GEM™ Ground Enhancement Material

GEM™ GROUND ENHANCEMENT MATERIAL

A superior conductive material that improves grounding effectiveness, especially in areas of poor conductivity (rocky ground, areas of moisture variation, sandy soils):

Effective:

- Can dramatically lower earth resistance and impedance measures.
- Typically, resistivity in range from 12-18 Ohm cms (20 times lower than bentonite clay).
- Once in its "set form", maintains constant resistance for the "life" of the ground system.
- Performs in all soil conditions, even during dry spells.
- See partial list of GEM™ World-wide Customers.

Permanent:

- Does not dissolve, decompose nor leach out with time.
- Does not require periodic charging treatments nor replacement.
- Does not require maintenance.
- Does not require continuous presence of water to maintain effectiveness.
- Freezing will increase resistivity by only 10-15 per cent.

Environmentally Friendly:

- Does not adversely affect soil.
- Does not leach ions nor contaminate ground water.
- Meets (USA) Environmental Protection Authority requirements for landfill.
- Material Safety Data Sheet (MSDS #768) available from ERICO® on request.

Convenient to Install:

- GEM™ Software Calculator estimates the quantity of GEM required and anticipated ground resistance for any installation.
- Available in convenient 11.3 kg (25 lb) bags - (Minimum Order 6 bags).
- Can be installed dry or mixed in a slurry and installed wet (recommended).
- Can be installed simply by one person.
- May enable reduction in the size of a grounding system where conventional methods are unsatisfactory.
- Trench Installation Method.
- Ground Rod Backfill Installation Method.

Specification for GEM™

- Ground enhancement material in its set form shall has a resistivity of not more than 20 ohm-cm.
- Ground enhancement material must be permanent and maintenance-free (no recharging with salts or chemicals which may be corrosive) and maintain its earth resistance with time.
- It must set up firmly and not dissolve or decompose or otherwise pollute the soil or the local water table.
- The ground enhancement material shall be suitable for installation in dry form or in a slurry form.
- The ground enhancement material shall not depend on the continuous presence of water to maintain its conductivity.

GEM™ World-wide Customers (partial list)

- US Cellular
- Signal Point Systems
- Bell Atlantic
- US Air Force
- US Navy
- US Coast Guard
- Signet Bank
- Westinghouse
- General Electric
- Morrison Knudsen
- Norfolk Southern Railway
- Pedernales Electric
- Amtrack
- Kentucky Power
- Virginia Power
- HBO
- National Defence Medical Center, USA
- Taipower
- Moel Vitelic, Inc
- Kuala Lumpur International Airport, Malaysia
- Time Telecom Station
- CEB, Sri Lanka
- Dacom Telecommunications, Korea
- Bell Canada
- Ontario Hydro
- Mississauga Hydro

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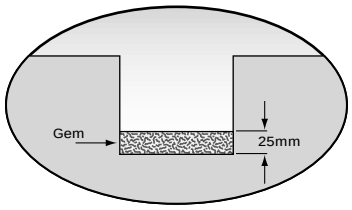
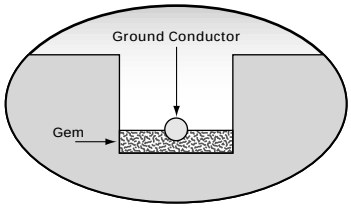
TRENCH INSTALLATION

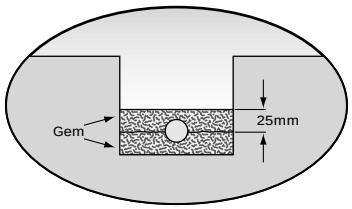
1. Dig a trench at least 10.2 cm (4 inches) wide x 76.2 cm (30 inches) deep or below the frost line, whichever is deeper.* Spread out enough GEM to uniformly cover bottom of trench - about 2.5cm (1 inch) deep.



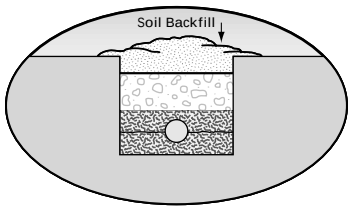
2. Place copper tape / earth grid conductor on top of GEM™.



3. Spread another 3 cm (1 inch) deep layer of GEM™ around and on top of the conductor so as to completely cover conductor.

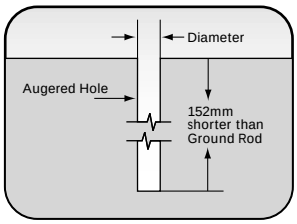


4. Carefully cover the GEM™ with soil to a depth of about 10 cm (4 inches), making sure not to expose the conductor. Tamp down the soil, then fill in the trench.

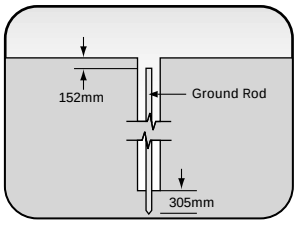


GROUND ROD BACKFILL INSTALLATION

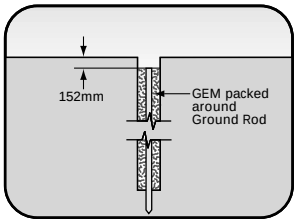
1. Auger a 7.6cm (3 inch) or larger diameter hole to a depth of 15.0cm (6 inches) less than the length of the ground rod.



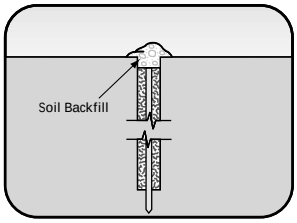
2. Place ground rod into augered hole and drive it using the steel head and hammer approx 30 cms (one foot) into bottom of the hole. The top of the ground rod will be approximately 15.2cm (6 inches) below the level of the grade. At this time, make any connections to ground rod using CADWELD® connections.



3. Pour the appropriate amount of GEM™ (see below) around the ground rod. To ensure the GEM material completely fills the hole, tamp around the ground rod with a pole.



4. Fill remainder of augered hole with soil removed during augering, For various augered-hole diameters and depths, see the table below.



Note: Excess standing water must be removed from the hole.

Note: If premixing GEM™ in a slurry form, use a standard cement mixer or hard-mix in a mixing box, wheelbarrow, etc. Use 5.5 to 7.5 litres (1 to 2 gallons) of clean water per bag of GEM™.

Estimated linear feet of ground conductor covering with each bag of GEM

Trench Width	Total Thickness of GEM			
	2.5cm (1″)	5.1cm (2″)	7.6cm (3″)	10. 2cm (4″)
10cm (4″)	4.3m (14.0′)	2.1m (7.0′)	1.4m (4.7′)	1.1m (3.5′)
15cm (6″)	2.8m (9.3′)	1.4m (4.7′)	0.9m (3.1′)	0.7m (2.3′)
20cm (8″)	2.1m (7.0′)	1.1m (3.5′)	0.7m (2.3′)	0.5m (1.8′)
25cm (10″)	1.7m (5.6′)	0.9m (2.8′)	0.6m (1.9′)	0.4m (1.4′)
30 cm (12″)	1.4m (4.7′)	0.7m (2.3′)	0.5m (1.6′)	0.4m (1.2′)

A 11.1 kg bag of GEM will cover 2.1m (7 linear feet) of conductor length for a 10.2cm - (4-inch) wide, 5.1cm (2-inch) thick covering 2.5cm (1 inch) below and 2.1cm (1 inch) above the conductor), based on 1017 kg /m^3 (63.5 lb/cu ft).

Estimated bags of GEM for backfilling around ground rods to a density of 90 lb/cu ft (1442kg/m3)

Dia. of hole	Depth of hole (feet) *						
	1.8m (6′)	2.1m (7′)	2.4m (8′)	2.7m (9′)	5.2m (17′)	5.8m (19′)	6.1m (20′)
7.5cm (3″)	2	2	2	2	4	4	4
10.0cm (4″)	2	3	3	3	6	7	7
12.5cm (5″)	3	4	4	5	9	10	10
15.0cm (6″)	5	5	6	7	13	14	15
17.5cm (7″)	6	7	8	9	17	19	20
20.0cm (8″)	8	9	11	12	22	25	26
22.5cm (9″)	10	12	13	15	28	31	32
25.0cm (10″)	12	14	16	18	34	38	40

*8 foot (2.44m) minimum rod length required to be in contact with the soil (or GEM™). Per NEC 250-83c.