

## PROPER GROUNDING TO REMOVE HARMFUL ELECTROSTATICS

### Why the electrostatics must be grounded and how to ground correctly?

Static electricity can be felt very often in our daily life, taking off a woolen sweater at the end of the day and see sparks of electricity, when touching the door knob and getting an electrical shock. These effects are related to the electrostatic charges. In some industrial processes like painting or printing, electrostatic charges might be helpful, but in most of the industrial processes, electrostatics can cause a lot of problems and may lead to devastating accidents. An uncontrolled discharge can cause an explosion and may effect lives of people and value of properties.

#### Removal of electrostatic charges

To prevent hazards caused by static electricity, measures must be taken. By far the most effective method of avoiding hazards due to uncontrolled static discharge is to connect all possible conductors to earth.<sup>1</sup>

In case of a potential difference between two objects, we call these objects electrostatically charged. To remove the charges, we need to bring the difference back to even neutral stand. This process is called grounding (a.k.a. earthing).



The planet earth can be regarded as an object with infinite capacity for electrical charges, and is capable of transferring electrons to or receiving electrons from a charged object in order to neutralize that object.

#### How to ground correctly

A conductive object can be grounded by a direct conductive path to earth or by bonding it to another conductive object that is already connected to earth.

As electrical aspect, the total resistance between a grounded object and the ground is the sum of the individual resistances of the grounding cable, its connectors, other conductive materials along the intended grounding path, and the resistance of the ground rod to the ground.

The recommended practical grounding resistance should not exceed 1 MΩ. (In few cases, 100 MΩ is also allowed).<sup>2</sup>

To ensure the grounding connection, the mechanical

1] cf.: IEC/TS 60079 (2013): Explosive atmospheres - Part 32-1: Electrostatic hazards, guidance, p. 108

2] cf.: TRGS 727 (2016) p. 82

strength must be also taken into consideration. In some national regulations, the cable section for the grounding cables is clearly defined<sup>3</sup> (SH/T 3097-2017):

Equipment type	Grounding cable section
Stationary equipment	16 mm <sup>2</sup> cooper wire cable
Large mobile equipment	16 mm <sup>2</sup> cooper wire cable
Normal mobile equipment	10 mm <sup>2</sup> cooper wire cable
Frequently movable equipment	6 mm <sup>2</sup> cooper wire cable

Also the color of the grounding cable is specified in some standards, e.g. in the TRGS 727: the equipment (cable) for grounding must be clearly marked, for example with green / yellow color code.<sup>4</sup>



For monitored grounding by using interlock devices, the specification of the cable should be chosen in accordance with the recommendation of the manufacturer.

#### How to ground objects during filling process

In the chemical or petrochemical industry, products will be usually filled into containers for use of transportation or sale. Filling of flammable products is particularly dangerous, when containers (drums, IBCs, tank trucks, railway wagons) or products are electrostatic charged. In these cases, grounding of containers is mandatory.

Theoretically, spark discharge can be easily avoided by simply grounding all conductive parts. However, experience shows

3] cf.: SH/T 3097 (2016): Specification for design of static electricity earthing in petrochemical industry, p. 5

4] cf.: TRGS 727 (2016), p. 87

that the safe grounding of all conductive parts in practice is not possible to ensure permanently. This applies in particular to mobile objects such as tank trucks, which have to be grounded by the operator, when loading or unloading.<sup>5</sup>

Therefore, to ensure grounding of tank trucks, TRGS 727 and IEC TS 60079-32-1 recommend ground monitoring systems (interlock equipment), that blocks the loading or unloading process, when the grounding cable is not connected, is interrupted, or when the grounding connection is not safe.

**TIMM’s grounding control technology**

TIMM provides grounding control devices for controlled and monitored grounding for all kinds of containers.

**EKX-4 (1-pole | standard version)**

Especially designed for tank trucks. The object impedance will be measured to ensure the grounding connection on tank trucks.

**EKX-4 (2-pole)**

Especially designed for grounding of drums, containers and IBCs.

**EKX-FIBC**

Special version for grounding control of FIBC type C (big bags).

**For further information**

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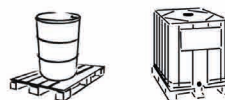


**- Guidance to Safe Electrostatic Grounding**

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<sup>5</sup> cf.: Handbuch des Explosionsschutzes (2016), Henrikus Stehen, John Wiley & Sons, p. 155