

## IN-HOUSE PROCEDURE # \_\_\_\_\_

### PROCEDURE FOR VERIFYING CAPPING MATERIAL

Item:

Capping Material    Sulfur    Gypsum    Neat Cement

Purpose:

This method provides instructions for verifying the strength of gypsum or neat cement capping material.

Inspection Equipment Required for **Sulfur Capping Material:**

1. Cube mold
2. Mineral oil
3. Melting pot
4. Feeler gauge 0.002 in. (0.050 mm)
5. Straight-edge at least 2 in. (50 mm) in length
6. Compression testing machine

Inspection Equipment Required for **Gypsum or Neat Cement Capping Material:**

1. Scale readable to 0.1 g or better
2. Mixer, bowl and paddle
3. Cube mold
4. Mineral oil
5. Tamper
6. Trowel
7. Feeler gauge 0.002 in. (0.050 mm)
8. Straight-edge at least 2 in. (50 mm) in length
9. Compression testing machine

Tolerance:

Capping material shall obtain 5000 psi (35 MPa) or the cylinder strength whichever is greater or more.

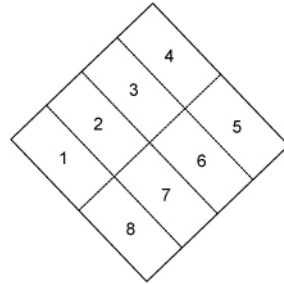
Procedure:

**SULFUR**

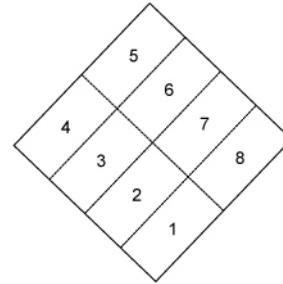
1. Preheat the sulfur to 265 – 290 °F (130 – 145 °C) in the melting pot. Bring the cube mold and top to a temperature of 68 – 86 °F (20 – 30 °C).
2. Coat the surfaces of the cube mold with mineral oil and fully assemble the mold.
3. Stir the sulfur mortar.
4. Quickly fill each compartment completely full with sulfur in one continuous pour.
5. Allow approximately 15 minutes for shrinkage to occur.
6. Refill each compartment until completely full.
7. Allow sulfur to cool to room temperature.
8. Scrape excess sulfur off top of mold.
9. Remove cubes from mold. Be careful not to damage the knobs.
10. Wipe the cubes with a cloth to remove oily residue. Remove sharp edges and fins.
11. Check planeness of all sides with a 0.002" (0.050 mm) feeler gauge. Discard cubes that do not meet the planeness requirements.
12. Allow sulfur to gain strength at room temperature. For cylinder strengths less than 5000 psi (35 MPa), allow at least 2 hours. For cylinder strengths of 5000 psi (35 MPa) or more allow 16 hours.
13. Wipe bearing surfaces of compression testing machine clean.
14. Zero the testing machine load indicator.
15. Turn each cube so that the knob is on the side of the cube and center under the upper bearing block in the machine.
16. Break each cube until completely fractured at a rate of 200-400 lbs/s (900 – 1800 N/s). Make no adjustments to the rate of movement in the latter half of the break.
17. Record the compressive strength of each cube.
18. Record the average compressive strength to the nearest 10 psi.

## GYPSUM

1. Coat the surfaces of the cube mold with mineral oil and fully assemble the mold using a watertight sealant to seal joints.
2. Using the mixer and paddle, mix the gypsum paste to the desired consistency at a water/cement ratio equal to or less than that required to produce the required strength. (See the manufacturer's recommendations).
3. Start molding the specimens within 2 min. 30 s after mixing. Fill each compartment half full with mortar.
4. Tamp each compartment using the tamper 32 times in about 10 seconds using the stroke pattern illustrated below.



Rounds 1 and 3

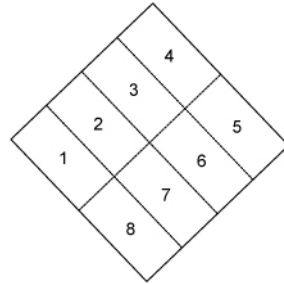


Rounds 2 and 4

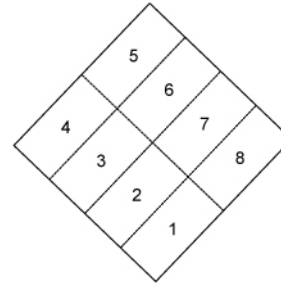
5. Fill the mold compartments completely full and tamp again as illustrated above.
6. Using the trowel, incline the trowel and draw the flat side of the trowel lightly along the length of the mold.
7. With the trowel held straight up and down, draw the straight edge of the trowel using a sawing motion along the length of the mold to bring the mortar flush with the top of the mold.
8. Allow the gypsum to harden approximately 1 hour under room conditions.
9. Remove gypsum cubes from mold.
10. Wipe the cubes with a cloth to remove oily residue. Remove sharp edges and fins.
11. Check planeness of all sides with a 0.002" (0.050 mm) feeler gauge. Discard cubes that do not meet the planeness requirements.
12. Allow cubes to sit for the approximate length of time as used in the lab for capping cylinders. If more than 1 or 2 hours will elapse, place cubes in a moist room and protect from any drips or running water.
13. Wipe bearing surfaces of compression testing machine clean.
14. Zero the testing machine load indicator.
15. Turn each cube on its side and center under the upper bearing block in the machine.
16. Break each cube until completely fractured at a rate of 200-400 lbs/s (900 – 1800 N/s). Make no adjustments to the rate of movement in the latter half of the break.
17. Record the compressive strength of each cube.
18. Record the average compressive strength to the nearest 10 psi.

## NEAT CEMENT

1. Coat the surfaces of the cube mold with mineral oil and fully assemble the mold using a watertight sealant to seal joints.
2. Using the mixer and paddle, mix the neat cement paste to the desired consistency at a water/cement ratio equal to or less than that required to produce the required strength. (See the manufacturer's recommendations).
3. Start molding the specimens within 2 min. 30 s after mixing. Fill each compartment half full with mortar.
4. Tamp each compartment using the tamper 32 times in about 10 seconds using the stroke pattern illustrated below.



Rounds 1 and 3



Rounds 2 and 4

5. Fill the mold compartments completely full and tamp again as illustrated above.
6. Using the trowel, incline the trowel and draw the flat side of the trowel lightly along the length of the mold.
7. With the trowel held straight up and down, draw the straight edge of the trowel using a sawing motion along the length of the mold to bring the mortar flush with the top of the mold.
8. Place the neat cement mold in a moist room for 24 hours. Protect from dripping water.
9. After 24 hours, remove neat cement cubes from mold. Wipe the cubes with a cloth to remove oily residue. Remove sharp edges and fins.
10. Check planeness of all sides with a 0.002" (0.050 mm) feeler gauge. Discard cubes that do not meet the planeness requirements.
11. Place neat cement cubes in a water tank saturated with lime.
12. Allow cubes to sit for the approximate length of time as used in the lab for capping cylinders.
13. Wipe bearing surfaces of compression testing machine clean.
14. Zero the testing machine load indicator.
15. Turn each cube on its side and center under the upper bearing block in the machine.
16. Break each cube until completely fractured at a rate of 200-400 lbs/s (900 – 1800 N/s). Make no adjustments to the rate of movement in the latter half of the break.
17. Record the compressive strength of each cube.
18. Record the average compressive strength to the nearest 10 psi.