



Plastics Industry Pipe Association  
of Australia Limited

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# *Industry Guidelines*

## **WATER JET CLEANING OF PLASTICS PIPES**

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*Pipelines Integrity For a Cleaner Environment*



## **Disclaimer**

*In formulating this guideline PIPA has relied upon the advice of its members and, where appropriate, independent testing.*

*Notwithstanding, users of the guidelines are advised to seek their own independent advice and, where appropriate, to conduct their own testing and assessment of matters contained in the guidelines, and to not rely solely on the guidelines in relation to any matter that may risk loss or damage.*

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## WATER JET CLEANING OF PLASTICS PIPES

The practice of high-pressure water jet cleaning internal pipeline surfaces is very common, but, if not properly managed, water emitted under high-pressure through a jet nozzle has the potential to damage any pipe surface, including those manufactured from plastics, metallic, ceramic and concrete materials. Where the use of excessive pressure and inappropriate techniques has caused damage to pipelines, this reflects unfairly on the materials from which the pipes are manufactured.

In the United Kingdom, a comprehensive Code of Practice produced by WRC<sup>(1)</sup> deals in detail with all aspects of high pressure sewer jetting. PIPA encourages asset owners and water jet operators involved in regular water jetting processes to avail themselves of this publication which may be ordered in hard copy from WRC Swindon, Wiltshire, UK, obtainable from the web site [www.webookshop.com](http://www.webookshop.com) as the WRC website doesn't list the publication.

These guidelines have been prepared for the jetting of plastics pipe systems, to provide information based on experience and research, as to the maximum pressures that may be used to avoid damage to plastics pipes in good condition. They do not provide detailed instructions on water jet cleaning procedures, and are not intended to replace the pipe manufacturers' specific recommendations, which should be sought in the first instance.

### Nozzle Type

Research conducted by Loughborough University in the UK and published by *The European Plastic Pipes and Fittings Association*<sup>(2)</sup> concludes that large diameter jet holes (2.4 – 2.8mm diameter) operating at a lower nozzle pressure (12,000 kPa), are more effective at clearing debris and far less likely to cause pipe damage than higher pressure cleaning with small diameter jets (typically ~1.0mm).

- The external surface of the nozzle should be smooth.
- Nozzles with jet holes around the circumference are preferred.
- Nozzles with flailing chains, wires or aggressively rotating nozzles should not be used.

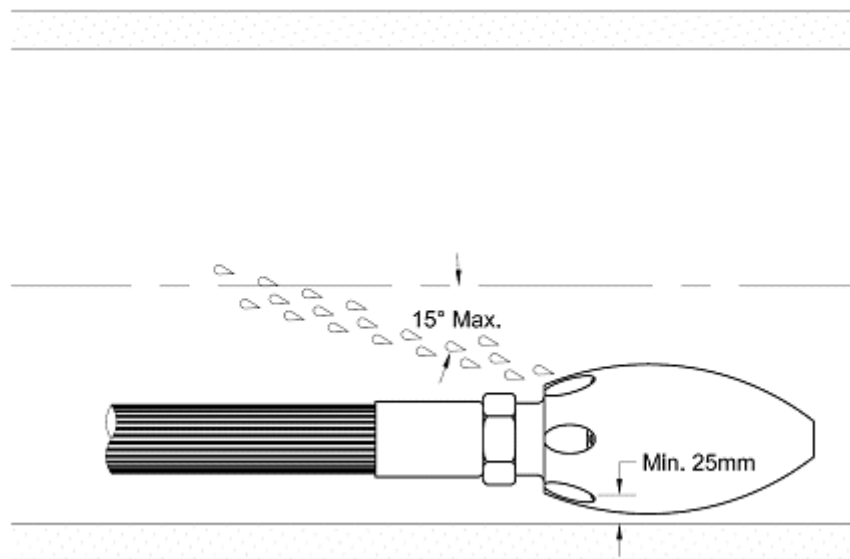
### Jet Angle

Nozzles with forward facing jets should be fitted with drain bars to reduce the likelihood of the nozzle turning inside the pipeline. The water jet discharge angle should be between 6° and 15° relative to the axis of the pipe. (See Figure A.)

### Standoff Distance

Whenever possible, a minimum standoff distance between the water jet orifice and the inner pipe wall of 25mm should be maintained. (See Figure A.) If necessary,

jetting/swabbing sleds with several runners may be used to ensure the standoff distance is maintained. It is acknowledged however, that the small internal diameter of many pipelines will prevent the use of sleds.



**Figure A: Jet angle detail**

### **Maximum Hold Time and Nozzle Speed**

The maximum time a nozzle is permitted to remain stationary in a pipeline should not exceed 60 seconds. The forward/backward movement speed of the nozzle should be limited to between 6 and 12 metres / minute.

## Maximum Pressure at the Nozzle

**Table 1: Maximum recommended jetting pressures**

Pipe Material	Maximum Recommended Pressure for Pipes in Good Condition
PVC-U, PVC-M	12,000 kPa
ABS	12,000 kPa
PE	12,000 kPa
PP	12,000 kPa
GRP*	8,000 kPa

\*Refer to GRP pipe manufacturer for specific recommendations regarding water jet nozzle configuration.

To maintain the appropriate nozzle pressure, allowance should be made for friction losses in the flexible water supply hose. Adjustment of pump gauge pressure based on hose size, length and flow rate is required.

Tables 2, 3, 4 and 5 provide an indication of the anticipated pressure drop in kPa for flexible pressure hoses in lengths up to 150 metres at nominated flow rates. Table data source is TEPPFA (The European Plastic Pipes and Fittings Association).

**Table 2: Pressure loss in 12mm hose due to friction at various flow rates and lengths**

12mm Nominal Bore Flexible Hose							
Flow Rate litres / minute	Length of Hose (metres)						
	10	25	50	75	100	125	150
25	50	125	250	375	500	625	750
50	280	700	1,400	2,100	2,800	3,500	4,200
80	700	1,750	3,500	5,250	7,000	8,750	10,500

**Table 3: Pressure loss in 20mm hose due to friction at various flow rates and lengths**

<b>20mm Nominal Bore Flexible Hose</b>							
<b>Flow Rate litres / minute</b>	<b>Length of Hose (metres)</b>						
	10	25	50	75	100	125	150
50	10	25	50	75	100	125	150
80	70	175	350	525	700	875	1,050
100	110	275	550	825	1,100	1,375	1,650
120	160	400	800	1,200	1,600	2,000	2,400
140	220	550	1,100	1,650	2,200	2,750	3,300
150	250	625	1,250	1,875	2,500	3,125	3,750
180	440	1,100	2,200	3,300	4,400	5,500	6,600

**Table 4: Pressure loss in 25mm hose due to friction at various flow rates and lengths**

<b>25mm Nominal Bore Flexible Hose</b>							
<b>Flow Rate litres / minute</b>	<b>Length of Hose (metres)</b>						
	10	25	50	75	100	125	150
150	80	200	400	600	800	1,000	1,200
180	120	300	600	900	1,200	1,500	1,800
200	150	375	750	1,125	1,500	1,875	2,250
250	230	575	1,150	1,725	2,300	2,875	3,450
300	340	850	1,700	2,550	3,400	4,250	5,100

**Table 5: Pressure loss in 32mm hose due to friction at various flow rates and lengths**

32mm Nominal Bore Flexible Hose							
Flow Rate litres / minute	Length of Hose (metres)						
	10	25	50	75	100	125	150
250	70	175	350	525	700	875	1,050
300	100	250	500	750	1,000	1,250	1,500
350	130	325	650	975	1,300	1,625	1,950
400	180	450	900	1,350	1,800	2,250	2,700
450	230	575	1,150	1,725	2,300	2,875	3,450

**Example:**

A nozzle jetting pressure of 12,000 kPa has been selected to clear a blockage requiring 50 metres of 20mm ID flexible hose. At a flow rate of 120 litres per minute, what is the required pump gauge pressure?

Given:

- Required nozzle pressure 12,000 kPa
- Required hose length 50 metres
- Hose ID 20mm
- Required flow rate 120 l/min

From Table 3,

a 50 metre long x 20mm ID hose at 120 l/min flow produces 800 kPa friction loss.

$$\therefore 12,000 \text{ kPa} + 800 \text{ kPa} = 12,800 \text{ kPa gauge pressure at the pump.}$$

## References

1. Lambert, J; Orman, N. R; Cant, J; Trew, J; Moy, F; Drinkwater, A (2005) **Sewer Jetting Code of Practice, 2nd Edition**, WRc Swindon, August 2005.
2. TEPPFA (2006) **The Plastic Pipes and Fittings Industry, Best Practice for effective jetting of sewer pipes**, a publication by The European Plastic Pipes and Fittings Association (TEPPFA), Brussels.



