

DESCRIPTION: PERMA 2000 is an unsanded, hydraulic-cement based grout containing pozzolan and other carefully selected additives. PERMA 2000 will set and gain strength quickly even in subzero temperatures. It is ideal for anchoring tendons, cables and bolts into soil or rock media in arctic conditions and can be used in cold conditions where normal Portland cement grout is unsuitable. It can be placed into substrates which have temperatures ranging from -10°C to $+4^{\circ}\text{C}$.

USES: PERMA 2000 can be used for many cold temperature applications such as:

1. Rock bolts or soil anchors in permafrost conditions.
2. Earth tiebacks for excavation or slope stabilization.
3. Cable bolting.
4. Soil or rock tendons used for anchoring piles.
5. Infill of pipe piles.

ADVANTAGES:

1. **HIGH EARLY STRENGTH:** PERMA 2000 has superior early strength gain even at sub-zero temperatures.
2. **EASILY PLACED:** PERMA 2000 can be easily pumped or poured.
3. **AUTOGENOUS HYDRATION:** PERMA 2000, once set, is highly exothermic. The set grout will generate a high heat of hydration which will speed curing even in low substrate temperature soils.
4. **LOW WEAR ON PUMP:** PERMA 2000 will cause little wear on pumping equipment, extending the life of mechanical equipment.

PROCEDURES:

1. Ensure that equipment and grout are at least $+10^{\circ}\text{C}$. Add warm water to bring the mix temperature up to between $+20^{\circ}\text{C}$ and 25°C . Using water heated to between 30°C and 40°C should be used. In the case where the grout and equipment are 20°C the water should also be 20°C .
2. Mix PERMA 2000 with a high shear mixer. Mortar mixers are not recommended.

CONSISTENCY

Flowable

RECOMMENDED MAX. WATER/30 kg (66 lb)

7.1 litres (1.9 US gal)

Over-watering results in reduced compressive strengths and inferior physical properties.

3. Introduce potable water into the high shear mixer, and then add PERMA 2000 while operating at medium speed. Heated water may be required.
4. Mix at high speed for a minimum of five minutes.
5. Decrease mixer speed to low and continue mixing while placing or pumping the grout. Do not place PERMA 2000 if the mix temperature is under 20°C .
6. Place PERMA 2000 only into a substrate that has a temperature between -10°C and $+4^{\circ}\text{C}$.

TECHNICAL DATA: The data outlined below is representative of typical values achievable under controlled laboratory conditions. Results obtained in the field may vary from those stated.

	<u>Test Method</u>	<u>Value achieved</u>	
Flow – seconds	ASTM C 1107	25 to 35	
Mix temp. – Celsius		20	
Working Time – minutes		30	
Initial set – minutes	ASTM C 191	60	
Density - kg/m ³ (lb/ft ³)	ASTM C 185	1938 (121)	
Yield - m ³ /bag (ft ³ /bag)	ASTM C 185	0.019 (0.68)	
Compressive Strength at 24 hours - MPa (psi)	ASTM C 109 (modified)	Curing Temperature	
		<u>-11^oC</u>	<u>+3^oC</u>
		21.8 (3161)	25.0 (3625)

LIMITATION: Adhering to recommended water additions is very important. Exceeding the maximum recommended water content per sack will result in inferior physical properties. Only place PERMA 2000 into a substrate that has a temperature between -10^oC and +4^oC. Liability for damages or defective goods shall be limited to the refund of the purchase price or product replacement.

PACKAGING: PERMA 2000 is packaged in 30 kg (66 lb.) triple-lined paper bags. All Basalite Dry mix can be custom packaged to meet specific project requirements.

SAFETY PRECAUTIONS: PERMA 2000 contains hydraulic cement, pozzolans and other carefully selected additives. Normal safety wear such as rubber gloves, dust mask and safety glasses, used to handle conventional cement-based products, should be worn. Material Safety Data Sheets are available on request.