Eskom	Scope Of Work	Generation

Title: **Kriel Power Station Splicing of Steel Cord and Plied Textile Reinforced Conveyor Belts Scope of Work**

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TABLES

1. INTRODUCTION

Kriel Power Station uses belt conveyors for transportation of bulk materials. The belts on the Coal Plant and Dust Handling Plant are plied textile and steel-cord type respectively. The belt sections are joined by hot-splicing method.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document scope is the Hot-Splicing of Kriel Power Station Steelcord and Fabric Belts.

2.1.1 PURPOSE

The purpose of this document is to specify the works and quality requirements for Hot-Splicing of Kriel Power Station Steelcord and Fabric Belts.

2.1.2 APPLICABILITY

This document is applicable to Kriel Power Station.

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 NORMATIVE

[1] ISO 9000	Quality Management Systems
[2] OSH Act	Occupational Health and Safety Act (Osh Act; Act 85 of 93)
[3] 240-120532564	Splicing and Repairs of Steel Cord - and Textile/Plied Reinforced Conveyor Belting
[4] SANS 1366:2013	Steel cord Reinforced Conveyor Belting.
[5] SANS 1173:2013	Fabric Reinforced Conveyor Belting.
[6] SANS 485:2009 Edition 1	Conveyor Belting - Splicing of steelcord conveyor belting.
[7] SANS 484-1:2009 Edition 1	Conveyor Belting - Step splicing for multiply textile reinforced rubber covered conveyor belting - Hot-splicing method.

2.2.2 INFORMATIVE

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2.3 DEFINITIONS

Table 1: Definitions

DEFINITION	DESCRIPTION
Approved	Approved in writing by the Engineer
Client	Eskom Kriel Power Station
Competent Supervisor	Supervisor from Eskom Kriel Power Station trained in basics of belt splicing
Contractor	Company to execute the splice or repair.
Engineer	The responsible Engineer at Eskom Kriel Power Station Coal Plant
Repair	A repair is defined as any work performed on a conveyor belt after the original pressing where any material has been removed and/or replaced irrespective of size
Splicer	Contractor representative who is trained to execute the splice.
Splicer Supervisor	Team leader for Contractor who is trained to execute the splice

2.3.1 DISCLOSURE CLASSIFICATION

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

2.4 ABBREVIATIONS

Table 2: Abbreviations.

Abbreviations	Description
AKZ	Anlagen Kenn Zeichnungs
OHSA	Occupational Health and Safety Act
QC	Quality Control
QCP	Quality control program/plan/procedure
SHE	Safety, Health & Environmental
SHEQ	Occupational Safety, Health, Environmental, and Quality
SOW	Scope of Work
EA	Each
IRHD	International Rubber Hardness Degrees
QTY	Quantity
UOM	Unit of Measure

2.5 ROLES AND RESPONSIBILITIES

Roles and responsibilities are as follows:

- **System Engineer:**
  - To draft the scope of work.
  - To apply requirements of specified standards during the repair or splicing of a belt to ensure strict quality control of the process and thereby providing quality assurance on behalf of Eskom.
  - To attend to quality intervention points and perform inspections.
- **Quality Inspector:**
  - To ensure technical quality requirements are met and Quality Management processes/ procedures are followed.
  - To attend to quality intervention points and perform inspections.
- **Contractor:**
  - To execute splicing and repair on conveyor belts.
  - To ensure compliance to the requirements outlined in this standard,
- **Client Supervisor**:
  - To assist with application of permits to work.
  - To assist with lowering of counterweights.
  - To assist with commissioning after completion of works.

3. THE *WORKS*

The *works* is the repair and hot-splicing of conveyors belts, steel cord and plied textile.

3.1 BACKGROUND

Table 3 below lists the plant areas and belt specifications.

Table 3: Plant areas and Belt Specifications.

PLANT AREA/ SECTION	BELT SPECIFICATIONS	FUNCTIONAL LOCATIONS
UNDERSTAITHE BELT CONVEYOR	BELT, CONVEYOR: WIDTH: 900 MM; CLASS: 630/EP630; PLY: 3; MATERIAL: NYLON/ POLYESTER; BOTTOM COVER THICKNESS: 2 MM; TOP COVER THICKNESS: 4 MM; SPECIFICATION: DIN 22 102; SANS 1173-2006; TYPE: N; CLASS EP630/3	05-00PC51 05-00PC52 05-00PC53 05-00PC54 05-00PC55 05-00PC56 05-00PC57
INCLINE BELT CONVEYOR	BELT, CONVEYOR: WIDTH: 900 MM; CLASS: 630/EP630; PLY: 4; MATERIAL: NYLON /POLYESTER; BOTTOM COVER THICKNESS: 2 MM; TOP COVER THICKNESS: 4 MM; SPECIFICATION: DIN 22 102; SANS 1173-2006; TYPE: N; CLASS EP630/4	05-00PC61 05-00PC62 05-00PC63 05-00PC64 05-00PC65 05-00PC66 05-00PC67
OVERLAND BELT CONVEYOR	BELT, CONVEYOR: WIDTH: 1.05 M; LENGTH: 360 M; CLASS: ST1000; MATERIAL: RUBBER REINFORCED/STL CORD GALV; BOTTOM COVER THICKNESS: 8 MM; TOP COVER THICKNESS: 9 MM; SPECIFICATION: SABS 1366-1982; TYPE: M; OVERALL THICKNESS: 17 MM; CORD DIAMETER NOMINAL 4.3MM; PITCH NOMINAL 13.6MM; CONSTRUCTION 7; VA TABLE C-1; NUMBER OF CORDS 74; BREAKING STRENGTH MIN 13KN; MASS OF MIN 18.4KG/SQ METER; NOTE: VA 3.5.1	05-00WF01 05-00WF02

3.2 DESCRIPTION OF THE *WORKS*

The *works* entails hot-splicing and repairs of conveyor belts on the Coal and Dust Handling Plant.

3.2.1 SCOPE

3.2.1.1 HOT SPLICING

The Contractor shall:

1. DESIGN the splice and parameters applicable to the belt and in accordance with Eskom Standard for splicing (**240-120532564-Splicing and Repairs of Steel Cord - and Textile/Plied Reinforced Conveyor Belting**).
2. SUBMIT the splice design and Quality Control Plan to the Engineer for review and approval a day prior to arriving on site.
3. PRODUCE all material specifications documents and equipment calibration certificates.
4. MEASURE and RECORD the weather conditions- humidity and temperature.
5. DETERMINE the splicing area in conjunction with Client Supervisor.
6. PREPARE the belt and area for splicing. **Client Supervisor to assist with application of permits and lowering of counterweights.**
7. MARK, CUT and PREPARE the belt as per the approved splice design.
8. PERFORM a trial assembly of the belt ends
9. POSITION the press and ASSEMBLE the belt ends.
10. CURE the splice and RECORD the curing parameters.
11. REMOVE tools and DO housekeeping.
12. COOL OFF the press after curing time has elapsed.
13. REMOVE the press and INSPECT the splice.
14. SIGN OFF the permit to work. **Client Supervisor to assist with clearing of permits.**

3.2.1.2 ON-SITE BELT REPAIRS

The Contractor shall:

1. IDENTIFY the type of belt defect/damage in conjunction with Client Supervisor.
2. SUBMIT an on-site repair procedure for approval by the Client Engineer prior to any repair being undertaken.
3. APPLY for permit to works.
4. PREPARE the belt and area for repairs. **Client Supervisor to assist with application of permits and lowering of counterweights.**
5. CLEAN and REMOVE contaminants in preparation for the repair.
6. REPAIR the belt defect/damage as per the approved procedure.
7. SIGN OFF the permit to work. **Client Supervisor to assist with clearing of permits.**

3.2.2 BILL OF QUANTITIES

Table 4: Bill of Quantities.

NO	PLANT AREA/ SECTION	ACTIVITY	QUANTITY	UOM
1.1	**UNDERSTAITHE BELT CONVEYOR**	Hot Splicing	40	EA
2.1	**INCLINE BELT CONVEYOR**	Hot Splicing	70	EA
3.1	**OVERLAND BELT CONVEYOR**	Hot Splicing	70	EA

3.2.3 GENERAL REQUIREMENTS OF THE WORKS:

- The contractor shall as a minimum meet the following requirement [**240-120532564- Splicing and Repairs of Steel Cord - and Plied Textile Reinforced Conveyor Belting**].

3.2.3.1 Procedure

- The splicer shall determine, in conjunction with the engineer/supervisor, the position of the splicing workstation to ensure the best possible splice,
- The splicer supervisor shall take a humidity reading before commencing with the splice preparation. A proper tent cover shall be erected over the splice workstation if:
    - The humidity is exceeding 70% (measured with hygrometer). Heaters shall be provided by the splicing contractor to dry the air inside the tent cover, or
    - There is enough reason to expect rain or fog during the splicing exercise.
- No two splices shall be made within a length of the belt less than or equal to the center distance between two drive pulleys.

3.2.3.2 Equipment and Material

3.2.3.2.1 Press

- The press shall be capable of exerting the required pressure and maintaining a controlled temperature to suit the range of belting constructions to be repaired as detailed in the preceding sections under splicing,
- The platens shall be of suitable design to ensure uniform loading across the surface of the belting,
- The press shall be checked at regular intervals with a straight edge to ensure platen flatness and for even temperature distribution,
- The platens shall be at least 100 mm wider than the belting to be repaired and the overlap of the platens on to the portion of the belt outside the repair area shall be a minimum of 50 mm,
- For the edge repair, the mould bars (side-bars) shall be slightly thinner (one millimetre) than the belting to be repaired to constrain the repair width and to prevent the repair spreading under pressure.

3.2.3.2.2 Shelf Life of Materials

- Materials used for covers complies with the requirements as defined in SANS 1366 and SANS 1173,
- All material should be stored at an ideal temperature of between 16°C to 18°C.
- Solutions are marked with “Expiry Dates”;
- Rubber marked with “Manufacturing Date”;
- Batch numbers of the products must be recorded on the relevant Quality Control documentation, and
- The datasheet identifies all the possible rubber compound tests that are required to determine suitability with conveyor belting used in ESKOM.

3.2.3.2.3 Monitoring Equipment

- The instruments used to record data are a hand-held humidity/temperature measurement instrument.
- A digital hand-held instrument monitors the temperatures of the press elements.
- Thermocouples are mounted on the top and bottom elements to provide temperature of both elements throughout the vulcanising process.
- Spare thermocouples should be available in case the thermocouples are damaged.
- A minimum of three (3) thermocouples shall be used.

3.2.3.3 Weather Conditions

- The following parameters shall be adhered to before a splice preparation can start:
  - Relative Humidity : should be below 70%
  - Sun : do not expose material to direct sun
  - Dust : less than 2 mg/cm^3

3.2.3.4 Splice Identification

- Each splice will have embossed on the top cover the contractor’s emblem with splice number and date of splice. The identification details must be positioned approx. 150 mm from the edge of the conveyor belt.
- Each splice shall be marked as follows:
  - Markings shall be a minimum of 1.5 to 2 mm deep and within 150 mm of the belt edge.
  - Steel stencil plates positioned within the vulcanising press on the return side of the belt.
  - Contractor's name or logo.
  - A unique splice number.
  - Month and year completed
  - Letter size shall be 50 mm (minimum)
- No splice will be accepted unless all requirements within this document have been met.

3.2.3.5 Tests and Inspections

- After completion of the splice/repair the splice/repair must be inspected for any defects such as blisters or lifting. The splice/repair supervisor together with the clients engineer will determine whether the defects are acceptable,
- After completion of the splice/repair the hardness of the material in the splice/repair area, must be measured with a shore hardness tester. Test results must be compared with the data sheet of the splice-kit supplier,
- For splices/repairs select nine (9) places on both the top and bottom covers (i.e. three (3) across the leading edge, three (3) across the centre and three (3) across the trailing edge) and record the hardness obtained. See Appendix F and G for splices and Appendix L for belt repairs on **240-120532564- Splicing and Repairs of Steel Cord - and Plied Textile Reinforced Conveyor Belting.**
- The average shore hardness obtained for the splice/repair shall be within five (5) units of the nominal hardness as specified by the materials manufacturer,
- Any individual reading of more than five (5) units below the nominal hardness specified by the materials manufacturer shall be cause for investigation and possible rejection. This deviation must be reported to the clients engineer, and
- When taking the hardness measurement, the splicer/repairer must consider the temperature of the splice/repair. Higher temperature may yield incorrect readings.
- All the testing is done with a hand-held Shore A durometer or IRHD meter would be suitable instrument to carry out such a test.
- All temperature/humidity recording is done via Thermo-Hygro instrument or equivalent. The top and bottom element temperatures monitoring via surface contact with the use of a Digital Thermometer or equivalent.

3.2.3.6 Guarantee of Services

- The Contractor shall guarantee his workmanship and materials for a minimum period of three (3) years following the completion of the splice.
- For steel cord belting there shall be a one (1) year guarantee against visual evidence of oxidation/corrosion of the steel cords.
- All repairs done on conveyor belting shall carry the same guarantee as the parent belt.

3.2.4 DOCUMENTATION SUBMISSION AND RECORDING

1. Quality Control Plan (QCP)
2. Material Safety Data Sheets (MSDS)
3. Equipment Calibration Certificates
4. Method Statement

3.3 STANDARDS, SPECIFICATIONS AND PROCEDURES

All material and equipment shall be new and of the standard and quality specified.

The design and manufacture of equipment and the complete installation shall be carried out and tested in accordance with the latest issue or amendments of the following Standards and Regulations, as applicable:

Document Number	Title
Eskom Standards	
240-30008949	Safety, Health and Environmental Specifications for Contractors
240-55944466	Supplier Contract Quality Requirement's Specification
QM 58	Supplier Contract Quality Requirements
240-120532564	Splicing and Repairs of Steel Cord - and Plied Textile Reinforced Conveyor Belting
General Standards	
ISO 9001	Quality Management Systems.
OSH Act 85 of 1993	Occupational Health and Safety Act and Regulations Act 85 of 1993.
SANS 1366:2013:	Steel cord Reinforced Conveyor Belting.
SANS 1173:2013:	Fabric Reinforced Conveyor Belting.
SANS 485:2009 Edition 1:	Conveyor Belting - Splicing of steelcord conveyor belting.
SANS 484-1:2009 Edition 1:	Conveyor Belting - Step splicing for multiply textile reinforced rubber covered conveyor belting - Hot-splicing method.
SANS 1366	Conveyor belling - Steel cord reinforced construction
SANS 1173	Conveyor belting - General purpose textile-reinforced construction
OHS Act	The Occupational Health and Safety Act, Act No. 85 of 1993 (OHS Act).

4. AUTHORISATION

This document has been seen and accepted by:

Name	Designation	Signature
	Senior Advisor Technical Support	

5. REVISIONS

Date	Rev.	Compiler	Remarks
August 2023	1		First Revision

6. Appendices