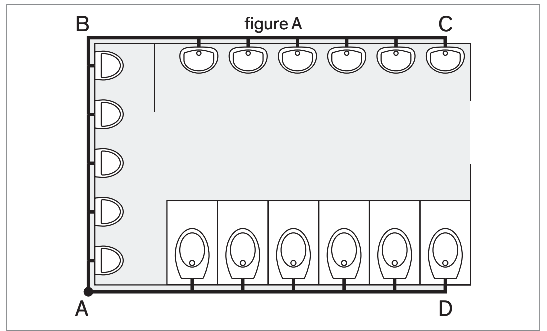
CALCULATION GUIDE FOR TIME FLOW CONTROLS SUPPLY PIPES

TABLE 2 / MINIMUM CALCULATION TO SUPPLY TIME FLOW VALVES

	BASIN	SHOWER	URINAL	SIPHON ACTION URINAL	SIPHON ACTION URINAL (with small waste)	WC
Min. flow rate Q min. (L/sec.)	0.10 L/sec. or 0.05 L/sec.	0.20 or 0.10 L/sec.*1	0.15 L/sec.	0.50 L/sec.	0.30 L/sec.	1 L/sec.*2
Min. dynamic pressure (bar)	0.5	1	0.5	0.6	0.6	1.5
Simultaneous Coeff. for normal use Y	$Y=\frac{0,8}{\sqrt{(x-1)}}$	$Y=\frac{0,8}{\sqrt{(x-1)}}$	$Y=\frac{0,8}{\sqrt{(x-1)}}$	$Y=\frac{0,8}{\sqrt{(x-1)}}$	$Y=\frac{0,8}{\sqrt{(x-1)}}$	see Table 1 Design Flow Rate page 245
Simultaneous Coeff. for high use Y	$Y=\frac{2}{\sqrt{(x-1)}}$	$Y=\frac{2}{\sqrt{(x-1)}}$	$Y=\frac{2}{\sqrt{(x-1)}}$	$Y=\frac{2}{\sqrt{(x-1)}}$	$Y=\frac{2}{\sqrt{(x-1)}}$	-
Design Velocity	Out of housing area: 1.5 < V< 2 m/sec., Housing area: 1 m/sec.					

*1 For TEMPOMIX shower mixers, TEMPOSTOP and SPORTING shower kits, TONIC JET and GYM shower heads, the minimum Q is 0.10 L/sec.
*2 For flush valves ¾" the Base Flow Rate is 1 L/sec.

1. Note installation data per branch



Example Figure A
- Total available pressure 4 bar.
- Design velocity 1.5m/sec.
- Pipe lengths AD = 8m, ABC = 12m.
- Supply head AD = 1m, ABC = 1m.
- Type and number of outlets per branch:
  AD: 6 WC, ABC: 5 urinals and 6 basins.
- Base flow rate (Q min.) L/sec.
  6 WC = 1.5 L/sec.,
  5 urinals = 0.15 L/sec.,
  6 basins = 0.10 L/sec.

2. Calculate flow rate per installation branch
Add together the base flow rate for each outlet.
See minimum Q calculation Table 2.

Example ABC branch
5 urinals x 0.15 L/sec. = 0.75 L/sec. + 6 basins x 0.10 L/sec. = 0.60 L/sec.
Total flow rate = 1.35 L/sec.
Supply TEMPOSTOP flush valves and shower valves separately.
E.g. AD branch 6 WCs, see section 3.

3. Calculate the design flow rate
Gross flow rate x simultaneous coefficient (Y), for sanitary fittings in public buildings with high simultaneous demand at peak periods, use the formula:

$$Y=\frac{2}{\sqrt{(x-1)}}$$

where X represents the number of appliances (valid for X > 5)

Example branch ABC
Gross flow rate for 5 urinals + 6 basins = 1.35 L/sec.

Design flow rate = 1.35 L/sec. x $\frac{2}{\sqrt{(11-1)}}$ = 0.85 L/sec.

Special cases: showers with high simultaneous demand at peak periods (sports centres, barracks, boarding schools, swimming pools, campsites, etc.).
Use the simultaneous coefficient 0.6 or 0.7.

Example
Design flow rate for 12 SPORTING showers ref. 714000:
Gross flow rate 1.2 L/sec. x 0.7 = 0.84 L/sec.
Design flow rate for 24 SPORTING showers ref. 714000, gross flow 2.4 L/sec. x 0.6 = 1.44 L/sec.

Flush valve See recommendations *Table 1*, WC Column *page 245*.
The design flow for flush valves must be added to the sum of the flow rates for the other appliances after the application of coefficient Y.
Example Figure A
Branch AD: 6 WCs, design flow = 3 L/sec.
Branch ABC: 5 urinals + 6 basins, design flow = 0.85 L/sec.
Design flow of the inlet pipe in A = 3.85 L/sec.

For sanitary fittings with normal or low demand
Use the simultaneous coefficient $Y=\frac{0.8}{\sqrt{(x-1)}}$

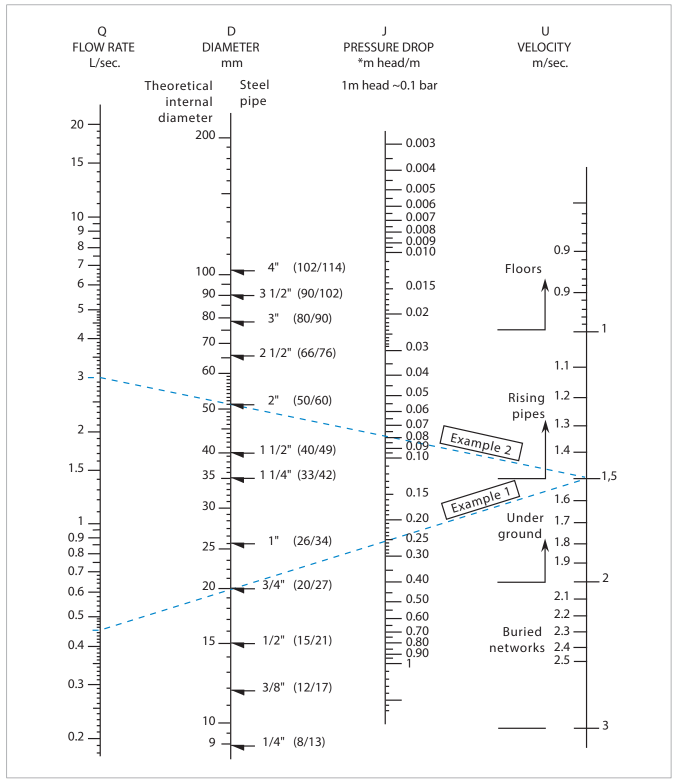
4. Pipe diameter selection: using the Darius Abacus chart

Reading the DARIUS ABACUS
Mark the DESIGN FLOW and the DESIGN VELOCITY on the chart and join these points with a ruler. The pipe DIAMETER and PRESSURE DROPS can now be read on corresponding scales. Take the higher reading.

Example 1
Installing 30 time flow basin taps.
Design Flow 0.45 L/sec.
Design Velocity 1.5 m/sec.
The abacus indicates Ø 20mm, either copper pipe 20/22 or steel pipe 20/27 (¾").
Pressure Drop per metre of pipe = 0.25m head.

If the pressure drop is too great to supply the most distant tap (P < 0.4 bar), a larger diameter pipe will be required, selecting a 1" steel pipe 26/34 (1") then Design Velocity: 1 m/sec., pressure loss 0.09m head.

NB: for hot water systems do not use galvanised steel pipes, only copper or synthetic material pipes.



5. Calculate system pressure drops in m head

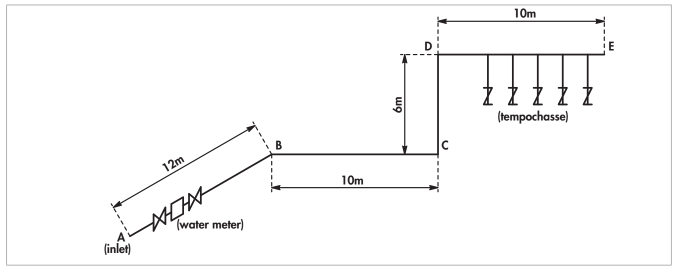
- **5.1 Pressure drop (friction in the pipes)**
  Multiply the pressure drop (J) as per the Darius Abacus by the pipe length.
  E.g. 5 flush valves, Q = 3 L/sec., U = 1.5 m/sec., pipe length = 10m.
  Read from the Darius Abacus pipe diameter (D) = Ø 50mm, J= 0.08m head.
  Total pressure drop: 0.08m head x 10m = 0.8m head.

- **5.2 Add the difference in height of the water column**
  E.g. 6m = 6m head.

- **5.3 Add the specific pressure drop for the outlet**
  See the manufacturer's catalogue, for example, here are the current pressure losses:
  - water meter at peak usage = 6m head
  - pressure reducer = 5m head
  - hot water storage = 3m head
  - group thermostatic mixing valve = 6m head

6. Check residual dynamic pressure is sufficient including pressure losses

Example 2
5 flush valves installed on the first floor.
Pipe length A B C D E = 38m.
Height difference CD = 6m.
Design flow = 3 L/sec.
Design velocity = 1.5 m/sec.
Pipe diameter based on Darius Abacus = 50mm.
Pressure drop in the pipe: 0.08m head x 38m = 3.04m head.
Add difference in height = 6m head.
Total pressure drop = 9.04m head, approximately 0.9 bar.
Total pressure 3 bar.
Residual dynamic pressure (E) = 3 - 0.9 = 2.1 bar.
For effective operation, the minimum dynamic pressure required is 1 bar, therefore the selected pipe diameter is correct.



7. Insufficient pressure
See minimum dynamic pressure Table 1.
If the pressure is insufficient, increase the size of the pipe and components to reduce pressure losses or anticipate a booster set (contact manufacturers for further information).