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SURVIVAL TECHNOLOGY

White Paper

WHY ARE THE FIRES NOT GOING OUT?

Unveiling the true cost of inadequate fire safety inspections

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The occurrence of fire on board ships remains a daily reality across the globe. Fire incidents are reported to be up 17% year on year, and fire continues to be a major cause of total ship losses and seafarer fatalities. However, there is also evidence to suggest that the situation could be far worse.

While fire detection and protection measures on board ship have improved significantly over the years, there has also been a worrying hike in fire safety-related deficiencies on board ships, with an increase in reported safety breaches and subsequent detentions following Port State Control inspections.

In this white paper, Metkel Yohannes, Director of Service and Rental Solutions at Survitec, draws on the testimonies and experiences of Survitec's network of certified technicians to reveal the extent of the problem. He highlights deficiencies in the routine maintenance and testing of safety-critical equipment that are impacting system performance – even leading to equipment failure in some cases – jeopardising crew and vessel safety.

Yohannes makes a strong case for more vigilant maintenance regimes and underscores the importance of crew training and regulatory compliance in ensuring proper and effective functioning of complex, safety-critical systems. He also asks the question: as an industry, do we need more governance of the service providers that shipowners use to carry out their inspections, not only to protect crew and vessel safety, but also to reduce the costs associated with ship downtime and emergency repairs.

Increasing incidents, rising insurance premiums

According to industry reports, fire remains one of the leading causes of major shipping incidents, accounting for over 20% of total losses. In their *Safety and Shipping Review 2023*, insurance firm Allianz reports that 64 ships were lost due to fire over the past five years, with fire being the most expensive cause of marine insurance claims.

In an analysis of 244,451 insurance claims between January 2017 and December 2021, Allianz found that 18% were due to fire and explosion, worth €9.2bn in total. While in 2022, 209 fire incidents were reported globally, representing the highest total for a decade, and making fire and explosion the second top cause of ship losses, with activity up 17% year-on-year.

So, why the increase? The use of new alternative fuels and the carriage of lithium-ion battery cargoes are two reasons cited by Allianz. Industry analysts also point to a reported increase in mis-declared dangerous cargoes, especially hazardous containerised cargoes.

These factors certainly create new fire risks and safety challenges, and analysts underline the importance of having suitable fire detection and fire protection systems in place to help mitigate these risks (see box). However, there is also evidence to suggest that this is not the whole story, and that there may be other, more basic, underlying factors that can help to explain the rise in high-value insurance claims and ship losses related to fire.

Mitigating the risk of fire

> Most ships lack the suitable fire protection, firefighting capabilities, and detection systems to tackle [electric vehicle] fires at sea. Attention must be focused on pre-emptive measures to help mitigate the peril, such as ensuring crew receive adequate training and access to appropriate firefighting equipment, improving early detection systems and developing hazard control and emergency plans.

Safety and Shipping Review 2023, Allianz

Turning a trend: The Concentrated Inspection Campaign

The past few years have also seen a worrying trend of fire safety-related deficiencies on board ships, with rising numbers of ship detentions following Port State Control Inspections. As a result, fire safety was made the focus of a Concentrated Inspection Campaign (CIC) that ran between September and November 2023.

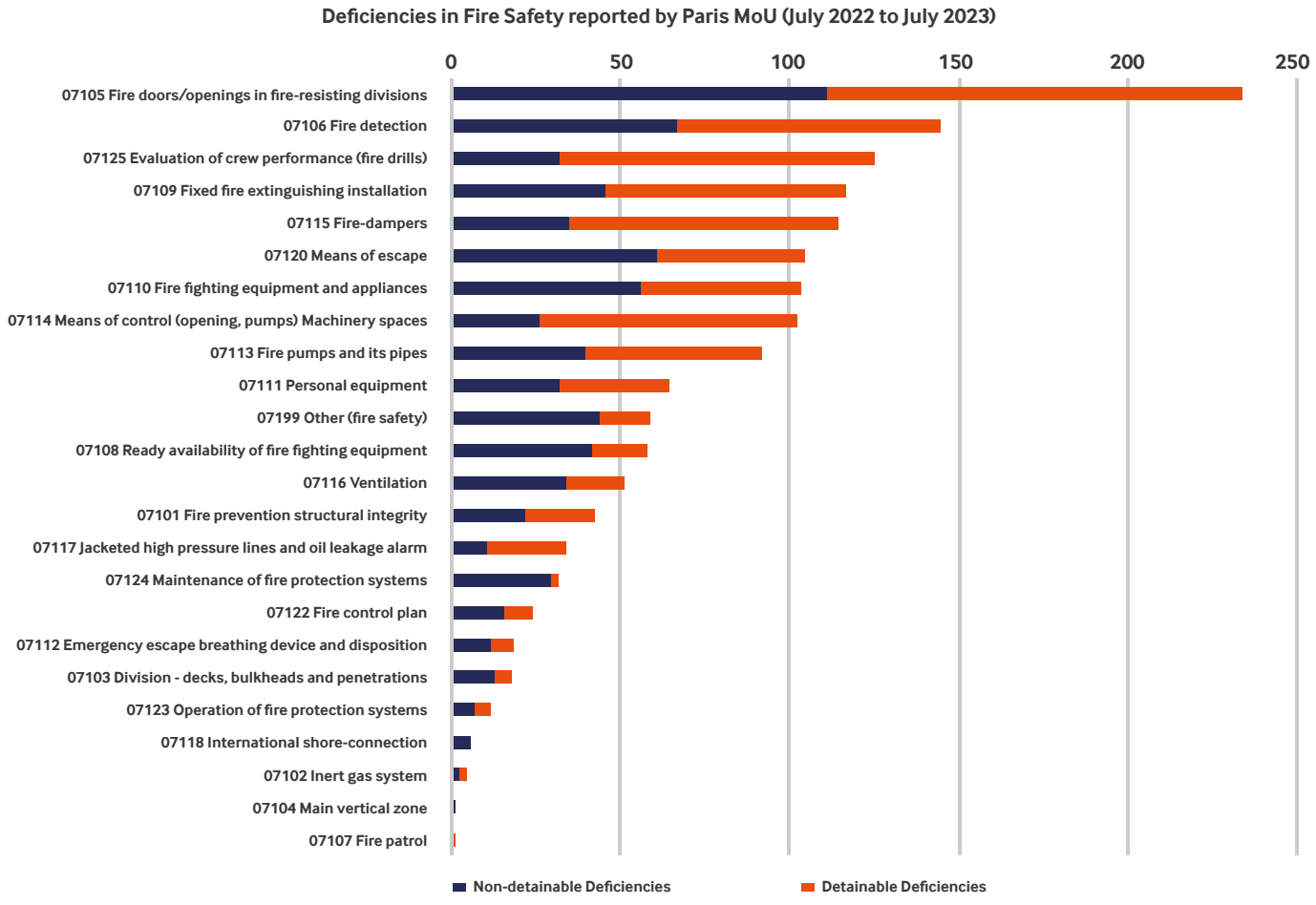
The results are alarming. According to preliminary results published in January 2024, the Baltic Sea MOU carried out 1,237 inspections on vessels in its jurisdiction. Inspectors noted basic failings in routine fire safety practices, such as the maintenance of fire doors (36%) and the periodic testing of fire detection and alarm systems (22%).

Other MOUs cite similar findings. In a review of fire related deficiencies found between July 2022 and July 2023, Paris MoU reported that most detainable deficiencies related to:

- Fire doors
- Fixed fire extinguishing installations
- Fire-dampers
- Ventilation
- Fire detection and alarm systems
- Fire pumps and pipework; and
- Remote means of control (valves, pumps, ventilation, etc).

The campaign was conducted jointly with the Tokyo MOU. Preliminary results published by the Tokyo MOU in March 2024 revealed a total of 8,273 inspections were carried out during the period, of which 7,190 (86.91%) were directly related to the CIC. 2,860 deficiencies were found on 1,287 ships, representing 17.90% of its CIC inspections.

> In 2023, [there were] 15,562 deficiencies [20.52%] related to fire safety measures... It is noted that, as a result of the CIC on Fire Safety, **deficiencies related to fire safety measures doubled** compared to the previous year.
>
> Annual Report on Port State Control in the Asia-Pacific Region 2023



Learning lessons the hard way

While alarming, these findings are of no surprise to global Survival Technology specialist, Survitec. As an Original Equipment Manufacturer (OEM) and fire safety expert, Survitec's service technicians are often called out to rectify problems and faults identified during inspections. The rise in the number of fire-related incidents and deficiencies has become a growing concern.

As Yohannes explains "The economic downturn and the emphasis on cost reduction post-Covid have had a negative impact on fire safety. We know from experience that some ship owners and operators are maintaining and inspecting safety equipment themselves as a way of making their budgets stretch further. Crew training is also being negatively impacted. We're finding basic errors and oversights that do not become apparent until either the ship fails an inspection and is detained – or there is a fire."

For example, Survitec was called out to a vessel after an engine room fire. The crew had managed to extinguish the fire but suspected there was a fault with their high expansion foam firefighting system. The cause of the fault was a blockage in the system. The crew had installed a new foam pump and forgotten to remove one of the protective caps. (Figure 1)

"Another common mistake is to mix different types or brands of firefighting foam. When this happens, the foam becomes contaminated. In one inspection of the foam tank for a helideck system, the technician found the foam had changed from a liquid state to an almost sponge-like, gelatinous state. The system was therefore inoperable and required major work – and considerable expense – to remove the contaminated foam, deep-clean the system, and recharge it. Fortunately, in this instance, the fault was discovered and rectified before the ship had cause to use the system, because the system would certainly have failed had there been a fire." (Figure 2)

Figure 1. A protective cap **(above, left)** retrieved from inside a high expansion foam firefighting system **(above, right)**, where it was restricting the flow of foam to the proportioner.

Figure 2. Internal inspection of the foam tank for a helideck foam system **(above, left)**. In this particular instance, 60% of the foam was found to be in a gelatinous state after different types of foam had been mixed, rendering the system inoperable. The locking caps from the cans were found floating inside the tank **(above, right)**.

Procuring the right parts

The procurement of spare and replacement parts can also be a challenge for ship owners/operators. Without the relevant training or expertise, it can be difficult to recognise low-quality or counterfeit parts, or even the "right" part.

High pressure hoses for CO_2 fire extinguishing systems is a key example. Hoses approved for use on a high-pressure CO_2 system can be distinguished by the pin pricks that run along the length of the hose, and by the Type Approval Test certificate details which will be stamped into the crimping neck, as mandated by the class societies. Poor-quality or counterfeit parts will not have these features but the purchaser needs to know what to look for.

Survey reports from Survitec's global network of service engineers indicate declining crew competencies and skills in this respect, possibly due in part to the seafarer shortage and the challenge of keeping on top of more stringent rules and regulations, including International Maritime Organisation's (IMO) MSC 1432.

As Yohannes explains "Service requirements are complex and varied. MSC 1432 is effectively a baseline for servicing. The vessel class and flag may specify additional or stricter requirements, and the Original Equipment Manufacturer (OEM) may have their own requirements too. Requirements will also vary depending on the service interval.

Specialist fire safety service providers will usually invest heavily in training to provide for this. For example, at Survitec, we have three training centres where we train our technicians on both our own and other brands of equipment.

Refresher training is also delivered frequently, to maintain certification. We grade our service technicians, from apprentice level to senior lead technician, before they even set foot on board a vessel. Our apprentices work alongside our top-grade technicians and we monitor their progress. They then progress through the levels as they build up experience."

CASE STUDY: Servicing requirements for fixed CO_2 firefighting systems

Revised guidelines for the maintenance and inspection of CO_2 systems were published in 2021 (MSC 1318 Rev.1), to help protect crew against the dangers of leaking gas. Yet, safety inspections often uncover serious issues.

Figure 3a: Hydraulic hoses are often mistaken for high-pressure hoses – and they are also cheaper – but they are not designed for use on CO_2 applications and may burst under pressure.

Figure 3b: The system datasheet will specify hoses of a particular length and diameter but it is not uncommon to find ill-fitting hoses in use, with copper washers used to force a connection.

Figure 3c: Overcrimping of the hose is also common, causing damage to the hose. While blocked hoses (Figure 3d) and peeling hoses (Figure 3e) often indicate that the hoses are not being inspected properly or changed regularly.

Figure 3f: Multiple connections, which are ill-advised and against best practice as they are less able to withstand the vibrations on board ship.

Figure 3a

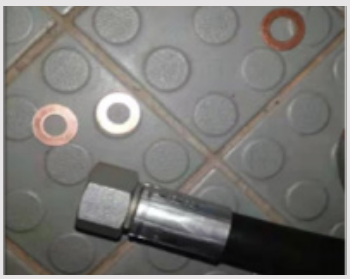


Figure 3b

Figure 3c

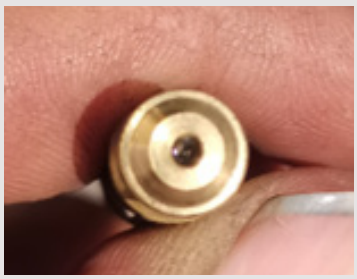


Figure 3d

Figure 3e

Figure 3f

Learning the hard way

Unfortunately, there is also evidence of a wide disparity in service quality between service providers.

Lid reports, "Our service technicians have seen the wrong parts being used or poorly fitted, or the use of low-quality parts that deteriorate rapidly and fail. There are also examples where the paperwork will confirm that a service inspection has been carried out but the levels of wear and tear on the equipment will suggest otherwise.

Some issues are self-evident – for example, the rust on a valve or a fire extinguisher is clear to see – but other issues are less obvious and can have catastrophic consequences."

Lid quotes an example. In early 2024 a bulk carrier left port, having just completed a fire safety inspection and received full certification from a local service provider. Shortly after leaving port, a fire started in the engine room. They released the CO_2 system, which had just been inspected and approved, yet more than half the cylinders failed to activate. The fire was eventually extinguished but there was significant damage to the vessel, with costs of $2-3 million USD for offhire and repairs.

CASE STUDY: Fixed firefighting systems

Rigorous fire safety inspections play a vital role in ensuring the safety of a vessel. Survitec reports that many, if not most, of the inspections they perform will reveal issues that require immediate corrective measures. Furthermore, issues related to poor maintenance or superficial inspections will generally be found across multiple systems, not just one system.

Figure 4a

Figure 4a: The foam proportioner on a high expansion foam system should be removed and inspected regularly, yet membranes are often found to be damaged or broken, which impacts the delivery of foam to the system.

Figure 4b

Figure 4b: Deck foam system. Mud and rust has collected in the pipeline over time causing a blockage.

Figure 4c : In this instance, foreign objects were found blocking the foam monitor head, restricting flow.

Figure 4c

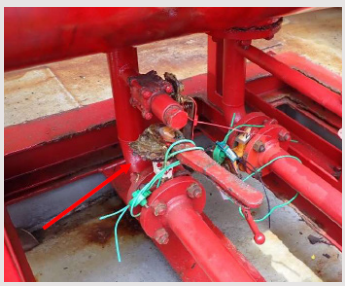


Figure 4d

Figure 4d: Valves that have corroded and do not open or close properly is a common issue across all systems. In this instance, the tank inlet valve on a low expansion foam system did not lock in the correct position and so was being held in place by cable ties.

Inspections are as essential for new vessels, as they are for older vessels, to verify that new equipment is fully operational. For example, a CO_2 system will be disabled, for safety, while a ship remains in the shipyard. It is not uncommon for Survitec service technicians to discover that a new ship has been sailing without a functioning CO_2 firefighting system, because the pilot hoses for the main control valves and release cabinets have not yet been reconnected, and safety pins are still in place.

Cutting corners

As Lid explains "Cost can be a determining factor when selecting a service provider, especially when different providers boast the same approvals. Some providers may compete by undercutting their competitors, but they can often only do this by cutting corners. They may not invest in training to the same degree, so their technicians may lack knowledge of the different rules and regulations or the requirements for all the different brands; they may not even have all the equipment required to complete the inspection beyond a cursory visual check.

In extreme cases, certificates may even be issued without an engineer setting foot onboard the vessel."

> We clearly see evidence of a slip in standards when it comes to basic safety practices. Approval stamps are being applied to fire systems and appliances that would or should not pass inspection. There should be more oversight, more governance, and better quality control procedures. Shipowners and managers need accredited service partners they can trust.
>
> **Metkel Yohannes, Director of Service and Rental Solutions, Survitec**

CASE STUDY : Breathing apparatus

The IMO mandates an annual inspection according to the OEM's recommendations. Some OEMs state that a functional test must be performed using approved test equipment, to check that the mask, the hose and the regulator all work correctly under pressure. Not all OEMs require this test, so not all providers will invest in the test equipment. Therefore, some providers will perform only a visual inspection of the apparatus.

Of most concern is the lack of internal inspections for breathing air cylinders. Cylinders may be continually topped up, rather than drained and inspected. Air will collect in the cylinder, and the water vapour present in the air will cause the cylinder to rust. The risk is that particles of rust will then be inhaled into the lungs. Best practice is therefore to empty the cylinder and inspect it before refilling, even if the cylinder is half full, but not all service providers do this.

Figure 5a. A visual inspection.

Figure 5b. A functional test.

Figure 5c.

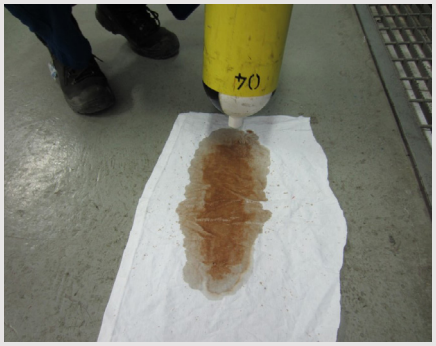


Figure 5d.

Figure 5e.

An internal inspection of the cylinder reveals the presence of water and rust (Figure 5c). Figures 5d and 5e illustrate how water and rust collects inside the cylinder if cylinders are continually topped up, rather than drained and inspected.

THE OPTIMUM SOLUTION

Finding a provider you can trust

So what is the advice for ship owners, operators and crew? How can they identify a reputable provider and avoid the prospect of a PSC detention and, most importantly, ensure they can rely on their safety equipment to perform when required?

Yohannes believes there are five key questions that can help ship owners/operators to assess the competency of a provider:

1. What training do they have?

Not all fire safety service providers have been trained to inspect all safety systems and equipment so you should check: what experience do they have? What training have they received and on which types and brands of equipment? What test facilities and equipment do they have?

2. What services will they perform and how will they be documented?

A reputable provider will clearly document all works in a service report. As Lid explains, "At Survitec, we provide comprehensive service reports with clear, transparent headings. We list each procedure with reference to the relevant IMO circulars, which details the required test protocols and parameters that we follow."

3. What procedures are in place to maintain quality control?

Ongoing training is essential, to ensure technicians keep up-to-date with advances in technology and changes in legislation. At Survitec, we ensure at least two technicians are available for every job – for practical purposes, and also quality control. If there is a need to blow the distribution line from the CO_2 system to the engine room for example, our technicians can manage this between them and verify the system works without having to call on crew. In addition, we have certified central compliance control to ensure we maintain a consistently high standard of service worldwide.

4. Will you have recourse to redress?

It's impossible to eliminate human error - mistakes happen. A responsible provider will make provision for this so you should ask, what corrective actions will be taken if you are unhappy with service delivery or if you identify an issue after leaving port.

5. Does the quote seem "too good to be true"?

If it seems too good to be true, it probably is and you should look more closely and verify: does the provider have the resources and the expertise to deliver the service? Do you have measures and resources in place to verify that the works will be performed to the required standards?

Creating Greater Awareness

Fire is a regular occurrence on board ships – there are almost weekly fires on board container ships, for instance - so it is imperative that fire safety equipment can be relied upon to work efficiently. This is particularly important as the industry moves forward with the development and introduction of alternative fuels, including the use and transportation of lithium-ion batteries. These fuels bring with them new fire risks and safety challenges, where successful containment of fire may depend upon early detection and a rapid response.

At a time when ever-more sophisticated technologies are being developed to protect ships against these new risks and challenges, there is also evidence to suggest that standards in basic fire safety management are slipping. Yet, the fires will only continue to go out – or be contained – as long as there is continued investment in fire safety, with the proper maintenance and testing of all fire systems and equipment, as mandated by SOLAS, the IMO and the FSS code.

Specialist fire safety service providers can play a crucial role in supporting proper and effective maintenance and testing on board ship. As Finn Lende-Harung, Chief Commercial Officer, Survitec, explains, "Specialist fire safety service providers, such as Survitec, invest heavily to resource, train and develop highly-skilled technicians with a thorough understanding of the intricacies and requirements of complex safety systems and equipment, the specific requirements of the vessel flag and class, and the particular requirements of individual brands. These technicians are an invaluable safety resource and there can be huge benefits to ship owners and operators in investing in safety agreements and/or safety management services. Safety agreements allow providers to build up partnerships with the ship owner/operator, to get to know the vessel and to predict and plan for the vessel's servicing requirements, which also offers cost and time efficiencies long term – not to mention reducing the risk, and costs, of detentions and emergency repairs short term."

However, trust is key. As Yohannes explains "Ship operators must have confidence in the system of approvals. There are vessels receiving substandard service inspections from providers that simply do not have the level of experience or understanding required to ensure ships are operating safely. Some service providers may boast a large number of approvals yet may not be suitably equipped or resourced to perform all of the required tests. Currently, there are no quality benchmarks, no training standards in place to help determine competencies. As an industry, we should review current practices and decide: do we need more oversight, more governance, better quality control procedures around servicing and approvals?

Because shipowners and operators need accredited service partners they can trust. Anything less is not just a false economy, it's potentially dangerous."

Sources

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Survitec fire safety services

Metkel Yohannes explains how Survitec's approach to fire safety inspections is informed by decades of experience as an OEM to ensure failsafe fire protection at sea.

"As an Original Equipment Manufacturer (OEM) and a leading provider of fire safety solutions to the maritime industry, we know fire safety systems inside out. We design and manufacture these systems so we work closely with regulatory bodies to keep up-to-date with the rules and regulations for the different flags and classes. We also understand the importance of regular inspections and help to define the requirements for the different service intervals. But, ultimately, it is our commitment to excellence and our purpose to protect lives that drives us to deliver meticulous inspections that will keep your seafarers and assets safe, while also minimising the risk of costly, unplanned repairs."

The Survitec difference:
The benefits of choosing Survitec as your fire safety service partner

Global coverage
Coverage of all key ports across 50 countries, 365 days a year, plus flying squads for emergency repairs

Highly-skilled technicians
Trained & approved to international standards to inspect & repair equipment across multiple brands

High quality parts
Fit-for-purpose spare & replacement parts, readily available across all global trading routes

Due date management
Full service agreements with your own dedicated account manager, for personalised support with compliance

Flexibility built in
Services can be delivered across multiple ports to accommodate globally-trading fleets

Clear pricing
Transparent pricing that allows you to budget more easily, with no hidden charges

RAFT XCHANGE

We've got you covered

SCAN ME to discover efficient liferaft rental solutions with unrivalled global coverage

SUIT XCHANGE

Immersion suit rental made easy

SCAN ME to discover how you can swap your traditional immersion suit purchase and servicing model for a time-saving rental package

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