

# Earth-Rite® RTR™

## Static Grounding for Tank Trucks



Precision and reliability is what the **Earth-Rite® RTR™** provides to HAZLOC safety professionals and engineers who are tasked with protecting personnel and plant assets from the ignition hazards of static electricity during tank truck loading and unloading operations.

**Inquiry** > Click here to submit a product related query or a request for quotation.

The loading and unloading of tank trucks with large quantities of chemicals and powders generates static electricity which, if left to accumulate on a tank truck, could discharge electrostatic sparks with energies far in excess of the minimum ignition energies of a vast range of combustible gases, vapours and dusts. The ignition of such atmospheres by static electricity can be prevented by ensuring the tank truck is grounded.

Grounding ensures there can be no build of static electricity on the tank and chassis of the tank truck and the most reliable way of grounding your tank trucks is to specify an Earth-Rite® RTR™. With over 3,000 units in the field the 2nd generation Earth-Rite® RTR™ is the most reliable and precise method of grounding tank trucks today.

The Earth-Rite® RTR™ utilises patented electronics called “Tri-Mode” technology (next page) to establish three key inputs that must be in place before the loading/unloading operation can commence. When the three key inputs are met, only then will the Earth-Rite® RTR™ go permissive and energise its pair of dry change-over contacts to engage the pump, or whatever equipment is interlocked with the system, to control the flow of product to or from the tank truck. Any static generated by the loading operation is transferred from the tank truck via the Earth-Rite® RTR™ to ground, eliminating static electricity as a potential source of ignition.



**Earth-Rite® RTR™** Road Tanker Grounding System

### The Earth-Rite RTR includes:

- > **Explosion Proof Control Enclosure** incorporating Intrinsically Safe Static Ground Monitoring Electronics.
- > **Ground Connection Junction Box** with Clamp Stowage Point and Quick Release Connector.
- > **Heavy Duty Stainless Steel Universal Grounding Clamp** with Hytrel™ Extendable Cable and Quick Connectors.

## Earth-Rite® RTR™ Static Grounding for Tank Trucks

### Tri-Mode Technology

#### MODE 1 | Tank Truck Recognition

In accordance with the recommendations of IEC 60079-32\*, the Earth-Rite® RTR™ determines if the grounding clamp is connected to a tank truck. This ensures the clamp is connected to the main body of the tank truck and cannot be bypassed by connecting the clamp to the loading rack.

#### MODE 2 | Static Ground Verification

The Earth-Rite® RTR™ ensures that it has a connection to the general mass of the earth. This is a critical input as a connection to earth is the only means by which the static electricity can be transferred from the tank truck, preventing the accumulation of static electricity.

#### MODE 3 | Continuous Ground Loop Monitoring

In accordance with the key recommendations of IEC 60079-32\* and NFPA 77\*, the Earth-Rite® RTR™ ensures the resistance between the tank truck and the verified grounding point at the loading rack never exceeds 10 ohms. The Earth-Rite® RTR™ achieves this by monitoring the resistance between the RTR clamp's connection to the tank truck and the RTR's connection to the verified grounding point for the duration of the transfer operation.

\*IEC 60079-32, "Explosive atmospheres: electrostatic hazards, guidance"

\*NFPA 77, "Recommended Practice on Static Electricity".



Pulsing LEDs confirm positive ground connection.

<b>Compliant with IEC 60079-32 &amp; NFPA 77</b>	The monitoring set-point of 10 ohms resistance is compliant with the standards for static control in hazardous areas: IEC 60079-32 & NFPA77.
<b>Operator friendly interface</b>	Simple GO / NO GO indication informs operator when the road tanker is connected to ground. When a positive ground connection is made the pulsing hi-visibility indicators are activated during the MODE 3   Continuous Ground Loop Monitoring stage.
<b>Control / Interlock capability (Two dry output contacts)</b>	The first output contact can be used to interlock with flow control devices (e.g. pumps, valves, PLCs) to ensure product cannot flow unless the RTR has established a ground path for the tanker truck. The second output contact can operate attention grabbing devices (e.g. strobe lights) to warn personnel that a hazardous product transfer is underway.
<b>Wide operating temperature range</b>	The RTR system can operate in extreme weather conditions without modifications or enhanced protection: -40°F to +122°F.
<b>Detachable Clamp &amp; Cable</b>	Quick Connect system provides flexible and easy removal of grounding clamp and cable from the hazardous area for maintenance.
<b>Universally Approved Enclosure</b>	Suitable for installation in highest range of gas and vapour environments.

The Earth-Rite® RTR™ forms part of the Earth-Rite® range of Static Grounding and Bonding Equipment available from Newson Gale Inc.

#### Options

- RTR System Tester (ER2/CRT)
- Mode Selector Keyswitch
- Self-Retracting Cable Reel
- Explosion Proof Strobe Light
- IEC/Cenelec (European) and NEC/CEC (North American) versions available

#### Certification



**Ingress Protection**  
Type 4X - IP 66

**Temperature Range**  
-40°F to +122°F - CSA  
(-40°C to +55°C -  
ATEX / IECEx)

#### Power Supply

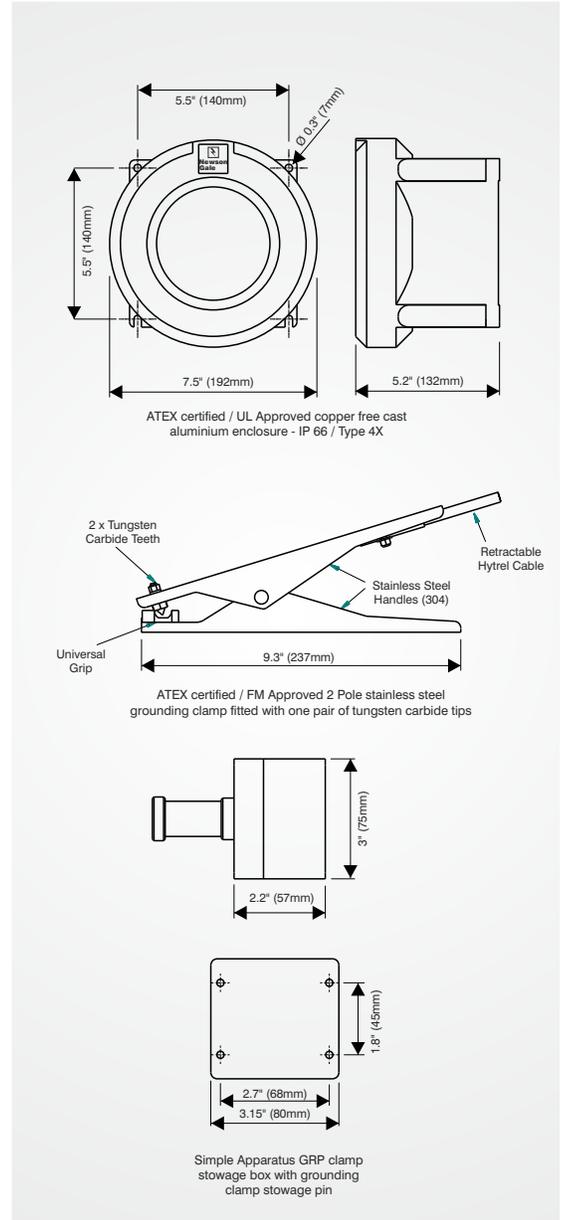
Selectable 110/120 V or 220/240 V AC, 50-60 Hz  
Selectable 12 V or 24 V DC

**Earth-Rite® RTR™** Static Grounding for Tank Trucks

**Technical Specification**

XP (Class I, II, III - Div 1 Installations)

Monitoring unit	
<b>Power supply</b>	110/120 V or 220/240 V AC, 50-60 Hz 12 V or 24 V DC
<b>Power rating</b>	10 watt
<b>Ambient temperature range</b>	-13°F to +131°F
<b>Ingress protection</b>	Type 4X, (IP 66)
<b>Weight</b>	9.9 lbs (4.5 kg) nett
<b>Construction</b>	Copper-free cast aluminium
<b>Monitoring Circuit</b>	Intrinsically Safe
<b>Operational Series Ground Resistance</b>	Nominally ≤10 Ohm
<b>Output Relay Contact Rating</b>	2 off dry contacts, 250 V AC, 5 A, 500 VA max resistive 30 V DC, 2 A, 60 W max resistive
<b>Cable Entries</b>	7 x ¾" NPT (supplied with 4 stopper plugs)
Junction Box/Stowage Point	
<b>Enclosure Material</b>	GRP with carbon loading
<b>Terminals</b>	2 x AWG #14 conductor capacity
<b>Stowage Device</b>	Insulated ¾" diameter pin
<b>Cable Entries</b>	1 x M20
<b>Clamp Cable Connection</b>	Quick Connect
Grounding Clamp	
<b>Clamp Design</b>	2 pole with tungsten carbide teeth
<b>Body</b>	Stainless Steel
<b>Approval</b>	FM Approved
Spiral Cable	
<b>Cable</b>	Blue Cen-Stat Hytrel sheath (Static dissipative, chemical & abrasion resistant)
<b>Conductors</b>	2 x AWG #18 copper
<b>Length</b>	32 ft. (10 m) extended, 3 ft. (1 m) unextended (other lengths available - please inquire)



**Earth-Rite® RTR™** Static Grounding for Tank Trucks

### Hazardous Area Certification

Europe / International:	North America:
<p><b>IECEX</b>                      Ex d[ia] IIC T6 Gb(Ga) (gas &amp; vapour).                      Ex tb IIIC T80°C IP66 Db (combustible dusts).                      Ta = -40°C to +55°C.                      IECEX SIR 09.0018                      IECEX certifying body: SIRA.</p> <p><b>ATEX</b>                      II 2(1)GD                      Ex d[ia] IIC T6 Gb(Ga)                      Ex tb IIIC T80°C IP66 Db                      Ta = -40°C to +55°C.                      Sira 09ATEX2047                      ATEX Notified Body: SIRA.</p>	<p><b>NEC 500 / CEC (Class &amp; Division)</b>                      Associated Equipment [Ex ia] for use in                      Class I, Div. 1, Groups A, B, C, D;                      Class II, Div. 1, Groups E, F, G;                      Class III, Div. 1,                      Providing intrinsically safe circuits for                      Class I, Div. 1, Groups A, B, C, D;                      Class II, Div. 1, Groups E, F, G;                      Class III, Div. 1,                      When installed per Control Dwg:                      ER11-Q-10110 cCSAus                      Ta = -25°C to +50°C.                      Ta = -13°F to +122°F.</p> <p>OSHA recognised NRTL: CSA.</p> <p><b>NEC 505 &amp; 506 (Class &amp; Zoning)</b>                      Class I, Zone 1 [0] AEx d[ia] IIC T6 Gb(Ga)                      (gas &amp; vapour).                      Class II, Zone 21 [20] AEx tD [iaD] 21 T80°C                      (combustible dusts).</p> <p><b>CEC Section 18 (Class &amp; Zoning)</b>                      Class I, Zone 1[0] Ex d[ia] IIC T6 Gb(Ga)                      DIP A21, IP66, T80°C</p>

### Additional Certification

<b>Safety Integrity Level:</b>	SIL 2 (in accordance with IEC/EN 61508).
<b>SIL assessment body:</b>	Exida
<b>EMC Tested:</b>	to EN 61000-6-4, EN 61000-6-2 FCC - Part 15 (Class B)



**Earth-Rite® RTR™** Static Grounding for Tank Trucks

**Technical Specification**

GRP (Class I, II, III - Div 2 Installations)

Power Supply & Monitoring Unit

<b>Power Supply</b>	108/125 V or 216/250 V AC, 50-60 Hz 12 V or 24 V DC
<b>Power Rating</b>	10 watt
<b>Ambient Temperature Range</b>	-13°F to +122°F
<b>Ingress Protection</b>	IP 66
<b>Weight</b>	4.4 lbs (2 kgs) nett
<b>Construction</b>	Carbon-loaded GRP
<b>Monitoring Circuit</b>	Intrinsically safe
<b>Operational Series Ground Resistance</b>	Nominally ≤10 Ohm
<b>Output Relay Contact Rating</b>	2 off dry contacts, 250 V AC, 5 A, 500 VA max resistive 30 V DC, 2 A, 60 W max resistive
<b>Cable Entries</b>	7 x M20 (4 x plugged)

Junction Box/Stowage Point

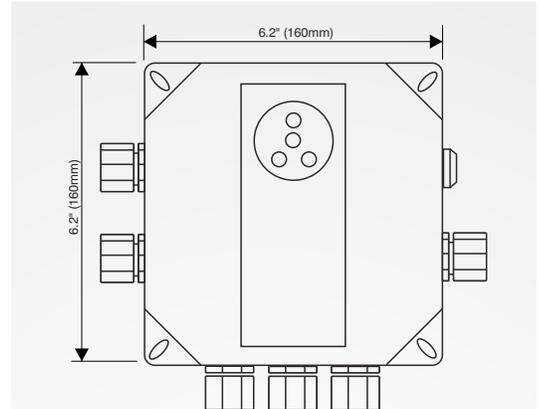
<b>Enclosure Material</b>	GRP with carbon loading
<b>Terminals</b>	2 x AWG #14 conductor capacity
<b>Stowage Device</b>	Insulated 0.79" diameter pin
<b>Cable Entries</b>	1 x M20
<b>Clamp Cable Connection</b>	Quick Connect

Grounding Clamp

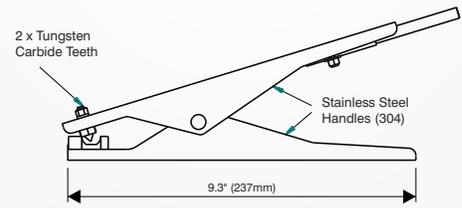
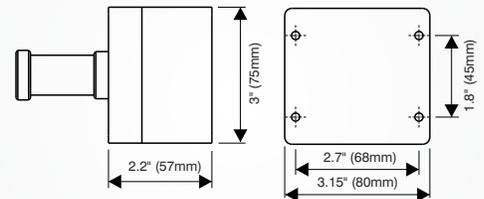
<b>Clamp Design</b>	2 pole with tungsten carbide teeth
<b>Body</b>	Stainless steel
<b>Certification</b>	Ex II 1 GD T6
<b>Approval</b>	FM Approved

Spiral Cable

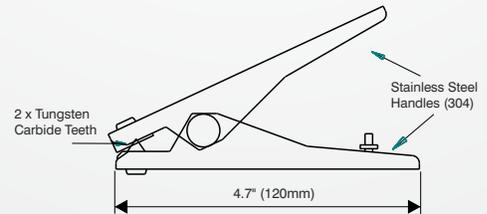
<b>Cable</b>	Blue Cen-Stat Hytrel sheath (Static dissipative, chemical & abrasion resistant)
<b>Conductors</b>	2 x AWG #18 copper
<b>Length</b>	32 ft. (10 m) extended, 3 ft. (1 m) unextended (other lengths available, please inquire)



Earth-Rite RTR in Static Dissipative Enclosure consisting of ground loop monitoring module and 230V/110V power supply for Zone 21 & 22 dust atmospheres installations. This system may also be installed in Zone 2 atmospheres. For Zone 1 installations the Earth-Rite RTR is supplied in a universally approved Ex(d)/XP metal enclosure.



X90-IP - Static Grounding Clamp



X45-IP - Static Grounding Clamp

ATEX certified / FM Approved 2 Pole stainless steel grounding clamp fitted with one pair of tungsten carbide tips.

**Earth-Rite® RTR™** Static Grounding for Tank Trucks

### Hazardous Area Certification

<b>Europe / International:</b>	<b>North America:</b>
<p><b>IECEX</b>                      Ex nA nC [ia] IIC T4 Gc(Ga) (gas &amp; vapour).                      Ex tb IIIC T70°C Db (combustible dusts).                      Ta = -40°C to +55°C.                      IECEX SIR 09.0097                      IECEX certifying body: SIRA.</p> <p><b>ATEX</b>                      Ⓢ II 3(1) G                      Ex II 2D                      Ex nA nC [ia] IIC T4 Gc(Ga)                      Ex tb IIIC T70°C Db                      Ta = -40°C to +55°C.                      Sira 09ATEX2247                      ATEX Notified Body: SIRA.</p>	<p><b>NEC 500 / CEC (Class &amp; Division)</b>                      Associated Equipment [Ex ia] for use in                      Class I, Div. 2, Groups A, B, C, D;                      Class II, Div. 2, Groups E, F, G                      Class III, Div. 2,                      Providing Intrinsically Safe circuits for                      Class I, Div. 1, Groups A, B, C, D;                      Class II, Div. 1, Groups E, F, G;                      Class III, Div. 1;                      When installed per Control Dwg;                      ERII-Q-10165 cCSAus                      Ta = -25°C to +55°C.                      Ta = -13°F to +131°F.</p> <p>OSHA recognised NRTL: CSA.</p> <p><b>NEC 505 &amp; 506 (Class &amp; Zoning)</b>                      Class I, Zone 2, (Zone 0), AEx nA[ia] IIC T4                      (gas &amp; vapour).                      Class II, Zone 21, AEx tD[iaD] 21, T70°C,                      (combustible dusts).</p> <p><b>CEC Section 18 (Class &amp; Zoning)</b>                      Class I, Zone 2 (Zone 0) Ex nA[ia] IIC T4                      DIP A21, IP66, T70°C</p>

### Additional Certification

<b>Safety Integrity Level:</b>	SIL 2 (in accordance with IEC/EN 61508).
<b>SIL assessment body:</b>	Exida
<b>EMC Tested:</b>	to EN 61000-6-4, EN 61000-6-2 FCC - Part 15 (Class B)



## **Earth-Rite® RTR™** Static Grounding for Tank Trucks

### System options

Newson Gale supplies a range of product options that enhance the control and general safety of transfer processes and aid engineers with system installations and routine system service checks. Contact Newson Gale or your local Newson Gale representative for more information on the range of options available.

#### **Hazardous Area Strobe Light**

The strobe light is mounted in an elevated position and when the equipment is correctly grounded, flashes continuously informing personnel that a transfer process is underway and is protected from the static hazard. The strobe light can be used in conjunction with the **Earth-Rite RTR** and **Earth-Rite PLUS**.

- > ATEX and Class/Div approved versions.
- > 115 V / 230 V AC and 24 V / 48 V DC options.
- > Amber, Green & Red strobe colour options.



**Hazardous Area Strobe Light**  
Product Code: VESI/33U (Class/Div)  
Inquire for color and mounting options

#### **RTR Tester**

The **RTR Tester** is designed to have the same electrical characteristics as a road tanker and provides engineers with a means of checking that the **RTR** undergoing installation is permissive when it detects these characteristics. The Tester is connected to the **RTR** system and its grounding point, and when activated, the **RTR**'s LED indicators change from red to green, confirming that the Road Tanker Recognition and Static Ground Verification checks are functioning as intended.

- > Ideal for system commissioning and routine service checks.
- > Easy to use with simple PASS / FAIL condition.



**RTR Tester**  
Product Code: ER2/CRT.

## **Earth-Rite® RTR™** Static Grounding for Tank Trucks

### **VESM02 Retractable Cable Reel**

The VESM02 Retractable Cable Reel is supplied for grounding system installations where customers want to ensure the grounding clamp and cable are returned to the static grounding system by operators and drivers on completion of the product transfer process. The **VESM02 Reel** can be used in conjunction with the **Earth-Rite RTR**, **Earth-Rite MGV** and **Earth-Rite PLUS**.

- > Certified for ATEX Zone 1 and 21 hazardous areas.
- > Self-retracting with up to 15 m (50 ft.) of Hytrel® protected cable.
- > Silver plated ultra low resistance slip ring contacts.



**VESM02 Retractable  
Cable Reel**

Product Code: VESM02.

### **Sun Shield**

Designed for operating environments subject to intense sunlight, the ER11 Sun Shield prevents direct sunlight hitting the indicators on the **Earth-Rite RTR** and **Earth-Rite PLUS** static grounding systems.

The Sun Shield casts a shadow over the indicators during peak sun light hours so that operators can easily view the ground status indicators. The shield is constructed from stainless steel and can be fitted to any installation in a matter of minutes.



**Sun Shield**

Product Code: ER2/SH

**Earth-Rite® RTR™** Static Grounding for Tank Trucks

**Inquiry >** Click here to submit a product related query or a request for quotation.

**Application Spotlight** Tank Truck static grounding protection.

As the product (liquid or powder) moves through the transfer system and interacts with pumps, valves, filters meshes and pipe walls, the product will be building up the amount of electrostatic charge it carries. In electrical terms this is commonly described as static charge accumulation. When the charged product is transferred into the tank truck, the tank truck will become electrified and be subjected to a rising voltage.

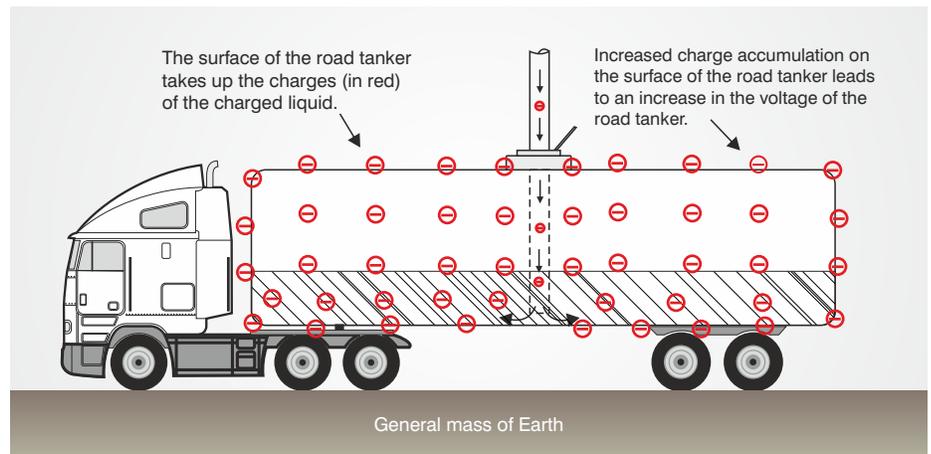
When a typical tank truck is being filled with a liquid at recommended flow rates, but has no static grounding protection in place, it could have its voltage raised to between 10,000 volts and 30,000 volts within 10 to 50 seconds. This voltage range is very capable of discharging a high energy electrostatic spark towards objects at a lower voltage potential, especially anything at ground potential. Examples of objects at ground potential could be operators working in the vicinity of the truck, or the filling pipe situated in the hatch on top of the tank truck.

A truck with capacitance as little as 1000 pico-farads, that has been electrified to 30,000 volts, has approximately 450 milli-joules of potential spark energy waiting to be discharged in the form of a spark. Given that most hydrocarbon vapors and gases have MIEs of less than 1 milli-joule and most combustible dusts have MIEs of less than 200 milli-joules, it's easy to see why tank trucks that do not have static grounding protection in place can be a major ignition source in a hazardous location.

To counteract this risk, it is important to ensure that the tank truck does not have the capacity to accumulate static electricity. The most practical and comprehensive way of achieving this is to make sure that the tank truck is at “ground potential”, especially before the transfer process starts. When we describe “ground potential” we mean that the tank truck is connected to the general mass of the Earth, which is commonly referred to, in electrical terms, as “True Earth”.

It is possible to estimate the energy of such sparks by combining the capacitance of the tank truck with the voltage on the tank truck at the time the spark is discharged.

Capacitance is a measure of how much charge can accumulate on the outer surface of the tank truck. Because tank trucks have a very large surface area, they can accumulate very large amounts of charge, which in turn, creates the presence of very high voltages on the surface of the tank truck.



1. Electrostatically charged road tanker (electrified road tanker).

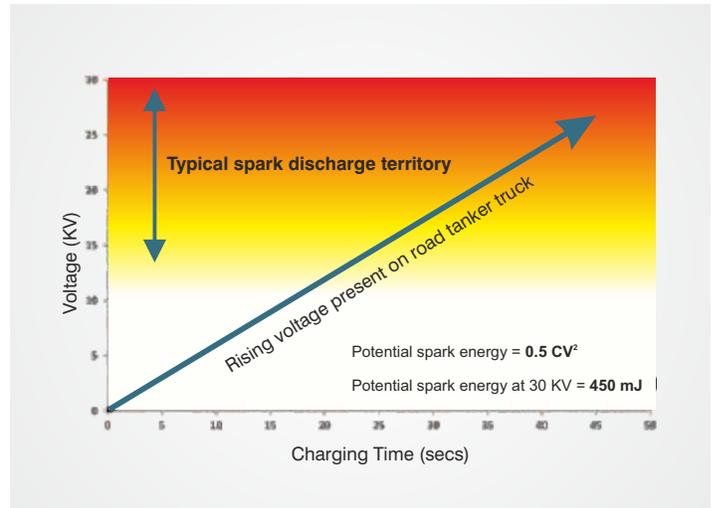
**Earth-Rite® RTR™** Static Grounding for Tank Trucks

**Application Spotlight** Tank Truck static grounding protection.

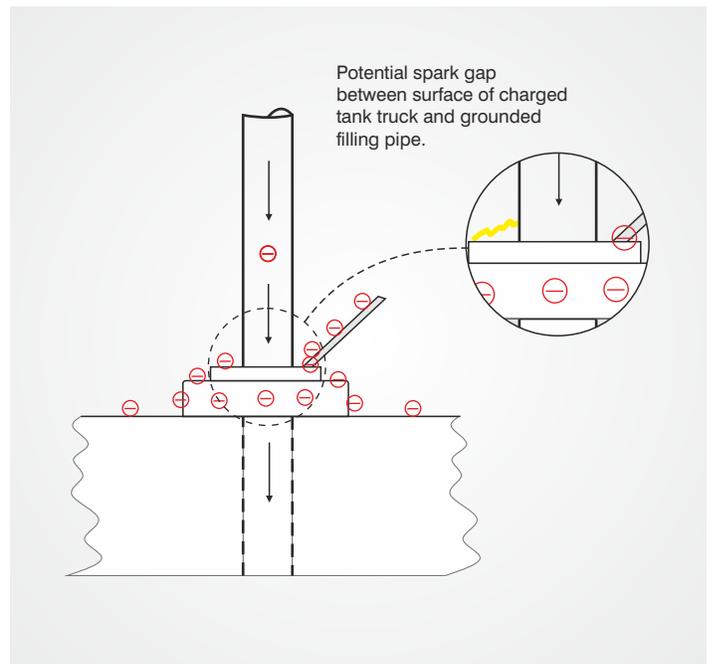
This is because the general mass of the Earth has an infinite capacity to pull static charges from the tank truck, which in turn eliminates the generation and presence of voltages on the tank truck.

The **Earth-Rite® RTR** performs three critical functions which ensures the fire and explosion risk of an ignition caused by static electricity is eliminated. The first function the **Earth-Rite® RTR** performs is in determining if the driver or operator has made a secure connection to the body of the tank truck.

This minimises the risk of the driver obtaining a permissive condition for the static grounding system by connecting to metal objects like the loading rack, or objects on the tank truck that could be isolated from the main body of the tank truck (e.g. wheel nuts), as this would defeat the objective of passing electrostatic charges from the tank truck to ground.



2. Voltage build-up on charged tank truck.



3. Example of potential spark gap during road tanker loading operation.

**Earth-Rite® RTR™** Static Grounding for Tank Trucks

**Application Spotlight** Tank Truck static grounding protection.

The **Earth-Rite® RTR** then verifies if it has a low resistance connection to True Earth via the structure to which it is connected, e.g. the loading rack.

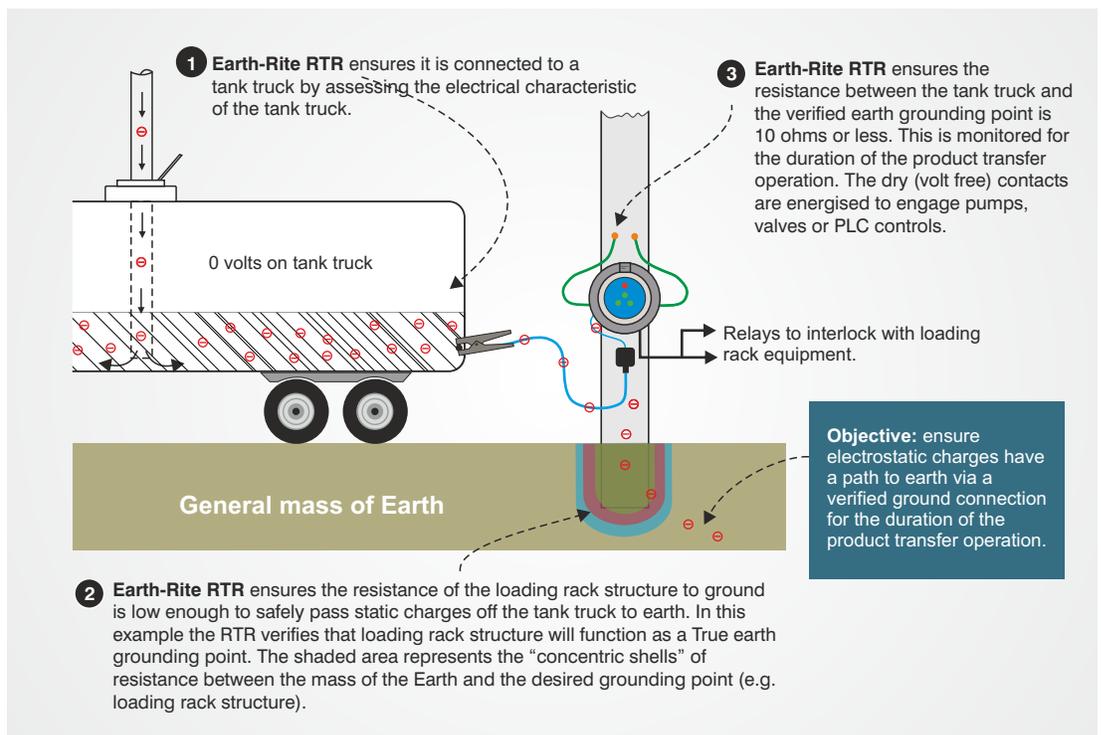
As any static charges generated by tank truck loading (unloading) process will travel to ground via the **Earth-Rite® RTR**, it is important to ensure the **Earth-Rite® RTR** itself has a low resistance connection to True earth. When both of these conditions are positive, i.e.:

1. **The Earth-Rite® RTR knows it is connected to a tank truck.**
2. **The Earth-Rite® RTR knows it is connected to a verified earth ground.**

...the **Earth-Rite® RTR** will then establish and continuously monitor the connection resistance between the tank truck and the verified earth ground is 10 ohms or less.

10 ohms is the benchmark requirement repeated in several international Codes of Practice, the most prominent of which is the National Fire Protection Association's NFPA 77 "Recommended Practice on Static Electricity" and the IEC's 60079-32-1 "Explosive Atmospheres: Electrostatic Hazards - Guidance".

If the resistance is not more than 10 ohms the **Earth-Rite® RTR** will indicate that the tank truck is connected to ground and indicate this via its ground status indicators, a cluster of green LEDs that pulse continuously.



4. How the Earth-Rite RTR ensures static electricity cannot build-up on the tank truck.

**Earth-Rite<sup>®</sup> RTR<sup>™</sup>** Static Grounding for Tank Trucks

**Application Spotlight** Tank Truck static grounding protection.

The LEDs pulse continuously to indicate that the **RTR** is continuously monitoring the static grounding circuit between the tank truck and the verified earth grounding point (e.g. loading rack) for the duration of the product transfer process. If the resistance of the tank truck's connection to the verified earth ground ever rises above 10 ohms, the **Earth-Rite<sup>®</sup> RTR** will go non-permissive.

Both of the Codes of Practice listed above recommend that interlocks controlling the flow of product to or from the tank truck are provided by the static grounding system. To comply with this requirement, the **Earth-Rite<sup>®</sup> RTR** has two dry contacts that can interface with control circuits for pumps, valves and PLCs.

If the **Earth-Rite<sup>®</sup> RTR** determines that the tank truck has lost its connection to ground, the volt free contacts can be used to halt the transfer process. The benefit of halting the transfer process removes the charging mechanism that would otherwise charge up the tank truck while it has no active static grounding protection in place.

\* "earthing": the equivalent term is "grounding".



5. The Earth-Rite<sup>®</sup> RTR in a permissive condition.

**IEC 60079-32-1, section 7.3.2.3.3, part c, states:**

"It is recommended that the earth cable required in b) be part of a static earth monitoring system that continuously monitors the resistance between the truck and a designated earthing point on the gantry and activates interlocks to prevent loading when this resistance exceeds 10  $\Omega$ . It is further recommended that the static earth monitoring system should be capable of differentiating between connection to the truck's tank (or earth connection point) and other metal objects. This type of system will prevent operators from connecting the earthing system to objects (e.g. the mudguards) that may be electrically isolated from the truck's container."

Leading the way in hazardous area static control



**Earth-Rite® RTR™** Static Grounding for Tank Trucks



**Product Ordering Codes** \* Additional Options Available

Ordering Code	Product Description
<b>RTRMUA1A3*</b>	Earth-Rite RTR™ Static Grounding System, Selectable 110/120 V AC or 220/240 V AC including Heavy Duty grounding clamp, 32 ft. (10 m) retractable spiral cable and GRP clamp storage box
<b>RTRP1UA1A3*</b>	Earth-Rite RTR™ Static Grounding System, GRP Enclosure, Selectable 110/120 V AC or 220/240 V AC including Heavy Duty grounding clamp, 32 ft. (10 m) retractable spiral cable and GRP clamp storage box
<b>RTRP1UA4A7*</b>	Earth-Rite RTR™ Static Grounding System, GRP Enclosure, Selectable 110/120 V AC or 220/240 V AC including Heavy Duty grounding clamp, 50 ft. (15.2 m) retractable M02 cable reel
<b>VESM02</b>	VESM02 Retractable Cable reel with 50 ft. (15 m) of 2 conductor Hytrel protected static grounding cable
<b>ER2/CRT</b>	RTR™ Tester for RTR System installation commissioning and servicing
<b>ER2/SH</b>	Earth-Rite Sun Shield
<b>ER/VESS60</b>	SoundEx, XP Electronic Sounder
<b>VESI/33U</b>	Explosion Proof Strobe Light (colour options amber, clear, blue, green and red) - Please enquire for more details

**Contact Us** > Your inquiry will be processed rapidly via our webform enquiry service. If you would prefer to call us, or e-mail us, please use the contact details provided below.

\* Alternative clamp, cable length and reel options upon request.  
Contact your local sales office or distributor with your requirements.



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