EUROPEAN FIRE SPRINKLER NETWORK

An Overview of Inspection Requirements for Sprinkler tanks

August 2025

Introduction

Water tanks are a crucial part of a sprinkler system. There have been a small number of incidents where corrosion has caused a tank to collapse. Aside from putting the sprinkler system out of service, a water tank collapse can cause injury and damage. If a tank must be emptied for repairs, the risk covered by the sprinkler system will be temporarily unprotected. The sprinkler industry should therefore do what it can to minimise downtime due to tank issues. The EFSN was asked by one of its members what guidance exists for sprinkler tanks across Europe. EFSN members provided information from several countries, briefly summarised in this paper.

Standards - EN 12845

Standards could be a source of guidance on measures to reduce corrosion of sprinkler tanks. While EN 12845 has some guidance about tanks it does not say much about corrosion prevention. The current, 2015 edition of EN 12845 has the following clauses with details of sprinkler tank requirements:

4.4.4.5 specifies what details of the tank should be provided, without giving guidance on any of them.

4.4.4.6 does the same for pressure tanks.

9.3 sets out how the calculate the tank capacity and provides dimensions and layout details for the suction pipe.

9.6 provides some details to size a pressure tank.

For the three-yearly routine 20.3.5.2 states *'With the exception of tanks designed not to need maintenance within 10 years (See 9.6.2 b), all tanks shall be internally inspected and if necessary drained and cleaned. They shall be examined for corrosion based on the manufacturer's recommendations and all tanks shall be repainted and/or have the corrosion protection refurbished, as necessary.'*

For the 10-yearly routine 20.3.6 states, *'At no more than 10-year intervals, all storage tanks shall be cleaned and examined internally and the fabric attended to as necessary.*

NOTE Cleaning of tanks usually requires them to be drained, but alternative solutions might be acceptable to save water.'

prEN 12845-1

The draft revision to EN 12845, which should be circulated to the CEN members for enquiry (comment) early in 2026, has the following clauses with details of sprinkler tank requirements:

4.2.5.3 specifies what details of the tank should be provided, without giving guidance on any of them.

4.2.5.4 does the same for pressure tanks.

In the chapter on alarms 20.2.6 on liquid levels states, *'An indication shall be given when any critical liquid level for water storage tanks drops more than 10 % below its nominal fill level. This requirement changes to 25 % for fuel tanks and priming tanks. A further indication shall be given before the level reaches 10 % above its nominal fill level for pressure tanks. This clause does not apply to liquid levels in batteries, primary cooling circuits or oil tanks.'*

Clause 23.3 on water storage tanks provides some guidance for their location in 23.3.2 and 23.3.3, while 23.3.5 provides guidance on their capacity and suction pipe location.

Clause 23.5 provides guidance on the sizing of pressure tanks.

Table 60 in 26.3 sets out the frequency of maintenance for all items, including tanks. 26.3.1.2 requires that the liquid level in all tanks be checked each week. 26.3.2.2 requires an external inspection for leaks and damage each month, as well as of the external access ladder and tank cover. 26.3.6.1 specifies what should be inspected every three years while 26.3.7.1 states, *'After not more than 10 years, water storage tanks shall be drained and inspected internally for corrosion, damage and accumulation of sludge or foreign materials. Alternatively, inspections may be conducted using remotely operated vehicles or divers. Any necessary repairs shall be conducted in accordance with the manufacturer's recommendations. Check valves and foot valves shall be cleaned and repaired or replaced if necessary.'*

Belgium

NTN 174 I[1] was first published in 2017 and will now be revised.

The document classifies three types of tank inspection:
A – external (required each year)
B – internal by a diver or a remotely operated vehicle of the filled tank (after five years and after another nine years)
C – internal of the empty tank (after 10 years then again after another eight years)

[1] *Bundled specification for inspection and maintenance of above-ground steel-bolted storage tanks as water source for water-based fire protection systems in accordance with CEA4001, FM4020, NFPA22 and EN12845, ANPI, Louvain-la-Neuve, Belgium, 2017*

Extensive checklists are given for each category of inspection. For the C-inspection plate wall thickness should be measured using ultra-sound and the bitumen coating cleaned.

There are also criteria to determine whether a tank must be replaced:

- Wind/water line completely corroded
- Roof beams and/or vertical supporting columns completely corroded
- Tank wall plates with more than 5% corrosion and pitting depth of more than 25% of plate thickness on more than 5 spots/m^2 and more than 5 patch plates as repair patches of a leak
- Pitting caused by crevice corrosion under the bolt heads

or can be repaired:

- Corrosion of the tank wall plates around pipe transits > 250mm diameter

Germany

VdS, which is owned by GDV, the German insurer association, publishes VdS CEA 4001, the contractual guideline used for many sprinkler systems in Germany. It has the following requirements for the inspection of sprinkler tanks:

Check the fill levels in water tanks each week.

Clause 18.4.4 requires a 5-year inspection by a VdS-approved installer. “All tanks with a coating inside or a lining shall be checked inside and outside for corrosion. Furthermore, the condition of any coating or lining shall be inspected. The tanks shall be cleaned and repaired when required.”

Clause 18.4.5 requires a 15-year inspection by a VdS-approved installer. “At no more than 15-year intervals, all water tanks shall be inspected from the inside after emptying or by divers/submersible robots. Contamination shall be removed. If necessary, the tanks shall be repaired.”

Note: VdS recently accepted inspections by divers or submersible robots (ROVs).

<u>Pressure Vessels</u>

Germany is perhaps the only country in Europe where one of the water supplies to a sprinkler system usually comes from a pressure vessel.

Where a pressure tank is installed (pressure vessel), it is inspected as a special pressure equipment (system requiring monitoring) according to the German Safety and Health Ordinance (BetrSichV) (national testing in Germany).

The pressure equipment (vessel) is manufactured in Europe according to the Pressure Equipment Directive 2014/68/EU. Acceptance is usually carried out using Module G (individual testing) by a notified body.

Since the pressure vessel (sprinkler) in Germany is generally always provided with an internal lining (corrosion protection is usually epoxy resin), it can be classified according to BetrSichV Annex 2 Section 4 No. 7.11a.

If the regular, recurring internal inspection reveals that the lining is not damaged, the very complex strength test can be omitted.

7.11	**Druckbehälter und Rohrleitungen mit Auskleidung oder Ausmauerung**										
	a) Druckbehälter mit Auskleidung	Die Prüfzuständigkeit ergibt sich aus Nr. 6 Tabelle 3 bis 6	Die Prüfzuständigkeit ergibt sich aus Nr. 6 Tabelle 3 bis 6								
			ZÜS/bP	10 Jahre	ZÜS bP	2 Jahre[1)] 10 Jahre[1)]	ZÜS bP	5 Jahre 10 Jahre	ZÜS bP	2) 2)
Nr.	Druckanlage/Anlagenteil	Prüfungen nach Nr. 4	Prüfungen nach Nr. 5							
			Prüfung der Druckanlage		Prüfung der Anlagenteile					
					äußere Prüfung		innere Prüfung		Festigkeitsprüfung	
		Prüfzuständigkeit	Prüfzuständigkeit	Höchstfrist	Prüfzuständigkeit	Höchstfrist	Prüfzuständigkeit	Höchstfrist	Prüfzuständigkeit	Höchstfrist

1) Sofern feuer-, abgas- oder elektrisch beheizt.
2) Wiederkehrende Festigkeitsprüfungen können entfallen, sofern bei den inneren Prüfungen keine Beschädigung der Auskleidung festgestellt worden ist.

Italy

Rizzotto, an Italian sprinkler tank supplier, provided the following information.

From a fire safety perspective, we essentially supply three types of tanks:
- compliant with UNI EN 12845
- compliant with NFPA 22
- FM certified

However, all of them must also be sized according to NTC 2018[2], EN 1090[3] and other European regulations on structural and seismic design.

Netherlands

Technical Bulletin 67B[4], published by Het CCV, provides guidance for the inspection and maintenance of sprinkler tanks. For the certification of the tanks it references LPS 1276 (see below). TB 67B inspired the above Belgian NTN 174 I. Thus it also has A-, B- and C-inspections, with A-inspections being visual, B-inspections including an internal tank inspection conducted by a diver or a remotely operated vehicle and C-inspections requiring the tank to be drained. During the C-inspection if the tank has a bitumen internal coating it must be replaced. If the tank has a liner it may need to be replaced, depending on the condition of the liner. If there have been any leaks of the liner it must be removed and the inside of the tank behind the liner must be inspected and repaired as necessary.

There are comments about factors that can accelerate external corrosion and advice that depending on water hardness, an internal zinc layer continuously under water can be expected to last eight years, while adding a bitumen layer to it can add eight further years.

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[2] Aggiornamento delle “Norme tecniche per le costruzioni”, Gazzetta Ufficiale della Repubblica Italiana, Rome, Italy, 2018
[3] EN 1090-2:2018+A1:2024 Execution of steel structures and aluminium structures – Technical requirements for steel structures, CEN, Brussels, Belgium, 2024
[4] Technisch Bulletin 67B, Controle en onderhoudsregime voor waterreservoirs, Het CCV, Utrecht, The Netherlands, 2016

Any bolts and nuts should be hot-dip galvanised. Earthing to avoid eddy currents helps prevent rapid loss of the zinc layer.

UK

LPS 1276

In the UK, sprinkler tanks are designed and certified in accordance with Loss Prevention Standard 1276, a 28-page document published by BRE[5]. The standard addresses design, manufacture, installation and commissioning. The supply of tanks as an ex-works activity is excluded from its scope. It requires tanks to be designed such that there is no need to empty them for maintenance for at least 10 years. Structural design is to comply with EN 1090, with a minimum steel wall thickness of 1.8 mm prior to galvanising. Where galvanising is used for corrosion protection it should be to a thickness of 600g/m^2 on each side (1200g/m^2 in total).

Where a liner is used, the standard requires, *'detailed design calculations and validated methodology for the design algorithms for the range of liner materials and sizes used; including eyelet type, spacings, reinforcements, support rings etc.'*

TB 203

Technical Bulletin 203[6], published by The Fire Protection Association, provides additional sprinkler system maintenance requirements from insurers. It calls for additional checks to those in EN 12845, including:

Weekly

- of the immersion heater/controls near ball float valves

Monthly

- of the tank content gauge by lifting the ball valve housing cover and checking the actual water level in the tank
- that the removable lower section of the access ladder has been removed and secured
- that the tank ball float valve housing cover/lid is closed, secured, and locked and there are no openings in either this ball float valve housing or the tank roof which would allow sunlight to enter the tank, encouraging the growth of algae/moss
- of the float valves on water storage tanks to ensure they are free from corrosion /debris and they function correctly. Operate the arm of the float valve to simulate

[5] LPS 1276: Issue 2.0, Requirements for the LPCB certification and listing of above ground suction tanks for sprinkler systems, BRE, Watford, UK, 2019

[6] Technical Bulletin 203: December 2024: 1 Care and maintenance of automatic sprinkler systems, Fire Protection Association, Moreton-in-Marsh, UK, 2024

a drop of water level in the sprinkler tank to verify the float valve opens and closes to control the inflow correctly

- of the tank for integrity, condition, damage and for any evidence of water leakage. The tank shell, ball float valve housing, tank roof and any flashing shall be visually checked to ensure there are no loose, missing or excessively corroded sections and there is no evidence of any areas of roof collapse. Any internal tank roof support purlins or wind bracing steels should be visually checked, where possible, to assess their condition. Where water storage tanks are fitted with internal liners, a visual check shall be undertaken to assess whether there is any evidence of shrinkage. If any of these visual inspections indicate a need, arrange for a full tank inspection in accordance with TB203.3.5.2 by either a) the original water storage tank manufacturer; b) a manufacturer of water storage tanks with proven knowledge and experience of similarly designed and constructed tanks; or c) a specialist water storage tank inspection/maintenance contractor. Any remedial works identified during this inspection shall be undertaken by one of the aforementioned parties as necessary.

Annual

- maintain water level float valves in accordance with the manufacturer's instructions and check they function correctly

Two-Yearly

- verify the tank rating plate is affixed detailing all the information for LPS 1276
- assess the thickness of the tank panels, handrails, access manway door and opening (e.g. using ultrasonic thickness meters/gauges capable of measuring to an accuracy of +/- 0.01mm with both Pulse Echo mode and Echo to Echo mode or alternative method to the same degree of accuracy), particularly near to where there is any evidence of corrosion, and review the results with the tank manufacturer, or carry out structural calculations and compare against the original design thicknesses/structural calculations to verify the structural integrity of the tank is still adequate for ongoing service of the tank. Where possible inspect other structural elements that cannot be accessed and if there is evidence of corrosion assess the thickness of the steel members
- check the condition of any internal coating or mastic seal to the tank shell
- check all fixings to the tank shell
- check the condition of any internal tank liners, particularly at connection points
- check the tank foundations for cracking/settlement or if supported on steel beams, check them for corrosion

After 10 Years

The tank shall be drained and cleaned as necessary. An ROV is not an acceptable alternative. The fabric shall be restored in accordance with the manufacturer's recommendations. Insurers shall be consulted to agree when the tank shall next be emptied and inspected; the interval is expected to be less than 10 years.

FM

FM 4020

FM 4020[7] is a document of over 50 pages that provides detailed requirements for the design and certification of sprinkler tanks. Unlike the other documents in this summary, it includes details of the wind load and earthquake load the structural design must withstand both for when the tank is full and when it is empty.

For tanks bolted steel cylindrical shell plates the minimum wall thickness is 2.4 mm, while for welded steel cylindrical shell plates it is 6.4 mm.

For welded steel tanks priming and painting is sufficient for corrosion protection. Bolted steel tanks require a zinc layer at 610 g/m^2, or 305 g/m^2 zinc with a butyl rubber liner, or 305 g/m^2 with two layers of a bitumen coating that has a total thickness of 190-500 µm. Alternatively, a liner may be used to provide corrosion resistance.

FM DS 3-2

FM data sheet 3-2[8] repeats much of the structural design requirements in FM 4020. It also includes detailed instructions for the installation of the water tank, siting, connections to it and protection from lightning and frost. While the standard states that a liner *'is not necessarily desirable'*, it has detailed guidance on their selection and installation for corrosion protection.

FM DS 2-81

FM data sheet 2-81[9] provides details of the inspection and maintenance required for fire protection systems, including for sprinkler tanks. Among other checks it requires a monthly inspection for leaks, damage, erosion, obstructions and exposures. Each year there should be a visual inspection of *'all systems and equipment that can be accessed without draining the tank, conducting an underwater evaluation, or disassembly.'* Every two years there should be an inspection of the exterior coating of the tank for corrosion. At intervals of not more than five years there should be a thorough visual inspection of the interior of the tank. *'Look for signs of debris, pitting, corrosion, spalling, rot, coating failure, liner or fabric tank weakness/failure, failure or water saturation of insulation, aquatic growth, etc. Inspect interior piping, anti-vortex plates, heater elements, ladders, etc. Inspect tank floors for evidence of voids beneath or leakage.'* It may be possible to use a diver or remotely operated vehicle to do this, although if work is required, the tank will have to be drained.

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[7] Examination Standard for Steel Tanks for Fire Protection, Class Number 4020, FM Approvals, Norwood, MA, USA, 2024

[8] FM DS 3-2 Water Tanks for Fire Protection, FM, Johnston, RI, USA, 2022

[9] FM DS 2-81 Fire Protection System Inspection, Testing and Maintenance, FM, Johnston, RI, USA, 2023

Conclusion

A water tank is a crucial part of a sprinkler system – it cannot function without it. On rare occasions corrosion can cause sprinkler tanks to collapse. More often, the corrosion is detected before collapse but repairs or replacement are then costly and mean that the risk is temporarily unprotected. Good design and correct installation can reduce the likelihood of severe corrosion, while regular inspections can detect tank corrosion in its early stages, when repair may be relatively easy and inexpensive.