OGUK

Good Practice in Fire Management in Offshore Accommodation

Technical Notes

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Contents

1 Introduction

Prior to the goal-setting PFEER regulations [1] coming into force in 1995, offshore installations had to comply with the now-revoked prescriptive requirements of SI611 [2]. For management of fires in accommodation, SI611 included the need to install sprinkler systems, but due to improved, high sensitivity smoke detection and other practices, other fire management strategies are now possible. Whatever approach is adopted for a new or existing installation, it must meet the PFEER requirement of "appropriate measures" to protect people from fires (and explosions) and ensure effective emergency response.

There is a commonality of fire hazard in accommodation across installations:

- For cabins the fire load is minimal and restricted to soft furnishings; and the ignition source is from fixed, or portable electrical equipment.
- For the laundry and galley, the fire hazard is clear with common risk management.

This document describes how to assess and manage the fire risk in typical offshore accommodation.

The hazard in cabins is different to that in other accommodation areas as personnel are likely to be asleep and may not identify the onset of a fire. Therefore, this guidance first considers cabins (Sections 2 and 3), with other areas and specifically the laundry and galley considered in Section 4.

The *Risk-based Decision-Making Framework* [3] guides on how to make decisions on whether a risk reduction measure should be implemented to manage a hazard. The good understanding that the industry has of fire management in accommodation and the appropriate risk reduction measures to take means that the decision on how to manage fires in cabins should be made by reference to good practice (i.e. a *Type A* decision). This document gives good practice on this topic and covers the fire risk assessment that must be carried out for a cabin in an offshore installation (Section 2) and the risk reduction measures that must be considered within it (Section 3).

Effective fire risk management for accommodation is achieved through a hierarchical strategy where fires are prevented and, as there will still be a residual hazard, by measures that will detect a fire, prevent its spread and alarm people so that they can quickly escape to a safe location. Many of the measures are part of the normal approach to the management of any hazard offshore e.g. meeting appropriate codes and standards, operating within a safety management system (SMS) and appropriate fire ratings for partitions (walls, floors and ceilings). Only specific elements of these are considered in this guidance.

2 Cabin Fire Risk Assessment

The HSE gives guidance [4] on the type of risk assessment that is expected for different situations. For a typical cabin, the risk is typically low:

Likelihood of Cabin Fire - The likelihood of accommodation cabin fire is relatively low. Although the use of personal electrical devices has increased considerably, the likelihood of them causing a fire is very low. However, faulty or poor-quality devices still present a relatively energetic ignition source which have the potential to ignite other materials.

Escalation Potential – The risk reduction measures in a cabin such as materials used, boundary fire ratings, ventilation controls and fixed firefighting (sprinklers) are designed to slow the development of any fire, but if the combination of those controls that are chosen do not operate as intended, smoke and heat production may be significant in a fire event. Modern fire detection technology provides early detection, which allows for subsequent alarm of a developing fire to be raised, ensuring that sleeping persons are woken in time to escape. However, in the worst-case of no alarm being raised, cabin occupants could be critically overcome by smoke. Additionally, there remains a risk that escalation to adjacent areas could occur and, in view of this, accommodation fires should be treated as a major accident hazard (MAH) event.

Describing fire in cabins as a lower risk MAH, the HSE guidance indicates that the risk assessment should be largely qualitative, and this document gives Good Practice for such a risk assessment. This qualitative approach is consistent with guidance documents such as PAS 79 [5] or a similar form (available via the Scottish Government's website, [6,7,8]) that is used onshore to prompt and record the controls required to manage fire risk in a building, though many of the points are mandatory offshore (e.g. operation under a SMS).

Whilst fire modelling is widely used for hydrocarbon fires in process areas offshore, fire modelling is not required in considering the management of fire in a typical cabin. PAS 79 does not require, nor expect, fire modelling to be carried out for similar onshore scenarios. Cabins are compartmentalised meaning that escalation should not occur and effective smoke detection plus an alarm will warn of a fire quickly and this, or sprinkler activation, occurs before escape from the cabin becomes improbable. If the cabin is not typical in some way, then the need for fire modelling should be considered further.

The potential for TR impairment should also be considered in the risk assessment and the suitability of the alternative muster point, blowdown of plant and other associated arrangements confirmed to be suitable. Typical cabins should be designed so that fires are contained within them preventing fire spread to the TR. Severe smoke spread causing impairment also needs to be considered.

3 Cabin Fire Risk Management Controls

Risk management controls that may differ between different cabins are discussed below and the good practice approach is either outlined, or the basis given on which a decision between different options can be made. For a typical cabin with limited fuel and ignition sources, the four major decisions are:

- How to detect and alarm a fire
  - Addressable smoke detection in the cabin and subsequent alarm allow occupants to exit well before occupation becomes untenable;
  - Smoke detection without immediate alarm requiring manual identification of its source;

  Both approaches can be good practice;
- How to limit fire development, or spread
  - By the design of the materials in the room (low flammability) and its fire compartmentalisation, or
  - By sprinklers and compartmentalisation;

  Both approaches can be good practice;
- What the "check and respond" team are required to do and how the fire team responds to an incident; and
- Ventilation philosophy on fire detection.

The approach taken needs to be recorded in a fire risk assessment.

The remainder of this section lists the specific controls associated with accommodation fire management under the headings of plant, people and procedural controls. Procedural controls may be implemented by procedures, site directives, or any other appropriately controlled means. Possible shortcomings, or issues that could occur with a control are also identified.

3.1 Plant Controls

3.1.1 Elimination

3.1.1.1 Ignition Sources

With smoking well-controlled offshore, the most realistic ignition source in cabins is electrical. For fixed equipment, this is controlled by the original procurement and ongoing inspection and maintenance, but for portable equipment neither of these aspects can be as well-controlled. However, for an electrical failure to cause a life-threatening fire, it must ignite a larger fuel source e.g. mattress.

The risk from personal electrical equipment is minimal when being used (even lithium-ion batteries, perceived as higher risk, have a very low probability of combusting with billions in use worldwide). In the unlikely event of battery failure leading to combustion, the consequences are minimal; as, although the fire would be of relatively high intensity, the size and subsequent fuel load of a lithium ion battery means that the events are short duration, independent of any fire detection or fighting as they are very short-lived and direct fatalities unlikely as personnel can react to any incident (recognising a lithium battery source fire can become a cellulosic fire if it ignites surrounding materials).

The greater risk from personal electrical equipment arises during charging. Housekeeping (see Section 3.2.1.1) and PAT testing (see Section 3.2.1.2) should be carried out to manage the risk.

3.1.1.2 Fuel Sources

The main fuel load in a typical cabin is the soft furnishings (mattress, bedding etc.) and these should be purchased as fire resistant to a relevant code e.g. the IMO Fire Test Procedures or British Standards.

A possible shortcoming for this control is infrequent replacement of items such as mattresses and bedding, which will gradually lose fire resistance as washed.

3.1.2 Detection and Alarm

Detection is only an effective control if it enables escape well before heat or smoke prevent this. For accommodation, three philosophies are adopted; these are discussed and ordered by efficacy below:

1. Automatic Local Alarm – a smoke detector in the cabin alarms to personnel in at least the affected cabin and the control room without the need for manual intervention. There is the potential for spurious alarms (to minimise this, smoke detectors can and have been mounted in cabin vestibule areas, but this introduces significant uncertainty in the time to detection and relies on compromising the segregation of cabins).
2. Manually Initiated Local Alarm – an activated detector alarms in the control room, but not locally. This philosophy relies on procedures to define the steps required to ensure quick fire confirmation and initiation of a local alarm. Typically, this would be through a "check and respond" team (see Section 3.2.2.1) confirming whether there is a fire and initiating the General Alarm (GA). If the check and respond team cannot reach the fire in sufficient time (e.g. within a few minutes), contingency measures, such as the Control Room Operator sounding the GA regardless, should be identified.
3. Sprinklers – alert both the cabin occupants and the control room once activated. A sprinkler is activated by the temperature at the sprinkler head rising above a set level; this can take several minutes depending on fuel type, fire size and proximity of the fire to the sprinkler head. Unlike smoke detectors, sprinkler systems cannot be easily tested, are less reliable and there is potential for significant delay before alarm. Since they are activated by heat, they may not activate before toxic combustion products reach harmful levels. Sprinklers also provide mitigation, releasing water that will control a fire in a cabin and cool the combustion products without the requirement for human involvement.

A possible shortcoming for this control is the process for identifying where the fire is after it has been detected taking a long time.

3.1.3 Mitigation

3.1.3.1 Segregation and Ventilation Control

An effective ventilation control system can prevent smoke spread and limit the oxygen supply to a fire. Ventilation rates in cabins are generally low and the oxygen supply is limited regardless of whether fire dampers are open or closed. The risk assessment should record the required action of the HVAC system on fire detection and the reasoning behind this. This should take into account the fact that HVAC fire dampers aligned with fire zones may allow a communication route between cabins.

A possible shortcoming for this control is HVAC dampers not being physically aligned with boundaries.

3.1.3.2 Shutdown of Electrical Equipment

The electrical supply to the affected area should be isolated following detection of a fire.

3.2 People Controls

3.2.1 Prevention

3.2.1.1 House keeping

As part of daily checks, stewards should identify, report and remove potential fire hazards. At a minimum, this should entail checking for unsafe usage of electrical devices e.g. equipment charging and left on bedding but may also include checks for issues such as excessive paper storage, or over loading of extension plugs.

3.2.1.2 Procedures for minimising ignition sources

The Electricity at Work Regulations 1989 require that any electrical equipment that has the potential to cause injury is maintained in a safe condition. For personal electronic devices, electronic cigarettes and chargers, PAT testing, at a suitable frequency, is a recognised way to achieve this. Procedures developed should include for the removal of unsafe devices.

3.2.2 Mitigation

3.2.2.1 Check and Respond Team

Due to the possibility of someone being incapacitated in a cabin with a fire, a fast response is needed to ensure that there are no personnel in the location of fire. This is best done through a "check and respond" team. The response needs to happen in a few minutes. In determining the exact actions of the check and respond team, the following must be considered:

- How they are given information quickly on the location of the fire;
- Description of who they are, their role and the area of the platform from which they are responding;
- How quickly they need to arrive on scene;
- How the above is guaranteed (i.e. platform drills etc.);
- How their competency (awareness training etc.) is managed; and
- Back-up plan in the case of first responder unavailability.

Additional training over and above BOSIET/FOET is not considered to be required for a typical cabin arrangement given good availability of the check and respond team. However, there is a need for this team to receive more frequent familiarisation of the hazards that they may face and the appropriate precautions. The situation needs to be reviewed carefully if the cabins are not typical, or there are other shortcomings.

3.2.2.2 Fire Team Intervention

If rescue is not required and the cabin boundary is maintained (door closed and HVAC operating as intended with occupants accounted for), the cabin fire poses an asset rather than safety risk. Fire team response and management of this hazard is not covered further in this document, all fire teams will have received OPITO fire team training which includes awareness of compartment fires and the need to dynamically assess risk as a situation changes. This means that the specifics of an event will be considered in any response and the need to ensure the safety of the fire team.

3.2.2.3 Manual Firefighting Equipment

Manual firefighting equipment and MAC points must be located within easy reach of all exit areas of cabins, e.g. near staircases and emergency exits.

3.3 Procedural Controls

3.3.1 Engineering Design Checks

For any hardware measures that are needed to control the cabin fire risk (e.g. fire partitions, smoke detection), inspection needs to be undertaken to ensure that integrity is maintained, and they operate as intended.

3.3.2 Training

Required procedural controls relating to training and competence are given below.

Trained and Fit Personnel	All offshore personnel undergo regular medical assessment and are trained to respond to alarms and escape from fires in rooms. In the unlikely event it is required to escape the cabin, personnel are also trained to use the safety equipment provided in cabin grab bags. Note that a comparison between response and behaviour in offshore cabins and public dwellings (hospitals, hotels etc.) is inappropriate as the latter provide accommodation for the general public in an uncontrolled environment, i.e. a range of ages, capabilities and physical conditions with access to alcohol etc, whilst everyone offshore is trained and physically capable.
Local Emergency Exercises	Emergency drills tested offshore should include cabin fires.
Platform Induction	Platform inductions should include the accommodation fire hazard, its management and the ways in which the workforce contribute to its management e.g. personal electronic device procedures.

4 Other Areas

In areas other than cabins, personnel are awake and will manually detect the onset of a fire before they are at risk. Personnel will then either escape, or if it is safe to do so, fight the fire. Despite this, the fire potential in other areas needs to be managed and the fire risk assessment should address the potential fire hazard in other accommodation areas, particular in areas of higher fire potential, such as the laundry and galley. Many of the risk management controls for cabins apply throughout the accommodation; risk management controls specific to the galley and laundry are discussed below.

4.1 Laundry

Laundry fires have occurred in the UKCS, with the main cause build up and ignition of lint. Good practice is to comply with HSE offshore information sheet 3/2009, the main requirements of which are to ensure that:

- Lint filters in tumble dryers are cleaned before use and that lint build-up is avoided.
- The 'cool down' cycle of the tumble dryer is adequate to reduce the temperature of the items.
- Items (e.g. catering cloths, PPE) contaminated with combustible substances such as solvents, grease, oils, fats etc. are not placed in tumble dryers and that coveralls are hung to avoid piling and any potential for auto ignition.
- PM routines are carried out as per the manufacturer's recommendations.

4.2 Galley

The galley fuel sources include cooking oil and grease, which can be ignited by heat. Good Practice in relation to galley fire management is:

- Training – Galley staff should always be present when operating equipment and must be given specific training in relation to development of and fighting galley fires.
- Galley Hood – wet chemical / CO_2 automatic fire suppression systems are installed in galley hoods to extinguish the fire and prevent its spread.
- PMRs – Implementation of PM routines for galley equipment.

4.3 Corridors and Stairways

These areas have minimal fire sources and are intended as escape routes for other events.

5 REFERENCES

1. The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995
2. S.I. 1978/611: The Offshore Installations (Fire–fighting Equipment) Regulations 1978
3. Risk Based Decision Making Framework, Oil & Gas UK, July 2014
4. HSE Offshore Information Sheet No. 3/2006 Guidance on Risk Assessment for Offshore Installations
5. https://shop.bsigroup.com/ProductDetail/?pid=000000000030251919 – PAS79
6. http://www.gov.scot/Topics/Justice/policies/police-fire-rescue/fire/FireLaw/GeneralGuidance - General Scottish Government Guidance
7. http://www.gov.scot/Topics/Justice/policies/police-fire-rescue/fire/FireLaw/GeneralGuidance/FireSafetyRiskAssessment – General FRA Guidance
8. http://www.gov.scot/Resource/0041/00418351.pdf – Blank FRA form
9. HSE offshore information sheet 3/2009 Tumble dryer fires in laundry rooms

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