

Dry Ice and Smoke Effects/Naked Flame

Relevant Legislation and Documents

Hazardous Substances & New Organisms (HSNO) Act 1996

See also appendix on smoke/fog & fire safety section

When a Dry Ice Machine was operated on stage during a preview performance of a popular musical in the UK - carbon dioxide (CO₂), being heavier than air, seeped into the pit. A member of the theatre staff who was in the orchestra pit became disorientated and collapsed. The member of staff was taken to hospital and later released, fortunately without suffering any apparent long-term injury.

HSE prosecuted the producer

This accident highlights the problems associated with such effects and the need for technicians to be aware of the associated problems.

Guidelines

- 1) Smoke, fog and naked flame on stage, is a hazard.
- 2) All personnel (stage crew, actors, etc.) should be informed in advance of the intention to use smoke or fog or naked flame and the type to be used. Before use, there should be a discussion of the hazards and precautions being taken.
- 3) Obtain Safety Data Sheets on all smoke and fog products. In particular note whether the Reactivity section lists any hazardous decomposition products.
- 4) The choice of product depends on whether it will be used indoors or outdoors, in enclosed spaces, and whether people will be exposed for any significant period.
- 5) Children, elderly and people with respiratory problems should be informed of their possible higher risks. A medical opinion should be obtained as to whether they should be exposed.
- 6) Use only fog and smoke machines with the chemicals recommended by the manufacturer. Other materials may clog, or otherwise interfere with proper operation of the machine. Keep the fog machine in good repair and use as instructed.
- 7) Use the minimum concentration of smoke for the minimum period of time necessary. Avoid heavy concentrations when people are exposed.
- 8) Only allow essential personnel on the stage when using smoke and fog effects. Also evacuate any nearby areas where the smoke could reach.
- 9) Respirators should be available for anyone wanting one in any situation.
- 10) On stages, interior sets or in enclosed areas, rapidly exhaust the smoke once not needed.
- 11) In theatres it is particularly important to exhaust the fog away from the audience or orchestra pit.
- 12) Minimise the number of exposures to risk, so if it is not essential for all rehearsals then don't use it.
- 13) When burning organic materials, you should have a designated fire watch on hand.
- 14) If performers are using naked flame then their costume/wig items should all be fire retarded