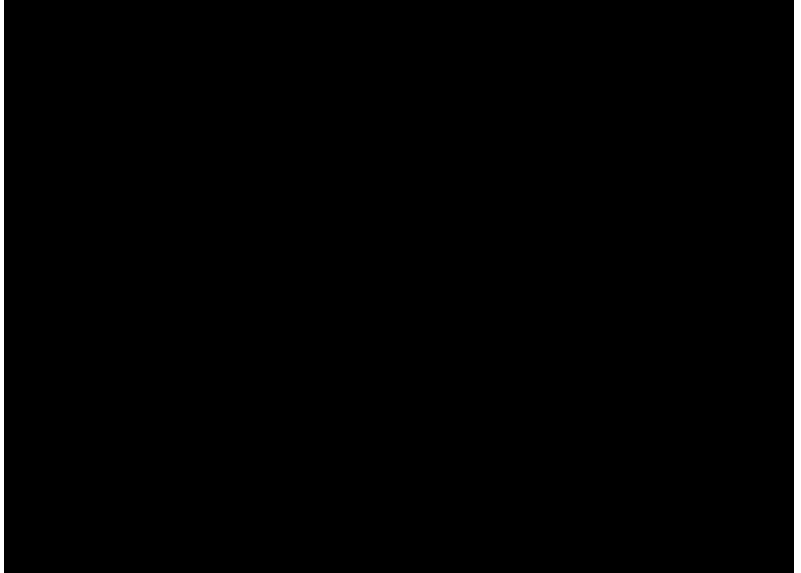


and 0.5% in percentage. It was ignored by considering the accuracy error from filling the same bottle with same amount of water.

The fundamenta



The fire sprinkler utilised is VK302. It is a pendent sprinkler with K-factor of 5.6. The sprinkler was

6 RESULTS AND DISCUSSION

Four regions were selected for recording the spray with two different water pressure, 37 kPa and 88 kPa. Each region is labeled in letters in Figure 5 to show the relative location between them, but it does not mean the recorded region was exact a 100mm square. The upper left corner of the square A was 900mm away from the sprinkler in horizontal direction and 760mm lower in vertical direction.

The effects of shutter speed, magnification, water pressure and location are illustrated in Figure 6 – 10. The first vertical axis is normalised frequency and the second axis is cumulative distribution function (CDF). Because the streak lengths were read from plots, a reading error of one pixel for each end is applied. The pixel length was calculated in a range between 0.11 mm/pixel and 0.19 mm/pixel for the experiments shown in Figure 6 – 10. Thus two pixels reading error corresponds to 0.5 m/s of uncertainty. By considering other uncertainties like losing dark ends from image processing, one streak length is the sum of the droplet travel distance and twice its diameter, and streaks have a thickness resulting an error on choosing the ends, the final results are rounded up to nearest integer. All the experiment results show a most frequent velocity of $4 \text{ m/s} \pm 1 \text{ m/s}$.

The shutter speed has an impact on the length of the streaks. Longer time provides longer streaks. As shown in Figure 6, the effect of shutter speed is insignificant.

Unlike shutter speed, different magnifications provide different results in terms of maximum velocity. With larger magnification, a larger maximum velocity was measured. However, theoretically magnification should not have any impact on the results since it varies in ratio. The possible reason is due to the different focus planes between the experiments since the focus planes were selected to maximise the number of clear droplets recorded. The larger maximum velocity might come from the outer part of the spray which might be affected by the slot.

