

EC&I CONSTRUCTION METHOD STATEMENT REGISTER

OHS ACT 85/1993 · CONSTRUCTION REGULATIONS 2014 · SANS 10142 · IEC 60364 · IEC 60079

Document Number	MSE-HSE-MS-001 · Rev 01 · 2025
Principal Contractor	Meekas Star Engineering Service Limited — Projects Department
Project Name	[Insert Project Name]
Project Number	[Insert Project Number]
Client / EPCM	[Insert Client Name]
Site Location	[Insert Site Location]
Scope	EC&I Construction — Full scope from OHL through to instrument loop testing & energisation
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Client Acceptance	[Name] — [Role] — [Date]
Related Documents	MSE-HSE-RA-001 (Risk Assessment Register) MSE-HSE-SF-001 (Safety File)
Review Frequency	Before each new activity phase or after any incident affecting the scope of work

⚠ THESE METHOD STATEMENTS MUST BE BRIEFED TO ALL WORKERS BEFORE WORK COMMENCES. WORKERS MUST SIGN THE ACKNOWLEDGEMENT TABLE IN EACH METHOD STATEMENT. NO WORK MAY PROCEED WITHOUT THIS BRIEFING.

Prepared By	Reviewed By	Approved By	Client Approval
[Name] — [Role]	EC&I Site Manager	[Name] — Manager Projects	[Name] — [Company]
Signature: _____	Signature: _____	Signature: _____	Signature: _____
Date: _____ —	Date: _____ —	Date: _____ —	Date: _____ —

MS Ref	RA Ref	Method Statement Title	Document Ref	Page
MS-001	RA-001	Cable Ladder & Tray Installation	MSE-HSE-MS-001-01	—
MS-002	RA-002	Cable Pulling Operations	MSE-HSE-MS-001-02	—
MS-003	RA-003	Isolation, Lockout & Tagout (LOTO)	MSE-HSE-MS-001-03	—
MS-004	RA-005	33kV OHL — Stringing, Hardware & Terminations	MSE-HSE-MS-001-04	—
MS-005	RA-008	Earthing Mat & Grid Installation	MSE-HSE-MS-001-05	—
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MS-001 — Cable Ladder & Tray Installation

MSE-HSE-MS-001-01

MS Reference	MS-001
Related RA	RA-001 (MSE-HSE-RA-001 — Risk Assessment Register)
Document Number	MSE-HSE-MS-001-01
Project	[Project Name]
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Date Prepared	[DD/MM/YYYY]
Review Date	[DD/MM/YYYY or after any scope change or incident]
Supervisor in Charge	[Name]
Gang / Discipline	[EC&I / OHL / Instrument / etc.]

1. SCOPE & PURPOSE

This Method Statement describes the safe step-by-step procedure for the installation of cable ladder, cable tray, and associated supports — including setting out, support installation, working at height, and earthing of cable ladder systems.

2. PRE-CONDITIONS — DO NOT START WITHOUT CONFIRMING ALL ITEMS BELOW

⚠ STOP: Every item in this section must be confirmed BEFORE work commences. If ANY item cannot be confirmed — work does NOT start. Notify EC&I Site Manager.

- ☐ AFC drawing issued and available on site
- ☐ Materials received, inspected, and stored correctly
- ☐ MRIR for ladder/tray materials signed by QC Officer
- ☐ PTW issued if work is within 1m of any energised equipment
- ☐ Scaffold inspected and tagged GREEN, or MEWP inspected and certified
- ☐ Toolbox talk completed — this method statement briefed to all workers
- ☐ PPE inspected and issued to all workers

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Item	Standard / Specification	Mandatory?
Safety helmet (hard hat)	SANS 1397	MANDATORY
Safety boots — steel toe & steel midsole	SANS 20345	MANDATORY
High-visibility vest	EN 471 Class 2	MANDATORY
Safety glasses	SANS 1425	MANDATORY
Work gloves — leather or cut-resistant	EN 388	MANDATORY
Full body harness + double lanyard	SANS 1354	MANDATORY — above 2m
Face shield	ANSI Z87.1	When overhead drilling or cutting
P2 dust mask / respirator	SANS 1412	When drilling concrete
Hearing protection (ear plugs or muffs)	85dB+ areas	When using power tools

4. TOOLS, EQUIPMENT & MATERIALS

#	Tool / Equipment / Material	Specification / Standard	Qty Required	Inspected?
1	Cable ladder sections (as per BOM)	Per engineering drawing	As per IFC	☐
2	Cable ladder supports / cleats / hangers	Per engineering spec	As per BOM	☐
3	Stainless steel or hot-dip galv fixings	Per corrosion specification	As per BOM	☐
4	M10/M12 anchor bolts — tested and rated	Manufacturer rated	As required	☐
5	Hacksaw / angle grinder with metal disc	Max 230mm disc, guarded	As required	☐
6	Hand drill / rotary hammer drill	Correct bit for substrate	1 per gang	☐
7	Spirit level + laser level	Calibrated	1 per gang	☐
8	Torque wrench	Calibrated — to correct Nm spec	1 per gang	☐
9	Earthing conductor + clamps	Per SANS 10142	As per drawing	☐
10	Earth continuity test instrument	Calibrated	1	☐
11	Full body harness, double lanyard	SANS 1354, pre-use inspection	1 per elevated worker	☐
12	Cable drum trolley / mechanical handling aid	Rated for load	As required	☐

5. STEP-BY-STEP SAFE WORK PROCEDURE

STEP 1. PRE-WORK CHECKS

- Verify AFC drawing is the correct revision. Do NOT work from superseded drawings.
- Walk the cable ladder route. Identify all potential conflicts — pipe, HVAC, existing equipment, low headroom, ATEX zones.
- Confirm the substrate (concrete, steelwork, GRP) to determine correct anchor type and drill bit.
- Confirm services location — do NOT drill without a CAT scan result or confirmed services drawing clearance.
- Check scaffold is tagged GREEN and inspection date is within 7 days, OR MEWP is inspected with valid certificate.
- Confirm all workers have attended the TBT for today's activity, are wearing correct PPE, and have valid medical fitness certificates.
- PTW signed and in hand if working within 1m of any energised equipment or in any designated electrical area.

STEP 2. MATERIAL STAGING & HANDLING

- Position cable drum trolley or materials handling trolley at work area access point.
- Cable ladder sections — carry maximum 2 persons per section. Never carry overhead without mechanical means.
- Stage materials within arm's reach of the work area. Do NOT overload scaffold platforms.
- Confirm all ladder sections are correct part number, length, material, and rung spacing per BOM.

STEP 3. SETTING OUT SUPPORTS

- Mark support positions on structure per drawing — maximum span 1.5m unless otherwise specified on drawing.
- Use laser level to ensure support positions are level across the run. Check for gradient requirements on drawing.
- Mark all drilling positions with pencil or marker. Confirm no services within 50mm of proposed drill position (CAT scan mandatory).

STEP 4. DRILLING & ANCHOR INSTALLATION

- Select correct drill bit for substrate — carbide for concrete, HSS for steelwork.
- Wear P2 dust mask and safety glasses (face shield for overhead drilling).
- Drill to correct depth per anchor specification. Clean hole with compressed air blast or vacuum.
- Install anchor bolt per manufacturer specification — check torque against specification using calibrated torque wrench.
- Do NOT exceed torque specification. Over-torquing will split concrete and compromise anchor strength.
- Record anchor installation in inspection register.

STEP 5. CABLE LADDER / TRAY INSTALLATION

- Position ladder section onto supports — minimum 2 workers per section for sections >3m.
- Do NOT rest sections on anchor bolts before securing — support manually until bolt is engaged.
- Torque all couplers and joiners to specification — record in inspection log.
- At all changes of direction, use correct bend or tee section per drawing — do NOT force ladder around bends.

- y) Maintain minimum bend radius for cables that will be installed in this section — minimum 6× cable OD.
- z) Install all required separators for HV/LV/Instrument segregation as shown on drawing.

STEP 6. WORKING AT HEIGHT

- aa) Attach harness to certified anchor point BEFORE stepping onto elevated work platform.
- bb) Never unclip from anchor until you have secured the second lanyard to a new anchor point — 100% tie-off at all times.
- cc) No more than the rated number of workers on scaffold bay — never overload.
- dd) All tools must be in a tool bag or tethered. No loose items on elevated work platforms.
- ee) Exclusion zone below elevated work — barriers and signage in place before elevated work begins.

STEP 7. EARTHING & BONDING

- ff) Install earth continuity bonds at each coupling joint using green/yellow earth conductor and correct clamps.
- gg) Bond to building main earth bar or designated earth point as shown on drawing.
- hh) Test earth continuity with calibrated meter — resistance must be $\leq 1\Omega$ per SANS 10142.
- ii) Record results on IR Test Register (MSE-IR2-001). QC Officer to sign off.

STEP 8. INSPECTION & HANDOVER

- jj) Conduct final visual inspection — all fixings tight, all earth bonds in place, no sharp edges.
- kk) De-burr all cut ends of ladder/tray. No exposed sharp edges that could damage cable sheaths.
- ll) Complete Inspection Register (MSE-IR-001) for the completed ladder run.
- mm) QC Officer to inspect and sign off. Photograph completed run — label photo with cable ladder ID.
- nn) Housekeeping — clear all off-cuts, packaging, and waste from the area before end of shift.

6. INSPECTION HOLD POINTS & WITNESS POINTS

- **QC Hold Point — anchor bolt torque inspection (QC Officer sign-off required before loading)**
- **QC Hold Point — earth continuity test $\leq 1\Omega$ (QC Officer sign-off required)**
- **Witness Point — final inspection before cabling**

7. EMERGENCY RESPONSE

EMERGENCY PROCEDURE — SPECIFIC TO THIS ACTIVITY:

In the event of a fall from height: Do NOT move the fallen person. Call for first aider immediately. Dial site emergency number. Notify site manager and Section 16(2). Preserve scene for investigation.

GENERAL: Site emergency number — [Insert]. National emergency: 10177. EC&I Site Manager: [Cell]. Section 16(2) [Name]: [Cell].

Muster point: [Insert location]. In any emergency — evacuate first, account for all persons, then report.

8. WORKER ACKNOWLEDGEMENT

I confirm that this Method Statement has been explained to me in a language I understand, that I understand the identified hazards and the controls to be applied, and that I will work in accordance with this procedure at all times.

#	Full Name	ID Number	Trade / Role	Signature	Date
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Method Statement Author	Construction Supervisor	EC&I Site Manager	Section 16(2) Approved
[Name]	[Name]	[Name]	[Name]
Signature: _____	Signature: _____	Signature: _____	Signature: _____
Date: _____ __	Date: _____ __	Date: _____ __	Date: _____ __

MS-002 — Cable Pulling Operations

MSE-HSE-MS-001-02

MS Reference	MS-002
Related RA	RA-002 (MSE-HSE-RA-001 — Risk Assessment Register)
Document Number	MSE-HSE-MS-001-02
Project	[Project Name]
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Date Prepared	[DD/MM/YYYY]
Review Date	[DD/MM/YYYY or after any scope change or incident]
Supervisor in Charge	[Name]
Gang / Discipline	[EC&I / OHL / Instrument / etc.]

1. SCOPE & PURPOSE

This Method Statement describes the safe step-by-step procedure for the installation (pulling) of all types and sizes of cable — including mechanical drum pulling, manual gang pulls, and single-cable draws through conduit, ladder, tray, and underground ducting.

2. PRE-CONDITIONS — DO NOT START WITHOUT CONFIRMING ALL ITEMS BELOW

⚠ STOP: Every item in this section must be confirmed BEFORE work commences. If ANY item cannot be confirmed — work does NOT start. Notify EC&I Site Manager.

- ☐ AFC cable schedule and routing drawing available
- ☐ Cable drum test certificate and drum sheet on site
- ☐ Ladder / tray installation inspected and signed off — no sharp edges
- ☐ PTW issued for any pull near energised equipment
- ☐ Mechanical cable pulling equipment inspected and tested — e-stop functional
- ☐ Cable drum spindle stand rated for drum weight — confirmed by inspection
- ☐ Toolbox talk completed — this method statement briefed to all workers

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Item	Standard / Specification	Mandatory?
Safety helmet	SANS 1397	MANDATORY
Safety boots — steel toe	SANS 20345	MANDATORY
High-visibility vest	EN 471 Class 2	MANDATORY
Safety glasses	SANS 1425	MANDATORY
Heavy-duty leather gloves	EN 388 Cut Level D+	MANDATORY during pulling
Face shield	ANSI Z87.1	During mechanical pulling — puller operator
Hearing protection	85dB+ areas	When using mechanical puller

4. TOOLS, EQUIPMENT & MATERIALS

#	Tool / Equipment / Material	Specification / Standard	Qty Required	Inspected?
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1	Cable drum (correct drum per cable schedule)	Tested and tagged	Per schedule	☐
2	Cable drum spindle stand — rated for drum weight	Manufacturer rated SWL	1 per drum	☐
3	Mechanical cable puller / winch	Rated for cable weight — with calibrated tension indicator	1	☐
4	Cable pulling grips (Kellems grips)	Rated for cable size	As required	☐
5	Swivels	Rated — matched to pulling load	As required	☐
6	Pulling eyes (terminating type)	Correct for conductor size	As required	☐
7	Cable lubricant (pulling compound)	Compatible with cable sheath material	As required	☐
8	Bell-mouth conduit entries	Correct ID for cable	All conduit entries	☐
9	Cable tags — brass or stainless	Per cable numbering schedule	2 per cable	☐
10	Multimeter / continuity tester	Calibrated	1	☐
11	Measuring tape / cable counter	Calibrated	1	☐

5. STEP-BY-STEP SAFE WORK PROCEDURE

STEP 1. PRE-PULL PREPARATION

- oo) Identify cable on schedule. Confirm drum number, cable type, voltage rating, size, and length.
- pp) Verify cable is correct drum — check drum label against cable schedule. Do NOT mix drums.
- qq) Position cable drum at pull start point — drum must unroll from top, not bottom, to prevent kinking.
- rr) Chock drum on both sides immediately. Never release drum from transport without chocking.
- ss) Install bell-mouth conduit entries at all conduit entry points to prevent cable sheath damage.
- tt) Pre-lay cable lubricant (pulling compound) in conduit as per manufacturer instructions.
- uu) Position mechanical puller at the pull end. Inspect: motor, brake, tension indicator, e-stop. Test e-stop before starting.
- vv) Brief all gang workers on communication signals: PULL / STOP / EMERGENCY STOP. No ambiguity in signals.

STEP 2. MECHANICAL PULLING SETUP

- ww) Feed pulling rope through route — use draw-wire or fish tape. Never pull a rope with excessive force.
- xx) Attach pulling grip (Kellems) correctly to cable end — correct grip for cable type. Never pull by the conductor alone.
- yy) Connect pulling grip to swivel — swivel connected to pulling rope. No direct connection — swivel prevents torque transfer.
- zz) Attach rated pulling eye to rope at puller end. Do NOT exceed cable's maximum pulling tension — calculate before pull.
- aaa) Maximum pulling tension: $T = 1500 \times \text{conductor cross-section (mm}^2\text{)} \times \text{number of conductors}$. Never exceed. Reduce by 25% for bends.
- bbb) Ensure all workers are clear of the pull axis — no person between drum and puller at any time.
- ccc) Mechanical puller operator position: to the side — never behind the drum or in line with the cable.

STEP 3. MANUAL GANG PULL

- ddd) For shorter pulls — gang pull under supervisor direction with clear communication.
- eee) Gang leader at front, section feeders at each mid-point guide, drum supervisor at back.
- fff) Pull on command 'PULL' — stop immediately on 'STOP'. Emergency shout = stop everything.
- ggg) Rotate gang positions every 15 minutes — same workers doing the same task continuously causes injury.
- hhh) Maximum gang pull per person: 25kg pulling force. For heavier cables — use mechanical pulling equipment.

STEP 4. CABLE INSTALLATION

- iii) Maintain even pulling speed — jerking causes conductor damage and grip failure.
- jjj) At every bend or change of direction — have a worker guiding the cable around the bend — do NOT allow cable to bind on ladder rungs.
- kkk) Monitor cable for kinking continuously — stop if kinking is observed. Straighten before proceeding.
- lll) If cable stops moving — STOP. Do NOT increase force. Investigate cause. Re-lubricate if required.

mmm) Do NOT exceed maximum pulling tension. If calculated tension is being approached — STOP. Re-assess route.

STEP 5. CABLE IDENTIFICATION & TAGGING

- nnn) Immediately after pulling — tag both ends of the cable with correct cable number from cable schedule.
ooo) Tags must be permanent, weatherproof, and match the cable schedule exactly.
ppp) Record pulled cable on the Drawing Register (MSE-DWG-001) — ticking off each cable as it is installed.
qqq) Measure and record actual installed length against drum label. Note any variance.

STEP 6. POST-PULL CHECKS

- rrr) Visual inspection of cable along full route — no visible damage, sheath intact, no kinking.
sss) Insulation resistance test on completed cable runs — per MSE-IR2-001. Record pre-termination IR.
ttt) Secure cable along ladder with ties at maximum 500mm intervals (instrumentation/LV), 750mm intervals (MV).
uuu) Clear pull area — collect all rope, grips, swivels, drum packaging. Drum to be removed from area.
vvv) Chock or remove cable drum spindle stands — no drums to be left unchocked on site.

6. INSPECTION HOLD POINTS & WITNESS POINTS

- Witness Point — drum identification check before pull (QC)
- QC Hold Point — IR test pre-termination (QC Officer sign-off)
- QC Hold Point — cable tagging verification (QC Officer)

7. EMERGENCY RESPONSE

EMERGENCY PROCEDURE — SPECIFIC TO THIS ACTIVITY:

Cable snap or grip failure: all workers clear of pull axis by procedure. In event of worker injury — stop all activities, call first aider, notify site manager, do not restart pull until incident investigated.

GENERAL: Site emergency number — [Insert]. National emergency: 10177. EC&I Site Manager: [Cell]. Section 16(2) [Name]: [Cell].

Muster point: [Insert location]. In any emergency — evacuate first, account for all persons, then report.

8. WORKER ACKNOWLEDGEMENT

I confirm that this Method Statement has been explained to me in a language I understand, that I understand the identified hazards and the controls to be applied, and that I will work in accordance with this procedure at all times.

#	Full Name	ID Number	Trade / Role	Signature	Date
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Method Statement Author	Construction Supervisor	EC&I Site Manager	Section 16(2) Approved
[Name]	[Name]	[Name]	[Name]
Signature: _____	Signature: _____	Signature: _____	Signature: _____

Date: _____ —	Date: _____ —	Date: _____ —	Date: _____ —
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MS-003 — Isolation, Lockout & Tagout (LOTO)

MSE-HSE-MS-001-03

MS Reference	MS-003
Related RA	RA-003 (MSE-HSE-RA-001 — Risk Assessment Register)
Document Number	MSE-HSE-MS-001-03
Project	[Project Name]
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Date Prepared	[DD/MM/YYYY]
Review Date	[DD/MM/YYYY or after any scope change or incident]
Supervisor in Charge	[Name]
Gang / Discipline	[EC&I / OHL / Instrument / etc.]

1. SCOPE & PURPOSE

This Method Statement defines the mandatory procedure for the isolation and lockout/tagout of all energy sources before any person commences work on electrical equipment or systems. This procedure applies to ALL electrical isolation activities — from LV socket circuits to MV switchgear. NO EXCEPTIONS.

2. PRE-CONDITIONS — DO NOT START WITHOUT CONFIRMING ALL ITEMS BELOW

⚠ STOP: Every item in this section must be confirmed BEFORE work commences. If ANY item cannot be confirmed — work does NOT start. Notify EC&I Site Manager.

- ☐ LOTO equipment kit available — padlocks (one per worker), hasp, danger tags, lockout boxes
- ☐ PTW issued and signed by the authorised PTW issuer
- ☐ Approved voltage detection equipment (two units) calibrated and available
- ☐ Switching schedule prepared and independently verified for MV systems
- ☐ All workers who will be working on the isolated equipment have their own padlock

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Item	Standard / Specification	Mandatory?
Safety helmet	SANS 1397	MANDATORY
Safety boots	SANS 20345	MANDATORY
Safety glasses	SANS 1425	MANDATORY
Electrically insulated gloves — LV rated (Class 00 min)	IEC 60903 Class 00+	MANDATORY for all electrical work
Arc flash face shield (min 4 cal/cm ² LV, 8–12 cal/cm ² MV)	NFPA 70E / IEC 61482	MANDATORY for panel access
Arc flash rated clothing (arc rated FR clothing)	ATPV rated to applicable cal/cm ²	MANDATORY MV work
Rubber insulating mat	IEC 61111	At all switchgear work positions

4. TOOLS, EQUIPMENT & MATERIALS

#	Tool / Equipment / Material	Specification / Standard	Qty Required	Inspected?
1	Approved voltage detector (two units)	Rated for system voltage — calibrated	2	☐

2	Personal padlock — one per worker	Individual lock unique to each person	1 per worker	☐
3	Hasp / lockout clamp	Multi-lock rated	As required	☐
4	Lockout box	For complex multi-lock isolations	As required	☐
5	Danger tags — 'DO NOT OPERATE'	Printed, weatherproof	Minimum 1 per isolation point	☐
6	Electrically insulated tools — LV rated	IEC 60900 rated	Full kit	☐
7	Discharge rod / earthing rod	Rated for system voltage	For MV systems	☐
8	Written switching schedule / isolation record	Signed by Section 16(2) or authorised person	1	☐

5. STEP-BY-STEP SAFE WORK PROCEDURE

STEP 1. IDENTIFY ALL ENERGY SOURCES

- www) Identify ALL energy sources associated with the equipment to be worked on:
- xxx) → Electrical (MV, LV, UPS, battery-backed systems, VSD capacitors, SCADA signal circuits)
- yyy) → Mechanical (gravity-loaded equipment, springs, counterweights)
- zzz) → Pneumatic (compressed air actuators, instrument air systems)
- aaaa) → Hydraulic (hydraulic actuators)
- bbbb) → Stored energy (capacitor banks, charged cables, pressure vessels)
- cccc) Confirm isolation points for EACH energy source on the drawing. Do NOT proceed if isolation points are not identified.

STEP 2. NOTIFY ALL AFFECTED PARTIES

- dddd) Notify the control room operator / shift supervisor that the equipment is to be isolated.
- eeee) Notify all other work groups who may be affected by or who work near the isolation.
- ffff) Obtain written authority to isolate from the authorised person (PTW issuer).
- gggg) Confirm the switching schedule has been reviewed and signed by a second authorised person.

STEP 3. DE-ENERGISE — SHUT DOWN EQUIPMENT

- hhhh) Bring equipment to a safe, controlled stop in normal operating sequence — do NOT emergency stop unless necessary.
- iiii) Operate the local isolator or control device to shut down the equipment.
- jjjj) Confirm equipment has stopped — observe, listen, and feel for continued movement (mechanical, airflow, vibration).

STEP 4. ISOLATE — OPEN ALL ISOLATION POINTS

- kkkk) Open the main isolation point — upstream incomer breaker, isolator, or disconnect.
- llll) Where multiple isolation points exist — open ALL of them. Never rely on one isolation point alone.
- mmmm) For MV systems — follow the written switching schedule step-by-step. Tick each step as completed.
- nnnn) Disconnect all UPS, battery-backed, or alternative supply feeds.

STEP 5. APPLY LOCK & DANGER TAG

- oooo) EACH WORKER who will work on the isolated equipment applies THEIR OWN personal padlock to the isolation point, using the hasp.
- pppp) EVERY padlock must be unique to the person who applied it. Only that person may remove their lock.
- qqqq) Apply a 'DANGER — DO NOT OPERATE' tag to every isolation point, signed and dated by the person applying.
- rrrr) Where multiple isolation points exist — lock and tag EVERY ONE.
- ssss) For complex isolations with many isolation points — use a lockout box. Keys to all isolation point locks are placed inside. Each worker locks the lockout box with their own padlock.

STEP 6. RELEASE STORED ENERGY

- tttt) Operate the control device in all directions to confirm pressure or stored energy has been released.
- uuuu) For capacitors / VSDs: wait the full discharge time specified by the manufacturer (minimum 5 minutes for most VSDs). Then verify discharge with meter.
- vvvv) For MV cables: apply discharge / earthing rods per applicable procedure after confirming dead.
- wwww) For spring-loaded mechanisms: mechanically pin or block in position.

STEP 7. TEST FOR DEAD — MANDATORY SEQUENCE

- xxxx) TEST THE TESTER: Use the approved voltage indicator to test on a KNOWN LIVE source to confirm the tester is working correctly.

- yyyy) TEST THE CIRCUIT: Apply the approved voltage indicator to each conductor / phase of the equipment to be worked on. Test Phase-Phase AND Phase-Earth.
- zzzz) TEST THE TESTER AGAIN: Re-test on the known live source to confirm the tester is still working.
- aaaaa) Only proceed if zero voltage is confirmed on ALL conductors AND both tester checks are positive.
- bbbbb) If any doubt — STOP. Repeat isolation procedure. Never work on equipment that has not been confirmed dead by this sequence.

STEP 8. WORK MAY NOW PROCEED

- cccc) With all locks applied, all tags in place, stored energy released, and zero voltage confirmed — work may commence.
- dddd) Workers must stay within the scope of the PTW. Do NOT work outside the isolated zone without a new PTW.
- eeee) If any worker leaves the site — their padlock remains on. They must reapply and re-verify on return.
- ffff) The PTW issuer must be notified if any condition changes.

STEP 9. RESTORATION — REMOVING ISOLATION (RE-ENERGISATION)

- ggggg) Confirm ALL work is complete and signed off. All tools removed. All workers briefed and clear of the equipment.
- hhhhh) EACH WORKER removes ONLY THEIR OWN padlock. No person may remove another person's padlock — ever.
- iiii) The last padlock to be removed is the PTW issuer's lock. PTW is signed closed at this point.
- jjjj) Remove all danger tags. Confirm all isolation points are being restored in the correct sequence (reverse of opening sequence).
- kkkkk) Close the PTW in writing. Notify control room / shift supervisor that equipment is being restored.
- lllll) Energise in the correct sequence per switching schedule. Confirm equipment runs normally.

6. INSPECTION HOLD POINTS & WITNESS POINTS

- **Hold Point — PTW must be signed before any LOTO is applied**
- **Hold Point — 'Test for Dead' sequence must be verified by a second person for MV systems**
- **Hold Point — all locks removed and PTW closed before re-energisation**

7. EMERGENCY RESPONSE

EMERGENCY PROCEDURE — SPECIFIC TO THIS ACTIVITY:

If a worker is found working on equipment that has NOT been properly isolated — STOP ALL WORK immediately. Notify EC&I Site Manager and Section 16(2). Conduct immediate incident investigation. Do not restart work until full re-isolation is completed.

GENERAL: Site emergency number — [Insert]. National emergency: 10177. EC&I Site Manager: [Cell]. Section 16(2) [Name]: [Cell].

Muster point: [Insert location]. In any emergency — evacuate first, account for all persons, then report.

8. WORKER ACKNOWLEDGEMENT

I confirm that this Method Statement has been explained to me in a language I understand, that I understand the identified hazards and the controls to be applied, and that I will work in accordance with this procedure at all times.

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Method Statement Author	Construction Supervisor	EC&I Site Manager	Section 16(2) Approved
[Name]	[Name]	[Name]	[Name]
Signature: _____	Signature: _____	Signature: _____	Signature: _____
Date: _____ —	Date: _____ —	Date: _____ —	Date: _____ —

MS-004 — 33kV OHL — Stringing, Hardware & Terminations

MSE-HSE-MS-001-04

MS Reference	MS-004
Related RA	RA-005 (MSE-HSE-RA-001 — Risk Assessment Register)
Document Number	MSE-HSE-MS-001-04
Project	[Project Name]
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Date Prepared	[DD/MM/YYYY]
Review Date	[DD/MM/YYYY or after any scope change or incident]
Supervisor in Charge	[Name]
Gang / Discipline	[EC&I / OHL / Instrument / etc.]

1. SCOPE & PURPOSE

This Method Statement covers the installation of 33kV Overhead Line conductors including conductor stringing, insulator and hardware installation, conductor terminations at towers/poles, and the procedure for working in proximity to the existing energised system. This is a HIGH RISK activity. Only qualified OHL personnel may execute this work.

2. PRE-CONDITIONS — DO NOT START WITHOUT CONFIRMING ALL ITEMS BELOW

⚠ STOP: Every item in this section must be confirmed BEFORE work commences. If ANY item cannot be confirmed — work does NOT start. Notify EC&I Site Manager.

- ☐ OHL erection team fully qualified — wireman's licences and OHL certificates verified and on file
- ☐ Minimum approach distance confirmed and documented — 33kV: 1.0m minimum (greater where practicable)
- ☐ All conductors to be worked on are earthed both sides of the working section — earth application record signed
- ☐ Mechanical clearance from line owner obtained in writing
- ☐ Stringing equipment inspected — conductor blocks, tensioner, engine, brakes all tested
- ☐ Toolbox talk completed with all OHL team — this method statement briefed in full
- ☐ PTW issued by authorised person

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Item	Standard / Specification	Mandatory?
Safety helmet with chin strap	SANS 1397	MANDATORY — chin strap fastened when climbing
Safety boots with ankle support	SANS 20345	MANDATORY
High-visibility vest	EN 471 Class 2	MANDATORY
Full body harness — OHL type with work positioning loop	SANS 1354 / EN 361	MANDATORY
Double lanyard with shock absorber	EN 355	MANDATORY — 100% tie-off
OHL arc-rated gloves (rubber insulating + leather protector)	IEC 60903 Class 2 minimum	MANDATORY on tower
Arc flash rated clothing	ATPV ≥ 8 cal/cm ²	MANDATORY for conductor termination work
Safety glasses	SANS 1425	MANDATORY

Leather work gloves	EN 388	MANDATORY — ground crew
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4. TOOLS, EQUIPMENT & MATERIALS

#	Tool / Equipment / Material	Specification / Standard	Qty Required	Inspected?
1	Conductor drum (correct conductor per stringing schedule)	Per line design	Per schedule	☐
2	Conductor stringing blocks — rated for conductor type	Manufacturer rated	Per structure	☐
3	Hydraulic tensioner / braking device	Rated for conductor pull	1	☐
4	Pulling machine (puller / engine)	Rated for conductor	1	☐
5	Pulling rope / pilot rope	Rated — HMPE or similar	Per span length	☐
6	Compression fittings / ferrules	Match conductor type and size	Per schedule	☐
7	Compression tool — hydraulic	Calibrated, dies match conductor	1	☐
8	Earthing sticks / short-circuit sets	Rated for 33kV — tested	Min 2 per working section	☐
9	Approved voltage detector (33kV rated)	Calibrated	2	☐
10	Sagging equipment — tension meter or theodolite	Calibrated	1	☐
11	Climbing equipment — lanyards, connectors, positioning lanyards	SANS 1354 rated, inspected	Per climber	☐

5. STEP-BY-STEP SAFE WORK PROCEDURE

STEP 1. SAFETY CLEARANCES — BEFORE ANYTHING ELSE

- mmmmm) Confirm written mechanical clearance received from the line owner / EPCM.
- nnnnn) Confirm earthing record: all conductors in the working section are earthed at both ends — verify earth application log is signed.
- ooooo) Physically verify earths are applied using approved 33kV voltage detector: TEST TESTER → TEST CONDUCTOR → TEST TESTER again.
- ppppp) Do NOT proceed until zero voltage is confirmed and earthing is physically verified.
- qqqqq) Confirm minimum approach distance is communicated to all workers — any energised conductor or equipment at 33kV: 1.0m absolute minimum.
- rrrrr) Confirm PTW is signed and in hand. Brief entire OHL team on PTW scope.

STEP 2. SITE ESTABLISHMENT & EQUIPMENT SETUP

- sssss) Position tensioner at pull start point — firm, level ground. Anchor tensioner per manufacturer spec.
- ttttt) Position puller at pull end — firm, level ground. Anchor puller.
- uuuuu) Install conductor stringing blocks on all structures between tensioner and puller. Correct block type for conductor — anti-rotation where required.
- vvvvv) Brief structure crews on communication protocol — radio communication at all times.
- wwwww) Establish exclusion zone: no person on the ground below or within 5m laterally of the conductor path during stringing.

STEP 3. PILOT ROPE INSTALLATION

- xxxxx) Install pilot rope through all stringing blocks from puller to tensioner position.
- yyyyy) Check pilot rope rating — minimum 2× expected pulling tension.
- zzzzz) Helicopter or manual installation of pilot rope — per OHL team standard practice for this route.

STEP 4. CONDUCTOR STRINGING

- aaaaa) Connect conductor to pilot rope using correct pulling sock / grip — never pull on the conductor strand alone.
- bbbbb) Begin stringing at slow controlled speed — supervisor monitors conductor at each structure.
- ccccc) Communication: dedicated radio contact between puller operator, tensioner operator, and all structure crews.
- ddddd) Any signal STOP is final — all operations cease immediately until cleared by supervisor.

- eeeeee) Monitor conductor for twisting, snapping, or block jump — stop immediately if observed.
 ffffff) Conductor must not contact ground at any point during stringing — adjust equipment if necessary.

STEP 5. SAGGING & TENSIONING

- gggggg) Sag conductor to design tension/sag per stringing sag chart for the ambient temperature on the day.
 hhhhhh) Measure sag using theodolite or tension method as specified in the stringing schedule.
 iiiiii) Record measured sag for each span. Do not proceed to clamping until sag is within specification.
 jjjjjj) Confirm with engineer if any span is outside tolerance.

STEP 6. CONDUCTOR HARDWARE — CLAMPING

- kkkkkk) Install vibration dampers, suspension/tension clamps, and spacers per hardware schedule.
 llllll) Torque all bolted hardware to manufacturer specification — use calibrated torque wrench. Record.
 mmmmmm) For compression fittings — use hydraulic press with correct dies. Die marks must be continuous. Record die number and press used.

STEP 7. CONDUCTOR TERMINATION AT TOWER / POLE

- nnnnnn) Ensure earth is still applied both sides of working section. Re-verify before any person ascends.
 oooooo) Climber applies harness, checks all PPE, attaches first lanyard to anchor BEFORE leaving ground.
 pppppp) 100% tie-off at all times — attach second lanyard before releasing first. Never unattached.
 qqqqqq) Install compression dead-end fitting using hydraulic compression tool. Correct dies for conductor.
 Ensure full compression — check die gap indicator.
 rrrrrr) Clean all insulator surfaces with clean dry cloth. No contamination on insulator surfaces.
 ssssss) Connect conductor to insulator string hardware and structure anchor per drawing — torque to specification.

STEP 8. REMOVAL OF EARTHS — CONTROLLED SEQUENCE

- tttttt) Only remove earths once ALL conductor installation and hardware work is fully complete.
 uuuuuu) Remove earths in reverse of application order — far end first.
 vvvvvv) Record removal of each earth on the earthing record log.
 wwwwww) Confirm to PTW issuer that all earths have been removed and all workers are clear.
 xxxxxx) PTW may only be closed after this confirmation.

6. INSPECTION HOLD POINTS & WITNESS POINTS

- **Hold Point — earth application record signed before any person ascends**
- **Hold Point — 33kV voltage verification (test for dead) on each working section**
- **Witness Point — conductor sagging check (engineer or site manager)**
- **QC Hold Point — compression fitting inspection — die marks continuous and full length**

7. EMERGENCY RESPONSE

EMERGENCY PROCEDURE — SPECIFIC TO THIS ACTIVITY:

Conductor contact / electrocution: Do NOT touch the person until the line is confirmed dead and earthed. Shout for help. Call site emergency number and 10177. Notify EC&I Site Manager and Section 16(2) immediately. Preserve scene. Do not restore supply until DoEL inspector authorises.

GENERAL: Site emergency number — [Insert]. National emergency: 10177. EC&I Site Manager: [Cell]. Section 16(2) [Name]: [Cell].

Muster point: [Insert location]. In any emergency — evacuate first, account for all persons, then report.

8. WORKER ACKNOWLEDGEMENT

I confirm that this Method Statement has been explained to me in a language I understand, that I understand the identified hazards and the controls to be applied, and that I will work in accordance with this procedure at all times.

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Method Statement Author	Construction Supervisor	EC&I Site Manager	Section 16(2) Approved
[Name]	[Name]	[Name]	[Name]
Signature: _____	Signature: _____	Signature: _____	Signature: _____
Date: _____	Date: _____	Date: _____	Date: _____

MS-005 — Earthing Mat & Grid Installation

MSF-HSE-MS-001-05

MS Reference	MS-005
Related RA	RA-008 (MSE-HSE-RA-001 — Risk Assessment Register)
Document Number	MSE-HSE-MS-001-05
Project	[Project Name]
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Date Prepared	[DD/MM/YYYY]
Review Date	[DD/MM/YYYY or after any scope change or incident]
Supervisor in Charge	[Name]
Gang / Discipline	[EC&I / OHL / Instrument / etc.]

1. SCOPE & PURPOSE

This Method Statement covers the excavation, installation, testing, and backfilling of earthing mat, earth grid, and earth conductor systems — including copper tape, copper conductor, earth rods, and thermite/exothermic welded connections.

2. PRE-CONDITIONS — DO NOT START WITHOUT CONFIRMING ALL ITEMS BELOW

⚠ STOP: Every item in this section must be confirmed BEFORE work commences. If ANY item cannot be confirmed — work does NOT start. Notify EC&I Site Manager.

- ☐ AFC earthing drawing available and reviewed
- ☐ Services drawing reviewed and CAT scan completed prior to any excavation
- ☐ Excavation inspection regime established — competent person appointed for daily excavation inspection
- ☐ Thermite welding team trained — thermite welding certificate on file
- ☐ Earth resistance test equipment calibrated and available
- ☐ PTW issued for any excavation within 500mm of identified services
- ☐ Toolbox talk completed — this method statement briefed in full

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Item	Standard / Specification	Mandatory?
Safety helmet	SANS 1397	MANDATORY
Safety boots — steel toe, ankle height	SANS 20345	MANDATORY
High-visibility vest	EN 471 Class 2	MANDATORY
Safety glasses	SANS 1425	MANDATORY
Work gloves — leather	EN 388	MANDATORY
Face shield (for thermite welding)	ANSI Z87.1	MANDATORY during welding
Leather welding gloves	EN 388 + EN 407	MANDATORY during thermite welding
Fire-resistant clothing	EN ISO 11612	MANDATORY during thermite welding
Gumboots / wellington boots	SABS rated	In wet or muddy trench conditions

4. TOOLS, EQUIPMENT & MATERIALS

#	Tool / Equipment / Material	Specification / Standard	Qty Required	Inspected?
1	Copper earth tape / conductor (size per drawing)	Per BS 6360 / SANS 10142	As per BOM	☐
2	Earth rods (copper-bonded steel, 16mm dia)	SANS 62561 / BS 7430	Per drawing	☐
3	Earth rod driver — pneumatic or manual	Match rod OD	1	☐
4	Thermite weld kit (crucible, mould, powder)	Correct mould for conductor size	Per schedule	☐
5	Earth clamps — mechanical (backup connections)	Rated — tinned copper preferred	Per schedule	☐
6	CAT scanner (cable avoidance tool)	Calibrated	1	☐
7	Excavator — mini plant	Trained operator + banksman	As required	☐
8	Shoring / excavation supports	Rated for depth / soil type	Per plan	☐
9	Earth resistance test equipment — fall of potential or clamp	Calibrated	1	☐
10	Steel tape measure / builder's line	Calibrated	1	☐

5. STEP-BY-STEP SAFE WORK PROCEDURE

STEP 1. SERVICES VERIFICATION BEFORE EXCAVATION

- yyyyyy) Review all underground services drawings for the proposed excavation area.
- zzzzzz) Complete CAT scan using cable avoidance tool (CAT) on a 1m grid over the full excavation area.
- aaaaaaa) Mark all detected services with spray paint / marker flags on the surface.
- bbbbbbb) Within 500mm of any detected service — HAND DIG ONLY. No mechanical excavation.
- ccccccc) If any unmarked service is encountered during excavation — STOP immediately. Notify EC&I Site Manager.

STEP 2. EXCAVATION — TRENCHES & PITS

- ddddddd) Excavate trenches to depth specified on drawing — minimum 600mm below finished grade unless otherwise specified.
- eeeeeee) Excavated material to be placed minimum 500mm from trench edge to prevent surcharge collapse.
- ffffff) For depths >1m: install shoring or batch/bench the trench before anyone enters. Comply with CR Reg 11.
- ggggggg) Competent person to inspect excavation every morning before any entry. Sign the excavation inspection register.
- hhhhhhh) Place barriers and signage around all open excavations. Cover open excavations when not actively working.

STEP 3. EARTH ROD INSTALLATION

- iiiiiii) Position earth rod at location per drawing. Vertical drive unless drawing shows angled installation.
- jjjjjjj) Drive rod using approved rod driver — do NOT use hammer directly on rod. Protect rod top with driving cap.
- kkkkkkk) Drive to full depth per drawing — typically 1.2m or 1.5m. If rod refuses — investigate soil condition, do not force.
- lllllll) Leave minimum 200mm exposed for connection to earth conductor.
- mmmmmmm) Inspect rod head after driving — confirm no deformation or cracks in coating.

STEP 4. EARTH CONDUCTOR LAYING

- nnnnnnn) Lay earth conductor (copper tape or round conductor) in trench bottom — clean, debris-free.
- ooooooo) Conductor to be flat in trench — no coiling, no sharp bends, no kinking.
- ppppppp) At all changes in direction — use minimum bend radius of 5× conductor width.
- qqqqqqq) Tape conductor to trench bottom using sand or fine aggregate bedding layer — 50mm bedding below, 100mm surround.
- rrrrrrr) Cross all other services with minimum 50mm clearance — use separator where clearance cannot be maintained.

STEP 5. THERMITE (EXOTHERMIC) WELDING — CONNECTIONS

- sssssss) Select correct mould for conductor size and type of connection. Refer to manufacturer matrix.
- ttttttt) Clean both conductors at the connection point — wire brush to bright copper.

uuuuuuu) Clamp mould firmly over conductors — secure per manufacturer instruction.
 vvvvvvv) Pour correct charge of thermite powder into crucible. Insert ignition disc. Close and lock mould.
 wwwwwwvv) Clear all non-essential personnel from 3m radius. Operator wears face shield, leather gloves, FR clothing.
 xxxxxxx) Ignite: single action — stand clear immediately.
 yyyyyyy) Allow to cool for minimum 60 seconds. Do NOT touch or move until cool.
 zzzzzzz) Open mould. Remove slag with brush. Inspect weld — must be full cross-section, no voids, no porosity.
 aaaaaaaa) Failed welds must be cut out and re-welded. Never repair a thermite weld — cut out and start again.

STEP 6. EARTH RESISTANCE TESTING

bbbbbbbbb) Test resistance of completed earth grid using fall-of-potential method or calibrated clamp meter.
 cccccccc) Target: earth grid resistance $\leq 1\Omega$ per SANS 10142 (or as specified on drawing).
 dddddddd) Record all test results — test point, resistance, test method, equipment serial number, date.
 eeeeeeee) If resistance is $>1\Omega$ — install additional earth rods per engineer's direction. Re-test after each addition.
 ffffffff) QC Officer to witness final test. Client to co-sign earth resistance test results.

STEP 7. BACKFILLING

ggggggggg) Compact first 100mm of backfill by hand — do not use mechanical compaction within 100mm of conductor.
 hhhhhhhh) Lay marker tape ('CAUTION — BURIED EARTH CONDUCTOR') 150mm below finished surface.
 iiiiii) Continue backfill in 150mm layers — compact each layer before proceeding.
 jjjjjj) Mechanical compaction may be used above 300mm from conductor — no heavy compaction equipment until 600mm cover.
 kkkkkkkk) Record backfill levels and compaction method in site diary.
 llllllll) Update as-built drawing to show actual earth conductor routing and rod positions.

6. INSPECTION HOLD POINTS & WITNESS POINTS

- **Hold Point — CAT scan result and services clearance before excavation**
- **Hold Point — excavation depth and shoring inspection (daily) before entry**
- **Hold Point — thermite weld inspection — each weld before backfilling**
- **QC Hold Point — earth resistance test $\leq 1\Omega$ witnessed by QC Officer and Client**

7. EMERGENCY RESPONSE

EMERGENCY PROCEDURE — SPECIFIC TO THIS ACTIVITY:

Worker trapped in excavation collapse: Do NOT enter the excavation — this could cause further collapse. Call site emergency number and 10177 immediately. If safe to do so — reach or throw a rope to the trapped person. Notify EC&I Site Manager and Section 16(2). Preserve scene.

GENERAL: Site emergency number — [Insert]. National emergency: 10177. EC&I Site Manager: [Cell]. Section 16(2) [Name]: [Cell].

Muster point: [Insert location]. In any emergency — evacuate first, account for all persons, then report.

8. WORKER ACKNOWLEDGEMENT

I confirm that this Method Statement has been explained to me in a language I understand, that I understand the identified hazards and the controls to be applied, and that I will work in accordance with this procedure at all times.

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Method Statement Author	Construction Supervisor	EC&I Site Manager	Section 16(2) Approved
[Name]	[Name]	[Name]	[Name]
Signature: _____	Signature: _____	Signature: _____	Signature: _____
Date: _____ —	Date: _____ —	Date: _____ —	Date: _____ —

MS-006 — Pre-Commissioning, Loop Testing & System Energisation

MS Reference	MS-006
Related RA	RA-010 (MSE-HSE-RA-001 — Risk Assessment Register)
Document Number	MSE-HSE-MS-001-06
Project	[Project Name]
Prepared By	[Name] — [Role]
Approved By	[Name] — Manager, Projects
Date Prepared	[DD/MM/YYYY]
Review Date	[DD/MM/YYYY or after any scope change or incident]
Supervisor in Charge	[Name]
Gang / Discipline	[EC&I / OHL / Instrument / etc.]

1. SCOPE & PURPOSE

This Method Statement covers the pre-commissioning sequence for EC&I systems — including IR testing, loop verification (4–20mA), motor run checks, and the formal first energisation procedure for LV and MV systems. This is a HIGH RISK activity requiring Section 16(2) sign-off before energisation.

2. PRE-CONDITIONS — DO NOT START WITHOUT CONFIRMING ALL ITEMS BELOW

⚠ STOP: Every item in this section must be confirmed BEFORE work commences. If ANY item cannot be confirmed — work does NOT start. Notify EC&I Site Manager.

- ☐ All installation inspections complete — ITP Hold Points signed off
- ☐ Quality Dossier pre-commissioning section complete — all IR tests recorded, loop check sheet prepared
- ☐ Pre-commissioning punch list compiled and all Cat A items closed
- ☐ Arc flash study reviewed — correct cal/cm² PPE identified for each system
- ☐ Written energisation procedure prepared and signed by EC&I Site Manager and Section 16(2)
- ☐ Client / EPCM representative available and has signed the pre-energisation checklist
- ☐ PTW system in place — all PTWs for pre-commissioning phase issued and controlled
- ☐ All non-essential personnel clear of the commissioning zone

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Item	Standard / Specification	Mandatory?
Safety helmet	SANS 1397	MANDATORY
Safety boots	SANS 20345	MANDATORY
Safety glasses	SANS 1425	MANDATORY
LV arc flash PPE — 4 cal/cm ² minimum	NFPA 70E / IEC 61482	MANDATORY for LV energisation
MV arc flash PPE — 12 cal/cm ² minimum	NFPA 70E / IEC 61482	MANDATORY for MV energisation
Arc flash face shield — rated to applicable cal/cm ²	NFPA 70E	MANDATORY for all energisation
Electrically insulated gloves — Class 00 (LV) or Class 2 (MV)	IEC 60903	MANDATORY during energisation
Arc flash rated clothing (FR)	ATPV rated	MANDATORY for MV work

Rubber insulating mat	IEC 61111	At all switchgear positions
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4. TOOLS, EQUIPMENT & MATERIALS

#	Tool / Equipment / Material	Specification / Standard	Qty Required	Inspected?
1	IR test equipment — 500VDC (LV), 5kVDC (MV)	Calibrated — certificate on site	1	☐
2	Loop calibrator / HART communicator	Calibrated	1	☐
3	Digital multimeter — CAT III/IV	Calibrated	2	☐
4	Phase sequence meter	Calibrated	1	☐
5	Clamp meter — AC/DC	Calibrated	1	☐
6	Thermal imaging camera	Calibrated — for post-energisation thermal scan	1	☐
7	Approved voltage detector — LV and MV rated	Calibrated — 2 units	2	☐
8	Pre-commissioning checklist and loop check sheets	Current revision	Full set	☐
9	Quality Dossier (for recording all test results)	Current revision	1	☐
10	Radio communication equipment	Charged and tested	Per team member	☐

5. STEP-BY-STEP SAFE WORK PROCEDURE

STEP 1. INSULATION RESISTANCE (IR) TESTING — ALL CABLES & EQUIPMENT

mmmmmmmm) Confirm all cables are terminated at BOTH ends before IR testing.
nnnnnnnn) Disconnect all sensitive equipment (PLCs, transmitters, VSD control boards) from circuits being tested.
ooooooo) Set IR tester to correct voltage: 500VDC for LV control / instrument cables, 500VDC–1kVDC for LV power, 5kVDC for MV cables.
pppppppp) Warning posted at both ends of cable being tested — 'HIGH VOLTAGE TESTING IN PROGRESS — DO NOT TOUCH'.
qqqqqqqq) Two-person test: one operates tester, one guards remote end.
rrrrrrrr) Apply test voltage for minimum 60 seconds. Record reading after 60 seconds.
ssssssss) Acceptance: LV power cables $\geq 1\text{M}\Omega$ at 500VDC. Control/instrument $\geq 100\text{M}\Omega$ at 500VDC. MV $\geq 100\text{M}\Omega$ at 5kVDC.
tttttttt) After test: DISCHARGE cable to earth for minimum 4 $\times$ test time. Verify discharged with meter before touching.
uuuuuuuu) Record all results on IR Test Register (MSE-IR2-001).

STEP 2. LOOP TESTING — 4–20mA SIGNAL VERIFICATION

vvvvvvvv) Before loop testing: inhibit all associated control outputs in the DCS/PLC — confirm inhibit with control room operator.
wwwwwww) Confirm all field devices for the loop are installed and connected.
xxxxxxx) Inject 4mA at field device (or loop calibrator): confirm 0% reading at DCS/HMI. Accept $\pm 0.1\text{mA}$.
yyyyyyy) Inject 12mA: confirm 50% reading at DCS/HMI. Accept $\pm 0.1\text{mA}$.
zzzzzzzz) Inject 20mA: confirm 100% reading at DCS/HMI. Accept $\pm 0.1\text{mA}$.
aaaaaaaa) Verify alarm setpoints trigger at correct values. Record on Loop Check Register (MSE-LOOP-001).
bbbbbbbbb) Verify HART communication if HART devices installed — read device tag ID from HART communicator.
cccccccc) QC Officer and Client co-sign each completed loop.

STEP 3. MOTOR RUN CHECKS — PRE-COUPLING

ddddddddd) Confirm motor is mechanically de-coupled from driven equipment.
eeeeeeee) Confirm motor alignment has been verified by mechanical team.
fffffffff) Check phase sequence with phase sequence meter at motor terminals — confirm rotation direction against motor nameplate.
ggggggggg) Apply power momentarily — jog the motor. Observe: correct rotation direction, no unusual noise, no vibration.

hhhhhhhhh) If rotation is incorrect — stop immediately. Swap any 2 phases at motor terminal box. Re-check rotation. Never swap at MCC.
iiiiiii) Run motor for 30 seconds uncoupled. Monitor: temperature, vibration, current draw vs nameplate.
jjjjjjj) Record motor run data on pre-commissioning checklist. Mechanical team to couple after sign-off.

STEP 4. PRE-ENERGISATION CHECKLIST — FINAL VERIFICATION

kkkkkkkkk) EC&I Site Manager to complete and sign the pre-energisation checklist — every item initialled.
lllllll) Section 16(2) ([Name]) to review and countersign the pre-energisation checklist.
mmmmmmmm) Client / EPCM H&S and engineering representative to countersign — energisation authority granted.
nnnnnnnnn) Confirm all PTWs for work on this system are CLOSED.
ooooooooo) Confirm all LOTO locks have been removed from the system being energised.
ppppppppp) Confirm all test equipment, tools, and personnel are clear of the equipment.
qqqqqqqqq) Arc flash PPE confirmed — all personnel at the switchgear wearing correct cal/cm² PPE.

STEP 5. FIRST ENERGISATION — LV SYSTEM

rrrrrrrrr) Non-essential personnel clear of the switchroom. Maximum 2 authorised persons in the room during energisation.
sssssssss) Stand to the side of the panel — never directly in front of the busbars or door during energisation.
ttttttttt) Close the incomer breaker following the written switching sequence — one step at a time.
uuuuuuuuu) Monitor: no tripping, no unusual noise, no smell of burning. 5 second pause between steps.
vvvvvvvvv) If any abnormality — trip the incomer immediately. Investigate before proceeding.
wwwwwwwww) After successful energisation — thermal imaging scan of all connections within 30 minutes of loading.

STEP 6. FIRST ENERGISATION — MV SYSTEM

xxxxxxxxx) MV energisation: minimum 10m exclusion zone for all non-essential personnel.
yyyyyyyyy) Arc flash PPE mandatory — minimum 12 cal/cm² for 33kV switching.
zzzzzzzzz) Remote racking of VCB where available — never manually rack a VCB in with body in front of the panel.
aaaaaaaaa) Switching sequence to be read out loud step-by-step and independently verified by second person.
bbbbbbbbbb) Each step confirmed complete before next step proceeds.
ccccccccc) Client / EPCM commissioning engineer must be present for all MV energisation.
ddddddddd) Record all switching operations — breaker position, time, operator, witness.

STEP 7. POST-ENERGISATION CHECKS

eeeeeeeeeee) Thermal imaging scan of all connections within 30 minutes of applying load.
fffffffff) Record thermal scan results — flag any connection >5°C above ambient as a defect requiring investigation.
gggggggggg) Check all protection relay setpoints against protection study settings list.
hhhhhhhhh) Record all measured voltages, currents, and power factor readings on commissioning sheet.
iiiiiii) Complete commissioning sign-off — EC&I Site Manager, Client / EPCM, QC Officer.
jjjjjjjjj) File all pre-commissioning and commissioning records in Quality Dossier under correct system boundary.

6. INSPECTION HOLD POINTS & WITNESS POINTS

- **Hold Point — IR test results accepted and signed off by QC Officer before energisation**
- **Hold Point — pre-energisation checklist signed by EC&I Site Manager AND Section 16(2)**
- **Hold Point — Client / EPCM countersign required before MV energisation**
- **Witness Point — first energisation — client representative must be present**

7. EMERGENCY RESPONSE

EMERGENCY PROCEDURE — SPECIFIC TO THIS ACTIVITY:

Arc flash or electrical fire: Activate fire alarm. Evacuate immediately. Do NOT fight electrical fires with water. Use CO₂ extinguisher only. Call site emergency number and fire station. Notify EC&I Site Manager and Section 16(2) immediately. No re-entry until line authority confirms safe.

GENERAL: Site emergency number — [Insert]. National emergency: 10177. EC&I Site Manager: [Cell]. Section 16(2) [Name]: [Cell].

Muster point: [Insert location]. In any emergency — evacuate first, account for all persons, then report.

8. WORKER ACKNOWLEDGEMENT

I confirm that this Method Statement has been explained to me in a language I understand, that I understand the identified hazards and the controls to be applied, and that I will work in accordance with this procedure at all times.

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Method Statement Author	Construction Supervisor	EC&I Site Manager	Section 16(2) Approved
[Name]	[Name]	[Name]	[Name]
Signature: _____	Signature: _____	Signature: _____	Signature: _____
Date: _____ —	Date: _____ —	Date: _____ —	Date: _____ —