



Deep Earthing

Smart design. Maximum protection. Minimal complexity.

ELPRESS

Why choose Elpress deep earthing systems?

Extended service life

Steel rods act as sacrificial anodes, protecting the copper electrode from corrosion over time. This stabilizes system potential and significantly extends the lifetime of the earthing system.

Continuous measurement capability

The uninterrupted copper electrode allows earth resistance to be measured at any time directly from the conductor — without dismantling equipment or interrupting the installation process.

Uninterrupted conductor integrity

The continuous copper electrode eliminates joints and minimizes the risk of system failure. Even in challenging ground conditions, such as rock or obstructions, the conductor remains intact — preventing loss of completed work.

Grounding & earthing overview

Deep earthing provides a high-integrity grounding method for electrical systems by utilizing a vertically installed copper electrode guided by sacrificial steel rods. This uninterrupted design eliminates joints and minimizes the risk of corrosion, making it ideal for installations with high reliability requirements.

A reliable connection to earth is essential in modern electrical infrastructures. Grounding ensures safety, performance, and compli-

ance across systems. Deep earthing is particularly suitable where traditional shallow grounding methods are not effective due to environmental or structural constraints.

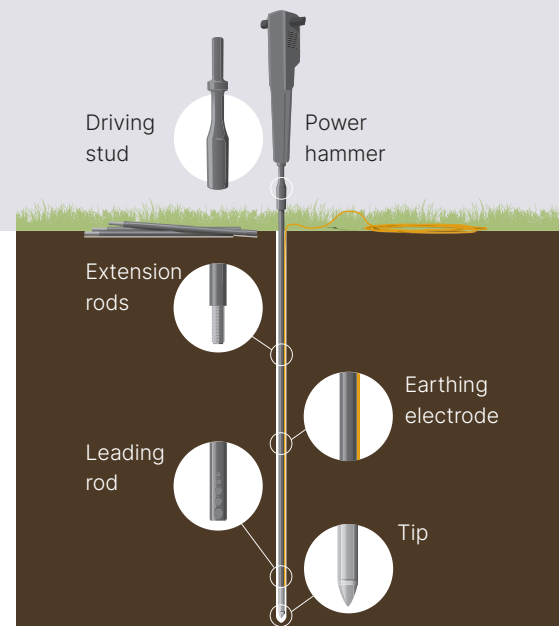
Achieving low and stable earth resistance is critical for long-term performance. Target values depend on system design, standards, and local conditions. Soil resistivity, electrode diameter, and installation depth all play a key role in reaching optimal results.

Benefits of our advanced rods

- ✓ Selection between two rods: standard (Ø 17 mm) and reinforced (Ø 21 mm).
- ✓ Rods can be extended, if required.
- ✓ Simple and quick advancing possible with all conventional power hammers.
- ✓ Power hammer or manually.
- ✓ Always at optimum working height (10–110 cm above the ground).
- ✓ The final extension pipe can be pulled back out and used again.
- ✓ Steel rods offers protection to the electrode as a sacrificial anode.
- ✓ Tubular steel rods combine high driving strength with reduced weight, improved energy transfer, and safer handling — delivering faster installation and long-term system reliability.

System Components

The Elpress Deep Earthing System consists of the following elements:



How it works:

- ✓ Insert the copper electrode into the steel tip and align with the leading rod.
- ✓ Use a power hammer to drive the rod and electrode into the ground.
- ✓ Add extension rods as needed to reach required depth.
- ✓ Monitor electrode progression during driving to ensure smooth feed.
- ✓ Measure earth resistance directly from the copper conductor at any stage of the installation.
- ✓ Retract final extension rod and reuse it for the next installation.

Elpress products

Deep earthing system FS - standard



Elpress deep earthing system FS consists of 3 parts.
Tip (FS11 or FS12), leading rod (FS21) and extension rod (FS31).



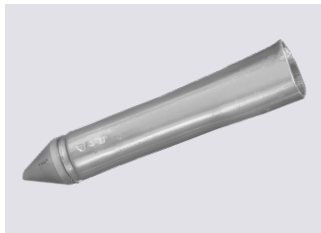
FS11 AND FS12

Tip, with hardened steel furthest out. Fits FS21 and allows the use of different types of earth line.



mm ²	Name	Net weight (kg)	Length	Pcs/pack
16-70	FS11	0,176	135	5
70-150	FS12	0,176	135	5

✓ **FS12 and FSHD11 support conductor sizes up to 150 mm²**
— exceeding standard industry ranges and enabling reliable installations for larger grounding systems.



FS21

Steel leading rod, equipped with a grooved notch to lock the earth line effectively. For loose and normal soil conditions.



ø	Name	Net weight (kg)	Length	Pcs/pack
17	FS21	0,644	800	5



FS31

Steel extension rod, HD, equipped with a guide pin that fits inside the preceding rod. For loose and normal soil conditions.



ø	Name	Net weight (kg)	Length	Note	Pcs/pack
17	FS31	0,804	870	Length incl. driving cap	5



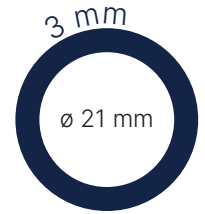
FS62C - Impact sleeve FS

Impact sleeve used when driving using a sledgehammer, or similar, to prevent deformation of the rod end. Specially designed for use with FS21 or FS31 rods.

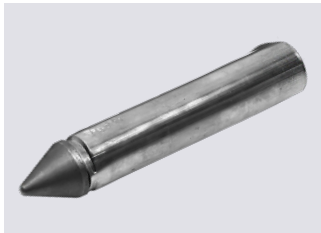


Name	Net weight (kg)	Length mm	Width	Pcs/pack
FS62C	1,018	110	45	1

Deep earthing system FSHD - reinforced



Elpress deep-earthing system with thicker rods for tougher soil conditions FSHD (HD: "Heavy Duty") consists of 3 parts. Tip (FSHD11), leading rod (FSHD23) and extension rod (FSHD31).



FSHD11

Hardened steel tip intended for hard and rocky ground. Used in conjunction with leading rod FSHD23.



mm ²	Name	Net weight (kg)	Length	Pcs/ pack
25-150	FSHD11	0,254	153	5



FSHD23

Steel leading rod, equipped with a grooved notch to secure the earth line effectively. Designed for hard and rocky ground.



∅	Name	Net weight (kg)	Length	Pcs/ pack
21	FSHD23	1,088	800	5



FSHD31

Steel extension rod, HD, equipped with a guide pin that fits inside the preceding rod. Robust rod intended for hard and rocky ground.



∅	Name	Net weight (kg)	Length	Note	Pcs/ pack
21	FSHD31	1,224	870	Length incl. driving cap	5



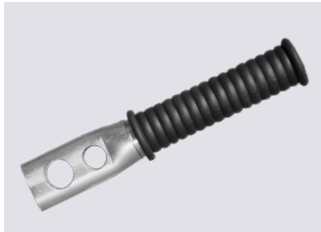
FSHD62C - impact sleeve FSHD

Impact sleeve used when driving using a sledgehammer, or similar, to prevent deformation of the rod end. Specially designed for use with FSHD23/FSHD31 rods.



Name	Net weight (kg)	Length mm	Width	Pcs/ pack
FSHD62C	0,93	110	45	1

Accessories for Elpress deep earthing systems

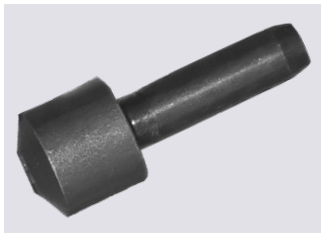


FS41 - withdrawal handle

Pull handle with grip-friendly design that facilitates withdrawal and allows reuse of the last extension rod FS3x/FSHD3x.



ø	Name	Net weight (kg)	Length mm	Width	Pcs/pack
18,5/22,5	FS41	0,403	230	60	1



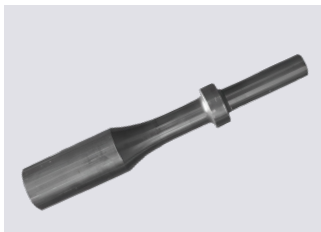
FS61 - impact stud

Impact stud used when driving using a sledgehammer, and similar, to prevent deformation of the rod end.



Name	Net weight (kg)	Length mm	Width	Pcs/pack
FS61	0,081	58	22	1

Driving sleeves for FS and FSHD deep earthing systems



Elpress offers a range of driving sleeves adapted for use with most commercially available rotary and power hammers on the market. Our driving sleeves are available in versions for both standard (Ø 17 mm) and reinforced (Ø 21 mm) driving rods and are designed to protect the rods from deformation during driving.



Name	Shaft ø mm	Flange length mm	Total length mm	Shape	Weight kg	Note
FS71C	19	108	305	Round	1,8	
FS72C	22	108	305	Round	1,9	
FS74C	22	82	280	Round	1,8	
FS77C	32	160	380	Round	2,5	
FS81C	18	-	265	Round	1,4	1
FS81D	18	-	215	Round	1,4	1, TE-Y, SDS MAX
FS82C	19	-	272	Round	1,5	1
FS83C	29	-	310	Round	2,2	1
FS85C	27	80	302	Square	2,1	
FS88C	22	-	288	Round	1,7	1, TE-S
FSHD71C	19	108	305	Round	1,8	
FSHD72C	22	108	305	Round	1,9	
FSHD74C	22	82	280	Round	1,8	
FSHD77C	32	160	380	Round	2,5	
FSHD81C	18	-	265	Round	1,4	1
FSHD83C	29	-	310	Round	2,2	1

1. These driving sleeves do not have a mounting flange, so no length is specified.

System structure and function

- deep earthing

Why Deep Earthing?

An earth connection is a conductor placed in the soil, with the aim of diverting electrical current from an installation connected to the earth connection and into the surrounding soil.

A customer who buys power takes earthing for granted. This is despite the fact that the use of power without, or with poor, earthing incurs great risks. All power suppliers must have approved earth connections at their installations. This means that voltage surges that can occur for various reasons are led into the ground so that they do not cause damage. Earthing thus functions as, among other things, personal protection, property protection, signal transfer protection, lightning protection and the like.

An approved earthing should have: (1) low electrical resistance, (2) ability to conduct voltage stably (despite weather changes) and (3) long service life, i.e. good resistance to corrosion.

Soil conditions or external conditions?

The importance of the soil as a conductor of electric current is great. The technical specifications and requirements for earthing demonstrate the advantages of deep-earth connections, both as a technical and economic solution, in relation to surface-earth connections.

Current conduction occurs in the soil through electrolytic processes, known as ionic conduction. Solid particles such as gravel are not usually conductive.

The electrical conductivity of the soil therefore mainly depends on the proportion of saline water bound by capillary forces and osmotic pressure in the pores between grains of sand and in hygroscopic humus particles (e.g. clay).

The water in deeper lying ground layers usually has a higher salinity than the water in the surface layer. The higher the moisture content of the soil, the better the conductivity. Soil humidity normally varies between 5-40%. At variations below 14-18%, conductivity deteriorates significantly.

Cold (frost) significantly impairs the ground's conductivity. It is of great importance that all this is taken into account for earth connections or earth connection systems.

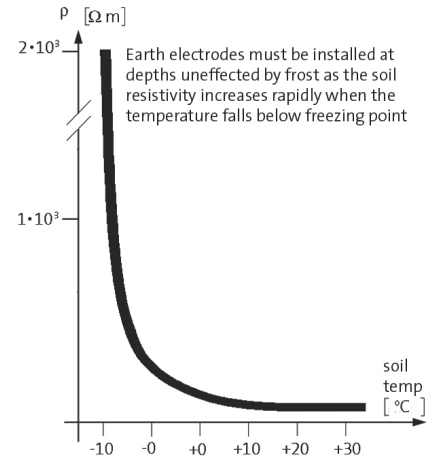
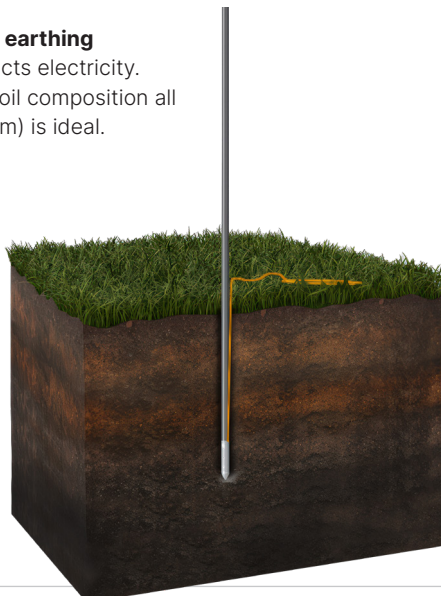
Weather conditions - cold, heat, rain and wind - mainly affect the upper layer of the soil (0 - 1.5 m), which therefore exhibits the most powerful variations. The most efficient earthing is thus reached when the electrode is placed deep enough so as not to be affected by changes in soil humidity and temperature.

Soil Resistivity – the foundation of effective earthing

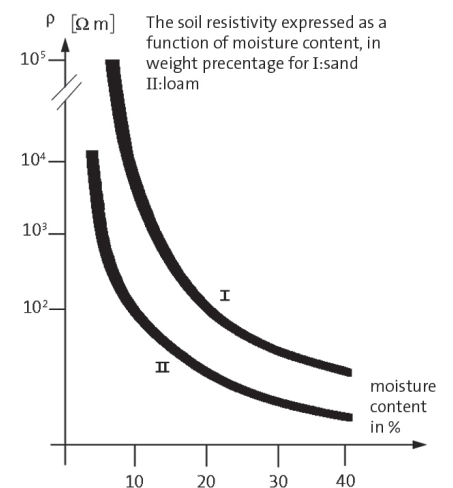
Resistivity (Ωm) indicates how well soil conducts electricity. Factors such as moisture, temperature, and soil composition all influence this value. Low resistivity (10–100 Ωm) is ideal.

Key factors influencing soil resistivity:

- Moisture content: Higher = better conductivity.
- Temperature: Cold and frost = decreased conductivity.
- Soil composition: More humus and saline water = better performance.



Soil resistance in relation to temperature.



Soil resistance in relation to humidity.

Soil Resistivity Table

Material	Resistivity (Ωm)	Conductivity Rating
Granite	10^6	Poor
Concrete	10^5	Poor
Volcanic rock	10^4	Poor
Moraine	10^3	Poor
Dry gravel	10^2	Low
Fine moist sand	10^1	Moderate
Fresh water	10	Moderate
Clay	1	Good
Dry, humous soil	10^{-1}	Good
Wet, humous soil	10^{-2}	Very good
Salt water	10^{-3}	Very good
Graphite	10^{-4}	Excellent
Minerals	10^{-5}	Excellent
Metals	$10^{-6} - 10^{-8}$	Excellent

Resistivity

The electrical properties of the soil are quality declared by means of its resistivity, which is measured in Ωm (former unit Ωcm , $1 \Omega m = 100 \Omega cm$). Soil with good electrical conductivity thus has low resistivity: 10 - 100 Ωm .

For each case of different soil type, soil resistance must be measured and preferably during several seasons and in different weather conditions. In measurement today almost exclusively voltage compensated electronic resistance bridges are used (measurement method according to Wenner) with 4 connection contacts, 2 of which are for current electrodes and 2 for voltage probes.

The connectors are connected to 4 vertical metal tips that are driven down in a row about 0.3-0.5 m deep a metre apart. (See image)

If the instrument reading is R, the resistivity of the soil is calculated according to the following equation:

$$\rho = 2 \times a \times R \Omega m$$

In unlayered soil, resistivity is independent of the electrode distance a. By increasing distance a, the current penetrates deeper into the ground and the measured resistivity can fall or increase depending on the resistivity of the ground layer at 1 metre's depth. When calculating approximate earthing resistance of the earth connection when the depth is l, the resistivity of the soil must be measured with electrode distance $a \approx 0.75 \times l$.

Measuring earthing resistance – Practical guide

Method 1: High accuracy (SS 487 0110)

- $\pm 2\%$ deviation
- Uses external current electrode and voltage probe
Placement in a straight line from the earth electrode

Method 2: Practical use

- Easier to perform in the field
- Probes placed at 90° from the earth electrode
- Used to estimate contact resistance and optimize grounding length

Basic formula:

$$l = \rho / R$$

Where:

l = required electrode depth (m)

ρ = soil resistivity (Ωm)

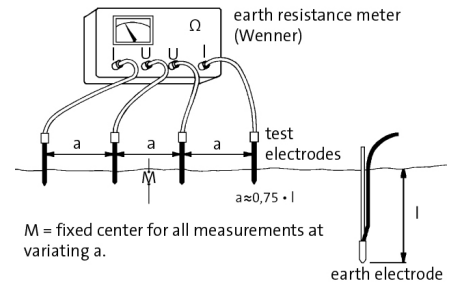
R = target earth resistance (Ω)

Corrosion – understand & minimize It

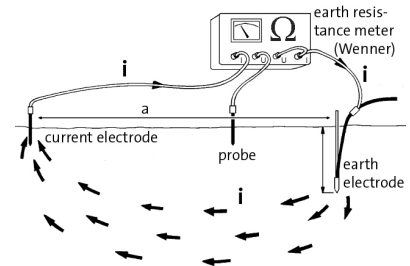
The Elpress system uses steel rods as sacrificial anodes, significantly reducing the corrosion risk to copper conductors. The process stabilizes the surrounding soil and extends the lifespan of nearby lead-sheathed cables.

Expected corrosion rates:

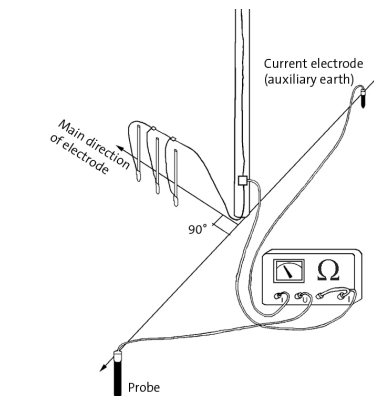
Soil resistivity	Corrosion rate ($\mu m/year$)
< 1 Ωm	100 $\mu m/year$
1-10 Ωm	100-30 $\mu m/year$
10-100 Ωm	30-4 $\mu m/year$
> 100 Ωm	Negligible



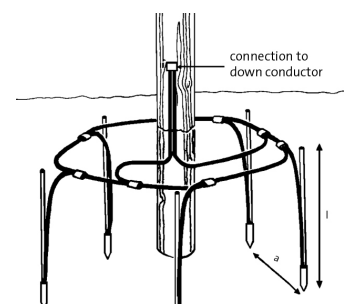
Measurement of ground resistance.



Measuring earthing resistance of the earth connection - Method 1



Measuring earthing resistance of the earth connection - Method 2.





Benefits of the copper electrode

- ✓ Completely corrosion-resistant. This means that the earth resistance is constant throughout the whole lifetime.
- ✓ Optimal electrical conductivity and mechanical strength (Crimping – KRF & C-sleeves).
- ✓ Uninterrupted copper electrode eliminates joints and ensures system integrity — even if driving rods encounter obstacles during installation.
- ✓ Suitable for connection to other earthing systems (e.g. foundation earthing).
- ✓ No additional ground – termination needed.

