# Jetting damage risk: Product tests help to avoid surprises

**Which power of cleaning can be maximally employed without causing damage to the sewer, significantly depends on the pipe and rehabilitation product. Therefore, the question of high pressure jetting durability is an important aspect of purchase decision. Product tests offer a possibility to recognize the risks of subsequent jetting damages in operation at an early stage. The IKT has already analysed diverse pipe products and rehabilitation systems and has access to up-to-date research results on the aggressiveness of HP-nozzles.**

Risk of HP-cleaning – aggressive HP-streams with high dissolving force and accelerated solid bodies stress the pipe walls

## How reliable is a product?

IKT conducts practical jetting tests on pipe and rehabilitation materials. The manufacturers as well are interested in the reliability which their product can offer to the customer, since the requirements for flush durability of pipe systems have constantly grown. In the meantime, modern high-performance high pressure cleaning crafts provide high nozzle pressures with simultaneously high rate of delivery for sewer cleaning. Moreover, network sections are often intensively cleaned over 50 times under high pressure during their operation time.

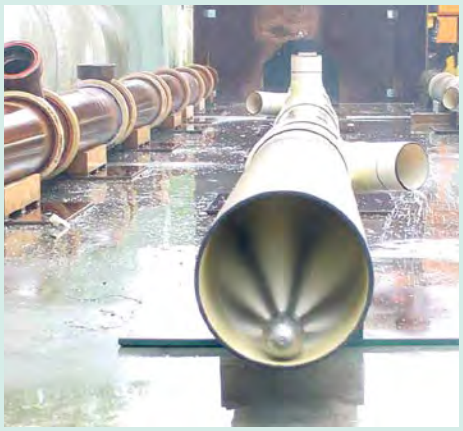
## Product tests – example: Sewer jetting test Aggressiveness of high pressure nozzles

The development of test concepts and measurement of results requires knowledge of cleaning processes and nozzles, since stressing of component surfaces seriously depends on the cleaning situation and the properties of the nozzle; and the choice of nozzles currently available on the market is wide. In the IKT Market Research on High Pressure Nozzles (www.ikt.de), over 1000 nozzles from 12 manufacturers can be found. This alone proves that not every way of cleaning is the same. For this reason, IKT developed a measurement system for recording of HP-stream properties. At the same time, the distribution of the stream pressure – especially the peak pressure and the stream impact area – measured using pressure measurement foils. These characteristics are important in order to describe the dissolving force and the aggressiveness of high pressure streams (comp. table 1).

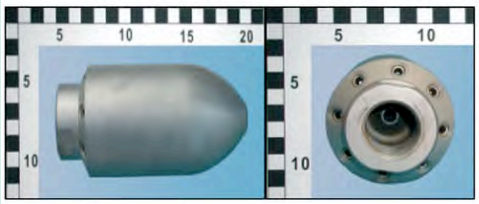
Left: jetting test on a tube liner

Middle: 50 cleaning cycles at nozzle pressure of 120 bar

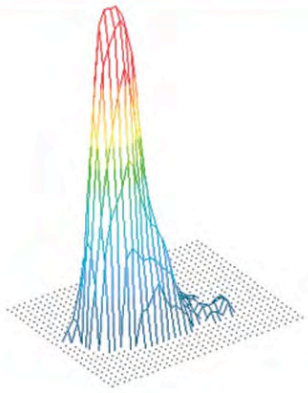
Below: Additional test: prolonged punctual overstressing for 3 min



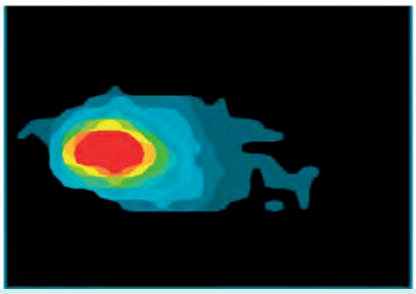
## nozzle D1 (8x30°)




8 holes
⌀ 2,8 mm, steel
angle: 18°
angle: 30°



| limiting conditions | | | measured variables | | |
|---|---|---|---|---|---|
| | P | 100 [bar] | | A | 621 [mm_] |
| | $Q_S$ | 36,9 [l/min] | | $P_{max}$ | 6,1 [bar] |



In order to provide for the repeatability or test stress, the stress parameters nozzle pressure and rate of delivery of the pump have to be measured. IKT employs a magnetic inductive flow measurement device and a pressure sensor for this goal. If a risk of flush damage is recognized in an already manufactured product, simple possibilities of cleaning process adjustment for sparing cleaning offer themselves. Thus the cleaning process can be customised for the particular situation if needed by alteration of the choice and application of cleaning instruments.


Metrological observation of nozzle pressure and flow rate for exact assessment of test stress

### Following basical points offer themselves in this case:

- Sewer bearings with particular risks for the network substance should already be identified at the stage of planning. This is especially relevant for the ranges which already showed vulnerability for the HP-cleaning at TV inspection, e.g. fragile damaged spots, skews and protruding connection pieces.

- The goal of the cleaning should be regarded as basis of nozzle choice, meaning the question if the nozzle requires a dissolving effect beside conveyance capacity. If only the transportation ability is important, a nozzle with flat stream angle (under 20°) or a nozzle with ejector effect should be employed when possible. If aggressive nozzles are used, a random test on singular bearings (parallel TV inspection) should be performed to examine the effect of employed nozzle systems on pipes, sockets and connections under the customary cleaning conditions.

- Undesirable material alterations can often be avoided by simple increase of stream distance to pipe wall, e.g. by employment of a nozzle sliding carriage.

Common cleaning tasks can usually be reliably accomplished with pressures under 120 bar. Regular controlling allows to determine and evaluate the effect of chosen diameter of the nozzles, pump capacity and hose lengths on the rate of delivery and nozzle pressure.

### Considerable risks for the network substance can be dramatically decreased even by simple measures:

- On letting the nozzles into the sewer, impacts on the shaft or pipe walls should be avoided.

- The nozzle speed should be monitored. The no-load operation must be prevented in any case.

- Continous monitoring of pump pressures and corresponding motor rotation speed allows to recognise irregularities. In this way, a pressure increase can point at blockage of the nozzles and thus the dangers of excessively aggressive HP-streams. Low pump pressures point at worn out nozzles with deficient dissolving effect.
- The pump pressure should be lowered possibly slowly to prevent the nozzle body from falling onto the pipe wall.
- It is in any case advisable to keep an eye on the flush water to recognise possible breakage of already existent sewer damages.

Source: IKT-ERGEBNISSE 2002-2005

neutral
independent
non-profit institute

IKT - Institute for Underground Infrastructure

# ABOUT IKT

**IKT - Institute for Underground Infrastructure** is a research, consultancy and testing institute specialized in the field of sewers. It is neutral and independent and operates on a non-profit basis. It is oriented towards practical applications and works on issues surrounding underground pipe construction. Its key focus is centred on sewage systems. IKT provides scientifically backed analysis and advice.

IKT has been established in 1994 as a spin-off from Bochum University, Germany.

The initial funding for setting up the institute has been provided by the Ministry for the Environment of the State of North-Rhine Westphalia, Germany's largest federal state.

However, IKT is not owned by the Government. Its owners are two associations which are again non-profit organizations of their own:

**a) IKT-Association of Network Operators:** Members are about 100 cities, among them Berlin, Hamburg, Cologne and London (Thames Water). They hold together 66.6% of IKT.

**b) IKT-Association of Industry and Service Providers:** Members are about 60 companies. They hold together 33.3% of IKT.

You can find information on projects and services at: **www.ikt.de**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