

ELPRESS DEEP EARTHING SYSTEMS *provide important benefits in today's technology-dense society*

Earthing is a central part of all installations, for both operational and safety earthing. Wind turbines, radio base stations, railway infrastructure, the distribution network, lightning protection and lightning conductors are some examples.

COMMON to wind turbines and radio base stations, for example, is that they are usually placed in open and elevated terrain. Installations are also getting higher, which means that they are particularly prone to lightning. Providing these installations with good protection against both direct and indirect lightning currents is important. This involves great expense as well as high demands on personal protection. These two fast-growing industries demonstrate the importance of good earthing and properly executed earth connections, and Elpress deep earthing systems have many advantages.

Elpress System Deep earthing was developed to meet a number of conditions of how the system would be designed and what advantages it would provide compared to alternative earthing systems. Some of the main objectives were that the system should have no joints, it should have a long service life with good protection against corrosion, it should be straightforward with few component parts, full control of the earth line should be provided during insertion and it should also be possible to continuously measure the earth connection resistance while it was being driven into the ground. – “A good earth connection is important in society of, for example, wind power and an increasing number of radio base stations means that earth connections and the choice of earthing system are of great importance. An improperly designed earth connection can not only result in damage to expensive equip-

ment but also personal injury. At the same time, it is required that earth connections can be implemented in a cost-effective way and that they have a long service life. These requirements, together with the right training for users, are becoming increasingly evident in today's market and this makes Elpress deep earthing systems a safe and secure choice with very good overall economy,” says Elpress CEO Mattias Östman.

Few parts provide safe and straightforward deep earthing

Wind turbines and radio base stations are two highly topical areas of application for Elpress System Deep earthing, but the system is also used to protect switchgear, transformers and technical installations along the railway network both in Sweden and abroad, for example.

Although earthing and earth connections are important as property protection, personal protection and also lightning protection, Mattias Östman believes that there is a need for more information and knowledge about the area.

– “Sometimes we see uncertainty among contractors, installers and clients, for example how earth connections should be designed and what type of system to choose. This means that we need to work even more actively and give information about the demands that should be placed on earth connections in a high-tech society. Our feeling is that this area of technology has been somewhat overshadowed and we want to try to change that.”

The principle of earthing is that a conductor is placed in the ground which is tasked with diverting electrical current from installations and plants connected to the earth connection. Voltage surges that may occur for various reasons are led into the ground so that they do not cause damage. An earth connection can either be a surface earthing where a conductor is laid along the ground, or deep earthing, as with Elpress systems, where earth electrodes are driven into the ground. Mattias Östman highlights a great advantage of deep earthing compared to earth connections laid on the surface parallel to the ground.

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– The electrical conductivity of the ground depends to a large extent on the content of saline water. The water in deeper lying ground layers usually has higher salinity than the water in the surface layer, and the higher the moisture content, the better the conductivity. With our deep earthing system you get down to the groundwater level and avoid the disadvantages of surface earthing where the conductivity can be greatly affected and vary in weather changes. Cold and frost, for example, have a significant impact on conductivity. Because with deep earthing the electrode is positioned deeply, the negative effects of changes in ground humidity and temperature fluctuations are avoided.

Elpress product manager, Sven Behring, highlights few parts as an important strength. “System Deep earthing consists of only five components: a hardened steel tip, a leading rod, extension rod, an earth line and driving sleeve or impact sleeve for insertion.

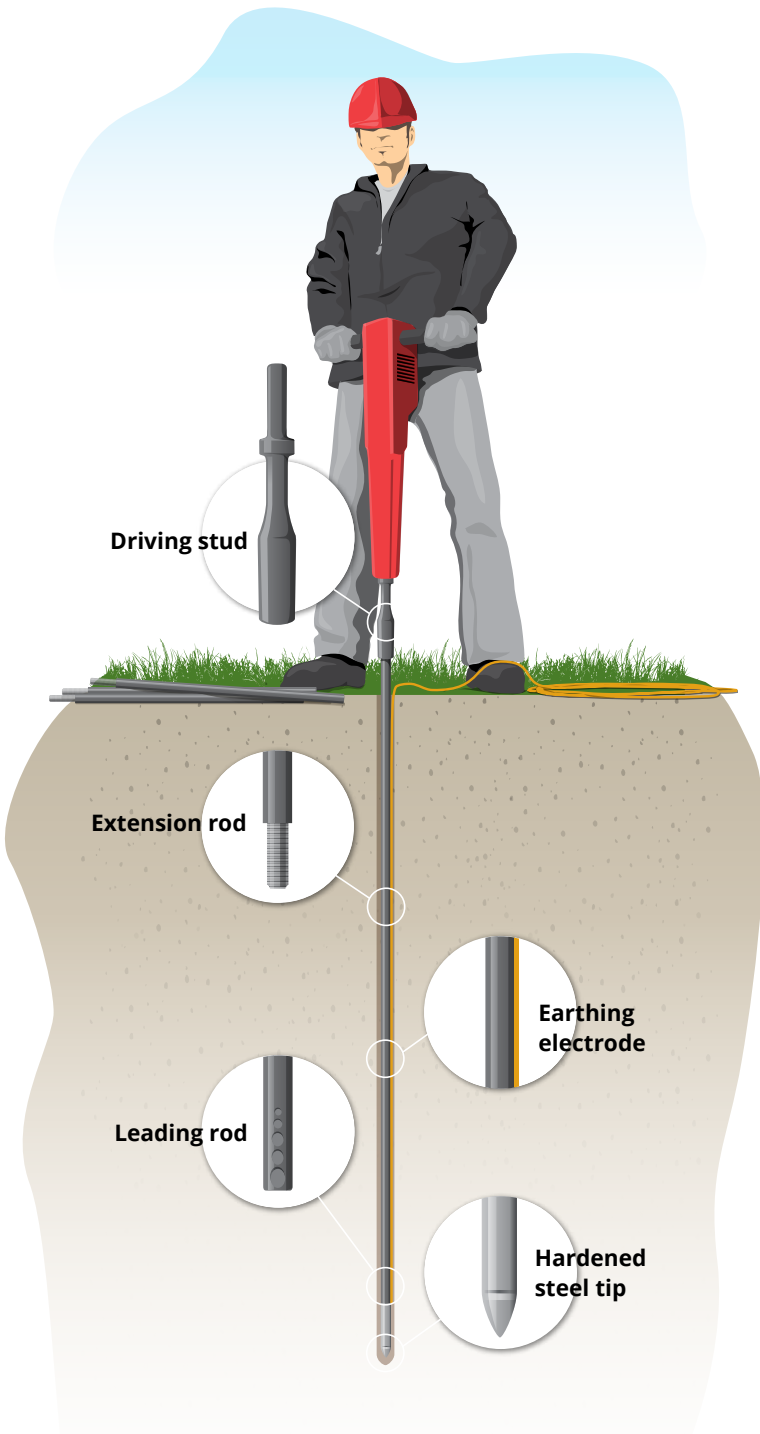
– “Few parts means simple function. The earth line, which can be of soft or hard copper, is inserted into the hardened steel tip and clamped by the leading rod. The extension rods are fitted with guide pins, which are pushed into the preceding rod during work. When driving is complete, the last extension rod is pulled up and can then be reused,” explains Sven Behring.

The hardened steel tip means that the system is often used in demanding environments such as in the Alps and in mountainous areas where there can be a lot of rock. Over the years, Elpress rods have been shortened from 1 metre to 0.8 metres to facilitate the work regardless of whether driving is done with a power hammer or sledgehammer and impact sleeve. Some adjustments have also been made to the new generations of power hammer.

Continuous control of the earth line during insertion

Sven Behring highlights three advantages of the deep earthing system. A very important advantage is that you can ensure that the earth line and steel tip follow each other during insertion.

– “If driving into ground conditions with a lot of stone, in other systems the earth line may fold



to the side without the person working on the insertion noticing. With our deep earthing system you can immediately detect if the earth line has released from the tip and does not follow it, and if that happens, it is then easy to restart the work. When insertion is complete, there is also no need to carry out any post-inspection as with other systems, because the Elpress deep earthing system is based on a seamless earth line unlike other systems that are based on spliced parts such as

electrical conductors. This saves a lot of time and also lowers the overall cost of a completed earth connection."

A further advantage is that the earthing resistance can be measured continuously during insertion. This means that driving can be stopped when the appropriate earth connection value has been reached. The ability to measure resistivity during the work therefore acts as quality assurance because you get a guarantee that the

ground has good electrical conductivity, and that the insertion ends at the right depth. That the earth line is not driven down further than necessary saves time as well as costs. In this way, as much material as necessary is used but as little as possible.

The third advantage Sven Behring wants to highlight is that the system provides very good resistance to corrosion and thus has a long service life. When a copper line is used as an earth line, the steel extension rods act as sacrificial anodes, with relatively high corrosion current against the copper electrode. In this way, the steel rod is attacked by the ground environment instead of the copper line. Other systems that may have unprotected copper rods are often exposed to direct corrosion, which gives a shorter service life at the same time as requiring post-checks and maintenance during operation.

It is important to plan the location of the earth connection by checking the ground conditions

Even a good deep earthing system requires good planning for an earth connection to perform its function and meet all the requirements of an approved earthing. A main requirement is that the earth connection has low resistivity (10-100 Ωm) and thus good electrical conductivity. A first step must therefore be to plan the earth connection in good time by checking the ground conditions at the site of, for example, a wind turbine, radio base station or switchgear. – "It is extremely important to declare the electrical properties of the ground quality by measuring ground resistance. System Deep earthing is a simple and straightforward system, however, there is no point taking a chance when it comes to choosing the location of the earth connection. Measurement can be carried out using a measuring instrument where the contacts are connected to four vertically driven metal tips

which are initially placed in a row approximately one metre apart, known as a Wenner bridge. By then increasing the distance, the current penetrates further into the ground. The resistivity can then be read from the instrument and, as a rule, approximate calculations can be made," explains Sven Behring.

Resistivity can vary greatly depending on the ground conditions, e.g clay, fine and moist sand, till, dry or moist humus and dry gravel for example. All the information required for good planning of an earth connection can be obtained by taking measurements with different measurement methods. Once the location has been chosen, the earthing resistance can also be measured when driving is started with System Deep earthing.

Here, the same type of instrument can be used as for the measurement of ground resistance. The ability to continuously measure the earthing resistance with Elpress Deep earthing system makes it easy to interrupt work when the earth line has reached the appropriate ground depth. In this way, you get a quality-assured earth connection and often at a lower cost compared to alternative deep earthing solutions, which may require much more extensive work before it is known with certainty that the ground conditions at a certain level have the desired resistivity. If the ground is awkward, several parallel earth connections can be made.

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Scan the QR-code for more information regarding Deep earthing on our website.

