



IMPROVING TANK FARM SAFETY GROUNDING & LIGHTNING PROTECTION SOLUTIONS

SAE ENHANCED GROUNDING ELECTRODES

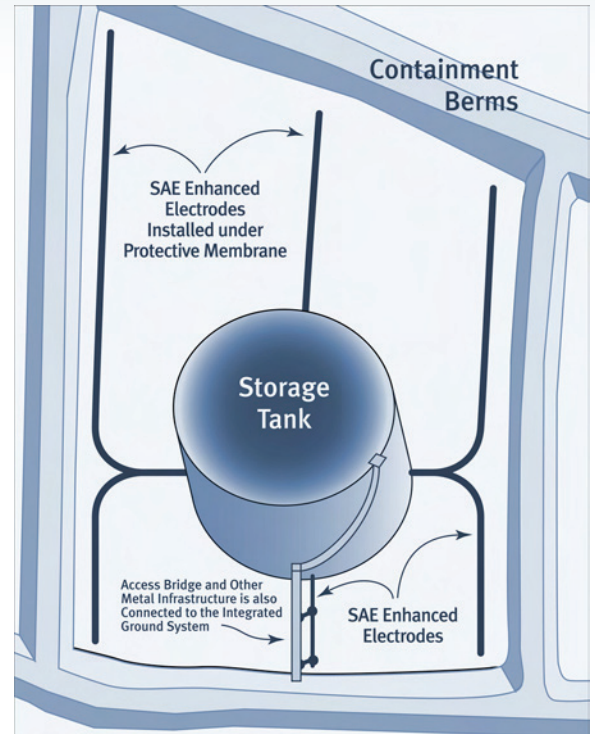
SAE enhanced grounding electrodes offer unparalleled electrical and financial performance over competing approaches, notably:

- SAE electrodes are constructed of **CONDUCRETE[®] DM100**, a specially formulated conductive cement that sets up to form molecular bonds between the copper core conductor and soil that enhance energy dissipation, even in difficult, high soil resistivity conditions;
- Engineered SAE electrodes feature low impedance and high capacitive electrical properties – ideal for grounding systems;
- Superlative high energy dissipation characteristics – the large surface area of an SAE electrode keeps surface energy densities low, facilitating better energy dispersal into the soil and preventing high energy damage to the electrode itself, which in turn contributes to excellent longevity, especially under repeated lightning strike events;
- SAE electrodes are built to deliver their high performance, maintenance-free service over very long lifetimes of 25+ years, contributing positively to your financial bottom line;
- SAE electrodes further enhance tank farm safety by eliminating lightning induced Ground Potential Rise (GPR) arcing to nearby structures that can ignite the combustion of volatile fuels;
- Environmentally neutral, SAE enhanced grounding electrodes are sealed to prevent contaminant migration;
- Where site geometry and conditions permit, more efficient horizontal electrodes can be engineered instead of more costly vertical systems.

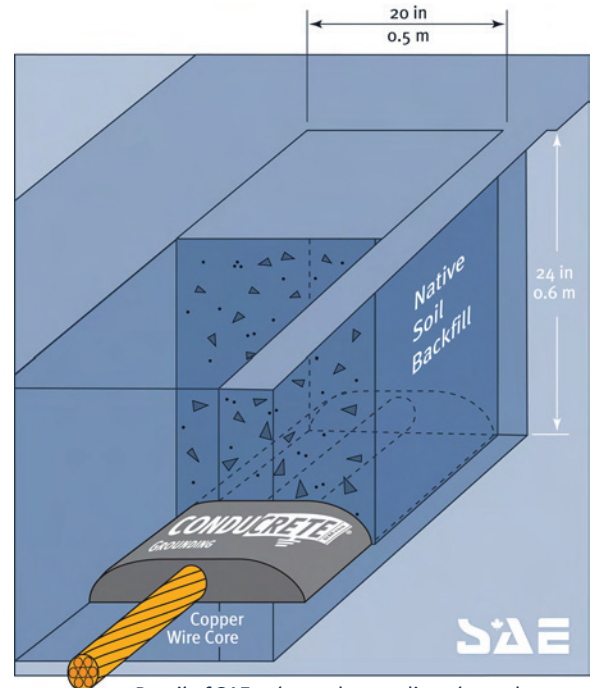
SAE SERVICES[™]

SAE Inc. tank farm safety solutions can include supporting services:

- Grounding system audits with upgrade recommendations;
- Engineering for brownfield and greenfield site grounding systems;
- Project procurement, logistics and installation/construction;
- Construction supervision and Project Management.



Generalized tank grounding design with radial electrodes



Detail of SAE enhanced grounding electrode



IMPROVING TANK FARM SAFETY GROUNDING & LIGHTNING PROTECTION SOLUTIONS

**REDUCE RISKS OF
STORAGE TANK FARM
LIGHTNING STRIKE
DAMAGE OR LOSS**

**REDUCE RISKS OF
PERSONNEL INJURY**

**GROUNDING SYSTEM
PERFORMANCE
AUDITS &
ENGINEERING**

**ADVANCED, HIGH
PERFORMANCE
& LONG LIFE
GROUNDING
SOLUTIONS**

**ROBUST VERTICAL
& HORIZONTAL
MAINTENANCE-FREE
ELECTRODE DESIGNS**

**SAE ELECTRODES ARE
ENVIRONMENTALLY
NEUTRAL & SEALED
TO PREVENT
CONTAMINANT
MIGRATION**

**SUITABLE FOR BOTH
BROWNFIELD AND
GREENFIELD SITES**

THE RISK

Inadequate storage tank grounding in tank farms compromises critical protection and safety systems, leaving the tanks and nearby structures vulnerable to potentially catastrophic lightning strikes. This significantly increases the risk for infrastructure damage, personnel injury and related legal and financial liabilities.

How can these risks be managed?



Dense tank farms present major grounding challenges

EVALUATING EXISTING GROUNDING SYSTEMS

The first step towards a solution is to audit existing tank farm grounding systems to assess:

- The state of the grounding system, focussing on corroded elements. Corrosion degrades the ability of the system to respond to lightning events;
- The integrity and performance of the grounding system as a whole, including nearby grounding systems. Independent grounding systems in close proximity to each other can actually work against each other, causing dangerous ground loop currents;
- Conformance to current grounding practices and regulations;
- A review of grounding system advances, including new technologies and materials.



Closer view of storage tanks and associated infrastructure

TOWARDS A SOLUTION

With a clear grasp of the weaknesses and deficiencies in existing grounding systems, action can be initiated to upgrade tank grounding and lightning protection systems with new technologies that provide better safety margins and improved performance over a longer life.

An innovator in advanced grounding and cathodic protection materials and services for the oil and gas sector, SAE Inc. offers engineered solutions specific to tank farm grounding and lightning protection that incorporate modern design techniques and advanced materials developed and manufactured in-house.

SAE tank grounding solutions are typically vertical, but where site areas permit, budget friendly horizontal electrodes can be built (see diagram). This high level design approach, combined with unique SAE enhanced electrodes, provides effective performance over exceptionally long lifetimes.