INSTRUCTION MANUAL

MULTI POINT BORE HOLE EXTENSOMETER
(VIBRATING WIRE TYPE) MODEL SME 2450

SENSORS & MEASUREMENTS ENTERPRISES
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INSTRUCTION MANUAL
OF
MULTI POINT BORE HOLE EXTENSOMETER

1. Pre-installation activity:-

1.1 Drill a hole of 76 mm dia. up to the required depth of installation.

1.2 Riming of hole for 90mm dia. up to 0. 5 meter height from for roof for fixing the reference head.

1.3 Check & collect all the following items require for the installation.

a. Anchors
b. S.S. rod of the required depth for all the anchors.
c. PVC pipe of required depth with threaded pipe at one end for anchor.
d. Fevi quick for thread sealing of SS rod.
e. PVC tape of required quantity.
f. Sensor setting rod of required no. (3 or 4) .
g. Grout sealing plug with grout nipple fitted.
h. PVC grouting pipe of required quantity.
i. PVC air vent tube of required quantity.
j. Reference head with grouting roof bolt -2 nos.
k. Small hacksaw.
l. Cutting plair.
m. Adjustable spanner.
n. Allenkey.

2. Installation Procedure

2.1 Grout the reference head bolt 2 nos. after proper marking to fix the reference head at the end of installation.

2.2 Take the bigger anchor and attach M.S. rod of 1.5m. length with thread by applying the thread sealing feviquick.

2.3 Take one meter of PVC pipe with threaded at one end and fix with threaded anchor properly . Ensure that grout should not leak from this joint. Apply some PVC tape over the joint.

2.4 Take PVC grouting pipe and attach it with anchor slightly above from the anchor and tie up with PVC tape.

2.5 Take vent air tube and tie up with this anchor by keeping it 6 to 8 inch above the grouting pipe. The vent tube should be bend in U shape to avoid the grout going in it during grouting process.

2.6 The grout pipe and vent tube must be tie up at one meter interval with main PVC pipe to avoid any sluggishness. Take the second MS rod and joint with hex socket. Use the thread sealing feviquick and tight it with the help of spanner & plair.

2.7 Take one PVC pipe and join it with upper PVC pipe with socket already provided at one end of each pipe. Apply PVC tape over the joint to ensure that joint is leak proof.

2.8 Take the other PVC pipe of 1.5 m length and join it with socket properly. Do not forget to use tape over every joints.

2.9 Similarily, go on joining the M.S. rod & PVC pipe upto the required depth. Do not forget to tie up the grout pipe at one meter interval.

2.10 Keep this assembled anchor at the ground with safe arrangement and mark it with no. 1 anchor.

2.11 Take the next anchor and joint the M.S. rod & PVC pipe with similar method as described above, upto required length.

2.12 Similarily, take the other required anchor and assemble with similar method upto required length.

2.13 The hex socket of each assembly should be adjusted with PVC pipe in such a way so that each hex socket in 5 mm out from the end of PVC pipe.

2.14 Apply some PVC tape over this hex socket so that it always be in centre of PVC.This will help us during installation of sensors.

3. Assembly of sealing plug & reference head:-

3.1 Take the first assembled anchor with PVC pipe, grout pipe & vent tube and insert it carefully in the hole and at the end keep it on the platform with one man holding and supporting the PVC pipe.

3.2 Take second longest assembled anchor and insert it in the hole & keep it on the same platform and hold it.

3.3 Similarly, take third and fourth assembled anchor and insert in the hole and keep these on the same platform.

3.4 Take the reference head with grout sealing plug and keep it near the assembled PVC pipe in vertical position.

3.5 Take the longest assembled anchor with grout pipe and insert it in the sealing plug at one hole.

3.6 Take the second assembled anchor and insert it in the sealing plug at second hole.

3.7 Similarly, take third and fourth assembled anchor and insert in the remaining hole.

3.8 Mark the hole for first anchor, second anchor, third and fourth anchor so that proper identification of each anchor should be clearly visible.

3.9 Now take out the grout and vent pipe from the respective holes of sealing plug by lifting the reference head assembly.

3.10 Now lift the whole reference head assembly (with 2/3 person) and insert it in the hole and attach it with anchor bolt already grouted and tight both the nuts.

3.11 Apply the quick setting cement around the reference head to make it water tight.

3.12 The whole assembly is ready to feed the cement and sand grout in the hole upto required depth.

4. Grouting of pipe and anchor assembly:-

4.1 Make the cement and sand mixture grout in 1:4 ratio and feed with the help of grouting pump in the hole.

4.2 The end of air vent tube should be immersed into the water so that air bubble can be clearly visible during the grouting process.

4.3 The grouting process should not be stopped in between otherwise the grout feeding pipe will choke. However, if any problem arises during this grouting process then the grout pipe should be disconnected from the pump and clean with the water to avoid any choking of cement grout.

4.4 When 2/3 bags of cement grout is fed into the hole and grout start coming out from the vent tube it indicates that the hole is properly grouted with cement mixture and no cement grout can be injected into the hole. The grouting process should be stopped and grout pipe should be bend near the reference head assembly and tie it with wire so that the grout should not come out.

4.5 Leave the system for 24 hours so that grout becomes dry.

5. Assembly & fixing of Displacement sensor.

5.1 Pick up displacement sensors and check for its working with the help of readout unit model SME2460-P. The data of each sensor should be stable even after giving some displacement by hand.

5.2 Take one sensor installation pipe with one end thread supplied with instrument and fix with sensor taking 2 core cable out through this pipe.

5.3 Attach this sensor with longest anchor as marked and by tightening it into clockwise direction.

5.4 Disengaged this pipe carefully by holding the sensor body. Extreme care should be taken to prevent the movement of sensor, otherwise the sensor may get damaged.

5.5 Similarily, attach this threaded pipe to another sensor and fix it with 2nd longest anchor assembly by tightening it into clockwise direction. Disengage the threaded pipe carefully.

5.6 Attatch all the balance sensors in respective anchor assembly in similar way carefully.

5.7 Fix all the sensors in reference plate assembly by pulling each sensors of 20 mm. approximately.

5.8 Mount this sensor reference plate with reference head assembly with the help of M-3 allenkey screws. Again check that all the sensors initial displacement should be nearly 20mm, if required give some spacer / packing in between reference head assembly & reference plate.

5.9 After proper tightening of reference plate mark each sensor cable for identification as anchor 1,2,3 & 4 etc.

5.10 Take the initial frequency by readout unit of each sensor and note down for programming purpose of readout unit.

5.11 Program the readout unit as per present I value (frequency) & other parameters as given in the test report.

5.12 Take the data of each sensor by entering into MEAS mode of readout unit and note down the data with date & time.

5.13 The installation of this multipoint bore hole extensometer is over and regular data can be taken.

Taking the data with Readout Unit:

6.1 After installation of complete system data of each anchor can be taken by the following procedure.

Example -1

Date	DATA				Remark
	Anchor 1 (Depth 25meters)	Anchor 2 (Depth 15 meters)	Anchor 3 (Depth 10 meters)	Anchor 4 (Depth 5 meters)	
	Millimeters	Millimeters	Millimeters	Millimeters	
25/11/11	10.12	8.50	9.28	10.22	Installed (Initial reading)
26/11/11	10.15	8.56	9.30	10.25	
08/12/11	12.22	10.60	9.88	10.54	Blasting in the area
10/12/11	12.30	10.64	9.92	10.58	

Data Calculation: Present reading of respective anchor – initial reading of installed date = actual ground Movement.

Conclusion:-

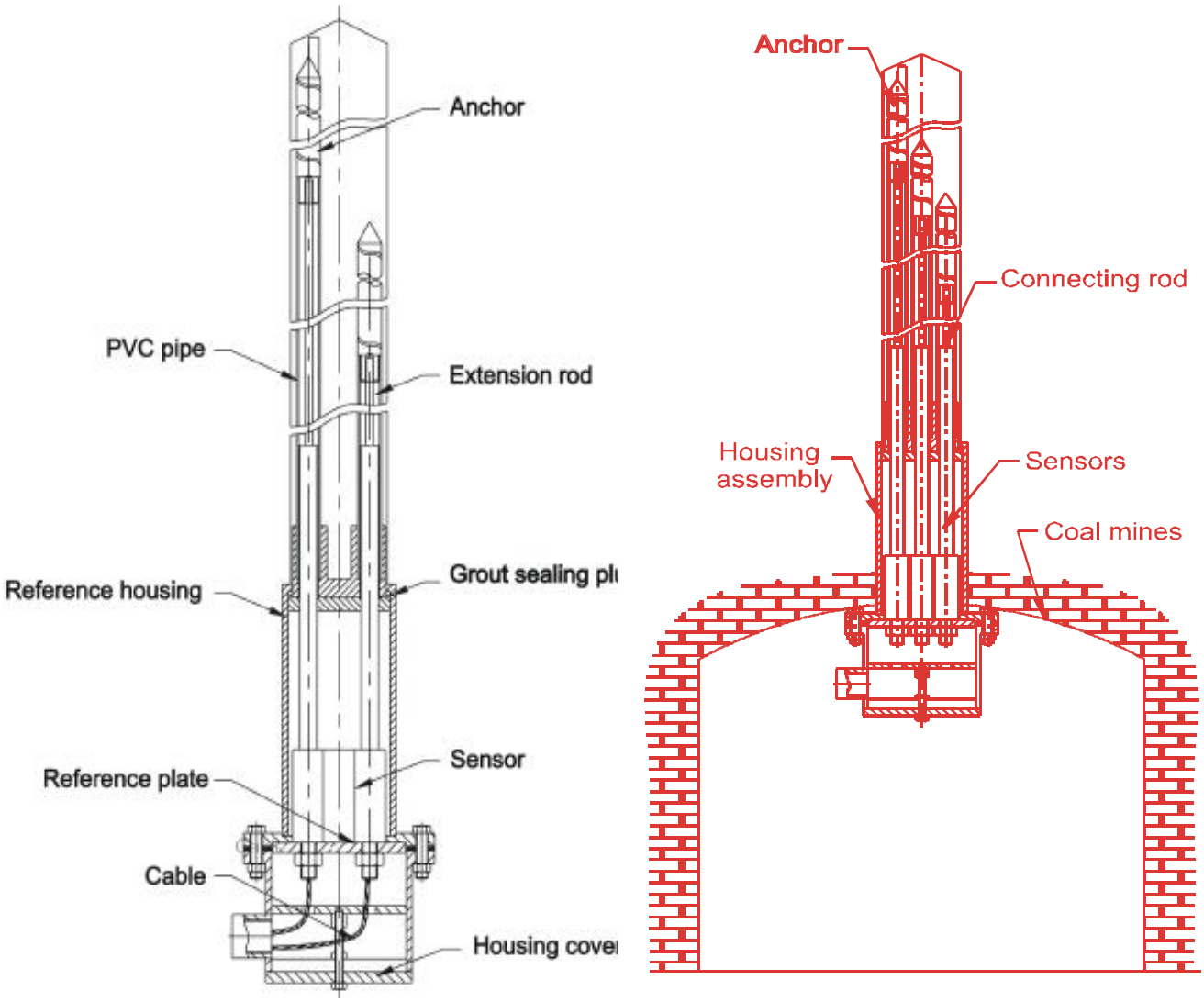
The data shown in the above table indicate that the ground movement between 10 meter & 15 meter has taken place by 2 mm. This could be due to blasting.

Example -2

Date	DATA				Remark
	Anchor 1 (Depth 25meters)	Anchor 2 (Depth 15 meters)	Anchor 3 (Depth 10 meters)	Anchor 4 (Depth 5 meters)	
	Millimeters	Millimeters	Millimeters	Millimeters	
12/12/11	12.35	10.66	9.95	10.58	
18/12/11	14.15	10.86	9.97	10.63	
20/12/11	14.20	10.88	9.98	10.65	

Conclusion:-

The data shown in the example 2 table indicate that ground movement between 15 meter & 25 meter has taken place by 2 mm.



TYPICAL DRAWING OF MPBX INSTALLATION

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