





**High Voltage Technology**

Site Quality, Inspection and Test Plan  
Multicore Cabling – Installing, Terminating And Testing

Document No: PM-SS-Q-015  
Revision: 1  
Date: 11/16/2011  
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**Reference Documents**

1. HVT document "Cabling Installation Instructions for Contractor"

Substation	SPITSKOP 400KV NEW WORKS	Client	Eskom Transmission.	Client Ref:								
Feeder bay	400KV NEW YARD EXTENTION	Order no	4500297548	Phase	ALL							
Operation/Activity Number and Description	Doc Ref	Visual, Dimensional, Documentation or Non-Destructive Examination			Contractor's Hold (H), Inspection (I), Witness (W) or Surveillance (S) Points			Client Hold (H), Inspection (I), Witness (W) or Surveillance (S) Points			Remarks and Report references	
		Vis	Dim	Doc	NDE	Code	Sign	Date	Cat	Sign		Date
1	Approved, latest revision drawing on site.		X		I							
2	Check quantity and quality of materials supplied by client	1		X		I						Delivery Note, Site Daily Diary
3	Approval of Eskom supplied materials by Client rep	1		X		W						
4	Compression equipment approved by client	1	X			W						
5	Conductor/Clamp contact area prepared as per spec	1	X			I						See specification
6	Verification of first compression crimp by Client	1		X		W						See specification
7	Random verification of compression crimp by Client	1		X		W						See specification
8	Stringer / Bus-bar tension / Sag checked	1	X			I						See specification
9	All bolts torque as per specification	1	X			I						See specification
10	Quantities of materials installed, recorded	1	X			I						

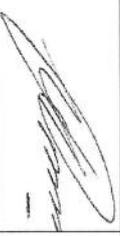




# High Voltage Technology

## Site Quality, Inspection and Test Plan - SUBSTATION EARTHING.

Document No: PM-SS-014  
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 Date: 11/16/2011  
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Operation/Activity Number and Description	Doc Ref	Visual, Dimensional, Documentation or Non-Destructive Examination				Contractor's Hold (H), Inspection (I), Witness (W) or Surveillance (S) Points			Client Hold (H), Inspection (I), Witness (W) or Surveillance (S) Points			Remarks and Report references
		Vis	Dim	Doc	ND	Cat	Sign	Date	Cat	Sign	Date	
12 All Scrap material has been removed to designated area.	1	X			E	I						Client's representative
<b>Approved by Contractor</b>		<b>Approved by Client QA</b>		<b>Approved by Client Tech</b>			<b>Approved by Client Project</b>					
Signature		Signature		Signature		Signature		Signature				
Name	H PIENNAAR	Name	S. Standaer	Name		Name		Name				
Designation	PM	Designation	Site QA advisor	Designation		Designation		Designation				
Date	04/08/2011	Date	29 Sept 2011	Date		Date		Date				

**Reference Documents**

1. HVT document "Earthing Installation Instructions for Contractor"

## **EARTHING**

### **EARTH MAT, EARTH TAILS, EARTH JOINTS, TESTING**

1. Before any work is done obtain a work permit for the work to be done if it is an existing life substation.
2. Makes sure that you have the latest and most updated drawings before you start.
3. Check to make sure that you have the correct earthing material on site according to the drawings.
4. Using your layout drawing of the earth mat, mark the lines where your trenches must be dugged with some chork powder or something similar.
5. Remove the yard stone clear out of the way so that the sand and the stone do not mix if there is any yard stone.
6. Dig your trenches according to your earth mat layout and to the correct death.
7. Roll out your earthing material for example, round copper, flat copper or what ever you're drawing specifies for you to use in the trenches.
8. Clean all your area's where there will be a joint or termination.
9. Make sure the workers wear their proper PPE for the specific joints.
10. Do all your joints according to what the drawing specifies for example, brazing joint, cad weld joints, compression joints or bolted joints.
11. Where the earth tails are connected to the equipment's steel structures make sure the steel is brushed clean and the earth tails.
12. Use a contact crease in between the joints and tighten it properly.
13. Back fill all trenches with sand and make sure no stones are in-between the sand.
14. Compact the trenches properly and then rake the yard stone over it again.
15. Test the earthing with the correct tester to make sure the correct ohms reading is obtained.

**CABLING**

1. Before any work is done obtain a work permit for the work to be done if it is in an existing life substation.
2. Makes sure that you have the latest and most updated drawings before you start.
3. Walk the cable routes that you are going to use to pull the cables and measure the actual lengths required for each cable.
4. Open up all trench covers according to the route you are going to pull the cables.
5. Dig your trenches to the equipment where necessary.
6. Make sure to remove the yard stone clear out of the way where you are going to dig your trenches.
7. Don't mix the sand and the yard stone.
8. Make sure that the trenches are dug at the correct depth according to the drawings.
9. Find a neutral point to place your cable jacks that will be appropriate for pulling all your cables near the control room.
10. Make sure that the workers have their correct PPE for pulling cables, example safety shoes, overalls, clothes and hard hats if necessary before you start moving or pulling anything.
11. Move all your different cable drums close to that point.
12. Place your cable jacks in place.
13. Start by pulling your biggest milt core cables first for example 37 core 4mm.
14. Place your cable drum that you have chosen to start with between the two cable jacks.
15. Insert your pipe through the cable jack and cable drum.
16. Jack the cable drum up making sure that it is clear of the ground and that it is level.
17. Loosen the end of the cable from the drum.
18. Mark the end of the cable with the correct cable number two or three times according to the drawing.
19. Start by pulling the longest cable runs thirst off the drum.
20. Pull the cable from the drum in accordance with the actual measured length required to it's designated point outside following your cable route leaving enough slack to reach the furthestmost point in the designated cubicle.
21. Place the cable neatly in the trench.
22. Pull the slack required according to your measurement making sure that you have enough slack to reach the most furthermost point in that panel.
23. Cut the cable off on your measurement and mark the cable with the same cable number as on the other end of the cable.
24. Reroute the end of the cable back to the designated panel inside the control room.
25. Repeat this procedure from point **12** until all cables have been pulled according to the drawing.
26. After all cables have been glanded, tested, furred, lugged and terminated, back fill the trenches with sand and not with rocks in-between and compact the back fill and then rake the yard stone over the trenches to make the yard as it was again.

**STRINGING**

1. Before any work is done obtain a work permit for the work to be done if it is an existing life substation.
2. Makes sure that you have the latest and most updated drawings before you start.
3. Try to do all your stringing first before erecting any equipment steel and any equipment to avoid damage to equipment and conductors.
4. Take an estimated measurement of all your stringers, droppers, jumpers and keep a record of each one.
5. Find a neutral point for placing your cable jacks to pull your conductors.
6. Make sure that the workers have their correct PPE for pulling the conductors, example safety shoes, overalls, cloves and hard hats if necessary before you start moving or pulling anything.
7. Place your cable jacks in to place.
8. Place your drum with conductor in-between the two jacks.
9. Insert your pipe through the jacks and drum.
10. Jack your drum up so that it stands level and is clear off the ground.
11. Place your conductor rollers in to place in front of the drum and far enough to suit the longest length of conductor to be pulled.
12. Always pull the longest lengths of conductor first off the drums.
13. Start pulling your conductors according to your measurements.
14. Make sure at all times that the conductor stays on the rollers to avoid any damage to the conductor.
15. Now place your stringers for each bay in to position on wood planks to avoid any scratches or damage to them on the ground.
16. Prepare the one end of the stringers on the ground by fixing the pistol grips and string sets to them and tighten the bolts to the recommended torque.
17. Also prepare the other end the same way, but just by temporary tightening the bolts by hand and at an estimated length so that you will have enough slack to pull this end up and hook it in to place by hand.
18. Tie a rope pulley near the u-bolt on the beam where the string set will hook in to place.
19. Place the rope through the pulley and tie one end on to the string set in the middle.
20. Have two people on top of the beam near the u-bolt to hook the string set.
21. Now pull the string set end that has been tied properly up with the rope from the ground with more people so that the two people on the beam can hook it in to place.
22. Repeat this for all three the phases on the one end.
23. Now move to the opposite beam and do the same with the other ends that has been temporary tied by hand.
24. Now move your crane with a man basket under the stingers in to place so that you can reach basically all three the phases from one position.
25. Pull your crane's outriggers out to stable lies your crane in place.
26. Have two people climb in the basket with the correct tools to start tensioning the conductor. The persons will ensure the use of correct safety harnesses and the harness will be attach to the steel structure of the crane.
27. Now have the crane operator move the basket in to position under the stringer.
28. Now place your cum-along on the conductor in front of the string set far enough to fully complete your tensioning.
29. Now hook your chain of your chain ratchet on to the cum-along and the other end on the one end of your dynamometer and the other end of the dynamometer on to the pistol grip.
30. Start tensioning till some of the slack has been taken up.
31. Now loosen the bolts that was temporary tied on the pistol grip and remove them.
32. Now start tensioning your conductor till the correct reading on your dynamometer has been reached according to the drawing's specifications.
33. Now replace the bolts of the pistol grip and torque then to the recommended torque.
34. Now slack the chain ratchet and remove the dynamometer, chain ratchet and cum-along from the conductor.
35. Cut the remaining slack off after the pistol grip about 100mm from the end of the pistol grip.
36. Repeat from point **26** for the rest of the phases.
37. Repeat from point **14** for the rest of the bays that needs stringers according to the drawings.