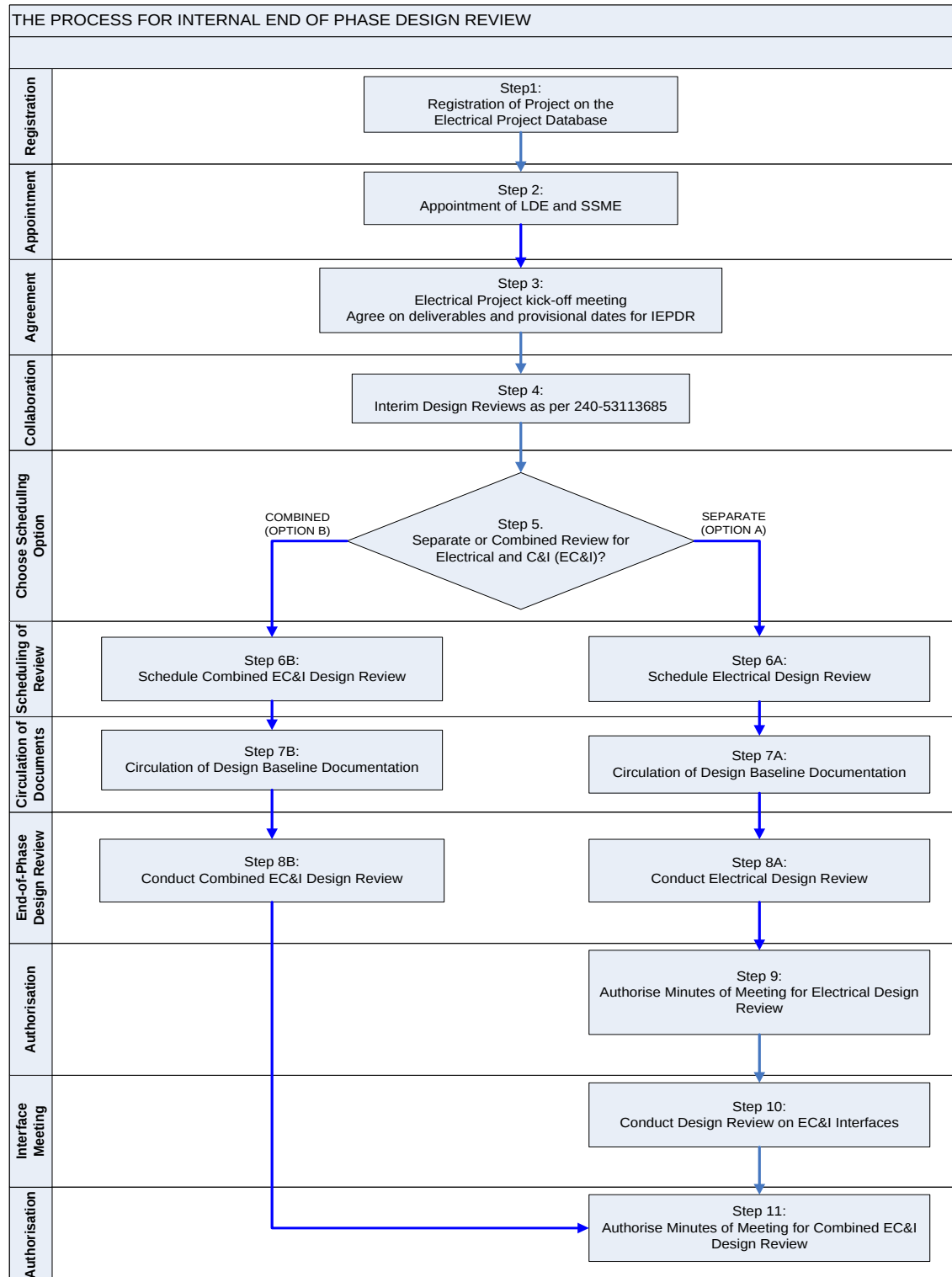


Figure 1: Internal End of Phase Design Review Flow Chart

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Step 1: Registration of Project on Electrical Project Database

A project is registered on Electrical Project Database listing all projects registered with Engineering Work Delivery Unit by the Electrical Design Application Manager or assigned Administrator.

Step 2: Appointment of LDE and SSME

Electrical Design Application CoE Manager shall appoint an Electrical LDE. The Electrical Plant CoE Manager shall also appoint the appropriate SSME to support the LDE based on the scope of the project.

Both appointments should be completed within 15 days of the work request being issued by Engineering Work Delivery Unit using the prescribed templates.

Step 3: Project Kick-off and Planning

The LDE, SSME and allocated project team member shall hold a kick-off meeting at the beginning of each phase of the Project Life-Cycle Model (PLCM) whereby the planning of the project shall be discussed. The LDE will be expected to present the project background as well as the scope of work to provide further clarity to the rest of the project team. The project team formation, roles and responsibilities shall also be defined during this meeting.

The LDE shall use the kick-off meeting to provide clarity on the list of Engineering Deliverables for project stage concerned using the Electrical Design Baseline Checklists listed in Section 2.1.3. The checklists are specific for electrical engineering deliverables during concept, basic and detail design stages. Additional checklist is also developed for electrical hand-over package.

The selection of the list of Engineering Deliverables shall be based on the scope of work for the project. This list should be accepted formally by the SSME as a basis for the definition of Design Baselines.

The LDE in collaboration with the SSME shall provide a high-level plan comprising of the target dates for project milestones at the kick-off meeting. The list of milestones shall include the End-of-Phase Design Reviews with the scheduled dates that will be formally accepted by the SSME.

The requirements for the quorum shall be agreed upon by the LDE and SSME.

In a project whereby the scope of work require involvement of Electrical and C&I disciplines, the respective LDEs shall ensure that the timing of Step 3 to 11 aligned to ensure synchronism leading up to the acceptance of the baselines and interfaces related to EC&I Engineering Work.

Step 4: Interim Design Reviews

As defined in Design Review Procedure [240-53113685], Interim Design Review is used to confirm the acceptance of Design Documentation issued by the Design Authority which could either be an internal or external party to Eskom. The Design Review Procedure also makes it clear that the Interim Design Reviews should be completed prior to MDR. Interim Design Reviews will therefore focus on ensuring completeness of the relevant deliverables within the project as defined during Project Kick-off as well as the acceptance by the relevant stakeholders.

It should be noted that a number of engagement sessions could be required to facilitate Interim Design Reviews aimed at addressing major deliverables prior to End-of-Phase Design Review. The use of Microsoft SharePoint is encouraged for the reviews for recording, tracking and collaboration purposes.

Collaboration between the LDE and SSME is highly encouraged during the scheduling and conducting of Interim Design Reviews that could be run on a day-to-day basis as per are Design Review Procedure [240-53113685].

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Step 5: Choosing the Approach to Internal End-of Phase Review

In principle, there are two possible options of how the IEPDR could be conducted which are described as follows:

A. Separate Internal Design Reviews

Each discipline (i.e. Electrical and C&I) shall host separate IEPDR whereby the designs and specifications of the discipline specific systems will be interrogated in detail. This option also allows for maximum participation by the affected role players within the discipline to ensure that the designs related discipline specific systems are complete and also comply with the relevant standards.

This option shall be considered for the following types of projects:

- i. Major or Mid-life Refurbishment Project which involves the refurbishment of various electrical and C&I systems
- ii. Large Greenfield Projects that involves multiple disciplines
- iii. Complex Greenfield Projects that is sometimes small but involves introduction of new technology whereby multiple disciplines are also involved.
- iv. Multidisciplinary Engineering Package developed by external engineering consultants

B. Combined EC&I Design Review

Provision is made for the Internal End-of-Phase Design Review to be combined for EC&I Department whereby the representatives from both disciplines will meet and review both the discipline specific designs as well as the interfaces between electrical and C&I systems.

The LDEs from Electrical and C&I shall agree on who shall lead the review depending on the scope of the project in consultation with the relevant SMEs from both disciplines. The LDEs shall also agree on the list of participants to ensure that the design baseline is accepted by all the affected role players.

This option shall be considered for the following types of projects:

- i. Single-discipline electrical project (i.e. Switchgear Replacement or Refurbishment Project, Power Systems Protection Upgrade Project, Transformer Replacement Project, Motor Replacement Project, Variable Speed Drive Upgrade Project, Essential Power Supply System Refurbishment Project, Generation Replacement Project, Excitation System Upgrade Project, etc.) whereby the scope of work is defined by electrical discipline.
- ii. C&I Upgrade or Refurbishment Project which excludes switchgear replacement or refurbishment and the scope of work is defined by C&I discipline
- iii. Multidisciplinary Engineering Package developed by external engineering consultants and provided to Eskom for review to ensure Technical Assurance.

Step 6A: Scheduling of Electrical Design Review

If Option A is chosen, the Electrical LDE shall schedule a meeting to conduct IEPDR that is specific for the electrical scope of work in consultation with the SSME. The LDE and the SSME shall also be responsible to identify the design review participants.

The appointment together with the Meeting Agenda shall be sent out at least ten (10) working days prior to the date of the design review.

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Step 6B: Scheduling of Combined EC&I Design Review

If Option B is chosen, the LDE chosen to coordinate the Combined EC&I End-of-Phase Design Review shall schedule a review meeting in consultation with the corresponding LDE and the relevant SMEs from both disciplines.

The appointment together with the Meeting Agenda shall be sent out at least ten (10) working days prior to the date of the design review. The agenda of the meeting that will cover both electrical and C&I scope will be agreed between the LDEs from both disciplines prior to the meeting.

Steps 7A and 7B: Circulation of Design Baseline Documentation

The LDE shall ensure that all the relevant documentation that helps to define the Design Baseline is circulated to the design review participants at least five (5) days prior to the review meeting.

NB: The individual documentation presenting designs and/or specification of major or critical systems shall be reviewed and approved through Interim Design Reviews prior to the End-of-Phase Design Review as defined in Step 4.

Step 8A: Conduct Electrical Design Review

The Electrical LDE shall conduct the meeting for Electrical IEPDR whereby the focus will be to ensure final acceptance of Design Baseline documentation by the Design Review Panel. The interfaces between the electrical equipment and systems will also be reviewed in detail during the Electrical IEPDR.

The design review shall be conducted in the form of a presentation. The presentation shall cover all the Engineering Deliverables agreed in Step 3. The LDE shall ensure the presentation/s is of good standard.

As the chairperson of the meeting, the LDE shall be responsible for the smooth running of the meeting whereby meeting etiquettes shall be maintained by all attendees. The LDE has the authority to call to order or even dismiss any attendee that is found destructive in the meeting.

The Design Review Secretariat shall be responsible to capture all the relevant points made in the meeting as guided by the chairperson.

Step 8B: Conduct Combined EC&I Design Review

After the review of the scope of work for each project, the C&I and Electrical LDEs shall decide if the approach of having combined review is suitable. The proposal for a Combined EC&I Design Review shall be approved by the Senior Manager EC&I.

Once the proposal for a Combined EC&I Design Review is approved, the Senior Manager EC&I shall appoint either the C&I or Electrical LDE to coordinate the review after consultation with the EC&I management team. The appointed LDE shall then be responsible to organise the design review meeting which he/she will facilitate and conclude.

The Combined EC&I Design Review meeting shall be attended by both LDEs, Electrical SSME and the relevant SME from C&I as a minimum. Provision should also be made for CoE Managers to attend.

The discipline specific LDEs shall ensure that the nominated panels members from both Electrical and C&I disciplines are invited to the meeting and the relevant Design Baseline documentation is shared with them. Electrical and C&I interface designs and philosophies shall form part of the focal points of the discussion during the Combined EC&I Design Review.

The design review meeting shall follow the same protocol presented in Step 8A.

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Step 9: Approval of Minutes of Meeting for Electrical Design Review

The Minutes of Meeting (MoM) taken during the Electrical Design Review and the documentation shall be made available for approval as soon as possible after the meeting is held so as to prepare for the Design Review on EC&I Interfaces.

The MoM shall be approved by the LDE as the chairperson of the meeting. The minutes will form part of the Record Of Decision (ROD) package which shall be signed-off by the CoE Managers to confirm acceptance and support of the outcome of the IEPDR.

Step 10: Conduct Design Review on EC&I Interfaces

Following the internal design review conducted by the Electrical and C&I disciplines in separate meetings, another meeting shall be scheduled to review Electrical and C&I interfaces so as to ensure alignment between the two disciplines prior to the Multi-Disciplinary Review (MDR) required for End-of-Phase Design Review as per Design Review Procedure [240-53113685].

The Design Review for EC&I Interfaces shall be held as soon as individual IEPDR minutes for both Electrical and C&I disciplines have been accepted. The LDEs shall ensure that the support and acceptance of the ROD for their respective IEPDR is done within reasonable timelines taking into account the target dates set for the project.

The LDEs from Electrical and C&I disciplines shall decide who will chair the meeting in consultation with the relevant SMEs. The choice of the chairperson shall be supported by CoE Managers and Senior Manager EC&I. The appointed chairperson of the design review meeting shall nominate the secretariat to help with the capturing of the minutes.

The meeting for Design Review for EC&I Interfaces shall be attended by both LDEs as a minimum. It is highly recommended that the Electrical SSME and the relevant C&I SME should attend to provide the relevant technical advice and guidance with regards to technical governance. Consideration shall also be made for the CoE managers to attend the design review meeting.

In some cases, the Senior Manager EC&I will chair the meeting depending on the criticality of the interface issues that need to be addressed.

The design review meeting shall follow the same protocol presented in Step 8A.

Step 11: Approval of Minutes of Meeting for EC&I Design Review

The MoM taken during the EC&I Design Review shall be made available for acceptance at least 5 days prior to the MDR to provide assurance on alignment between EC&I disciplines at the MDR.

The MoM shall be approved by the chairperson of the meeting. The minutes will form part of the ROD package which shall be signed-off by the CoE Managers to confirm acceptance and support of the outcome of the IEPDR.

3.2 DESIGN BASELINE DECLARATION

The Design Review Panel shall be responsible to declare the Design Baseline acceptable after validating that all the relevant requirements have been addressed accordingly. The basis for acceptance of the design shall be Electrical Engineering Design Baseline Checklists listed in 2.1.3, which help to define the specific electrical engineering deliverables for Concept Design, Basic Design, Detail Design and Hand-over Stages. Further, the list of deliverables and questionnaire contained in Generic End-of-Phase Design Review Checklists found in Appendix A shall also be used as a means to validate the acceptance of the Design Baseline at all the Project Stages. In stages where the Electrical Engineering Design Baseline Checklists are applicable, they shall be considered to be pre-requisite of the final validation of Design Baseline through the Generic End-of-Phase Design Review Checklists.

Design Baseline shall only be declared in a well-constituted design review meeting where the quorum requirements as defined by the SSME and LDE are met. The declaration for acceptance of the Design Baseline shall be done by consensus upon satisfaction of the Design Review Panel that all the critical items have been addressed.

Upon completion of the Electrical IEPDR, the LDE shall prepare the ROD to capture the declaration of the baseline from the discipline perspective. Refer to Appendix B for the template of the ROD. The ROD together with MoM should be completed within ten working days and submitted to Electrical CoE management for support. The ROD for the Electrical IEPDR shall be signed-off by the SSME, Design Review Panel and the CoE Managers from both Design Application CoE and Electrical Plant CoE sections, as a minimum.

In case of major dispute, The LDE in consultation with SSME shall refer the outstanding issue/s to the Electrical Design Application CoE Manager for resolution. The Electrical Design Application CoE Manager shall be responsible to obtain a suitable solution in consultation with the Electrical Plant CoE Manager, failing which the matter shall be referred to the Senior Manager EC&I for adjudication

Upon completion of the EC&I Design Review, the chairperson of the meeting shall prepare only the Declaration of Design Baseline Acceptance form found in Appendix B, Pages 30 and 31 (**NB:** Not the complete ROD), for signatures by the Design Review Panel to confirm the declaration of the baseline from perspective of the EC&I department. Any dispute arising from the EC&I Design Reviews shall be resolved by the Senior Manager EC&I. If all the necessarily conditions for Design Baseline for EC&I engineering work are met, the Declaration of Design Baseline Acceptance form shall be completed within five working days and submitted to Senior Manager EC&I for support. In case the Senior Manager EC&I chaired the design review meeting, the secretariat of the EC&I Design Review shall be responsible to prepare the Declaration of Design Baseline Acceptance form.

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Lungile Malaza	Middle Manager: Electrical Design Application CoE
Miranda Shilubane	Switchgear and DC Design Application Manager (Acting)
Nonkululeko Mabaso	Rotating Machines and Design Application Manager

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5. REVISIONS

Date	Rev.	Compiler	Remarks
October 2013	0.1	T. Njapha	Initial draft
November 2013	0.2	T. Njapha	Consolidated comments post 1 st workshop
December 2013	0.3	T. Njapha	Rev 0.2 comments incorporated
January 2014	0.4	T. Njapha	Further comments post workshop held in December.
February 2014	0.5	T. Moroaswi	Further comments after incorporation of electrical engineering design baseline checklists.
March 2014	0.6	T. Moroaswi	Final comments after incorporation of generic design baseline checklists and acceptance criteria.
March 2014	0.6	T. Moroaswi	For authorisation.
August 2014	1	T. Moroaswi	Revised to align the Generic End-of-Phase Design Review Checklists with the End-of-Phase Design Review Report Template [240-57934588] Final document authorised for Publication as Rev 1
September 2014	1.1	T. Njapha	Modified Authorisation table. Deleted empty rows of tables in appendices. Corrected Appendix A5 table numbering. Modified heading for Design baseline documentation table.
September 2014	2	T. Njapha	Final document for Authorisation and Publication

6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Thulile Njapha
- Tiego Moroaswi

7. ACKNOWLEDGEMENTS

The following person is acknowledged for valuable inputs provided during the development of the document:

- Etienne Du Preez

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APPENDIX A: GENERIC END-OF-PHASE DESIGN REVIEW CHECKLISTS

NB: Refer to End-of-Phase Design Review Report Template [240-57934588] to ensure alignment between the Generic End-of-Phase Design Review Checklists.

APPENDIX A1: STAKEHOLDER REQUIREMENTS REVIEW CHECKLIST

	Checklist Item	✓
1	Signed Stakeholder Requirement documentation	
2	Review and establish the need and objectives for the project	
3	Scope of work defined	
4	Identify and resolve conflicting requirements	
5	Legal and regulatory constraints identified	
6	System Operability and Maintainability targets identified	
7	System Performance Requirements identified	
8	Establish complete and agreed Required Operating Capability (ROC) baseline	
9	Constraints or limitations to the project identified	
10	Define site characteristics available vs required	
11	Dismantling and demolition requirements	
12	Key dates identified	
13	State assumptions	
	In case of a refurbishment project, the following further items might be considered:	
14	Plant/ System Description	
15	Plant/ System Operating and Control Philosophies (High-level Philosophies)	

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16	User Requirement Specification (Functional Requirements)	
17	Plant/ System Operating and Maintenance Requirements	
18	Site Specific Safety, Health and Environmental Requirements	
19	Site Specific Quality Requirements	
20	Project Budget	
21	Documentation Minimum Requirements	
22	Project Hand-Over Requirements	

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APPENDIX A2: CONCEPT DESIGN REVIEW CHECKLIST

	Checklist Item	✓
1	Signed Stakeholder Requirements Definition (SRD)	
2	SRD Compliance/Deviations Schedules	
3	Identify and Resolve Conflicting Requirements	
4	Legal and Regulatory Constraints considered	
5	Operability and Performance Targets Met	
6	Safety, Plant Availability / Reliability Aspects Addressed	
7	Design Deficiencies of the Past Addressed in the New Design	
8	Conceptual RAM Assessments and Preliminary RAM Analysis Report	
9	Execution / Build feasibility and Risks (Site Selection)	
10	Operational Concept Specifications	
11	Process Flow Conceptualised	
12	Documentation and IM Requirements Identified	
13	Conceptual Design Analysis (Risk, Trade – off, Feasibility, Viability)	
14	Environmental Assessment	
15	Technology Maturity and Market Availability Assessed	
16	CAPEX Cost Estimation	
17	Change Register including List of Engineering Change Proposals (ECP)	

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APPENDIX A3: BASIC DESIGN REVIEW CHECKLIST

	Checklist Item	✓
1	Signed Concept Design Review Report	
2	Process Design Complete	
3	Preliminary (Physical) Design Complete	
4	Operability and Performance Requirements Met	
5	Energy Conversion and Cycle Net Efficiency	
6	Provision for Maintainability and Logistic Support	
7	Replaceability and Upgradeability Considered	
8	Electrical Protection, Recording, Alarming, Indication, Condition Monitoring Considered	
9	Compliance to Specifications and other Mandatory Requirements	
10	Reliability, Availability and Maintainability (RAM) Assessment	
11	Environmental Impact and Compliance	
12	Execution Plan, Constructability and Market Identification	
13	Validation against Concept Design Review / Concept Baseline	
14	Project Design Philosophies and Criteria Defined	
15	Expected Project Life Cycle	
16	Dismantling and Demolition Requirements	
17	Risk Assessment and Risk Mitigation Evaluated	
18	Levelised Life Cycle Costs	
19	Total Cost of Ownership (TCO) Evaluation including Obsolescence Management Considered	

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	Documentation Requirements	
20	System Process Flow Design	
21	Preliminary/ Process Design	
22	Preliminary Engineering Implementation Plan	
23	Preliminary (Physical Design) Drawings	
24	Environmental Impact Assessment Documentation	
25	Financial Assessment Documentation	
26	Applicable Codes and Standards	
27	Operational Capability Specifications (Including Net Cycle Efficiency)	
28	Functional Specifications	
29	Information Management (IM) Requirements Assessment	
30	Risk Assessment	
31	Operability and Performance Specification	
32	Maintenance and Logistical Support	
33	Basic RAM Analysis Report	
34	Interface Register	
35	Assessment Report on Compliance with Stakeholder Requirements Definition (SRD)	
36	Change Register including List of Engineering Change Proposals (ECP)	

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APPENDIX A4: PRE-ENQUIRY REVIEW CHECKLIST

	Checklist Item	✓
1	Ensure Technical Integration between Work Packages (Interfaces between various Work Packages, Contractors, or Contracts)	
2	Re-enforce and Agree on Enquiry Specification (e.g. Works Information) Requirements	
3	Identify and Resolve all Responsibility (roles and responsibilities) and/or Scope of Work Clashes	
4	Compliance with Design Basis	
5	Scope and Deliverables defined for each System	
6	Means of Compliance determined	
7	Design Execution Process defined	
8	Quality Control measures defined	
9	Interfaces defined including Technology Management	
10	Design Methodologies	
11	Establish an agreed Enquiry Specification Baseline	
12	Environmental Assessments done (if applicable)	
13	Configuration Management Requirements defined	
14	Project Quality Assurance (QA) Requirements	
	Documentation requirements	
15	Enquiry Specification (e.g. Works Information)	
16	Vendor Document Submittal Schedule (VDSS)	
17	Limit of Supply and Services (LOSS)	
18	Site and Plant Area Layout Drawings	
19	Electrical Power Reticulation System	

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20	Procurement Strategy	
21	Acceptance Criteria including Gatekeepers	
22	Tender Returnables	
23	Risk Assessment Report and Register	
24	Project and Engineering Schedules	
25	Change Register including List of Engineering Change Proposals (ECP)	

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APPENDIX A5: CONTRACT AWARD REVIEW CHECKLIST

	Checklist Item	✓
1	Assessment of Compliance with Enquiry Specification (including Applicable Codes and Standards)	
2	Assessment of Contractor's Wavers and Exceptions	
3	Assessment of Interfaces between Systems Identified and Clarified	
4	Applicable Technical Evaluation Report/s and Clarification Meeting/s Minutes	
5	Equipment Qualification, Verification & Validation and Test Plan	
6	Constructability Checks (Tolerances, Interfaces, Signal Flows, etc)	
7	Confirm Operability and Human Factors	
8	Operating and Maintenance (O&M) Manuals	
9	Vendor Document Submittal Schedule (VDSS)	
10	Assessment Report on Compliance with Stakeholders Requirements Definition (SRD)	
11	Risk Assessment	
12	Change Register including Technical Deviation Schedules	

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APPENDIX A6: DESIGN FREEZE REVIEW CHECKLIST

	Checklist Item	✓
1	Vendor Document Submittal Schedule (VDSS)	
2	All Documents on Project Master Document List (Acceptance Status of Document to be Verified)	
3	Applicable Limit of Supply and Services (LOSS) Register - Interdisciplinary Design Clashes rectified - Subsystem Interface Issues resolved	
4	Applicable Terminal Point Register - Interdisciplinary Design Clashes rectified	
5	Compliance with Project Master Plan (Alignment of Target Dates with Applicable Milestones)	
6	Assessment Report on Compliance with Stakeholder Requirement Specification (SRD)	
7	Assessment Report Confirming Human Safety during Operating and Maintenance (e.g. HAZOP).	
8	Assessment Report Confirming that Plant will Operate Safely within Specified Design Margins	
9	Assessment Report Confirmation Conformance of Design, Manufacturing and Installation	
10	System Reliability Availability and Maintainability (RAM) Analysis Report	
11	Failure Mode, Effect and Criticality (FMECA) Analysis Report	
12	Final System Specifications	
13	Total Cost of Ownership (TCO) evaluation including Obsolescence Management	
14	Change Register including List of Engineering Change Proposals (ECP) and Technical Deviation Schedules	

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APPENDIX A7: SYSTEM INTEGRATED DESIGN REVIEW CHECKLIST

	Checklist Item	✓
1	Compliance with Enquiry Specification (e.g. Works Information)	
2	Assessment Report on Compliance with Stakeholders Requirements Definition (SRD)	
3	Vendor Document Submittal Schedule (VDSS)	
4	Master Document List (MDL) with Eskom Document/Drawing Numbers showing Approval Status of each Document/Drawing	
5	Conformance with Specifications, Code and Standards.	
6	Assessment of Compliance to Design Basis (i.e. Design Criteria and Philosophies)	
7	Assessment of Compliance to Statutory Requirements	
8	Review of System Simulation Results and Design Calculations	
9	Applicable Limit of Supply and Services (LOSS) Register	
10	Applicable Terminal Point Register	
11	Equipment Qualification, Verification & Validation and Test Plan	
12	Constructability Review (Constructability Checks (Tolerances, Interfaces, Signal Flows etc.))	
13	Confirm Operability and Human Factors	
14	Operating and Maintenance Philosophies	
15	Information Management (IM) Requirements Assessment	
16	Configuration Management Methodology (including Plant Codification)	
17	Execution Plan (including Works Packages Integration Plan, Construction Analysis and Sequence of Construction and Commissioning Activities)	
18	Project Quality Plan (Covering Quality management System (QMS) and Quality Assurance (QA) Principles)	

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19	Quality Control Plans (Covering Construction and Commissioning Activities)	
20	Control and Testing Philosophy including Site Acceptance Testing (SAT) Methodology	
21	Multiple Unit Trip (MUT) Exposure Assessment	
22	Risk Assessment and Review of Risk Register	
23	Equipment Data Package or Quality Dossier including the following: • Equipment Designs Drawing List with Eskom Drawing Numbers • Equipment Design Standards and Specifications • Design Drawings - Electrical Power Reticulation System (Single-Line Diagrams (SLD)), General Arrangement Drawings, Protection and Control Schematic Diagrams, Wiring Diagrams, Functional/Logic Diagrams, etc. • Applicable Process and Instrumentation Diagrams (P&IDs) • Switchgear/Load Schedules • Equipment/Component List • Plant, System and Equipment Codes (e.g. KKS Codes, AKZ Codes) • Equipment Data Sheets • Cable Schedules • Technical Manuals • Equipment Operating and Maintenance Manuals • Engineering, Operator and Maintenance Training Manuals • Maintenance Plans • Spares Requirements • Equipment Test Reports • Equipment/Components Test Certificates • Test Equipment Calibration Certificates • Equipment Warrantees/Guarantees • etc.	
24	Dismantling and Demolition of Existing Systems	
25	Change Register including List of Engineering Change Proposals (ECP) and Technical Deviation Schedules	

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APPENDIX A8: PRE-COMMISSIONING REVIEW CHECKLIST

	Checklist Item	✓
1	Execution Plan (including Works Packages Integration Plan, Construction Analysis and Sequence of Construction and Commissioning Activities)	
2	Master Document List (MDL) with Eskom Document/Drawing Numbers showing Approval Status of each Document/Drawing	
3	Commissioning Quality Control Plans	
4	Control and Testing Philosophy including Site Acceptance Testing (SAT) Methodology	
5	Equipment Data Package or Quality Dossier - 'AS CONSTRUCTED' Status	
6	Subsystem Interface Issues Resolved	
7	Interdisciplinary Design Clashes Resolved	
8	Commissioning Procedure/s and Checklists	
9	Safety Clearance Requirements	
10	Plant Codification Verification and Validation	
11	Compliance to Maintenance and Operating Requirements	
12	Multiple Unit Trip (MUT) Exposure Assessment	
13	Risk Assessment and Review of Risk Register	
14	Change Register including List of Engineering Change Proposals (ECP) and Technical Deviation Schedules	

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APPENDIX A9: ACCEPTANCE TESTING REVIEW CHECKLIST

	Checklist Item	✓
1	Execution Plan (including Works Packages Integration Plan, Construction Analysis and Sequence of Construction and Commissioning Activities)	
2	Master Document List (MDL) with Eskom Document/Drawing Numbers showing Approval Status of each Document/Drawing	
3	Equipment Data Package or Quality Dossier - 'AS BUILT' or 'AS COMMISSIONED' Status	
4	Verification that Physical Architecture (i.e. Actual Configuration) Conforms to the "Built-to-Specification"	
5	Verification that Plant Performance and Functions meet Contractual Requirements	
6	Final Process Optimisation Review (including Reliability, Availability and Maintainability Analysis)	
7	Protection Configurations and Settings for Electrical Systems	
8	Control Configurations and Settings for Electrical Systems	
9	Data Communication Architecture and Configurations for Electrical Systems	
10	Integration Requirements for Electrical Protection and Control Systems	
11	Validation of Assumptions made during the Design Phases	
12	Initial "Snap-Shot" of Plant and Process Performance Data Recorded and Documented	
13	Verification that Hazards and Operability (HAZOP) Studies and Failure Mode, Effects and Criticality Analysis (FMECA) issues have been considered.	
14	Validated Commissioning Report/s	
15	Validated Commissioning Procedure/s and Checklists	
16	Plant Codification Verification and Validation Report or Sign-off	

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17	Compliance Report for Verification of Maintenance and Operating Requirements	
18	Multiple Unit Trip (MUT) Exposure Assessment	
19	Risk Assessment and Review of Risk Register	
20	Change Register including List of Engineering Change Proposals (ECP) and Technical Deviation Schedules	

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APPENDIX A10: HANDOVER REVIEW CHECKLIST

	Checklist Item	✓
1	Master Document List (MDL) with Eskom Document/Drawing Numbers showing Approval Status of each Document/Drawing	
2	Equipment Data Package or Quality Dossier - 'AS BUILT' or 'AS COMMISSIONED' Status	
3	Recommended Maintenance and Operating Procedures	
4	Final Maintenance Plans	
5	Final Test and Inspection Plans	
6	Assessment Report on Compliance with Stakeholders Requirements Definition (SRD)	
7	Change Register including List of Engineering Change Proposals (ECP) and Technical Deviation Schedules	

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APPENDIX B: THE RECORD OF DECISION TEMPLATE (SAMPLE REFERENCE ONLY)

(Refer to the SAMPLE template as information only in terms of the required contents. When developing a specific Record please use the correct and required authorised template available from the Eskom Document Management System only)

PROJECT NAME:

PROJECT DESCRIPTION:

REVIEW LEVEL:

- 4

Component Design
- 3

System confined to one discipline.
- 2

System involves multiple disciplines.
- 1

System involves multiple business units.

Design Review Approval:

INITIALS AND SURNAME

DESIGNATION

DATE

C

C

Y

Y

M

M

D

D

SIGNATURE

Design Review Date:

Y

Y

Y

Y

M

M

D

D

Design Review Baseline:

This Record of Decision (ROD) details the activities performed during the following End-of-Phase Design Review in the establishment of the associated Design Baseline:

End-of-Phase Design Review and associated Design Baseline		Mark with ("X")
Stakeholder Requirements Review	Stakeholder Requirements Baseline	
Concept Design Review	Concept Design Baseline	
Basic Design Review	Basic Design Baseline	
Pre-Enquiry Review	Acquisition Requirements Baseline	
Contract Award Review	Contract Award Baseline	
Design Freeze Review (Detail Design)	Design Freeze Baseline	
System Integrated Design Review (Detail Design)	Integrated Design Baseline	
Pre-Commissioning Review	As-Built Baseline	
Acceptance Testing Review	As-Commissioned Baseline	
Handover Review	Handover Baseline	

Design Review Decision Classification:

CLASSIFICATION	✓	COMMENTS
APPROVED		
CONDITIONALLY APPROVED WITH MINOR ADJUSTMENTS		
NOT APPROVED WITH REWORK		
REJECTED		

[illegible]

[illegible]

CONTENTS OF DESIGN BASELINE DECLARATION

- 1. PLANT OR SYSTEM DESCRIPTION**
- 2. SCOPE DESCRIPTION**
- 3. LIST OF DESIGN BASELINE DOCUMENTATION**
- 4. PRESENTATION**
- 5. FINDINGS**
- 6. CONCLUSIONS**
- 7. RECOMMENDATIONS**
- 8. ACTION LIST**

1. Plant or System Description

<actual contents will be added in document when created>

2. Scope Description

<actual contents will be added in document when created>

The following documentation is considered to be part of the design baseline upon the sign-off of this report:

[illegible]

4. Design Review Presentation

<actual contents will be added in document when created>

5. Technical Findings

Item No.	Description of Identified Issue and Cause	Impact Analysis
1		
2		
3		
4		
5		
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8		
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10		
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12		
13		
14		
15		

6. Conclusions

<actual contents will be added in document when created>

7. Recommendations

<actual contents will be added in document when created>

8. Action List

Item No.	Action Item Description	Responsible Person	Target Date
1			
2			
3			
4			
5			
6			
7			
8			
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