Product Bulletin

SEALED CARGO SYSTEM (SCS)
For PETROLEUM TANKERS

As energy prices continue to increase and product loss problems continue to grow, active monitoring of bulk petroleum transport is becoming a necessary requirement.

Utilising proven Radio Frequency Identification (RFID) technology, Emco Wheaton's wireless Sealed Cargo System (SCS) for fuel road tankers provides operators a unique and accurate way to monitor individual compartment valves and hatches, give instant alerts and real time tracking from loading terminal to delivery point to a host computer or mobile phone.

The system is upgradeable to include wet leg (liquid presence) sensing and geo-fencing i.e. a complete sealed delivery system (SDS) that can replace and add much more than our successful hard wired, onboard SDS which, has been the preferred solution for many years.

PLATFORM

The SCS monitoring system uses bi-directional wireless communication based on RFID technology. RFID is an automatic identification method of storing and remotely retrieving data from tags. These tags function with the tankers loading/unloading API valves and manhole covers (if required).

The RFID tags receive and respond to radio frequency queries from an RFID transceiver or reader. This creates a physically linked domain where each API valve and manhole cover is uniquely identified, numbered, catalogued and tracked.

Every time an API valve or manhole cover is opened or any seal is tampered with it is instantly registered and reported to the host software and can provide an alert signal if the event is unauthorised.

In addition the tags are constantly monitored by the system so acquiring continuous information on their state. RFID is fast and automatic and does not require line of sight or contact.

The wireless SCS includes the following features,

- **AUTOMATIC**
- **ELECTRONIC**
- **WIRELESS**
- **RADIO FREQUENCY ID (RFID)**
- **UNIQUE ID**
- **REAL TIME MONITORING OF:**
  - **API VALVES**
  - **MANHOLE COVERS**
- **REAL TIME ALERTS**
- **GPS TRACKING**
- **FLEET MANAGEMENT INTERFACE**

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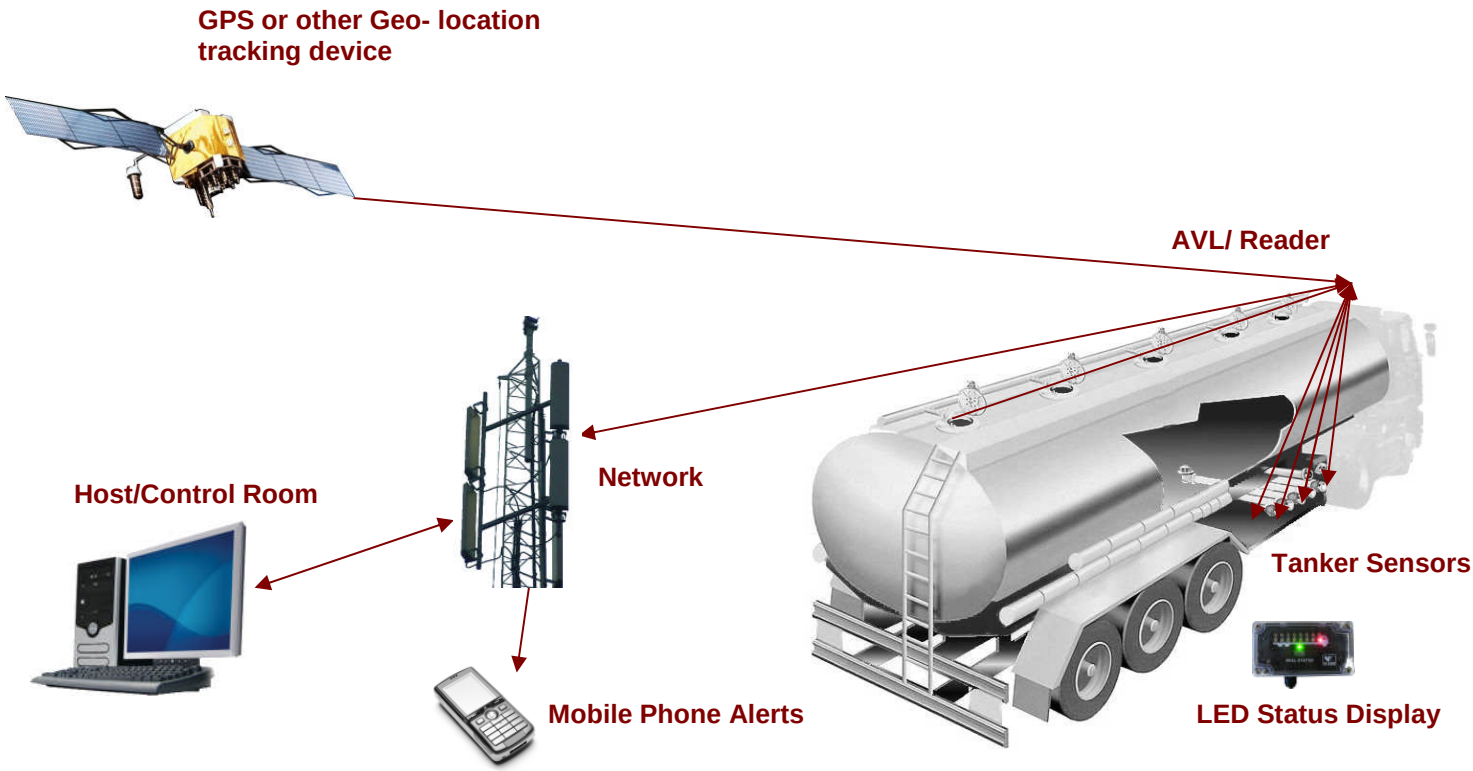
PLATFORM



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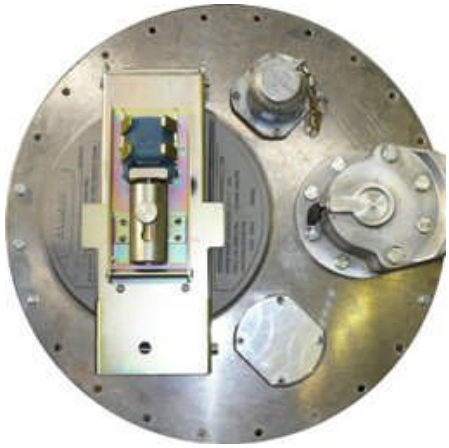
ELECTRONIC SEALS

Manhole Cover with sensor and RFID tag



Seal tags features,

- Intelligent RFID devices
- Monitor fuel access points
- Enable visibility of status
- Internal memory for events and user data including Time Stamp, Open, Close, Tamper, Set and Electronic Signatures.
- User memory for information such as the manifest that can be separated for use in areas where GPS is not available.
- Two radios to communicate via long range high frequency RF and
- Short range low frequency close contact for portable micro readers and handhelds.
- Reusable
- Long battery life (4 to 5 years in normal operating conditions)
- ATEX certified intrisically safe.

Tags are installed on the manhole cover and on a flanged pneumatic spool lock that is designed to be installed behind the API load/unload valve.

API valve spool lock with sensor and RFID tag

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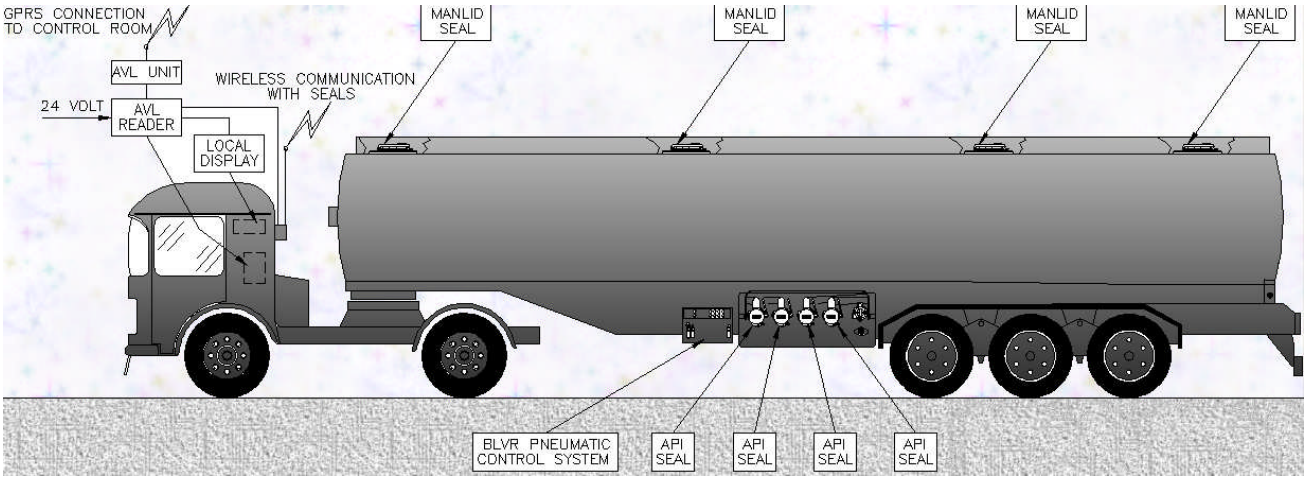
ORIENTATION OF TANKER COMPONENTS



READER

The reader can be connected serially to an AVL COMM Modem, on board computer (OBC), GPRS/Satellite modules depending on system set up.

RFID technology is used to provide automatic data collection and real-time monitoring of the seal tags during transit

The reader is installed in the truck cab and is powered by the vehicles power source. The reader and seal tags have full bi-directional communication capability.

Reader Functions include:

- Seal tag monitoring and communication.
- Two way transfer of seal tag information and cellular/SAT modem.
- Processing of seal events in real-time.
- Commands to seals for verification.
- Intelligence to process events/data and report to host via OBC/SAT/Modem.
- Connects and relays inormation to on board visual display unit.

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DISPLAY

The display provides drivers and customers the ability to be able to view the status of each compartment's manhole cover and API / discharge valve electronically. Any seal compromise can be seen at a glance.

The visual display shows valve and manhole cover sealed or unsealed status by tanker compartment using LED's and is mounted in the drivers cab. A real time facsimile of this display can be seen on the host computer.

TYPICAL OPERATION

- Service station sends a request for fuel to operations room of Fuel Company.
- Operator assigns a truck for the delivery and creates the Delivery Note.

This operation could be supported by the back office or ERP of the customer

- The selected truck arrives at the fuel loading facility. It fills up with fuel according to Delivery Note. The driver triggers a set operation and the reader sends the corresponding event to the Fleet Manager.

The meaning of the set operation is that the truck is ready for assignment. Fleet Manager notifies customer ERP. As the response Fleet Manager receives the Delivery Note.

- From this moment Fleet Manager Software monitors the truck according to specified Delivery Note.
- The tanker is on its way to service stations specified in Delivery Note. Every opening of seals outside those geo-fences triggers alerts.
- Tanker arrives to service station for unloading. Driver can open only the seals specified in Delivery Note for this station. This operation can be supported by Microreader or remote center.
- At the end of unloading the driver has to close all the seals on truck before leaving the geo-fence, otherwise system will generate alert.
- At the end of unloading for all stations specified in Delivery Note the truck is ready for new assignments