CONVEYOR MANUFACTURERS ASSOCIATION OF SOUTH AFRICA NPC

TECHNICAL DOCUMENT

GUIDELINE FOR THE REPAIR OF CONVEYOR PULLEYS

CMA TD05 Rev00 2015

[previously MP02 Rev00]

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1. SCOPE

1.1 It is intended that this Guideline may be used as a basis for a company-specific specification.

1.2 This guideline covers the minimum general technical requirements for the repair of belt conveyor pulleys suitable for both textile reinforced and steel cord conveyor belting.

1.3 The repair is limited to pulleys being equipped with keyless locking elements.

1.4 The supply and repair of bearings is excluded from this Guideline.

1.5 It is useful to note that in excess of 70% of conveyor pulleys that are submitted for repair are not to the original particular specification. The reasons for this are manifold.

1.6 It is also important to note that the cost of safe repair of a conveyor pulley may exceed the cost of a total replacement. Pulleys that are submitted for repair must therefore be thoroughly inspected and a cost estimate provided, so that the end user is kept informed at all times.

1.7 Whether a pulley is new, used or refurbished, the same duty is expected from it as a new pulley, since the operational and safety risks are the same. In this respect industry has a responsibility to use only reputable, proven suppliers of components.

1.8 On dual drive applications, due consideration must be given to load sharing requirements and restrictions imposed by the drive system when changing shell diameters.

1.9 If a drawing is not available, the company performing the repair should allow for the preparation of at least a sketch of the repaired pulley, in order to accurately document the extent of the repair and to provide a record for the Purchaser.

2. TECHNICAL REQUIREMENTS TO BE SPECIFIED BY THE PURCHASER

The following requirements shall be specified in every tender, order or contract

2.1 Title, reference number, issue and date of this Guideline.

2.2 Title, issue and date of applicable drawing. (See 1.5)

2.3 Diameter, face length and hub bore diameter of the pulley and shaft if the pulley is crowned.

2.4 Type of lagging.

2.5 Type of repair required, e.g. Full repair as per strip and quote or repair and return.

3. REQUIREMENTS

3.1 New Components

3.1.1 New components shall comply with the requirements of the Purchaser's specifications.

3.1.2 All replacement components shall be new unless otherwise approved by the Purchaser.

3.1.3 All repaired Pulleys shall carry a 6-month warranty from date of installation, or 12 months from delivery. It is noted that the onus is on the User to identify refurbished pulleys and to manage their use accordingly.

3.2 Cleaning and stripping

3.2.1 Pulleys shall be cleaned by means of a high-pressure water jet to remove loose dirt and dross prior to stripping. Items shall be suitably marked during the stripping process.

3.2.2 Pulley lagging shall be completely removed by solvent cleaning, hand-tool stripping and/or wire-brush and grinding, as required and approved by the Purchaser.

3.2.3 All external shell surfaces shall be abrasive blast cleaned to SA 2½.

3.2.4 All paint, scale, rust and foreign matter shall be removed to facilitate inspection.

3.2.5 The Pulley Shell shall be inspected for cracks, using visual and UT techniques. Any crack on the pulley shell shall be cause for rejection.

3.3 Assessment

3.3.1 A detailed assessment report shall be submitted with the quotation. (See also paragraph 1.4).

3.3.2 The Pulley Shaft shall be checked between lathe centres for straightness. A run out of more than 0,5 mm on any of the working surfaces shall be cause for rejection.

3.3.3 The Pulley Shaft shall be dimensionally inspected and the results compared to the Purchaser's drawing (if available).

3.3.4 The Pulley running and mating surfaces shall be checked in accordance with the bearing manufacturer and locking element supplier's tolerances. Dimensions outside the original tolerances for the bearings and locking elements shall be cause for rejection.

3.3.5 The Shell and End Discs shall be visually and dimensionally inspected and the results compared to the Purchaser's drawing (if available).

3.3.6 Shell thickness wear in excess of the following shall be cause for rejection. The dimensions shown are in millimeters.

Table 1: Shell thickness

Original Shell Thickness	Minimum Repair Shell Thickness
14	10
18	13
22	16
25	18

3.3.7 All other dimensions shall comply with the approved drawing and the requirements of the Purchaser, unless otherwise approved by the Purchaser.

3.3.8 A design audit shall be conducted taking into consideration the refurbished sizes with due consideration to further wear for the intended application.

3.3.9 Locking elements shall be visually inspected for wear, damage and corrosion pitting. It should be noted that in the majority of cases, if a locking element is removed, it should be replaced.

4. SHAFTS

4.1 New shafts shall be manufactured from steel which complies with the requirements of the Purchaser.

4.2 Where these are unknown, the Shafts shall be manufactured from steel which complies with BS 970 080M40 (EN8) or BS 970 Grade 070M20 (EN3A), unless otherwise indicated by the Purchaser.

4.3 New Shafts of a finished diameter 130 mm or less may be supplied as bright shafting.

4.4 New Shafts of a finished diameter greater than 130 mm shall be normalised.

4.5 Shafts shall be machined in accordance with the approved drawing, if available.

4.6 All bearing, seal, locking element, coupling and shaft attachment diameters shall be machined to a surface finish of 1,6µ or as required by the bearing and locking element suppliers. Undercuts, reliefs and grooves are not permitted.

4.7 Welding, flame spraying, plating, stray arcing and weld spatter on shafts is not permitted.

4.8 Repairing of any section of a damaged pulley shaft by machining it to a smaller diameter and the installation of a sleeve to restore it to its original diameter is not permitted.

4.9 Any damaged pulley shaft shall be discarded and a new shaft shall be manufactured and installed.

5. SHELLS

5.1 New shells shall be manufactured from steel, which complies with the requirements of SABS 1431 Grade 350 WA (SJ355).

5.2 All dimensions shall comply with the approved drawing (if available) and the Purchaser's specification.

5.3 Longitudinal welds shall be in accordance with BS 5135. Circumferential welds are not permitted.

6. HUBS AND END DISCS

6.1 New Hubs and End Discs shall be manufactured from steel in accordance with SANS 1431 Grade 350 WA (SJ355).

7. LOCKING ELEMENTS

7.1 Self-centering Locking Elements of the single or double element type shall be used in accordance with the Purchaser's requirements.

7.2 When the locking elements are replaced, it is important that they are replaced on a like-for-like basis.

7.3 Locking Element shall be capable of transmitting the maximum torque that can be developed by the pulley shaft irrespective of whether the pulley is driving or idling. See also paragraph 3.3.8.

8. WELDING

8.1 Welding shall comply with the requirements of BS 5135 or approved equivalent, such as AWS D1.1.

8.2 Weld Procedures and Welder Qualification Records shall be approved in accordance with the Purchaser's requirements.

8.3 Repairs to shell longitudinal, shell-to-end disc welds and end disc bores shall be performed in accordance with procedures approved by the Purchaser.

8.4 Shell longitudinal full penetration butt welds shall be dressed to a smooth profile inside.

8.5 End Disc to Shell welds shall be blend-ground to a smooth radius.

8.6 Pulley shells shall be stress relieved after all welding has been completed.

9. MACHINING

9.1 The shell shall be machined concentric with the shaft.

9.2 The Total Indicator Run-out (TIR) shall not exceed 0,5 mm.

9.3 Crowning shall be in accordance with the Purchaser's requirements and approved drawings, when required.

10. LAGGING

10.1 Lagging shall be one of the following types as specified by the purchaser:

10.1.1 Plain, or Diamond Patterned Rubber in accordance with SANS 1669/2. In the case of Chevron Patterned Rubber, the direction of drive is to be advised by the Purchaser.

10.1.2 Ceramic Lagging. This shall be either plain or dimpled tiles, directly applied using a flexible bonding agent, or in an elastomer substrate, in accordance with the requirements of the Purchaser.

10.1.3 Ceramic paste in accordance with SANS 1669/2 shall be used for non-drive pulleys only.

10.1.4 Where pulleys are re-lagged on site, the face of the pulley must be prepared in accordance with the requirements of SANS 1669/2.

10.1.5 Deviations of the diameter of the bare pulley measured across the face in excess of the minimum repair shell thickness (Table 1) shall be cause for rejection.

10.1.6 The application of rubber lagging may be by either hot Vulcanising or cold bonding, in accordance with the requirements of the Purchaser.

11. BALANCING

11.1 Pulleys shall be at least statically balanced in accordance with the purchaser's requirements.

11.2 Where required by the Purchaser, the pulley shall be dynamically balanced. In the case of dynamic balancing, the pulley maximum operating speed must be specified by the Purchaser.

11.3 Welding of fitments to end discs for balancing purposes is not permitted.

12. CORROSION PROTECTION

12.1 Prior to painting, all rust, mill scale, grease, oil and other foreign matter shall be removed.

12.2 The shell (when not lagged), the hubs, end disks and diaphragms shall be primed and coated in accordance with the Purchaser's requirements.

12.3 Otherwise, it is recommended that the shell, (when not lagged), the hubs, end disks and diaphragms shall be primed with one coat of single pack wash primer of not less than 20 μm thickness and a single coat of chlorinated rubber, resin-based paint of not less than 30 μm thickness.

13. TEST AND INSPECTION METHODS

13.1 Pulley shafts shall be subject to Ultrasonic Examination as well as either Liquid Penetrant or Magnetic Particle Examination.

13.2 End Discs shall be subject to Ultrasonic as well as either Liquid Penetrant or Magnetic Particle testing in accordance with the Purchaser's requirements.

13.3 Welding shall be subject to 100% Ultrasonic as well as either Liquid Penetrant or Magnetic Particle testing before and after stress relief in accordance with BS 5135.

13.4 Rubber Lining shall be tested in accordance with SANS 1669/1.

14. MARKING AND PACKING

The following data shall be clearly marked in a non-stressed area of both end discs:

14.1 Contractor's name or logo.

14.2 Contractor's traceable reference number.

14.3 Purchaser's unique number.

14.4 Month and year of repair.

14.5 Pulleys that are placed in storage shall be protected to provide a minimum of 12-months' protection against corrosion or damage. See paragraph 3.1.3.

14.6 Pulleys shall be protected against inadvertent damage during handling and transportation.

14.7 Copies of manufacturing test and inspection data shall accompany the delivery.

14.8 All scrap and redundant materials shall be credited to or returned to the Purchaser.

15. APPLICABLE STANDARDS

15.1 **SANS 1669 Part 1.**
Conveyor belt pulleys. Pulley types, dimensions and construction.

15.2 **SANS 1669 Part 2.**
Conveyor Belt Pulleys. Lagging.

15.3 Non-Destructive Testing Specifications

15.3.1 ASME VIII Division 1, Appendix 8: Referencing Code and Acceptance Criteria (for Liquid Penetrant Examination)

15.3.2 ASME V Articles 4 and 23: Ultrasonic Examination of Welds

15.3.3 ASME V Article 5: Ultrasonic Examination Methods for Materials

15.3.4 ASME VIII Division 1, Appendix 12: Referencing Code and Acceptance Criteria (for Ultrasonic Examination)

15.3.5 ASME V Articles 7 and 25: Magnetic Particle Examination

15.3.6 ASME VIII Division 1, Appendix 6: Referencing Code and Acceptance Criteria (for Magnetic Particle Examination)

15.3.7 ASME V Articles 6 and 24: Liquid Penetrant Examination

15.4 **BS EN ISO8501-1 2007**
Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.

16. ACKNOWLEDGEMENTS

This Guideline was written by Graham Shortt with contributions from pulley manufacturers Bosworth, CPM and Lorbrand. Contributions are also acknowledged from Alan Exton, Adi Frittella, Paul Nel and Hannes van Eeden.

17. REVISIONS AND AMENDMENTS

Rev 00	October 2015	Original issue
Amendment 1	December 2025	CMA TD05 Rev00 assigned [previously CMA MP02 Rev00] CMA formatting applied