6 IEQ 6.2 HYGIENE

6.2.1 PLUMBING AND DRAINAGE

EXCLUSIONS
None.

OBJECTIVE
Reduce the potential for contamination of plumbing and drainage systems, the ability of systems to carry infections, and the likelihood of odours.

CREDITS ATTAINABLE
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PRE-REQUISITES
Compliance with the provisions of the Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations.

CREDIT REQUIREMENT
1 credit for designs that reduce the potential for transmission of harmful bacteria viruses, and odours.

ASSESSMENT
The Client shall submit details in the form of drawings and specifications for the plumbing and drainage systems, and confirmation that installation of the systems was carried out according to the specifications. A summary report shall be submitted highlighting where appropriate means have been included to allow for safe and hygienic operation over the expected lifespan of the systems and components.

The ‘appropriate means’ shall include, but is not limited to, reference to the following:

- adequacy of flushing water supply to meet the pattern of demand;
- design of drainage stacks of adequate capacity for peak loading;
- venting of stacks;
- access to pipework and ducts for maintenance purposes;
- installation of buried pipework that pays attention to leaks at joints, seals, etc. for the expected life of the installation;
- design of floor drains; and
- maintenance of water seals.

Where it can be demonstrated that the design and installation of the plumbing and drainage systems, and any other provisions that can impact on performance (e.g. ventilation of bathrooms) have been given due attention, e.g. comply with the recommended practices promoted by various authorities, then the credit shall be awarded.

BACKGROUND
Since the outbreak of the SARs virus there has been a great deal of attention on the design of buildings to improve building hygiene. There appears to be sufficient evidence to conclude that building drainage systems was a path for the transmission of the SARs virus. Subsequent investigations have identified that certain features of drainage and sewage system design should be improved. HK-BEAM seeks to ensure greater attention is paid to the design and installation of plumbing and drainage systems in buildings in order to reduce the risk of transmission of bacteria, viruses and odours into occupied areas.

Water seal traps are required to be provided for all sanitary fitments, including floor drains (if provided), before they are connected to a common drainage stack [1]. Trap seal retention can be a problem in multi-level drainage systems. The main ways that air passes a trap are:

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• system pressure variations cause air-entrained bubbles to pass through the water seal; and/or
• complete or partial trap seal loss.

Unless water is replenished, from time to time, by the building users or through discharge of waste water cross-contamination is likely. Viruses can enter in indoor spaces through water traps if water seals are dried out or contaminated, or there is leakage in pipework.

Under working and test conditions traps should retain a minimum seal of 25mm of water or equivalent. Self priming type drainage traps or drainage pipe connections which ensure trap priming may be considered, e.g. connection of washbasin discharge to the pipe between the floor drain grating and its U-trap. Care should also be taken to prevent back-flowing at the floor drain.

Any provision requiring modification of the relevant Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations may be considered by the Building Authority on the merits of individual case upon application.

**TWO-PIPE SYSTEM**

According to regulations [2] waste pipes must be connected to a soil pipe. Use of two pipes for drainage, one for foul water and one for greywater, may also be a consideration (note that such an arrangement can allow for greywater recycling). Separation of soil and waste pipes can reduce the chance of cross contamination between systems, the connection of wash basin; bath and floor drain to the same waste stack can still permit cross contamination within the waste system. A more effective measure is to provide an independent stack for floor drains.

However, the use of a one-pipe system of combined soil and waste stack has been commonly used in Hong Kong for decades. Many local designers do not regard the adoption of separate stacks for soil and waste a practical and cost-effective solution because it does not resolve the problem of drying out U-traps. The amount of drainage pipework will be doubled and, besides extra cost, can impose spatial constraints [3].

**INSTALLATIONS**

Leaky joints and broken drainage pipes are the result of the lack of regular inspection and maintenance. Pipework needs to be as accessible as possible in order to carry out such work, and building management should be provided with means for regular inspection, maintenance and repair of building drainage systems.

**MAINTENANCE**

A common problem is the difficulty in gaining access to systems from public or common areas. Locating pipework on the exterior of a building has the advantage that maintenance can be carried out with minimal disturbance to users; however, locating pipework internally is acceptable if adequate duct space is provided with proper access from a public area, such as a common corridor.

As drainage and other service pipes are often placed in lightwells and re-entrants, when designing these designers should pay special attention to access for repair and maintenance [4]. The lowest level of re-entrants and lightwells housing soil and waste pipes or stacks should be designated as common areas with access, including access through cat-ladder where appropriate, to facilitate maintenance and clearance of any refuse.

2 Regulation 12. Hong Kong Building (Standards of sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations.
VENTILATION

Where mechanical ventilation in the form of extractor fan is provided, such as in bathrooms and lavatories, care should be taken to ensure that water seals are intact and operate according to the design intent [5]. Consideration should be given to the quality and quantity of air intake, air-flow path and fan capacity.

The Environmental Health Team of the World Health Organisation (WHO) has advised that the optimum volume for bathroom ventilation is 2 cfm/sq ft (10.2 l/s per sq. metre). WHO is of the view that a larger volume does not add much on the comfort side and has the hidden risk of building up negative pressure. Designers are advised to provide an opening to bathrooms and lavatories for make-up air, such as an undercut to the door or an opening with a louvre at the door or wall, in order to minimise the build-up of negative pressure where an extractor fan is used for ventilation. The airflow path created should avoid circuiting of the ingress and exhaust air.