



SHORT ENCAPSULATION TESTING MACHINE 30 T CAPACITY.

2nd generation rock bolt tester

DGMS Circular No. S&T/Tech. Circular (approval) No. 03 of 22,09.2010 has advised industry to adopt short encapsulation Test where resin bolting is practiced. NMC has developed Short Encapsulation Testing Machine to meet industry requirement.

1) **Description :** Short Encapsulation Testing Machine 30 T capacity comprising of

- a. Hydraulic Cylinder - Capacity 30 Ton
Hole Dia - 32mm
Close Height - 180mm
- b. Pump - Light weight 2 speed 700 Bar of 4.1 kg wt.
- c. High pressure hose 5mtr. length.
- d. Pressure Gauge suitably calibrated in tones with maximum pointer as per DGMS Tech Circular 11 of 2002.
- e. Mechanical fixtures suitable for carrying out short encapsulation test up to 25 T.
- f. Monopod (Extensometer) comprises of telescopic spring mounted S S Tubes with dial gauge.

2) Short Encapsulation Testing Machine complies with DGMS / S & T / Tech. Circular (approval) no. 03 of 22.09.2010.

3) Fire resistant Hydraulic fluid.

4) Suitable bolt pulling assembly which will not crush under loading of 25 MT.





SHORT ENCAPSULATION PULL TEST (SEPT) PROCEDURE

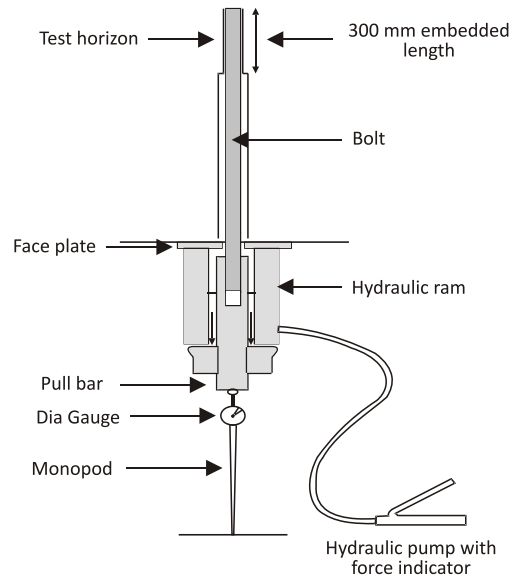
Methodology of Performing Monitoring by Pull test of the full column grouted bolts and short encapsulation test for the resin grouted bolts and specified performance standards.

INTRODUCTION

The Short Encapsulation Pull Test is used to measure the performance of the roof bolt system. The test is performed under ground and it is the ultimate test of roof bolting system.

BRIEF DESCRIPTION

R series of holes are drilled to varying depth and bolts of required length are installed with a short resin capsule to give an encapsulated bolt length of not more than 300 mm. The pull test needs to be performed after a curing period of 30 minutes and not more than 8 hours, after this an axial load is applied to the bolt end and bolt extension is measured. The load is applied up to 20 tonne or until the maximum load of the system has been applied, whichever is greater.



PULL TESTING EQUIPMENT

PROCEDURE

Following equipment is used for pull test,

- Tie wraps for resin capsule
- Knife
- Tape measure
- Pull test equipment comprising
 - o A suitable hydraulic ram
 - o Pressure gauge capable of reading pressure equivalent to a load of 30 tonne to an accuracy of 1 tonne,
 - o Dial gauge capable of reading to 0.01 mm
 - o monopod to support dial gauge
 - o bearing plate
 - o drawbar
 - o Shims of varying thickness

NUMBER OF TESTS

A minimum of two tests needs to be carried out at each of the chosen horizon, as an example for a 2.4 m bolt length, these horizons would normally be at 600mm, 1800mm and 2300mm. If a significant change in geology occurs within the bolted horizon, further tests need to be carried out at other horizons to determine their influence, if any, on the bond strength of the bolting system.

BOLT PREPARATION

The bolt length needs to be at least 40mm longer than the hole length to allow full engagement to the draw bar on the threaded end of the bolt, fill test bolts, including full length bolts; need to be cut square to the bolt axis.

LOCATION

Place pull test as close as practicable to the free end of the heading. Chose a section of reasonably flat roof, which is not subject to spalling.

CAPSULE PREPARATION

Determine the resin capsule length to produce not more than 300 mm bolt encapsulation using the formula.

$$\text{Capsule length} = \frac{(\text{Hole dia.})^2 - (\text{bolt dia.})^2}{(\text{capsule dia.})^2} \times \text{encapsulated length}$$



Prepare test resin capsule of the calculated length using the tie wraps and remove the excess capsule.

HOLE PREPARATION

The same drilling machine and operator need to be used through out the test,

- Use a new bit,
- Measure the bit dia. before each test,
- Use wet drilling,
- Drill holes to the required length.

BOLT INSTALLATION

The surface condition of the test section of the bolt needs to be free from rust, grease, paint, dirt and any other surface contaminant. Follow these steps.

- Insert the capsule and bolt and push the capsule to the back of the test hole by hand
- Raise the machine to the bolt and engage
- Thrust and spin the bolt slowly to the back of the hole taking three - five seconds, after which the bolt should be spun for at least for a further 5 seconds or as per manufacturer's instruction.
- Wait for 30 seconds for fast setting and two minutes for slowsetting resin capsule
- Identify the test bolt for length by marking the roof

PULL TESTING

Bolts need to be pulled no sooner than 30 minutes and no later than 8 hours after installation. This is to ensure that the resin has the time to cure and that no time dependent roof movement mechanically locks the bolt in the hole.

For testing, align the ram along the axis of the bolt and make sure that bolt is not in contact with the wall of the hole. This is best achieved by first trimming any loose material from around the mouth of the hole and then aligning the assembly by wedging steel shims between the roofs and bearing plate.

Apply the bolt load slowly and smoothly and without push. The bolt displacement needs to be noted at every 1 tonne interval.

Minimum Performance Level of SEPT for use of Resin Capsules U/G	
Short Encapsulation pull test after	
30 minutes	10 Tonne (For 20 mm dia roof bolt) 12 Tonne (For 22 mm dia roof bolt)
8 hrs or 24 hrs.	15 Tonne (after 8 hrs.) 20 Tonne (after 24 hrs.)
Net displacement measured during SEPT	Not more than 15 mm

FREQUENCY

Tests shall be conducted for every batch received by mine.

FAILURE OF TEST

Incase of SEPT failure batch shall be withdrawn from use in all mines and reported to DGMS Directorate.



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