

HYDRAULIC KNOWLEDGE IS POWER

Plumbing, gasfitting and drainlaying are crafts that require great skill, accuracy and diligence during execution if a high standard, well functioning installation is to be achieved. In many cases, the knowledge needed to achieve this is transferred from the older generation to the younger generation via word of mouth. This fosters invaluable practical knowledge in trainees which cannot be taught in a classroom, or in fact anywhere other than on the work site. Boost that with an understanding of the hydraulic theory behind a practical solution and you're on to a winning combination, says hydraulic design expert Nick Post.

The disadvantage of this informal teaching however, is that the theory behind a practical solution may not be explained and so is left behind and/or improperly understood by the student. If an apprentice asks why something is done the way it's done, the response may be "because that's the way we always do it". On many occasions, the solution may well be entirely appropriate for the problem at hand, although there may be other ways to achieve an identical or better result. But when the theory behind a practical solution is also explained, a broader knowledge of plumbing is gained, as a result of which problems may be better understood and multiple solutions more easily found.

Ipsa scientia potestas est – "knowledge itself is power"

This famous 16th century saying by Francis Bacon remains proven today. So, it is fair to say that the basis of a healthy industry is the knowledge available within it; without knowledge any industry can become dormant. Therefore, it is very important to maintain and expand the – in this case, hydraulic – knowledge in the industry. However, whilst there certainly are courses at NZ universities which teach hydraulic principles, all of them are integrated within mechanical, civil or other engineering degrees. Both the likelihood of a student being encouraged to specialise in hydraulics and the opportunities for them to do so in NZ, are therefore limited. As a result, the knowledge-base necessary to ensure progress in our industry is very hard to find. In addition, if progress is not initiated at the top of the industry ladder – among those responsible for forming regulations, providing information and advancing education – this will have its effect further down.

Australian/NZ Standard

In the short time I have been studying our Standard, the AS/NZS 3500, I have found that there are a number of knowledge gaps which cannot easily be filled in. This may be because the current Standard adopted much of its information from the old British Standards. Whilst the regulations themselves have been recorded, the reasons for their implementation can be harder to trace, to the point that their inclusion is often simply accepted without question. In addition, the old British Standards were written in imperial units and then transferred to our metric system. These and other changes might appear small, but just as in a game of Chinese whispers, an apparently small change may have a significant impact.

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Discharge units

One such example, which boggles the mind (mine, at least), is that of discharge units. All foul water drainage designed to the Standards is based upon the discharge units allocated for each fixture. But if the discharges end up in a pump chamber and need to be pumped away, the units must be converted into litres per second, and this is where the problem starts; the relationship between discharge units and litres per second is nowhere to be found. Of course, it is possible to work it out, but this requires time consuming research or comparisons with overseas Standards, which often leads to errors and inaccuracy. As a result, installations are oversized too soon, too often.

Domestic versus commercial

It appears also that AS/NZS 3500 is written for domestic purposes. When designing a water supply reticulation system in a larger, commercial situation, it can prove difficult to calculate the required amount of water. In the case of water installations, the Standard gives requirements in loading units which can then be converted, via a table, to litres per second. The table however only gives information for installations up to 0.68 litres per second – larger than that and you are left on your own, and the formula behind the table is nowhere to be found either.

Hydraulically incorrect

The AS/NZS 3500 leaves room for discussion in many situations and may even be called incorrect in some, possibly due to the reasons discussed before. For example, hydraulically, it is not ideal to connect a branch drain to a stack via a 45° junction, as described in the Standard. Image 1(a) (opposite page) shows that when a drain is connected to a stack with an 88.5°, or graded junction, air can enter the branch drain towards the fixture trap to supply air for the discharge. If, as in Image 1(b), a branch drain is connected to a stack with a 45° junction, the discharge

will create a hydraulic closure and prevent the air flowing to the fixture trap which causes the risk of under pressure and breakage of the water seal, if the branch is not vented. Such disparities between the older Standard and more recent, knowledge based best practice can cause serious problems in some circumstances, so it is crucial that such issues are addressed with further, detailed study and assessment.

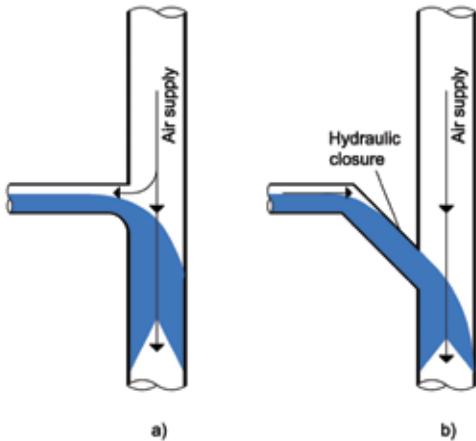


Image 1:
Hydraulic issues around air supply to a branch drain.

The future

The general public do not realise how reliant they are upon our services so one can only hope that the subject of hydraulics with specific regard to plumbing, gasfitting and drainlaying will be taken seriously by those at the forefront of our industry – those responsible for its regulation and advancement. Then

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progress can be ensured, through the delivery of accurate, relevant education to those who need it, because if knowledge isn't looked after well it can disappear and that could be the beginning of a dormant period.

About the author: Nick is an engineer and holds his Bachelors degree in operational technology. Prior to his job at Plumbing Design and Consultancy, he worked for seven years for a major Dutch plumbing firm as a project manager.



Plumbing Design and Consultancy is a specialised firm which provides specific hydraulic design solutions to the building industry. With thorough industrial knowledge and over 30 years of combined experience, they also act as consultants in situations where the hydraulic system situation is challenging, and specialised knowledge is required. For more information visit www.plumbingdesign.co.nz

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