

Smoke-free Lift Shafts by Pressurisation and its Importance in Case of Evacuation

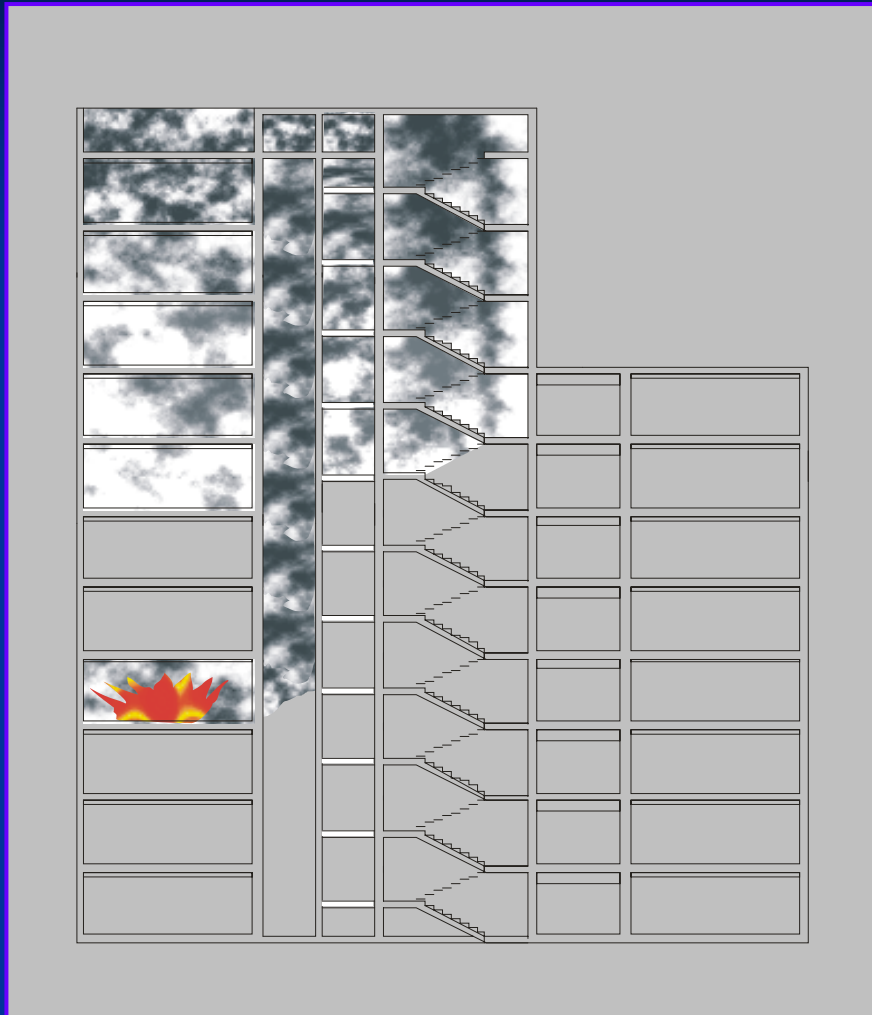
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Risk & Fire Management
Brussels

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Since the fire at the Düsseldorf International Airport in 1996 with seven people killed in lifts by smoke inhalation this devastating accident got much attention in the technical community.

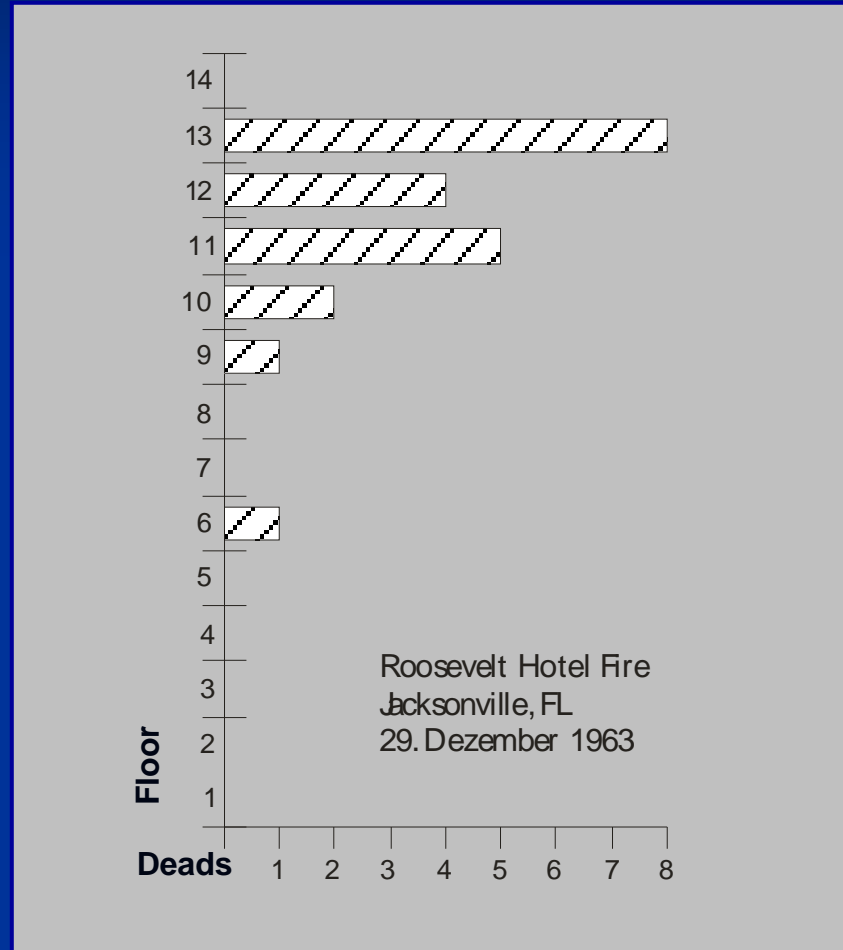
The result was that lift shafts especially at airports got Pressurized (Germany)



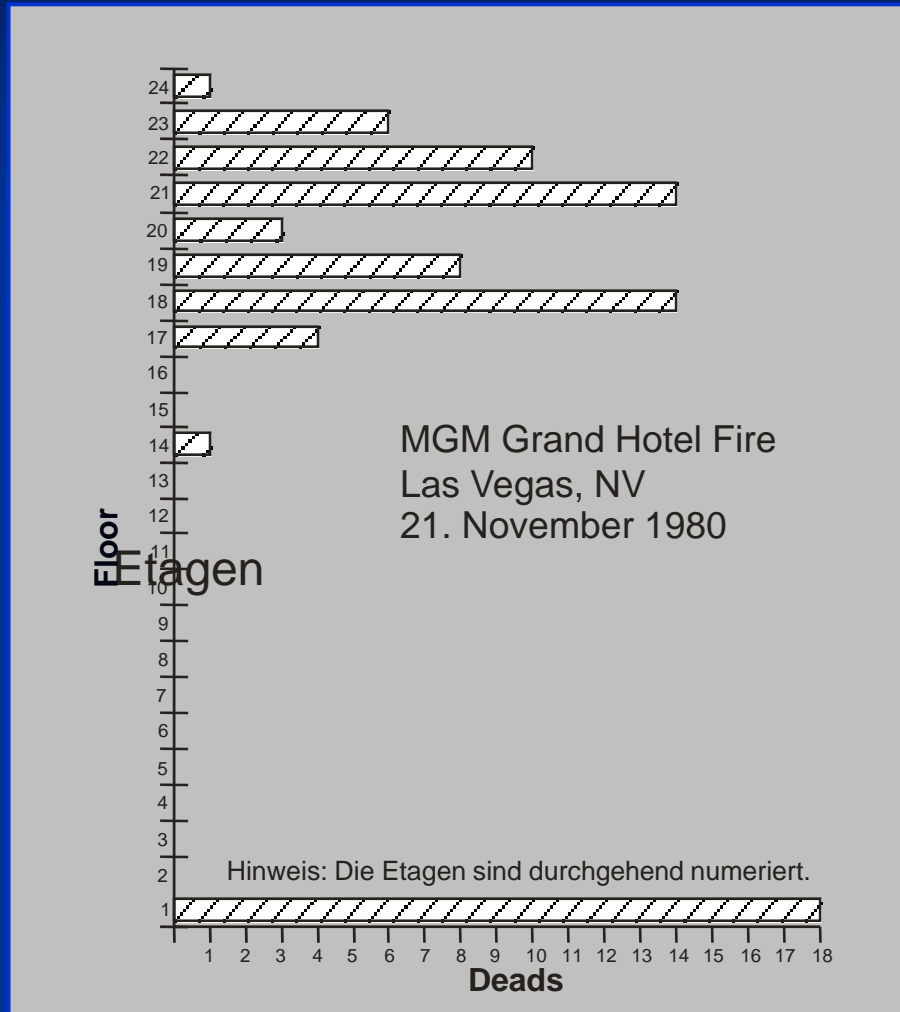
All vertical connections in buildings are very critical in case of fire.

In case of fire in an accommodation smoke will distribute without barriers into stairs and liftshafts and from there in corridors of the upper floors. In almost every fire in a building the occupants are trapped by smoke on their way into the outside building

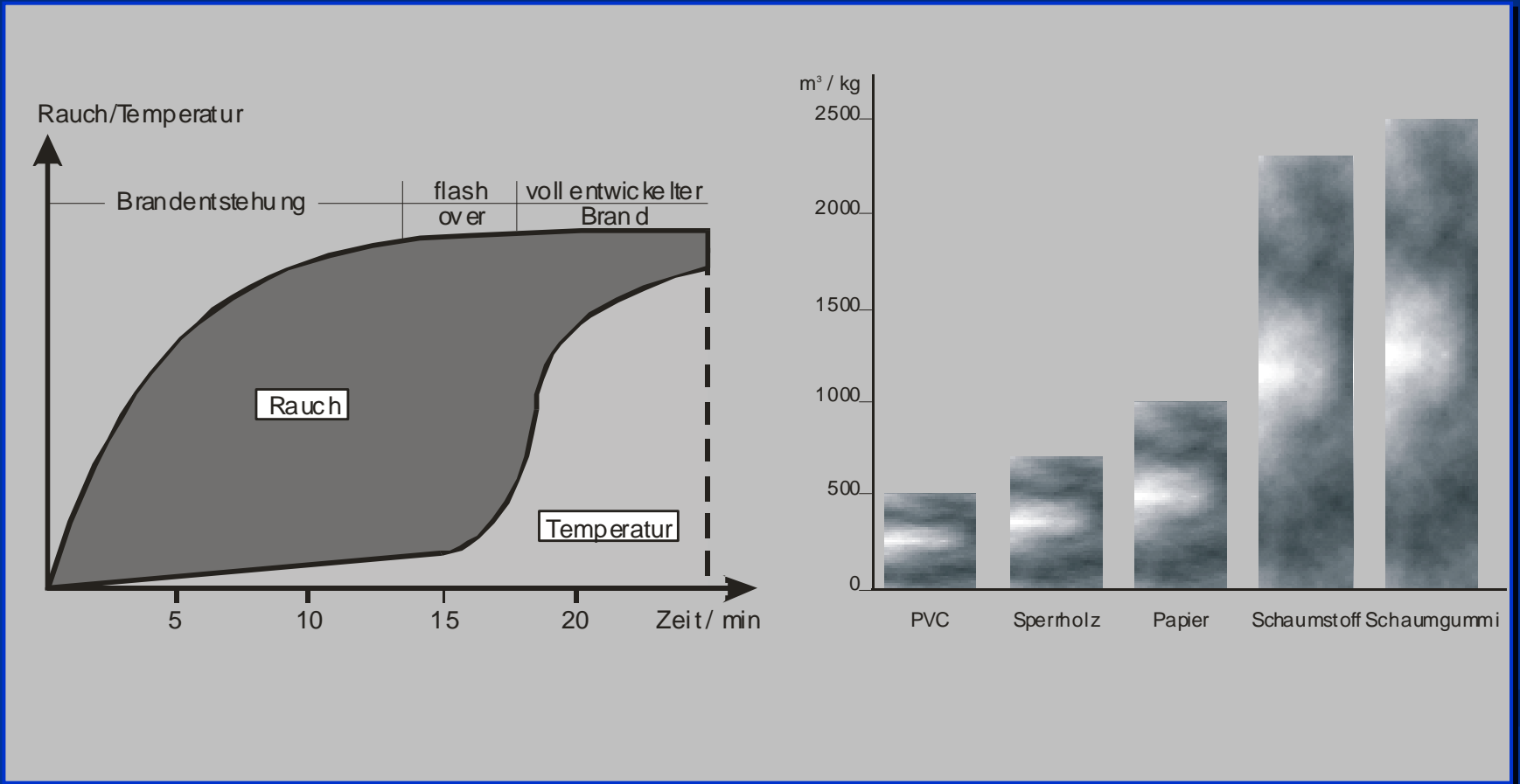
Home for the Elderly, Jacksonville, FL



Fire in MGM Hotel, Las Vegas, N.V.



The killer no. 1 is the toxic smoke **not** fire



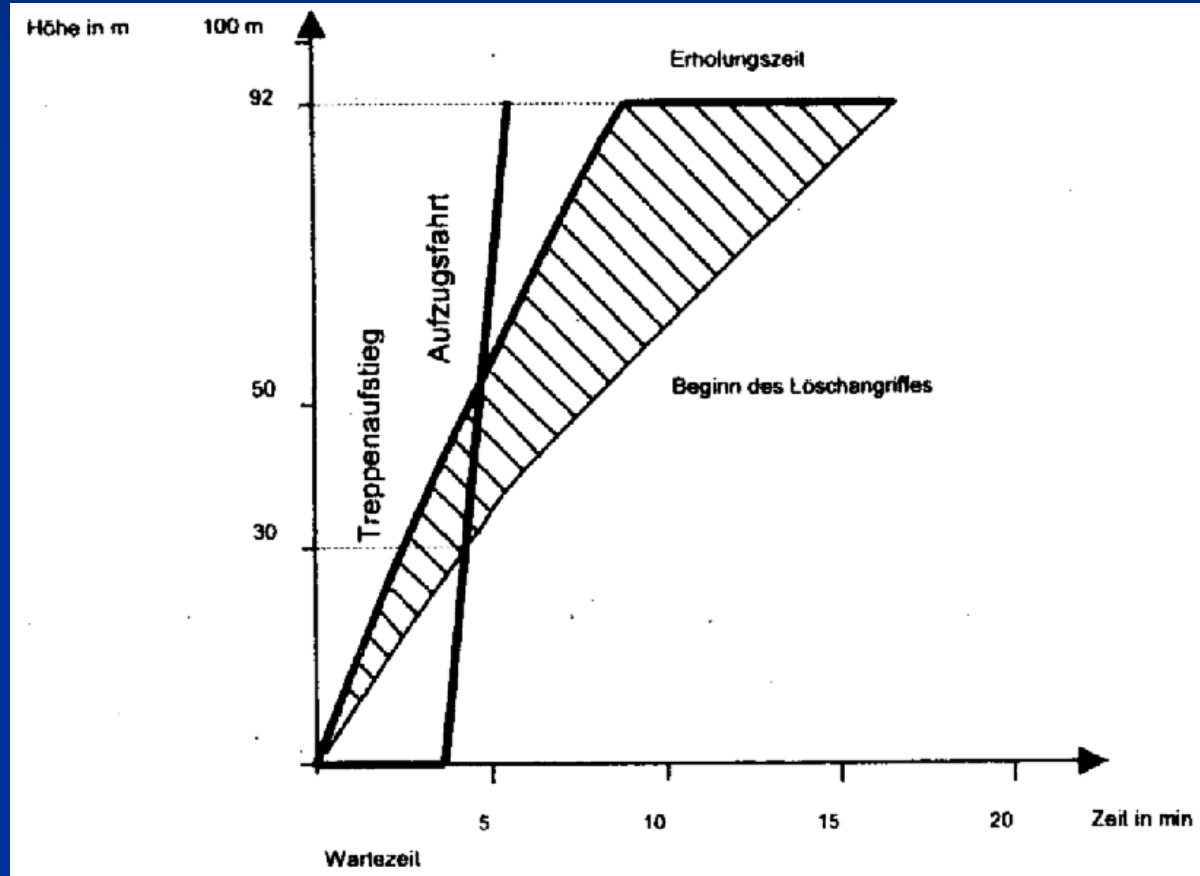
Recommended application for pressurized lift shafts in buildings

1. Fire fighter's lifts

2. Lifts for the disabled

Precondition: circuit integrity

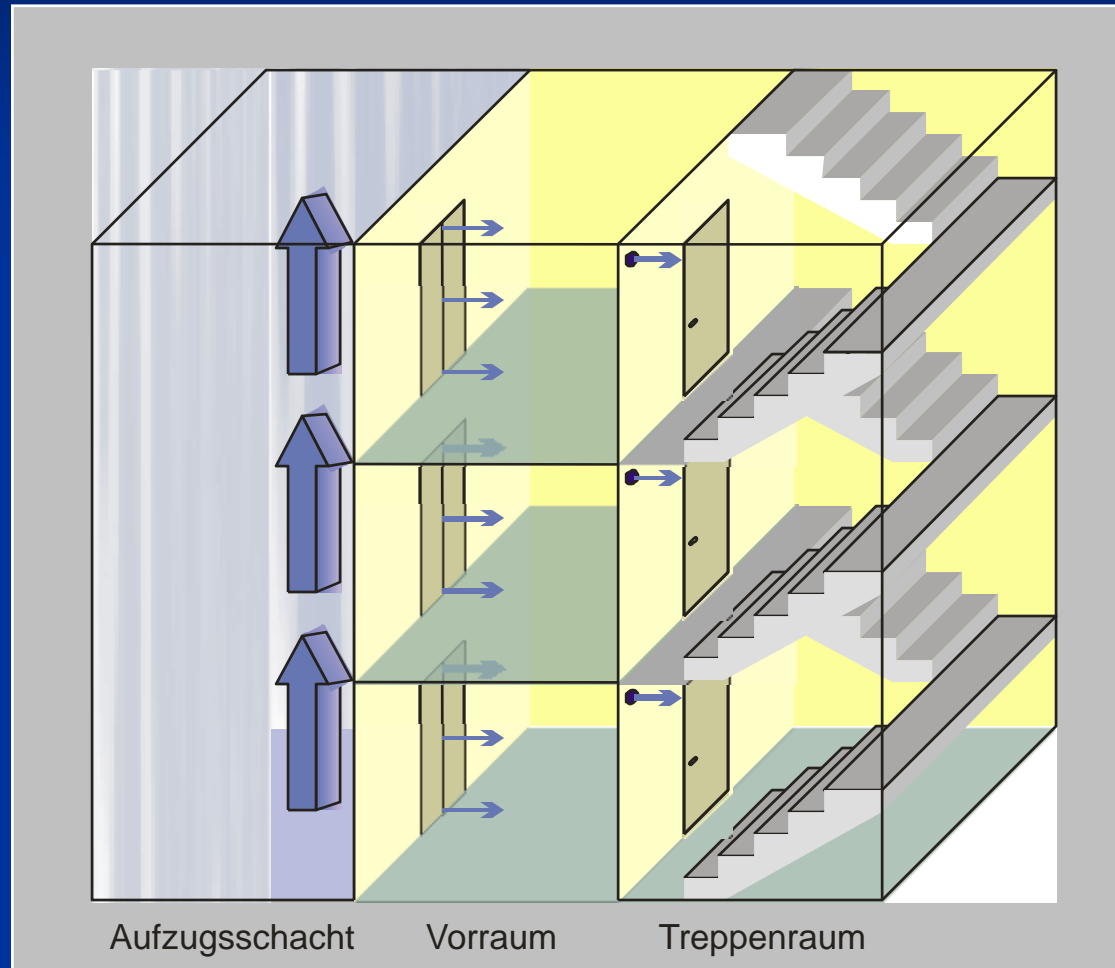
Firefighters physical stress climbing up the staircase of a high rise building



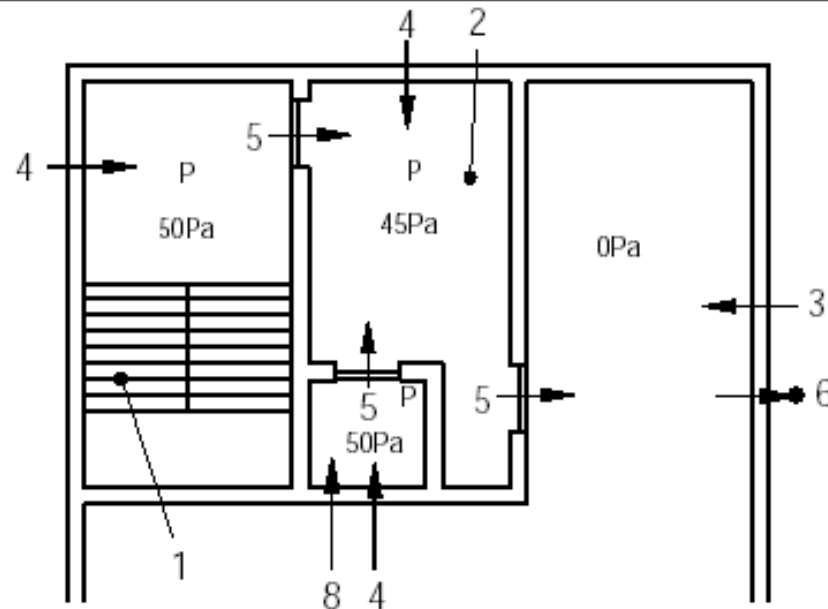
- **The stress of wearing oxygen masks in climbing up the stairs is exhausting. An immediate fire attack is not possible and justifiable**
- **Every firefighter reaches his physical capability depending on his individual fitness and age**
- **Firefighter lifts are absolutely necessary in high rising buildings (>22 m)**
- **Alone the presence of a firefighter lift guarantees that the fire floor is reached in a reasonable time and the attack can be started immediately with physical fit firefighters**

Ross, R. and Mitschker, J., Belastungen beim Aufstieg in einem Hochhaus durch den Treppenraum, in: Brandschutz, Deutsche Feuerwehrzeitung, 2/2005, S. 83 - 87

The functioning of pressurizing a lift shaft, lobby and staircase



Detail on EN 12101 - 6



These arrangements are provisions for firefighting.

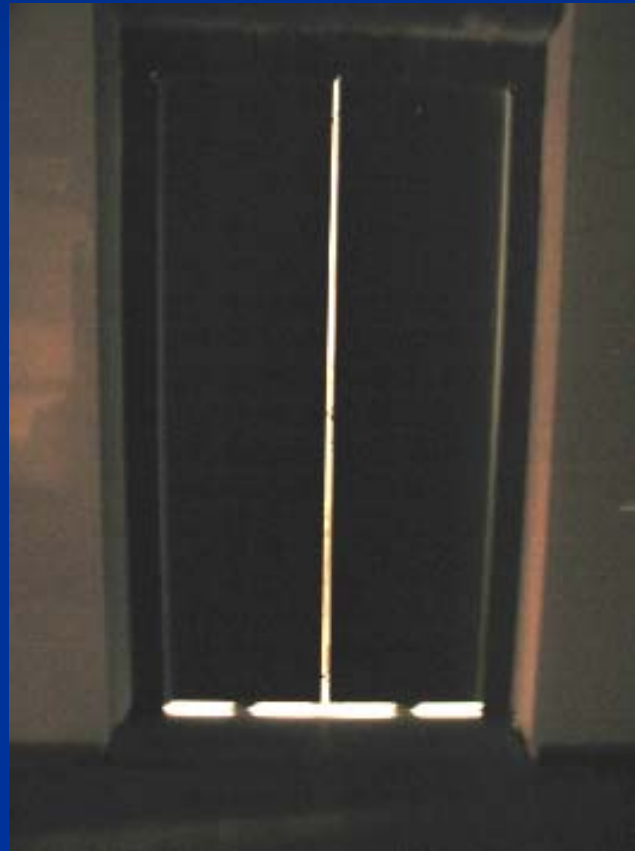
Key:

1 Stair	5 Leakage path through doors, etc.
2 Lobby	6 Air release path from building
3 Accommodation	8 Lift
4 Supply air	

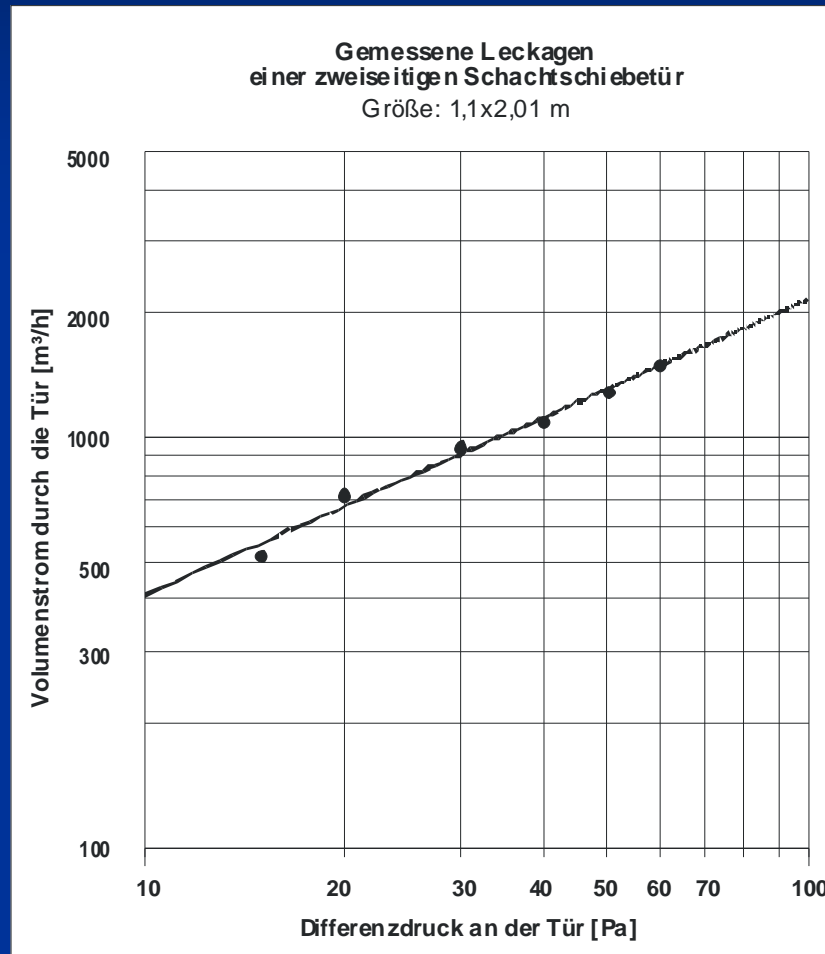
P denotes pressurized space denotes minimum design pressure differential, e.g. 50 (Pascals) relative to the accommodation, identified by 0

Figure 13 – Pressurization to stairs lobbies and lift wells

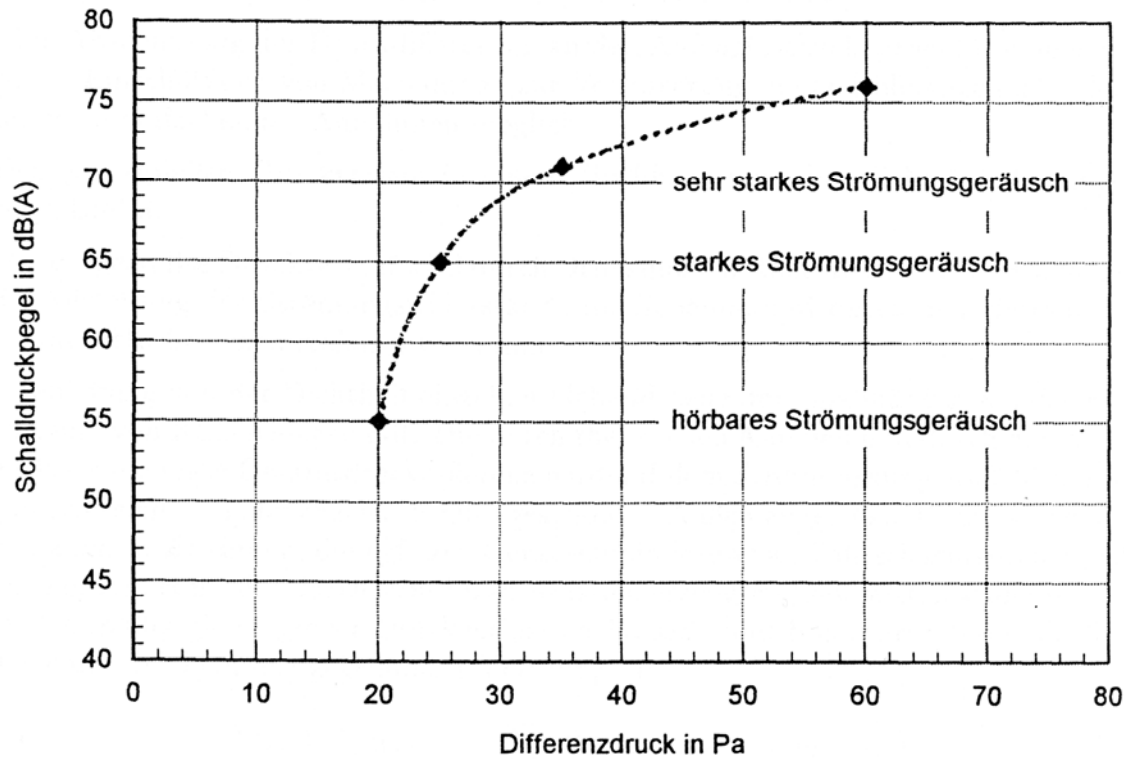
Leakages of a sliding door



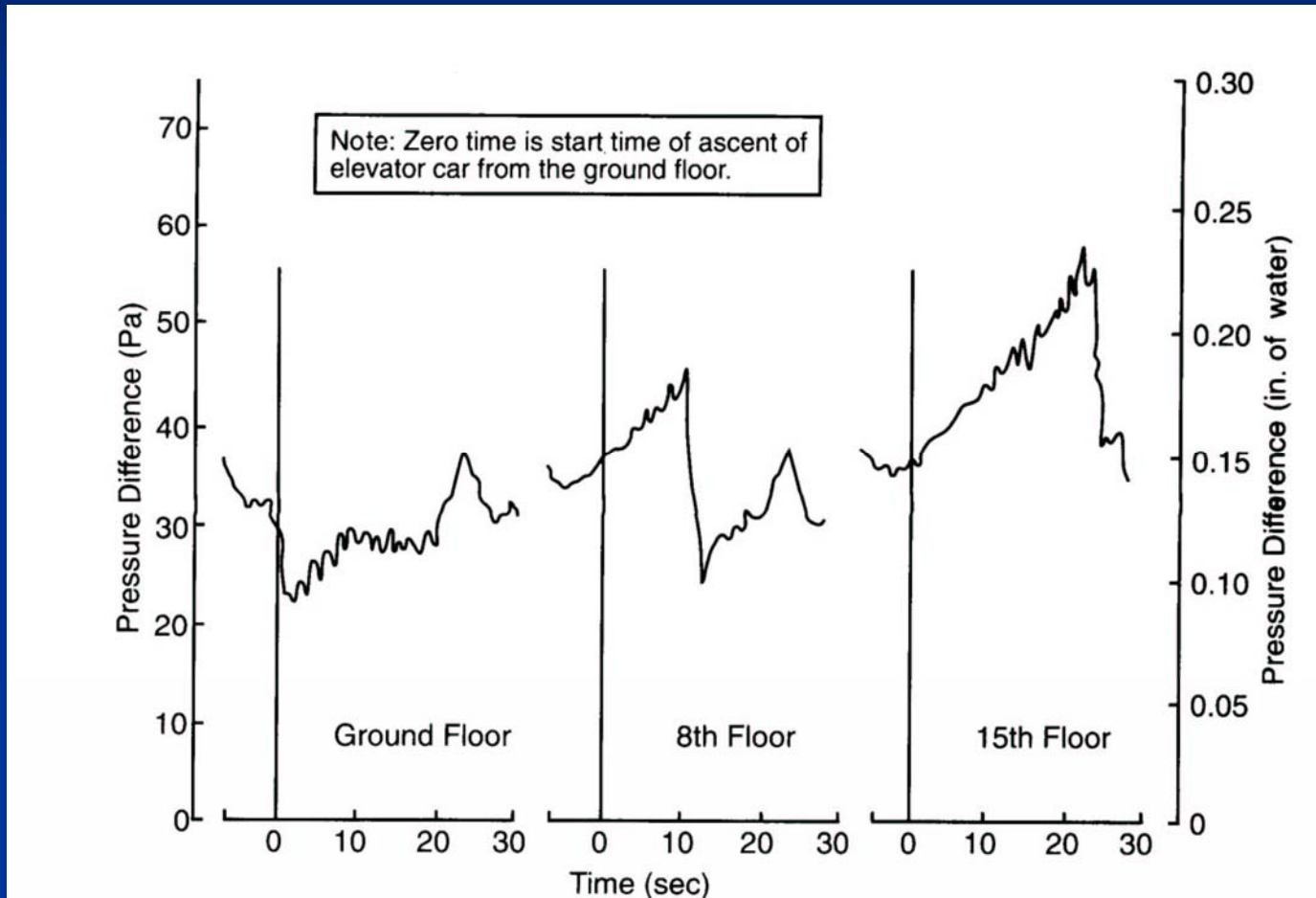
Measured leakages at a sliding door



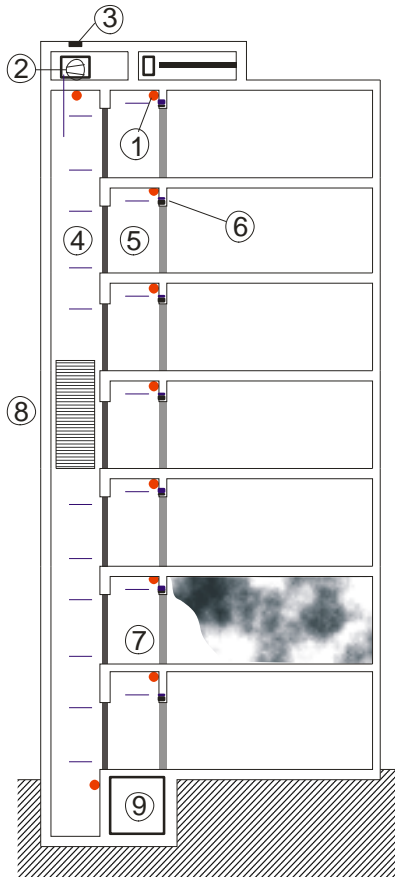
Pressurisation and flow noises at sliding doors



Pressurisation and piston effect



How the system works



1. The smoke control system is activated by smoke detection
2. MISTRAL high performance ventilator is starting either on bottom or on top
3. Smoke release vents in the machine room become closed
4. Pressure is build up in the lift shaft
5. Pressure ist evenly distributed by leakeges through lift door into lobbies
6. and through presssusre release vents into the accomodation
7. Because off overpressure the smoke is banned to the burning afea and smoke is retained from the rescue path
8. Intelligent smoke detection system prevents the stop of the car on the fire floor
9. Circuit integrity is necessary for transportin handicapped or injured people

Feuerwehr-Aufzugsschacht (druckbelüftet)

Druckwerte lt. Bericht TÜV Köln vom 02.09.1998



Schachtschiebetüren geschlossen

1 Schachtschiebetür geöffnet

2 Schachtschiebetüren geöffnet

The importance of pressurized lift shafts in high rising buildings in case of fire



**Evacuation and pressurisation systems
in case of fire are found in the following
buildings**





Deutsche Bank, Frankfurt

Hight: 158 m

40 floors

2 Towers

2.500 persons

Time for evacuation: 18 minutes
(Data: Firefighter's Department Frankfurt)



www.thehighrisepages.nl

Commerzbank, Frankfurt

Height: 258 m

54 floors

2.200 persons

Time for evacuation: 25 minutes
(Data: Firefighter's Department Frankfurt)



Messeturm, Frankfurt

Height: 256 m

64 floors

800 persons

Time for evacuation : 29 minutes
(Data: Firefighter's Department Frankfurt)

Presentation of film

„Smoke free lift shafts by Pressurisation“





PRAKTIKAGEBÄUDE HPP



Danke für Ihre Aufmerksamkeit

Thank you for your kind attention

Merci pour votre attention

Molto grazia per la loro attenzione

