

Assessment to ascertain the viability for removal of Drencher System for

ATG Theatres
Manchester Palace
97 Oxford St
Manchester
M1 6FT



Prepared by Jim Richens MIFSM
Date of Report: 22nd April 2024

Client ATG Theatres Ltd

Client Premises Manchester Palace
97 Oxford St
Manchester
M1 6FT

Assessment Undertaken by RB Health and Safety Solutions Ltd
Silver Springs Business Centre
40 Beaufort Road
St Leonards on Sea
East Sussex, TN37 6PP

Name of Consultant Jim Richens MIFSM

Date of Assessment 26th March 2024

Prepared for Jack McGuire

Contents

Section 1	Introduction
Section 2	Current Installation
Section 3	Considerations
Section 4	Risk Matrix
Section 5	Summary
Section 6	Recommendations
Section 7	Conclusion
Appendix A	Technical Standards for place of assembly references (Yellow Book)
Appendix B	Photos

Section 1- Introduction

The purpose of this report is to assess the long-term viability of the current drencher system, as well as establishing its overall effectiveness in protecting the theatre's safety curtain.

Following a fire risk assessment at the Theatre, it has been established that the current drencher system does not meet the current standards required to provide maximum protection to the safety curtain. This has been verified following the information contained within recent annual maintenance reports, where comprehensive works have been advised to address potential underlying issues predominantly related to the age of the system.

Whilst the drencher system within the theatre is considered fully operational, given the age of the system, as well as associated issues encountered with other theatre drenching units across the UK, there is an aspirational objective within the company for the curtain drenchers to be removed where possible from their theatres. Whilst this could be considered to present a reduction in fire safety measures, this report seeks to measure the benefit of maintaining what is considered to be a historical active fire protection measure within a theatre, against the associated risks and costs in doing so.

The purpose of the drencher system itself is to protect the theatre's safety curtain from buckling whilst being lowered because of a fire on the stage. By removing the drencher, if a fire occurs on the stage, the theatre's safety curtain would potentially be left vulnerable during its descent to the stage floor.

However, it can be argued that with the appropriate control measures in place, there will never be a fire of sufficient size that will cause the safety curtain to fail before being lowered and placing persons within the auditorium at risk.

Section 2 - Current Installation

The stage

Size – 25.1m x 21.1m = m²

The height to the grid is 21.94m

There are three exit doors

- FD30 – Exit to stairs
- FD30s – Exit to gym reception
- FD – Exit to scene dock

Stage Ventilation

Currently, there is a Haystack lantern on the roof, with regular maintenance by TFG Ltd.

Iron / Curtain

Iron Curtain is in use and is “shown” at regular intervals.

The total width = 12.9m

The total height = 10.4m

Safety Curtain drop time recorded at 23s.

Last Maintained by TFG Ltd in August 2023

Controls for Curtain and Drencher

Main – Stage right by prompt desk

Secondary – Stage door.

Current provision of fire extinguishers

1 x Fire Blanket, 2 x 6ltr Water and 2 x 2kg CO2 stage left front

2 x 6ltr Water and 2 x 2kg CO2 stage left rear

1 x 6ltr Water and 1 x 2kg CO2 stage right exit to scene dock

1 x fire blanket, 2 x 6ltr Water and 2 x 2kg CO2 stage right front

Drencher

Outlet height – 8.63m from stage

Installed in 2-inch pipe.

Sprinklers

There is no sprinkler system installed, however, a significant amount of fire extinguishers have been installed upstage and down stage left and right.

Auditorium

There are 3 number of main floor levels in the auditorium.

The **stalls** is the lowest level and has an occupancy of 838 seated.

There are 8 fire exits.

Door 1 – 1669mm
Door 2 – 1466mm
Door 3 – 1660mm
Door 4 – 1662mm
Door 5 – 1611mm
Door 6 – 1550mm
Door 7 – 1431mm
Door 8 – 1503mm

The fire exit capacity is 2,140.

It is therefore confirmed that the occupancy within this area is satisfactory regarding safe emergency evacuation.

Circle – is the next sequential level and has an occupancy of 643 seated.

There are 4 fire exits.

Door 1 – 1473mm
Door 2 – 1469mm
Door 3 - 1633mm
Door 4 – 1611mm

The fire exit capacity is 865.

It is therefore confirmed that the occupancy within this area is satisfactory regarding safe emergency evacuation.

Grand Tier – is the highest level and has an occupancy of 511 seated.

There are 4 fire exits.

Door 1 – 1276mm
Door 2 - 1378mm
Door 3 – 1273mm
Door 4 – 1497mm

The fire exit capacity is 750.

Section 3 - Considerations

The following recommendations in Appendix A, are taken from the Technical Standards for Places of Entertainment 2022 (Yellow Guide). Where references to other documentation have been made in the standards, these have been checked to ensure that there are no additional requirements for drencher systems and safety curtains elsewhere.

The recommendations listed, include E2 Fire resistance and Finishes, E4 Safety Curtains and K6 Scenery. Not all sub sections are being used in this document, but reference will be made to appropriate sections.

In the E4 commentary section, it states that;

'BS 9999 confirms that if drenching is necessary this need only be whilst the curtain is descending. Therefore, the drencher must be activated at the same time as the safety curtain for any effect.

However, the practical problems with the inadvertent operation of the drencher means other solutions should be considered. It is important to note that:

- *a conventional safety curtain provides a form of smoke control to enable the audience to leave the auditorium*
- *a safety curtain will not be effective unless the stage ventilators are open*
- *a safety curtain is not normally intended to provide compartmentation for Building Regulations purposes*
- *the top edge of the safety curtain provides a reasonably airtight seal*
- *the bottom edge of the safety curtain need not form an airtight seal with the stage floor*
- *any pressure relief ventilation should be taken from the auditorium.'*

And Section E4.03 states

'Where necessary to maintain the integrity of the safety curtain, the curtain and its guides may be provided with a drencher pipe arranged to spray the whole of the stage face of the curtain and its guides with sufficient water to keep the curtain and guides cool whilst the curtain is descending. Any such drencher should be proved/tested during installation or commissioning'.

Section K6.07 States;

‘On a separated stage (one with a safety curtain), scenery should normally be made of the following materials, subject in the particular case to any requirements of the fire authority:

- a) materials acceptable on an open stage – see Recommendation K6.08; or*
- b) flame-retardant fabrics; or*
- c) other materials acceptable to the fire authority’.*

When considering the wording and interpreting of the above for drencher requirements, the use of *‘where necessary’* and *‘may’* imply that a drencher is not necessarily required for the protection of the safety curtain, and where fitted should be operated at the same time the safety curtain is lowered. The report author has been unable to locate any guidance to ascertain the absolute necessity for a drencher to be provided on all occasions.

The commentary also states that practical problems with the inadvertent operation of the drencher means that other solutions should be considered.

However, it is accepted by the author that the provision of a drencher does contribute towards a ‘higher’ standard of fire safety, and therefore its provision should be considered on all occasions where possible. As already stated, although the current drencher system is operational, it is considered that the theatre has implemented a suitable and sufficient set of control measures to mitigate for the potential removal of the drencher from the premises.

The theatre’s current drencher system is believed to be in excess of 50 years old. Although this has routinely been subject to appropriate maintenance on an annual basis, there have been numerous issues at other venues within the UK which has led to drencher supplies being isolated.

This is predominantly associated with the valve works, which have reached/are nearing the end of their serviceable life and have been required to be replaced.

On most occasions, the valves in question are located adjacent the fly floor, approx. 1m from a safe standing position, which itself is located 7.7m above the stage. This would require the erection of an access tower to be provided, with considerable expenses attached to the undertaking of any project (approximately £6-8k).

Consideration must be given to the testing regime, which only allows a test up to the valve, and not the full system.

The drencher system water supply is connected to the mains pipework. Once the drencher is actuated, the only way that the water flow can be stopped is via the reversal of the main actuation valve. It is again considered that in a fire situation, the provision for the closure of the main valve could be overlooked. With high voltage areas located to the side and under the stage, any water ingress into these areas could raise an increased fire risk substage, as well as quickly creating a situation where water damage will most likely supersede the damage caused by a fire in its infancy. This also carries long-term

implications for a production not to be able to go ahead if any electrical equipment has been damaged by water. Extensive closures of the theatre would also be anticipated.

There have been incidents in other theatres where accidental actuation of the drencher system has occurred. With modern day productions, there can be a large amount of electrical equipment for the production located within the substage area. Any accidental

activation of a drencher increases the electrical fire risk significantly if a large amount of electrical equipment is present in the substage.

The stage area of the theatre has strict controls on the type of construction and fabrics used for the construction of sets (see K6.07). Documentation is sought from visiting productions and flammable material is not allowed to be used on stage. This reduces the fire loading on stage, and also reduces the risk of a fast-growing fire on the stage due to the inherent fire resistance of materials.

The stage is also fitted with a comprehensive fire alarm system and has a significant amount of fire extinguishers available which includes coverage to the stage, substage and back of house areas.

The safety curtain is designed to close within a 30 second timescale.

This is checked as part of the ongoing maintenance and testing regime.

With a fast closure time, this will limit the time the curtain is exposed to any potential fire, especially in the early stages of a fire. This also minimises the risk of relevant persons from the effects of a fire on the stage area.

During a performance, there are adequate members of the cast, production and technical crew to detect and react to a fire. Early signs of a fire will be detected long before a fire can increase significantly so that the curtain will be affected and fail to close.

All technical staff on the stage area have suitable training in fire safety and are able to use firefighting equipment. There is adequate firefighting equipment on the stage.

This will further reduce the risk of a large fast-growing fire.

Front of House staff have preshow safety briefings and fire drills are regularly conducted, including full audience evacuation. There have been no recorded issues of significant evacuation problems when evacuations have been conducted.

Following a fire on stage in another venue where fire service attendance was required, the technical staff lowered the safety curtain and activated the drencher. The drencher, even though tested, failed to operate on that occasion.

Following the debriefing of the events that led to the fire, there were no issues found with the lowering of the safety curtain and the failure of the drencher system. The failure had no impact on the integrity of the curtain which could have occurred from the buckling of the curtain due to fire and excessive heat output.

This example shows that if there are good management procedures in place and early action by staff, the risk is minimal, and a safety Curtain (Iron)drencher is not required.

In the instance of the Apollo Theatre, consideration needs to be given to the cost versus the risk and the inconvenience to the premises for the potential future upgrading of the safety curtain/ drencher system. The cost for these works is approximately £50-60,000.00 which is a considerable amount of capital expenditure at any time.

It is our opinion that the cost versus the risk to life safety in this instance is excessive and that with the appropriate systems in place, the risk to relevant persons is minimal.

Section 4 - Risk Matrix

System	Failure	Problem caused	Control measures	Remedy timescale
Fire drencher system installed on the stage	A fire on the stage	▪ Safety curtain not protected ▪ Drencher would not automatically activate ▪ Manual activation required	Manual activation of the drencher on lowering of safety curtain	N/A Staff trained in emergency procedures
	The failure of the water supply to the drencher / a burst pipe	▪ Safety curtain not protected ▪ Potential fire risk to the electrical equipment / automation equipment under the stage area	A suitable regime for the testing and maintenance of the drencher	24-hr call out contract
	Valve failures	▪ Safety curtain not protected ▪ Potential fire risk to the electrical equipment / automation equipment under the stage area	▪ A suitable regime for the testing and maintenance of the drencher ▪ Replacement of drencher system	▪ 24-hrs call out contract ▪ Capital expenditure program
	Replacement part availability for the drencher system	▪ Possible long-term defect to the drencher system / drencher system not available ▪ Safety curtain not protected ▪ Potential fire risk to the electrical equipment / automation equipment under the stage area	▪ Visual inspections of valves only to ensure valves are not damaged and cannot be shut off after testing ▪ Replacement of drencher system	▪ As soon as possible ▪ Capital expenditure program
	Accidental activation	Potential fire risk to substage area (electrical risk)	▪ Theatre unable to operate, due to water damage from the drencher system ▪ Potential damage from fire	▪ 24-hr call out contract ▪ Business continuity planning ▪ Staff training

System	Failure	Problem caused	Control measures	Remedy timescale
Fire drencher system is not installed on the stage	A fire on the stage	Fire on stage with a risk to the safety curtain incorrectly lowering	▪ All staff trained in fire procedures on the stage area and in the use of fire extinguishers ▪ The safety curtain is lowered before investigation started	▪ Business continuity planning ▪ Staff training
	A fire on the stage	Cancellation of the performance	▪ Restrict the use of combustible material ▪ Fire wardens and fire training given ▪ The safety curtain is lowered before investigation started	▪ Business continuity planning ▪ Staff training
	A fire on the stage	Relevant persons placed at risk from fire	▪ Staff training ▪ Restrict the use of combustible material ▪ Fire wardens and fire training given ▪ The safety curtain is lowered before investigation started	▪ Business continuity planning ▪ Ongoing training
	No water damage to electrical equipment	▪ No cancellation of performances ▪ No accidental activation of the drencher system	▪ Staff training ▪ Restrict the use of combustible material ▪ Fire wardens and fire training given	Ongoing training

Section 5 - Summary

- Guidance contained within the Yellow Book and British Standards makes no mention to the requirement of a safety curtain and/or drencher system.
- All sets and scenery have a class 0 or 1 fire rating.
- The stage has minimal storage/ if any at all of combustible materials.
- There are adequate provisions of fire extinguishers on the stage and surrounding areas.
- There are suitable numbers of staff that are fire extinguisher trained.
- The Fire Safety and evacuation procedures are well rehearsed.
- The stage can conform to an “open stage as per K6.08.

Section 6 - Recommendations

It is recommended to start formal discussions with Manchester Fire and Rescue Services and the Local Authority responsible for licensing, with the view that the findings of this report that although operational, there are adequate compensating measures in place to allow for the removal of the current drencher system.

A procedure is to be implemented, that at all times a minimum of 2 members of the technical team will be on the stage (One Stage Left and the other Stage right), who will be fire extinguisher trained, and will have the ability to tackle a small/developing fire if required.

This issue forms part of the annual review of the fire risk assessment and if conditions change, the stage area and safety curtain should be reviewed to ensure that there is no adverse life safety risk to relevant persons.

Section 7 - Conclusion

It is RB Health and Safety Solutions Ltd and Ambassador Theatre Group Ltd opinion that when considering the potential future cost to renew the drencher system, this is considered onerous when considering the current control measures in place at the theatre and that the risk to relevant persons is minimal.

Appendix A

Yellow guide recommendations E2 Fire resistance and finishes

COMMENTARY

It is essential, in order to ensure the safety of the occupants, that the building should not collapse in the early stages of a fire. Firefighters may also subsequently need to fight the fire from within the building. Therefore, in order to maintain the stability of the structure, all walls, floors and the parts of the structure that support such elements should be constructed of fire-resisting materials or be provided with fire-resistant protection to avoid early collapse.

The premises should be generally constructed and furnished so as to restrict the spread of fire. Wall finishes, furniture and soft furnishings may contribute significantly to the growth of a fire whilst the volume of smoke produced by the burning of such items may cause problems with the safe evacuation of the premises and subsequent firefighting. Care is therefore needed to select materials that do not readily catch fire nor spread fire across their surfaces, and which have a low rate of heat release and smoke emission.

E4 Safety Curtains

COMMENTARY

During the nineteenth century the presence in theatres of numerous unprotected gas jets for illumination and large quantities of totally untreated scenery resulted in many disastrous fires. As a result of experiments in Austria, safety curtains in front of stages were developed which, coupled with controlled ventilation, enabled audiences to be safely evacuated in case of fire. The introduction of electric lighting removed the ready source of ignition. The development of modern methods of treatment to render scenery flame and fire retardant has reduced the risk of the rapid development of a fire on stage. As a result of this lessening of risk, many modern theatres have been built without safety curtains. However, where there is no safety curtain, the fire authority will need to be satisfied of the standards applied to the scenery. It may also limit the amount of scenery that may be kept on the stage in order to reduce the fire load in the event of a fire.

It is important that the safety curtain is made of non-combustible materials, and it is able to withstand the heat from the fire and the resulting pressures across it. Safety curtains were frequently doused with water from a drencher pipe to cool the curtain and its guides whilst the curtain is descending.

BS 9999 confirms that if drenching is necessary this need only be whilst the curtain is descending. Therefore, the drencher must be activated at the same time as the safety curtain for any effect.

However, the practical problems with the inadvertent operation of the drencher means that other solutions should be considered.

It is important to note that:

- a conventional safety curtain provides a form of smoke control to enable the audience to leave the auditorium
- a safety curtain will not be effective unless the stage ventilators are open
- a safety curtain is not normally intended to provide compartmentation for Building Regulations purposes
- the top edge of the safety curtain provides a reasonably airtight seal
- the bottom edge of the safety curtain need not form an airtight seal with the stage floor
- any pressure relief ventilation should be taken from the auditorium

Ideally the release of the safety curtain would be automatically linked to the opening of the stage ventilators. However, this is generally not practicable because of the need to demonstrate that the safety curtain is in working order on a daily basis.

If a production company does not want to use the safety curtain for a particular production (for example to allow scenery across the line of the safety curtain), it is normally acceptable provided the production meets the open stage requirements. However, if outside contractors are working in the area of the safety curtain it may be sensible to provide a physical fixture to ensure that the safety curtain cannot be accidentally operated. This is usually done by bolting or chaining the counterweight frame to prevent its movement. It would almost certainly mean the safety curtain would not be lowered when the premises are unoccupied.

For advice on front curtains where there is no safety curtain see Recommendation E2.17.

For other than safety curtains see E2.12 - E2.17.

E4.01 Any safety curtain should be of robust and rigid construction and be made entirely of non-combustible materials so as to be able to withstand the effect of a fire on stage for a sufficient time to enable the evacuation of the premises. For design purposes safe evacuation should be assured for not less than 20 minutes.

E4.02 The stage side of the safety curtain should be able to withstand damage from falling scenery or other debris.

E4.03 Where necessary to maintain the integrity of the safety curtain, the curtain and its guides may be provided with a drencher pipe arranged to spray the whole of the stage face of the curtain and its guides with sufficient water to keep the curtain and guides cool whilst the curtain is descending. Any such drencher should be proved/tested during installation or commissioning.

E.4.04 Where a drencher is provided a permanent facility should be installed for proving the drencher system is fully functional. The facility should:

a) prove the availability of the water supply to the drencher; and

b) permit testing the drencher water release valve and mechanism without releasing water over the stage. The valves of any testing by-pass system should be clearly labelled as to their normal open and closed positions and - except during testing - should be locked in their correct positions for proper operation of the drencher.

Note: It is desirable that the valves are monitored, for example with warning lights to indicate when the valves are in test mode.

E4.05 Drenchers should be inspected in accordance with BS 5306 once a year to ensure that they are in working order. The date of the inspection should be clearly marked on the control valves and be recorded in the fire logbook.

E4.06 The safety curtain should be designed to withstand the pressure of air likely to be caused by a fire on stage without being distorted sufficiently to rupture or be withdrawn from its restraining guides. Typically, the curtain should be able to withstand a pressure of 15kg/m² provided the stage is equipped with sprinklers. A pressure of 30kg/m² would be appropriate where sprinklers are not installed.

E4.07 Where ventilation is necessary to relieve the pressure on the safety curtain this should be taken from the auditorium and not directly from outer air.

E4.08 In a fire condition the safety curtain should provide an adequate seal against the passage of smoke between the stage and the auditorium. This seal should as far as be reasonably practicable be smoke tight across the top edge of the curtain and reasonably efficient for the upper two thirds of the curtain. A good seal across the bottom edge is not necessary.

Note: There were two main ways of seeking a reasonably tight top smoke seal, being by an overlapping buffer or a sliding joint. Nowadays the top smoke seal is usually formed from a rubbing contact between the face of the curtain and a compressible seal mounted on the proscenium wall face. The rubbing seal contact allows for the possibility of temporary scenic floors raising the stage level over an agreed range of movement.

E4.09 The curtain should be designed so as to close the proscenium opening completely within 30 seconds of the operation of its release mechanism. When released the curtain should operate by gravity, safely and without any external power source. A deceleration damper will therefore be necessary to ensure that the curtain comes to a gentle rest.

Note: This does not preclude the provision of a motorised winch to move the curtain in non-emergency conditions.

E4.10 Manually operated controls to cause the closing of the safety curtain, the operation of the drencher (if any) and the operation of the stage ventilator(s) should be provided:

a) near the prompt corner or usual performance control position; and

b) outside the stage fire risk area in a position readily accessible to firefighters or authorised staff. (This is often at the stage door or artistes' entrance.)

Note: The safety curtain should be lowered whenever the premises are unoccupied

E4.11 The controls may operate mechanically or electro-mechanically. Where operated electrically:

a) any wiring or control apparatus that may be adversely affected by fire so as to hinder the proper working of the system should be suitably fire protected or fire rated;

b) where necessary additional mechanical protection should be provided to cables and equipment; particular attention should be given to cables and equipment within the stage area where the risk of mechanical damage is high;

c) a standby supply should be provided to ensure that the system would continue to operate in the event of failure of the normal supply;

d) the normal supply, standby supply and control wiring for the system should be monitored for any faults that could affect the proper working of the system; visual and audible indication of any fault should be provided in a position under regular observation;
Note: The provision of 'fail safe' operation in the event of mains failure would not be acceptable as the unintentional operation of the safety curtain or drencher could itself create a hazard. However, 'fail safe' operation of the extract ventilation may be desirable.

E4.12 Signs should be provided adjacent to each control or release – see Recommendations J2.31 to J2.33.

E4.13 Consideration should be given to the provision of an audible and/or visual alarm that operates during the descent of the safety curtain. Any alarm system should be fitted with an over-ride control that requires continuous pressure on the alarm inhibitor to stop the operation of the alarm during the movement of the curtain. This over-ride control is necessary for situations such as performances where an alarm would be inappropriate during the routine demonstration of the safety curtain.

E4.14 The release points for the safety curtain, drencher and ventilator(s) should be unobstructed, maintained in good working order and clearly visible.

E4.15 It should be possible to immediately arrest the descent of the safety curtain in case of an emergency.

E4.16 When contractors are working around the safety curtain there should be a clear notice not to operate the manual control in error and the use of plastic cable tie(s) might be advised. (See also J2.31.)

E4.17 The safety curtain should remain in use unless it is damaged. The curtain may be in open stage mode but would still be of use in the event of smoke or fire.

E4.18 When it is intended to drop the safety curtain to a level other than its basic stage floor level (for example when there is a production floor above the stage floor), there should be materials (fabric or solid) under the line of the safety curtain between the stage and production floors to at least the same fire resistance as the safety curtain.

a) Where the bottom gap of a safety curtain is not more than 150mm high and the stage extract ventilation is adequate, there is no need to enclose gap.

b) Where there is a gap greater than 150mm below the safety curtain, the production should be treated as open stage – see K6.08.

E4.19 See N5.19 to N5.25 for performances.

Scenery K6

K6.01 All scenery, decorations, borders, drapery, gauzes, cloths, curtains and similar decorative hangings should be made of material, which is not readily flammable, or of material which has been rendered and is maintained flame-retarded to the satisfaction of the fire authority.

K6.02 non-durably flame-retardant fabrics should be tested at intervals to ensure the treatment is still effective and to ensure safety. Annual testing is advisable, and more frequently if exposed to significant wear and tear. Any fabrics no longer flame-retardant should be removed and be retreated to restore the flame-retardant fabrics and be tested before use on stage. Non-durably flame-retardant fabrics should be retreated after washing and/or dry cleaning as necessary.

K6.03 The management reserves the right to check and test where deemed necessary all scenery for compliance with the appropriate fire standard. Scenery may be removed or rendered flame-retardant and any items not conforming to the appropriate standard may be removed by the fire authority or the management as failure to comply may result in a performance being delayed or cancelled.

K6.04 The fire authority will generally apply the same standards as apply to scenery to large properties, large quantities of furnishings and to items especially constructed for the presentation. Appropriate certificates must be retained in the Production Safety File.

K6.07 On a separated stage (one with a safety curtain), scenery should normally be made of the following materials, subject in the particular case to any requirements of the fire authority:

a) materials acceptable on an open stage – see Recommendation K6.08; or

b) flame-retardant fabrics; or

c) other materials acceptable to the fire authority.

Appendix B - Photos

	Vertical run to drencher height
	Start of Drencher Pipe Network



Isolating stop cock
stage right



Pipe Run above
Pross



Main water isolation point.
A new isolation valve would need to be installed for the drencher when the main valve is replaced at a cost to the theatre.
Due August 2024



Drop weight activation



Tap outlet



Old safety curtain and
drencher release



Current Stage view
from Auditorium



Curtain in view