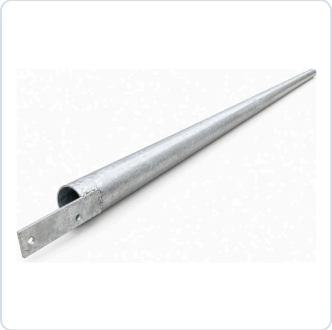
Galvanised and stainless steel earth pipe (pipe electrode for earth pits)

HGV 3 · HGV 6 · HSL 3 · HSL 6 · HSM 3 · HSM 6



Galvanised earth pipe from KALOT Group is a pipe earth electrode for vertical installation in deep earth pits, and we offer it in hot-dip galvanised steel and in stainless steel 304L and 316 . The pipe has a nominal size of 3 inches and comes in two lengths, 3 and 6 m; a two-hole lug welded to the outer wall of its top end takes a two-hole copper cable lug. The pipe's large contact area with the soil and its installation at depth, together with a column of GIM at the bottom of the pit, create a large electrode in the moist layer of the ground: an answer for sites whose upper layer is dry and whose moisture lies at depth.

- Hot-dip galvanised steel or stainless steel 304L and 316; nominal size 3 inches
- Two lengths, 3 and 6 m, in each material
- Two-hole tab welded to the outer wall of the pipe, for a two-hole copper cable lug
- Installed in a 40 to 60 cm pit at least 6 m deep, with GIM and an earth pit

Technical specifications

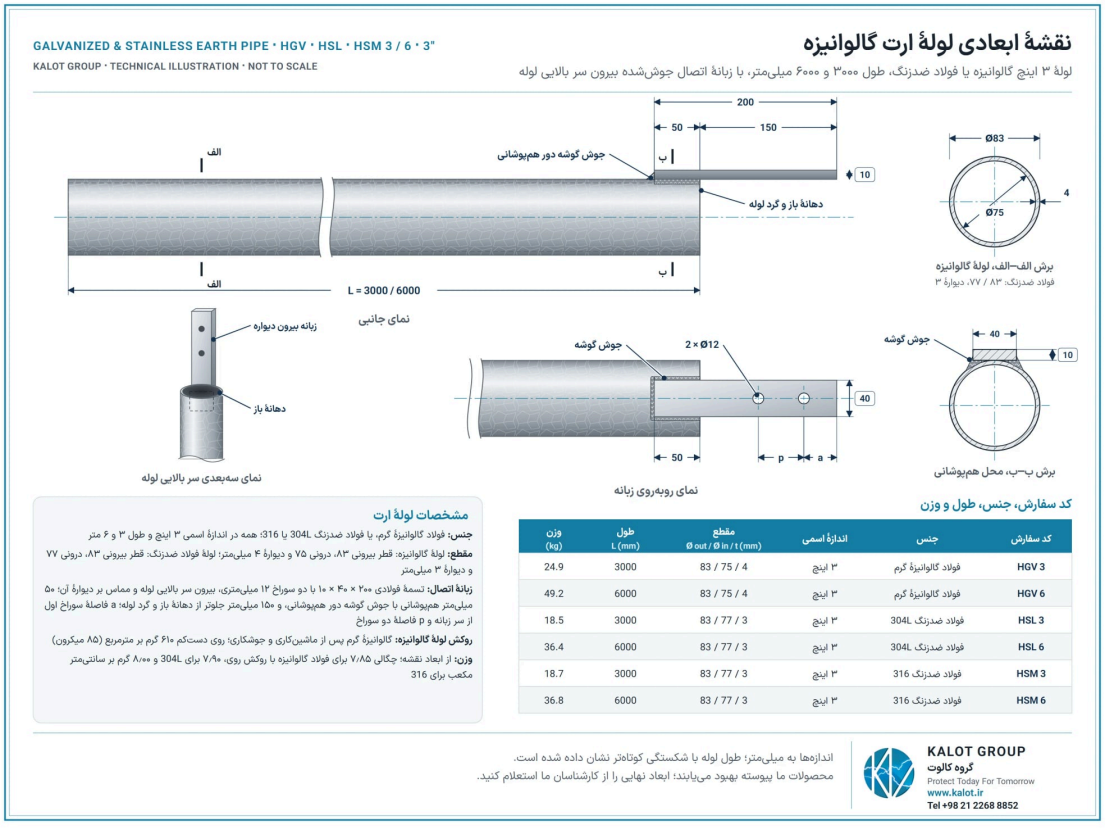
Product type	Tubular earth electrode (earth pipe for earth pits)
Material	Hot-dip galvanised steel; stainless steel 304L and stainless steel 316
Nominal size	3 inches
Galvanised pipe section	Outer diameter 83, inner diameter 75 and wall 4 mm
Stainless steel pipe section	Outer diameter 83, inner diameter 77 and wall 3 mm
Length	3000 and 6000 mm (3 and 6 m), in each material
Connection tab	200 × 40 × 10 mm steel strip, welded tangent to the outer wall at the top end of the pipe with a 50 mm overlap; it projects beyond the open round mouth of the pipe
Tab holes	Two 12 mm holes for a two-hole copper cable lug
Galvanised pipe coating	Hot-dip galvanised after machining and welding; zinc coating of at least 610 g/m², equal to 85 microns
Galvanised pipe weight	24.9 kg for the 3 m length and 49.2 kg for the 6 m length
Stainless steel pipe weight	Type 304L: 18.5 kg for the 3 m length and 36.4 kg for the 6 m length; type 316: 18.7 and 36.8 kg
Conductor connection	Bare copper conductor with a two-hole copper cable lug and stainless steel bolts, nuts and washers on the tab; the joint is wrapped in waterproof insulating tape
Installation method	Vertical, in a pit 40 to 60 cm in diameter and at least 6 m deep, with GIM in the lower part of the pit and a concrete or polyethylene earth pit over the top end of the pipe
Inspection pit earth bar	For this pipe we recommend the tinned copper earth bar
Order code	HGV 3 and HGV 6 (galvanised); HSL 3 and HSL 6 (stainless steel 304L); HSM 3 and HSM 6 (stainless steel 316)

Earth pipe sizes: dimensions, material, weight and order code

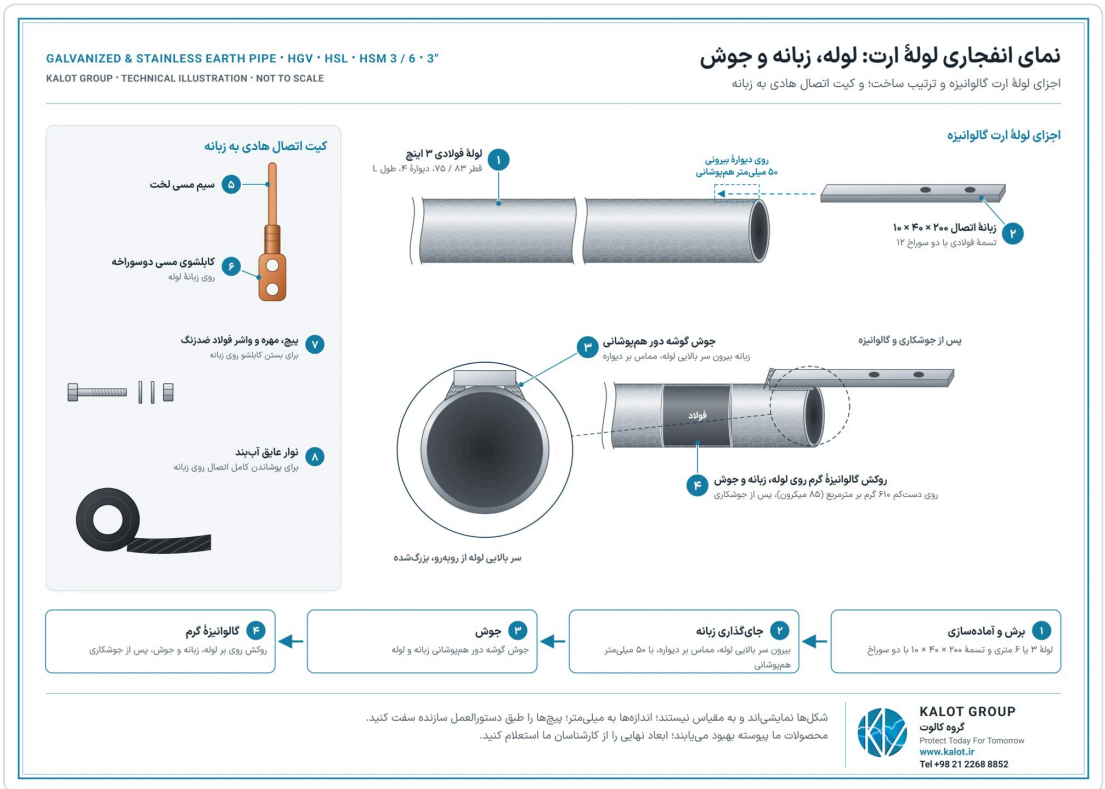
Order code	Material	Nominal size	Outer diameter / inner diameter / wall (mm)	Length L (mm)	Weight (kg)
HGV 3	Hot-dip galvanised steel	3 inches	83 / 75 / 4	3000	24.9
HGV 6	Hot-dip galvanised steel	3 inches	83 / 75 / 4	6000	49.2
HSL 3	Stainless steel 304L	3 inches	83 / 77 / 3	3000	18.5
HSL 6	Stainless steel 304L	3 inches	83 / 77 / 3	6000	36.4
HSM 3	Stainless steel 316	3 inches	83 / 77 / 3	3000	18.7
HSM 6	Stainless steel 316	3 inches	83 / 77 / 3	6000	36.8

Dimensions are in millimetres. L is the pipe length, which stands upright in the pit. The connection lug is a 200 × 40 × 10 mm flat bar with two 12 mm holes, welded tangent to the outer wall of the pipe's top end with a 50 mm overlap, and it projects beyond the open, round mouth of the pipe. Weights

Dimensional drawing of the galvanised earth pipe

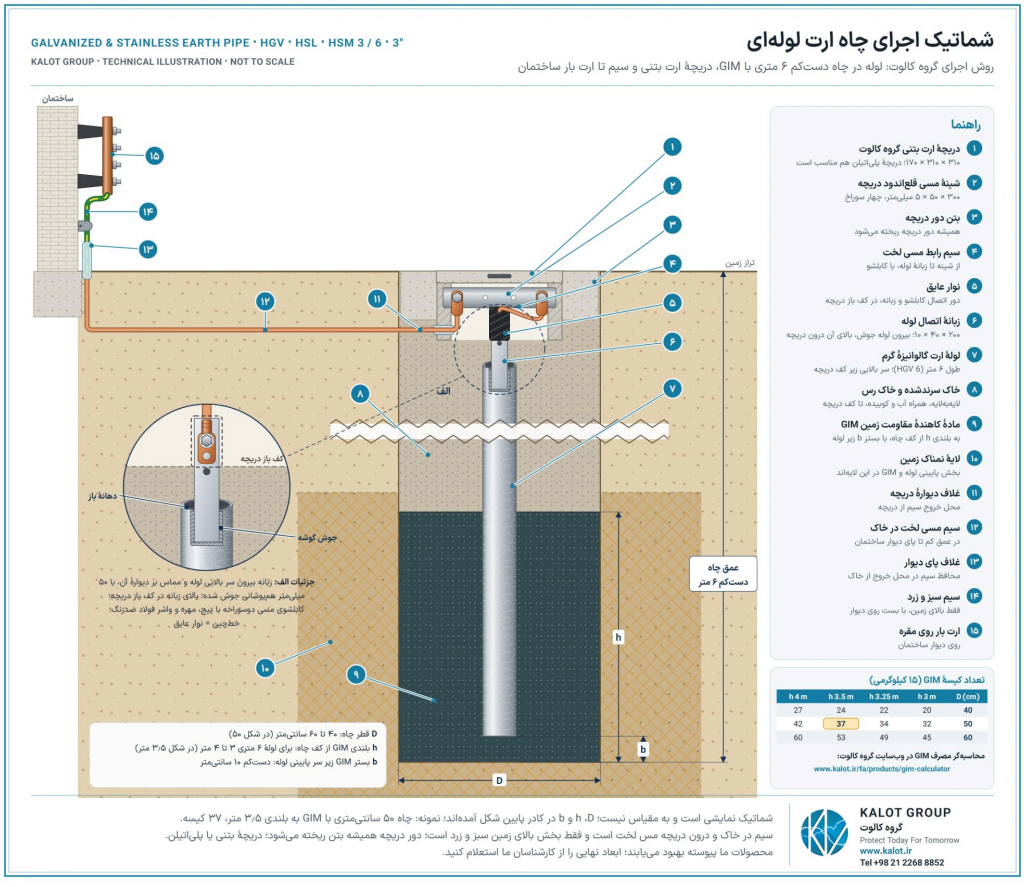


Exploded view: pipe, tab and weld



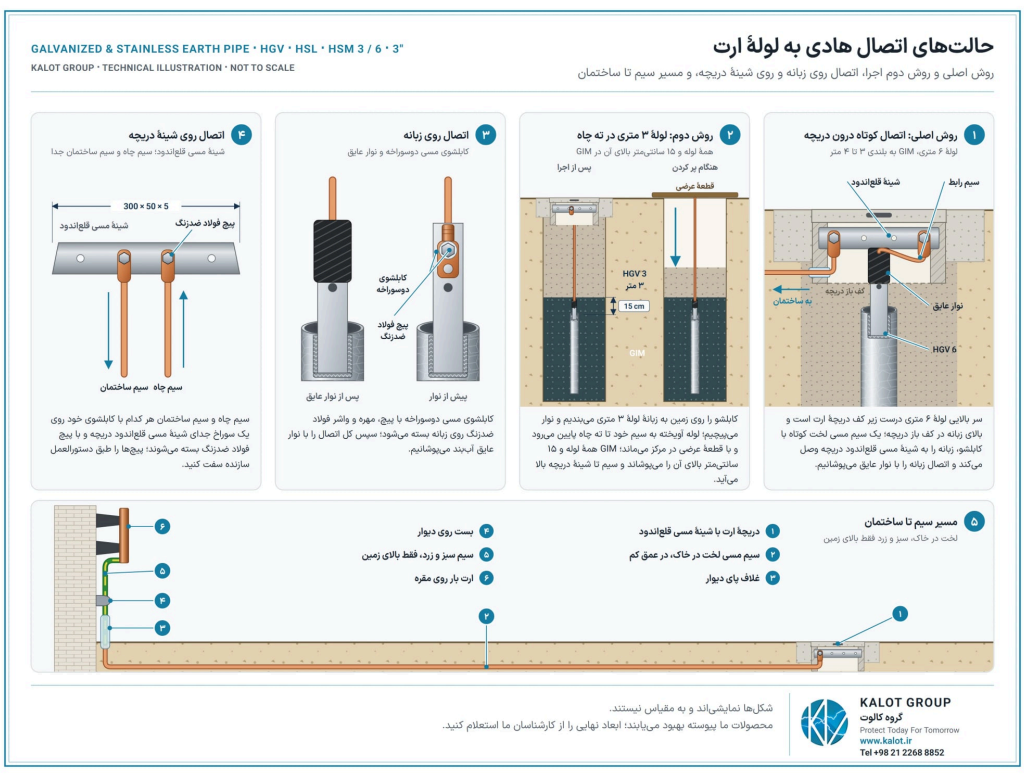
Full print-quality drawings (PDF and SVG) can be downloaded from the product page: www.kalot.ir/fa/products/earthing-1379

Installation schematic of a pipe earth pit with GIM and an earth inspection pit



شماتیک نمایشی است و به مقیاس نیست؛ D، h و b در کادر پایین شکل آمده‌اند؛ نمونه: چاه ۵۰ سانتی‌متری با GIM به بلندی ۳/۵ متر، ۳۷ کیسه.
سیم در خاک و درون دریچه مس لخت است و فقط بخش بالای زمین سبز و زرد است؛ دور دریچه همیشه بتن ریخته می‌شود؛ دریچهٔ بتنی یا پلی‌اتیلن.
محصولات ما پیوسته بهبود می‌یابند؛ ابعاد نهایی را از کارشناسان ما استعلام کنید.

Connecting the conductor to the earth pipe tab: main method and second method



شکل‌ها نمایشی‌اند و به مقیاس نیستند.
محصولات ما پیوسته بهبود می‌یابند؛ ابعاد نهایی را از کارشناسان ما استعلام کنید.

How to build an earth pit with a galvanised pipe

۱. Choose the earth pit location: soil that holds its moisture, away from waste, manure and chemicals. Mark the routes of underground services; if you know the Soil resistivity[1] , choose the pit design based on it; if not, measure it before designing (Measuring soil resistivity[2]). Dig the pit 40 to 60 cm in diameter, for example 50 cm, and at least 6 m deep so that it reaches the moist layer; a hand-dug pit is at least 40 to 50 cm in diameter, and narrower pits are drilled by machine. For a 6 m pipe, the pit depth equals the pipe length plus the bed of GIM beneath it and room for the earth pit, so more than 6 m, for example about 6.5 m.

۲. Prepare the mix of GIM : combine each bag of GIM mix it with 8 litres of clean water and 2 kg of cement, as set out in the GIM installation guide[3] . Add no other material, and do not let soil, bag scraps or plastic get into the mix.

۳. Pour a layer of mixed GIM at least 10 cm deep on the pit floor, so that the lower end of the pipe sits at least 10 cm above the pit floor and inside GIM sits in place.

۴. Stand the pipe upright in the centre of the pit, tab facing up, on the bed of GIM and hold it centred and vertical with a cross-piece across the pit opening.

۵. Prepare the mix of GIM goes around the pipe: for a 6 m pipe up to 3 to 4 m from the pit floor, and in the second method with a 3 m pipe, over the whole pipe and up to 15 cm above its top end. A 50 cm pit for 3 m GIM needs 32 bags, for 3.25 m 34 bags, for 3.5 m 37 bags and for 4 m 42 bags; for other diameters and heights, use the GIM consumption calculator[4] . If you wish, while pouring the mix you can also place a slotted PVC pipe beside the earth pipe, reaching up into the inspection pit, so you can water the pit from time to time and keep it moist; this is optional and mostly used in plate pits.

۶. Fill the rest of the pit with sieved soil and clay, layer by layer with water, and compact it up to the floor level of the earth inspection pit. The top end of the pipe stays just below this level, and the top of the tab stands clear of the soil.

۷. Concrete earth pit[5] or Polyethylene earth pit[6] goes over the top end of the pipe, with concrete poured around it; the top of the pipe tab sits at the open floor of the pit and is reachable from inside it. Fix a short bare copper conductor with a Two-hole copper cable lug[7] and a stainless steel bolt, nut and washer to the tab, wrap the joint fully with waterproof insulating tape, and connect the other end of the conductor with a cable lug and stainless steel bolt to the Inspection pit earth bar[8] ; for this pipe we recommend a tinned copper bar. Tighten the bolts as the manufacturer instructs.

۸. Run the main conductor from the bar's other hole and through the sleeve in the pit wall, bare and buried in the soil, to the building, and take only the above-ground section, with Green and yellow conductor[9] and Wall clamp[10] to the Earth bars[11] of the building. Measure the earth pit resistance after installation and record it, with the date, in the earthing system file.

GIM bags for a pipe earth pit

Pit diameter D	h = 3 m	h = 3.25 m	h = 3.5 m	h = 4 m
40 cm	20	22	24	27
50 cm	32	34	**37**	42
60 cm	45	49	53	60

Number of 15 kg GIM bags for pit diameter D and GIM height h. For the 6 m pipe, h is 3 to 4 m; for the 3 m pipe in the second method it is 3.25 m (the whole pipe, 15 cm above it and the 10 cm bed below it). For other sizes, use the GIM consumption calculator[4] . The bold cell is the schematic example: a 50 cm pit with GIM 3.5 m high, 37 bags.

Measuring resistance and inspecting a pipe earth pit

Measure the earth pit resistance after installation by the fall-of-potential method (62 percent) and record the result, with the date, season and soil moisture condition, in the earthing system file; Topic 13 of the Iranian National Building Regulations requires a measurement after installation and periodic measurements. During periodic inspections, check from inside the earth pit the condition of the insulating tape on the tab, the conductors and the tightness of the joints on the bar. If the resistance is above the design value, install a second pit at a distance of about twice the electrode depth (per Topic 13) and connect the two pits with bare copper conductor. For the measuring method, see the article “How is earth termination resistance measured?[12]”.

Links on this page

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Material and construction: hot-dip galvanised after welding, and stainless steel

KALOT Group's galvanised earth pipe is a **3-inch steel pipe with a 4 mm wall** . On the outer wall of the pipe's top end, a **connection tab** made from 200 × 40 × 10 mm steel strip is welded tangent to the pipe: the tab overlaps the pipe by 50 mm, is welded all round the overlap, and the rest of the tab projects beyond the open, round mouth of the pipe. The tab's two 12 mm holes are for the Two-hole copper cable lug[1] . After machining and welding, the pipe is **Hot-dip galvanising** ; so the pipe, tab and welds are all under the zinc coating, and the zinc coating is at least **610 g/m², equal to 85 microns** . The bottom end of the pipe is open. We also offer the earth pipe in **Stainless steel 304L and 316** , with the same 3-inch nominal size and 83 mm outside diameter, a 3 mm wall, and in 3 m and 6 m lengths.

Tools and materials needed

Pit digging tools, a cross-piece to hold the pipe in the centre of the pit, a container and mixer for the GIM mix, clean water and cement, sieved soil and clay, a concrete or polyethylene earth pit with its tinned copper bar, bare copper conductor, a two-hole copper cable lug, stainless steel bolts, nuts and washers, waterproof insulating tape, a cable lug crimping tool, a spanner and an earth resistance tester.

Earth pipe, earth rod or copper plate? A technical and financial comparison

Feature	Earth pipe (3 and 6 m)	Galvanised earth rod	Copper-bonded earth rod	Copper plate
Material	Hot-dip galvanised steel or stainless steel 304L and 316	Steel with hot-dip galvanised coating	Steel core with copper coating	Solid copper
KALOT sizes	3 inches; lengths 3 and 6 m	Diameters of 16 and 20; lengths of 1500 and 2000	5/8 and 3/4 inch; length 1500	660 × 660 and 660 × 500; thickness 3 and 5
Installation	Pit 40 to 60 cm in diameter, at least 6 m deep	Driven; borehole with ground improvement material in hard ground	Driven, with earth rod sections coupled one after another	Drilled pit with GIM
Suitable moist layer depth	Deep	Shallow	Down to the depth of the coupled sections	Shallow to medium
Space needed	One pit	Several earth rods, spaced apart	One point	One small pit
GIM ground improvement material	50 cm pit: 37 bags for 3.5 m of GIM (6 m pipe) and 34 bags for 3.25 m (3 m pipe)	No GIM when driven	No GIM when driven	37 bags (660 × 660) and 24 bags (660 × 500)
Metal weight per electrode (kg)	24.9 and 49.2 (galvanised); 18.5 to 36.8 (stainless steel)	2.4 to 5.0	2.0 and 2.8	8.9 to 19.5
Conductor connection	Two-hole copper cable lug on the tab	Clamp	Exothermic welding or clamp	exothermic welding
Raw metal value per electrode (US dollars)	14.5 and 28.7 (galvanised)	1.2 to 2.5	3.0 and 3.8	130 to 287
Metal value index (copper-bonded earth rod, 5/8 inch, 1500 = 1)	4.8 and 9.6 (galvanised)	0.4 to 0.8	1 and 1.3	44 to 96
Full installation cost rank (1 = lowest)	3	1	2	4
Recommended use	Dry ground with a deep moist layer; where driving to depth is not practical and one large electrode in one pit is needed	Soft, damp soil with enough space; galvanised earthing networks	Most projects; reaching depth by coupling sections	A hard layer near the surface, tight spaces and projects that specify a plate electrode

This table was prepared on 21 and 22 Mehr 1405. The raw metal value is calculated from the metal weight of each electrode: zinc and copper at the official London Metal Exchange price (LME) and steel at the global market reference price on the same days; this value changes with the daily metal price, and the selling price also covers other costs. Pipe weights come from the drawing dimensions; the metal value and its index are given for the galvanised pipe, and for the earth rods and the copper plate the smallest and largest size of each type. The cost ranking is for the complete installation of one electrode: metal, excavation, GIM and connection; the earth pit, concrete, conductor to the building and testing are the same for all and are not included in the ranking. The 3 m and 6 m pipes are installed in the same pit and share the same cost ranking. Earth pit resistance is set by the soil and the length and depth of the electrode; we measure the final resistance after installation. To learn more, see Choosing the right material for an earth electrode[2] and Calculating earth termination resistance[3] instead.

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