**Appointment of service providers to render Guy Rope Tensioning and Cappel Servicing at C1 Constantiaberg within the Western Region Operations, Cape Town OC Jurisdiction.**

**1. DESCRIPTION OF THE WORKS**

Sentech is planning an appointment of service providers to render Guy Rope Tensioning and Cappel Servicing at C1 Constantiaberg within the Western Region Operations, Cape Town OC Jurisdiction.

1. **SCOPE OF WORK**

The scope of work for this contract includes but not limited to:

* Guy Rope Tensioning
* Cappel Servicing

**3 DESIGN and DRAWINGS**

The Contractor shall be responsible for the design and safety of all temporary formwork, support work and scaffolding required during construction.

The Employer retains the right to issue additional specifications during the progress of the works.

The Contractor must bring all cases of ambiguity or discrepancy to the attention of Sentech before he/she proceeds with the various works.

Sentech shall issue instructions to the Contractor which determine what work is to be executed.

1. **CONSTRUCTION**

**Standard Specification**

SANS 2001-CSI, SANS 121, SANS 50025 are the applicable SANS specification for this contract. These documents are not issued with this document.

**Inclement Weather**

Contractors are expected to take any possible inclement weather delays into account when submitting quotations. Contractors shall satisfy themselves through their own local knowledge/investigation as to rainfall/temperature data when compiling their quotation.

**Utilities on Site**

The Contractor shall make provision for toilet facilities for his workforce, for the duration of the works, by means of the supply, daily cleaning and removal on completion of suitable chemical toilets erected in an area demarcated by Sentech

Potable water required for drinking and the execution of the contract works is not available on site. It shall be the responsibility of the contractor to provide potable water for drinking and the execution of the contract works as well as any hosepipes and adapters required for the execution of the works.

No site telephone and electricity are available on site. Contractor to provide for these facilities where necessary

Accommodation and washing facilities are not available in the Sentech building or at the site. The contractor must provide suitable washing facilities for staff members.

**Contract Works Area**

The Sentech site is located on private land. All areas outside the demarcated site fencing and site access road is to be considered private land and as such is not owned by Sentech. The Contractor shall confine his activities to the Contract Works site within the site fencing and access route to the site.

The Contractors’ working area will be demarcated on site by Sentech and handed over to the

Contractor soon after the award of the Contract.

The construction area may not exceed the current boundaries of the Sentech site – i.e. all equipment and materials must be stored within Sentech’s fenced off area.

The Contractor shall provide all reasonable measures necessary to protect the existing and/or partially occupied works to ensure that they are not damaged, and he shall remove such protection on completion.

The Contractor will be required to remove all facilities established on site for construction and restore the site to its original condition on completion of the Works.

Work is to be executed during normal working hours.

Sentech expects the Contractor, his staff or agents to maintain good public relations with landowners, other Contractors, other site users and members of the public at all times.

All equipment, materials, etc. is left on the premises at the Contractors own risk.

No fires shall be made on Sentech property.

All gates shall be kept closed at all times. The contractor shall be held liable for damage, loss or injury to persons or property, resulting from non-compliance with this condition.

**Site Cleaning and Rubble Removal**

The Contractor shall be responsible for the daily cleaning of all areas which he occupies or works on under this contract and clearing and removal of all rubble from the site to a Municipal designated dumping site. The Contractor is to allow for the cost of site cleaning and rubble removal in his Quotation.

**Health and Safety**

The Contractor will be responsible for all Occupational Health and Safety (OHS) requirements as

governed by the OHS Act for the full duration of the Contract.

Prior to the commencement of work on site, the Contractor will be required to submit a Health and Safety File complying to both the requirements and format required by Sentech. As part of these requirements, the Contractor is to provide proof that he is in Good Standing with the compensation fund.

The Contractor is to allow for the cost of Health and Safety measures in his Quotation.

**Quality Assurance**

The Contractor shall arrange for all the work done at the site to be inspected either by his own inspection staff or by an approved inspection authority.

Requests for Sentech to inspect such work shall only be made after the Contractor's inspectorate has inspected and approved the work.

Requests for the inspection of critical work at hold points should be made well in advance of the requirement, in order for Sentech to make the necessary travel arrangements.

Sentech reserves the right, however, to inspect the works at any stage and without prior notice of inspection.

Sentech reserves the right to intervene at any stage if it is believed that the work is unsafe or not according to specification.

**Program and Progress Reporting**

Timeous execution of the project as a whole is of paramount importance to Sentech. To ensure this and to assist the Contractor to monitor his own progress, he will be required to provide a detailed execution program within 10 days after award of Contract. This program shall provide the following information in either data listing format or bar chart and network diagram format:

Activity description

Activity duration

Activity logic (inter-dependencies, delays)

Resource allocations (plant, labor)

Key dates

This execution program will be used to monitor and report on the Contractor's progress.

There are no constraints on the execution program, however, the work sequence must follow logically. Non-working days are Sundays. The special non-working days are statutory public holidays.

Weekly reports are to be compiled and submitted to Sentech via e-mail. Detailed photographic evidence of progress must be included in the weekly report.

1. **LOCATION OF THE WORKS**

Sentech’s C1 Constantiaberg Transmitter site is in the Western Cape Province:

| **REGION** | **SITE NAME & CODE** | **Mast type** | **Mast Height**  **(meters)** | **Number of Guy Ropes** |
| --- | --- | --- | --- | --- |
| WR | C1 Constantiaberg | Liebherr | 154m | 4 x 4 |

**Site Coordinates**

C1 Constantiaberg 340 07' 47" S; 190 01' 18" E

Site access comprises of gravel and tar road it will be advisable for contractors to use a 4 x 4 bakkie or vehicle with adequate ground clearance can access site.

**Sentech SOP’S**

**SAFETY MEASURES (SOP MI 1)**

Safe work at heights depends upon the team being able to work safely as a unit. This means that the safety of each individual member of that team depends upon the training, knowledge and physical condition of the others. Each member should recognise and admit to his technical and physical limitations.

Before commencing with any work on masts the following safety requirements and procedures as well as the provisions of the OSH ACT, shall be observed:

1.1 No work must be carried out on masts under the following conditions:

1.1.1 Wet, rain or snow

1.1.2 Excessive winds

1.1.3 at night or dark conditions

1.1.4 Lightning

1.2 Work must be so that all waterproofing is reinstated before rain or nightfall.

1.3 Check theodolite calibration prior to departure for site as well as prior to use on site.

1.4 No persons shall be permitted in the buildings whilst major work is in progress on the mast or guy ropes.

1.5 Nobody shall be on the mast whilst work is in progress on the guy ropes.

1.6 Everyone on site shall be warned that work on the mast is being carried out and that hard hats must be worn when leaving the safety of the building.

1.7 No vehicles shall be parked directly under the guy ropes.

1.8 Clear site of long grass local to the mast and anchor blocks.

1.9 Place relevant safety signs at access roads.

1.10 Ensure that all rigging team members are issued with appropriate protective clothing including:

1.10.1 Overalls

1.10.2 Leather gloves

1.10.3 Safety shoes

1.10.4 Goggles or face shield

1.10.5 Hard Hats with chin straps

1.10.6 Safety Harnesses

The rigger in charge must ensure that team members are properly clothed and protected whilst working on the mast.

1.11 The minimum team size should be determined by the work load, type of work, skill and fitness of the members.

1.12 Inspect all slings, snatch blocks, shackles, and winch wire prior to installation work on mast. Inspections should be done at least once a week whilst being used and inspection results entered into log book.

1.13 Ensure that winch ropes run free all the way up and down the mast, and that it does not rub against the mast steelwork, antennae or other guy ropes.

1.14 When greasing guy ropes, the hoist rope shall be inspected daily and inspection results entered into log book.

1.15 Note that turpentine and trichloroethylene are harmful and hazardous chemical substances and should be used in well ventilated areas and away from naked flame.

1.16 When a contractor is appointed to perform work on a mast, the requirements and procedures in SOP M1 12 shall be observed.

1.17 Taking safety precautions; following SOP's instructions and procedures prescribed

by law and displaying sound judgement.

1.18 Ensuring that at least two team members have valid First Aid Certificates.

1.19 Ensuring that at least one team member has a driver's licence (code 10).

1.20 Transport must be available at all times during site visits.

**END OF SOP MI 1**

**CONTRACTORS (SOP M1 12)**

Sentech and the Contractor must agree, in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act 1993 (Act 85 of 1993, hereinafter referred to as the Act) that the following arrangements and procedures shall apply between them to ensure compliance by the Contractor with the provisions of the Act, namely:-

12.1 The Contractor undertakes to acquaint the appropriate officials and employees of the Contractor with all relevant provisions of the Act and the regulations promulgated in terms of the Act,

12.2 The Contractor undertakes that all relevant duties, obligations and prohibitions imposed in terms of the Act and Regulations will be fully complied with,

12.3 The Contractor hereby accepts sole liability for such due compliance with the relevant duties, obligations and prohibitions imposed by the Act and Regulations and expressly absolves Sentech from itself being obliged to comply with any of the aforesaid duties, obligations and prohibitions,

12.4 The Contractor agrees that any duly authorised officials of Sentech shall be entitled, although not obliged, to take such steps as may be necessary to ensure that the Contractor has complied with his undertakings as set out more fully in paragraphs 12.1 and 12.2 above, which steps may include, but will not be limited to, the right to inspect any appropriate site or premises occupied by the contractor, or to inspect any appropriate records held by the Contractor,

12.5 The Contractor shall be obliged to report forthwith to Sentech any investigation, compliant or criminal charge which may arise as a consequence of the provisions of the Act and Regulations, pursuant to work performed in terms of this Contract, and shall, on written demand, provide full details in writing of such investigation, compliant or criminal charge.

**END OF SOP MI 12**

**INSPECTION AND SERVICE OF GUY ROPE ATTACHMENTS (SOP MI 6)**

The procedures are laid out step-by-step and cover two types of attachments:

Long Loop Cappels Adjustable Rope Anchorage Units (Gland Cappel).

 

Please note the safety procedures (SOP MI 1) before commencing work.

Work should commence at one anchor block and start from the top rope working down.

Once all the ropes have been done, move to the next anchor block.

6.1 **REMOVE WATERPROOFING**

Remove all waterproofing material from rope attachments.

6.2 **VIBRATION DAMPERS**

Remove and inspect vibration dampers. Discard if excessive signs of rust and wear are evident.

6.3 **SCAFFOLDING**

Erect scaffolding if necessary and ensure that it is properly braced in two directions (e.g. North-South and East-West) so that it is secure and stable.

6.4 **CLEAN GUY ROPE FOR TEMPORARY CLAMPS**

At a distance of about 5m up from Cappels, clean a 0,5m length to which temporary tensioning clamps are to be attached. Use mineral turpentine or white spirits for the initial cleaning and then use trichloroethylene for final cleaning to remove the oily layer so that the rope is left dry.

6.5 **FASTEN SAFETY CLAMPS**

The amount and size of safety clamps to be used is dependent on the application, size of rope, and type of clamp to be used. For Crosby clamps the range varies from 2 to 7 clips for 6mm to 32mm diameter ropes respectively. The tightening torque also varies but specific details should be obtained from the suppliers of the clamps/clips. Fasten at least two safety clamps on the guy rope at a distance to suit the length of the pennant sling, turnbuckle and rope diameter. Ensure correct size and integrity of safety clamps to be used on the temporary gland cappel. Compare to existing cappel clamps and rope diameter. The two clamps should butt up against each other. In the pennant sling the initial set of the turnbuckle thread exposed shall not be more than a hand width with fingers spread (± 100mm) on each side. Place the clamps against the wedges in the temporary attachment.

6.6 **INSTALL THE TEMPORARY CLAMPS AND ESTABLISH "SET DISTANCE"**

Locate the clamp in the position that has been cleaned and made ready. Install two clamps (holding and safety). Place wedges in position and assemble temporary gland cappel. Install slings. Lubricate threads of turnbuckle. Measure distance from safety clamps to the anchor plate or tensioning loops in the concrete. Make a reference mark and record this distance (set distance) to ensure that the original tension is retained once the service is complete.

6.7 **TAKE UP PLAY**

Take up play with temporary turnbuckles to reduce tension on permanent attachments and then: for the loop cappel:



Loosen permanent turnbuckle and remove turnbuckle pin freeing the cappel and rope from the anchor block.

For the gland cappel:



Loosen rods of existing gland cappel and remove gland cappel pin freeing the cappel and rope from the anchor block.

6.8 **REMOVE SAFETY CLAMPS**

**Gland cappel**

Make marks on matching faces of clamps to ensure that they are reinstalled the same way with a good clamping action. Remove wedges but put one clamp on the rope half a wedge distance from cappels to avoid the wedge from falling out and hurting someone. Make a mark on the rope so that the assembly is reinstalled 20mm min (30mm standard) further up the rope towards the mast. In the event of this movement not being achievable and where the rope is badly damaged, link plates will need to be installed.

**Loop cappel**

Support loop cappel with tackle or ropes and then remove pin. Make a mark on the rope so that the assembly is reinstalled 20mm min (30mm standard) further up the rope towards the mast. In the event of this movement not being achievable and where the rope is badly damaged, link plates will need to be installed.

6.9 **EASE WEDGES WITH SPECIAL WEDGES**

**Gland Cappel**



Ease wedges out with special wedges from the mast side using 2 x 14 lb hammers simultaneously.

**Loop Cappel**



Hit rings off with specially recessed hammer head (offset hammers) placed on wedges. Hit these hammers with a 2nd hammer to remove wedges. Care should be taken, as this is dangerous.

6.10 **REMOVE WEDGES**

**Gland cappel**

Remove remaining safety clamp and wedges releasing the unit.

**Loop cappel**

Remove wedges and loop. Then remove safety clamp.

6.11 **CLEAN WEDGES AND INSIDE OF CLAMP**

**Gland cappel**

Clean wedges and inside of gland box with materials as per 6.4.

**Loop cappel**

Clean wedges and inside of loop and rings with material as per 6.4.

6.12 **EXAMINE FOR RUST AND CLEAN**

Check sliding sides of wedge and rope groove, burr edges if needed. The sliding surface must be smooth and free of high spots particularly on the ends.

**Rope**

Examine rust on rope (pull rope out of gland box) and sandpaper if necessary. Rope must be cleaned with turpentine and trichloroethylene and left clean and dry. Check for wear in clamp area, and broken wires strands, and any significant increase or decrease in diameter of the rope that may indicate internal rust of the rope.

**Gland cappel**

Examine wedges for damaged edges. A file must be used to clean ends of wedges as far as possible on both sides (i.e. Rope and sliding side) and clean the rest of the areas with sandpaper. Burr all edges and ensure flat surfaces are properly filed. Polish wedges, bolts, and safety clamps with a wire cup brush (use fine brush so as not to do any damage).

**Loop cappel**

As above except file must be used on inside and outside of loop. Use sandpaper to polish further on inside and outside.

**Turnbuckle**

Carry out the following checks on the turnbuckle:

* Check for cracks and bends at neck of jaws and bottle
* Check for thread damage and bent rods
* Check for cracks and deformations on bottle surface.

6.13 **LUBRICATE SLIDING EDGES AND WEDGES**

Wash again with turps and ensure that the inside of the wedges remains clean (clean inside with trichloro-ethylene). Ensure that the rope groove and cable are clean and dry (as per 4 above). Ensure that only the sliding surfaces are greased (sliding side of wedge). Use Noxal Rope Dressing-S (supplied by Fuchs lubricants) or similar.

6.14 **REPLACE WEDGES IN CLAMP**

Replace rope ensuring it is kept clean and dry. Replace safety clamps on cable behind wedges 30mm above old position. Clamps should butt up against each other.

**Gland cappel**

Replace wedges and tap with 2x4 lb copper hammers simultaneously ensuring the wedges are evenly positioned in the box at the top and bottom as well as from the front and the back and that the wedges do not protrude past the end of the gland box. Ensure assembly is 30mm further up the rope (refer mark under item 6.6 above). Wedges must be tapped in a manner that they are seated without any force.

**Loop cappel**

Lubricate sliding edges of wedges and inside of loops with Noxal Rope Dressing-S or similar approved lubricant. Assemble loop Cappel. Wedges must not protrude past end of loop. Place rings over the tap rings until they are secure. Lift loop with Cappel and place on scaffold plank and hit offset hammers simultaneously on both sides (as a guide: 4 hits, then 3 hits, 2 hits, etc.). Replace the cleaned rings and ensure that the wedges do not protrude past the end of loop housing. Use the specially shaped hammers (see 6.9).

6.15 **RE-APPLY INITIAL TENSION TO GUY ROPE**

**Gland cappel**

Take up tension by tightening the tension bolts on clamp. Ensure reference distance is exactly the same as measured in 6.6 (the "set" distance). Slacken the tension in the pennant sling then remove and re-check set distance.

**Loop cappel**

Replace pin in turnbuckle jaw after greasing threads of turnbuckle thus reattaching the rope to the anchor block. Take up tension by tightening the turnbuckle. Ensure reference distance is exactly the same as measured in 6.6 above (the "set" distance). Slacken the tension in the pennant sling remove and re-check set distance

**Sockets**

Remove the old Denso tape from the tensioning rods. Clean tensioning rods and grease. Fit Digital Dynamometer to the Guy rope. Calibrate the Digital Dynamometer and set to the required rope construction. Loosen or tighten the bolts on the tensioning rod to the required tension.

**Triangular Mast**

One turn on loosen two guys to the left = ½ turn tighten on one guy to the right. When all the guy ropes have been tensioned to the replace and lock nuts and cover the tensioning rods and nuts with Denzo tape and seal. To ensure the mast is standing 100% vertical, first loosen on the one side then the other side to correct the plum. Check with theodolite.

6.16 **REMOVE TEMPORARY CLAMP**

Loosen temporary turnbuckles. Remove slings, temporary glands and wedges. Remove safety clamps.

6.17 **REPLACE VIBRATION DAMPER**

Replace vibration damper on cable at the set distances for the relevant rope diameter according to the following table:

|  |  |  |
| --- | --- | --- |
| Min. Rope Dam. (mm) | Max. Rope Diam. (mm) | Spacing (mm) |
| 19 | 21 | 1145 |
| 21 | 23 | 1220 |
| 23 | 24 | 1295 |
| 24 | 27 | 1372 |
| 27 | 29 | 1450 |
| 29 | 31 | 1525 |
| 31 | 33 | 1600 |
| 33 | 36 | 1675 |
| 36 | 38 | 1750 |
| 38 | 42 | 1830 |

Spacing is initially measured from the point where the rope enters the wedge to the centre of the damper clamp.

6.18 **WATERPROOF CLAMPS**

Pack with densomastic and wrap with densotape. Re-grease rope with rope dressing where cleaned under 6.4 above.

**LOOP CAPPEL**

Stop-up turnbuckle holes with denso to prevent water from entering.

6.19 **REPEAT PROCEDURE**

Move to next attachment unit and repeat procedure.

6.20 **PAINT WITH PETRO GUARD**

At the end of each day or before rain, paint all waterproofed areas with PETRO GUARD (water based paint) to seal.

**END OF SOP MI 6**

**CHECKING AND RE-TENSIONING OF GUY ROPES (SOP MI 7)**

7.1 Check calibration of theodolite prior to departure to site by taking a reading to a reference point, swiveling eye piece upside down and rotate horizontally around by 180°C. Send theodolite in for calibration if problem detected.

7.2 Recheck calibration of theodolite once on site.

7.3 Check plumb of mast. Set up at 90° to the ropes that are to be used to correct plumb. Start on bottom guys and work to the top.

* + 1. On 4 sided Mast: 1 Turn loosen on left guy = 1 Turn tighten on right side guy.
    2. On 3 sided Mast: 1 Turn loosen on 2 guys to left = ½ turn tighten on 1 guy to right.

Sight outside of diameter of outside leg. Judge "out of plumb" by fractions of leg diameters.

7.4 1st loosen on one side then tighten on other side to correct plumb. Check through drain hole that there is sufficient thread in turnbuckle to allow further loosening. If not install link plates (as per procedure in section (SOP M1 8 - Appendix A).

7.5 Assemble "Tensioning Beam" (Cross Head) above Cappel around rope. Install rods through cross head and connect to tensioning loops in anchor block.

7.6 Install dynamometers over thread. Measure from reference point to base plate and record reference dimension. Install washers then tighten nuts until a reference point on the dynamometer is reached. Say 3 t or when the load is beginning to be transferred. Turn nuts until three consecutive quarter turns result in the dynamometer increasing with each turn. Loosen by two-quarter turns and then take the initial readings. Both dynamometers should read the same, or as close as possible. Note reference point readings on both.

7.7 Unlock turnbuckle lock nuts.

7.8 Slacken turnbuckle with a chain spanner until slack and take dynamometer readings. Do not continue to slacken.

7.9 Record readings. Add together. e.g. (13 + 11) = Tension in guy.

7.10 Tighten turnbuckle back to initial settings on dynamometer.

7.11 Check dimension back to base plate as measured above in step 6.

7.12 Go to opposite anchor block and tighten matching guy rope by (say) three turns. Experience is the only guide here on how much to tighten.

7.13 Come back to original anchor block and tighten by the same amount (say 3 turns as well).

7.14 Recheck tension as in steps (7) to (11). Calculate the ratio of turns to extra tension. Therefore, calculate final number of turns to arrive at required tension.

7.15 Repeat step (12) but tighten the rope by the calculated number of turns.

7.16 Repeat step (13) with correct number of turns.

7.17 Recheck tension and repeat above procedure if still incorrect.

7.18 Once correct tension is achieved tighten locknuts on turnbuckle.

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7.19 If opposite anchor blocks are at largely different levels, recheck plumb.

7.20 Re-waterproof turnbuckle before nightfall or rain (whichever comes first).

7.21 Move to next guy rope and erect scaffolding if needed.

**END OF SOP M1 7**