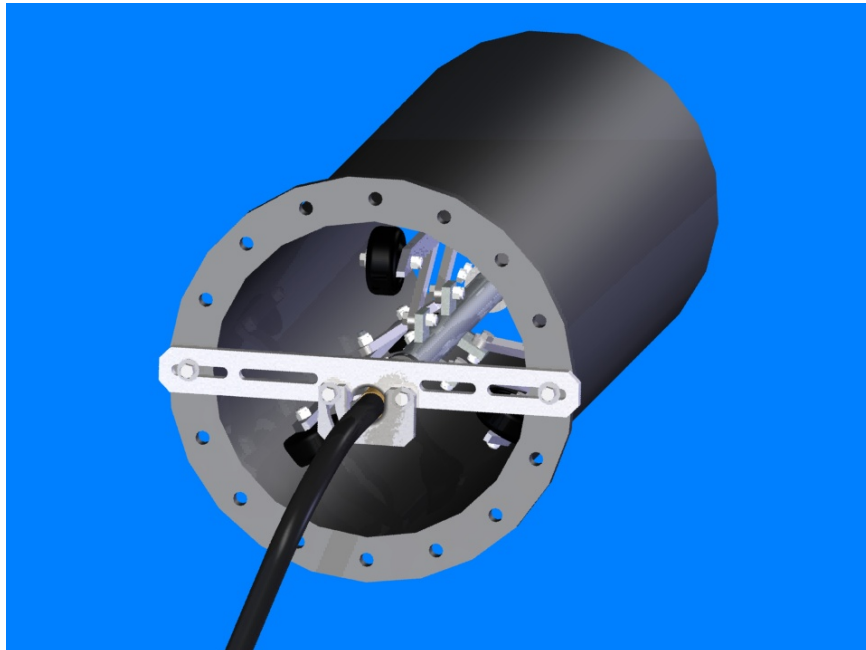


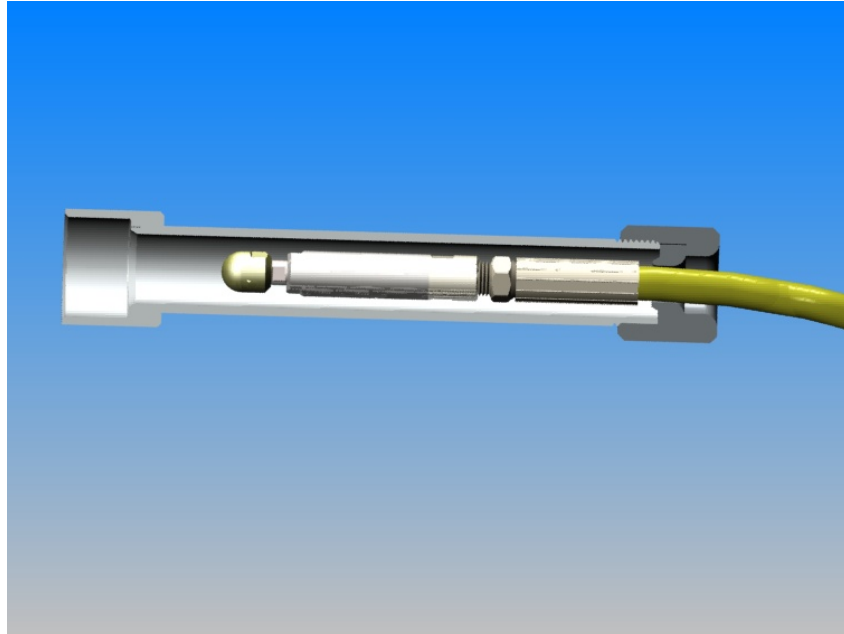
SAFETY DEVICES FOR PIPE AND TUBE CLEANING

When cleaning pipes and tubes with waterblasting tools, there is a risk of the cleaning nozzle coming backwards out of the pipe and striking the operator with either the jets or the tool itself. It is just as likely that an injury will occur due to being struck by the cleaning head as it is to be caused by the jets themselves. This can happen suddenly and unpredictably, with the tool being rapidly propelled backward out of the pipe or tube by an unbalanced force created by a nozzle becoming plugged or a head or tip coming off, or the mechanism of hydraulicking, where the tool is forced out of the tube like a piston by water pressure building up inside the tube behind a debris dam. Even the operator can inadvertently pull the cleaning nozzle out of the pipe or tube while still under pressure.

To protect the operator from these hazards, safety equipment known as a back-out prevention device or anti-withdrawal device should be used. This equipment consists of a bar, plate or arm that is securely attached across the opening of the pipe, that will physically stop the tool from coming back out of the pipe and striking the operator. The high pressure hose passes through an opening in this bar or plate. Two methods exist for catching the tool or hose- one type fits very closely around the hose itself and is intended to catch on the hose swage, requiring specifically sized collets for the hose being used. This type is most commonly used in tube cleaning, because the nozzle tip may not be any larger than the hose swage itself. The other type is intended to catch on the tool diameter, which is much larger than the hose, allowing a looser fit and being adaptable to most applications and hose sizes.



Back-out device bolted to pipe flange with simple latch for securing hose

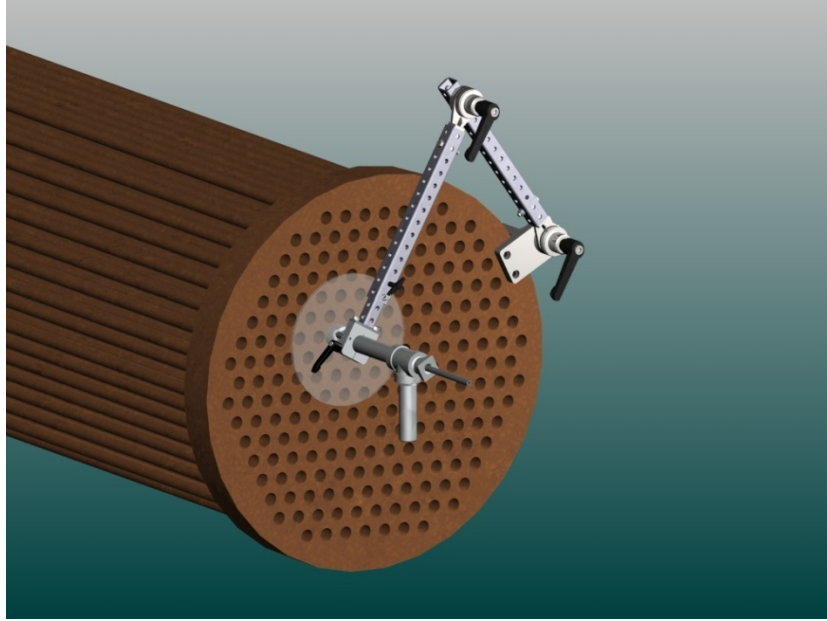


Close fitting collet to catch hose swage for tube cleaning

The back-out prevention device is attached to the pipe end by bolting to an existing flange if one exists, or by a chain or strap type clamp that is tightened to grip around the outside of a pipe with no flange. The arm type used for tube cleaning is clamped to the tube bundle face, bolted to the flange or to expansion anchors placed in the tubes themselves.



Chain clamp securing back-out device to pipe without flange



Jointed arm back-out device for tube cleaning, clamped to flange of bundle

These devices are not designed to stop a tool that turns around in a pipe- other means should be taken to ensure that this does not happen, such as using a stinger behind the tool to create a straight rigid length at least 1.5 times the inside diameter of the pipe being cleaned. The full face plate type of back-out preventer offers some protection from a reversing tool, but the full face is primarily intended to deflect debris and water exiting the pipe. These should be mounted with a gap between the end of the pipe and the plate to allow room for material to escape as the pipe is cleaned. The design for tube cleaning may include a shroud for the nozzle to be pulled back into, allowing complete cleaning of the tube while protecting the operator from the jets. No matter what equipment or method is used for pipe and tube cleaning, a dump valve that will automatically relieve the water pressure when released should always be used, and controlled by the person nearest the exit of the pipe being cleaned.

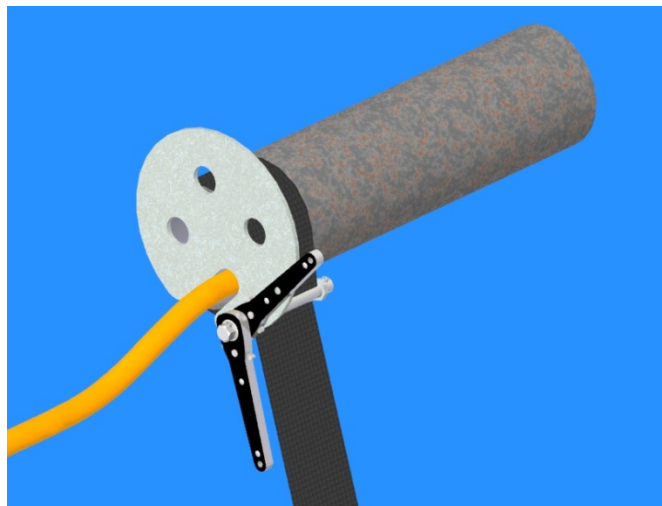


Plate type with strap for securing to flangeless pipe