

120-PSI REINFORCED CONCRETE MINE SEAL  
ONE-WAY FIXED/FIXED (HUNGATE ENGINEERING)  
MSHA SEAL APPROVAL NUMBER 120-75.336.1.07.25.0

**120-PSI Reinforced Concrete Mine Seal - One-Way Fixed / Fixed (Hungate Engineering)**

This approval is for reinforced concrete seals designed to withstand an overpressure of 120 psi in openings up to 7 feet in height and 24 feet wide. The seals are designed to perform as reinforced concrete walls spanning between the roof and the floor of the mine (one-way, fixed/fixed slab). The concrete will have a minimum compressive strength of 2,900 psi and the reinforcing steel will have yield strength of 60,000 psi. There are five seal designs for seal heights of 5 feet (or less), 5.5 feet, 6.0 feet, 6.5 feet, and 7.0 feet; and, up to 24 feet wide. The wall thickness will vary from 24 to 32 inches depending on the height of the wall.

The seal design and construction requirements are contained in a report entitled "120 psi Reinforced Concrete Mine Seals," dated November 20, 2007, prepared by Hungate Engineering, P.C. The design is certified by a registered professional engineer. MSHA approval number 120-75.336.1.07.25.0 was issued on November 27, 2007.

Elements of the design include internal steel reinforcing bars spanning the vertical direction which are doweled and grouted into the mine roof and floor. There will be four rows of reinforcing steel across the thickness of the seal. The outer face (inby and outby) reinforcing will consist of No. 7 steel bars that will be continuous from roof to floor via mechanical splices. This reinforcement will provide fixed restraint at the mine roof and floor and will serve as the moment resisting steel. The inner two rows will be No. 8 bars. This reinforcement will serve as the shear transfer dowels with the assistance of the moment steel; and, will have standard hooks on the ends extending into the concrete. There will also be two rows of horizontal No. 6 bars near the inby and outby faces that will be used for temperature and shrinkage steel. The spacing of the horizontal and vertical bars will vary depending on the five different mine heights.

For detailed information on the use of this seal, please contact Mr. Anthony W. Porter, P.E., Project Engineer, Hungate Engineering, P.C., 1652 East Jackson Boulevard, Jonesborough, Tennessee 37659, telephone number 423-913-2860, [aporter@hungate-eng.com](mailto:aporter@hungate-eng.com).