

ATCM TECHNICAL GUIDANCE

TANK STRUCTURAL FAILURES: CATASTROPHIC EFFECTS AND AVOIDANCE THROUGH INSPECTION, MAINTENANCE AND COMPETENT MANAGEMENT



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Intended audience: Building owners, facilities managers, responsible persons, water hygiene professionals, tank manufacturers, maintenance contractors, consulting engineers, designers and other competent persons responsible for cold water storage systems.

Important note

This document provides technical guidance and recommended good practice. It does not replace a site-specific risk assessment, competent engineering assessment, manufacturer's instructions, statutory requirements or applicable British/European Standards.

Where structural integrity is in doubt, the tank should not be assumed to be safe simply because it is not currently leaking. A suitably competent person should determine whether further investigation, remedial work or removal from service is necessary.



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1. INTRODUCTION

Cold water storage tanks and cisterns are critical components within many commercial, industrial, healthcare, residential and other building water systems.

When correctly designed, installed, supported, operated and maintained, they can provide many years of reliable service.

However, deterioration of the tank structure, supports, fixings or associated components can progressively reduce the safety margin of an installation.

Structural deterioration is not always obvious. A tank may remain apparently watertight while corrosion, laminate deterioration, failed internal supports, damaged fixings, distortion or deterioration of its supporting structure is taking place.

If deterioration progresses unchecked, failure can be sudden and potentially catastrophic.

A structural failure can result in:

- rapid release of stored water;
- flooding;
- damage to ceilings, roofs, walls and building fabric;
- damage to electrical and mechanical services;
- collapse or displacement of tanks or supports;
- injury to persons;
- interruption or loss of water supply;
- contamination of stored water;
- loss of critical building services;
- business interruption and consequential financial loss;
- emergency evacuation or closure of affected areas; and
- significant remediation and replacement costs.

ATCM therefore recommends that **structural condition should form an integral part of the inspection and maintenance regime for cold water storage tanks and cisterns.**

This guidance complements ATCM TG101, which provides guidance on inspection, maintenance, cleaning and disinfection of cold-water storage tanks and cisterns. TG101 already identifies structural condition, corrosion, supports, fixings, tank surfaces, access arrangements and associated components as matters requiring inspection.



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2. PURPOSE

The purpose of this guidance is to:

- 1.raise awareness of the potential consequences of tank structural failure;
- 2.identify common causes and warning signs of structural deterioration;
- 3.promote appropriate inspection and maintenance;
- 4.encourage early identification and remediation of defects;
- 5.clarify when specialist structural assessment may be required;
- 6.support responsible persons and building owners in managing structural risks;
- 7.promote competent inspection and maintenance practices;
- 8.reduce the likelihood of catastrophic failure; and
- 9.support compliance with applicable legislation, guidance and standards.

The fundamental principle is:

Do not wait for a tank to leak before considering whether it is structurally safe.

3. SCOPE

This guidance applies principally to above-ground cold water storage tanks and cisterns, including, where applicable:

- sectional GRP tanks;
- one-piece GRP cisterns;
- metal tanks;
- stainless steel tanks;
- galvanised steel tanks;
- tanks incorporating internal stays, supports or partitions;
- tanks installed individually or as multiple interconnected units;
- tank bases and support structures;
- associated access covers and hatches;
- tank connections and penetrations;
- associated overflow and warning arrangements; and
- structural components directly supporting the tank.



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The guidance should be applied proportionately according to:

- tank construction;
- tank age;
- size and stored volume;
- location;
- consequences of failure;
- condition;
- water hygiene risk;
- environmental conditions;
- access arrangements;
- previous repairs;
- manufacturer's requirements; and
- the findings of the site's risk assessment.

4. LEGAL AND REGULATORY FRAMEWORK

Tank structural integrity does not sit within a single piece of UK legislation. Several legal duties and technical requirements may apply depending on the premises, installation, work being undertaken and location within the UK.

4.1 Health and Safety at Work etc. Act 1974

The Health and Safety at Work etc. Act 1974 places duties on employers and others responsible for premises and work activities to protect people from risks arising from their activities.

Section 3 is particularly relevant where persons other than employees may be affected by work activities, while section 4 addresses persons with control over premises, plant or substances.

A tank failure may therefore create risks not only to maintenance personnel but also to building occupants, contractors, visitors and other persons who may be affected.



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4.2 Management of Health and Safety at Work Regulations 1999

Regulation 3 requires a suitable and sufficient assessment of risks to employees and others affected by work activities.

The assessment should be reviewed where it is no longer valid or where there has been a significant change.

For tank installations, this should include consideration of risks associated with:

- structural deterioration;
- access;
- inspection;
- cleaning;
- work at height;
- confined spaces;
- manual handling;
- electrical services;
- chemicals;
- isolation;
- flooding;
- tank failure; and
- emergency arrangements.

4.3 Water Fittings Regulations and Byelaws

Water fittings legislation applies differently across the four nations.

England and Wales

The **Water Supply (Water Fittings) Regulations 1999**, as amended, apply. Among other requirements, storage cisterns must have appropriate arrangements for valves, servicing, overflow/warning arrangements, insect exclusion, covers, insulation and installation that minimises contamination and stagnation.

Scotland

The **Water Supply (Water Fittings) (Scotland) Byelaws 2014** apply to relevant water fittings supplied by Scottish Water. These include requirements concerning suitable fittings, contamination, pressure and installation.

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Northern Ireland

The **Water Supply (Water Fittings) Regulations (Northern Ireland) 2009** apply to relevant premises connected to the public water supply.

The applicable national legislation should therefore always be confirmed for the location of the installation.

5. HSG274 AND LEGIONELLA RISK MANAGEMENT

HSE's **HSG274 Part 2 – The control of Legionella bacteria in hot and cold-water systems** provides detailed technical guidance for the control of Legionella in hot and cold-water systems.

HSG274 recommends that cold water storage tanks are inspected **at least annually**, including assessment of their internal and external condition and the condition of the stored water. It specifically identifies the need to check the tank, lid, insect/vermin screens, insulation and water condition, with cleaning, disinfection and fault rectification where required.

HSG274 also provides examples of deterioration including:

- corrosion;
- corrosion of restraining bars;
- fouling;
- debris;
- severe stagnation;
- heavy scale; and
- GRP gel-coat failure.

These conditions can be indicators that remedial action is required. It is important to recognise that **water hygiene and structural condition are interconnected**.

A deteriorating tank may:

- provide surfaces for biofilm development;
- accumulate sediment and debris;



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- become difficult to clean effectively;
- allow contamination;
- develop leaks or defects;
- compromise insulation;
- alter water temperatures; or
- create areas of stagnation.

6. WHAT IS STRUCTURAL FAILURE?

Structural failure occurs when a tank, its components or its supporting structure can no longer safely withstand the loads imposed upon it.

Failure does not necessarily mean complete collapse.

Structural failure may include:

- cracking;
- splitting;
- delamination;
- excessive deflection;
- distortion;
- buckling;
- corrosion causing significant loss of section;
- failure of bolts or fixings;
- failure of internal stays;
- failure of tank panels;
- separation of joints;
- support failure;
- foundation or plinth movement;
- failure of tank-to-pipe connections; or
- progressive deterioration resulting in loss of structural capacity.

A tank can therefore be **structurally unsafe while still appearing watertight**.

7. COMMON CAUSES OF STRUCTURAL DETERIORATION

Structural deterioration can result from a combination of factors.



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7.1 Corrosion

Corrosion may affect:

- steel tank panels;
 - bolts;
 - nuts and washers;
 - support frames;
 - internal stays;
 - brackets;
 - pipework connections;
 - galvanised components; and
 - concealed or hollow structural sections.
- Particular attention should be given to areas where water, condensation or contamination can remain trapped.

7.2 GRP deterioration

GRP tanks may experience:

- gel-coat deterioration;
- cracking;
- crazing;
- blistering;
- delamination;
- exposed fibres;
- localised biological fouling;
- deterioration around fixings;
- deterioration around penetrations; and
- deterioration of joints or sealants.

The presence of exposed fibres or damaged laminate should not automatically be treated as cosmetic.

The significance of damage should be assessed according to its location, extent, construction and effect on structural integrity.

BS EN 13121 includes requirements relating to the design, fabrication, inspection, testing and verification of GRP tanks and vessels, although its applicability should be confirmed for the particular tank type; one-piece and sectional cold-water cisterns have specific standards and specifications that may apply.



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8. INTERNAL SUPPORTS AND RESTRAINING COMPONENTS

Internal stays, tie rods, braces and other restraining components may be essential to the structural integrity of a tank.

These should be inspected for:

- corrosion;
- cracking;
- deformation;
- loose or missing fixings;
- failed brackets;
- deterioration at attachment points;
- movement;
- loss of protective coating; and
- signs of overstressing.

Failure of one component can alter the load carried by other components.

A defect affecting an internal support should therefore not simply be treated as an isolated component failure.

Where the significance is uncertain, a competent structural assessment should be obtained.

9. TANK SUPPORTS AND BASE STRUCTURES

The condition of the supporting structure is as important as the tank itself.

Inspection should consider:

- steel support frames;
- concrete plinths;
- masonry supports;
- timber supports where present;
- support channels;
- bearers;
- brackets;



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- anchorages;
- fixings;
- corrosion;
- cracking;
- settlement;
- movement;
- distortion;
- water damage;
- inadequate bearing;
- uneven loading; and
- evidence of overloading.

Particular attention should be given to the interface between the tank and its supports.

A structurally sound tank can still become unsafe if the supporting structure deteriorates.

10. PIPEWORK AND CONNECTION LOADS

Pipework should not impose unintended loads on the tank.

Inspection should consider:

- rigid pipework connected directly to tank penetrations;
- unsupported pipework;
- movement;
- vibration;
- thermal movement;
- poorly positioned supports;
- excessive loads at flanges;
- leaking connections;
- corrosion;
- damaged flexible connectors; and
- evidence that pipework is pulling or twisting tank components.

Where pipework has been altered, extended or replaced, the tank and its connections should be inspected to ensure that the revised arrangement has not introduced additional loading.



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11. ENVIRONMENTAL FACTORS

The surrounding environment can contribute significantly to structural deterioration.

Potential factors include:

- high humidity;
- condensation;
- water ingress;
- external corrosion;
- aggressive atmospheres;
- chemicals;
- salt-laden environments;
- temperature fluctuations;
- UV exposure;
- poor ventilation;
- flooding;
- roof leaks;
- inaccessible areas; and
- exposure to contaminants.

The installation environment should therefore form part of the inspection.

12. CATASTROPHIC EFFECTS OF TANK FAILURE

A large stored-water tank contains considerable potential energy and mass.

A sudden failure can release the stored water extremely rapidly.

Possible consequences include:

Building damage

- flooding;
- ceiling collapse;
- damage to roof structures;
- damaged flooring;
- damaged walls;
- damaged insulation;
- water ingress into occupied areas.



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Services damage

- electrical equipment;
- fire alarm systems;
- control panels;
- lifts;
- mechanical plant;
- IT equipment;
- communications systems;
- heating and ventilation systems.

Human safety

Potential hazards include:

- falling components;
- sudden water release;
- slips and falls;
- electrical hazards;
- structural collapse;
- restricted escape routes.

Business and operational impact

Depending on the building, failure may result in:

- loss of water supply;
- closure of facilities;
- interruption of manufacturing;
- disruption to healthcare;
- loss of accommodation;
- loss of business-critical services;
- emergency contractor costs;
- replacement tank costs; and
- reputational damage.

Water hygiene

Following a failure or major remedial event, water quality and hygiene should be reassessed.



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The system may have experienced:

- contamination;
- loss of control;
- ingress of debris;
- stagnation;
- temperature changes;
- loss of disinfection control; or
- disruption to normal operation.

13. INSPECTION STRATEGY

13.1 Minimum inspection frequency

Cold water storage tanks should be inspected **at least annually**, consistent with HSG274 guidance, with more frequent inspection where the risk assessment, condition, environment or previous findings indicate that this is appropriate.

Annual inspection should not be interpreted as a guarantee that a tank will remain structurally safe for the following 12 months.

Additional inspections should be considered where:

- deterioration has previously been identified;
- the tank is approaching the end of its expected service life;
- the installation is in an aggressive environment;
- there has been a leak;
- the tank has been repaired;
- building works have taken place;
- pipework has been altered;
- supports have been modified;
- the tank has been subjected to abnormal loading;
- there has been impact or damage;
- flooding has occurred;
- the tank has been relocated; or
- there has been a significant change in use.



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14. WHAT SHOULD BE INSPECTED?

A structural inspection should consider the whole installation, not simply the visible tank panels.

Tank

- external panels;
- internal panels;
- joints;
- seams;
- corners;
- base;
- roof;
- lid;
- access hatches;
- penetrations;
- flanges;
- sealants;
- fixings;
- coatings;
- insulation.

Internal components

- stays;
- tie rods;
- brackets;
- supports;
- fixings;
- partitions;
- internal pipework;
- strainers where applicable.

External supports

- steelwork;
- concrete;
- masonry;
- frames;



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- bearers;
- anchorages;
- brackets;
- corrosion protection.

Associated components

- inlet;
- outlet;
- overflow;
- warning pipe;
- vents;
- valves;
- temperature sensors;
- level controls;
- pipe supports.

Environment

- water ingress;
- condensation;
- corrosion;
- roof leaks;
- access;
- ventilation;
- chemical exposure;
- surrounding structures.

15. WARNING SIGNS REQUIRING INVESTIGATION

The following should be treated as potential warning signs:

GRP

- cracking;
- crazing;
- blistering;
- delamination;
- exposed fibres;
- discolouration;



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- damaged gel coat;
- unusual flexibility or movement.

Metal

- corrosion;
- pitting;
- perforation;
- staining;
- scale;
- coating failure;
- distorted panels;
- cracked welds;
- loose fixings.

Supports

- corrosion;
- movement;
- deflection;
- cracking;
- distortion;
- missing fixings;
- failed brackets;
- uneven loading.

Tank geometry

- bulging;
- bowing;
- leaning;
- distortion;
- unusual panel movement;
- gaps developing at joints.

Water/operation

- unexplained water loss;
- persistent leakage;
- changes in water level;



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- abnormal noise or movement;
- excessive sediment;
- unexplained temperature changes.

16. SPECIALIST STRUCTURAL ASSESSMENT

Routine visual inspection is not a substitute for specialist engineering assessment where structural integrity is uncertain.

A specialist assessment may be required where there is:

- significant corrosion;
- cracking;
- delamination;
- structural distortion;
- failed internal supports;
- significant tank movement;
- damaged tank panels;
- support deterioration;
- evidence of overloading;
- repeated leakage;
- major repairs;
- uncertainty over the original design;
- uncertainty over loading;
- significant age-related deterioration; or
- evidence that the tank may no longer comply with its original design assumptions.

Depending on the circumstances, investigation may include:

- detailed visual examination;
- dimensional measurements;
- thickness measurement;
- non-destructive testing;
- GRP laminate assessment;
- corrosion-depth measurement;
- bolt/fixing assessment;
- deflection monitoring;
- material assessment;
- review of original drawings;
- review of manufacturer information;



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- structural calculations; and
- assessment of tank and support loading.

The investigation should be undertaken by a person with appropriate competence for the specific tank construction and structural problem.

17. INSPECTION MUST NOT CREATE A NEW RISK

Tank inspection itself can present significant hazards.

The inspection methodology should consider:

Work at height

Where there is a risk of falling, the **Work at Height Regulations 2005** apply. Work should be properly planned, appropriately supervised and carried out by competent persons using suitable equipment.

Confined spaces

Tank interiors and associated spaces may present confined-space hazards.

Entry should be avoided where reasonably practicable. Where entry cannot be avoided, the work should be subject to an appropriate safe system, risk assessment and emergency arrangements.

Electrical hazards

Particular care should be taken where tanks are located above electrical installations or where water release could affect electrical equipment.

Chemicals

Where cleaning, disinfection or chemical treatment is undertaken, COSHH requirements and appropriate control measures should be followed.

Manual handling

Tank components, covers, panels and associated equipment may be heavy or awkward and should be assessed accordingly.



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18. CLEANING AND STRUCTURAL INSPECTION

Cleaning and structural inspection should be considered together.

Cleaning can expose defects that may not previously have been visible, including:

- corrosion;
- pitting;
- damaged coatings;
- GRP deterioration;
- cracks;
- damaged joints;
- failed sealants;
- damaged stays;
- loose fixings;
- structural distortion;
- sediment accumulation.

Cleaning should therefore not simply restore the tank to service without considering whether defects discovered during the process require investigation.

TG101 establishes the principle that cleaning should be undertaken where inspection, contamination, deterioration, microbiological fouling, sediment or risk assessment indicates that it is required, rather than relying on an arbitrary automatic cleaning interval.

19. PREVENTING STRUCTURAL FAILURE

Preventative measures should include:

1. appropriate initial design;
2. correct installation;
3. suitable materials;
4. correct tank support;
5. appropriate pipework support;
6. protection against corrosion;
7. appropriate environmental control;
8. regular inspection;
9. prompt repair of defects;
10. competent cleaning;



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- 11.maintenance of access arrangements;
- 12.maintenance of covers and insulation;
- 13.monitoring of known deterioration;
- 14.retention of inspection records; and
- 15.replacement where continued service is no longer justified.

HSG274 also emphasises accessibility for inspection and maintenance, suitable materials and appropriate tank arrangements as part of good system design.

20. CHANGES THAT SHOULD TRIGGER ADDITIONAL INSPECTION

An additional inspection should be considered following:

- building refurbishment;
- roof replacement;
- changes to tank location;
- replacement of pipework;
- installation of new valves or equipment;
- alteration to tank supports;
- structural building works;
- seismic or significant accidental impact where relevant;
- flooding;
- fire;
- major water leakage;
- significant corrosion;
- tank repairs;
- changes in stored volume;
- changes in operating conditions; or
- prolonged periods out of service.

Where construction work is undertaken, the **Construction (Design and Management) Regulations 2015** may also apply depending on the nature and extent of the project.

21. WHAT TO DO WHEN A STRUCTURAL DEFECT IS FOUND

Where a defect is identified:



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Step 1 – Assess

Determine whether there is an immediate risk to:

- people;
- the building;
- the tank;
- water quality; or
- critical services.

Step 2 – Control

Where necessary:

- restrict access;
- isolate the tank;
- reduce the stored water level;
- isolate associated services;
- protect electrical equipment; and
- implement emergency measures.

Step 3 – Escalate

Notify the responsible person/building management and obtain competent technical advice.

Step 4 – Investigate

Determine:

- the cause;
- the extent;
- the severity;
- whether the tank remains safe to operate; and
- whether other components may also be affected.

Step 5 – Remediate

Repair or replace defective components in accordance with appropriate technical requirements.



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Step 6 – Verify

Following remedial work, confirm that the tank and associated system are safe to return to service.

Step 7 – Record

Document:

- defect;
- photographs;
- assessment;
- risk;
- action taken;
- repairs;
- replacement components;
- verification;
- date;
- competent persons involved.

22. EMERGENCY RESPONSE TO TANK FAILURE

Where a tank suffers significant or catastrophic failure:

1. **Protect people first.**
2. Restrict access to the affected area.
3. Stop or isolate the water supply where safe to do so.
4. Consider electrical isolation where water has affected electrical equipment, using competent persons.
5. Prevent access beneath damaged structures.
6. Control the spread of water where practicable.
7. Protect critical services.
8. Notify the responsible person and relevant emergency contacts.
9. Arrange competent structural assessment.
10. Assess the condition of surrounding building structures.
11. Assess the water system for contamination.
12. Establish the root cause.
13. Develop a safe remediation/replacement plan.
14. Record the incident and corrective actions.



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The failed tank should not simply be repaired and recommissioned without establishing why the failure occurred.

23. TANK STRUCTURAL CONDITION RATING

ATCM recommends a simple condition-rating system such as:

GREEN – SERVICEABLE

No significant structural defects identified.

Action: Continue routine inspection and maintenance.

AMBER – DETERIORATING

Defects or deterioration identified but no immediate evidence of imminent failure.

Action: Record defect, establish remedial timescale and consider increased inspection frequency.

RED – STRUCTURALLY COMPROMISED

Significant structural defect, serious corrosion, distortion, failed support, major cracking or other condition where structural integrity cannot be demonstrated.

Action: Immediate competent assessment. Consider taking the tank out of service or implementing other appropriate controls.

Important: The colour rating should support, not replace, professional judgement and site-specific risk assessment.

24. INSPECTION RECORD

Each inspection should record, as a minimum:

- site;
- tank identification;
- tank manufacturer;
- tank type/material;
- approximate age;
- capacity;
- location;
- inspection date;
- inspector;
- areas inspected;



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- tank condition;
- support condition;
- internal component condition;
- pipework/connection condition;
- photographs;
- defects identified;
- condition rating;
- recommended actions;
- priority;
- person responsible;
- completion date; and
- verification of completed remedial work.

HSG274 recommends maintaining records relating to inspection, monitoring, corrective actions and maintenance, with relevant inspection records retained for an appropriate period.

25. RECOMMENDED INSPECTION CHECKLIST

YOU CAN FIND THIS ON THE NEXT PAGE...

RECOMMENDED INSPECTION CHECKLIST

Inspection Area	Check	Condition	Action
Tank Panels	Cracking, corrosion, damage	☐	☐
GRP Surfaces	Gel coat, laminate, delamination	☐	☐
Joints	Leaks, deterioration	☐	☐
Internal Stays	Corrosion, movement, damage	☐	☐
Bolts/fixings	Corrosion, looseness, failure	☐	☐
Tank Base	Condition and bearing	☐	☐
Supports	Corrosion, movement, distortion	☐	☐
Plinth	Cracking, settlement	☐	☐
Pipework	Loading, movement, leakage	☐	☐
Connections	Flanges, penetrations, seals	☐	☐
Lid/access	Condition and security	☐	☐
Overflow/vent	Condition and screening	☐	☐
Insulation	Condition and coverage	☐	☐
Internal water	Debris, sediment, fouling	☐	☐
Environment	Damp, corrosion, contamination	☐	☐
Access	Safe inspection arrangements	☐	☐
Records	Previous defects/actions	☐	☐

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26. DESIGN, INSTALLATION AND STRUCTURAL STANDARDS

The exact standards applicable to a tank should be established according to its construction, purpose and installation.

Relevant standards and guidance may include:

- **BS EN 806** – Specifications for installations inside buildings conveying water for human consumption;
- **BS EN 806-5** – Operation and maintenance of water installations;
- **BS 8558** – Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings;
- **BS EN 13121 series** – GRP tanks and vessels for use above ground, where applicable to the tank construction;
- relevant Eurocodes and UK National Annexes for supporting structures, where applicable;
- manufacturer's design and installation requirements;
- applicable Water Fittings Regulations or Byelaws; and
- applicable HSE guidance.

For example, the BSI Eurocode framework includes standards for the design of steel and concrete structures, with the applicable edition and UK National Annex needing to be established for the particular project.

ATCM avoids prescribing one structural design standard for every tank, because the appropriate structural assessment will depend on whether the tank and its support are GRP, steel, concrete or another construction.

27. COMPETENCE

Inspection and assessment should be undertaken by persons with appropriate competence for the task.

Competence should reflect:

- tank construction;
- water systems;
- structural condition;



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- health and safety;
- work at height;
- confined spaces where applicable;
- water hygiene;
- inspection techniques; and
- relevant legislation and standards.

Where structural integrity cannot be determined through routine inspection, a suitably qualified and experienced structural engineer or other specialist should be engaged.

28. KEY PRINCIPLES

ATCM recommends the following principles:

- 1. A tank does not have to be leaking to be unsafe.**
- 2. Structural condition should form part of every tank inspection.**
- 3. The supporting structure is as important as the tank itself.**
- 4. Internal stays, fixings and connections must not be overlooked.**
- 5. Pipework should not impose unintended loads on tanks.**
- 6. Small defects should not automatically be assumed to be cosmetic.**
- 7. Known deterioration should be monitored and managed.**
- 8. More frequent inspection may be necessary where deterioration or risk warrants it.**
- 9. Structural assessment should be undertaken where the significance of a defect cannot be established by routine inspection.**
- 10. Cleaning and water hygiene activities should not be separated from consideration of structural condition.**
- 11. Inspection activities must themselves be safely planned and controlled.**
- 12. Records provide an essential history of the tank's condition.**
- 13. Remedial action should address the cause, not simply the symptom.**
- 14. Where structural integrity cannot be demonstrated, continued operation should not be assumed to be acceptable.**

29. CONCLUSION

Tank structural failure can have consequences far beyond the loss of the tank itself.

A relatively small defect, if left unidentified or unmanaged, can develop into a significant structural problem.

TANK STRUCTURAL FAILURES: CATASTROPHIC EFFECTS AND AVOIDANCE THROUGH INSPECTION, MAINTENANCE AND COMPETENT MANAGEMENT



The consequences of catastrophic failure can include flooding, building damage, damage to critical services, interruption of water supplies, injury, contamination, business interruption and substantial financial loss.

The most effective method of avoiding catastrophic failure is **early identification and management of deterioration**.

Regular, competent inspection provides an opportunity to identify defects before they become critical.

ATCM therefore recommends that tank owners, responsible persons, facilities managers and maintenance providers adopt a proactive approach based on:

Inspect → Identify → Assess → Act → Verify → Record

The objective should not simply be to determine whether a tank is leaking.

The objective should be to determine whether the **tank, its components, its supports and its surrounding installation remain fit for continued service**.

30. REFERENCES

Legislation and official guidance

1. Health and Safety at Work etc. Act 1974.
2. Management of Health and Safety at Work Regulations 1999.
3. Work at Height Regulations 2005.
4. Confined Spaces Regulations 1997 and associated HSE guidance.
5. Construction (Design and Management) Regulations 2015, where applicable.
6. The Water Supply (Water Fittings) Regulations 1999, England and Wales.
7. The Water Supply (Water Fittings) (Scotland) Byelaws 2014.
8. The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009.
9. HSE HSG274 Part 2 – The control of Legionella bacteria in hot and cold water systems.
10. HSE Approved Code of Practice L8 – Legionnaires' disease: The control of Legionella bacteria in water systems.



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British and European Standards

1. **BS EN 806 – Specifications for installations inside buildings conveying water for human consumption.**
2. **BS EN 806-5 – Operation and maintenance.**
3. **BS 8558 – Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings.**
4. **BS EN 13121 series – GRP tanks and vessels for use above ground, where applicable.**
5. **Relevant BS EN Eurocodes and UK National Annexes for structural assessment of supporting structures, as applicable.**

