



Compartment firefighting



Rosenbauer Proter 2 in action, see page 4

This special edition of Operational News focuses on compartment firefighting tactics, the provision of new equipment (specifically the Select flow RB101 and the Rosenbauer Proter 2) and training presentations to support best practice in the operational and training environment.

As a result of the review into compartment firefighting a number of publications have been introduced:

- Policy **PN793** Compartment firefighting
- Policy **PN793** Compartment firefighting training PowerPoint presentation
- Policy **PN810** Rosenbauer Proter 2
- **PN811** Rosenbauer Select flow RB101 firefighting branches
- Branch training packages
- Case study PowerPoint presentation of an incident that occurred at 89 East Hill Wandsworth in 2011.

This operational procedure details how to deal with compartment fires safely and effectively, by explaining the appropriate application of firefighting tactics for the various conditions that may be encountered at an incident. Of utmost importance is the need to continually monitor, both internally and externally, the

POLICY PN793 COMPARTMENT FIREFIGHTING

development of the fire and the changing conditions within individual compartments and the building they are situated in. All staff should share and use this information to enable the incident commander (IC) and breathing apparatus (BA) teams to adapt their tactics accordingly.

A compartment can be defined as an enclosed space within a structure that is capable of allowing a fire to develop and is able to contain the products of combustion such as heat, smoke and fire gases. Compartments can be simple or complex in nature and will vary in size. They can be a single compartment or a series of compartments within a larger area, potentially over a number of levels above or below ground. They can also contain lobby areas. Wherever possible information should be gathered as to the size and nature of the compartment prior to committing crews as this may impact on the tactics required to safely and effectively conclude the incident.

- The new procedure places emphasis on:
- Assessing conditions before operations start
 - Compartment entry – recognition and monitoring of changing conditions
 - Effective communication between crews and the IC
 - Adapting tactics as necessary to suit changing conditions
 - Ventilation of compartments to improve working conditions for firefighters and people in need of rescue and who may be suffering effects of smoke and heat within the compartment and/or building
 - Ensuring crews use the appropriate weight of attack
 - Application of sufficient water to mitigate the potential hazards of backdraft and flashover
 - Maintenance of firefighter safety within compartments

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Operational News reflects important operational issues for staff. Topics are identified from our robust audit and review processes which include performance reviews of command and operations, supplemented with articles on new equipment or procedures that reduce risk. Where appropriate training packages on page 4 provide further information on the topics covered.

Watch training packages

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COMPARTMENT FIREFIGHTING (continued)

- Direct or indirect attack to extinguish the seat of the fire.
- The proper use of personal protective equipment (PPE).

The IC and all crews need to be aware of the inherent hazards and the necessary tactics associated with firefighting in compartments. Hazards include:

- Uncontrolled ventilation.
- Flashover.
- Backdraught.
- Explosive atmospheres.
- High temperatures.
- Radiated heat from the fire and hot gas layer.
- Steam and the potential this has to cause scalds.
- Protection of exit routes and the need to landmark.
- Structural deterioration/collapse.
- Those posed by utilities, such as the rupturing of gas mains and electrical wiring/cabling becoming loose, posing the risk of electrocution and entanglement.

Recent safety event investigations involving injuries to firefighters and damage to PPE have highlighted that staff are sometimes exposing themselves to fire conditions beyond the capability of their PPE. This has resulted in burns and scalds as well as severe heat damage to fire helmets, BA face masks and communications cables on breathing apparatus radio interface equipment (BARIE).

Investigations have shown that this is caused by the combination of the proximity of staff to the radiant heat source, time of exposure and the amount of heat being generated by the fire. This, in conjunction with an insufficient weight of attack, has resulted in inadequate quantities of water being delivered to extinguish the fire. In the majority of cases the severity of injury and damage to equipment would have been reduced if larger volumes of water had been applied to cool the compartment and/or extinguish the fire. No fire situation is ever the same and it is not always possible to

either anticipate or recognize every aspect of fire behaviour. However, by following correct operational procedures and responding appropriately to prevailing conditions, the risks associated with compartment firefighting can be reduced to an acceptable level. Some of the key tactical considerations covered within the revised procedure include:

Compartment entry – appropriate assessment and door entry procedures must be made to prevent exposure of crews to the heat and smoke from fully involved compartment fires. Maintaining the integrity of the door as well as controlling the door opening is essential during the assessment of the compartment beyond. Available protection afforded by the structure, doorways and staircases should be used where possible to protect crews from radiant heat, hot fire gases and steam. Staying low to the floor and using internal structural features such as walls or doors to protect personnel from fire gases and heat will also reduce the risks. When the situation allows for an external attack of a fully involved compartment fire this should be considered.

Ventilation – ventilation should only be undertaken on the instructions of the IC. Entering a compartment is itself an act of ventilation. It should be considered that compartment doors when shut contain the products of combustion: heat, smoke and gases escaping from the fire compartment can adversely affect crews exit and/or hinder the evacuation of public. It may be necessary in certain circumstances to ventilate a compartment before committing crews in order to improve the working conditions for firefighters as well as people trapped elsewhere in the building.

Sufficient weight of attack – selecting an appropriate weight of attack is crucial when attempting to extinguish a fully established fire within a compartment. The amount of water must be sufficient to cool the burning material and thereby extinguish the fire, whilst also protecting committed crews. A portable



extinguisher, hose reel, firefighting main jet, ground monitor or aerial monitor may all be appropriate, depending on the prevailing conditions. However, where signs of flashover or backdraught are present at least one main jet must be used as a minimum.

In addition to the firefighting jet it may also be necessary to provide a support team with one or more 45 mm jets to cover and protect the exit route of the most advanced firefighting teams, particularly in large or complex buildings where deeper penetration may be required. On some occasions, this may need to be implemented before the initial entry is made to ensure crew safety is maintained. An example of this would be where the fire is well established or if the compartment is large/complex and known to extend over more than one level or within a basement.

Land-marking – conditions within a building can change suddenly when fire compartments are accessed or through uncontrolled ventilation. The importance of BA crews undertaking landmarking in clear conditions whilst searching the building must also be emphasised. Fire compartment entry or ventilation either controlled or uncontrolled e.g. window failures can rapidly and significantly reduce visibility within entry/exit routes.

Correct use of equipment – the appropriate forced entry equipment (FEE) should be selected to safely gain entry to a compartment. The correct choice of branch and its settings should be made in accordance with the nature of the fire compartment and the prevailing conditions encountered by firefighting crews. Branches should always be momentarily opened to check the water supply and the range of settings tested before entry into a hazard area.

A thermal image camera (TIC) should be used to assess the conditions within a compartment as well as aid safe movement and the identification of casualties and hotspots. A TIC can also be effective when used from outside the building to monitor conditions within a compartment as well as to determine fire spread.

Recognise signs – firefighters must be able to recognise the signs and symptoms of fire development, the differences in smoke colour and volume, smoke development both internally and externally in order to decide which firefighting tactics to adopt.

Recognition of the signs and symptoms of heat stress and associated heat exposure factors in relation to individual and crew wellbeing.

FIREFIGHTER SAFETY

Firefighters are required to possess the necessary knowledge, skills and understanding to control the exposure to risks during operational incidents. In addition to the key tactics outlined above, the following actions and considerations are key to firefighter safety and effective operations when tackling a fire in a compartment:

Communications – communications are essential so that everyone attending the incident develops a full understanding of the internal and external conditions, prior to and on a regular basis following entry into a compartment.

Application of extinguishing media – pulse spray firefighting is a proven means of cooling fire gases and mitigating the potential of flashover and backdraught

when making entry to a fire compartment. However, continued use of pulse spray as opposed to a direct or indirect attack may not extinguish a fire quickly or completely, prolonging the effects of heat and gases on crews, particularly when the fire has vented from the compartment. Direct or indirect application of water in the form of a solid core or spray should be used to extinguish the fire and this also allows firefighters to tackle a fire from a safe distance, which may be from the entry point (doorway) to a compartment.

Cooling – crews should sufficiently cool the compartment and/or extinguish the fire before entering. This minimises the risk of crews entering an atmosphere which is potentially explosive or being exposed to conditions which will impede their ability to carry out their intended task.

Steam – ICs and firefighters should have an awareness of the effects of steam produced whilst firefighting in compartments and its effects on committed crews. Applying water from the compartment entry point will often enable crews to contain the steam produced or take cover behind suitable cover.

PPE – staff must understand, acknowledge and act upon the limitations in their own personal abilities and the capability of their PPE, which are critical components in enabling firefighters to operate safely whilst engaged in compartment firefighting activities.

PPE is designed to afford a level of protection against the effects of heat and steam to its wearer. If PPE is worn incorrectly, not checked and/or incorrectly maintained, or used in a manner that was not intended, the potential for injury can increase dramatically. In particular, it should be remembered that PPE has been designed to withstand external water ingress, but this will only be achieved if it has been properly maintained. Even small holes and loose stitched garment joints can compromise the level of protection afforded by PPE. These imperfections could allow moisture to penetrate the

garment, which in certain conditions will allow heat to be transmitted to the wearer's skin more readily.

Arduous conditions or high ambient air temperature will cause individuals to sweat and this can be another source of moisture being present in the inner layer of PPE. The innermost layer of the PPE is made from a wicking material which is designed specifically to collect and disperse any moisture allowing the layer to dry rapidly. Similarly, during the course of the shift PPE may become wet, therefore in these circumstances PPE should be exchanged or allowed to dry.

The operational procedure for compartment firefighting has been published in conjunction with an accompanying PowerPoint presentation. Together, these highlight and explain the points outlined above and they are designed to promote effective and safe compartment entry and firefighting tactics. They also provide further information regarding the recognition of the signs of flashover, backdraught and flammable gas ignition.

In addition to the knowledge session on the procedure, a case study presentation of an incident which occurred at 89 East Hill, Wandsworth in 2011, will be made available for delivery by watch officers, to promote further consideration and discussion around:

- Compartment entry.
- Effective communications between IC, BA entry control officers and BA teams.
- Protection of exit routes, for evacuating members of public and crews.
- Sufficient weight of attack.

NEW FIREFIGHTING BRANCHES

The risk assessment undertaken as part of the compartment firefighting policy identified a need to replace the Akron turbojet branch with models offering a broader range of capabilities within the modern operating environment.

The review concluded that two different types of branch are necessary to meet these requirements and to ensure firefighters have the best equipment to deal safely

COMPARTMENT FIREFIGHTING (continued)

and effectively with a range of different fire conditions and sizes. These new branches will contribute to firefighter safety by allowing a high flow of water to be delivered at a lower pressure than the current branch and by allowing fires to be tackled from a greater distance when this tactic is appropriate.

Extensive evaluation by the Brigade's Research and Development Team resulted in the procurement of the Rosenbauer Selectflow RB101 and the Rosenbauer Projet 2 hand controlled branches.

Rosenbauer Selectflow RB101

This branch operates at variable flow rates between 130 and 400 litres per minute. Whilst the normal working pressure of the branch is specified at 6 bar pressure, data obtained from real fire testing has

identified that the branch is effective for pulse spraying with a minimum of 3 bar pressure at the branch. The RB101 can also be used in conjunction with a foam aspirator to produce foam.

The Rosenbauer Selectflow RB101 is particularly effective at gas cooling as well as providing a similar flow rate to the currently used Akron Turbojet.

Rosenbauer Projet 2

This branch is larger in size than the Selectflow and provides a larger volume of water. It is able to supply a solid core jet or a spray curtain or a combination of both – each function can be independently controlled by the operator. This provides greater flexibility to firefighters enabling them to:

- Apply water to a fire from a greater

distance where conditions dictate.

- Provide a protective curtain shielding the operator from the effects of the fire.

The branch has an operating range of between 3.5 bar and 7 bar pressure. At a branch pressure of 3.5 bar it provides a solid core jet of 440 lpm and a solid core/spray combined flow rate of 640 lpm.

The Projet 2 spray curtain will provide protection from radiated heat and the larger volume of water delivered will enable firefighters to fight developed and well-ventilated fires more safely and effectively.

These replacement branches are currently being distributed to fire stations. Local training with the branches should start as soon as the technical and training notes have been received.

WATCH TRAINING PACKAGES

Training packages, associated with operational news issues are available for your immediate use. They can be accessed via an ICON on your Desktop which links to all the current training materials related to the items below and previous packages. Additionally there are links to Trainee packages and support material. Just click on this ICON on your desktop.



Training Support
Shortcut
2 KB

Red represents training themes are mandatory for all watches.

Amber represents training themes are mandatory for all watches to which they are relevant. These will be detailed within the training guidance.

Green represents optional and can be included in the watch training programme at the discretion of the WM based upon identified watch training needs.

Article	Training	Guidance and supporting information	STEP – Recording reference (Create on STEP)
Compartment firefighting	Article and package	PN 793: Compartment firefighting Training support pack available through training support icon – training presentations – Operational News training – Compartment firefighting presentation and lesson plan	Lecture/Training /Risk Management/ Building General/ Compartment Firefighting – 793
East Hill, Wandsworth case study	Article and package	Training support pack (East Hill, Wandsworth case study) available through Training support icon – training presentations – Operational News training	Lecture/Training /Risk Management/ Building General/East Hill Case Study
New Rosenbauer Select flow RB101 and the Rosenbauer Projet 2 firefighting branches	Article and package	PN 810: Rosenbauer Projet 2 Firefighting branch PN 811: Rosenbauer Selectflow RB 101 Training support pack (new Rosenbauer branches) available through Training support icon – training presentations – Operational News training – Branch Notes	Lecture/Training Notes/Training/ Rosenbauer branch training note

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