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TECHNICAL BULLETIN
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ETI FIRE SYSTEM DISCHARGE FLOW RATES

CIRCULATION : ETI distributors and associated technical staff.

PREAMBLE:
From time to time, ETI distributors have expressed concerns about significant variations in actual discharge time verses theoretical when doing discharge tests.

Our design is based on a minimum design discharge rate of 4.1 Litres per square metre per minute based on NFPA11 invoked under AS5062. Our design only works on previous tested flow rates for a nozzle during a typical discharge. For nozzles, 3.2 LPM is only a predicted average per nozzle used to calculate from. By using the application rate and the minimum time we are designing for, we are in fact calculating the correct quantity of foam. This is a difficult concept to get across to people as it is the quantity of foam that is most critical. Once we have the correct quantity of foam, discharge rate is nevertheless important to get right within acceptable limits.

In our fire testing, we observe that once you have the correct quantity of foam calculated on those rates, you now have a potentially excellent performance system. The 3.2 litres per minute is in fact the design average discharge per minute for nozzles. Discharge starts somewhere below 1375 KPa and reduces steadily down to pressures around 400 KPa at the time of completed discharge. This means that discharge rate is not a constant at all. It's just a weighted average. We have always understood that different builds will give significantly varying discharge times. In fire testing we know this not to be a critical issue as to exactly how fast you put it on, although it has to be within reasonable bounds to the predicted performance. So our design rules allow plus or minus 20% from theoretical, to pass a practical test.

Recently a distributor reported that they were building a fire system using a 50L foam cylinder and 12 nozzles and the discharge time was below the 20% allowance and was discharging too fast. ETI repeated the test and confirmed the concerns and found that the medium size system using a 20mm supply hose was creating a very low friction environment. The ETI manual in chapter 10 "Pipework Calculations" provides a formula to check acceptable pipe sizes. This equates to a 12mm hose which has slightly reduced orifice sizes through the fittings, will usually allow a maximum of 14 nozzles. A 20mm nominal hose will usually calculate under the same criteria to handle in the order of a maximum of 39 nozzles. For a 12 nozzle system, the 12mm hose passes the design requirement. As you can appreciate, the valves are ported and flow designed for the worst flow demands placed on them and so have low friction co-efficients. This is good if we are using valves on the largest cylinders with many nozzles attached. In this case, testing showed that when friction was very low, and flow rates were too fast, using a 12mm hose regulated the flow much better within the time limit constraints, whereas the larger 20mm hose was overkill in size and reduced friction to the point where the system discharged too fast.

So the tip is, if fast discharge is becoming a problem on single cylinder systems up to 14 nozzles, reducing the main supply hose to 12mm will help regulate the flow within design limits.

Please ensure that all related technical personnel are informed of this procedure. Please add a copy of this technical bulletin in the appropriate section of your ETI technical manual.

Yours sincerely

L D Waldon

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