

**WRITTEN SAFE WORK PROCEDURE
FOR ERECTION OF
SELF-SUPPORTING OPTICAL FIBRE
CABLE ON AC OHTE**

**PRC-00112
APRIL 2008**

Revision 2.00

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I DOCUMENT AUTHORISATION

FUNCTION	NAME	TITLE & DIVISION	SIGNATURE	DATE
Compiled by :	BG Nel	Technologist, Quality Assurance		
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Approved :	CF du Toit	Senior Engineer, Infrastructure Electrical (OHTE)		

II DISTRIBUTION

Once updated, a copy of the latest revision will be published in the document management system in use. E-mail to this effect will be sent to the relevant personnel or heads of department.

III DOCUMENT CHANGE HISTORY

ISSUE NO.	DATE ISSUED	ISSUED BY	HISTORY DESCRIPTION
1.00	April 2008	Technical Execution	New document
2.00	June 2008	Technical Execution	Addition of OHTE requirements

IV CHANGES SINCE LAST REVISION

CLAUSE	DESCRIPTION
Document	Addition of OHTE requirements

V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
AC	Alternating Current
As-Build Drawings	Final drawings of a site and/or route installation of transmission infrastructure as presented to the customer at handover.
BS	British Standard
DC	Direct Current
GPS	Global Positioning Satellite (a system whereby the latitude and longitude co-ordinates of any site on earth can be determined via a GPS receiver)
HDPE	High Density Polyethylene
kV	Kilo-volt
Nm	Newton Meters
OFC	Optical Fibre Cable
OHTE	Overhead Traction Equipment
OTDR	Optical Time Domain Reflectometer
PPE	Personal Protective Equipment
QAD	Quality Assurance Department
SOP	Standard Operating Procedure
UV	Ultra Violet

SPECIFICATIONS

SPECIFICATION NO.	DESCRIPTION
SPC-00575	Specification for the erection of self support OFC on overhead track structures.
SPC-00029	Specification for trenching, laying and hauling in of telecommunication cables.

VI RELEVANT DOCUMENTATION

RELEVANT DOCUMENT NO.	DESCRIPTION
INS-00007	Risk, PPE, Clearances
Document	Electrical Shock Incident Awareness
Document	Safe Work Procedure : Step-by-Step of how to Raise the OFC Bracket Past Backstraps

1. SPECIFIC RISKS IDENTIFIED FOR THIS PROCEDURE

1.1 Specific Risks Associated with the OFC Construction Activity

- 1.1.1 The erector will be handling insulated tools (poles) which could make direct contact with "live" equipment.
- 1.1.2 The erector will be manipulating conductive brackets near "live" electrical equipment. Should such a bracket bridge out an insulator, the mast structure will become "live" and a person can be electrocuted.
- 1.1.3 Strong winds and rain may cause the workman to loose control of the installation tools – (work in strong winds and rain prohibited).
- 1.1.4 In tunnels, under bridges and in station yards the "live" equipment do not follow the usual open line structure pattern and safe working clearances may be compromised.
- 1.1.5 The removal of trees which foul the route near the "live" OHTE.
- 1.1.6 The erecting of additional OFC support poles in the rail servitude near the "live" electrification equipment (specifically the use of vehicle mounted cranes)..
- 1.1.7 Passing trains.

1.2 Scope and Purpose

- 1.2.1 This safe work procedure covers the erection of self-supporting optical fibre cable on 25 kV and 50 kV AC overhead high tension electrification (OHTE) masts for Freight Rail, a Division of Transnet Limited.
 - 1.2.1.1 The installation methodology is to use special brackets and insulated tools (sticks) to do these installations "remotely" i.e. from formation level.
 - 1.2.1.2 Where possible, construction will mostly take place under live traction power conditions and with the normal operation of train services.
 - 1.2.1.3 This procedure generally covers safety precautions and safe working procedures during construction.
 - 1.2.1.4 The Electrical Officer (Contracts) appointed for the section shall at his own discretion decide if any procedure is safe or not and inform the Transport Telecom, Project Manager or Supervisor accordingly.

- 1.2.2 The objective is to install the major component of the cable above ground. Underground sections should be kept to a minimum. Underground trenches, Rail Pipe Crossings and Pipe and Chamber systems may be required or utilised where these exist.
- 1.2.3 To avoid additional splices the same optical fibre cable must be utilised for aerial and buried sections. The OFC will be of the all-dielectric aerial self-support type. On AC sections OFC with anti-tracking sheath shall be used.
- 1.2.4 This document focuses on safety and safe work procedures and must be read in conjunction with Specification SPC-00575 for the Engineering Requirements for the Installation of Optical Fibres on overhead track structures. Please note that although some sections and clauses are similar, this document does not replace above specification. For any safety related requirement, this document takes preference.
- 1.2.5 This procedure also sets the minimum standards for materials, tools and techniques to be used in aerial optical fibre cable installations, and may not be deviated from without the permission of the Transport Telecom, Project Manager and Electrical Officer (Contracts).
- 1.2.6 Where reference is made to approved materials, tools or techniques, this approval must be obtained from Transport Telecom, Project Manager, who will co-ordinate any necessary interfacing with the Electrical Officer (Contracts) and relevant authorities.

1.3 **The following Annexures Form Part of these Instructions and Procedure**

- 1.3.1 E7/1 : Specification for works on, over, under or adjacent to railway lines and near high voltage equipment.
- 1.3.2 E.4E : Safety arrangements and procedural compliance with the occupational health and safety Act; Act 85 of 1983 and regulations.
- 1.3.3 Annexure 1 : Safe working procedure, photographs and methodology (with DVD) on Safety Shield and tools (Installation procedure to remotely install cable support to traction masts in AC electrified sections).
- 1.3.4 DVD on Electrical Safety Awareness.
- 1.3.5 Daily Safety Work Instruction for the Installation of Optical Fibre Cable on OHTE (INS-00007).
- 1.3.6 Electrical Shock Incident Awareness.
- 1.3.7 Contractors Induction to Safe Working Procedures.

- 1.3.8 Installation Guidelines for the safe positioning of OFC on OHTE structures from Senior Manager Electrical (Infra Maintenance) (S.PL&T) 1 CAO/13/3/1/6 of 9 November 2001.

2. GENERAL SAFETY PRECAUTIONS

- 2.1 Due to the proximity of live conductors the installer must ensure that his employees installing the cable on the masts obtain a Category C certificate from the relevant authorities before any work can be carried out on the masts.
- 2.2 The Contractor's employees must be trained for competence and understanding of the basic electrical safety requirements. The certificate obtained will not be transferable. The cost of the training will be borne by the Installer or Freight Rail as stipulated in the contract document.
- 2.2.1 The supervisor of the team must have a Letter of Training in his possession on site. This letter of training involves successful completion of the INFR and COM modules presented at accredited Training Schools. INFR involves supervision of staff in the permanent way environment and COM involves signing of work permits, which is required when installing fly-over crossings. On successful completion of the person will hold a yellow SPOORNET 436 card.
- 2.2.2 All workers who will handle the OFC or associated brackets on the electrification structures must hold a valid Category C certificate. This requires
- (a) successful attendance of a 5-day course held at an accredited Training School, and
 - (b) certification by an examining officer appointed for each infrastructure depot.
- In completion the person will have a G-Green certificate, which must be carried on his person.
- 2.2.3 An Electrical Officer (Contracts), being an official from the Infrastructure Depot, must be appointed for every contract. The Contract's Project Manager must advise the contractor who this person is and arrange initial consultation between the parties.
- 2.2.4 Whenever OFC cables must cross over the Electrification, a work permit must be arranged. The electrical Officer (Contracts) must be consulted to ensure that timeous arrangements are made. This notice period can be 3 weeks or longer.
- 2.2.5 Flagmen must be deployed in terms of the General Appendix Chapter 11.
- 2.3 The installer and his employees installing the cable must be fully conversant with the Electrical Safety Instructions, Transnet specifications E.7/1 and E.4E and other safety documentation and instructions referred to in this document.

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- 2.4 A person authorized with a Category C certificate must maintain the prescribed clearance for the electrification voltage applicable.
- 2.5 The brackets to be fitted to OHTE masts by means of remote tools (sticks) must always be "under control" by the workmen using the tools to prevent accidental "flash-over" (possible bridging-out of insulators).
- 2.5.1 Where the face of the mast is open (not obstructed) the bracket must be opened marginally to allow easy sliding up the mast, without the risk of the bracket dislodging from the mast.
- 2.5.2 Where the mast is fitted with one or two backstraps and the OFC bracket must be lifted past these backstraps, a safety shield with ring (as per the safe working procedure) must be used to keep the tools "under control".
- 2.6 In all instances where the safety of workmen is jeopardised, electrical permits and/or track occupations must be requested. The Electrical Officer (Contracts) will decide where occupations are required. Notification could be required up to four (4) weeks in advance.
- 2.7 Under bridges where live cross span wires are involved and at make off masts and where the live conductors approach the optical fibre cable very closely, a standard warning board must be fitted. Electrical personnel must be approached to arrange for a work permit to fit the cable and warning boards.
- 2.8 No attempt must be made to install the cable in windy conditions, especially when the sag (before tensioning) is blown in the direction of the track. Supervisors must use their discretion in this regard.
- 2.9 No metal ladders will be allowed for construction but only wooden or fibreglass ladders.
- 2.10 Remote AC bracket installation tool (sticks) must be kept clean may not be used in wet or rainy conditions. This tool must be tested for 50 kV isolation and approved by Freight Rail, Technology Management Department and carry a marking to that effect.
- 2.11 Hard hats, protective clothing and safety boots must be worn during construction.
- 2.12 Optical fibres are extremely thin and can easily penetrate skin and eyes. Any off cuts or bare pieces of fibre must be properly disposed of in sealed containers. Optical fibres are categorised as hazardous materials and require special disposal measures.
-

- 2.13 Care must be taken whilst testing as the laser in test equipment produces an invisible light, which can cause permanent eye damage. All fibres should be treated as "lit".
- 2.14 All personnel involved in the installation and testing must be made aware of the above safety aspects by attending the "Induction Training" and viewing the relevant Freight Rail Safety DVDs and any other materials that the Project Manager deems necessary.
- 2.15 A Safety Plan as required by Freight Rail must be submitted before any work may commence. Details of the Safety plan may be obtained from the Project Manager.
- 2.16 A Site Safety File as required by Freight Rail must be available on site and kept current. Details and content of the Site Safety File may be obtained from the Project Manager.
- 2.17 The Installer must comply with the "Installation Work Procedures for the Installation of Optical Fibre Cable" (latest version).

3. INSTALLATION (Methodology)

- 3.1 This portion is included to allow the Project Supervisor and Electrical Officer (Contracts) to identify safety and risk situations before work commences and recommends specific requirements.
- 3.2 Preparation must be carried out on the route on which the cable is to be erected. Trees, bushes and grass must be cut so that work can be carried out without any obstacles. The aerial route must be at least three (3) metres clear of bush and trees within the reserve. Where excessive trees or bush, which could become a fire hazard, are encountered, an alternative route must be chosen. Tree branches overhanging the cable must be removed.

3.3 Erection of OFC on AC Traction Masts

- 3.3.1 Fit the universal multipurpose bracket at $\pm 1,5$ metres above ground level.
- 3.3.2 Fit a pulley/sling on every suspension bracket (at a working height) for a distance equivalent to the length of the cable to be hauled in.
- 3.3.3 Place the OFC drum with cable away from the mast where the cable will pass through the first pulley/sling. This would prevent the cable from bending too much whilst being hauled. Under no circumstances should the cable be bent excessively. The OFC drum should be placed on cable jacks with an axle. The rate of the hauling should be controlled from this point.

- 3.3.4 The cable must be fed off the drum according to the speed with which the cable is hauled. Care must be taken that the cable is not tightening between the drum and the first pulley. A constant tension must be maintained on the cable by braking of the cable drum when necessary. Tension must be maintained to ensure minimum OFC contact with the ground.
- 3.3.5 OFC hauling should be avoided on very windy days, especially if the wind blows the cable in the direction of the track.
- 3.3.6 The hauling team must haul the cable evenly and slowly to prevent the cable from jerking which can result injuring workers or in broken fibres.
- 3.3.7 Good communication between persons at the drum, alongside the cable-end and the hauling team, is absolutely essential and must be available at all times. If communication breaks down, the hauling must be stopped immediately until such time that the communication had been re-established.
- 3.3.8 When hauling the cable, a person, in full communication with the team, must walk alongside the cable-end to ensure that the cable is taking the designated route. The OFC must not twist, especially at angle-masts where the possibility of twisting is great. When the cable starts twisting, hauling must be stopped immediately. The cause of the problem must then be pinpointed and rectified.
- 3.3.9 The cable sag and tension under normal installation conditions may vary around bends. Special care must be taken when the cable is removed from the pulley or sling and placed onto the termination fitting so that the cable does not exceed the prescribed tension.
- 3.3.10 A termination bracket and fitting (dead end) must be installed at the beginning of each length. Where only false terminations occur in a cable section the cable must be tensioned sequentially for every false termination section.
- 3.3.11 The cable shall be tensioned by means of an approved device at the far end and the tension shall be continually monitored not to exceed the parameters provided by the cable manufacturer.
- 3.3.12 On sections with a number of angle masts, it may be required to tension the cable over shorter distances. In this case care should be taken not to damage the cable at the intermediate tensioning points.

- 3.3.13 Sufficient time shall be allowed for the tensioned cable to settle. This time is when there is no longer a movement on the tensioning scale. When the correct tension has been achieved, the suspension (PLP) and termination (PLP) fittings shall be fitted.
- 3.3.14 The cable must be marked at all anchor points in an approved manner to indicate possible slippage.
- 3.3.15 The site supervisor must record the final stringing tensions and terminated span lengths on a control sheet. The site supervisor must submit these sheets with the site diaries for scrutiny and retention.
- 3.3.16 Once tensioning and splicing of the cable is completed, the suspension brackets shall be moved sequentially and incrementally up the masts in at least three steps with various lengths of installation tools to the correct final position on the mast. Note that although approved non-conductive tools will be used, the installation teams shall avoid touching any high voltage carrying infrastructure at all times.
- 3.3.17 The splicing team must strive to keep-up with the hauling team. If this is not the case, additional labour will be required to lower and raise the cable especially for splicing purposes.

3.4 Cable Slack

- 3.4.1 At positions where it may be required to accumulate cable slack due to the nature of the route, this slack must always be coiled in a figure of eight to avoid twisting of the cable. In muddy or dusty conditions the figure of eight must be done on a ground sheet to avoid soiling of the cable.
- 3.4.2 After the hauling process, sufficient slack must be left for splicing purposes. Less cable slack is required for AC-type joint splicing as the joint closure is moved up with the cable, but sufficient slack must however be left for splicing purposes.
- 3.4.3 Ten (10) metres OFC on the hauling end, must be cut off by the installation team. The installer must ensure that this length is cut off during the installation process.
- 3.4.4 The slack shall be coiled in two separate coils of minimum 500 mm diameter, tied with UV stabilised coated stainless steel cable ties at four positions and secured on the PLP dead-end. See drawing TC 000172 for details.
- 3.4.5 A small amount of slack only, between 250 mm and 300 mm (sag), must be allowed at false terminations.

3.5 In order to avoid sharp angles in the vertical plane when going over or under bridges a gradual increase or decrease of the route shall be obtained by adjusting the suspension brackets upwards or downwards on the masts, but only as directed by the Electrical Officer (Contracts).

3.6 **Intermediate Poles**

3.6.1 Intermediate telephone poles (where required) must be installed where span lengths exceed 70 metres or where the cable veers away from the track for any reason. Intermediate poles must be of the wooden, steel or concrete telephone type. The ground clearance of the suspended cable must not be less than 7,0 metres.

3.6.2 Where the intermediate wooden pole is in the danger of burning, a 2 metre high-galvanised metal sleeve must be fitted around the base of the pole. In high theft areas, concrete poles may be required.

3.6.3 The Project Manager must obtain approval from the Electrical Officer (Contracts) for the erection of intermediate wooden, steel or concrete poles in the vicinity of electrified tracks. If the pole is planted closer to the OHTE than its length (in the case of the pole falling over), permits (dead orders) must be arranged in conjunction with the Electrical Officer (Contracts).

3.6.4 To make the poles more visible at night, a reflective band of UV resistant material must be fixed to the pole next to service or other roads at 1,5 metres above ground level. Pole stays must also be fitted with reflective boards.

3.7 **Underground Installation**

3.7.1 At all instances where it becomes necessary to install the cable underground the cable must be protected as follows :

3.7.1.1 High-density polyethylene conduit of minimum 40 mm diameter.

3.7.1.2 Approved concrete slabs placed longitudinally over the cable and duct if a depth of 800 mm cannot be achieved.

3.7.1.3 A combination of the methods above, depending on the class of protection required.

3.7.2 To protect workmen and other parties, open trenches must be barricaded if left open overnight or for a considerable time. In general pedestrian areas, illumination shall be used after dark as stipulated in specification No. SPC-00029.

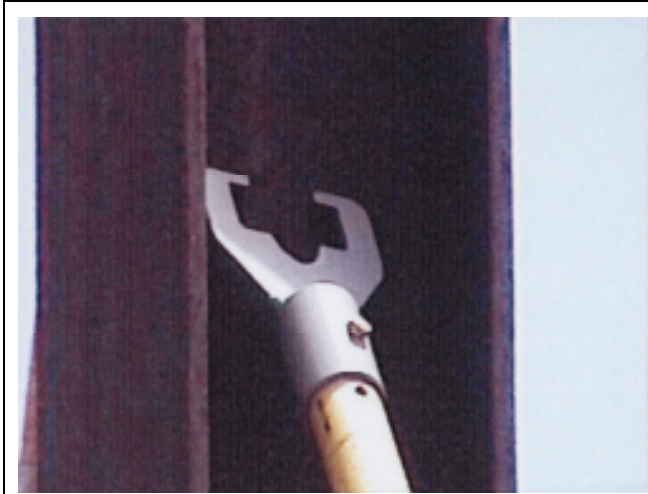
-
- 3.7.3 Warning tape with a distinctive marking, i.e. "optic fibre cable" must be installed above the cable and 300 mm below ground level.
- 3.7.4 Track crossings must be in accordance with specification E7/1 and Specification SPC-00029. On specific lines, Transnet could insist on doing the track crossings themselves.
- 3.7.5 Cable markers must be provided and planted wherever the cable is laid in the ground. Cable markers must be planted as stipulated in specification No. SPC-00029. The fibre optic marker shall have a distinctive mark, i.e. OFC, and must be painted yellow.

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ANNEXURE 1 : SAFE WORKING PROCEDURE, PHOTOGRAPHS

<p>SAFE WORK PROCEDURE</p>	
	<p>Installation procedure to remotely install cable support to traction masts in AC electrified traction section.</p> <p style="text-align: right;">Rev 1.00 March 2008</p> <p>NOTE : This procedure and the Safety Fitting DVD must be viewed simultaneously.</p>
	<p>Example of the safety shield.</p> <p>This unit must be used to safeguard the installation of a cable bracket. The shield must be used on traction masts fitted with back straps. The purpose of the shield with ring is to prevent "flashover" and guide the cable tools when the cable bracket needs to be lifted over a back strap.</p>
	<p>The safety shield in the final clamped position, before the tools are inserted through the ring.</p>



Example of a remote installation tool. (Link Stick). The profile of the cutout prevents the bracket from dislocating from the tool.



Remote cable support bracket and remote installation tools, lifting the cable to designated height.



Location of back straps indicated. Where necessary the bracket and cable must be lifted past these back straps.



Step 1) by using the ETSA – mast (I-beam) as a guide, slide the cable bracket and cable to the lower end of the back strap and temporarily secure the unit.



In the same manner slide the safety shield and ring up to the cable support bracket and secure the unit.



Loosen the cable support bracket and lift the bracket from position "A" to "B".



By using the guide ring of the safety bracket to guide the Link Sticks, move the cable bracket to the final clamping position on the mast.



Clamp the cable bracket to the allocated position on the mast.



Remove the Link Sticks



Unlock the safety shield and slide it down the mast. Remove the safety shield.

DAILY SAFETY WORK INSTRUCTIONS FOR THE INSTALLATION OF OPTICAL FIBRE CABLE ON OHTE

4. GENERAL

- 4.1 These safety rules must be conveyed every morning in a very simple manner to all workmen.
- 4.2 A translator must be used to translate and explain the rules to co-workers.
- 4.3 In the case of new workers or workers that have no previous experience of work next to railway lines or on electrification traction masts, assurance should be obtained that these workers have a proper understanding of these safety rules.

5. REGULATIONS WITH REGARD TO SAFETY CLOTHING

- 5.1 All workers must wear safety boots when working with heavy materials. Safety boots can prevent an injury if a heavy object drops on a worker's foot.
- 5.2 Reflective safety vests must be worn at all times to assist train divers and flagmen with visibility and assist to warn workers timeously. Nametags and Employer Name must be attached to safety vest.
- 5.3 Safety helmets must be worn when workers are exposed to falling objects and on all "Construction" sites.

6. FLAGMEN

- 6.1 Flagmen must blow a whistle or hooter when a train approaches.
- 6.2 Workers must ascertain themselves on which track and from which direction the train approaches, before standing clear.

- 6.3 Emphasis must be placed that **MOST ACCIDENTS** occur when workers stand clear from one train and accidentally move in front of another passing train.
- 7. RULES THAT ARE APPLICABLE WHEN WORK IS DONE NEXT TO THE RAILWAY LINE**
- 7.1 The **second MOST injuries** occur when passing trains hit tools and equipment used by workmen. Tools like picks, shovels and materials like cable, clamps and cable sticks must never be placed on or near railway lines.
- 7.2 All work must stop when a train passes the work site. Workers, tools and materials must be kept at a safe distance.
- 7.3 A suitable certified person must determine if it is safe to work on a ladder. If it is not safe, the certified worker must carry out the work.
- 7.4 Only fibreglass ladders will be allowed.
- 7.5 Workers must not cross the tracks unnecessarily, but remain on the side where the work is being carried out. Works may **NOT** sit or rest on the railway line.
- 8. SAFETY ASPECTS**
- 8.1 It must be explained to all workers how dangerous the overhead lines are. If any metal object should touch the wire, the metal will conduct electricity and cause serious injury or death.
- 8.2 Thus **NO** metal ladders are allowed.
- 8.3 When carrying metal materials like "ducting" or metal pipes, it must be carried horizontally by at least two (2) workers.
- 8.4 It must be emphasised that non-metallic objects like wooden poles will conduct electricity in wet weather conditions.
- 8.5 No person will be allowed to work on an electrification mast without a valid C-Category certificate.
- 8.6 Any person using push-up sticks must be in possession of a valid C-Category certificate.
- 8.7 Under **NO** circumstances must work be carried out on electrical traction masts when they are or wet and damp.
- 8.8 For the fitting of push-up brackets, push-up sticks must be constructed of Transnet approved materials (pantograph sticks).
- 8.9 The push-up sticks must be clean and dry or else it may conduct electricity. Regardless, contact with the overhead traction conductors must be avoided at **ALL** times.

9. ELECTRICAL SHOCK

- 9.1 Remember all overhead wires are dangerous. All wires must be treated as live!
- 9.2 Breakdowns of electric wires must be treated as **"live and dangerous" STAY CLEAR!!!!**
- 9.3 Treatment of electrical shock when person still in contact with live equipment :
- Keep hand off + call the doctor
 - Advise electrical control :
 1. Have power switched off.
 2. Section to be earthed.
 3. Work permit to be issued
 - Apply first aid when safe.
- 9.4 The voltage of overhead and underground power lines must always be considered dangerous, even with the line "earthed".
- 9.5 Ladders must always be used in such a manner that the distance from the base of ladder to any "live" equipment is greater than the fully extended length of ladder, plus three (3) metres.
- 9.6 Ladders must be secured to the mast at the top with safety strap. Ladder carriers / General Workers must hold ladders in position to prevent slipping.
- 9.7 When working within signal gantry make sure that you take up a safe position to ensure that no portion of your body, tools or equipment hang or project beyond or below the restricted barriers provided.
- 9.8 Do not leave the gantry access way.
- 9.9 Category "C" safe working clearances from "live" high voltage electrical equipment :
- 3 kV DC – 900 mm .**
 - 25 kV AC – 1,2 m .**
 - 50 kV AC – 1,7 m .**
- 9.10 Workers must present "C" certificate at any time on request.

**NB : This portion MUST be placed on
the Site Safety File**

**FIBRE OPTIC INSTALLATION TEAM DAILY PERSONNEL
SAFETY CHECK LIST AND INFORMATION SESSION**

PROJECT NO. :

PROJECT DESCRIPTION :

SECTION :

DATE :

TEAM :

No. of WORKERS :

I HEREBY CERTIFY THAT THE SAFETY CLEARANCES WITHIN WHICH WORK MAY BE CARRIED
OUT ARE EXPLAINED TO ME IN DETAIL.

NAME :

(Team leader)

DATE :

TIME :

NAME :

NAME :

NAME :

NAME :

NAME :

NAME :

NAME :

NAME :

NAME :

NAME :

NAME OF PERSON GIVING INSTRUCTION :

NAME OF INTERPRETER :

A. PROTECTIVE CLOTHING CHECK

	YES	NO	REMARKS
Reflective Vests	<input type="checkbox"/>	<input type="checkbox"/>	_____
Safety Shoes	<input type="checkbox"/>	<input type="checkbox"/>	_____
Gloves	<input type="checkbox"/>	<input type="checkbox"/>	_____
Sun Glasses	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hard Hats	<input type="checkbox"/>	<input type="checkbox"/>	_____

B. EQUIPMENT CHECK

	NUMBER	YES	NO	REMARKS
Ladder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Ladder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Ladder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Safety Belt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Safety Belt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Safety Belt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
First Aid Kit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
First Aid Kit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

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C. IMPORTANT TELEPHONE NUMBERS

	NAME	TEL. NO.
Team Supervisor		
Regional Engineer (Electrical)		
Maintenance Manager (Electrical)		
Electrical Officer in charge		
Electrical Control Office		

ELECTRICAL SHOCK INCIDENT AWARENESS**10. CERTIFICATION**

- 10.1 It is of the utmost importance that candidates be correctly assessed as to their temperamental suitability, their theoretical knowledge, practical competence and intimate knowledge of the high voltage equipment in the particular area for which the certificate of authority will be valid.
- 10.2 The candidate has attended the applicable prescribed training courses and has passed the relevant qualifying examinations.
- 10.3 The candidate is in possession of all relevant instruction and regulation books and has access to all relevant electrical diagrams and drawings.
- 10.4 The candidate has received adequate additional local training in the work situation on the relevant equipment (to be specified on the certificate of authority) and has had reasonable time and opportunity to acquaint him with the equipment and layout of the area.
- 10.5 Special attention should be afforded to the candidate's ability to apply portable earth connections and the correct use of earthing devices.
- 10.6 For working on "live" 3 kV DC overhead track equipment, special attention should be given to the candidate's observance of clearances as laid down in clause 603.1 of the Electrical Safety Instructions. The candidate must be tested to ensure thorough acquaintance with all electrical hazards involved when doing "live" working.
- 10.7 The Departmental Head shall maintain a database for certificates and letters of authority.

- 10.8 The officer who issues, renews or withdraws a certificate or letter of authority shall advise the database maintainer.
- 10.9 The officer who issues, renews or withdraws certificates of authority that includes switching must also advise "Control".
- 10.10 "Control" shall keep an accurate and complete record of such certificates.
- 10.11 Each depot or office from which certificates or letters of authority are issued shall depute a specific person to be responsible for keeping a complete and accurate record of all certificates and letters of authority. This person must ensure that authorised employees attend refresher courses before their authorities expire.
- 10.12 The officer who issues, renews or withdraws a certificate or letter of authority shall advise the person responsible for keeping the record of any issues, renewals or withdrawals.
- 10.13 A copy of the advice shall be placed on the employee's staff file and copies shall also be sent to the department concerned for retention on the employee's control office file and to the department responsible for the training.
- 10.14 A check of the certificates and letters of authority shall be arranged annually by the depot engineer / Technical Manager to ensure that the records kept at depots are correct.
- 11. WORK NOT PERMITTED WHILE ELECTRICAL EQUIPMENT IS "LIVE"**
- 11.1 All electrical equipment and all electric wires may be "live" and dangerous and must not be touched. Even loose or broken wires lying on the ground may still be "live" and must be avoided.
- 11.2 No person may climb any pole or structure which supports exposed "live" overhead wires or electrical equipment.
- 11.3 No person may climb, ride or work on the roof of, or on the top of any load or equipment carried on any rail or road vehicle or any machine under exposed "live" overhead wires.
- 12. WORK ON THE OUTSIDE OF ROLLING STOCK (INCLUDING LOADING OR UNLOADING)**
- 12.1 No person may stand, climb or work whilst on any platform, surface or foothold higher than the normal unrestricted access way, namely –
- 12.1.1 the floor level of wagons,
- 12.1.2 external walkways on diesel, steam and electric locomotives, steam heat vans, etc. and

12.1.3 walkways between passenger coaches and locomotives.

12.2 When in the above positions –

12.2.1 no person may raise his hands or any equipment he is handling above his head,

12.2.2 the handling of long lengths of material such as metal pipes, etc. should be avoided, and only if essential must be handled as close as possible to the horizontal position below head height,

12.2.3 responsible persons must always warn all persons under their control against the dangers involved with exposed "live" wires,

12.2.4 no person may whilst on electric rolling stock approach or work on any part of the pantograph, hooter or other roof equipment, except the headlight, and

12.2.5 train personnel may give the recognised hand signals from the floor and steps of wagons and recognised positions on locomotives not higher than footplate level.

13. WORK PERMITS

NOTE : A work permit is a written application and an authority to proceed with work on high-voltage electrical equipment after it has been isolated and earthed. It is an assurance that the equipment has been made "dead" and that it will not again be made "live" until the permit has been cancelled.

13.1 Work on high-voltage electrical equipment which has been isolated and earthed may only be undertaken under cover of a work permit, unless otherwise provided in these instructions.

13.2 Work boundaries within which work may be carried out must be pointed out to personnel in the most suitable manner. The method used must take into account the competence of the personnel concerned.

NOTE : A work permit will provide safety to personnel only if the work boundaries within which work may be carried out are completely clear to all persons concerned and are constantly observed by them.

13.3 The work boundaries can be pointed out by using a physical means of identification, e.g. the earth connections where they can be placed in conspicuous positions, warning notices, flags or conspicuously coloured tapes suitably attached to the overhead equipment. In cases of particular danger the work boundaries concerned must be effectively marked at suitable intervals, e.g. in a yard where a "live" line may overlap a work permit area.

14. WORK TO CLEARANCE FROM

14.1 An authorised person, category A or C, or a person issued with a letter of authority may undertake work to clearance from exposed "live" high-voltage electrical equipment under the following conditions :

14.1.1 The authorised person must select a safe working position on or close to the de-energised equipment or structures where he is required to work.

14.1.2 The person must choose a safe route to and from this working position.

14.1.3 While in the safe working position and moving to and from it, the person must ensure that with outstretched arms, no part of his body or the tools or equipment he is handling, come within the safe clearances to adjacent exposed "live" high-voltage electrical equipment laid down in the following table :

TRACTION SYSTEM	SAFE CLEARANCE (ANNEXURE 6.1)	
	CATEGORY A	CATEGORY C
3 kV DC	600 mm	900 mm
25 kV AC	900 mm	1,2 m
50 kV AC	1,4 m	1,7 m

NOTE : *The clearances given in this table are the minimum safe working distances. The greatest care must always be taken when working near exposed "live" equipment, and whenever possible greater clearances should be observed. Where working barriers can be used this should be done in preference to working at the clearances permitted.*

14.1.4 Where safe working clearances cannot be observed from the exposed "live" equipment, approved portable working barriers must be employed by all persons in all cases, or work must be done with the equipment "dead" under cover of a work permit.

15. IN GENERAL

15.1 Place ladders in a safe position and keep them steady.

15.2 When you see that someone is working unsafely ensure that you go through the STOP process.

15.3 We must create a culture where we look after each other.

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