

Wavin QuickStream

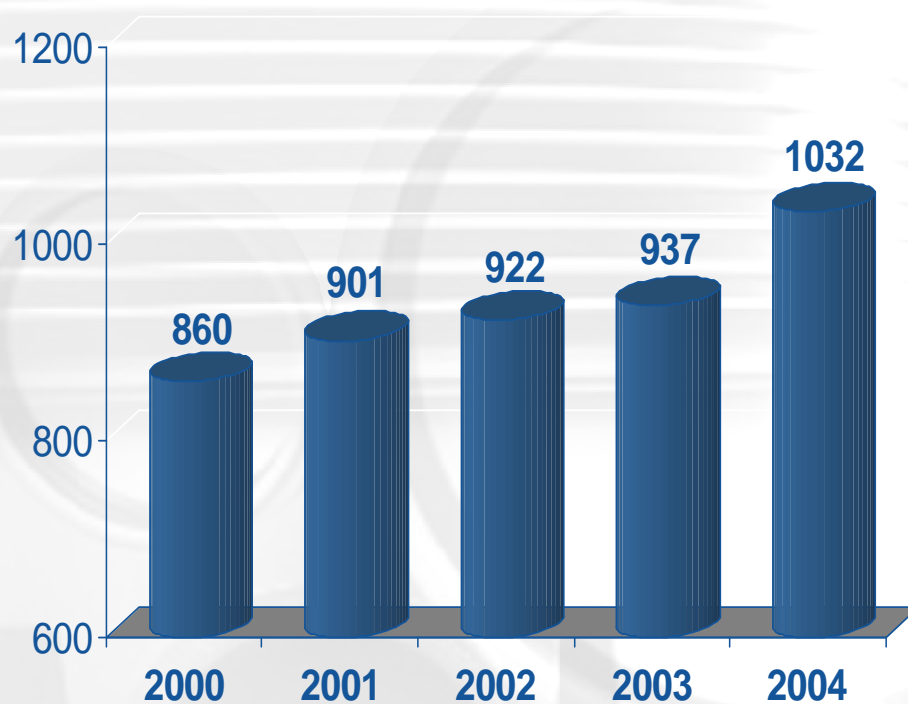
The engineered
rainwater solution
for large roof areas



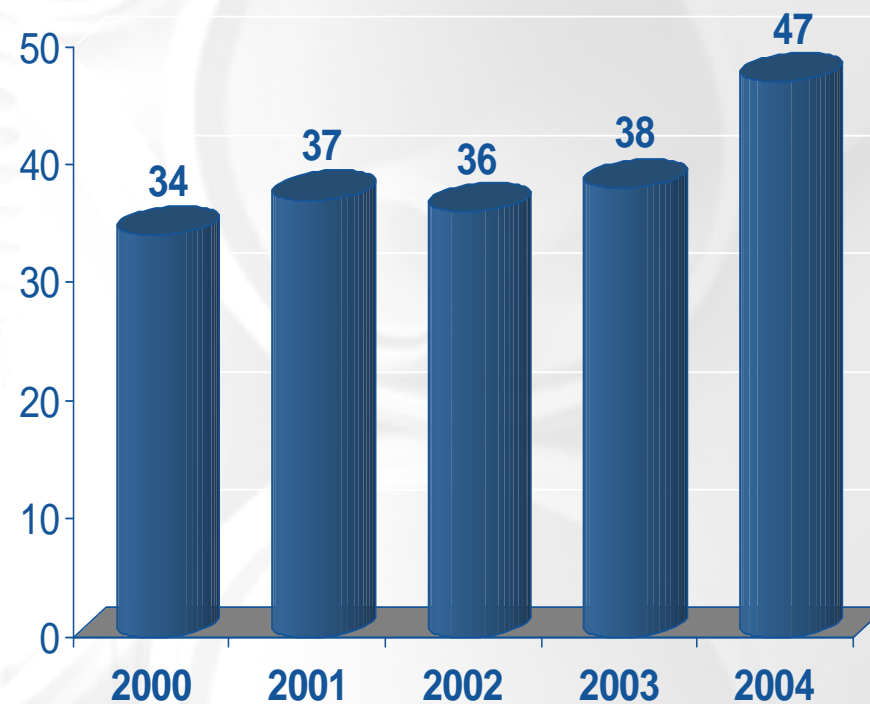
- Company profile
- Conventional rainwater systems versus syphonic roof drainage systems
- Advantages of Wavin QuickStream
- Requirements for a Wavin QuickStream system
- Recently supplied projects
- Wavin's offer

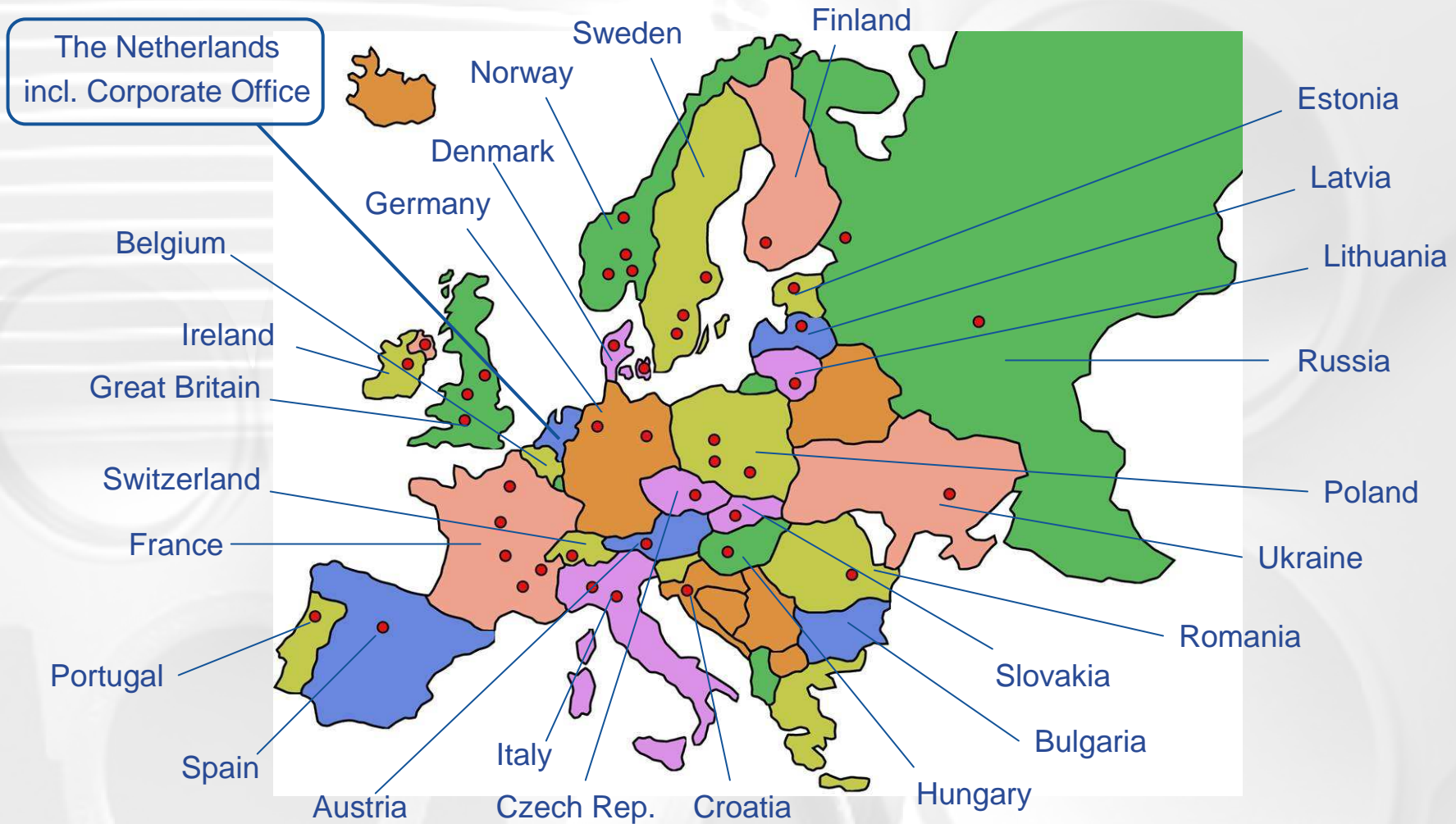
- European market leader in plastic pipe systems
- Dutch multinational based in Zwolle
- Sales of EUR 1,032 million in 2004
- Approx. 5.000 employees in 27 European countries
- Network of over 90 agents, licensees and distributors

Turnover (€ mln)

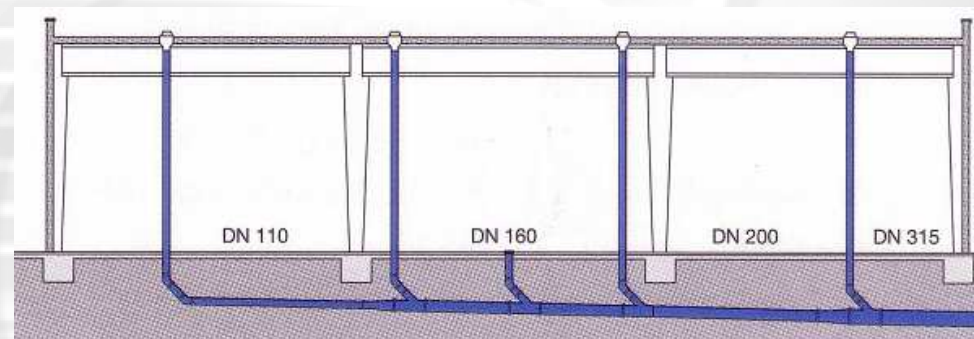


Net Profit (€ mln)

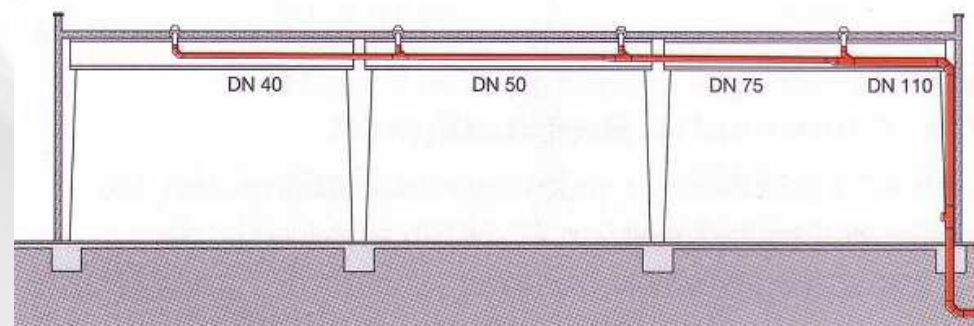




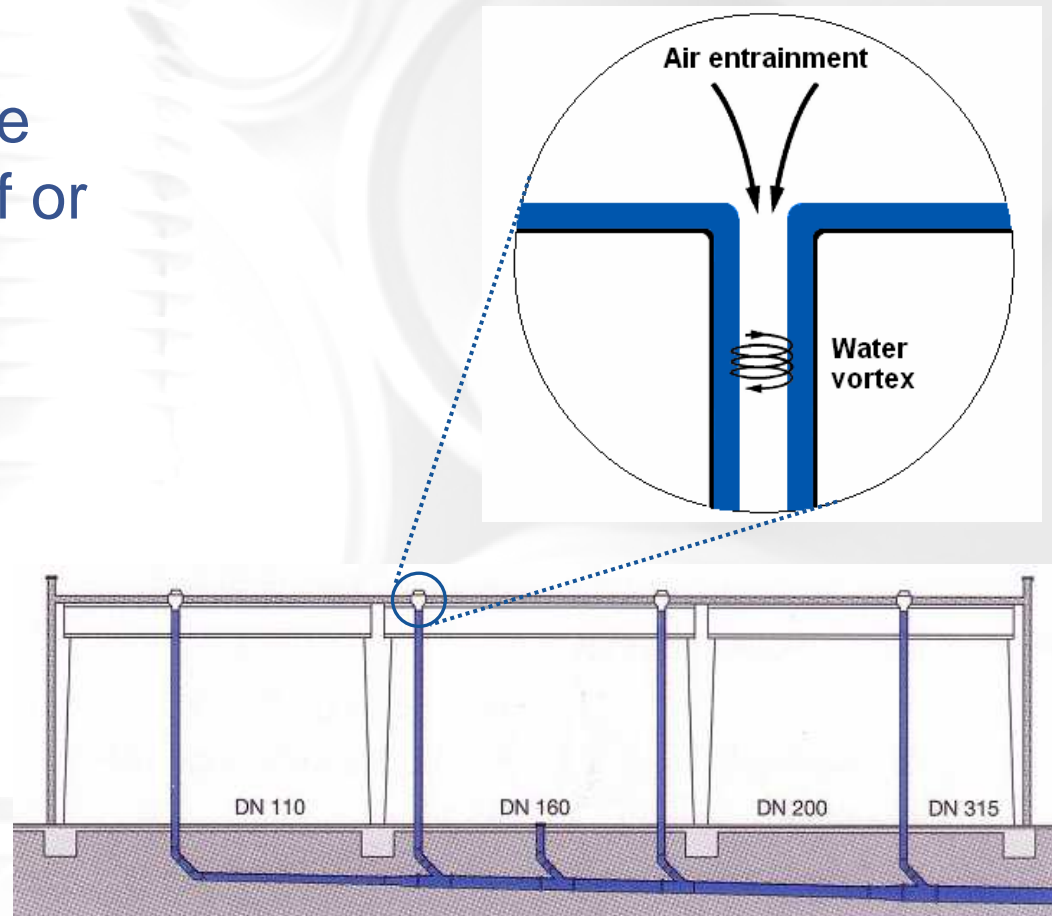
Conventional rainwater systems



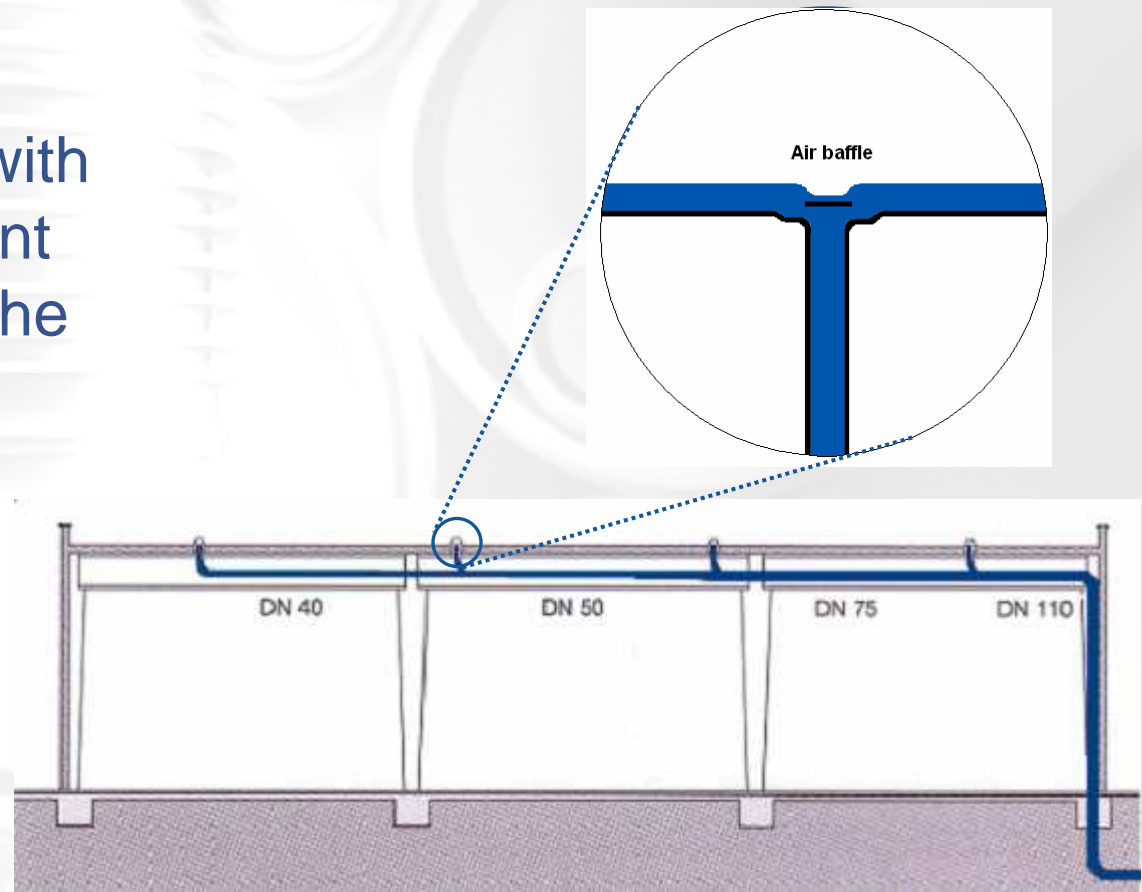
versus Syphonic Systems



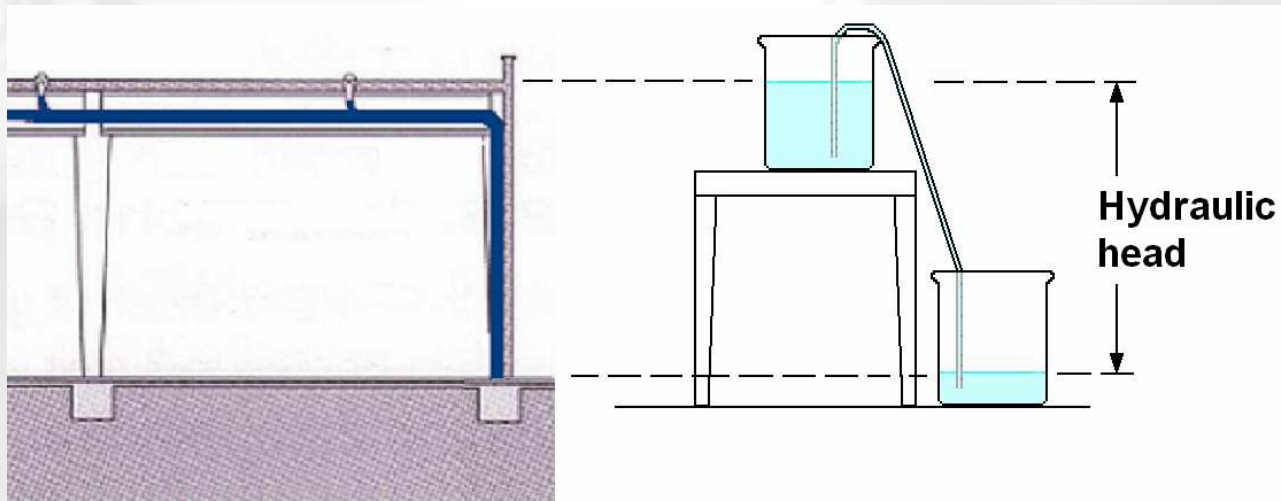
- Outlets are holes at the lowest point of the roof or in a gutter
- Mix of water and air (50/50) in the pipe system
- System operates at atmospheric pressure



- Special roof outlets with an air baffle to prevent air entrainment into the pipe system
- Full-bore flow



- Full-bore flow enables to use the full height of the building as a hydraulic head where negative pressure in the vertical-pipe water column accompany syphonic action
- The hydraulic head leads to an increase of the velocities of the water in the pipe system up to 6 m/s (= max. $1,5 \text{ m/s}$ for a gravity system) which consequently results in a further reduction of the dimensions of the whole pipe system

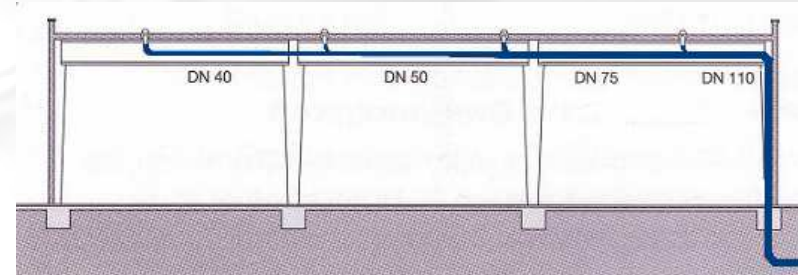


Advantages of Syphonic Roof Drainage Systems



■ Smaller pipe dimensions and a reduction on the total pipe length

- ✓ advantage: lower material costs and lower installation costs results in a considerable reduction of the total installed cost of the rainwater system



■ All pipes are installed in the building

- ✓ advantage: no exposure to sunlight / UV radiation, less problems with freezing and no damages due to vandalism

■ Lateral pipe work is installed without a gradient

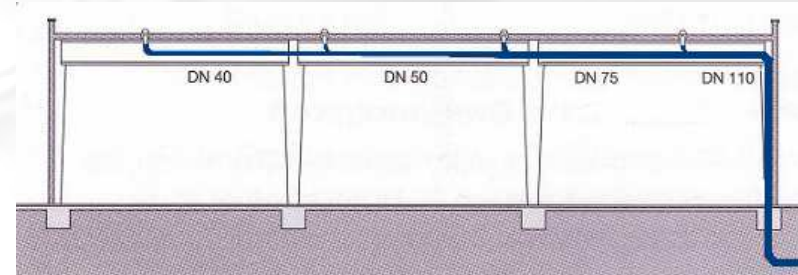
- ✓ advantage: maximum use of the height in the building

■ No or limited pipe trenches next to the building are required

- ✓ advantage: considerable savings in ground work and during the construction works the building can be entered from almost each side due to the absence of pipe trenches

■ Less roof outlets

- ✓ less roof penetrations, less chance of potential leakage, lower installation costs



■ Flexible location of roof inlets

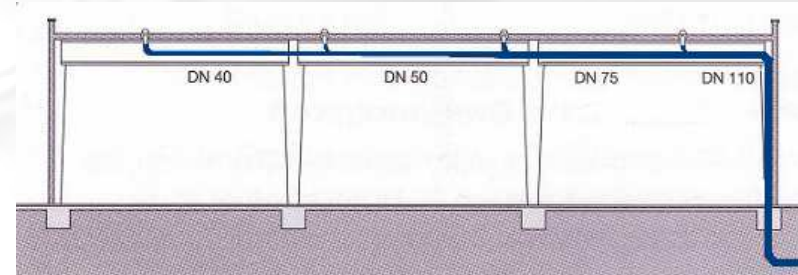
- ✓ advantage: more flexibility for architect / building owner

■ Less down pipes smaller dimensions of the down pipes

- ✓ advantage: less obstructions, easier to incorporate in the building design

■ High flow velocities

- ✓ self cleansing of the system since the velocity of the rainwater will be higher than 1 to 1,5 m/s. No silt build up in the pipes results in cost savings due to less maintenance



What is required to design a Wavin QuickStream system?



- Wavin has a comprehensive range of self priming metal and plastic roof outlets of various capacities for bitumen roofs, PVC and other roof foils and gutter systems
- For each situation we are able to offer the most suitable solution

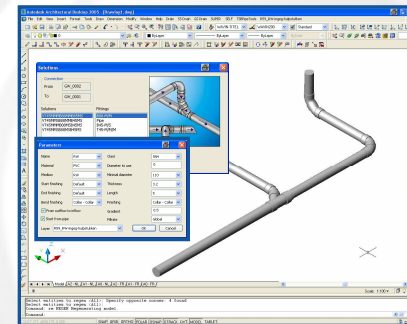


metal outlet

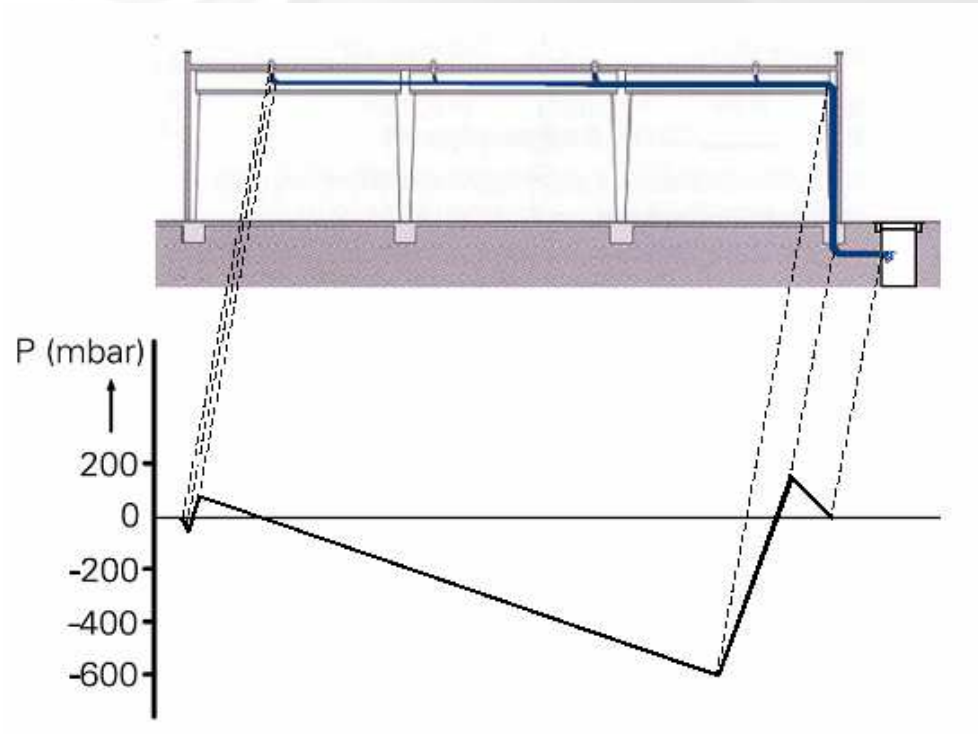


plastic outlet

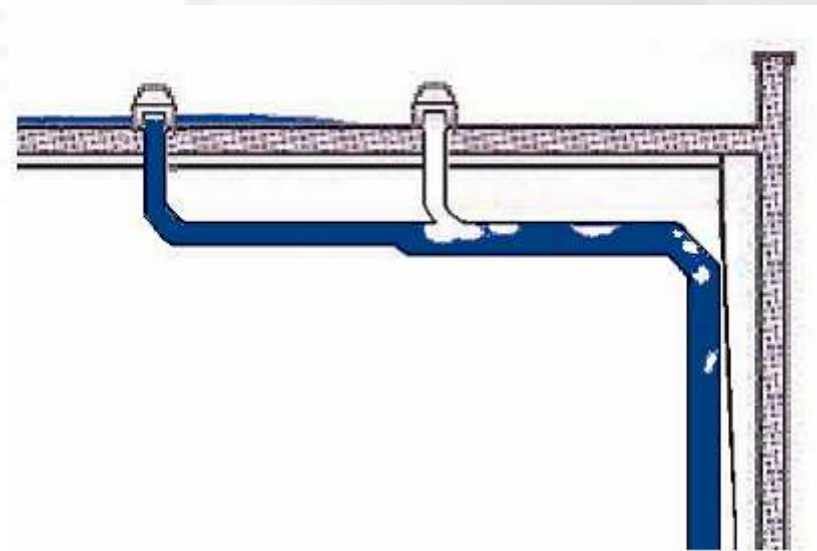
- For each project a project specific engineered solution needs to be worked out by use of computer modeling
- All outlets need to work simultaneously and need to be engineered to handle the same flow capability



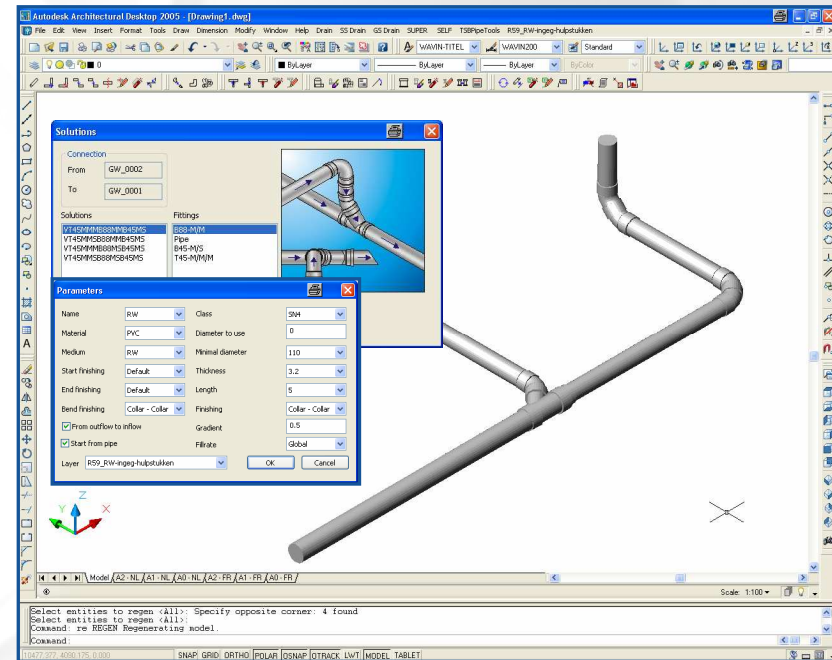
- Due to the syphonic action, under- and over pressures take place in the pipe system
- Pipes and fittings need to have sufficient stiffness and the system needs to be installed tensile resistant:
PE pipe system needs to be PN4



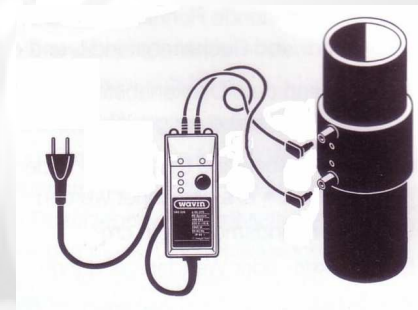
- Unbalanced systems will result in air being drawn into the system and a breakage of the syphonic action
- Wavin has more than 20 years experience in the engineering of syphonic systems



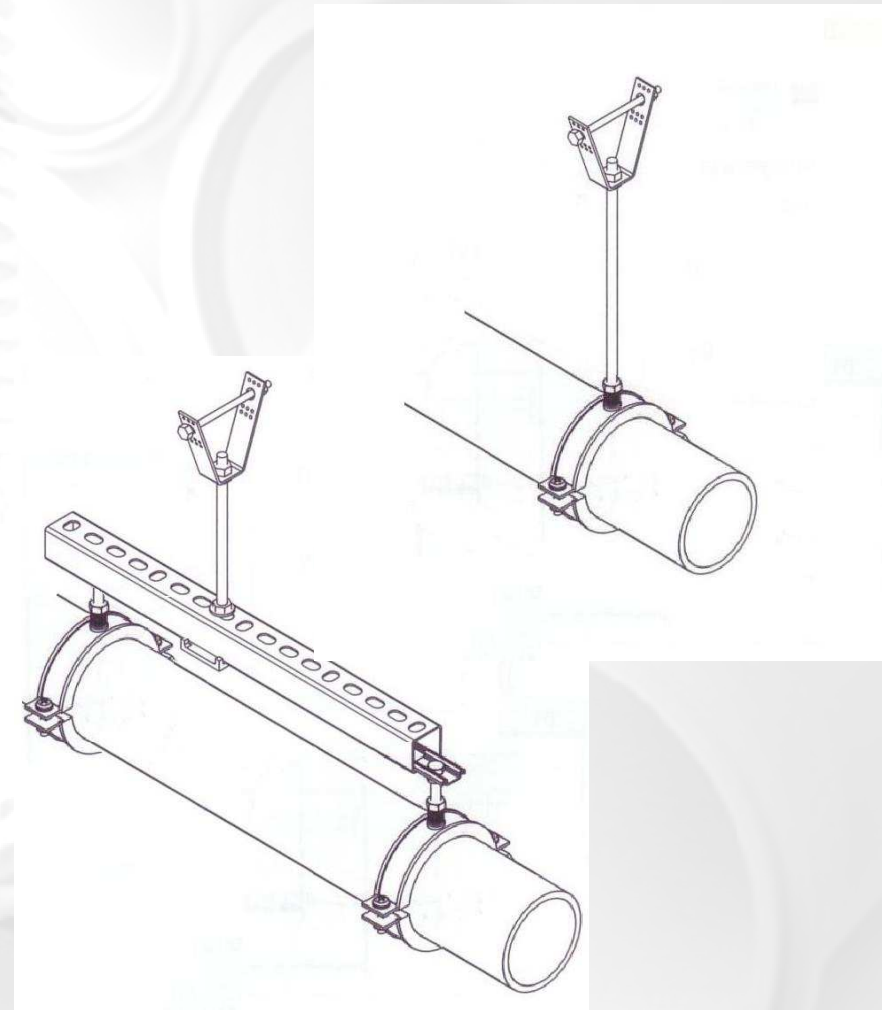
- Deviation from the drawing and calculation can only be made after consultation of Wavin and a possible redesign of the system.



- PE pipes and fittings SDR26 (PN4) are capable to withstand short term under pressures of -1,0 bar
- PE pipes and fittings can be made tensile resistant by use of butt welds or electrofusion couplers
- Wavin has a comprehensive range of PE pipes and fittings up to 315 mm



- Flexible bracketing system:
 - maximum 20 meters pipe length without a bend
 - must have an expansion possibility at the end
 - not a straight line
- Fixed bracketing system:
 - use of steel rails system
 - quick assembly
 - pipes system straight as an arrow



For the calculation, Wavin requires:

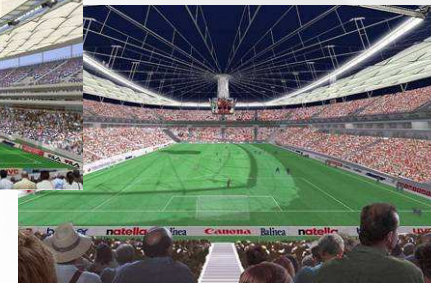
- Drawings of the building
- Information on the type of roof foil
- Height of the building to ground level
- Location of other pipelines like sprinklers
- Preferred location of the down pipe

Recently supplied projects



FRANKFURTER WALDSTADION

- Syphonic Roof Drainage system installed in the steel gutter
- Sliding roof of canvas
- Roof area:
open roof 25.000 m²
closed roof 34.000 m²
- Infiltration system
- World cup football will be held in 2006 in Germany



FRANKFURTER WALDSTADION

- All rainwater is either re-used or infiltrated
- Net storage volume:
1.715 m³
- 9.000 Infiltration crates



MAXIMUS CENTRE

- Roof area: 95.000 m²
- 310 roof outlets with electric heaters (snow)
- Wavin QuickStream system comprised:
5.700 meter PE-pipes,
10.000 fittings &
3.400 brackets



OLYMPIC COMMITTEE

- New office for PKOL
Polish Olympic
Committee
- Roof area: 15.000 m²



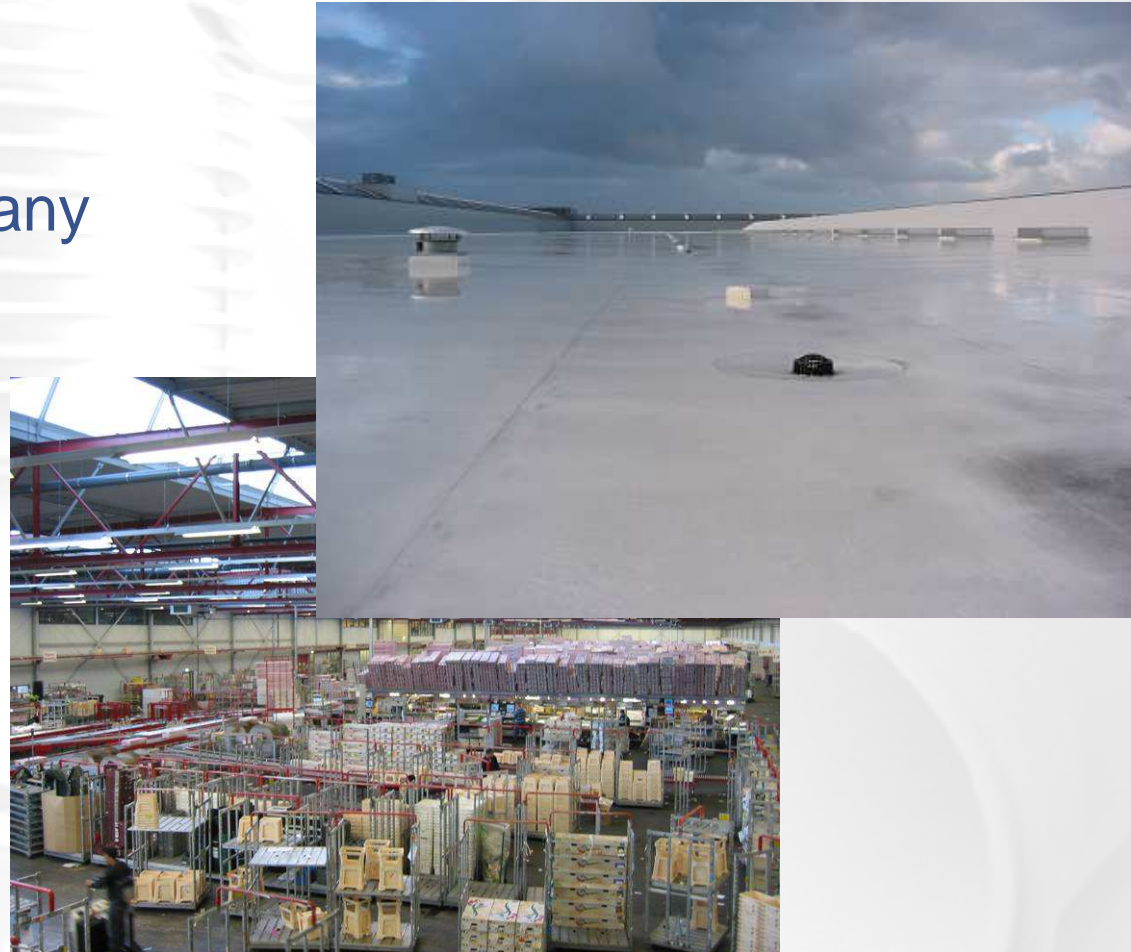
SCHIPHOL AIRPORT

- New business lounge
- Pipes of a conventional system could not be installed through the holes in the steel beams due to size



FLOWER EXPORT AALSMEER

- Hilverda de Boer flower export company based next to the flower auction in Aalsmeer
- Roof area: 20.000 m²



PORSCHE MOTORENWERK

- Production location
Porsche 911 and
Cayenne engines
- Roof area: 9.000 m²



BMW DYNAMIC CENTRE

- Roof area: 135.000 m²
- Drainage capacity system: 8.000 liters per second
- The system:
 - 764 roof outlets
 - 18 km of PE-pipes
 - 25.000 PE fittings



TESCO

- Roof area: 5.000 m²
- More than 10 new Tesco warehouses & distribution centers use Wavin's QuickStream syphonic system



ANTWERP COURT HOUSE

- Design by architect Sir Richard Rogers (UK)
- Highly complex roof shape and very stringent requirements with respect to:
 - Drainage function
 - Aesthetics
 - Fire protection
 - Sound protection



ANTWERP COURT HOUSE

- Pipe location and routing determined in cooperation with the architect
- Use of stainless steel in visible areas to create the desired architectural expression.
For non-visible areas PE is used



VOLVO AUTOMOTIVE

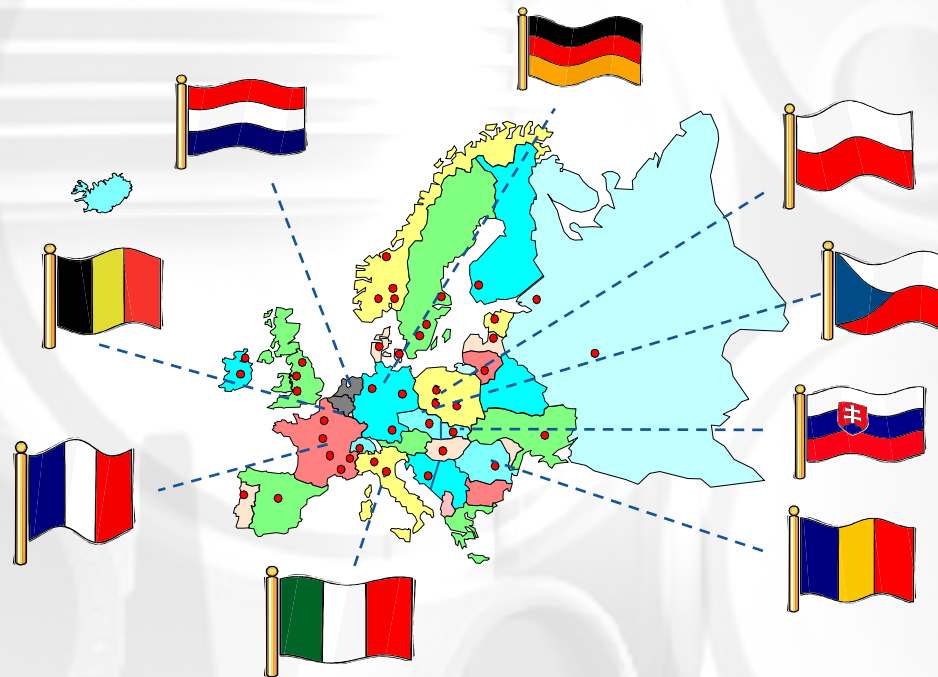
- Total roof area:
37.000 m²
- Engineering and supply
of the Syphonic Roof
Drainage system and
the Infiltration system



Wavin's offer



European organisation but local knowledge & local support



- Metal or plastic roof outlets
- A comprehensive range of PE pipes and fittings and electro welding couplers
- Fixed and flexible bracketing systems
- Total solutions from roof until infiltration
- More than 20 years of experience in syphonic roof drainage systems



**We will be happy to
support you with
tailor made
engineering services**

**Thank you
for your attention**