



Hot Line OPGW Stringing activities

Work Instruction

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1. PURPOSE & OBJECTIVES

To support IndiGrid's Asset Management Framework and ensure safe execution of transmission line maintenance activities, this Work Instruction defines the requirements for **Hot Line OPGW Stringing** on energized transmission lines.

The objective is to ensure that OPGW installation is carried out safely, efficiently, and without interruption to power supply, while minimizing risks to personnel, equipment and transmission assets.

This Work Instruction aims to:

- Ensure safe execution of OPGW stringing on live transmission lines.
- Prevent electrical, mechanical, and operational hazards during the activity.
- Define roles, responsibilities, and safety requirements for all personnel involved.
- Ensure compliance with statutory regulations, approved procedures, and IndiGrid safety standards.
- Protect transmission assets and maintain system reliability throughout the work.
- Establish requirements for planning, risk assessment, execution, monitoring, and quality control.
- Promote a culture of safety, operational excellence, and continuous improvement.

This Work Instruction is applicable to all Hot Line OPGW Stringing activities carried out on IndiGrid-owned or managed transmission lines.

2. SCOPE

The purpose of this Work Instruction is to provide a standardized and safe methodology for **Hot Line OPGW Stringing activities** on energized transmission lines, ensuring consistent execution, personnel safety, asset protection, regulatory compliance, and uninterrupted system reliability.

3. REQUIRED TOOLS & EQUIPMENT'S

S. No	Description of Goods	Specification
1	Ratchet Level 1.5 T	1.5 Ton
2	Ratchet Level 3.0 T	3.0 Ton
3	Roller 300 mm	300 mm
4	Roller 450 mm	450 mm
5	Roller 600 mm	600 mm
6	Platina/BOB Rope	16 mm
7	PP Rope 12mm	12 mm
8	PP Rope 16mm	16 mm
9	Patta Clamp	5 Ton
10	Winch Machine	3/5 Ton
11	Traction Machine	80 KG
12	Drum Lifting Jack	4 Ton
13	Tripod Stand	5 Ton
14	Recovery Machine	As per the requirement
15	Earthing Rollers	As per the requirement

16	Swivel Joint	3.0 Ton
17	Single End Socks	3.0 Ton
18	Double End Socks	3.0 Ton
19	Ratchet Level 5.0 T	5.0 Ton
20	Hanging Pulley	As per the requirement
21	Discharge Rods	As per the requirement
22	Safety Shoes	As per the requirement
23	Safety Helmets	As per the requirement
24	Safety Reflective Jackets	As per the requirement
25	Cotton Hand Gloves	As per the requirement
26	Insulated Gloves	As per the requirement
27	Dielectric Safety Harness	As per the requirement
28	Fall Arrestor Rope	As per the requirement
29	Fall Arrestor Clamp	As per the requirement
30	OPGW Cycle	As per the requirement
31	Walkie Talkie	As per the requirement
32	Wire Rope 16 mm	16 mm
33	Wire Rope 12 mm	12 mm
34	Hand Tools	As per the requirement
35	Emergency Rescue Kit	As per the requirement

4. WORKING ELIGIBILITY FOR OPGW WORK

- Workers must have undergone a pre-employment medical examination and been Pre Employment Medical Examination & found fit for work.
- Gang Evaluation has been completed for all workers involved.
- Workers have been provided with Safety Induction & issued with Valid ID card.
- Workers have been provided with Job Specific Training & Work at Height Safety Training.
- Workers must have been undergone an acrophobia Acrophobia/vertigo test and been issued a Test & provided with Height Pass.
- Height Pass shall be issued to only those workers who have either attained 21 years age or 3 years' experience.
- Workers who are unwell or show signs of weakness shall not be allowed to work at height.

5. SAFETY PRECAUTIONS

Hot Line Specific

- Prior survey/reci of span before imitation of work
- Maintain safe approach distance for the voltage level.
- Ensure correct insulation level of every tool.
- Do not use metal tools unless insulated adapters are fixed.
- No work during rain, fog, lightning, or high wind conditions.
- Clean the tower of loose metal before starting work.
- Ensure communication channels remain clear and continuous.
- Ground crew must not touch energized parts through OPGW or rope

- Entire work should be carried out only after obtaining AR-OFF of the respective circuit/line

6. GENERAL HSE REQUIREMENTS IN OPGW WORK

- Conduct a toolbox talk before the start of work. Topics shall include related activity such PPE maintenance and inspection, hazards; Hazards in height work and Height Work & OPGW work, hand-tool tools usage, first- aid awareness, Emergency Preparedness and emergency preparedness Response etc. and response. Attendance records shall be documented.
- Competent supervisor must be present at the work location.
- Use walkie-talkies talky for communication between workers at height, & on the ground workers, and teams working across & between different spans.
- The EPC site team shall obtain a take Permit to Work at Height or complete the OPGW Safety Checklist, which shall be verified daily by the EPC EHS team and periodically on daily basis & occasionally by the IGT team during site inspections/audits Site inspection/audit.
- Barricade the work area with caution tape and & display red flags to warn the outsiders. Use a whistle to warn any outsider attempting to enter the from entering in barricaded area.
- Display Safety posters related to height work & emergency contact nos.
- The first workers shall carry the vertical fall arrester and arrestor with him to fix it at the top anchorage point. All remaining all workers shall use this vertical fall arrester for ascending and/ descending.
- All workers must wear dielectric full body double lanyard safety harness & use vertical fall arrestor while ascending/descending the tower and while working at height.
- Applicable PPE must be used at site.
- A retractable fall arrester must be used by each individual worker while working on different sections of the tower, especially specially on insulators, if any.
- No material (Nuts/bolts) or hand tools shall be kept/left loose at height. Tool bag and tool lanyard shall be used while working at heights.
- Winch or puller machine shall have operational load display/warning arrangement.
- Standard tensioner, Tension and puller, and standards Bob/Platina wire must be used.

7. PRE WORK INSPECTIONS

Documentation

- Work permit for live-line maintenance obtained
- JSA and HIRA must be prepared, and approved, and communicated to all concerned personnel.
- Emergency Response Plan (ERP) discussed and understood.

Tools & Equipment's

- All hot-line tools tested for insulation.
- Rope blocks and pulleys cleaned and tested.

- OPGW drum direction verified.
- Anti-twist devices ready and available.
- Tensioner-puller alignment checked.

Site Condition

- Weather conditions checked and found suitable.
- Ground movement/restricted area verified.
- Area barricading and signage placed.

8. REQUIRED PPEs

- a. Safety Helmet
- b. Safety Shoes
- c. Reflective Jacket
- d. Cut & Impact-Resistant Gloves
- e. Safety Belt with Double Lanyard & Shock Absorber
- f. Full body Dielectric Safety Harness
- g. Rope Grab Fall Arrestor
- h. Fall Arrestor Clamp
- i. Shoulder Pad
- j. Retractable Fall Arrestor
- k. Tool lanyard and tool kit
- l. Insulated hand gloves
- m. Rescue Kit

9. WINCH MACHINE OPERATION METHOD

- a. Store and handle winches correctly.
- b. Inspect the winch, rope and accessories before use and before placing into storage
- c. Ensure mounting and suspension points are secure and suitable for the full loads that will be imposed.
- d. Lift the load just clear and halt for a short period to ensure the integrity of the brake or sustaining mechanism before completing the lift.
- e. Deadman shall be used to anchor the winch machine.
- f. All lifting equipment should be in good condition.
- g. Use a speed appropriate to the specific application.
- h. Keep hands and feet clear of ropes, etc.
- i. All lifting equipment's TPI should be completed on site and colour coded
- j. A dedicated and trained operator should be deployed at site.
- k. The plan shall address the risks identified by the risk assessment, the resources required, procedures, and the responsibilities so that any lifting operation is carried out safely.
- l. Stand clear of wire rope and load during operation.
- m. Inspect winch installation and wire rope condition before operating the winch.
- n. Operator should be medically fit.
- o. Training should be provided to all workers before starting the work.
- p. All loads shall be securely tied with web slings or wire rope slings to prevent roll-out during lifting.
- q. The lifting area should be barricaded and unauthorized persons shall not be allowed in the lifting area.

- r. TBT (Toolbox Talk) shall be conducted daily.
- s. Access shall be clear, and pre-inspection shall be completed.

10. PROCEDURE FOR OPGW REPLACEMENT

10.1 Procedure for OPGW Replacement

- a. Old OPGW Disconnection / Earth Wire Removal
 - Disconnect clamps and hardware.
 - Remove vibration dampers.
 - Attach a temporary pilot rope to the old OPGW/Earth Wire.
 - Maintain proper control to avoid uncontrolled fall.
 - All machinery in operation, including tensioners, pullers, winch machines, and drum lifting jacks, shall be properly earthed using suitable earth electrodes.
 - All tools, tackles, plants, and equipment (T&P) shall be kept dry and stored under adequate cover to prevent exposure to rain or moisture.
- b. **Advanced Safety**
 - Use tag lines to control swinging.
 - Monitor tension at both ends.
 - All machinery in operation, including tensioners, pullers, winch machines, and drum lifting jacks, shall be properly earthed using suitable earth electrodes.
 - Hanging pulleys shall be inspected to ensure they rotate freely and are properly lubricated before and during stringing operations.
 - All workers shall wear high-quality electrical insulating rubber gloves of the appropriate rating while carrying out the work.
 - Workers shall wear cotton clothing during hotline stringing activities.
 - For critical and long spans, OPGW installation should preferably be carried out under a planned shutdown to ensure safe execution of the work.

10.2 Pulling of Passing Pilot Rope / Messenger Rope

- Pass the pilot rope through all running blocks.
- Ensure the rope moves smoothly without twisting.
- Keep the ground crew alert to pulling direction.

10.3 Installing Winch Machine

- Place the winch machine at the receiving end.
- Establish communication links between all working teams.
- Perform pre-tension checks.
- Verify anchoring and alignment of the winch machine before operation.

10.4 OPGW Drum Preparation

- Swivel connector attached.
- Anti-twist device installed.
- Insulated messenger rope linked to OPGW tail
- Drum direction verified

10.5 Pulling New OPGW (Hotline Control)

- Connect OPGW to pilot rope with swivel connector.
- Start slow pulling at uniform tension.
- Check running blocks continuously.
- Maintain clear communication.
- Ensure that no extra loops are formed during OPGW installation. The specified stringing tension shall be maintained throughout the operation to prevent slackness and loop formation.
- Sufficient numbers of hanging pulleys shall be used in a span to avoid loop formation.

10.6 Advanced Control Measures

- Dynamometer used to prevent over-tension.
- Hotline workers on the tower guide OPGW using insulated guiding tools.
- Crew communicates using "Ready–Pull–Stop" signals.
- Use binoculars for long-span monitoring.
- Ensure no rubbing against tower steel.
- Do not exceed the allowable OPGW bending radius.

10.7 Sagging and Tensioning

- Sagging performed based on the temperature-compensated chart.
- Use digital sag measuring tools.
- Tower workers remain bonded while handling OPGW.
- Tension adjusted gradually.

Advanced

- Use laser rangefinder or sag meter for accuracy.
- Compare measured values with client specifications.

10.8 Final Hardware Installation

- Install hotline-compatible dead-end clamps.
- Fix suspension clamps using an insulated torque wrench.
- Install vibration dampers as per the client-approved spacing chart.
- Ensure proper line angle and no conductor twist.

10.9 Removal of Temporary Equipment

- Remove running blocks carefully.
- Clear all towers and ground equipment.
- Lower tools using insulated ropes.
- Remove barricading.

11. HARDWARE INSTALLATION

- Install hotline-compatible dead-end clamps.
- Fix suspension clamps with an insulated torque wrench.
- Install vibration dampers as per the client spacing chart.
- Ensure proper line angle and no conductor twist.

Advanced

- Use insulated platform for tension tower hardware.
- Use hot-line grade spacer/damper installation tools.

12. ROLES & RESPONSIBILITIES OF PERSONNEL / PARTIES INVOLVED IN ACTIVITIES

Clearly define the roles and responsibilities of all personnel involved in the activity, including site management staff and subcontractor personnel such as the Project/Site Manager, Project Engineer, EHS Staff and Competent Supervisory staff.

Role	Accountability
Project Manager	Shutdown planning and approval
Site Engineer / In-charge	Execution and workforce coordination, HIRA, PTW, JSA, PPE enforcement, monitoring, and HSE compliance
Safety Officer (Implementing Agency)	HIRA, PTW, JSA, PPE enforcement, monitoring, and HSE compliance
Site Supervisor	Safe dismantling operations
Crane Winch, Machine Operator	As per IndiGrid's HSE Policy

Key Responsibilities

- Ensure earthed equipotential zones are established.
- Oversee emergency preparedness and maintain first-aid and rescue equipment.
- Hot Line Linemen / Tower Climbers
Key Responsibilities
- Perform tower-top hotline work using insulated tools only.
- Install and remove hotline running blocks, sheaves, and pulleys.
- Maintain equipotential bonding while working near energized parts.
- Attach pilot rope, guide OPGW, and install hardware safely.
- Communicate hazards, clearance issues, or abnormal conditions immediately.
- Follow instructions from the Hot Line Supervisor and maintain disciplined movement.

Ground Crew Team- Responsibilities

- Operate ground pulling equipment and assist in rope management.
- Maintain proper alignment of pilot rope and OPGW.
- Avoid contact between rope/OPGW and grounded objects.
- Assist in tool lifting/lowering, drum handling, and hardware preparation.
- Maintain barricades and ensure public safety around work zones.
- Support communication between tower crews and machine operators.
- Winch Machine Operators

Key Responsibilities

- Inspect and calibrate machines before operation.
- Maintain uniform pulling and tensioning as per supervisor instructions.
- Use hot-line-rated insulating links between machine and rope.
- Respond immediately to STOP/EMERGENCY commands.
- Avoid sudden jerks or over-tension that can damage OPGW.
- Record tension readings, pulling force, and sagging parameters.

13. QUALITY CHECKPOINTS

- No twist or damage in OPGW.
- Sag and tension values are within specification.
- All hardware torqued to the correct value.
- Dampers installed at exact specified locations.
- Insulating tools marked "Tested OK".
- No foreign objects left on the tower.

14. EMERGENCY RESPONSE TEAM (ERT)

Key Responsibilities

- Maintain standby readiness during hotline work.
- Provide rapid rescue support in case of fall, shock, or arc incidents.
- Coordinate with the nearest hospital or ambulance service.
- Maintain hotline rescue kits and fall recovery equipment.
- Ensure a dedicated emergency vehicle is available at the work site.
- Ensure availability of fire extinguishers, a safe assembly area, and a first-First aid kit.
- Ensure availability of a CPR (Cardio-Pulmonary Resuscitation) device and snake, Snake anti-venom kits.
- Ensure availability of barricading tape and emergency, Emergency contact details for the nearest hospitals, ambulance service, police, fire brigade station, etc.

15. DONT'S WHILE HOT LINE STRINGING OF OPGW

- Do not work without a valid work permit and TBT.
- Do not allow untrained or unauthorized persons at the work site.
- Do not work during high wind, rain, lightning, or poor visibility.
- Don't ignore safety instructions
- Do not allow workers without fall- protection PPE and other required PPE.
- Don't stand or walk under the suspended load
- Don't overload winch, pulley or wire rope
- Do not work near /red zone live lines or in the red zone without shutdown and proper earthing arrangements.
- Do not work under the influence of alcohol or when if feeling illness.
- Do not throw any tools or materials from height.
- Do not take shortcuts during work.
- Tractors must not be used for transporting workmen. transport
- Smoking is prohibited at site.
- Avoid lone working at site
- Don't indulge in any horse play while working at height.
- Do not apply load beyond the specified limit during final sagging.

16. Do's WHILE OPGW ACTIVITY

- Competent supervisor must be present at site during working hours
- Adequate PPE (Helmet, Safety shoe/gum boot, hand gloves/nose mask, full body harness) must be used by workers

- Ensure First aid box at site with first aider, Ambu bag and emergency vehicle
- Provide repellent for snake, insects, etc. for camp.
- Provide safe shelter for lunch, rest & protection from rain near to work location
- Display relevant safety sign board at work site
- Only Authorised operation is allowed
- Assess the site condition
- Ensure safe working load (SWL) of lifting tools
- Barricade lifting and drop zones
- Maintain three-point contact while ascending and descending from tower

17. TRAINING / TBT / PTW & OTHER REFERENCE DOCUMENTS RECORDS

A training record is a systematic collection of data and information that documents an individual's or group's training history, including the type, duration, and outcome of training activities, assessments, and evaluations.

- Work Permit System
- HIRA / JSA for OPGW work
- PPE Standards (IS:15298 / EN Standards)
- Safety Training Records
- Toolbox Talk (TBT) Records
- Permit to Work (PTW) Records
- Pre Job Inspection checklist for OPGW work
- Emergency Response Plan (ERP) Records
- Equipment Inspection and Test Certificates
- Hot-Line Tools Testing & Certification Records
- Medical Fitness Certificates of Workers
- Operator Competency and License Records
- Daily Site Inspection Checklists
- Incident / Near-Miss Reporting Records
- Client Specifications and Approved Method Statements
- Relevant Applicable Standards and Procedures

18. REVIEW

This procedure shall be reviewed by the head-Opex or their nominee at least once in 3 years or whenever there are major applicable changes.