a world class African city

TITLE	**STANDARD FOR INSPECTION, TESTING AND REPAIRS OF CRANES AND ANCILLARY EQUIPMENT**	REFERENCE **CP_TSSTAN_048** REV **1**
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FOREWORD

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INTRODUCTION

City Power strives to become a world class energy distributor. In line with this vision the company continues to invest in innovative techniques and technologies that will improve the overall performance and management of its entire network infrastructure. Furthermore the company seeks to retain its ISO accreditations, in achieving this goal a number of crane and ancillary equipment need to maintain according to acceptable standards.

1. SCOPE

The purpose of this standard is to outline specialised maintenance of cranes and ancillary equipment. It is not the intent of this standard to restrict any service provider from exceeding the minimum requirements described in this document.

2. NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this standard. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

SANS 4309: Cranes — *Wire ropes — Care, maintenance, installation, examination and discard*

SANS 23814: Cranes — *Competency requirements for crane inspectors*

SANS 14518: Cranes — *Requirements for test loads*

SANS 12482-1: Cranes — *Condition monitoring Part 1: General*

SANS 12478: Cranes — *Cranes - Maintenance manual - Part 1: General*

SANS 10973: Cranes — *Spare parts manual*

SANS 10375: *The inspection, testing and examination of overhead cranes*

SANS 10307: *Cranes, lifting and suspended equipment — Support documentation and training*

SANS 9373: *Cranes and related equipment — Accuracy requirements for measuring parameters during testing*

SANS 7752: *Lifting appliances — Controls — Layout and Characteristics Part 1: General principles*

SANS 687*: Inspection and testing of non-fixed load-lifting attachments*

SANS 522*: Cranes — The inspection, testing and examination of tower cranes*

SANS 61-1*: Cranes — Limiting and indicating devices — Part 1: General*

SANS 19*: The inspection, testing and examination of mobile cranes*

SANS 9001*: Quality management systems*

SANS 14001: *Environmental management systems*

SANS 45001: *Occupational Health and Safety management systems.*

3. DEFINITIONS

Definitions used in this document shall reference to those used at the normative reference documents.

4. REQUIREMENTS

4.1 Service provider

4.1.1 Inspection, testing and examination shall be carried out by a competent person.

4.1.2 After the competent person has identified defects which need to be rectified within a specified timescale, he/she shall submit a report promptly to allow the City Power responsible person to take the necessary action within the required period.

4.1.3 All maintenance shall be conducted in accordance with the manufacturer's recommended procedures. All tools and equipment required to perform repairs and maintenance shall be supplied by the Service provider, and shall remain his property.

4.2 Facilities

City Power shall ensure that the facilities required by the Service provider in order to carry out the inspection are provided. The Service provider shall cater for the following:

4.2.1 cordoned off area to prevent access by persons not directly involved in the examination;

4.2.2 provide a crane operator;

4.2.3 provide own resources (personnel) to remove covers or open up parts of the crane; and

4.2.4 arranging and preparation of parts or areas of the crane for non-destructive examination (NDT).

4.3 Provisions for inspection

Before any inspection, the overhead crane shall be cleaned, to remove all spilt matter and dirt that would otherwise conceal the structure or mechanisms and prevent an effective inspection. The inspection shall be carried out in a logical sequence, (for example, top to bottom), to ensure that nothing is overlooked.

The inspection scheme approach to thorough examinations, if used, shall be based on regular assessments of the overhead crane in accordance with its usage. The Service Provider shall take into account the age, loading, environmental and duty cycle history of the crane, and any examination intervals which have traditionally been accepted as appropriate for that or similar equipment. Equipment that does not have a complete record of past usage shall be subjected to periodic thorough inspection.

The inspection plans shall include a written schedule of the steps required to periodically assess the condition of items included in the inspection.

Note: The inspection plan is intended to ensure that the equipment remains safe to use and includes information on the required frequency of inspection.

4.4 Rated capacity indicator/limiter

4.4.1 Thorough examinations of cranes shall include confirmation that the Rated Capacity Indicator/Load (RCI/L) shall be calibrated to an accuracy within the tolerances given in SANS 61-1.

4.4.2 This calibration check shall be carried out at intervals of not more than 12 months, and after the RCI/L has undergone repairs.

4.4.3 At each successive calibration, a different configuration of the crane shall be chosen so that eventually all configurations are systematically covered.

4.4.4 During the calibration check of the RCI/L it is essential that the crane is not loaded beyond 100 % of its rated capacity. The radius/angle at which the test load corresponds

to 100 % of the rated capacity shall be marked and the test load shall not be taken beyond that point.

4.5 Period inspection

Overhead cranes that are not used to lift persons shall be examined by a service provider at least once every 12 months. After carrying out the thorough inspection, the service provider shall specify when the next inspection is to be carried out, which may be less than, but not more than, 12 months later.

4.6 Items to checked at the period inspections

4.6.1 Visual inspection on wheels for wear and damage;

4.6.2 Carry out a visual examination and functional check on the axle locking system for correct operation, for freedom from leaks, damage, corrosion and distortion, and for correct operation of all indicators.

4.6.3 Examine the crawler tracks for wear and adjustment.

4.6.4 Examine the crane structure, including the chassis, for signs of damage, distortion, cracking and corrosion.

4.6.5 Inspect all bolts and fastenings to ensure that they are not coming loose.

4.6.6 Wheels motion throughout its full range of movements and with the crane at maximum reach.

4.6.7 Examine all pipework on the crane for corrosion, damage, leakage, security and fretting.

4.6.8 Examine all gearbox for leakage, and corrosion on the including and alignment. Visually check end fixings/stops for wear, security and lubrication.

4.6.9 Inspect the superstructure and jib of the crane for corrosion, damage, cracks and distortion.

4.6.10 Examine all pivoting joints on the jib and attachments of the crane for wear, corrosion, security and evidence of lubrication.

4.6.11 Examine all wire ropes to determine whether they are of the size and type specified in the instructions and reeved in accordance with those instructions. Pay particular attention to the end terminations. Requirements for wedge and socket anchorages for wire ropes are specified in SANS 61-1.

4.6.12 Check whether all pulleys/sheaves and drums are free from damage and wear, whether the rope fits correctly on them and if they are effectively lubricated. Check whether all idler pulleys/sheaves turn freely and ensure that all guards are undamaged and in place. Plastics sheaves need special attention, as surface cracks might be deeper than indicated on the surface and special solvents are required to establish the integrity of the sheaves.

4.6.13 Thoroughly examine the whole length of the wire ropes for signs of wear, damage, broken wires and corrosion. The requirements of SANS 4309 shall be complied with.

4.6.14 Inspect the braking mechanism for wear, damage and adjustment, and check whether it conforms to the instructions for the crane.

4.6.15 Check any means of access for completeness and security of ladders, walkways and hand rails/hand holds.

4.6.16 Examine the beams for wear, security, freedom of movement and markings to show the correct size of overhead crane

4.6.17 Check the oil and other fluids for the condition (for example by debris monitoring) and level of the fluid.

4.6.18 Check whether the fixings for the pendent control, where fitted, is all in place and secure.

4.6.19 Check whether all control buttons are marked with their function and mode of operation.

4.6.20 Inspect the upper and lower hoist limit switches and check if they are in place and free from damage and excessive wear.

4.6.21 Examine the hooks, and their attachments and safety catches, for wear, fretting, distortion, corrosion and security.

4.6.22 Examine the fly jib and mounting attachment for corrosion, cracking, distortion and wear. Check whether the hoist limit switch is in good working order.

4.6.23 Check whether there is a displayed in the overhead crane showing the rated capacities for the overhead crane for all crane operating conditions.

4.6.24 Functionally test all controls for smoothness of operation and to determine whether they are free from wear and other damage.

4.6.25 Check whether warning signs and other important instructions are present and readable, for example the rating plate for load lifting.

4.6.26 Operate the overhead crane to check whether all motions operate smoothly and effectively without excessive play.

4.6.27 Ensure that the load-lifting attachment does not drop excessively after the motion has been stopped, and all limiters and safety devices operate correctly.

4.7 Inspection before load testing

4.7.1 These inspections shall be determined, with the crane in motion and at rest whether it is

a) free from any defect that would preclude it from safely handling the test load,
b) in the correct configuration and condition according to the instructions, and
c) equipped with sufficient falls of wire rope for the load under consideration.

4.7.2 Check all safety switches, for example over the hoist, lowering limit, derricking limit, and trolley limit, for correct operation.

4.7.3 Before the test, thoroughly examine the lifting accessories and determine whether the slinging arrangements are safe.

4.8 Load Test

4.8.1 New, reinstalled, altered, repaired, and modified cranes shall be load tested prior to initial use, as determined by a qualified person.

4.8.2 Load testing of altered, repaired, and modified cranes shall be limited to the functions affected by the alteration, repair, or modification, as determined by a qualified person.

4.8.3 The replacement of load chain and rope is specifically excluded from this load test; however, an operational test of the hoist shall be made in accordance to relevant standard prior to putting the crane back in service.

4.8.4 If a load test is conducted, the load shall be not less than 100% of the rated load of the crane or hoist(s), whichever governs; or more than 110% of the rated load of the crane or hoist(s), whichever governs; unless otherwise recommended by the manufacturer or a qualified person.

4.8.5 If a load test is conducted, the person conducting the load test shall prepare a written report of the load sustained during the test and the operations performed during the test. Reports shall be placed on file.

4.8.6 If a load test is conducted, operations shall be performed as outlined below or as modified by a qualified person.

a) Hoist the test load a distance to assure that the load is supported by the crane and held by the hoist brake(s).

b) Transport the test load by means of the trolley for the full length of the bridge.

c) Transport the test load by means of the bridge for the full length of the runway in one direction with the trolley as close to the extreme right-hand end of the crane as practical, and in the other direction with the trolley as close to the left-hand end of the crane as practical.

d) Lower the test load, and stop and hold the test load with the brake(s).

4.9 Levelling

The crane shall be levelled to a slope of not more than ± 1 % or according to the recommendations of a Service Provider.

4.10 Inspection after load testing

After load testing, a thorough examination shall be undertaken by a competent person to determine whether the crane has withstood testing without signs of structural damage that could affect the safety of the crane, such as

a) cracking,

b) permanent deformation,

c) paint flaking,

d) loosening of, or damage to, structural connections and

e) deflection of cross members.

4.11 Inspection and certification

4.11.1 When the testing has been completed, the Service provider shall issue the appropriate certificate, which shall be include to the report of the inspection and testing.

4.11.2 After all the inspection and testing, the service provider shall provide a report detailing required information as to SANS 19 Annexure H.

4.12 Non-destructive testing (NDT) of cranes

NDT of overhead cranes might be necessary, particularly when there is a suspicion of cracks or other damage being present in structural parts of the crane.

4.13 Ancillary equipment/ Harnesses

In the case of slings and shackles, check and test; certification shall be issued that covers all ancillary equipment. The scope of inspection shall be based on the following:

4.13.1 Visually examine the harness for signs of cuts, abrasion, damaged stitching or contamination.

4.13.2 Check the harness for correct operation of all buckles, adjusters, fasteners, etc.

4.13.3 Visually examine both primary and secondary suspension points. They shall be free from damage, corrosion, cracks and other imperfections.

4.13.4 Check the age of the harness to determine whether it is within the age range recommended by the manufacturer.

5. HEALTHY AND SAFETY

The Service provider shall conforms to the Safety, Health, Environmental and Quality requirements. Personal Protective Equipment (PPE) shall be worn at all times by any person working on equipment. The Service provider shall ensure that the correct PPE is worn for specific activities on any site.

6. DOCUMENTATION

The Service provider shall prepare Inspection; Load testing and functional performance test report covering all information, data sheets, and a comprehensive summary describing any test. The test report shall be submitted to a City Power Responsible person. City Power shall then accept responsibility for operating the crane or any equipment being inspected or tested.

Information on, rated capacities, maintenance repairs, renewals and operators' instructions, full service history shall be generated by the Service provider, as City Power has no records at present for any crane. A Report of thorough examination after an inspection" shall, be supplied and retained by City Power.

7. PERFORMANCE

City Power may inspect and test the various portions of the work at all times and shall have full power to reject all or any portion of the work that they may consider to be substandard or inferior in quality of workmanship with respect to the original design. Any portion of the work so rejected shall be corrected immediately by the service provider. In this event the service provider shall at his own expense, be at liberty to repair the work to the satisfaction of City Power. The service provider shall carry out such work/tests as are necessary, in the opinion of City Power, to prove that the contract requirements are being complied with.

8. TRAINING OF STAFF

The following training courses for City Power's staff shall be provided; which is classified into the three main areas:

a) operation;

b) maintenance; and

c) Associated disciplines/information, such as slinging of loads, hand signals, examination and discarding of wire rope, and the safe use of cranes.

It is advisable that each of the above be treated separately, since they are applicable in different ways to different equipment.

In addition to complying with all the mandatory requirements given in national legislation, training documents shall comply with the operational and maintenance requirements given in the standard. The training documentation supplied shall explain all the safety aspects of the electrical equipment installation.

9. QUALITY MANAGEMENT

A quality management system shall be set up in order to assure the quality of work is according to City Power's requirements. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001.

10. ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to assure the proper environmental management of overhead cranes and ancillary equipment. Guidance on the requirements for an environmental management system may be found in ISO 14001 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset conforms to environmental standards and City Power SHEQ Policy.

11. OCCUPATIONAL HEALTH AND SAFETY (OHS) MANAGEMENT

The OHS management shall be set up in order to ensure the compliance to standards. Guidance on the requirements for an OHS management system may be found in ISO 45001:2018. The details shall be subject to agreement between the City Power and service provider. This is to ensure that all air conditioning installed in City Power buildings conforms to OHS standards required by ISO 45001:2018.

12. SCHEDULE OF RATES

The rates entered for each item includes for all work and other things necessary to complete the item.

Part	Description of task for three (3) monthly inspection	Cost per task
1	**1.**All items as per the checklist – CP_TSCHECK_060 Note: All lifting equipment shall be examined as to ensure are in an acceptable standard	

Part	Description of task (Six) monthly inspection	Cost per task
1	**Hoist – Main and Auxiliary** 1.Gearbox 2.Load rope 3.Guide nut assembly 4.Brakes 5.Tie bars 6.Limit switch 7.Rope drum wear 8.Turn on drum 9.Lubrication 10. Hook block wear and safety latches 11. Load limiter 12.Electric motor 13. Electric motor controller 14. Electric motor cable **Structural** 1.Grinders 2.End carriages 3.Hand rail/platform 4.Crane rail/gantry rail 5.End stops **Long travel** 1.Gearbox 2.Wheels and bearings 3.Brakes 4.Spur wheels and pinions 5.Lubrication 6.Buffers 7.Transmission shaft 8.Plummer blocks 9.Limit switch **Cross travel** 1.Gearbox 2.Wheels and bearings 3.Brakes 4.Spur wheels and pinions 5.Lubrication 6.Buffers 7.Electric motor 8. Electric motor controller 9. Electric motor cable 10.Limit switch 11.Rail 12.Catenary wire	

	Control 1.Pendant/Joy stick controller condition and operation 2.Festoon/catenary system 3.Contactors 4.Timers 5.Circuit breakers 6.Fuses 7.Panel wiring	

Part	Description of task of yearly (12 month) inspection and Test	Cost per task
1	**1.Load testing** **2.Load limiters calibration** **3.Non-destructive testing** **a) Main hoist hock** **b) Auxiliary hock** **4.Load test of lifting tackle** **5.Producing a load certificate**	

Travel and Costs as per the table below:

Item	Description	Per meter	Cost per Km
1.	From office to site (per radius)		

Skills Costs as per the table below:

Items	Description	Per meter	Cost per hour
1.	Competent person hourly rate		
2.	Assistance hourly rate		

Tender Number:

_____

Tenderer's Authorised Signatory:

_____

Name in block lettersSignature

Full name of company:

_____

ANNEXURE A - BIBLIOGRAPHY

None

ANNEXURE B - REVISION INFORMATION

DATE	REV. NO.	NOTES
July 2016	0	First issue
May 2022	1	Second issue
		Update Normative references
		Update Clause 9, 10 and 11