

SECTION 5 (V) SPECIFICATIONS, STANDARDS AND DRAWINGS

SECTION V A SPECIFICATION STANDARD

1. General

- 1.1 These Standard Specifications, together with the Construction Standards and Standard Drawings shall govern the performance of the Works and shall be the basis for inspection and acceptance of the Work by NEA PDC.
- 1.2 The Standard Specifications and the Construction Standards and Standard Drawings shall be considered as mutually inclusive, and the conditions stated in each shall supplement the other as appropriate.
- 1.3 All Standard Specifications shall be followed at all times by the Contractor unless specifically accepted in writing by the NEA PDC, or unless some aspects of the work covered by these General Specifications are not required by the Scope of Work.
- 1.4 The Standard Specifications, Construction Standards and Drawings for the construction items shall be as per NEA standards. If any dispute or confusion arises , the NEA standards will govern and must be followed by the concerned parties.

2. Route of Circuits

- 2.1 To the greatest extent practicable, all overhead circuits should be located along streets or travelled ways ordained by the Kusma Municipality or required authority as public property, except as required for Service drops and circuits to individual consumers.
- 2.2 To the greatest extent practicable, all facilities should be located on public property, and in no case shall private property be occupied unless specifically authorized by NEA PDC. NEA shall obtain any required permits for occupancy of public or private Right-of-Way.

3. Survey and Staking

- 3.1 All structures should be located at the outer limits of public property along streets or travelled ways. Structures should also be located along streets at property lines of adjacent private property. Structures and stays running parallel or perpendicular to the line route shall not block portions of streets, travelled ways, drives, passages, or gates.



- 3.2 All structures shall be so located as to reduce, to the greatest extent practicable, obstacles to pedestrian and vehicular traffic. Barriers shall be provided in accordance with instructions by the employer. As far as practicable, transformer structures shall be located to reduce visual and noise impact on adjacent residences or businesses.
- 3.3 Where underground facilities are indicated by surface conditions, or where such facilities can be located, structures and stays shall be so located as to avoid conflict with such facilities during construction.
- 3.4 All measuring and staking activity shall be accomplished by personnel with experience in survey procedures, and standard survey equipment acceptable to the employer, shall be used to perform the survey work. Field survey notes covering all survey work shall be produced and maintained and shall be turned over to the NEA PDC at the time of completion of the Works. The format of proposed survey notes shall be submitted to NEA for approval.
- 3.5 Survey work shall include centre line and structure location and staking; determination of overhead and site clearings of other structures, wires, and obstacles; area surveys and plotting; and centre-line profiles of terrain; as directed by the NEA PDC.

4. **Technical Documentation**

- 4.1 All technical documentation as specified here in, shall be prepared by the Contractor. The Contractor shall employ skilled drafting personnel to produce all documentation specified. All technical documentation prepared by the Contractor shall be subject to the approval of the NEA PDC prior to acceptance by the NEA PDC of such documentation. All technical documentation shall be prepared in the English language.
- 4.2 Documentation shall be prepared using the following mediums:
- a) Mylar material, with a minimum thickness of 0.127 millimetres, shall be used to produce the base Structure Data Sheet, As-Built Drawings and other drawings specified by the NEA PDC.
 - b) Standard drafting vellum shall be used to produce small area plottings, profiles of line-sections and centre-line plotting necessary for the development of Structure Data Sheets and As-built Drawings.
- 4.3 Structure Data Sheets (SDS) shall be prepared in accordance Construction standards. Submission of SDS for approval shall be in the form of A3 photocopy in clearly legible copy. Any unclear or illegible form entry or reproduction shall be rejected. NEA PDC may require any revisions to be made, at their sole discretion, prior to approval of the SDS for construction. An approved and field checked SDS is required for all Construction works invoiced by the Contractor. Field checking of the SDS shall be performed jointly by the Contractor and NEA PDC representative. The SDS and As Built Plan are intended as permanent records for NEA PDC. Any construction performed prior to the Contractor's receipt of approved SDS from



NEA PDC shall be completely at the Contractor's risk, and NEA PDC shall have the right to require any correction due to the un-approved construction activities. No extra cost will be borne by NEA for the preparation of SDS.

- 4.4 As-Built Drawings shall be prepared by the Contractor in the general format provided by the NEA PDC. Drawing size shall be approximately 841 x 597 mm overall and the scale shall be 1:10,000, 1:2,000. The NEA PDC shall provide any available environmental background data for inclusion on the various drawings and the Contractor shall record (in ink) all facilities as-built.
- 4.5 The Contractor shall prepare other technical drawings, in the same medium and format as the As-Built Drawings, for As-Built Drawings index sheets, pole maps, and One-Line Diagrams as specified and required by the NEA PDC.
- 4.6 The Contractor shall and prepare and furnish Transformer Record documents, in the format specified by the NEA PDC, for each transformer installed.

5. **Material Storage**

- 5.1 The Contractor shall procure all materials and equipment .All materials and equipment turned in to the NEA PDC reclaimed after demolition of existing facilities if any shall be transported to the NEA LDC warehouse and unloaded in the same manner.

5.2 **Worksite**

- a) Extended storage of materials along the routes of lines will not be permitted. All small items of material shall be provided to the work crews on a daily basis and no small items of materials may be stored on the worksite overnight.
- b) Construction materials may be spotted at the worksites for a short period prior to installation provided that crating and reel lagging are intact to protect the items. Poles may be spotted at structure locations for short periods prior to setting.
- c) Construction materials placed at the worksites shall be located so that the items are not subject to damage and do not impede pedestrian or vehicular traffic.
- d) Any damage caused by imprudent placement of equipment and materials by the Contractor at the worksites shall be corrected by the Contractor, in a manner acceptable to the NEA PDC, at the Contractor's cost.

5.3 **Contractor Storage Facility**

- a) The Contractor shall be financially responsible for the secure and proper storage of materials.

6. **Excavations**

- 6.1 All excavations made for the installation, or demolition, of facilities shall be accomplished in a timely manner according to the scheduled installation. Required excavations shall be opened, material installed, and backfill placed, as specified, in a continuing operation to the greatest extent practicable.



- 6.2 Any excavation left open during discontinuous construction which is accessible to the public or along public thoroughfare, shall be covered or barricaded, and marked by suitable visual means, to prevent a public hazard.
- 6.3 Excavations shall be properly located and sized for the intended use. Pole and stay plate/ anchor excavations shall be correctly sized to retain undisturbed soil to the greatest extent consistent with the means of excavation. Pole holes shall be made by power-driven auger or by manual methods; power-driven shovel equipment shall not be used. Pole holes shall be excavated to the specified depth with no tolerance shallow and tolerance of ten (10) centi meters deep. The bottom of pole holes shall be undisturbed soil, gravel or rock. Stay plate holes shall be excavated by manual methods to specified depth with no disturbed soil in the direction of the anchor rod.
- 6.4 All excavations shall be backfilled with excavated material, or as specified for the installation. Backfill shall be free of foreign materials and shall be well tamped with excess backfill graded over the excavated area to prevent depressions resulting from eventual natural compaction. Large amounts of excess backfill shall be removed from the site by the Contractor if so directed by employer. If so directed by NEA PDC, The Contractor shall provide suitable backfill materials for excavations where existing removed materials is insufficient, or inappropriate, to provide suitable grading of the excavated area.

7. **Pole Setting**

- 7.1 Poles shall be set in accordance with the appropriate Sections of the Construction Standards and subparagraph 6 above.
- 7.2 Each pole shall be assigned a unique construction number at the time of structure staking for preliminary identification and preparation of structure Data Sheets (SDS).
- 7.3 Subsequent to the preparation and approval of SDS, and prior to provisional acceptance of a given line section, the NEA PDC shall provide the Contractor with unique permanent pole numbers. The Contractor shall then apply the specified permanent pole numbers to each pole with black oil-based paint in neat clear English letters and/or Arabic numerals. Permanent pole numbers shall be applied in letters/numerals five (5) centimetres in height at a point on the pole 1.6 meters above ground level. Numbers shall be applied on the side of the pole facing the adjacent street or travelled way.

8. **Safety**

- 8.1 The Contractor shall take all measures required to safeguard the public, public and private property from any hazard to life, limb, or property which may arise during the performance of the construction of the works. Such measures shall include, but not be limited to: barricades, signs, newspaper announcements, traffic control by police, or other advisory and control methods deemed appropriate.
- 8.2 The Contractor shall provide his work force with all tools and equipment in sufficient numbers and quality to perform all aspects of the works in a safe manner. The Contractor shall provide protective headgear for all members of his workforce,



and shall provide protective clothing as required for specific tasks. The Contractor shall instruct his work force in proper and safe construction techniques and shall continuously monitor compliance with safety instructions throughout the period of the Contract.

8.3 The Contractor shall provide, and require use of, protective grounding equipment when:

- a) Work is being performed on lines adjacent, either in extension of, or parallel to, energized circuits.
- b) Work is being performed on isolated circuits after conductors have been installed.

8.4 The Contractor shall maintain all tools and equipment in good working order. All mechanized equipment shall have adequate safety mechanisms and guards in place and be fully operational. Operators of such equipment shall be skilled and fully trained in the operation of such equipment.

8.5 The Contractor shall provide and maintain emergency medical supplies to cover with accidents and snakebites for his work force on a readily available basis. The Contractor shall also instruct all supervisory personnel in the action to be taken in the event of serious injury, and the sources and locations of professional medical assistance which shall be employed in such cases.

8.6 The Contractor shall apply all accidental insurance policies to his work force for an accident occurring during the working period of the construction.

9. **Tests**

9.1 The Contractor shall furnish the electrical test equipment and personnel to perform electrical tests of equipment and circuits, as specified by, and under the supervision of the NEA PDC.

9.2 The Contractor shall megger all circuits installed with a motor-driven megger or equivalent instrument. All circuits installed with a motor-driven megger to demonstrate the acceptable insulation characteristics of the line prior to energization and Provisional Acceptance. 11 kV overhead circuits shall be tested at 2500/1000 volts AC.

9.3 All tests specified shall be conducted during suitable atmospheric conditions under the supervision and witness of the NEA PDC. All test results shall be documented and signed by both parties.

10. **Tree Cutting and Trimming**

10.1 Any tree cutting or tree trimming authorized and directed shall be accomplished by the Contractor under the direct supervision of NEA PDC.



SECTION V B

STRUCTURE DATA SHEET (SDS)

Structure Data Sheets (SDS) shall be prepared to provide details of specific construction information necessary for erection of pole structures with hardware and accessories and conductor installation. The SDS shall be used in conjunction with the area plan drawing to document the works to be performed.

Abbreviations used in the preparation of SDS shall be defined as follows,

<u>Sl. No.</u>	<u>Nomenclatures</u>	<u>Meaning</u>
a.	Pole Construction No.	Number assigned by the Contractor to identify pole on Plan drawing.
b.	Span	Length of conductor span between poles
c.	BK	Angle of line deflection in degrees
d.	Pole	Pole quantity
e.	Frame	The construction Standard Drawing No. for 11 kV system for which the pole is to be framed e.g. CS11-02. The Construction Standard Drawing No. for 33 kV system for which the pole is to be framed e.g. CS33-01.
f.	Stay	The Construction Standard Drawing No. of stay to be installed in different voltage system, e.g., CSG-08.
g.	Conductor	The number and size of conductors in sq. mm in 11 kV system, e.g. 3-100.sq mm.
h.	Conductor (km.)	Running km. length of conductor.

Note :

- Information for a single pole location need not be confined to a single row.
- All works, whether new or on existing systems, shall be documented on the SDS.
- Each SDS shall include the applicable "As Built" Plan Drawing number(s). Similarly each "As Built" Plan Drawing shall include the applicable SDS number(s).



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SECTION V C

CONSTRUCTION STANDARDS

1.0 GENERAL INSTRUCTIONS

A. General

The general instructions included in this section shall be applied to all 11 kV and 400/230 volt overhead line construction under this NEA PDC. Additional general instructions are included in each section as they are applied specifically to the subject covered in that section.

These construction standards provide basic requirements for new facilities.

The clearances of conductors and structures shall be as per the NEA construction standard

. Deviations from these standards may become necessary due to unique or special conditions. In such cases, the directions of the Employer shall be followed.

The safety rules of the NEA shall be strictly observed at all times by the Contractors' and NEA's work forces.

B. Pole numbering

Poles and structures shall be numbered in accordance with a numbering system provided by NEA. Each pole or structure shall be paint stencilled with the assigned number.



2.0 POLES, CROSSARMS, AND STAYS

A. Poles

Poles shall be installed by length and class at locations in accordance with the construction plan.

B. Pole setting

Pole holes shall be dug large enough in diameter to admit a tamping bar all around the periphery of the pole and shall have a uniform dimension as per the type of pole used at the top and bottom. Poles shall be planted in the ground to the depth specified in Table 2. Before planting a pole, the bottom of the hole made for planting the pole, shall be cleaned of free soil and firmly tamped, to prevent the hole from settling.

The stability of a pole, particularly a pole without stay, is greatly influenced by the size of the pole hole, the nature of the soil and the care exercised in back filling and tamping. Two active hand tampers and one slow shoveler shall result in good compaction.

Poles shall be set to stand perpendicular except at terminals, angles and other points of excessive strain where they shall be given a rake not to exceed 10 centimetres against the direction of strain. Poles located at the sides of banks or other locations, where washouts may occur, shall be protected by suitable cribbing, or shall be referred to the Engineer for recommended action.

After the pole is in position and the hole is back filled and tamped, soil shall be piled and packed firmly around the pole. Pole setting shall be inspected prior to acceptance and any back fills that have sunk shall be refilled.

Poles located in shallow river beds shall be protected by gabions as designated by the Employer. Gabions should be approximately 2 metres x 1 metre x metre. Four such gabions are required for each pole.

Set pole and pour 860 mm diameter foundation and level areas around pole and set gabions in pattern shown in CSG-06. It is important to lace adjacent gabions together along the perimeter of all contact surfaces. Fill gabions with hard, durable, clean stone, 100 mm to 200 mm in size in three layers. Install two connecting wires at each layer. Lace gabion lids securely and make certain that all edges are closed. Fill void between pole and gabion with hard, durable, clean rock 200 mm minimum size.

C. Pole Framing

Pole and structures shall generally be framed in accordance with these standards and the construction structure data sheets. Where special framing requirements are necessary, the Employer shall provide framing instructions for the specific structure.

Each cross-arm shall be attached to the pole by a pole clamp or by machined bolts of sufficient length to pass completely through the holes provided on the pole and cross-arms and receive their full complement of nuts.

Bolts of proper length shall be used. Excess nuts shall not be used to make use of a bolt which would otherwise be too long. The end of a machined bolt NEA PROing more than 3



centimetres beyond the nut shall be cut off to a length of 2 centimetres beyond the nut. Each bolt, when installed, shall have its full complement of nuts.

D. Stays

Stay leads specified in construction documents are defined as the horizontal distance from the centre line of the pole at ground line to the point where the anchor rod should enter the ground assuming the ground to be level. For the correction in stay leads for uneven ground see Drawing No. CSG-11.

The Engineer, upon request, may designate the actual location of stay anchor rods on slope of hills. The stay stake indicates the point where the anchor rod enters the ground. The anchor hole shall be dug accordingly.

The attachment of one stay shall not overlap that of another stay when two or more stays are carried to a pole or anchor. Each shall be entirely independent of the other. This does not prevent the use of multiple eye rods for nuts designed for such use.

All stays to be installed on a pole line shall be placed and drawn reasonably tight before the conductors are tensioned. After the conductors are tensioned and sagged to their final position, the stays shall be carefully inspected to see that each is carrying its share of the load on the pole as intended. If multiple stays are not carrying equal strain, the slack stay shall be pulled up until it is sharing load as intended.

Stay anchors must be installed full depth and set to pull against undisturbed soil to develop full tension. An anchor not properly installed will move and allow movement of the top of the pole, thus slacking the conductors. Stay anchors installed in soft or unstable earth shall be placed at specified depth and back filled with 5 cm. maximum size crushed stone placed to a depth of 1 meter from the bottom of the pole.

E. Stay Insulators

Stay insulators shall be installed on all stays in accordance with the construction drawings.

F. Field Modifications

During the erection work at the field there may be necessity to modify galvanised steel hardware and may have to be drilled, reamed, filed or cut. Under such a condition the area of the steel exposed, after these modifications, shall be coated with a zinc-rich paint to protect the steel from corrosion.



3.0 CONDUCTOR

A. Materials

Aluminium conductors refer to an assembly of strands of hard drawn aluminium with steel reinforcements for greater strength which are termed as Aluminium Conductor Steel Reinforced (ACSR) Conductor.

B. Sagging

Conductors shall be sagged in accordance with the sag chart specified by these specifications.

The importance of careful sagging of conductors cannot be over emphasised. Conductors have definite characteristic that control their behaviour resulting from changes of temperature, wind speed and additional load due to ice or wet snow.

Conductors must not be sagged too tightly (less than specified sag) as unspecified extra tensions may result in failure of conductor structure.

Conductors sagged too loosely (more than specified sag) may contact adjacent conductors hardware or any structure. Excess sag can reduce clearance beneath the line with the ground to the point of danger.

C. Sag Charts

Unless otherwise noted, all sag charts are calculated on the basis of 35 kg/sqm wind pressure

Sag is always measured vertically, without wind, when conductors are being installed or re-sagged.

Unless otherwise specified by the Employer for a specific condition, initial or stringing sag shall be applied to the installation of all new unstressed conductor. The initial sag is always less than the final sag.

Sags for the various temperatures shall be furnished by the Engineer in a table form for spans not covered by the sag chart.

In order to ascertain the sag for a given stringing temperature, select the point corresponding to the proper temperature on the scale on the left-hand side of the sag chart. Lay a straight edge so that it passes through this point and the point of the centre scale representing the length of span to be sagged. The straight edge will then indicate the proper stringing sag on the right-hand scale. Interpolate if the temperature of span is not exactly the same as designated on the chart. The low voltage neutral conductor shall be sagged with the same sag as the low voltage phase conductor. If the low voltage conductor, as a group, has less design sag than the high voltage phase conductor installed above it, the low voltage conductor, as a group, shall be installed to the same sag as the high voltage conductors installed above.

D. Stringing



The dynamometers and similar apparatus shall be used for tensioning of conductor to obtain appropriate sagging of conductors.

For stringing of ACSR conductors of all sizes, stringing rollers or roller shall be used to support the conductor as it is pulled out and sagged. Stringing rollers shall be used regardless of size of aluminium conductors, bare or covered.

Stringing rollers shall be suspended at each insulator support position so that the conductor shall roll smoothly over the roller protecting conductor from any physical damage.

Stringing sheaves shall have a diameter at least 20 times the conductor diameter and so finished as to prevent damage of any kind to the conductor as it is pulled through the sheaves.

Conductor drum shall be located at a sufficient distance from the first structure to avoid excessive bending of the conductor over the sheaves and excessive downward loading on the cross-arms.

Attention shall be paid to the fact that all sag charts contained herein for ACSR conductors are calculated on the basis of non pre-stressed conductor. For this reason, at no time during the stringing or sagging operation, shall conductors of this type be pulled to sags which are less than those shown by the charts.

Special care shall be taken at all times to prevent the conductor from becoming kinked, twisted or abraded in any manner. Where it is necessary to drag conductors on the ground, the conductors shall be protected by covering all stones or other objects which might damage the conductor with boughs or trees or suitable pieces of lumber. These requirements are specially important when ACSR conductor is being handled on river crossing spans. Floats with rollers shall be used to prevent the conductor from dragging along the river bottom.

In stringing conductors across highways, the conductors shall be fully protected from passing vehicles by use of temporary guard structures.

E. Damaged Conductor

Damaged conductors shall be repaired by using a repair sleeve provided that no more than 2 strands of the outer aluminium layer are damaged and further provided that none of the sleeve core strands are damaged. For a conductor damaged in excess of the above conditions, the damaged section of the conductor shall be cut out and a tension splice installed.

When cutting out damaged section of conductor, no more than 1 tension splice shall be permitted in a span and no splice be made within 8 meters of an insulator attachment.

F. Sag Error

Sag error shall not exceed ± 40 mm from the sag defined by the sag chart.

G. Conductor Attachment



Conductors shall be secured to pin insulators with pre-formed conductor ties or with tie wire. Insulator ties, except at jumper supports in structures, shall be made with pre-formed ties when available.

Conductors shall be connected to dead end assemblies with tension set.

H. Line Splices For Tensioning And Looping

Cleaned and polished contact surfaces are necessary to make conductor splices so that it shall remain free from trouble. Great care shall be taken to completely clean the strands of aluminium conductor. The splicing sleeve must be centred over the conductor ends before compressing to make a splice of required strength.

Sleeve listed in material list CSG-31 shall be used when splicing ACSR conductors prior to installation. The outer strands of aluminium shall be carefully cleaned with a wire brush to remove all foreign matter till the aluminium shines brightly. The cleaning applies to both new and old conductors. Splicing sleeves for aluminium conductor are supplied by the manufacturer pre-filled with inhibitor compound.

Splices in line conductors shall be so located that the end of the splicing sleeve is at least 30 cm from the end of a suspension or dead end clamp. Non-tension loops, such as between dead ends, shall be spliced with a connector when the conductor are of same metal and size.

1. Connectors

1. Cleaned and polished contact surfaces are necessary to make electrical connections that will be free from trouble.
2. Tap connectors are supplied by manufacturers pre-filled with inhibitor compound. Excess inhibitor compound shall not to be removed but it shall be wiped over the connector as a moisture seal. Connectors shall not be covered or taped.
3. Compression connectors shall be located in such a manner that there shall be at least 30 cm of conductor between the end of the connector and the end of a dead end
4. Connectors shall be installed on non-tensioned portion of the conductor such as loops in preference to the conductor in the span.
5. Connectors installed on conductor shall be located in a span adjacent to the crossing rather than the crossing span when practicable.
6. Aluminium compression connectors, pre-filled with inhibitor compound, shall be compressed on the cleaned area of aluminium conductor. Where necessary, inhibitor compound shall be applied to the cleaned conductor and connector before assembly.
7. Aluminium compression connectors shall be used for connecting aluminium to aluminium conductors.



4.0 CONDUCTOR ACCESSORIES

A. Pre-Formed Ties And Grips

Taps for jumpers and services shall not be made over the legs of ties or dead end grips.

B. Pin Insulator Ties

Pin insulator ties are of 2 types:

- a. **With single top grooves:** Single top ties may be used to turn line angles to 7 degrees where single insulators are permitted. Please refer material list CSG-29, 30 for specific applications.
- b. **With side grooves with specific size of ties for specific conductor in each tie style:** Specific usage is dictated by insulator pin loading and use of single insulators as specified in material list CSG-29, 30.

C. Preformed ties for Stay Wire

- c. Preformed ties for stay wire are furnished as per material list CSG-29, 30.

Preformed ties for stay wire are right hand lay. Preformed ties for stay wire may be removed and replaced up to 3 times, when initially installed, to permit adjustment of stay tension.

D. Application

When applying ties or grips the manufacturer's identification tag and colour coding shall be checked to insure that the tie or grip is the right unit specified for application on the specific conductor or wire strand.

Preformed ties for stay wire are furnished with two crossover markings. When applying preformed ties on hardware, the grip shall be installed using the crossover point closest to the loop of the grip.

F. Compression Fittings

Full-tension conductor splices and repair sleeves are furnished for all conductors to be installed.

- a. Full Tension Conductor Splice

Full-tension splices for ACSR conductor are provided in a 2/1-piece unit. Full tension conductor splices will develop full conductivity of the conductor and a minimum of 95% of the rated conductor breaking strength. Please see material list CSG-31 for application tables and Drawing No. CSG-31 for splicing instructions.

- b. Repair Sleeves

Conductor repair sleeves are furnished for all conductors to be used to restore the rated current carrying capacity of conductors with broken strands. Please see material list CSG-M8 for application tables. Repair splices have no tension rating.



G. PG Clamps

PG clamps are furnished in a full range of sizes for application in the non-tension connection in 33 kV and 11 kV circuits. The PG clamps are designed for general use in making tap and jumper connections of various types.

In all applications of PG clamp fittings, the conductor metal shall be wire-brushed to a bright condition to remove surface oxidation on the conductor.

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5.0 LINE CONSTRUCTION

A. Arrangement Of Conductor

The standard position of 11 kV phase conductors on the cross-arm in the normal triangular configuration looking from the normal source of power supply shall be seen as:

Red (R) on top of the pole, Yellow (Y) on right hand end of the cross-arm and Blue (B) on left hand end of the cross arm.

B. Attachments To Poles

Bolt holes are provided on poles for cross-arms, cross-arm braces and stay bolts.

C. Conductor Ties

Pre-formed ties and grips shall be used for attaching conductors to structures when available.

If pre-formed materials are not available, the wire shall be soft conductor so that when made up, the tie wire will bind the conductor tightly. No tie wire shall be used for a second time.

Jumpers on structures shall always be made with tie wire as per Drawing No. CSG-29

Tie wire shall be of the same metal as that of the bare conductor to which the tie is applied.

D. Conductor Support

The conductor supports on straight lines shall be carried on the top wire groove of the pin insulator. Conductors shall be attached to the side conductor groove of pin insulator on the outside of angles so that transverse conductor tension will tend to hold the conductor in the insulator groove.

Conductor ties shall not hold a conductor on the insulator when uplift exists. If uplift is found, it is required to consult with the Employer to determine remedial action to be taken.

E. Pole Wiring

All taps or connections passing from one level to another on the pole shall, as far as possible, be vertical. Connections shall have sufficient length so that the line conductors are not moved from normal positions and normal movement is not restricted. Connections shall have at least 30 centimetres clearance from other conductors. Any connection carried from one side of the pole to the other side shall be supported on pin insulators.



6. INSTALLATION OF STAYS

1. Where stays are installed on a line angle structure, line of stay shall bisect the outside line angle.
2. The span of stay extending between poles shall not be greater than 50 meter.
3. Anchor and anchor rods shall be set so that the axis of the rod and line of stay shall be straight. The portion of the anchor rod above the ground shall not be bent at an angle to connect a stay wire. If this occurs, anchor and anchor rod shall be reset. The anchor rod shall not be exposed for more than 15 centimetres above the ground after the anchor is set.
4. If gravel back fill is required to set anchor in soft or unstable soil, gravel back fill shall be designated as "Local Material".
5. If a stay is installed on a pole where low volt conductor is dead ended or double dead ended and extends past stay, a piece of plastic hose slit along the length shall be placed over the stay wire extending from the upper stay attachment to 200 mm below lowest low voltage conductor. After installation, the hose shall be wrapped with plastic tape and the hose shall be secured to the upper stay bolt with tie wire. Plastic hose shall be "Local Material".

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7. INSTALLATION CRITERIA

GENERAL INSTRUCTION

1. The line alignment should be as straight as possible to minimise requirements for stays.
2. The basic span shall be maintained within the following limits:-
 - a) For 11 kV – 50 m to 70 m
3. The entire construction works shall be performed as per the construction units specified. Whenever the construction unit does not cover any specific activity, the Contractor and the PDC shall mutually settle the cost as per the man-hour involvement for the same and according to the labour rate quoted by the Contractor in his Bid.
4. Detailed schedules of material to be used are provided in each structure drawing of the construction standards. It shall be the responsibility of the Contractor to judge the appropriateness of the listed material according to the site conditions. If there is any need for addition/reduction or deviation from the listed material size/quantity, the Contractor shall ask the PDC for the approval of the same.
5. All types of line clearances shall be maintained as per the construction standards provided to the Contractor. Deviations from the standards may be allowed only for unique or special conditions.
6. Safety rules of the NEA shall be strictly observed at all times by the PDC and the Contractor and their personnel. Special care shall be taken to maintain the optimum conductor sag to provide adequate safety to the construction and the property or people.
7. All fastenings (e.g. preformed ties, nut bolts, stays etc.) shall be so installed that the constructed line components shall not fail to remain within the safety margin while maximum working load is applied.
8. If the Contractor requires clarification of any construction standard or unit or he feels any doubt in his interpretation of construction activities he should clarify the points with the PDC in writing and the decision thus made shall be valid for further work.
9. HV Insulators: The Contractor shall use HV pin insulators in the alignment of the line where the break angle does not exceed the limits provided hereafter.

<u>S.No.</u>	<u>Conductor Size in sq. mm.</u>	<u>Minimum Break Angle in Degrees</u>
1	30 (Weasel)	7

In the case where the break angle exceeds the above values the Contractor shall make dead-end at the angle structure and use disc insulator fittings.



10. Stays:- The Contractor, in general case, shall install at least one stay for the supports in the following cases:

1. Dead end structure
2. Tee-off (Tap) structure

For conditions different from the above, the Contractor shall provide calculations showing the number of stays necessary and get approval from PDC prior to installation.

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SECTION V E

DRAWINGS

The purpose of drawings is to specify locations, dimensions, materials to be used, stages of manufacturing, and other characteristics of the Goods and Related Services.

1. The Bidder is instructed to go through and follow the Standard Construction procedures and the Drawings as per the NEA standards.
2. Any deviations from NEA standards will not be accepted.
3. The contractor must produce the drawings and the hole patterns of poles, channels and other construction material as if required while preparing the SDS. The design, drawings and hole patterns must be approved by NEA PDC before construction actually starts.

Signature

