Velocity Breakers- what is the impact on the system.

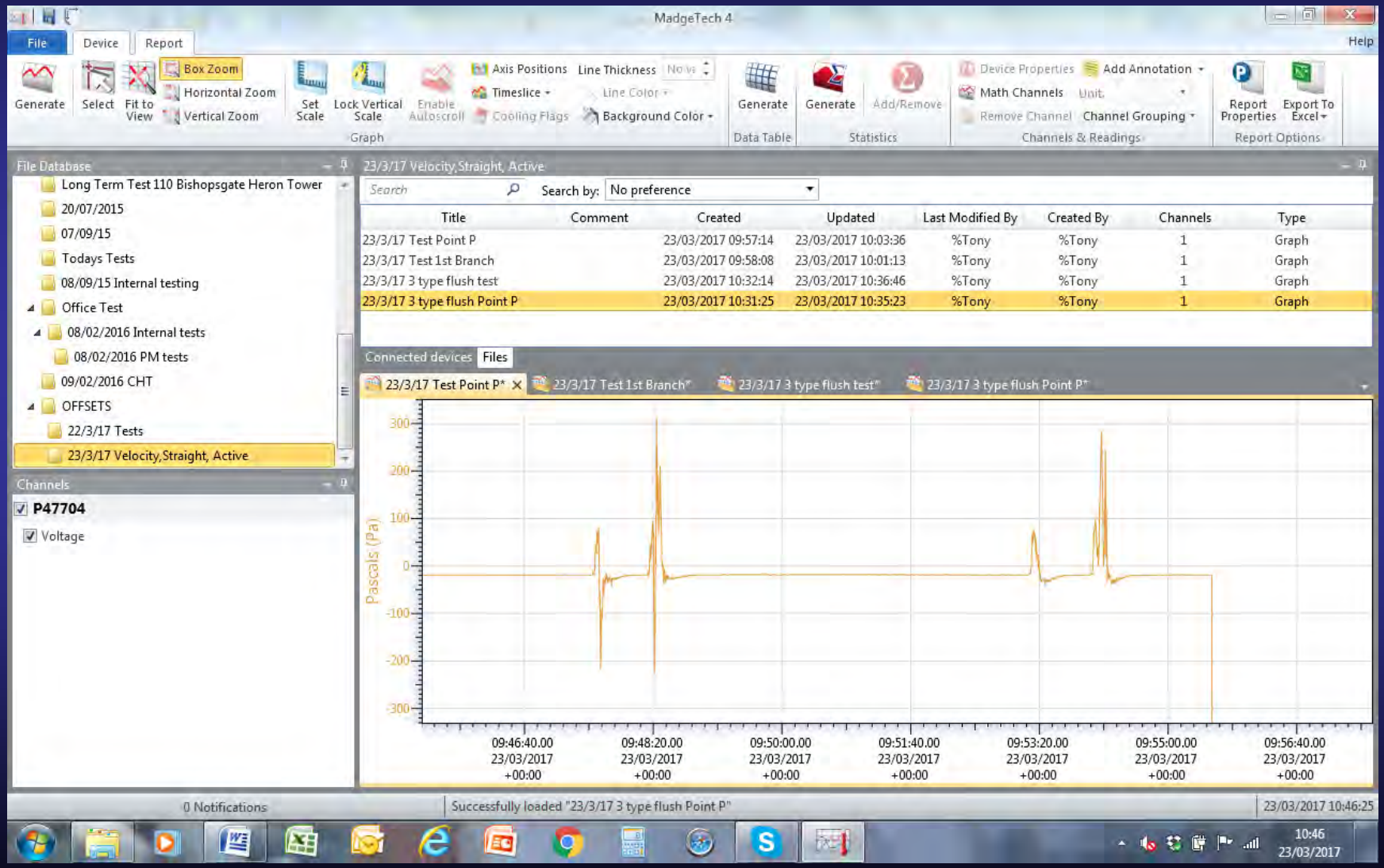
- Testing was carried out on the tower to see the impact velocity breakers have on the system
- There seems to be the belief that velocity breakers slow the flow of the water and  waste in the system
- It is a proven fact that terminal velocity of water is between 3m/s and 6 m/s for water and solids in the range of 15m/s in 100-150 pipe. Terminal velocity is reached with in 1.5m to 3 meters from the discharge. Basically one floor.
- But with extensive research,, no data can be found on velocity breakers, and no test results can be found.

# TEST

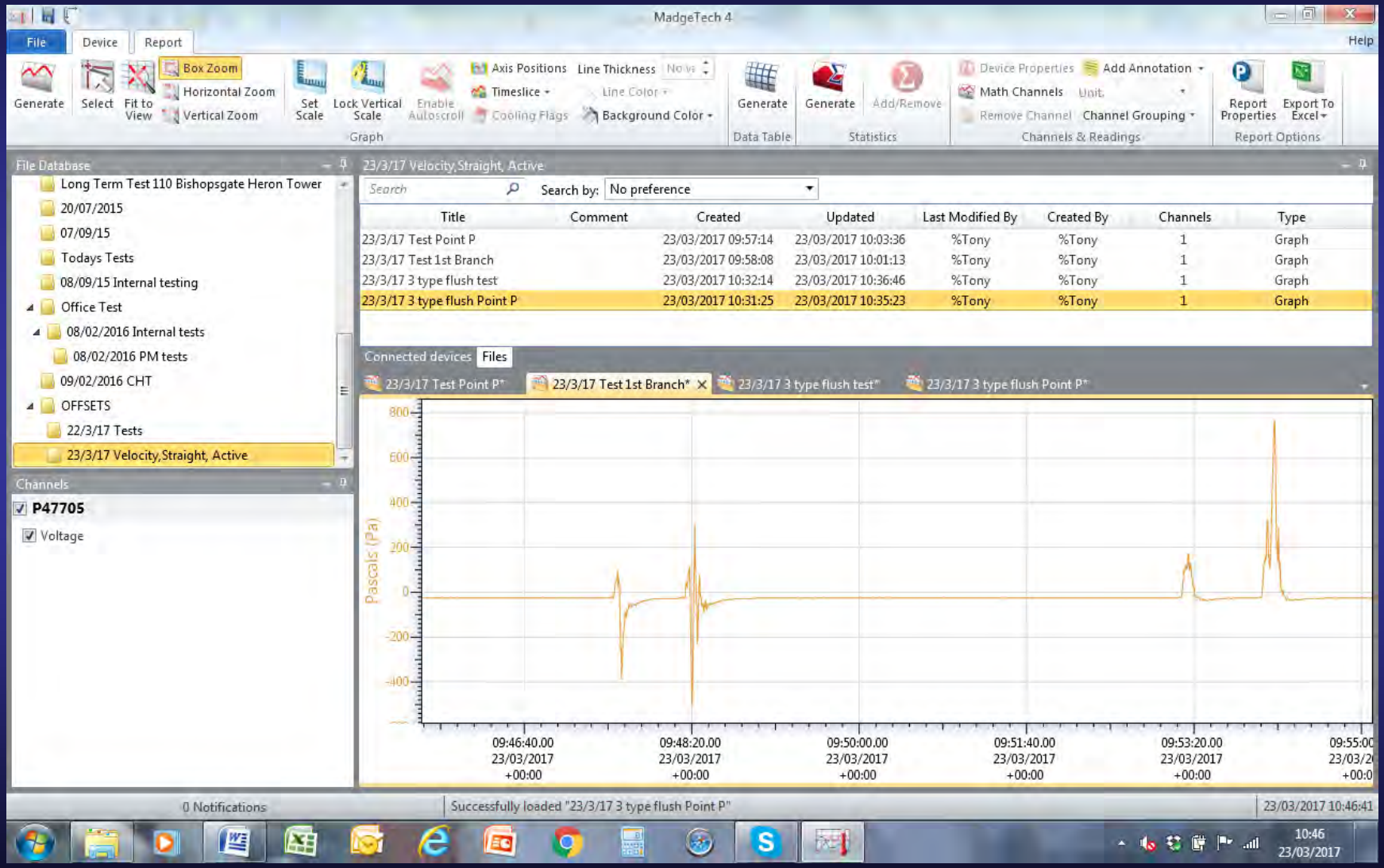
- Testing was done on the tower, with flushing one 6L W.C and then two . W.C  at the same time two and 3 floors above the fitting.
- Sensor were placed above and below the fitting.
- Test compared
  - Straight pipe no active venting
  - Velocity Breaker
  - Active venting

  - The aim was to measure the speed of the water and the pressure in the system above and below the fitting

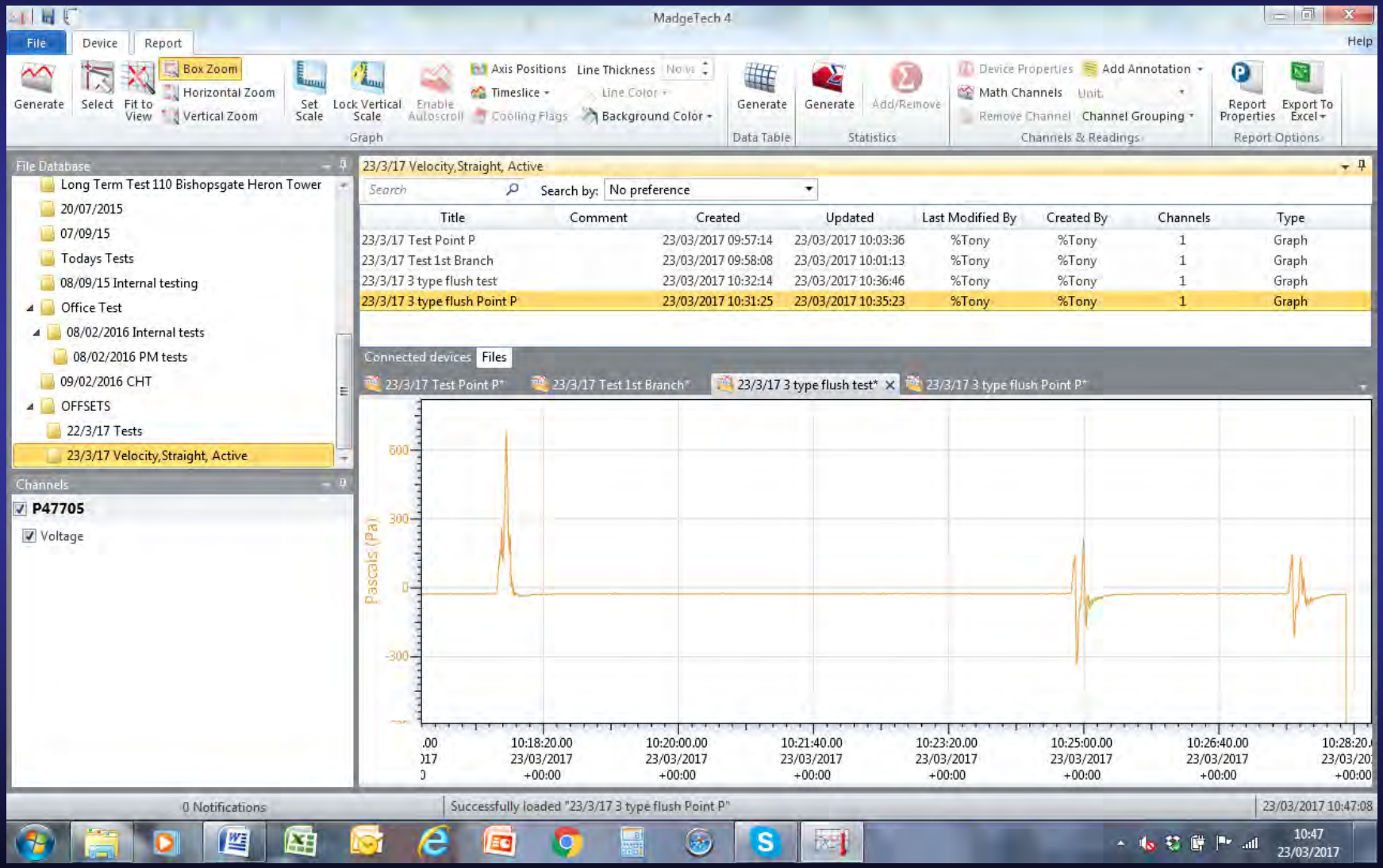
# Single discharge 6L straight pipe and velocity breaker



# Straight pipe and velocity breaker two discharges



# Velocity breaker and active venting two discharges



# Results - two discharges

- Terminal velocity of the water in the straight pipe was measured at 2.8m/s
- Negative pressure was measured at peak of -425Pa
- Positive pressure was measured at a peak of +300Pa
- W.C above the fitting had slight trap movement but no breach of the seal
- Noise was typical level of HDPE pipe
- Little vibration of the pipe was observed

# Results - two discharges

- Terminal velocity of water with velocity breaker was measured at 2.6l/s after the fitting
- Negative pressure peak was measured at -22Pa
- Positive pressure peak was measured at +650Pa
- W.C above the fitting bubbled a the seal was broken
- Noise was much higher verse straight pipe
- Vibration around the fitting was much higher verses straight pipe

# Results - two discharges

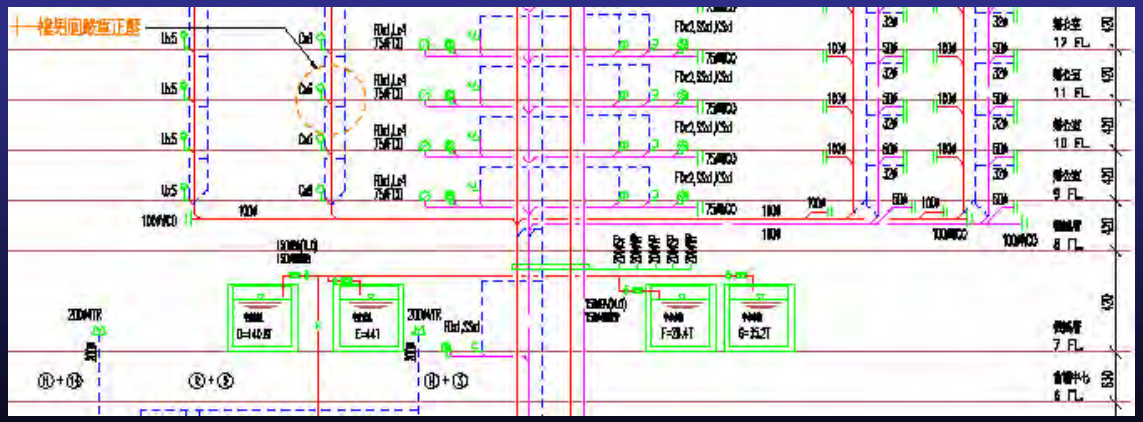
- Terminal velocity with active venting was 2.8m/s
- Negative pressure peak was -300Pa
- Positive pressure peak was  +120Pa
- W.C above the fitting had slight trap movement but no breach of the seal
- Noise was typical level of HDPE pipe
- Little vibration of the pipe was observed

# Findings

- Velocity breakers only slow the speed of the water by 0.2m/s
- They do cancel negative pressures below the fitting until the water drops one floor and reaches terminal velocity again
- They cause significant positive pressure above the fitting that will breach trap seals
- The cause noise and vibration above straight pipe
- Unless they are installed every 3 meters the waste will reach terminal velocity
- Testing is ongoing with solids, but initial testing showed no speed reduction, just more noise….
- Why!!!!!

# Do these designs fail?

- This 101-floor building experiences **positive transient pressures** from floors 6 to 12, evident through bubbling and self siphonage of toilets
- The design for this building covers 8 floors that tie into a centralised stack and vent system of 200 DN pipes
- Local intervention of **Active Ventilation** was used **to resolve the problem**



**Trump Tower – Panama City – Panama**

**Original drainage system design:** fully vented according ASPE/IPC code

**Cost Savings**

Installing the Studor System in this mixed used (Hotel + luxurious residential flats) 239m high building, more than 40,000m of equivalent ventilation pipe were saved. In details 36,000m of 2” and 3,400m of 4” ventilation pipes where replaced by 2,200 Studor Mini-Vent, 56 Studor Maxi-Vent and 180 Studor P.A.P.A.’s.

The overall saving of kilometers of pipe has reduced drastically the carbon footprint of the drainage system, making the Studor System the “greenest solution”.

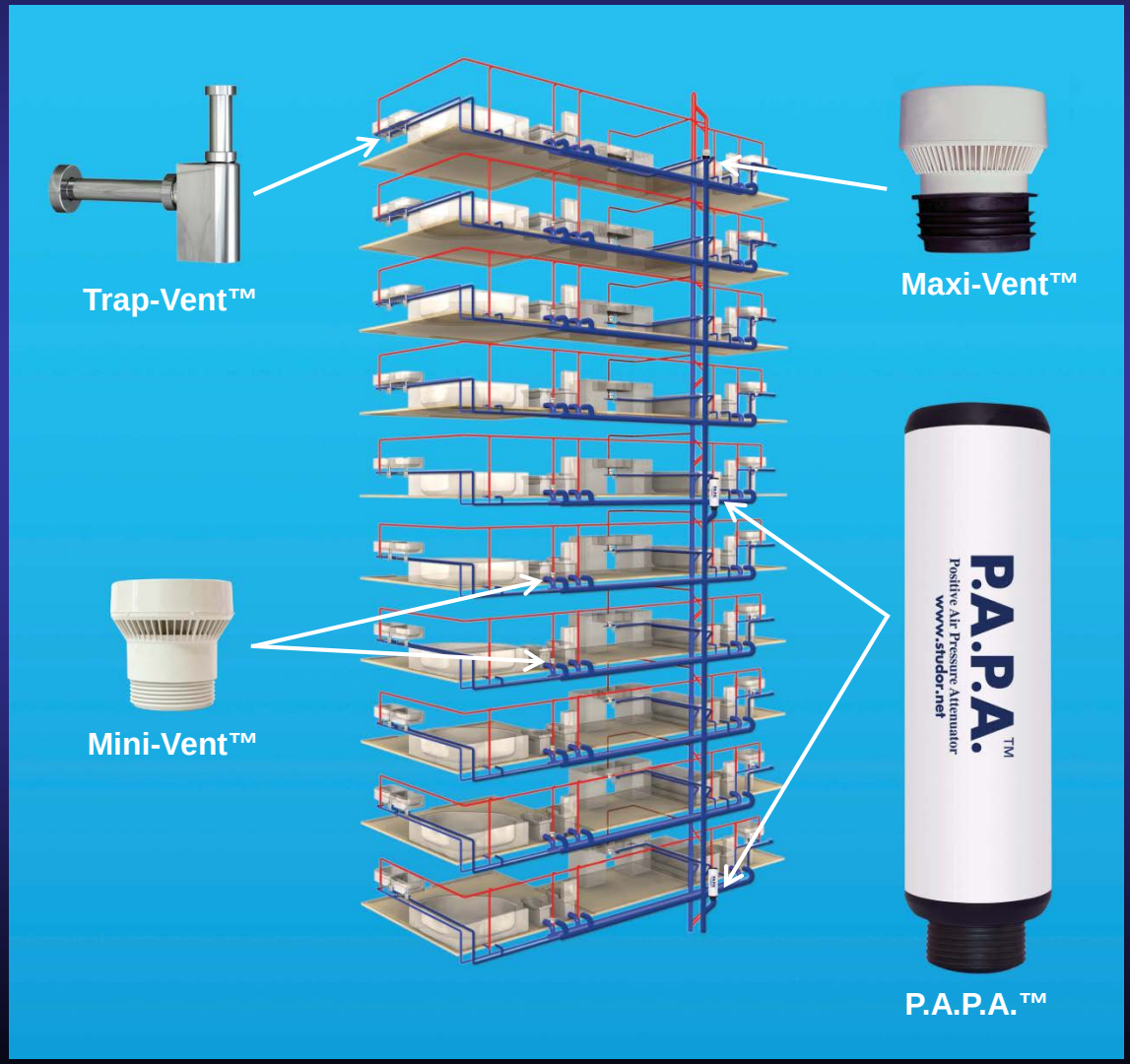
# Case studies


See:
www.studor.net

# The Studor System

## Studor AAVs + Studor® P.A.P.A™

- Complete active control for the drainage system
- Improved performance versus traditional systems proven by university studies
- Space saving
- Quick and easy installation
- Saves labour and material costs



# Active Venting – is it a solution?

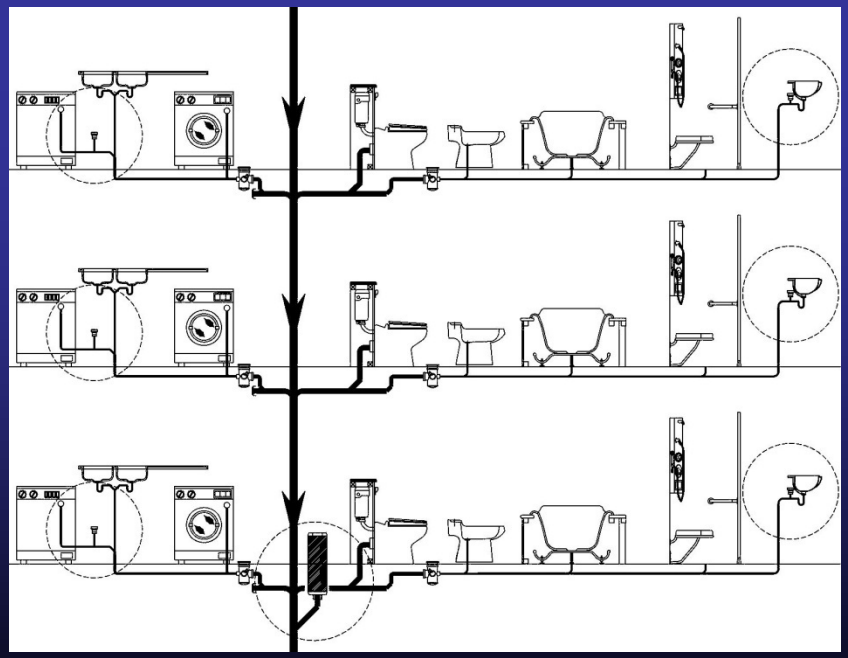
With substantial research and the problems solved by Active Venting, it is a logical step to design a high-rise system from the start:

- Reduced system complexity
- Reduced time of installation and labour
- Reduced material used in the system, bringing sustainability to the design
- Increased predictability of the system operation
- Ability to place suppression between transient source and appliances trap seals to be protected
- Interception of transients prior to propagation throughout the network and impact on all connected appliance trap seals

# Active Venting – is it a solution?

With Active Venting the drainage system becomes:

- Single stack system
- Suitable for buildings of over 100 floors
- System pressures kept in the region +-100Pa, well below +-400Pa that affect trap seals in the system



Single stack active vented system

# Conclusion

- **Increasingly** high-rise buildings are being designed across the world
- There are many examples of their **drainage systems failing**
- Current **codes do not** address the **requirements** for high-rise buildings
- Only through dedicated **research and validation** in the market place can a truly safe systems be designed
- Through a **partnership of research and manufacture**, new systems can be developed for the requirements of high-rise design
- **Active Venting** is one such system that has been developed and is proven through research and practise

- **Thank you!**