ADEQUATE FLOW-RATE

How much water do we need to apply to a developing fire?

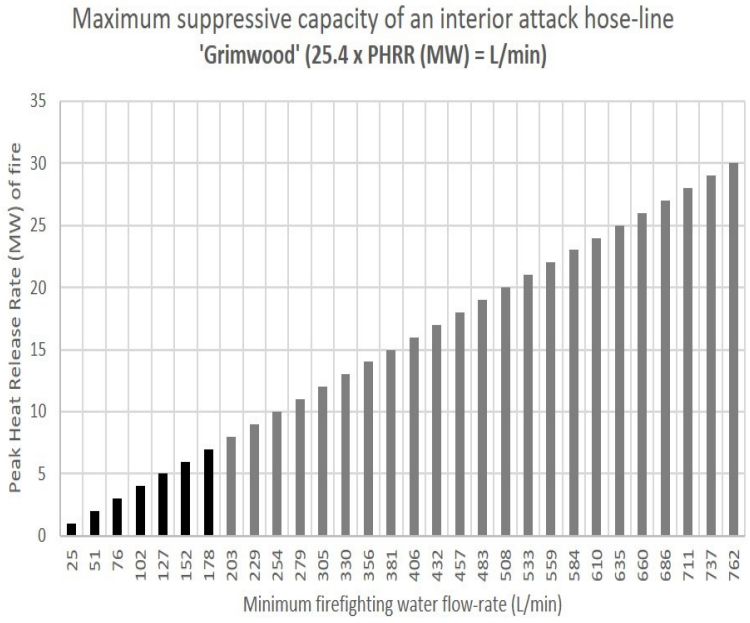
In this issue:

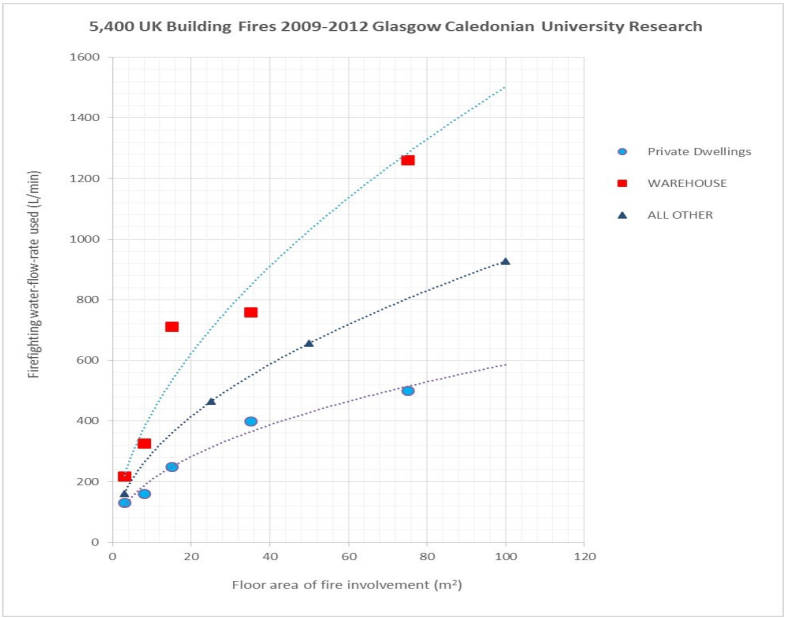
- How much water is needed to counter energy release (MW)?
- How much water is needed per floor area of fire involvement?
- How effective are rising main stand-pipes, nozzles and hose-lines?

5,400 UK *'working'* Building Fires

How much water was used?

An extensive study of firefighting water flow-rate was undertaken at 5,400 UK building fires between 2009 and 2012.These fires all entailed breathing apparatus and flowing water needed to extinguish fires in three main groups of buildings or occupancies: (a) apartments and house (b) offices and all other buildings (c) storage warehouses.



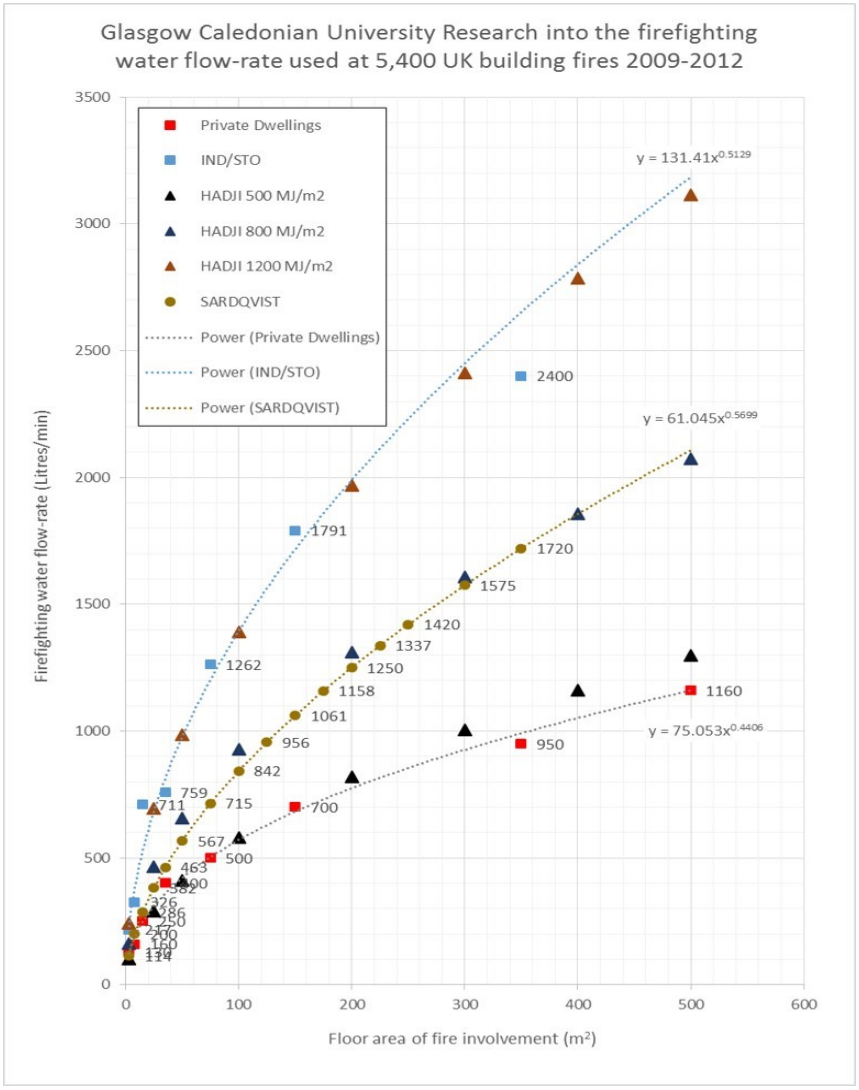


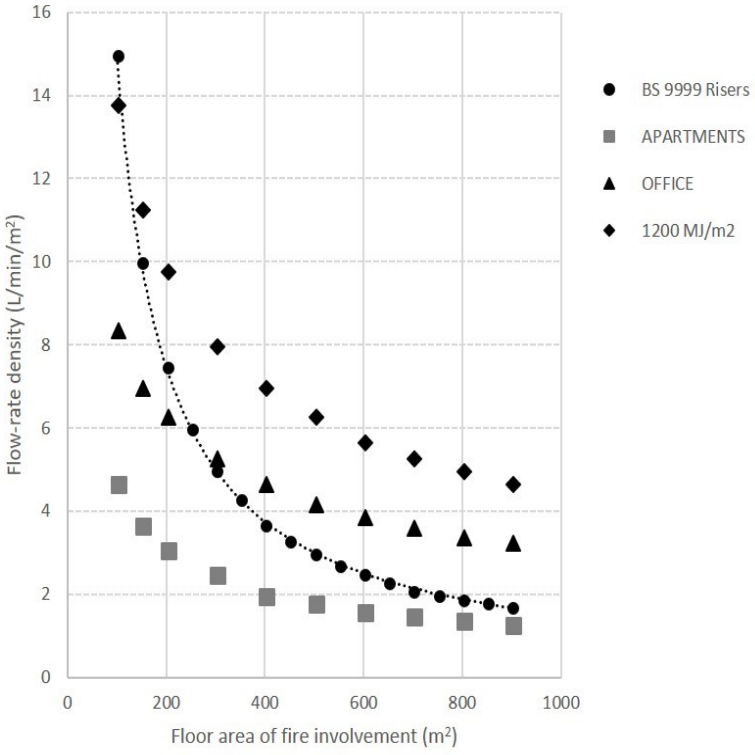
How much water you are able to deploy and apply is determined firstly by the supply provisions; then by your distribution provisions, which include pump; to delivery hose; to stand-pipe rising main; to attack hose -line diameter and length and to nozzle combinations. If you don't meet the calculated (top chart) or actual (lower chart) flow-rates, the fire will most likely continue to spread beyond control at a greater percentage of fires.

The GCU University research showed that a higher flow-rate applied immediately on arrival reduces the amount of building fire damage that occurs.

It is the fire services responsibility to source an 'adequate' quantity of firefighting water by law. An adequate amount of water means the fire will be extinguished during the growth or steady state stages of development (not during decay).

These are the flows needed by UK firefighters in mainly solid masonry construction with a small percentage of timber framed properties also included, where the flow-rate increased according to the amount of structural load involved.





The chart on the left demonstrates how much firefighting water was flowed in a range of occupancies in the 5,400 UK building fire research undertaken by Glasgow Caledonian University. The key outcomes of the research were that firefighters deployed more than was necessary to extinguish fires in some instances to create a safety reserve, in dealing with dangerous and out of control fire spread.

In many situations, fires were under-flowed on arrival and fire spread occurred beyond the compartment (and floor) of origin more frequently. However, where flow-rates were increased at the earliest point of attack, the building fire damage was seen to reduce and the need for greater resources and higher flow-rates, using several large hose-lines at a later stage, was greatly reduced.

The chart on the left demonstrates that rising main flows were adequate for high-rise apartments but where open-plan offices were concerned, the available flow-rate would only be adequate for fires involvement to 300 square metres. Also, where fire loads exceeded around 1,200 MJ/m2, the rising mains only served floor areas effectively to 100 square metres.

These are the points where passive or active fire protection is needed.

Rising fire main stand-pipes are only effective if matched against fire load and compartment size. A BS 9999 rising main every 900 m2 is only effective for up to 300 m2 of fire involvement in an open-plan office. Active or passive measures then become a critical design requirement - sprinklers or smaller fire-resisting compartments should be considered.