This safe work instrument is administered by WorkSafe New Zealand. For more information please see:

Website: http://www.worksafe.govt.nz

Contact phone: 0800 030 040

Contact address: PO Box 165, Wellington 6140

Health and Safety at Work (Hazardous Substances—Above Ground Rotationally-Moulded Polyethylene Stationary Tanks) Safe Work Instrument 2017

This safe work instrument is approved under section 227 of the Health and Safety at Work Act 2015 by the Minister for Workplace Relations and Safety, being satisfied that—

(a) appropriate consultation has been carried out under section 227(3) of that Act; and

(b) in accordance with regulation 17.105(2) of the Health and Safety at Work (Hazardous Substances) Regulations 2017, for the purposes of clauses 6(2), 17, 18, and 22 to 30, compliance with the provisions of the Regulations that apply to stationary tanks will not appropriately control risk associated with stationary tanks.

Contents

Safe Work Instrument

1 Title

This is the Health and Safety at Work (Hazardous Substances—Above Ground Rotationally-Moulded Polyethylene Stationary Tanks) Safe Work Instrument 2017.

2 Commencement

This safe work instrument comes into force on 1 December 2017.

3 Overview

In this safe work instrument—

(a) clauses 6(1), 7 to 12, 14 to 16, 19 and 21 set requirements for the design and construction of a tank for the purposes of regulation 17.6(1)(k) of the Regulations:

(b) clause 13 sets requirements for the design, construction, and installation of a liquid level indicator for the purposes of regulation 17.12(3) of the Regulations:

(c) clause 20 sets requirements for marking of a tank for the purposes of regulation 17.76(1)(b)(ii) of the Regulations:

(d) clauses 17, 18, 22, 23, and 26 set out additional requirements that apply to the testing of a tank and states which PCBUs are required to comply with those requirements for the purposes of regulation 17.105 of the Regulations:

(e) clause 6(2), and clauses 24 and 25 set out additional requirements that apply to the installation of a tank and state which PCBUs are required to comply with those requirements for the purposes of regulation 17.105 of the Regulations:

(f) clauses 27 to 29 set out additional requirements that apply to the operation of a tank and states which PCBUs are required to comply with those requirements for the purposes of regulation 17.105 of the Regulations:

(g) clause 30 sets out additional requirements that apply to the inspection of a tank and state which PCBUs are required to comply with those requirements for the purposes of regulation 17.105 of the Regulations:

(h) clause 31 specifies the maximum period of validity for which a compliance certificate for a tank may be issued for the purposes of regulation 17.92(1)(a)(i)(E) of the Regulations.

4 Interpretation

(1) In this safe work instrument, unless the context otherwise requires,—

Act means the Health and Safety at Work Act 2015

AS/NZS 1170.0 means the Australian/New Zealand standard AS/NZS 1170.0:2002 Structural design actions – Part 0: General principles

AS/NZS 1170.1 means the Australian/New Zealand standard AS/NZS 1170.1:2002 Structural design actions – Part 1: Permanent, imposed and other actions

AS/NZS 1170.2 means the Australian/New Zealand standard AS/NZS 1170.2:2011 Structural design actions – Part 2: Wind actions

AS/NZS 1462.6 means the Australian/New Zealand standard AS/NZS 1462.6:2008 Methods of test for plastics pipes and fittings: Method 6: Thermoplastics pipes, fittings and assemblies for the transport of fluids under pressure — resistance to internal pressure

AS/NZS 4766 means the Australian/New Zealand standard AS/NZS 4766:2006 Polyethylene storage tanks for water and chemicals

AS/NZS ISO 9001 means the Australian/New Zealand standard AS/NZS ISO 9001:2008 Quality management systems – requirements

ASTM D638 means the ASTM standard ASTM D638-14 Standard test method for tensile properties of plastics

ASTM D2765 means the ASTM standard ASTM D2765-16 Standard test methods for determination of gel content and swell ratio of crosslinked ethylene plastics

ASTM D1505 means the ASTM standard ASTM D1505-10 Standard test method for density of plastics by the density-gradient technique

ASTM D2837 means the ASTM standard D2837-13e1 Standard test method for obtaining hydrostatic design basis for thermoplastic pipe materials or pressure design basis for thermoplastic pipe products

ASTM D2990 means the ASTM standard D2990-09 Standard test methods for tensile, compressive, and flexural creep and creep-rupture of plastics.

BS EN 1778 means the British/European standard BS EN 1778:2000 Characteristic values for welded thermoplastics constructions - determination of allowable stresses and moduli for design of thermoplastics equipment

cylindrical tank means a tank in which the vertical axis is longer than the horizontal axis**FEA** means finite element analysis

GNA means geometric non-linear analysis

ISO 527 means ISO standards ISO 527-1:2012 – Plastics – Determination of tensile properties – Part 1: General principles and ISO 527-2:2012 – Plastics – Determination of tensile properties – Part 2: Test Conditions for moulding and extrusion plastics

ISO 899 means the ISO standards ISO 899-1:2003 – Plastics – Determination of creep behaviour – Part 1: tensile creep and ISO 899-2:2003 – Plastics – Determination of creep behaviour – Part 2: Flexural creep by three-point loading

ISO 1183 - means the ISO standards ISO 1183-1:2012 Plastics – Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pyknometer method and titration method, ISO 1183-2:2004 Plastics – Methods for determining the density of non-cellular plastics – Part 2: Density gradient column method and ISO 1183-3:1999 Plastics – Methods for determining the density of non-cellular plastics – Part 3: Gas pyknometer method

ISO 9080 means the ISO standard ISO 9080:2003 – Plastics piping and ducting systems – Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation

NZS 1170.5 means the New Zealand standard NZS 1170.5:2004 Structural design actions, Part 5: Earthquake actions – New Zealand

NZS 3101 means the New Zealand standard NZS 3101:Part 1:2006 Concrete structures standard and NZS 3101:Part 2:2006 Concrete structures standard

Regulations means the Health and Safety at Work (Hazardous Substances) Regulations 2017

slimline tank means a tank in which the horizontal axis is longer than the vertical axis

tank means an above ground stationary tank to which this safe work instrument applies.

(2) Any term or expression that is defined in the Act or the Regulations and used, but not defined, in this safe work instrument has the same meaning as in the Act or the Regulations.

5 Application

This safe work instrument applies to an above ground stationary tank that—

(a) does not exceed 25,000 L water capacity; and

(b) is manufactured from polyethylene using a continuous rotational moulding technique as one discrete component.

6 Duties in respect of tank

(1) A relevant PCBU must ensure that a tank is designed, constructed, marked, and tested in accordance with AS/NZS 4766 and the provisions of this safe work instrument.

(2) A PCBU with management or control of a tank must ensure that the tank is installed in accordance with AS/NZS 4766 and the provisions of this safe work instrument.

(3) The provisions of AS/NZS 4766 are subject to the provisions of this safe work instrument.

Design

7 Structural analysis

(1) A relevant PCBU must ensure that the structural analysis of the design of a tank is carried out using the FEA method using a GNA solver.

(2) The FEA design model must include all penetrations such as inlets, outlets and overflow holes. The analysis for inlets and outlets must include the loads with the pipes blanked off.

(3) For the purposes of subclause (2), the PCBU may conduct type modelling by modelling penetration sizes with minimum wall thicknesses specified.

(4) A relevant PCBU must ensure that the FEA results are reported in such a way as to facilitate the verification of a tank, and include the following information:

(a) a description of the model and the assumptions used:

(b) the software package and version used:

(c) the element topology adopted:

(d) the loads applied:

(e) the boundary conditions assumed:

(f) a description of failure criteria and limits that have been utilised:

(g) plots of the deflected shapes of the structure under all relevant loading conditions:

(h) von Mises stress plots of the structure (both inside and outside wall or an envelope that uses the maximum of the inside and outside wall von Mises stress) under all relevant loading conditions:

(i) the minimum wall thicknesses derived from the analysis and design undertaken, including images or plots with dimensions to convey the design intent.

(5) A relevant PCBU must ensure that the design life of a tank is at least 10 years.

(6) A relevant PCBU must ensure that a tank is designed either—

(a) to be supported by a reinforced concrete foundation slab designed in accordance with NZS 3101; or

(b) to be supported by overlying stable foundation material; or

(c) in a way that takes account of variable foundation conditions, subgrade creep and differential settlement.

(7) A relevant PCBU must ensure that a tank is designed for an overpressure of at least 2.5 kPa and a vacuum of at least 2.5 kPa.

(8) A relevant PCBU must ensure that a tank that is designed to carry loads on its roof incorporates additional loads as prescribed by AS/NZS 1170.1 with additional load combinations as prescribed by AS/NZS 1170.0.

8 Applied loads

(1) A relevant PCBU must ensure that the following primary load cases are applied to an FEA model:

(a) dead load, G (self weight) – vertical downward acceleration of 9.81 m/s^2:

(b) internal hydrostatic pressure due to the liquid contained, $F_{lp,c}$:

$$F_{lp,c} = \rho_w s_g \, h$$

where—

ρ_w is the density of water

s_g is the specific gravity of the stored liquid

h is the liquid depth

$F_{lp,c}$ varies from zero at the maximum liquid level to a maximum at the base of the tank where the liquid depth ‘h’ is at its maximum

designations for ‘c’ are as follows:

c = ‘full’ denotes liquid level at maximum capacity (at the centreline of the overflow hole unless noted otherwise):

c = ‘60’ denotes 60% full:

c = ‘min’ denotes minimum liquid level so as to maintain overturning and sliding stability:

(c) wind loads (external installations only), W_u, derived from AS/NZS 1170.2:

(d) earthquake loads, E_u, derived from NZS 1170.5:

(e) internal gas pressure F_{gp}, is the generated pressure.

(2) For the purposes of subclause (1)(d), a relevant PCBU must consider horizontal and vertical loads when determining earthquake loads.

(3) In circumstances where the tank has been provided with a free vent to atmosphere (for instance at the overflow penetration), the gas pressure load case F_{gp} can be ignored, except for the pressure due to filling and discharging.

9 Load case combinations

(1) A relevant PCBU must ensure that, as specified in AS/NZS 1170.0, the ultimate limit state design load case combinations to be examined must include (without limitation),—

(a) for ultimate limit state design

$$1.2G + 1.2\ F_{lp,full} + 1.5F_{gp}$$

$$1.2G + 1.2\ F_{lp,60} + W_u$$

$$0.9G + 0.9\ F_{lp,min} + W_u$$

$$G + F_{lp,full} + E_u$$

$$1.2G - 1.5F_{gp}$$

(b) for serviceability limit state design

$$G + F_{lp,full}$$

(2) Where the density of the fluid being stored is known and the design liquid height cannot be exceeded, a load factor of 1.2 may be used for ultimate limit state design. In other circumstances, a load factor of 1.5 must be used.

(3) The creep modulus must be used to determine serviceability limit state design..

10 Stability limit states

(1) A relevant PCBU must ensure that the stability of a tank against overturning and sliding caused by transient wind or earthquake loads is addressed in accordance with section 7.2.1 of AS/NZS1170.0, using a suitable method.

(2) For the purposes of subclause (1), a suitable method includes:

(a) designing an external frame where the restraining effect of the frame is considered in the design of the tank:

(b) designing strapping over the tank.

11 Thickness of tank walls

(1) A relevant PCBU must ensure that the thickness of a tank wall is determined by engineering design methods including FEA, which make allowance for the average service temperature during the lifetime of the tank.

(2) A relevant PCBU must ensure that a tank is designed for a minimum service temperature range of -10°C to +23°C

(3) The maximum average service temperature is 40°C.

(4) A relevant PCBU may use published meteorological data to assess average service temperatures in circumstances where the stored liquid is at ambient temperatures.

(5) A relevant PCBU may use a reference temperature of 23°C in design calculations unless meteorological data specifies a higher temperature or the service temperature of the tank contents is higher, in which case the PCBU must use the higher temperature.

(6) A relevant PCBU must—

(a) rely on the test data provided by the PCBU who supplied the material used in construction of the tank when designing a tank; but

(b) if no test data is provided by the PCBU who supplied the material used in construction of the tank, follow subclause (9)(c) in conjunction with diagrams in annex A of BS EN 1778 when designing a tank for use at temperatures above 23ºC.

(7) A relevant PCBU must ensure that analyses conducted for the purpose of design consider GNA, but material behaviour must be considered as elastic (under GNA).

(8) Despite subclause (7), a relevant PCBU may use visco-elastic type analyses to determine required wall thicknesses, but such analyses must rely on long term test data undertaken for levels of applied stress between 2 MPa and 6Mpa.

(9) A relevant PCBU must ensure that the following criteria are to be used when calculating the required wall thickness:

(a) a tank must be designed so that it does not buckle. For all ultimate limit state load case combinations, the minimum buckling factor must be greater than 1.5; that is, when the ultimate limit state load combination is factored up by 1.5, the GNL analysis must have full convergence:

(b) for all ultimate limit state load case combinations, the calculated ultimate stress (f*) must be less than ϕfy

where–

ϕ = 0.7

f_y is the 5% characteristic tensile yield stress of the material:

(c) subject to paragraph (d), for long-term serviceability limit state load case combinations, the stresses exhibited by the tank must be less than the minimum of subparagraph (i) and (ii) below:

(i) The allowable stress f_a derived as follows:

$$f_a = (K / A_{2K})/(2A_1)$$

where–

K is the creep strength obtained from diagrams A.1.1 of BS EN 1778 or in accordance with ISO/TR 9080

A_{2K} is the reduction factor determined in accordance with section 5.1.1 of BS EN 1778

A_1 is the reduction factor determined in accordance with section 5.2 of BS EN 1778

(ii) the applied stress adopted during long term creep tests for establishing E_{lt} as described in clause 18(3):

(d) the stresses exhibited by a tank may exceed the minimum of subparagraph (i) and (ii) of paragraph (c) in singular isolated areas of stress concentration where it can be determined that alternate load paths exist (which can allow stress relaxation due to visco-elastic effects), and that the in-plane membrane stresses are less than the applied stress associated with the creep modulus derivation:

(e) for all serviceability limit state load case combinations, maximum long-term displacements of the tank must be limited to the following:

(i) for net horizontal deflections of the tank wall, wall height/50. The net horizontal deflection must be calculated by taking the peak horizontal deflection in the wall of the tank and deducting from this the average of the horizontal displacement at the base/wall junction of the tank and the horizontal displacement at the wall/roof junction of the tank:

(ii) for net vertical deflections of the tank roof, diameter/75 for a cylindrical tank and span/75 for a slimline tank. The net vertical deflection of the roof must be calculated by taking the peak vertical displacement in the roof and deducting from this the vertical displacement at the wall/roof junction.

(10) Despite subclauses (1) to (9), a relevant PCBU must ensure that the walls of a tank are at least 5 mm thick. This minimum thickness must not be used as the basis for the structural design of a tank.

12 Design of fittings and access holes

A relevant PCBU must ensure that—

(a) mechanical fittings are not located in areas of a tank where they will be in contact with the stored liquid; and

(b) fittings attached to a tank (including those used for level measurement) are designed to allow for differential thermal expansion and contraction between components; and

(c) any access holes for the purposes of undertaking inspections within a tank are located only in the roof of the tank.

13 Liquid level indicator

(1) A relevant PCBU must ensure that a tank has a liquid level indicator that—

(a) indicates the actual liquid level in relation to the safe fill level; and

(b) is designed, constructed and installed to resist heat and impact to which it may be subjected in any reasonably foreseeable situation.

(2) If a relevant PCBU uses a sight glass as the liquid level indicator, the PCBU must ensure the sight glass is fitted with a self-closing valve.

(3) If a relevant PCBU complies with subclause (1) by means of a dipstick, the PCBU must ensure that the dipstick —

(a) has a striker plate attached to its end; and

(b) is constructed from a robust material that is non-reactive to the liquid being stored within the tank.

Material used to construct a tank

14 Mechanical properties of resin

(1) A relevant PCBU must ensure that a tank is constructed of structural-grade, virgin polyethylene materials.

(2) A relevant PCBU must ensure that the polymer is, as a minimum, a hexene (C6) copolymer-based resin.

(3) A relevant PCBU must ensure that the materials comply with paragraph 6.1 of AS/NZS 4766 and the following requirements:

(a) minimum 5% characteristic short term yield stress: 16 MPa:

(b) minimum 10 year creep modulus (at 4 MPa applied stress, 23°C): 130 MPa:

(c) minimum 10 year creep strength (at 23°C): 7.5 MPa (in accordance with BS EN 1778 or ASTM D2837).

(4) A relevant PCBU must ensure that the base resin has the following material values:

(a) density not less than 934 kg/m^3:

(b) melt flow index not less than 4.0 g/10 min ± 3.0 g/10 min at 190°C at 2.16 kg:

(c) elongation at break not less than 200%:

(d) elastic modulus at 20 years that is greater than 20% of the initial modulus:

(e) an $ESCR_{100}$ of F50 ≥ 1000 hours or, where $ESCR_{100}$ data is not available, an $ESCR_{10}$ value of F50 ≥ 200 hours.

(5) In subclause (4)(e), **ESCR** means environmental stress cracking resistance.

15 Material test data

A relevant PCBU must ensure that material test data relating to the polyethylene resin used in the construction of a tank—

(a) is agreed between the supplier of the base resin, the supplier of the compound, the tank designer and the PCBU who constructs the tank, based on relevant documented field experience, published chemical resistance reference texts or laboratory analysis; and

(b) as a minimum includes—

(i) the raw material name and relevant standard or code; and

(ii) the short and long term physical properties relevant to the minimum design life of the tank; and

(c) is determined in respect of the base resin to be used in the tank at the average temperature during the lifetime of the tank, as set out in clause 11; and

(d) is derived from independently verifiable testing conducted in accordance with standards listed in clauses 16 and 17.

16 Short term mechanical properties

(1) A relevant PCBU must ensure that any base resin used in the construction of a tank possesses short term mechanical properties for—

(a) density determined in accordance with ASTM D1505 or ISO 1183; and

(b) Poisson's ratio determined in accordance with ASTM D638 or ISO 527; and

(c) short term yield strength determined in accordance with ASTM D638 or ISO 527, with the strain rate between 1.0 and 5.0 mm/minute; and

(d) short term tensile modulus determined in accordance with ASTM D638 or ISO 527, with the strain rate between 1.0 and 5.0 mm/minute; and

(e) the hydrostatic design basis in accordance with ASTM D2837.

(2) A relevant PCBU must not use base resin in the construction of a tank unless the PCBU has obtained, from the PCBU who supplied the resin, a summary of the test results for the short term mechanical properties.

17 Long term mechanical properties

(1) A PCBU who constructs a tank must ensure that the long term tensile properties of the base resin are tested in accordance with ISO 899 or ASTM D2990.

(2) The PCBU must ensure that the test method adopted for the evaluation of the long term creep modulus is based on either uni-axial application of load or based on pressure tests on rotationally moulded pipe specimens.

(3) The PCBU must ensure that the dimensions of rotationally moulded pipe specimens conform with AS/NZS 1462.6, with any measurement readings taken at the centreline of the specimen.

(4) The PCBU must ensure that the long-term tests are undertaken for levels of applied stress between 2 MPa and 6 MPa.

(5) The PCBU must ensure that test results are presented as—

(a) a table or graph of tensile creep modulus over time, based on a specified and constant temperature and applied stress; or

(b) derived relationships (formulae) for tensile strain relative to time based on a specified and constant temperature and applied stress.

18 Extrapolation of material test data

(1) A PCBU who constructs a tank must ensure that the minimum duration of long term creep tests is 5 000 hours.

(2) The long-term creep modulus may be calculated using extrapolation procedures beyond the duration of the test up to the design life.

(3) The PCBU must ensure that the long-term creep modulus to be used in the analysis of the tank is determined by:

$$E_{lt} = f_s / (\varepsilon_{lt} A_{2E})$$

where

E_{lt} is the long-term creep modulus used in the analysis of the tank based on the required design life

ε_{lt} is the creep strain extrapolated from long-term creep tests for the required design life

f_s is the applied stress adopted during the long-term creep test

A_{2E} equals 1.0, unless the stored liquid is deemed to cause swelling of the polyethylene material in accordance with table A.1 of BS EN 1778, in which case A_{2E} is evaluated via test in accordance with ASTM D2765.

Construction of tank

19 Wall thickness verification

(1) When tanks of a particular design are first produced, a relevant PCBU must measure the thickness of the walls of the tank in the 'as moulded' condition using destructive means, and compare the measured thickness of the walls with the thickness required by the tank design.

(2) If the wall thickness of the tank varies by more than +30% / -10% from the design wall thickness, the PCBU must,—

(a) modify the production process so that the design wall thicknesses of the tank are achieved in the 'as moulded' condition; or

(b) contact the design engineer so the design engineer can undertake re-analysis work and check the design accordingly.

(3) The wall thickness measurements referred to in this clause must be taken as follows:

(a) on surfaces that are not corners, no more than 300 mm apart vertically and horizontally:

(b) subject to paragraph (c), along internal and external corners, no more than 300 mm apart:

(c) along internal and external corner areas that have been denoted as high-stress regions in the associated FEA, no more than 100 mm apart.

20 Tank markings

(1) A relevant PCBU must ensure that a tank is permanently and legibly marked with the following information by moulding the information into the outside surface of the tank:

(a) the information specified in regulation 17.76(1)(b)(i) of the Regulations:

(b) the information specified in clause 14 of AS/NZS 4766:

(c) the design life:

(d) the substances which the tank is designed to contain:

(e) whether the tank is designed for internal or external use:

(f) the location of the fill point:

(g) the location of any gas pressure relief vents.

(2) A relevant PCBU must ensure that, if a tank that has not been designed to bear loads on its roof, that fact is clearly and permanently marked on the outside surface of the

tank, by means such as embossing, graphics incorporated in the mould or the use of permanent polymer-based graphics.

21 Quality management

A relevant PCBU must operate a quality management system that complies with AS/NZS ISO 9001.

Testing

22 Type test

(1) A PCBU who constructs a tank must conduct a type test on a sample of each size of tank by filling the tank with water and taking one of the actions in subclause (2) so the resultant hydrostatic pressure at the bottom of the tank is twice the pressure expected in service.

(2) The actions are:

- (a) pressuring the tank:
- (b) fitting the tank with a riser.

(3) The pressure must be held for a minimum of 20 minutes, during which time the tank must not leak.

23 Production test

(1) Subject to subclause (2), before supplying a tank, a PCBU who constructs a tank must test each tank by—

- (a) filling it completely with water, including to the height of any overflow point or nozzle; and
- (b) holding the water at that level for a minimum of 5 hours.

(2) If water is incompatible with the substance that will be stored in the tank, a PCBU who constructs a tank must conduct a pneumatic test in accordance with subclause (3).

(3) In conducting a pneumatic test, the PCBU must—

- (a) coat the entire surface of the part line, manhole cover and area surrounding the manhole with a solution of soap and water, heavy oil, or other substance that would indicate leakage from the tank by foaming or bubbling; and
- (b) subject the tank to a pneumatic pressure of 10 kPa; and
- (c) hold that pressure for at least ten minutes; and
- (d) observe whether any foaming or bubbling occurs.

(4) If a leak occurs during testing, the PCBU must ensure that the reason for the leak is determined and that the tank is repaired and tested again until no leakage occurs during testing.

Installation

24 Pipework

A PCBU who installs a tank must ensure that, unless the design specifies otherwise, pipework connected to a tank must be adequately supported independent of the tank itself.

25 Impact protection

(1) A PCBU with management or control of a tank must ensure that before a tank is installed, a site-specific risk assessment is undertaken to determine whether there is potential for impact on the tank, particularly from moving vehicles.

(2) If there is a risk of impact, the PCBU must ensure that a tank is protected by a protection barrier designed, and certified as designed, in accordance with AS/NZS 1170.1.

26 Testing after installation

(1) Subject to subclause (2), after a tank is installed at the place where it is to be used for the storage of hazardous substances, a PCBU with management or control of a tank must ensure it is filled with water for 10 minutes and remains free from leaks.

(2) If water is incompatible with the hazardous substance to be stored in the tank, a PCBU with management or control of a tank must conduct a visual inspection to determine the presence of any leaks.

(3) If a leak is detected, the PCBU must ensure that the reason for the leak is determined and that the tank is repaired and tested again.

(4) A PCBU with management or control of a tank must ensure the tank is not used to store hazardous liquids unless it has passed this test.

Operation

27 Storage of hazardous substances

(1) A PCBU with management or control of a tank must ensure that a tank is used only to store hazardous substances that—

(a) are class 5, 6 or 8 substances (regardless of whether they also have a class 9 classification); and

(b) are not class 1, 2, 3 or 4 substances.

(2) A PCBU with management or control of a tank must ensure that any hazardous substance contained in a tank is non-reactive with the material used in the construction of the tank and with any fittings or pipework connected to the tank.

(3) In subclause (2), **non-reactive** means—

(a) the materials used in the construction of the tank, fittings or pipework are chemically inert when in contact with the hazardous substances carried in the tank at the range of temperatures and pressures at which the contact may occur; or

(b) if the materials used in the construction of the tank, fittings or pipework chemically react with the hazardous substances carried in the tank,—

(i) the reaction does not cause or contribute to a fire or an explosion, or generate a substance of a different hazardous property, nature, or degree; and

(ii) continuous or repeated exposure to the reaction does not soften, weaken, or otherwise affect the materials used in the construction of the tank, fittings or pipework to the extent that the tank, fittings or pipework fail to meet any of the design or construction requirements specified in this safe work instrument.

28 Pressure

A PCBU with management or control of a tank must ensure that a tank is operated only at atmospheric pressure.

29 Service life of tank

A PCBU with management or control of a tank must not use a tank for a period of more than 10 years after it is first used to store a hazardous substance.

30 In-service inspection

(1) A PCBU with management or control of a tank must ensure that the following measurements are taken 4 weeks after the tank was initially filled following installation:

(a) for a cylindrical tank, at the circumference at distances 300, 600, 900 and 1,200 mm from the base of the tank when the tank is full:

(b) for a slimline tank, the width and depth of the tank.

(2) A PCBU with management or control of a tank must inspect a tank annually for cracking, crazing, splitting, accelerated deflections or buckling, and keep records documenting the observations made during such inspections.

(3) Where an inspection reveals significant levels of cracking, crazing, splitting, accelerated deflections or buckling, the PCBU must cease using the tank until it is evaluated and repaired so that it meets the requirements of this safe work instrument.

(4) From the date that is five years after a tank was manufactured, a PCBU with management or control of a tank must ensure that the measurements in subclause (1)(a) and (b) are taken annually.

(5) The PCBU must record the measurements specified in subclause (4) and compare them with equivalent similar measurements taken under subclause (1).

(6) The PCBU may continue to use the tank only if the annual measurements comply with the criteria in clause 11(9)(e).

Compliance certificate

31 Compliance certificate

For the purposes of regulation 17.92(1)(a)(i)(E) of the Regulations, the maximum period of validity of a compliance certificate issued under regulation 17.91 for a stationary container system that includes a tank is 5 years.

Made at Wellington on the day of 2017.

Hon Iain Lees-Galloway
Minister for Workplace Relations and Safety

Date of notification in *Gazette*:

This safe work instrument is administered by WorkSafe New Zealand.