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Tank Truck Bottom Loading and Overflow Protection Systems

Foreword

This document presents the Standard prepared for tank vehicle and island components of approved Bottom Loading Systems pursuant to the Liquid Fuels Handling Code.

It was originally prepared as a consensus document by the Fuels Safety Branch and the Ontario Petroleum Association Task Force. This edition contains revisions intended to recognize rack control equipment designed for use with both Thermistor and Optic systems. Companies such as Scully, Dixon Bayco (under the name Flo Tech) and OPW (under the name Civacon) are three examples of companies who manufacture these systems.

This Standard is under continuing review and suggestions for technical changes shall be recommended by the Liquid Fuels Risk Reduction Group and approved by the Director of the Fuels Safety Program.

This 4th edition supersedes the 1981 edition.

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SECTION 1 - Coupler/Adapter

The coupler/adapter configuration shall satisfy the following requirements:

- a) The coupler can only be opened manually after connection to the adapter and the adapter valve shall be mechanically opened by the action of the coupler and shall automatically close when disconnected.
- b) The tank vehicle adapter shall conform to the applicable dimensional, pressure and test requirements of the latest edition of API 1004, for mating with loading couplers, including paragraph 5.12 (g) thereof.
- c) A dust cover with a liquid tight seal shall be provided.
- d) The coupler/adapter shall be capable of operation with all Class I, II and III petroleum products at their individual loading temperatures.

Note - If the user requires provision of a break feature to fail when a highway tank is accidentally moved while the coupler or unloading hose is connected, it shall be included in the coupler not the adapter. The design shall provide for automatic closing of the coupler and adapter valves prior to breakaway and shall fail safe with a minimum spillage of product.

SECTION 2 - Primary Shut-Off Loading Control

The primary shut-off loading shall be by means of loading island controls.

SECTION 3 - Automatic Overflow Protection

An automatic overflow protection system shall satisfy the following requirements:

- a) The system shall be electrically energized, self-checking, intrinsically safe, and the total system shall fail safe in both truck and island installations.
- b) Systems shall not be capable of being by-passed under normal operation. However, should there be the necessity for providing a manual override to compensate for system failure, such override shall be activated only by a lock controlled switch requiring supervisory authorization.
- c) The sensing level of the probe shall be installed 25 mm above the top-most calibration marker in each compartment.
- d) Where two systems are not compatible, there shall be design provisions to ensure that the connectors of incompatible systems cannot be interconnected.
- e) Compartment ullage above the probe sensing level shall provide for a maximum system shutdown time of 4 seconds without overflow from the compartment.
- f) The individual compartment overflow sensing devices shall have a maximum signal to island control system transmission time of ½ a second.
- g) The system shall provide loading rack shutdown. Overflow in any one compartment shall shut down the total system until the overflow condition is corrected.
- h) The system shall be capable of handling petroleum products at their loading temperatures and operate properly in the temperature range -40°C to +82°C.
- i) Connections in the system shall be to the manufacturers' specification and intrinsically safe.
- j) Electrical components shall conform to the requirements of the Ontario Electrical Safety Code and shall be certified.

- k) A non-replaceable, sealed fuse shall be included in the mounting assembly of each sensing probe where necessary to protect against accidental extraneous voltages or currents.
- l) The equipment mounted on islands dispensing Class I and II product up to +70°C product temperature shall monitor through a *single* connector any combination of compartments and /or vehicle configuration. Connections from the island controls to the overflow protection system installed in the vehicle shall be by means of connectors complying with the specific Annex for each system.
- m) The equipment mounted on islands dispensing Class III product (in excess of +70°C product temperature) may comply with (l), or if individual compartment connectors are installed on the vehicle, the mating connector component of the island system must be so restricted that it can only be mated with that connector appropriate to the compartment to which the loading arm is coupled. Connections from the island controls to the overflow protection system shall be by means of connectors complying with the specific Annex for each system.

SECTION 4 – Loading System

The piping and couplings shall be a minimum of 100mm I.D. with a maximum flow rate of 45 L/s for each loading assembly and a maximum system shutdown time of 4 seconds.

SECTION 5- Venting

The individual compartment vents shall satisfy the following requirements:

- a) Vents shall open automatically with emergency valve operation or by other means that will prevent start of loading until the vent is open.
- b) Vents shall comply with recognized vent standards.
- c) When the vent is open, it shall be able to pass the full liquid loading rate without allowing the tank to exceed its design working pressure.
- d) Vent vapour and liquid discharging capacities expressed in loading rate shall be clearly marked on the vent.

SECTION 6 – Grounding Circuit

The grounding circuit shall satisfy the following requirements:

- a) The grounding circuit shall provide a closed circuit from the truck to ground with a resistance of less than 10,000 ohms for the dissipation of static charges.
- b) Loading cannot begin or continue unless the grounding circuit is completed.
- c) The grounding circuit shall not be by-passed.

SECTION 7 – Dimensional Limitations

The installation shall be on the curbside of the vehicle with a maximum dimension of 9.15 m to outside centres of any combination of adapters. The face of the adapter must be on a vertical plane located at a maximum of 150 mm inside of the maximum width of the vehicle.

- a) Vehicles loading Class I and II products, 1000 mm \pm 300 mm vertical height.
- b) Vehicles loading Class III product, 1200 mm \pm 300 mm vertical height with a minimum of 1500 mm \pm 300 mm horizontally between adapter centres.