

- (l) Where piping is encased in concrete, the need to guard against corrosion and to provide for expansion.
- (m) Painting or marking of piping to permit ready identification of its content (see AS 1345).
- (n) Access to, and operation of, valves and other control devices including ergonomic considerations.

7.2.2 Joints Piping joints shall be suitable for the operating pressures, temperatures, materials, and other conditions of use. Particular attention should be paid to vulnerability to failure in the event of fire and susceptibility to corrosion, particularly if buried or submerged.

Joint types which are suitable are—

- (a) threaded joints to AS 1722; and
- (b) flanged joints to AS 2129.

NOTE: Mechanical grooved couplings tested to API 607 should only be used to accommodate misalignment/movement.

7.2.3 Flexible tube Flexible tubing, piping or hose may be used provided that it is of a suitable type and its use is approved.

This Clause does not apply to the internal piping of fuel dispensers but does apply to the connection of the fuel dispenser to the supply piping.

7.2.4 Transfer hose A hose and hose assembly for petroleum products shall comply with AS 2683 and hose couplings shall comply with AS 3664.

NOTE: Products other than petroleum may require specific hose materials or couplings, because of compatibility of materials, additional hazards or the like.

7.2.5 Vapour recovery piping Any vapour recovery piping system for tank vehicle filling installations shall be designed so that when all pump-supplied tank vehicle filling provisions served by that vapour recovery system are in use simultaneously, the back-pressure on each tank vehicle does not exceed 10 kPa.

7.3 VALVES

7.3.1 System requirement Sufficient valves shall be provided to permit proper operation of the system and to protect the installation, and in particular—

- (a) a manually operated tank or liquid outlet valve shall be located as close as practicable to the shell of an above-ground tank; and
- (b) a non-return valve shall be located in each tank-filling pipe close to the filling connection unless the levels of the filling connection, the downstream filling pipe, and the tank are such that backflow cannot occur when the filling hose has been disconnected. Where an anti-siphon opening is made in the filling pipe above the maximum liquid level in the tank, a non-return valve will not be required.

7.3.2 Emergency shut-off provisions Provision shall be made to shut off the flow of liquid quickly in an emergency—

- (a) from the storage tank to a consuming device; and
- (b) to a tank vehicle fill point.

Any manually operated valve or the actuating device for a remotely operated valve shall be located in a convenient and safe location and conspicuously marked with the words EMERGENCY LIQUID SHUT-OFF.

7.3.3 Valve selection Any valve used for a flammable or combustible liquid shall comply with the following requirements:

- (a) For any valve that can be operated or closed by manual action, the distinction between the open and shut positions shall be obvious.
- (b) Any hand-operated valve having a handwheel, cross, tee or similar symmetrical handle, shall close by clockwise rotation, when viewed from the end of the spindle of the actuating device. A hand-lever operated valve shall be installed so that the lever is at right angles to the pipe when closed, and so that gravitational forces on the handle will not act in the direction of opening except where the valve is designed to fail-safe. The direction of closing shall be clearly marked.
- (c) The use of detachable handles for valves should be avoided unless essential for security, for procedures, or for sequences. Any such handle shall not be removable unless the valve is at a safe setting and so indicated.
- (d) It is preferable that the valve type permits gland repacking to be achieved without the necessity to remove the valve from the installed position.
- (e) Any valve whose failure in the event of fire could create a hazard should be of either steel or a suitable grade of spheroidal graphite iron, and the valve handle shall be of metal not inferior to the valve body in fire resistance.
- (f) Fire-safe cast steel valves shall be provided in the following situations:
 - (i) Where any tank valve is below the liquid level of a tank of Categories 4, 5 or 6 containing flammable or combustible liquid.
 - (ii) Where located in the transfer piping between marine tanker berths and storage tanks.

7.4 PUMPS

7.4.1 Pressure and temperature control Where the discharge pipe of a pump can be shut off, provision shall be made to prevent the build-up of pressure or temperature in excess of the design capability of the pump and piping. The design of the system shall take into account the following:

- (a) A hydraulic relief valve shall not normally be provided with an isolating valve.

Pump bypasses may be installed to prevent local overheating. Isolation valves to serve hydraulic relief valves or pump bypasses are not recommended. Any such isolation valves, if installed, shall be arranged to be secured in the open position. (Refer to Clause 9.7.12.3.)
- (b) Discharge from a hydraulic relief valve should be returned to the supplying storage tank but may be returned to the pump inlet provided that the heat generated by such recirculation is within design limits.
- (c) The range of adjustment of any hydraulic relief valve shall be restricted to prevent excess pressure, or an excess-pressure relief valve shall be fitted.

7.4.2 Emergency shut-off A means shall be provided for shutting off the power to any pump in an emergency. The shut-off device shall be readily accessible and prominently identified.

7.4.3 Pump drive Clauses 3.2.8 and 3.2.9 shall apply to motors and engines for driving pumps.

7.5 HEATING OF LIQUIDS

7.5.1 Access for service Critical components of the control system shall be removable without the necessity of draining any tank.

7.5.2 Condensate Condensate from a steam heater that may be contaminated with flammable or combustible liquid should not be returned to a boiler feed without treatment to ensure that it is suitable as feed water.

7.5.3 Resistance heating of pipes Where heating is effected by heat tracing or passing an electric current through the pipe wall, the supply shall be thermostatically controlled and shall comply with AS 3000.

7.5.4 Heater controls Where heating elements may become exposed above the liquid level because of normal operating level fluctuations, and the heating medium is at a temperature in excess of a temperature which is 6°C below the flashpoint of the liquid (see Clause 7.5.5), sufficient valves or control systems shall be provided to isolate such exposed heating elements.

7.5.5 Temperature limits The maximum temperature to which any portion of the liquid may be heated shall be below the temperature at which cracking, decomposition, or ignition could occur.

NOTES:

- 1 Where water could be present, the heating should be controlled to prevent sudden eruptive boiling.
- 2 The authority may be consulted for any alternative requests.

7.5.6 Temperature monitoring The energy input shall be controlled to prevent boiling, steam eruption or deterioration of the liquid. An excess temperature control and alarm shall be fitted.

SECTION 8 TANK VEHICLE LOADING FACILITIES

8.1 APPLICATION Any installation used to fill a tank vehicle shall comply with the general requirements of Clause 8.2 together with the specific requirements of other Clauses that are applicable to the particular type of filling operation.

NOTES:

- 1 Installations considered to be located in remote areas, may be exempt from some of the requirements of this Section with the approval of the authority.
- 2 The requirements for tank vehicle unloading are provided in the ADG Code.

8.2 GENERAL

8.2.1 Additional requirements Any requirement related to tank vehicle filling of the ADG Code not stated in this Standard shall be taken as an additional requirement of this Standard.

NOTE: In any conflict between the ADG Code and this Section, the authority should be consulted.

Transfers to a tank vehicle shall not be achieved by pressurizing the container unless the entire system has been designed for the pressure and an appropriate gas is used.

8.2.2 Location The point of connection to the tank vehicle shall be separated—

- (a) from any on-site above-ground storage tank by the distances specified in Table 5.3;
- (b) from any protected works, by the following distances:
 - (i) For flammable liquids, or facilities where both flammable and combustible liquids are loaded, a distance of not less than 15 m.
 - (ii) For facilities where only combustible liquids are loaded, a distance of not less than 3 m;
- (c) from any package storage area—
 - (i) for flammable liquids or for facilities where flammable and combustible liquids are loaded, a distance of not less than 8 m;
 - (ii) for facilities where only combustible liquids are loaded, a distance of not less than 3 m; and
- (d) from any on-site facility, security fence, source of ignition, a distance as given in AS 2430 from any hazardous zones.

8.2.3 Construction Where the fill point is within a building, the building shall be open on at least three sides for flammable liquids, or two sides for Class C1 liquids and shall be solely used for tanker loading purposes.

NOTE: Any side of a building where the wall sheeting does not extend within 2 m of the ground may be considered 'open' for the purpose of this Clause.

8.2.4 Collision protection A tank vehicle filling facility shall be protected as necessary by bollards or other physical barriers against damage from manoeuvring vehicles.

8.2.5 Vehicle access The direction of entry of vehicles into a tank vehicle filling area shall be clearly marked.

A facility shall be designed for vehicles to drive in and out in a forward direction without recourse to reversing. Where this is not possible on an existing site or where other factors intervene the statutory authority shall be consulted.

8.2.6 Spillage control A tank vehicle filling area shall be provided with a system for collecting and disposing of any likely spillage, in accordance with the following requirements.

- (a) The capacity of the spillage provisions shall be sufficient to contain the greater of—
 - (i) the total capacity of the largest compartment of any tank vehicle using the filling facility or 9000 L, whichever is the lesser; or
 - (ii) the maximum quantity capable of being discharged from the two filling points having the greatest flow during a period of two min.

Further capacity shall be added where relevant to provide for rain or clean-up or fire protection systems.

- (b) The vehicle standing area shall be graded so that any spillage—
 - (i) will drain from the spillage area; and
 - (ii) will prevent the spread of the spillage or fire to other loading areas.
- (c) The retaining surfaces shall be concrete or other materials with equivalent liquid retaining qualities.

NOTE: To satisfy environmental requirements, the surface may need to be impervious.

- (d) A system of drainage for the quantity of spillage and other liquid as determined in Item (a) above, shall be provided by one of the following methods:
 - (i) It shall be retained by an isolating valve which shall remain closed at all times except when draining the liquid under controlled conditions through a separator pit unless the system is designed to take account of the fact that the valve is continuously open.
 - (ii) It shall drain directly to a separator pit designed to handle the expected flow conditions.
 - (iii) It shall drain directly to a remote compound or storage tank for subsequent treatment through a separator pit.
 - (iv) A combination of the above.
- (e) A separator pit installed in accordance with Item (d) above shall be capable of dealing with the rate of flow from the drainage system in accordance with local authority requirements.
- (f) The isolating valve in Subclause (d)(i) above, shall be clearly marked TANK VEHICLE FILLING AREA DRAIN VALVE—NORMALLY CLOSED and its status shall be readily identified by observation.
- (g) A tank or compound used for the retention of spillage shall be constructed and located in a similar manner to the tanks and compounds used for storage.

8.2.7 Flow rates Means shall be provided or procedures established to control the flow velocity into the compartment of a tank vehicle to less than 1 m per second until a minimum level of 150 mm has been reached. Maximum flow velocity thereafter shall not exceed 7 m per second until filling is nearly completed, when the flow velocity shall again be reduced to minimize hydraulic shock when filling stops.

8.2.8 Emergency shut-down Any transfer pump shall be provided with an emergency shut-down device located in a prominent position not less than 10 m and not more than 30 m from any tank vehicle filling point. It shall be clearly marked EMERGENCY PUMP STOP.

8.2.9 Earthing and bonding Means shall be provided to dissipate static electricity during filling operations in accordance with AS 1020.

8.2.10 Bond wire connection The bond between the vehicle tank being filled and the filling facility shall be made by means of a flexible sheathed welding cable having a cross-sectional area of not less than 10 mm² (322/0.2) or equivalent, securely attached to the filling facility at one end and provided with a robust spring clip, G clamp, plug and socket or equivalent specially designed for the purpose at the other end.

NOTE:

- 1 The size of the flexible sheathed welding cable above is unrelated to its resistance but is necessary to provide a robust flexible connection suitable for field use.
- 2 A flexible cable used to prevent overfilling of the tank vehicle and containing a dedicated bond wire connected by a special plug and socket is an acceptable alternative.
- 3 The sheathing on a bond cable should be resistant to the product.

8.3 TOP-FILLING INSTALLATIONS

8.3.1 Access to vehicle tank A platform with an anti-slip surface and incorporating an elevated grating or walkway shall be provided for each tank vehicle position within the filling facility. Any platform over 6 m long shall have a means of egress at each end.

Handrails suspended from the roof structure, if existing, shall be provided on the opposite side of the vehicle tank to the access platform.

8.3.2 Open-hatch filling An open-hatch filling facility shall comply with the following:

- (a) Flammable liquid transfer shall be through rigid piping extending to and in contact with the bottom of the vehicle tank compartment during the entire transfer operation. A hose shall not be used inside a vehicle compartment.
- (b) Where the liquid transfer operation is controlled by a pre-set measuring device an overriding 'stop' mechanism shall be provided.
- (c) Where a liquid transfer operation involving other than Class C2 liquids is controlled manually, it shall incorporate a valve which is manually held open, closes upon release and shall not be locked or otherwise fixed in the 'open' position.

NOTE: Where the products being transferred are viscous, e.g. bitumen, and there are operational problems in complying with Clause 8.3.2 Item (a), the requirements of this Clause need not apply.

8.3.3 Tight-connection filling Liquid transfer into a tank vehicle employing a fixed internal filling tube with leak-proof connections within the coaming area of the vehicle tank shall comply with the following:

- (a) Final connection of pipework to the vehicle tank shall be rigid metal piping or a flexible hose complying with AS 2683.
- (b) The requirements of Clause 8.3.2 Items (b) and (c) shall apply.

8.4 BOTTOM LOADING

8.4.1 System Design A bottom-loading facility shall incorporate the following:

- (a) A preset meter incorporating automatic slow-start and slow-finish controls.
- (b) A dry-break coupling between the loading arm or hose and the vehicle tank.
- (c) Automatic overfill protection for each vehicle tank compartment.
- (d) An integrated bond cable between the pipework in the filling facility and vehicle tank.
- (e) A vapour relief provision, accessible from ground level, which includes a means of safely discharging vapours to atmosphere or to a vapour recovery system.

- (f) Interlocks to—
 - (i) prevent the tank vehicle from moving whilst hoses are connected;
 - (ii) prevent liquid transfer if the bond wire and vapour collecting hose are not properly connected; and
 - (iii) prevent the liquid transfer if any one of the overfill protection devices has been tripped.

8.4.2 Compliance with AIP Code Where appropriate, a bottom-loading facility shall comply with AIP CP6 where not otherwise dealt with in this Standard.

8.4.3 Design pressure All components of a bottom-loading facility which are subject to pump shut-off pressure shall be designed to withstand without leakage a pressure not less than 1.5 times the maximum shut-off pressure of the transfer pump.

8.4.4 Flow rates The meter pump controller shall be capable of controlling the liquid transfer into the vehicle tank within the limits specified in Clause 8.2.7, and shall reduce the flow rate towards the end of filling to minimize hydraulic shock.

8.4.5 Overfill protection Means shall be provided to ensure the overfill protection devices are active and to prevent liquid transfer into any compartment under fault conditions. A clear visible signal shall provide fault indication.

8.4.6 Internal valve and vent control A pneumatic system for opening and closing the internal valves and vents of each compartment shall be interconnected with the tank vehicle braking system to prevent the tank vehicle being driven or moved while the internal valves and vents are open, or while any liquid transfer hose is connected to the tank vehicle.

8.4.7 Data collection A data collection device which incorporates some or all of the control devices required by this Section may be provided within the bottom-loading facility provided it complies with all relevant Standards.

8.4.8 Atmospheric venting Where vapours are discharged to atmosphere during transfer, the discharge shall be in a vertical direction from a point not less than 2 m above the highest point of the filling facility roof or, if not roofed, 8 m above the concrete paved area of the filling facility. The separation distances given in Clause 8.2.2(b) shall apply to the vent outlet. The vent shall be provided with flashback protection at its outer extremity.

SECTION 9 OPERATIONS

9.1 SCOPE OF SECTION This Section prescribes procedures for the operation of an installation as distinct from its construction. It deals with installations larger than minor storages.

NOTE:

- 1 Many states have Occupational Health and Safety legislation in place. The legislation generally provides for consultative mechanisms at workplaces to enable management and workers to be jointly involved in the development of procedures and work practices.
- 2 Requirements specifically applicable to the operation of fuel dispensing for vehicles are given in Section 6.
- 3 Requirements for quality systems are available in the AS 3900 series of Standards.

9.2 ESTABLISHMENT OF PROCEDURES

9.2.1 Procedures required It shall be the responsibility of the occupier of the installation to develop and implement procedures appropriate to the installation as follows:

- (a) Site plan or plans indicating plant, main pipework (or routes) switchboards or sub-stations, emergency stop valves or actuating devices, fire protection systems, drainage, etc. depending on the intended use of the plan.
- (b) Operating procedures, covering all aspects of the day-to-day operation of the facility.
- (c) Maintenance procedures, covering regular testing, inspection, and monitoring of the equipment.
- (d) Emergency procedures, covering action to be taken in the event of fire, spillage, accident, equipment failure or other abnormalities or emergencies.
- (e) Construction procedures, covering new facilities and modification of existing plant.

9.2.2 Promulgation of procedures The procedures shall be documented in notices, manuals, or other recorded instructions as appropriate to the particular installation, on view or readily available on-site.

9.2.3 Review and upkeep of procedures The procedures shall be modified when necessary because of equipment or organizational changes, and shall otherwise be reviewed at least every two years.

9.2.4 Operating procedures The operating procedures shall provide, where appropriate, for the following:

- (a) Any specific requirements detailed in Clause 9.7.
- (b) Initial commissioning procedures.
- (c) Normal handling procedures.
- (d) Liquid transfer procedures.
- (e) Monitoring of essential functions and components.
- (f) Recognition of fault conditions.
- (g) Control of hazards including ignition sources.
- (h) Earthing and bonding.
- (i) Manufacturer's operating instructions for the equipment.

- (j) Equipment not in use (e.g. isolation, deactivation and identification).
- (k) Housekeeping, site upkeep.
- (l) Treatment of leakage, spillage and clean-up.
- (m) Maintaining clear spaces for access.
- (n) Personnel safety.
- (o) Personnel protective equipment.
- (p) Security.
- (q) Control of access, and of movements and activities of people, equipment and vehicles.
- (r) Environmental monitoring.
- (s) Operation of utilities.
- (t) Fire protection systems.

9.2.5 Construction and maintenance procedures The construction and maintenance procedures shall provide, amongst other things, for the following where appropriate to the particular installation:

- (a) Any specific requirements detailed in Clause 9.8.
- (b) Work authorization.
- (c) Work in confined spaces.
- (d) Testing of instrumentation, and of protective devices, alarms and monitors.
- (e) Gas-freeing.
- (f) Isolation and tagging.
- (g) Control of contractors.
- (h) Firefighting equipment.
- (i) Pipelines.
- (j) Storage tanks.
- (k) Drainage, separators.
- (l) Bunds.
- (m) Electrical equipment.
- (n) Ventilation systems.
- (o) Fences and security measures.
- (p) Illumination.
- (q) Needs of any other individual items or plant components, e.g. pumps, fans, fire doors and package filling equipment.
- (r) Signs and notices.

9.2.6 Emergency procedures A documented emergency procedures plan shall be prepared, which shall make provisions for dealing with, where appropriate, likely emergencies for the particular installation. Any such pre-planning shall include the following:

- (a) Hazard identification.
- (b) List of contacts, emergency services and phone numbers.
- (c) Emergency operations flow chart and chain of command.

- (d) Duty list.
- (e) Capacity of resources, including any mutual aid (inter-company) arrangements.
- (f) Cooperation with relevant authorities.
- (g) Fire teams (initial response).
- (h) Fire drills, and practice of emergency procedures.
- (i) Evacuation provisions and assembly points.
- (j) First aid.
- (k) Debriefing and internal/external reporting of incidents.
- (l) Vehicles on site.
- (m) Contractors.
- (n) Access control.
- (o) Site plan.
- (p) Spillage, clean up and decontamination.

NOTE: Action to clean up spillage or leakage shall be initiated immediately.

- (q) Any specific requirements of Clause 9.2.5.

NOTE: Following an incident, facility and emergency procedures should be reviewed as they relate to the incident.

9.3 TRAINING OF PERSONNEL

9.3.1 Responsibility It shall be the responsibility of the occupier of the installation to ensure that training or instruction in established procedures is provided in accordance with the following Clauses.

Particular care should be taken to ensure comprehension in the case of language difficulties.

9.3.2 Employees Each employee shall be trained in such duties as have been individually assigned to that person. The training shall include the following as appropriate:

- (a) Procedures to be followed in the event of an incident (spillage, accident or fire).
- (b) Layout of the installation.
- (c) Location of firefighting equipment.
- (d) Basic principles of firefighting, and the use of fire extinguishers and firefighting equipment.
- (e) Statutory regulations relevant to employees' tasks.
- (f) Awareness of the properties, characteristics and hazards of any materials kept or handled and materials to be brought on-site.
- (g) Correct use of any personnel protective equipment provided.
- (h) Area housekeeping.
- (i) Safety rules of the installation, including any restrictions on movement, access or activities.

9.3.3 Contractors Contractors and their staff shall be trained in the following as appropriate to the specific task to be performed:

- (a) Safety rules of the installation, including any restrictions on movement, access, activities and use of personnel protective equipment.

- (b) Conditions and obligations associated with work permits and confined-space entry permits.
- (c) Hazards likely to be encountered, including any materials stored or handled on site.
- (d) Procedures to be followed in the event of an incident, e.g. spillage, accident or fire.

9.3.4 Visitors Every person who enters premises where flammable liquids are kept shall comply with all signage and notices for the site.

Every person entering restricted areas shall be instructed to comply with the relevant safety instructions.

9.3.5 Emergency response personnel Persons having been assigned emergency duties shall be given specific training in those duties. Such duties may include, among other things—

- (a) firefighting;
- (b) spillage control, clean-up and decontamination;
- (c) evacuation control; and
- (d) first aid.

Drills shall be conducted at regular intervals to ensure that assigned persons have adequate opportunity to become familiar with their tasks. Local emergency services should be involved in joint exercises wherever possible.

9.3.6 Refresher training Training procedures shall include provision for refresher training at sufficient intervals to ensure that capability is maintained.

9.4 WORK ACTIVITIES AND SUPERVISION All activities within a restricted area shall be carried out by a competent person trained in the particular tasks to which they are assigned unless under the direct control of a supervisor. Any supervisor shall be experienced and knowledgeable in the regulations and Standards applicable to the activity.

9.5 COMPLIANCE WITH PROCEDURES The procedures established for the particular installation shall be complied with by all persons at that installation and an audit system shall be established to ensure compliance.

9.6 RECORDS Records shall be kept of the following:

- (a) Training and retraining (permanent record).
- (b) Equipment tests required by this Standard and reference Standards.
- (c) In-service inspections (life of installation).
- (d) Drills (six years).
- (e) Maintenance and repairs (life of installation).
- (f) Fires, significant spillage, accident, injury, dangerous occurrence or other abnormal incident (life of installation).

The suggested periods for retention of records are indicated in parenthesis.

NOTE: Regulations generally require that any of a specified range of abnormal incidents be reported.

9.7 SPECIFIC OPERATING PROCEDURES

9.7.1 General In addition to the items listed in Clause 9.2.4, the following specific requirements shall be incorporated in the operating procedures where relevant.