

A Series of Studies on Drainage Performance Evaluation and the Planning and Designing Methods of
Drainage Systems in Buildings

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The basic rules for planning and designing a drainage system for a building are: to secure good drainage capacity by ensuring that draining from sanitary fixtures changes the pressure in drainage/ventilation pipes so as to prevent breaking trap seals which stop odour and pests entering the drainage system; and to secure good carrying performance by ensuring that accumulated waste and toilet paper never blocks horizontal drainage pipes, i.e., smooth draining. This paper presents a series of studies consistent with these rules, wherein drainage performance tests and evaluation methods for examining various types of drainage systems in buildings are discussed; basic theories to support such tests and methods are suggested; performance verification is performed according to the theories on experimental models and real systems; and the findings from the verification are discussed from theoretical and practical viewpoints and summarised to contribute to practical planning and designing. Further, the findings are subsumed under four themes: 1. Understanding the drainage capacity of a high-rise drainage stack system and constructing a theoretical calculation system; 2. Evaluating the performance of a food waste disposer drainage system for apartment houses and commercial buildings and verifying the design thereof; 3. Proposing a drainage piping system that allows free plumbing planning, and the design verification thereof; and 4. Designing piping that ensures good carrying performance in horizontal drainpipes, and corresponds to water-saving toilets.