WHS-42 Safe Operation of Overhead Cranes Procedure

Table of Contents

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1.0	09/09/2014	Rebranding	Rebranding and recoding

1 Purpose

The purpose of this procedure is to establish the minimum requirements for the safe operation of overhead cranes.

This procedure shall also cover the training and licensing requirements to safely secure loads (dogging) and operating procedures for overhead cranes with three movements only.

2 Scope

This procedure is to provide the Territory Generation requirements for the operation and management of overhead travelling cranes including Bridge and Gantry Cranes installed in or on Territory Generation controlled sites or buildings.

This includes the requirements for ensuring that people are not placed at risk from the operation of the crane. This procedure may be supplemented by local procedures and requirements.

3 References

- Australian Standard AS 1353.2 – 1997 Flat synthetic – webbing slings Part 2: care and use
- Australian Standard AS 1418.3 (1997) Cranes, hoists and winches Part 3: Bridge, Gantry, Portal (including container cranes) and jib cranes
- Australian Standard AS 1418.17 (1996) Cranes (including hoists and winches) Part 17: design and construction of Workboxes
- Australian Standard AS 1438.2 – 1998 Wire – coil flat slings Part 2: care and use
- Australian Standard AS 2550.1 (2011) Cranes, hoists and winches – Safe use Part 1: General Requirements.
- Australian Standard AS 3777 – 1990 Shank Hooks and large – eye hooks – maximum 50t
- Australian Standard AS 3775.2 – 2004 Chain Slings – Grade T Part 2: care and use

4 Roles and Responsibilities

Role / Title	Responsibility
Chief Executive Officer	Shall ensure that : • All personnel are aware of requirements of this procedure and its management in sites under Territory Generation control. • Initiates procedure review as required.
All Managers/Site Coordinators	Shall ensure that: • This procedure is put in place at all Territory Generation controlled power stations sites. • Personnel are advised and trained as necessary in the procedure to be followed. • Contractors are informed of and follow the procedure, where applicable.

	• Contribute to procedure reviews
Project Officers/Contract Managers	Shall ensure that: • Contractors under their control are informed of and follow the procedure, where applicable. • Contribute to procedure reviews
Maintenance Manager North and South	Shall: • Maintains a crane and operator register. • Maintains the Territory Generation Lifting Gear Register. • Approves Territory Generation Authorisation for persons to operate cranes. • Identifies personnel who require training.
Site Coordinators/Maintenance Coordinators	Shall: • Ensure that only authorised persons operate cranes. • Ensure that the Lifting Gear Register is regularly updated. • Ensure that employees are entering notes into the B/U Lifting Gear Register. • Ensures that all employees adhere to this procedure. • Ensures that overhead crane issues and faults are brought to the attention of the Crane Maintainer.
All Personnel	Shall ensure that: • This procedure is followed personally and by contractors under their control, where applicable • A JSEA/Lift plan is completed prior to operating cranes for complex lifts • Pre-operational checklists are completed and any faults are immediately reported to their coordinator. • Inspection of slings, shackles, hooks and wire ropes is conducted prior to use and any findings are entered into the Lifting Gear Register. • Contribute to procedure reviews
Document Owner	• The position responsible for the preparation, review and accuracy of this document.
Document Sponsor	• The position responsible for the approval and use of this document

5 Definitions

Approved	Means having appropriate Territory Generation endorsement in writing.
Authorised	Means a *competent person* with technical knowledge or sufficient experience who has been *approved* to act on behalf of Territory Generation to perform the duty concerned.
Bridge Crane	Means a crane that: a) consists of a bridge beam or beams, that are mounted to end carriages at each end; and b) is capable of travelling along elevated runways; and c) has 1 or more hoisting mechanisms arranged to traverse across the bridge
Competent Person	Means a person who has, through a combination of training, qualification and experience, acquired knowledge and skills enabling that person to correctly perform the specified task.
Control Measure	Means in relation to Health and Safety, a measure to eliminate or minimise the Risk.
Crane	Means an appliance intended for raising or lowering a load and moving it horizontally including the supporting structure of the crane and its foundations, but does not include: a) an industrial lift truck; b) earthmoving machinery; c) an amusement device; d) a tractor; e) an industrial robot; f) a conveyor; g) building maintenance equipment; h) a suspended scaffold; i) a lift.
Critical Lift	Means a lift which involves multiple cranes, lifts over or close to power lines, lifts exceeding 20 tonnes, lifts which meet or exceed 85% of the maximum rated load of the crane.
Dogman	Means a Territory Generation *Authorised* person conducting slinging techniques, including the selection and inspection of lifting gear, to safely sling a load and direction of the crane operator in the movement of the load.
Gantry Crane	Means a crane that: a) Consists of a bridge beam supported at each end by legs mounted on an end carriage; and

	b) Is capable of travelling on supporting surfaces or deck levels, whether fixed or not; and c) Has a crab with 1 or more hoisting units arranged to travel across the bridge.
Hazard	Means a situation or thing that has the potential to harm a person. Hazards in the workplace include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence in the workplace.
Job Safety and Environmental Analysis (JSEA)	Means the process used to break a task into steps; identify the potential hazards and control measures; and implement these so that the task can be completed safely. This process is conducted at the task level by the persons carrying out the work and is also known as a task based risk assessment.
Lifting	Any operation using a crane and lifting equipment that involves the raising, suspension and lowering of a load.
Lifting Gear	Any device which is used to connect a load to a crane and which does not form part of the load, e.g., wire rope, chains, slings, shackles and spreader beams.
Non Routine Lift	Any activity that is outside the regular operations of the site. Non-routine work could involve no designated lifting points, a lift not previously conducted, night operation, engineered lifts (e.g. requiring special rigging or lifts outside the load chart), awkward items of unknown centre of gravity or be low to medium frequency tasks with a medium to high levels of risk.
Overhead Crane	Means a *Bridge Crane* or *Gantry Crane*
Pre-start Check List	Means a pre-start checklist that shall be completed by the operator daily (or before each use if operated periodically).
Risk	Means the possibility that harm (death, injury or illness) might occur when exposed to a hazard
Risk Assessment	Means following a systematic process that involves: • Identifying hazards • If necessary, assessing the risks associated with these hazards, • Implementing and maintaining the most effective risk control measures • Reviewing risk control measures to ensure they are working.
Risk Control	Means taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable. Eliminating a hazard will also eliminate any risks associated with that hazard.

Routine Lift	Means a lift that forms part of Routine Work. Routine work nominally involves medium to high frequency tasks.
Shall	Mandatory requirement
Should	Advisory requirement
Slinging	Attaching a device between the crane and load, e.g., slings and wire rope.
Spotter or Safety Observer	A person specifically assigned the duty of warning against unsafe approach of the crane, its lifting attachments or its load to electrical apparatus.
Safe Working Load (SWL) (also known as Working Load Limit WLL)	Safe Working Load as shown on cranes, slings and lifting attachments
Safe Work Method Statement (SWMS)	Means a document that: a) Specifies hazards and risks to health and safety associated with those hazards; and b) Describes the measures to be implemented to control the risks; and c) Describes how the control measures are to be implemented, monitored and reviewed.
Third Party Inspection	Means an Inspection carried out by an independent competent person, who is not involved in the maintenance of the crane. NOTE: For the purpose of this definition, "independent" means not employed by the same organisation unless that organisation uses a quality process that confirms independence.
Work Box	Means a personnel carrying device, designed to be suspended from a crane, to provide a working area for a person elevated by and working from the device.

6 General Requirements

This procedure sets out guidelines for *routine lifts* with *overhead cranes* and hoists. If a load does not have fixed lifting points and is not the subject of a pre-approved lifting procedure and / or the weight of the load is unknown, a dogman shall be consulted to provide direction on safe methods to lift.

Minimum PPE shall include enclosed safety footwear (steel capped shoes), safety helmet and eye protection. The use of riggers gloves is also recommended for added protection against pinch points, cuts, abrasions etc.

7 Pre-operational Checks

These shall include checks on:

a) The Hook (look for cracks, gouges, excessive wear and a correctly operating latch)

b) The Block (check that block is level and free from damage, wear or looseness in assembly or fittings)

c) Crane Chain

i. Elongation of links
ii. Deformation of links
iii. Cuts, dents or gouges
iv. Cracks
v. Excessive wear
vi. Excessive corrosion
vii. Twists

d) Crane Rope
   i. Kinks
   ii. Twists
   iii. Bird caging
   iv. Broken strands
   v. Excessive rust or corrosion
   vi. Excessive wear or abrasion
e) Crane Drum
   i. Smooth operation
   ii. No overlapping ropes
   iii. No oil leaks from motor or gearbox
f) Safe Working Load – Ensure the decals or signs are visible and legible.
g) Controls – Ensure all buttons are operational, check multiple speeds and emergency stop
h) Crane Brake – lift load approximately 300mm and check for creep.

8 Planning the Lift

a) The weight of the load *shall* never exceed the *SWL* of the *crane* or the *lifting gear.*
b) The weight of the load must always be known and should not be lifted without this knowledge. If the weight is not known consult a *dogman* to help calculate the weight.
c) The centre of gravity of the load must also be known. Unless the load has designated lifting points a *dogman shall* always be consulted.
d) The load shall be secured at all times it is suspended.

9 General Safe Operational Rules

a) All routine lifts should be covered in detail in a current SWMS/JSEA or Territory Generation Crane Lift Plan.
b) Ensure the load is with the SWL of the crane and lifting gear.
c) Continuously check for area specific hazards. These may include or require:
   i. Waiting for pedestrians or mobile plant/vehicles to leave the area of crane travel;
   ii. Erection of warning signs and or barriers;
   iii. Poor lighting;
   iv. Traffic control; and
   v. PPE

d) When attaching “D” shackles, do not over tighten. Finger tight and then back off ¼ a turn.

e) Hooks on chain slings should always face outwards.

f) Always take the slack out of the lifting gear before lifting the load to avoid shock loading.

g) Control buttons should be used smoothly throughout the lift.

h) Always perform a direct lift, i.e. ensure that the crane hook is directly above the centre of gravity of the load.

i) If the load does swing, correct it by moving the load in the direction of the swing when it’s at the end of its arc – if it is safe to do so, i.e. no potential to hit people or equipment.

j) Always keep the load as close to the ground as possible, never raise the load any higher than necessary.

k) Never allow anyone to walk under or place any part of their body under a raised load at any time.

l) Keep unnecessary people out of the lifting area when lifting. If necessary, use barricading or a spotter.

m) Always keep the load in clear view. If this is not possible the lift shall be carried out with the aid of another person familiar with the crane’s operation, working under the operator’s instructions.

n) A crane operator must pay attention at all times. Never talk to, distract or approach a crane operator during a lift. (Spotters and safety situations excepted)

o) If handling hazardous materials the operator shall be familiar with the SDS and the location of eyewash stations and emergency equipment. In the event a spill, the site specific emergency procedure(s) shall be followed.

p) Never leave a load suspended or unattended.

q) If you need to leave a load, lower the load and chock it at ground level.

r) The use of mobile phones and other communication equipment shall not be permitted during a lift unless used as part of the communication between the crane operator and the dogman as part of the approved lift plan.

10 Standard shutdown procedure

a) Lower and raised load to ground level. Chock if necessary.

b) Disconnect the hook from the load.

c) Remove all lifting gear from load, i.e., slings shackles etc. (complex slinging or rigging work exempt).

d) Raise crane hook up to almost maximum height. This prevents personnel from striking the hook and protects the chain or wire rope from corrosion.

e) Position the crane to a safe position – to the far end of the building is the preferred position.

f) Ensure that the pendant/remote control is in the off position and place in a designated area – shackle box is ideal.

g) Turn power off at main isolation point.

h) Place all lifting gear in designated area – this should be a rack that is off the ground, out of the weather and direct sunlight.

i) Lifting gear shall be checked while placing back on rack.

j) Any defects shall be reported to the appropriate coordinator or manager.

k) Defective *lifting gear shall* be removed from service until inspected by a *competent person.*

11 Conducting a Risk Assessment

Before conducting any crane operations, a risk assessment/SWMS/JSEA shall be undertaken. The assessment shall be in writing and take into account the following:

a) The task to be conducted;

b) The range of methods by which the task can be done and the appropriateness of using the crane rather than a safer method;

c) The hazards involved with the lift and the associated risks;

d) The equipment to be used for the lift such as slings, spreader beams and hooks with appropriate ratings;

e) The proposed route of travel while the load is suspended;

f) The clear space and location for setting down the load;

g) The possible results of the failure of the crane or the lifting gear;

h) The possibility of persons entering the lifting zone;

i) The location and the types of warning signs and barricading;

j) Exposure to energised busbars or other equipment;

k) Emergency procedures;

l) Any other activities that may be occurring in the area that could pose a safety risk, i.e. other work or workers;

m) All other risks associated with the activities that the lift is being used for, that do not relate directly to the use of the crane.

12 Routine Lifts

a) Where the crane is being used for routine or commonly occurring work, a SWMS or JSEA is sufficient to identify hazards, risks and their appropriate control measures.

b) If at any time due to changes in the work area or surrounding work a routine lift becomes a non-routine lift, work shall stop and consultation with a qualified dogman shall take place. Where required, a risk assessment shall be performed in consultation with a qualified dogman.

13 Non-routine Lifts

Where the crane is to be used for non-routine lifts, lifts where the load has no designated lifting points or the centre of gravity is offset and for rarely conducted lifts, a *Territory Generation Lift Plan* (see attachment 2) shall be conducted by a competent person (dogman) in association with a risk assessment/JSEA

14 Record Keeping

a) All records created, including risk assessments, SWMS, JSEA's, inspection records and failure notifications shall be documented for future reference, consistent with Territory Generation procedures.

b) These records shall be made available following any request by senior management, the relevant WHS committee, an approved HSR, a person authorised to conduct an investigation or an NT WorkSafe Inspector.

15 Unsafe equipment, failures and damaged parts management

a) All defective equipment shall be tagged as "Out of Service" and reported to the appropriate manager, coordinator or site contact and the incident logged into the GRACE incident database.

b) Faulty lifting gear shall not be given to anyone to take home. However, if the equipment is rendered completely inoperable, a signed statement from the receiver shall be obtained stating

they are aware the equipment is unsafe for use as a lifting device. If this does not occur, the faulty equipment shall be destroyed or dismembered before being disposed of.

c) All dropped loads and equipment failures that occur during lifts shall be deemed as incident and the incident logged into the GRACE incident reporting database.

d) Any fall from a height of an object shall be reported to NT WorkSafe as a notifiable incident.

Attachment 1: Overhead Crane Pre-Start Log

TERRITORY GENERATION OVERHEAD CRANE PRE-START LOG				**No: XXXXX**
Date:	Time:		Crane name/ID:	
Site:	Checked by:			
Item to be Inspected by Operator	✓	✖	N/A	**Faults and Comments:** NOTE: All faults to be reported to relevant supervisor/coordinator and crane not be used until repaired/approved
Rails and runways - Check for wear, damage or obstructions.				
End Carriage/truck – Check for wear or damage				
Bus Bars and/or conductors - Check for wear, damage or obstructions				
Trolley and hoist unit - Check for wear or damage and travel limits.				
Hoist rope condition – Correctly reeving on the sheaves and correctly laying on the drum.				
Hoist movement - including upper and lower limits and brakes				
Safety switches and interlocks - Check all functioning correctly				
Signage – Check they are displayed and legible (Safe Working Load, Directional Compass etc.)				
Hook block - Check for signs of wear or damage				
Crane runway – Check clear of obstacles				
Controls – Check clearly labelled, function as labelled, including emergency stop.				
Bridge Movement - including travel limits and brakes				
Oil Leaks – Check gearbox(s) and drives for oil or hydraulic oil leaks.				
Any other comments or observations: …… …… ……				

Attachment 2: Non-Routine Crane Lift Plan

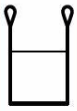
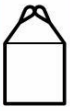
Non-Routine Crane Lift Plan		
Date:	**Location & Site**	**AA No:**
Description	**Control Measures or Required Information**	
Lift: What is to be lifted?		
Precautions: Are there any special Precautions?		
Load: What is the weight of the load?		
CoG: Where is the centre of gravity?		
Stability: Is the load stable, Does it need to be stabilised?		
Crane(s): What is the crane name or ID?		
Crane(s): List the SWL of the crane(s) to be used.		
Crane(s): Pre-use inspection conducted in accordance with Territory Generation procedures?		
Lifting Gear: Inspected in accordance with Territory Generation Lifting gear Inspection Procedure?		
Slings: Identify the configuration to be used: choker, basket, vertical or angle; and list their SWL		
Shackles: List their SWL and inspect for wear or damage.		
Eye Bolts and Swivel Eyes: List their SWL and inspect for wear or damage.		
Other Lifting Devices: e.g. spreader beams, multi leg chains etc. List their SWL. And inspect for wear or damage.		
Rigger/Dogman: Are rigger/dogman weight calculations required?		
Personnel - What personnel will be required for the lift?		
Crane Operator: Licensed and approved by Territory Generation?		
Rigger/Dogger: Licensed and Approved by Territory Generation?		
Safety Equipment: What PPE or other safety equipment is required?		
Final Inspection: Has the rigging been inspected?		
Any other information:		

Synthetic Flat and Round Slings:

	 M=1.0	 M=0.8	 M=2.0	 M=1.9	 M=1.7	 M=1.4	 M=1.0	 M=1.7	 M=1.4
COLOR CODE	VERTICAL WLL	CHOKE WLL	BASKET WLL	30° WLL	60° WLL	90° WLL	120° WLL	60° WLL	60° CHOKE WLL
	kg	kg	kg	kg	kg	kg	kg	kg	kg
VIOLET	1000	800	2000	1900	1700	1400	1000	1700	1400
GREEN	2000	1600	4000	3800	3400	2800	2000	3400	2800
YELLOW	3000	2400	6000	5700	5100	4200	3000	5100	4200
GREY	4000	3200	8000	7600	6800	5600	4000	6800	5600
RED	5000	4000	10000	9500	8500	7000	5000	8500	7000
BROWN	6000	4800	12000	11400	10200	8400	6000	10200	8400
BLUE	8000	6400	16000	15200	13600	11200	8000	13600	11200
ORANGE	10000	8000	20000	19000	17000	14000	10000	17000	14000
ORANGE	12000	9600	24000	22800	20400	16800	12000	20400	16800
ORANGE	15000	12000	30000	29500	25500	21000	15000	25500	21000
ORANGE	20000	16000	40000	38000	34000	28000	20000	34000	28000
ORANGE	30000	24000	60000	57000	51000	52000	30000	51000	52000
ORANGE	50000	40000	100000	95000	85000	70000	50000	85000	70000

* Remember the maximum WLL depends on the angle.

Wire Rope Slings:

												
ROPE Ø	REEVE LOAD			Round Basket Load			Oblong Basket Load			2,3 or 4 Leg Sling		
mm	Straight	Round	Oblong	0°	60°	90°	0°	60°	90°	0°– 60°	90°	120°
8	0.55	0.41	0.27	1.09	0.94	0.77	0.55	0.48	0.39	0.94	0.77	0.55
9	0.69	0.52	0.34	1.38	1.19	0.97	0.69	0.60	0.49	1.19	0.97	0.69
10	0.85	0.64	0.43	1.70	1.47	1.20	0.85	0.74	0.61	1.47	1.20	0.85
11	1.03	0.77	0.52	2.10	1.78	1.45	1.03	0.90	0.73	1.78	1.45	1.03
12	1.23	0.92	0.61	2.50	2.10	1.73	1.23	1.07	0.87	2.10	1.73	1.23
13	1.44	1.08	0.72	2.90	2.50	2.00	1.44	1.25	1.02	2.50	2.00	1.44
14	1.67	1.25	0.83	3.30	2.90	2.40	1.67	1.45	1.19	2.90	2.40	1.67
16	2.20	1.64	1.09	4.40	3.80	3.10	2.20	1.90	1.55	3.80	3.10	2.20
18	2.80	2.10	1.38	5.50	4.80	3.90	2.80	2.40	1.87	4.80	3.90	2.80
20	3.40	2.60	1.70	6.80	5.90	4.80	3.40	3.00	2.40	5.90	4.80	3.40
22	4.10	3.10	2.10	8.30	7.10	5.80	4.10	3.60	2.90	7.10	5.80	4.10
24	4.90	3.70	2.50	9.80	8.50	6.90	4.90	4.30	3.50	8.50	6.90	4.90
26	5.80	4.30	2.90	11.5	10.0	8.10	5.80	5.00	4.10	10.0	8.10	5.80
28	6.70	5.00	3.30	13.4	11.6	9.40	6.70	5.80	4.70	11.6	9.40	6.70
32	8.70	6.50	4.40	17.4	15.1	12.3	8.70	7.60	6.20	15.1	12.3	8.70

Chain Slings:

GRADE 80 (T) CHAIN SLINGS

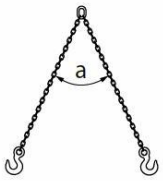
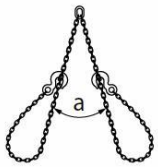
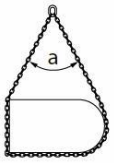
										ENDLESS SLING			
													
DIA	DIRECT LOAD	ADJUSTABLE SLING	CHOKE HITCH	DIRECT LOAD			REEVED SLING			BASKET HITCH			REEVED SLING
				60º	90º	120º	60º	90º	120º	60º	90º	120º	
6	1.1	1.1	0.8	1.9	1.6	1.1	1.5	1.2	0.8	1.5	1.2	0.8	1.7
7	1.5	1.5	1.1	2.6	2.1	1.5	2.0	1.6	1.1	2.0	1.6	1.1	2.3
8	2.0	2.0	1.5	3.5	2.8	2.0	2.6	2.1	1.5	2.6	2.1	1.5	3.0
10	3.2	3.2	2.4	5.5	4.5	3.2	4.1	3.4	2.4	4.1	3.4	2.4	4.8
13	5.3	5.3	4.0	9.2	7.5	5.3	6.9	5.6	4.0	6.9	5.6	4.0	8.0
16	8.0	8.0	6.0	13.8	11.3	8.0	10.4	8.5	6.0	10.4	8.5	6.0	12.0
20	12.5	12.5	9.4	21.6	17.6	12.5	16.3	13.3	9.4	16.3	13.3	9.4	18.8
22	15.0	15.0	11.3	26.0	21.2	15.0	19.5	15.9	11.3	19.5	15.9	11.3	22.5
26	21.2	21.2	15.9	36.7	29.9	21.2	27.6	22.5	15.9	27.6	22.5	15.9	31.8
32	31.5	23.6	23.6	54.5	44.4	31.5	41.0	33.4	23.6	41.0	33.4	23.6	47.3

Diagram of Lift and Work Area:

Essential Personnel Involved with the lift			
Name:	**Classification**	**Competency**	**Company**

NOTE: Ensure load is secure prior to removal of hold down points			
Role	**Name**	**Signature**	**Date**
Supervisor:			
Rigger/Dogman in Charge:			
Crane Operator:			
NOTE: Ensure all lifting gear is thoroughly inspected prior to use and is of the correct rating for the lift			