(Garuda Emblem)

MINISTERIAL REGULATIONS

FUEL OIL VAPOUR RECOVERY
B.E. 2550

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By virtue of Sections 5 and 7 (1), (3), (5) and (7) of the Fuel Oil Vapour Recovery Act, B.E. 2542 which provides for action to be taken pursuant to the law, the Minister of Energy hereby issues the Ministerial Regulations, as follows:

1. In these Ministerial Regulations:

"Fuel Oil Vapour" means vapour of benzene oil including those of other fuels as announced by the Minister.

"Vapour Recovery System Stage I" means a system of protection against release of fuel oil vapour into atmospheric surroundings during the process of oil transfer between storage tanks and oil trucks, or from trucks into underground storage tanks inside a fuel service station.

"Vapour Recovery System Stage II" means a system of _____against release of oil Vapour into atmosphesic surroundings during the process of oil transfer from oil distributing nozzles into oil trucks inside a fuel service station.

"Vapour Recovery Unit" means systems of pipelines, tanks and equipment used in the process to convert oil vapour into liquids.

"Fuel Oil Transport Truck" means vehicle used to transport fuel oil by land, excluding railway, which has an oil tank affixed to the upper part of its body.

Chapter 1

Fuel Oil Vapour Recovery System

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2. A system for vapour recovery shall be installed in the manner and in areas and within premises, as follows:

(1) Vapour Recovery System Stage I:

(A) Within areas of Bangkok Metropolis and the provinces of Samutprakarn, Nonthaburi, Pathumthani and other areas as designated by the Minister.

1. Petrol service stations under Category A (Gor).
2. Fuel oil depots.
3. Oil storage premises where oil intake/outtake are made via oil transportation trucks.
4. Premises where oil intake/outtake is made by oil pipeline transportation system and distributed onwards to oil trucks within the above premises.
5. Other premises as prescribed by the Minister.

(B) In areas throughout the country:

1. Petrol service stations under Category B (Kor).
2. Other premises as prescribed by the Minister.

(2) Vapour Recovery System Stage II:

(A) Within areas of Bangkok Metropolis and provinces of Samutprakarn, Nonthaburi, Pathumthani and other areas as designated by the Minister.

1. Petrol service stations under Category B (Kor).
2. Other premises as prescribed by the Minister.

(B) In areas throughout the country as prescribed by the Minister:

1. Areas designated by the Minister in the Notification.

3. Oil trucks which are not equipped with vapour recovery system Stage 1 are not allowed to accept or distribute oil containing oil vapour within premises listed in Clause 2 even though such premises may have a vapour recovery system, stage I already installed.

Chapter 2

Vapour Recovery Unit

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4. Vapour recovery units must be equipped with safety equipment as well as necessary components pursuant to standards set by the Department of Energy Businesses as published in the Government Gazette.

Vapour recovery units under the preceding paragraph must be capable of controlling oil vapour releases pursuant to standards prescribed by laws governing promotion and preservation of the country's environment.

5. Vapour recovery units must be installed in the following premises:

(1) Oil depots.
(2) Oil storage premises where oil intake/outtake are made via oil transportation trucks.
(3) Premises where oil intake/outtake are made by oil pipeline transportation system and where oil is distributed to oil trucks.

6. Vertical oil storage tanks with internal floating roofs must be equipped with vapour recovery units.

7. Vertical oil storage tanks with fixed roofs or horizontal oil storage tanks must be equipped with a vapour pipeline system extending from oil tanks to premises of oil intake/outtake, or equipped with vapour recovery units or any other means capable of eliminating fuel oil vapour in the manner which is up to the standards of a vapour recovery unit.

8. Action must be taken by operators of controlled businesses to ensure that the system of vapour recovery units are constantly checked and tested in order to contain the release of vapour within the parameters and standards prescribed by laws governing the promotion and preservation of the country's environment.

If it is found during such checks/tests in the preceding paragraph, that the value of vapour releases exceed mean standards set by laws governing the promotion and preservation of the country's environment, adjustment must be made without delay by the operator of such controlled business on its vapour recovery unit to ensure that the ventilated air is kept in

line with standards prescribed by laws governing the promotion and preservation of the country's environment.

9. Drawings of the vapour recovery unit must at least give the following details:

(1) Unit drawing
(2) Side-view drawing
(3) Cross-section drawing
(4) Foundation drawing
(5) Drawings showing details of the pipeline system, tanks and various equipment which may be checked.

Use a scale of not less than 1 : 50 for drawings under (1), (2), (3) and (4).

10. The oil intake/outtake system must be such which supports the bottom -line loading process and, at least, give the following details:

(1) Plan drawing
(2) Side-view drawing
(3) Cross-section drawing
(4) Foundation drawing
(5) Drawings showing details of installation of fuel oil intake/outtake platforms including pipeline system and equipment used to control such activities which may be checked.

Use a scale of not less than 1 : 50 for drawings under (1), (2), (3) and (4).

11. Vapour storage tanks in the vapour recovery unit must be placed at a distance of not less than 8.00 metres from boundary lines of premises under Clause 5, and not less than 20.00 m distance from houses or inflammable items.

12. If a vapour recovery unit is equipped with auto-ignition temperature devices, they must be kept at least 20.00 metres away from oil tanks.

13. Connectors of the fuel oil intake/outtake platforms shall be designed and tested on the following criteria:

(1) They must be of the type for specific use with fuel oil and designed in such a way to at least support 517 kPa (75 lb per sq. in.) operating pressure and at least 1.5 times the designed pressure.

(2) With at least 101.6 mm (4 inches) diameter.

(3) Where there are several connectors, distance between the surface level of the central point of each connector shall be distanced at not less than 254 mm (10 inch) and not more than 1.83 m (6 ft) from one another.

(4) They must be installed at a height between 0.458 metre (1.5 ft) to 1.22 metre (4 ft) above the ground.

14. The diameter of the vapour recovery unit's conduit system must not be less than 101.6 mm (4 inch), and the end of the conduit must be equipped with a connector with the same diameter of 101.6 mm (4 inch) as well.

15. Distribution platform equipment of the outtake control system must be designed in accordance with the following particulars:

(1) The system of control of fuel oil distribution, stage I, must consist of meter valves to control the volume of outflow.

(2) The system of control of fuel oil distribution, stage II, must consist of a signal system from the fuel-level measuring meter inside the fuel transportation tank to prevent fuel overflow from the tank during any filling-up process.

Chapter 3

Vapour Recovery by Class A (Gor) Petrol Service Stations And Class B (Kor) Petrol Service Stations

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16. Petrol Service Stations, Class A (Gor) and Class B (Kor) located in areas under Clause 2 (1) (a) and (b), are required to have Vapour Recovery System, Stage I in place. The manner, method of installation and testing of such system are as follows:

(1) Drawings of the Vapour Recovery System Stage I must give details concerning installation of the conduit system and vapour control/recovery equipment.

(2) Vapour conduits used in the vapour recovery system must be made of strong and stable materials which will not react with fuel oil. It can either be a single or double panelled conduit with a sloping gradient of not less than 1 : 100 towards underground fuel storage tank(s).

(3) Connectors of fuel oil conduits must be of the type which can prevent vapour leakages (quipped with dry break fitting) and must be covered with a cap when no intake/outtake activities are in progress.

(4) A device/equipment must be provided for overfill protection at the connector of fuel oil intake conduit or connector of the vapour conduit.

(5) A safety device/equipment for pressure and vacuum vent must be installed at the end of the fuel oil conduit with such features and testing methods as follows:

(a) Pressure ventilation must be activated by the safety device/equipment at a pressure of not less than the value of pressure generated while transferring oil from trucks into underground tanks which, however, must not exceed the tank's designed pressure. Vacuum ventilation must also be activated when there is a vacuum inside a tank with a vacuum pressure of not more than 2,000 Pa. (8 water inches).

(b) Such safety devices must be tested every two years.

(6) Vapour recovery units must be installed in accordance with any of the following conditions:

(a) Two Point Systems: there must be connector(s) for oil intake pipes and connectors for oil vapour pipes for each underground oil tank. Connectors of vapour pipes which are connected with the oil truck's flexible pipes to return the vapour back into oil transportation tanks must be larger than fuel pipes which are branched out to oil vapour recovery pipes to ensure ease of return of vapour flow back into the oil transportation tanks as illustrated in Drawing No. 1 attached hereto.

(b) Coaxial Systems: double-layer (coaxial) connectors must be provided to accept fuel oil supply and the return of oil vapour in the same pipe at each of the underground storage tanks, with coaxial delivery elbow branching out to the oil truck's flexible pipes as illustrated in Drawing No. 2 attached hereto.

(c) Manifolded Systems: manifolded vapour pipes must be provided for several underground storage tanks to cut down on the number of vapour connectors. Protection equipment against the flow of fuel oil into vapour pipes such as extractable ball float valve(s) must be provided at the connecting point of fuel oil pipes with manifolded pipes to prevent oil from flowing into vapour pipes, as illustrated in Drawing No. 3 attached hereto. However, it will not be necessary to install equipment/devices to prevent oil flow into vapour pipes if manifolded pipes are installed at a point higher than oil transportation tanks, as illustrated by Drawing No. 4 attached hereto.

(7) Once the vapour recovery unit, Type 1, are installed, the vapour control system must be tested before use with a pressure of not less than 0.70 kg. per cm^2 (1 lb/in^2) After it is left for at least 30 mins., there must not be any sign of leakages. Or, another testing method can be used pursuant to the Department of Energy Businesses' Notification duly published in the Government Gazette.

(8) The Vapour Recovery Unit, Type 1, must be tested every two years with the use of inert gas with a pressure of not less than 0.07 kg per cm^2 (1 lb/in^2) After it is left for at least 30 mins., there must not be any sign of leakage. Or, another method of test can be carried out pursuant to the Department of Energy Businesses' Notification duly published in the Government Gazette.

(9) Transfer of fuel oil from oil trucks into underground oil tanks installed with Vapour Recovery Unit Type 1 must be made with oil trucks duly equipped with Vapour Recovery Unit Type 1.

17. Arrangements must be made by fuel oil service stations, Type B, located in areas under 2 (2) (a) and (b) to have vapour recovery units, Type 2, installed for which their features, installation methods and tests are as follows:

(1) Vapour recovery unit Type 2 must show details of installation of the pipeline system, oil distribution box and vapour recovery units.

(2) The oil distribution box must be equipped with the following:

(a) double-layered oil distribution nozzle with an access door for oil outflow and a sleeve for oil vapour to flow back to underground oil tanks.

(b) Double-layered flexible pipes for filling oil with a sleeve for oil outflow and another for oil vapour to flow back to underground oil tanks.

(3) Vapour check valves must be installed at the vapour pipeline system to prevent vapour in the system from flowing back through oil distributing nozzles.

(4) Vapour pipes must be made of strong/stable materials which will not react with fuel oil. They may be single or double-layered with a sloping gradient of not less than 1 : 100 towards underground storage tanks.

(5) To connect each tank's vapour pipes together, a device must be installed to prevent oil from flowing into vapour pipes such as ball float valves or from flowing into other tanks while being transferred from oil trucks to underground storage tanks.

(6) Installation of vapour recovery unit, type 2, must be of the vacuum-assist system with vacuum pumps installed at the fuel distribution box or the vapour pipe systems capable of adjusting the force of suction to correlate with the rate of oil flow into the truck's oil tank to prevent it from being damaged as illustrated in Drawing No. 5 attached hereto.

(7) Once the vapour recovery unit, Type 2, have been installed, the vapour control system must be tested before use with a pressure of not less than 0.70 kg. per cm^2 (1 lb/in^2). After it is left for at least 30 mins., there must not be any sign of leakage. Or, another method of test can be carried out pursuant to the Department of Energy Businesses' Notification duly published in the Government Gazette.

(8) The Vapour Recovery Unit, Type 2, must be tested every two years with the use of inert gas with pressure of not less than 0.07 kg per cm^2 (1 lb/in^2). After it is left for at least 30 mins., there must not be any sign of leakage. Or, another method of test can be carried out pursuant to the Department of Energy Businesses' Notification duly published in the Government Gazette.

Chapter 4

Control of Oil Transportation Trucks' Oil Vapour

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18. Oil transportation trucks for fuel service stations Type A and B, oil depots, premises for storage of oil with oil intake/outtake by means of oil transportation trucks or by means of pipeline transportation system and from which fuel oil are distributed to oil trucks in areas under 2 (1) (a) and (b), must be trucks with bottom-loading intake/outtake capabilities and installed with vapour recovery unit, type 1.

19. Vapour recovery unit, Type 1, for oil trucks, must be equipped with safety equipment and necessary accessories pursuant to standards prescribed by the Department of Energy Businesses and published in the Government Gazette as well as installed in accordance with the approved plans.

20. Properties of connectors used for bottom-loading intake/outtake of oil must be as follows:

(1) poppet valves with a diameter of 101.6 mm (4 inch.) which can be opened to a depth of 50.87 mm (2 inch), measured from the front-most surface pursuant to the standards of API RP 1004 Bottom Loading and Vapour Recovery for MC-306 Tank Motor Vehicles.

(2) designed for use at a pressure of not less than 517 kPa (75 lb/in^2) and capable of withstanding a testing pressure of at lesat 1.5 times the functional pressure.

(3) designed for minimum loss of fuel oil during use such that when connectors are removed, fuel loss will not exceed 10 cm^3 per removal as averaged out from three disconnections.

(4) designed for all residue oil in the tank to be completely discharged after fuel oil transfer.

(5) lid provided to keep off dusts and capable of preventing oil leakages between connectors as well.

21. Oil transportation tanks and connector accessories for bottom-loading fuel oil intake/outtake must comply with the following requirements:

(1) connectors for oil intake/outtake must be installed on the left-hand side of the oil truck.

(2) Where there are several connectors for oil intake/outtake, the distance at horizontal plane from the centre of the connectors must not be less than 254 mm (10 inch) and not more than 1.83 m (6 ft) from one another. The front part of the connector must be vertical and located by not more than 152.4 mm (6 inches) deep from the widest part of the truck's body.

(3) Connectors for oil intake/outtake must be installed at a height of not more than 1.22 metres (4 ft.) above ground when the oil tank is empty, and not less than 0.458 metres (1.5 ft) above ground when it is fully-loaded.

(4) Oil transportation truck's pipeline system and equipment must be designed to be used at a pressure of not less than 517 kPa (75 lb/ in^2) and able to withstanding a testing pressure of not less than 1.5 times the functional pressure. If any device/equipment cannot withstand such pressure, it shall be separated from the bottom-loading oil intake/outtake system.

(5) Oil transportation tanks must be installed with pressure- and vacuum-assist safety systems to prevent them from being damaged as the result of pressure changes while oil are being transferred.

22. Oil trucks' transportation tanks must be installed with meters to measure oil levels in each oil container to prevent overfill, which may be any of the following systems:

(1) Termistor System: which check on changes of temperatures. When this device is high and dry in the air, the temperature will be higher than when it is immersed into fuel oil. When oil comes into contact with the meter, the meter's temperature will drop which will cause the meter's electric resistance value to change and send out electrical signals to the oil distribution station. Oil level in the tank will be checked by the Control System at the oil distribution station and order made for the distributing valve to be shut to prevent any overfill.

(2) Optical System: which check on reflection of light inside the meter. When this device is airborne, light may be reflected back to the photo detector and when the meter comes into contact with oil, light rays will not be reflected back to the photo detector and electrical signals will be sent to the oil distribution station. Oil level in the tank will then be checked by the Control System at the oil distribution station and order made for the distributing valve to be shut to prevent any overfill. Devices in this optical system must be located from ventilating valves to reduce hazy mists from being formed which may interfere with the meters' functions.

23. Receptacles used with oil level meters installed on oil trucks under 22 must be located at a distance of not more than 2.134 m (7 ft) from oil intake/outtake connectors and must not be located in a way which would cause obstruction to oil transfer work.

24. Vapour recovery unit, Type 2, must have a pipeline system with the pipe's cross-section area of not less than 101.6 mm (4 inch) with a vapour pipe connector of 101.6 mm (4 inch) size installed at the end of the pipe. The pipeline system connecting oil storage sectors to vapour recovery unit must have a cross-section area of not less than the pipe's cross-section area of 76.2 mm (3 inch).

25. Fuel pipeline connector under 24 must be of the fast insertion type according to the API RP 1004 bottom Loading and Vapour Recovery Standards for MC-306 Tank Motor Vehicles. Connectors for oil intake/outtake may not be used as connectors for oil vapour.

26. Fuel oil connectors must be located in any of the following positions:

(1) along the lines of the diameter of the connector used for oil intake/outtake underneath oil transportation tanks and must be located at not more than 2.134 m (7 ft) distance from oil intake/outtake connectors located underneath oil storage tanks.

(2) In areas around the head of oil transportation tank at the end of an oil truck.

(3) Vapour pipe connector must not be more than 1.524 m (5 ft) above-ground when the oil transportation tank is empty, and not less than 0.609 m (2 ft) when the tank is fully-loaded.

27. Vapour recovery unit, Type 1's equipment which are installed above oil transportation tanks must be located at a point below the level of the truck's overturn protective guard.

28. Prior to its first usage, vapour recovery unit, type 1 must be tested to ensure that it will be capable to control vapour recovery. Such test will be conducted with a pressure of 4,500 Pa (18 water inch) and vacuum pressure of 1,500 Pa (6 water inch) for 5 minutes, with a variable pressure of not more than 750 Pa (3 water inch). Tests on vapour recovery unit, type 1 on such properties must be conducted by this method every two years or by other methods prescribed by the Department of Energy Businesses as published in the Government Gazette.

Chapter 5

Standards of Equipment and Testers of Vapour Recovery Units

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29. As far as equipment to control distribution of oil by oil distribution platforms pursuant to Clause 1 are concerned, equipment of vapour recovery unit, Type 1, under 16

and equipment of vapour recovery unit, Type 2, under 17, shall be in accordance with standards prescribed by the Department of Energy Businesses as published in the Government Gazette.

30. Tests to be conducted on vapour recovery unit systems under 8, vapour recovery unit, type 1 under 16 and vapour recovery unit, type 2 under 17, must be undertaken by the Department of Energy Businesses or testers duly qualified pursuant to Ministerial Regulations issued by virtue of Section 7 (4).

INTERIM PROVISIONS

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31. Fuel service stations, Categories A and B, located in areas under 2 which are authorized by virtue of the Fuel Oils Control Act, B.E. 2542 prior to enforcement of these Ministerial Regulations, or whose plan-drawings and construction plans have been approved by virtue of the Department of Public Works' Notification re: Safety Standards for Fuel Service Stations, Category 1 dated June 30th, B.E. 2538 or the Department of Public Works' Notification re: Safety Standards for Fuel Service Stations, Category 2 dated June 30th, B.E. 2538, prior to enforcement of these Ministerial Regulations, shall be exempted from the requirement to have overfill protection equipment installed pursuant to 16 (4), with the exception of tests to be conducted on underground oil storage tanks in accordance with the law when overfill protection equipment must be installed by these fuel service stations pursuant to 16 (4).

32. Fuel service stations, Category B, duly authorized by the Fuel Oils Control Act, B.E. 2542 prior to the date of enforcement of these Ministerial Regulations that already have vapour recovery units, Type 1 installed which, however, do not reach the standards as prescribed herein may continue to use such vapour recovery units although action must be taken, when any modification, expansion or change is make on these vapour recovery units to ensure that they are in line with the requirements of these Ministerial Regulations.

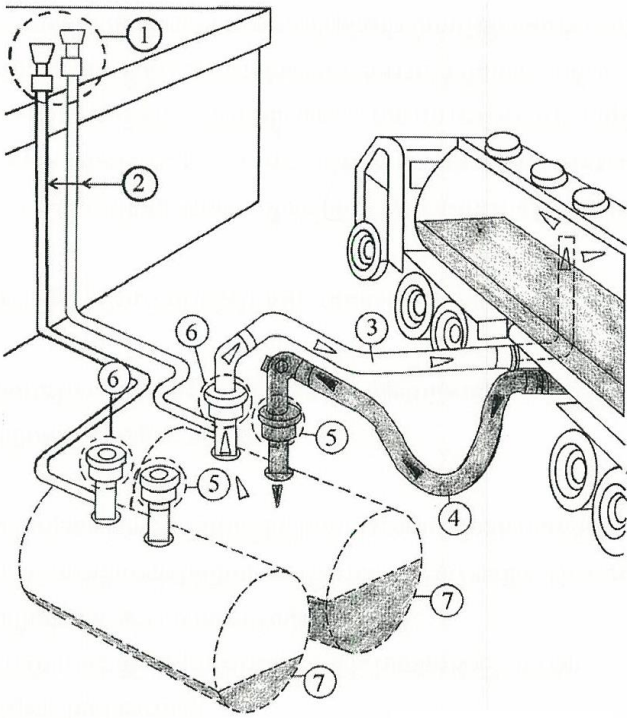
33. Subject to the provisions of 31 and 32, fuel service stations, Category A and B, oil depots, oil storage premises with oil intake/outtake by oil trucks and by oil transportation pipelines and distribution of oil by trucks in areas under 2 duly authorized by virtue of the Fuel Oils Control Act, B.E. 2542 prior to the enforcement of this Act, or whose plans, drawings and constructions plans have been approved pursuant to the Department of Public Works' Notification re: Safety Standards for Fuel Oil Service Stations, Category 1, dated June 30th, B.E. 2538, or the Department of Public Works' Notification re: Safety Standards for Fuel Oil Service Stations, Category 2, dated June 30th, B.E. 2538 which have

not arranged to have vapour recovery system installed pursuant to these Ministerial Regulations, must arrange to have vapour recovery systems installed within one year from the date these Ministerial Regulations come into force.

34. Oil transportation trucks under 18 duly authorized by laws governing land transportation prior to the date these Ministerial Regulations come into force must arrange to have vapour recovery systems installed within one year from the date these Ministerial Regulations come into full force and effect.

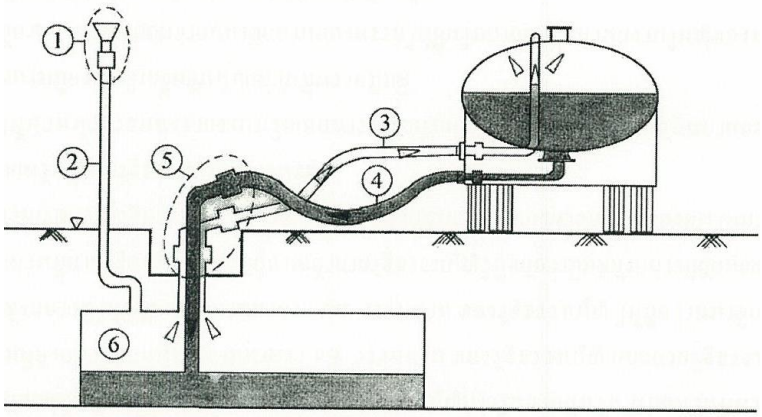
Given on January 9th, 2007.

Piyaswasdi Amaranand
Minister of Energy.



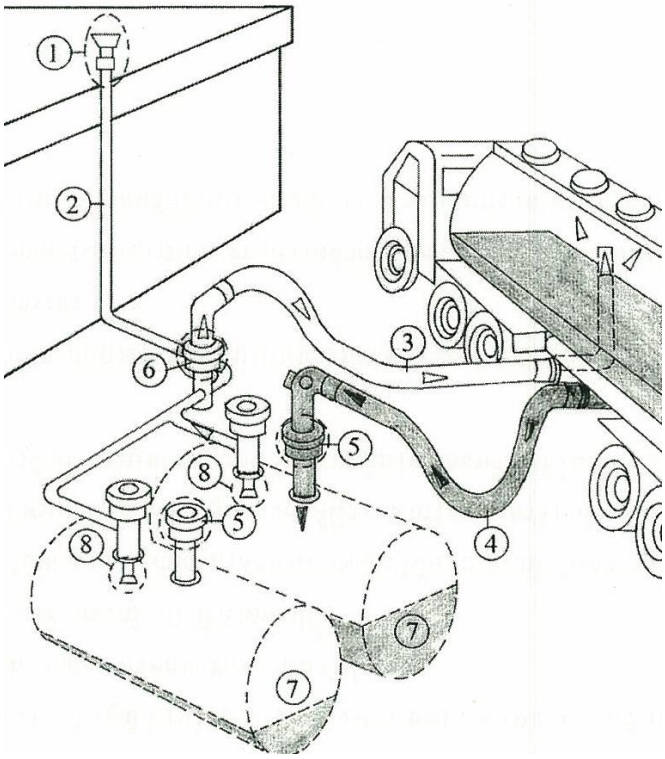
Drawing No. 1 : Two Point System

① Pressure – Vent and Vacuum Safety Equipment.
② Oil Vapour Ventilation Pipes
③ Flexible Vapour Pipes for return vapour flowing back into oil tank
④ Flexible pipe to fill oil into underground storage tanks
⑤ Connector of oil intake pipes
⑥ Connector of oil vapour pipes
⑦ Underground oil storage tanks



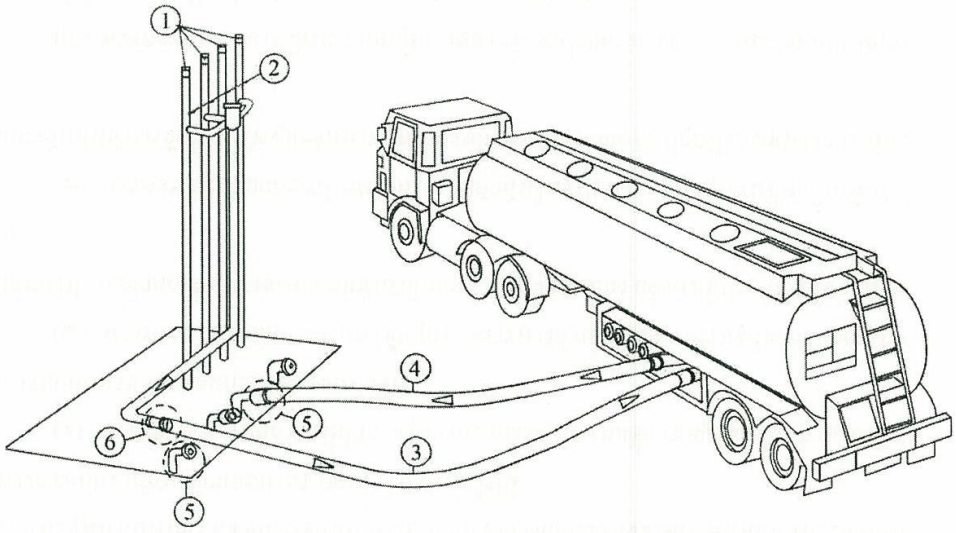
Drawing No. 2 : COAXIAL Systems

① Pressure – Vent and Vacuum Safety Equipment.
② Oil Vapour Ventilation Pipes
③ Flexible Vapour Pipes for return vapour to flow back into oil tank
④ Flexible pipe to fill oil into underground storage tanks
⑤ double-layered connector for oil intake and return vapour
⑥ Underground oil storage tanks



Drawing No. 3 : Mamifolded Systems

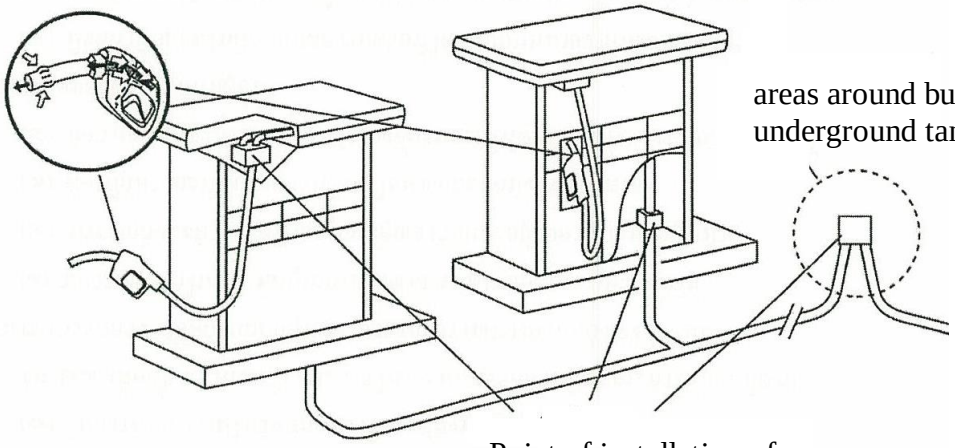
① Pressure – Vent and Vacuum Safety Equipment.
② Oil Vapour Ventilation Pipes
③ Flexible Vapour Pipes for return vapour to flow back into oil tank
④ Flexible pipe to fill oil into underground storage tanks
⑤ Connector of oil in take pipes
⑥ Connector of oil vapour pipes
⑦ Underground oil storage tanks
⑧ Protection equipment against fuel oil flowing into oil vapour pipes



Drawing No. 4

Manifolded Systems with points of connection higher than oil transportation tanks

① Pressure – Vent and Vacuum Safety Equipment.
② Oil Vapour Ventilation Pipes
③ Flexible Vapour Pipes for return vapour to flow back into oil tank
④ Flexible pipe to fill oil into underground storage tanks
⑤ Connector of oil intake pipes
⑥ Connector of oil vapour pipes
⑦ Underground oil storage tanks



Drawing No. 5 : Vacuum System

Remarks:

Rationale for enactment of these Ministerial Regulations:

Currently, as there are no criteria governing the control of oil vapour stored in premises of fuel oil storage, fuel oil service stations, oil depots and oil transportation trucks with ensuing problems of incresed air-pollution, it is necessary, therefore, that these Ministerial Regulations be issued in order to prevent and solve these problems.