PRODUCT CATALOGUE

GIM®

Ground Improvement Material

Earth resistance reducing material

Conforms to the IEC international standard



GIM® ground improvement material bag



Power plants and grids



Industrial plants



Oil, gas and petrochemicals

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Why earthing matters

Today earthing is one of the most important subjects in most industries, including oil, gas, petrochemicals, construction and telecommunications. Every computer network, substation, electrical switchboard, item of industrial machinery, telecom and radio mast, all precision instruments and even household electrical and electronic appliances now need an earthing system, and many suppliers of these products will not give a guarantee, or even commission their systems, without reliable earthing.

Equipping facilities and buildings with a reliable, durable earthing system goes a long way towards the correct operation of electronic and electrical equipment, and largely prevents damage caused by electrostatic overvoltages, fault currents, lightning impulse voltages, magnetic fields and substation switching.

GIM® earth resistance reducing material

GIM® is a compound of mineral and chemical materials with a carbon base and very high electrical conductivity, used to backfill around earth conductors (Carbon-Based Backfill Material).

Thanks to its very low resistivity (less than 0.05 Ω·m), high pH, exceptional adhesion and anti-corrosion properties, GIM® considerably raises the effectiveness of the earthing system and improves its performance and service life.

GIM® is environmentally friendly and free of any substances that pollute soil and water.

GIM® can be used in all kinds of ground and conditions. It is used most in areas where soil resistivity (ρ) is high, where other earth resistance reducing materials such as bentonite are likely to be washed away by heavy surface water, and where the electrical contact between the earth conductor and the soil is very poor.

Soils and ground where GIM® performs best and is used most

- Rocky ground
- Stony soils
- Mountain areas
- Gravelly soils
- Wet sandy soils (seashore)
- Dry sandy soils (desert)
- Areas where seasonal weather causes large changes in soil moisture and temperature

Conforms to the IEC international standard

Laboratory test certificates

Razi Metallurgical Research Center
Niroo Research Institute
Amirkabir University of Technology
University of Tehran, Faculty of Engineering
Sharif University of Technology

International approvals

AMPER

FRANKLIN FRANCE

LIGHTNINGTECH

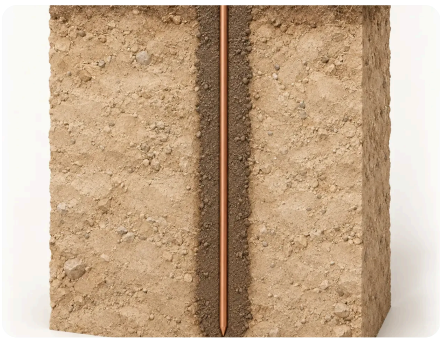
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Methods of use and installation

In every installation method, first mix GIM® with purified water and cement (8 litres of water and 2 kg of cement per bag). Adding anything other than water and cement to GIM® is not permitted, and while mixing take care that no soil, gravel, bag plastic or similar enters the mix.

Note: GIM® reaches its intended resistance 48 hours after installation.

Installation layouts



Earth rod method

Picture: earth mesh laid in an excavated pit

Mesh method



Plate method

Horizontal trench method

1. Dig a trench at least 10 cm wide and 75 cm deep (where the ground frost depth is greater, dig deeper than the stated depth so that you reach below that level).
2. Fill the floor of the trench with GIM® mix to a thickness of at least 5 cm (Table 1).
3. Lay the earth conductor (tape or bare stranded copper wire) on the GIM®.
4. Cover the conductor again with GIM® mix to a height of at least 5 cm (the whole conductor must be fully covered with GIM® mix).
5. Cover the GIM® with screened soil to a thickness of at least 15 cm, then compact the soil firmly.
6. Fill the rest of the trench completely with the soil excavated from it.

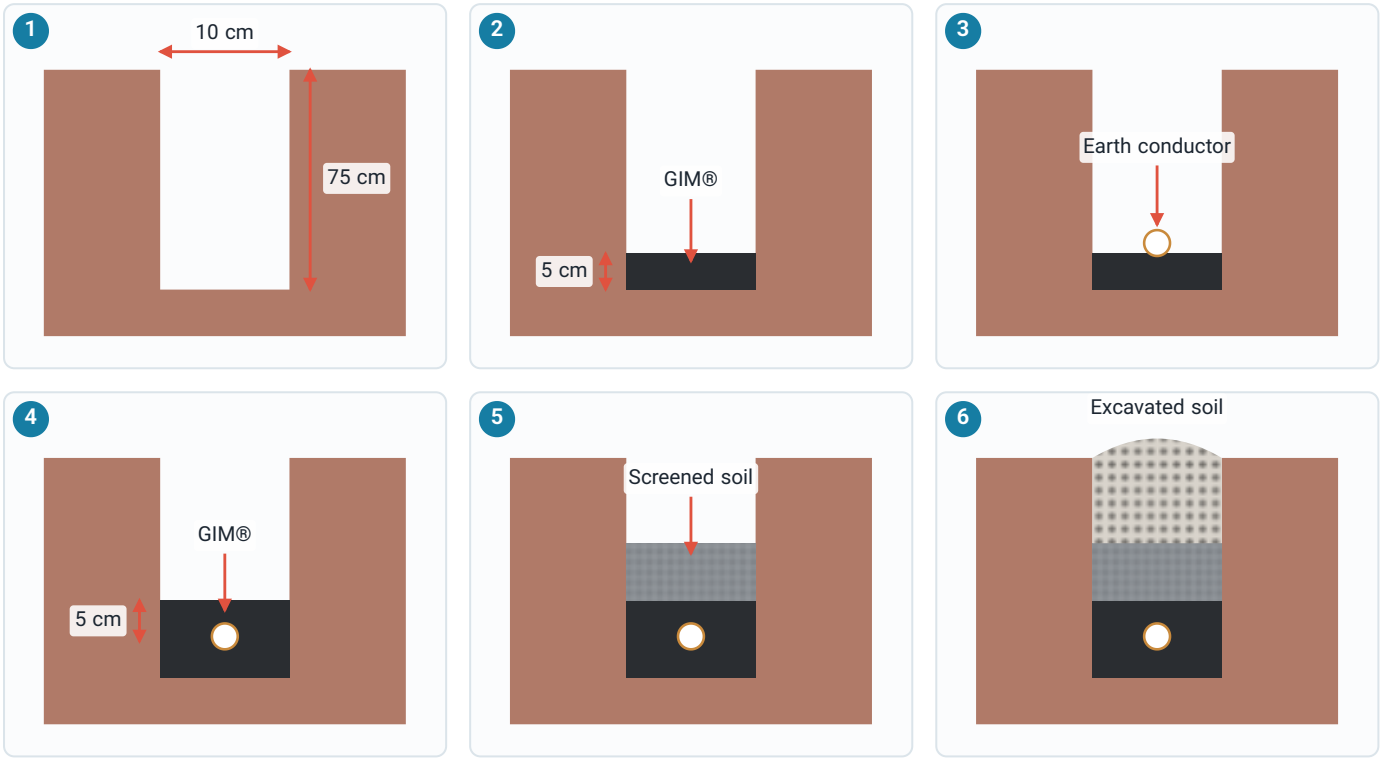


Horizontal trench method

Key parts: Soil excavated from the trench · Screened soil · Earth conductor · GIM®

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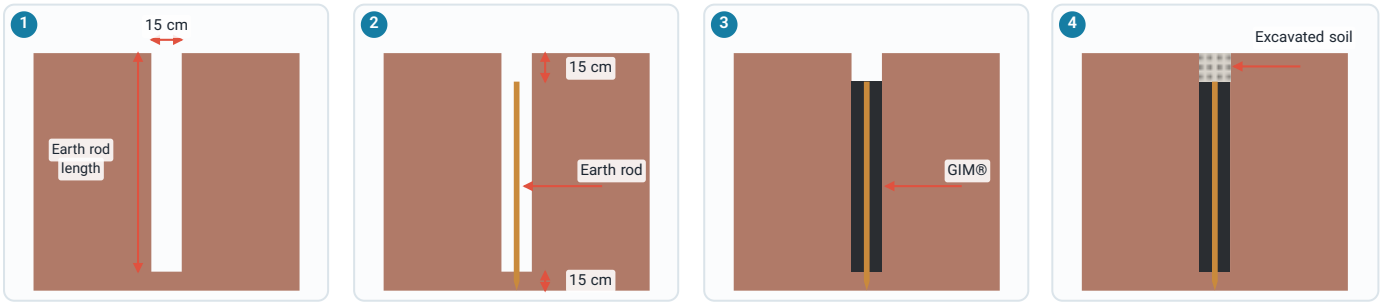
Horizontal trench method: Step by step



Earth rod method

1. Drill a hole at least 15 cm in diameter and as deep as the earth rod is long.
2. Place the earth rod in the hole and, where possible, drive it 15 cm into the ground so that the top of the earth rod sits about 15 cm below ground level. At this stage make any earth conductor connection (tape or wire) to the earth rod (by exothermic welding or a clamp).
3. Pour the GIM® mix around the earth rod and compact it so that the whole hole is fully covered up to the top of the earth rod (Table 2).
4. Fill the rest of the hole with the soil excavated from it (special access covers may also be used for later access).

Key parts: Access cover | GIM® | Earth rod



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Plate method

1. Dig a pit 30 cm wider than the plate (where possible, deep enough to reach the moist ground), then connect the earth conductor (wire or copper tape) to the plate at one point at least by exothermic welding.
2. Fill the floor of the pit with at least 10 cm of GIM® mix (Table 3).
3. Stand the plate vertically, aligned north to south.
4. Fill the pit with GIM® mix so that at least 10 cm above the plate is fully covered with GIM® mix.
5. We recommend an access cover within 50 cm of ground level.

Key parts: Access cover | Clay soil | GIM® | Exothermic weld | Copper plate

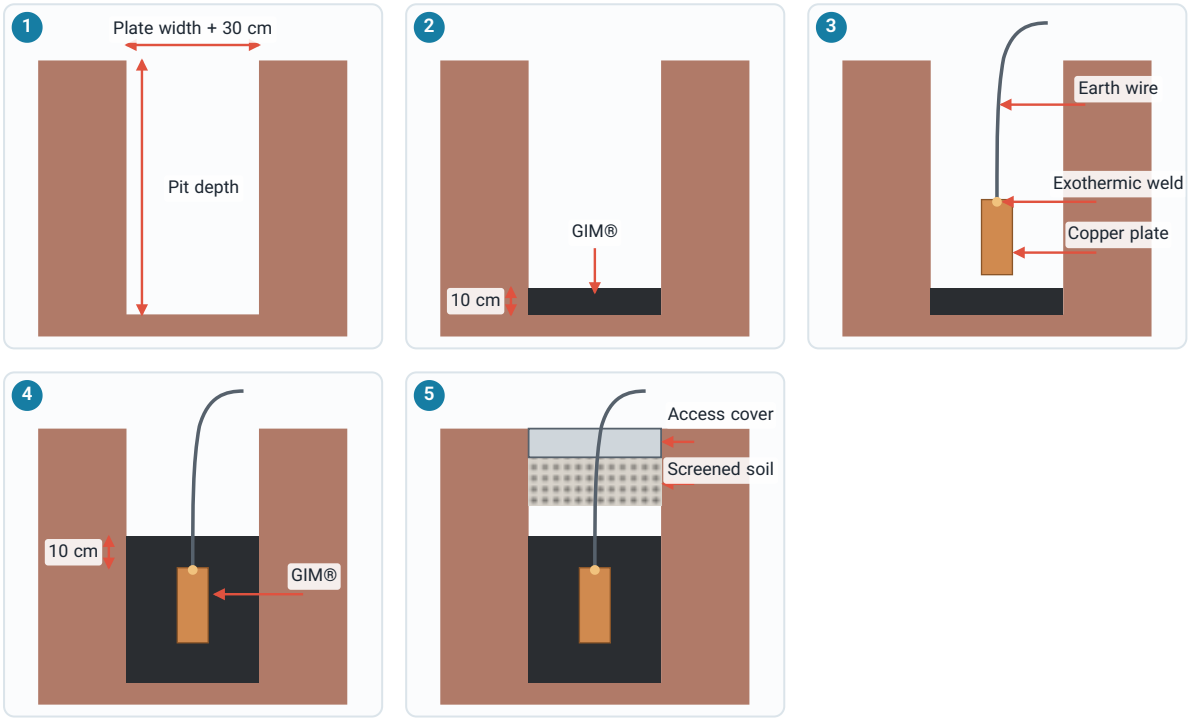


Table 3: plate method

Number of GIM® bags needed							
Pit diameter (cm)	GIM® height (cm)						
	20	30	70	80	90	100	120
60	3	4	10	12	13	15	18
70	4	6	14	16	18	20	24
80	5	8	19	21	24	27	32
90	7	10	24	27	30	34	40
100	8	12	29	33	37	42	50
110	10	15	35	40	45	50	60
120	12	18	42	48	54	60	72

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Quantity tables

Note: GIM® reaches its intended resistance 48 hours after installation.

Table 1: horizontal trench method					
Trench length filled by one bag of GIM® (cm)					
Trench width (cm)	GIM® height (cm)				
	5	10	15	20	25
10	378	189	126	94	76
15	252	126	84	63	50
20	189	94	63	47	38
25	151	76	50	38	30
30	126	63	42	31	25
35	108	54	36	27	22
40	94	47	31	24	19

Table 2: earth rod method							
Number of GIM® bags needed							
Hole diameter (cm)	Hole depth (m)						
	1.2	1.5	2	2.5	3	4.5	6
10	1	1	1	1	1	2	2
15	1	1	2	2	3	4	6
20	2	2	3	4	5	7	10
25	3	4	5	6	8	12	16
30	4	6	7	9	11	17	22
35	6	8	10	13	15	23	31
40	8	10	13	17	20	30	40

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The first earth resistance reducing material in Iran to conform to the IEC international standard

GIM® specifications

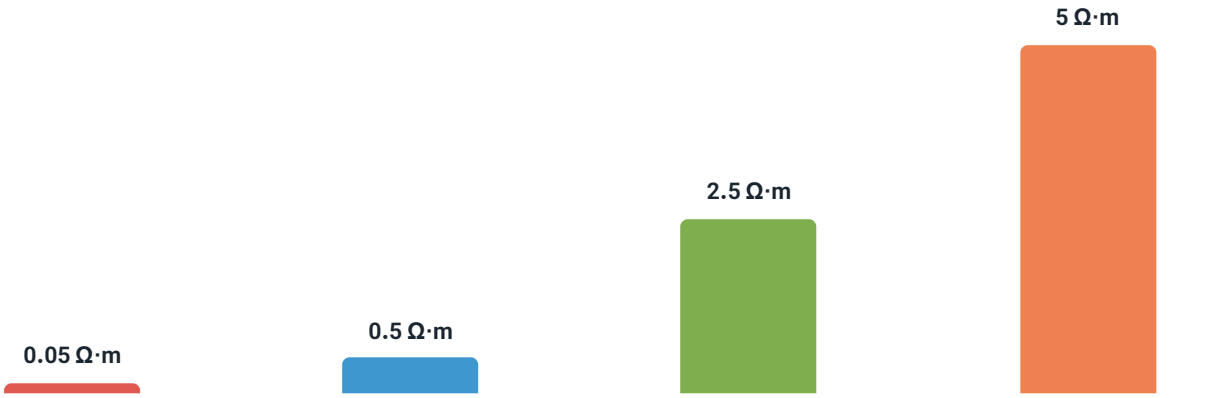
- Conforms to the IEC international standard
- Very low resistivity (ρ): less than 0.05 Ω·m, about 50 times lower than wet bentonite
- Very high conductivity: more than 200 millisiemens per centimetre (mS/cm)
- Does not corrode the earth conductor (pH above 10)
- Low solubility in acidic environments
- Exported to European and Asian countries
- Approved by Franklin France (France), Amper (Turkey) and Lightningtech (Malaysia)
- Laboratory test certificates from Razi Metallurgical Research Center, Niroo Research Institute, Amirkabir University of Technology, Sharif University of Technology and the University of Tehran
- Resists being washed away by surface and subsurface water
- Resists dissolving in water and in acidic environments
- No maintenance and no periodic injection of water and salt
- High moisture absorption
- Bonds permanently to the earth conductor
- Very high durability
- Electrical resistance stays stable over time
- Certified environmentally compatible and non-polluting
- Certified non-corrosive
- Considerably less material needed by volume
- Easy installation, saving time on site
- Allows smaller earthing grids
- Approximate bag size: 10 × 40 × 50 cm
- Bag weight: 15 kg
- Material density: 900 kg/m³
- Bag material: polyethylene

Soil resistivity depends on the soil composition, its moisture content and its temperature. The table below lists the resistivity of some types of soil and ground for reference.

Soil type	Electrical resistivity (Ω·m)
Swampy terrain	30
Jurassic marl	30-40
Soft clay	50
Humid peat	5-100
Silt	20-100
Humus	10-150
Marl and compact clay	100-200
Schist	50-300
Soft limestone	100-300
Clayey sand	50-500
Grass-covered stony soil	300-500
Granite and sandstone, little altered	100-600
Mica schist	800
Cracked limestone	500-1000
Siliceous sand	200-3000
Bare stony soil	1500-3000
Compact limestone	1000-5000
Granite and sandstone, depending on alteration	1500-10000

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Resistivity (ρ) of earth resistance reducing materials compared



GIM® specifications compared with the minimum requirements of the BS and IEC standards

Standard parameter	GIM®	Standard limit
pH	more than 10	more than 8
Solubility in acid (%)	less than 22	less than 25
Permitted sulphur content (%)	less than 1.4	less than 2
Electrical conductivity (mS/cm)	more than 200	more than 2

Some of the laboratory test certificates and international approvals we have obtained



Approval letter, Amper


Test report, Razi Metallurgical Research Center


Test report, Amirkabir University of Technology

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KALOT Group
Tehran, Fatemi Square, Shahid Gomnam Street, No. 15, First Floor
Tel: 22 68 88 52 · Fax: 22 68 88 53
Email: info@kalot.ir · Website: www.kalot.ir

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