

HYDRO-EXCAVATION NOZZLES

SAFETY BEST PRACTICES

Hydro-Excavation, when performed properly, can be a safe and efficient alternative to traditional excavation methods or the use of hand-tools to expose underground utilities. As with any excavation project, hydro-excavators must:

- Follow all national (and local) council rules and regulations.
- Follow industry best practices and the project requirements as set forth by their employer, the facility owner, the project owner, etc.
- Obtain underground utility locations (prior to beginning work.)
- Use equipment designed specifically for hydro-excitation.
- Equipment must be operated by trained, competent, and qualified workers.
- Read and understand all equipment manuals prior to operation.

INDUSTRY BEST PRACTICES REFERENCES:

Common Ground Alliance: Best Practices Guide

Available online at:

<http://www.commongroundalliance.com/best-practices-guide>

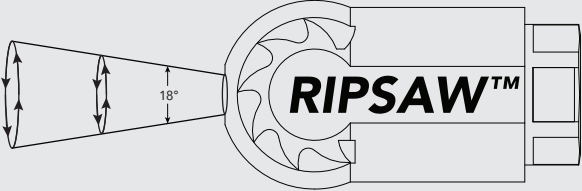
Gas Technology Institute: Vacuum Excavation Best Practice & Guideline

Available online at:

http://www.gastechnology.org/Expertise/Documents/KeyholeTechnology/Guidelines/Keyhole-Vacuum-Excavation-Guideline_v10-Jan2012.pdf

NOZZLE TYPES:

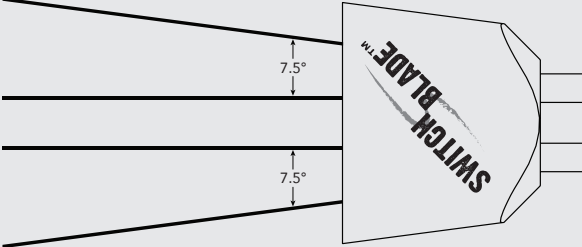
Several nozzle types are available for different types of applications or project conditions. Just like picking the right silverware from the drawer – do you need a knife, a fork, or a spoon?



The diagram shows a cross-section of a Ripsaw Rotating Turbo Nozzle. It features a central cylindrical body with a circular cutting edge containing several sharp, curved blades. The nozzle is shown emitting a conical water stream. A dimension line indicates a 18-degree angle for the water stream's cone.

ROTATING/TURBO/SPINNING NOZZLE
(*Ripsaw Rotating Turbo Nozzle*):

Dynamic 0° straight water stream that rotates at a high speed to form a cone-shaped flow pattern that is ideal for potholing applications. Typically a rotating nozzle is less likely to do damage than the same size, same pressure straight tip nozzle. A rotating water stream contacts the substrate for a shorter duration of time.



The diagram shows a cross-section of a Switchblade Linear Nozzle. It consists of a cylindrical body with a linear array of three straight, parallel nozzle tips. The nozzle is shown emitting three parallel water streams. Two dimension lines indicate a 7.5-degree angle for each individual water stream.

LINEAR NOZZLE
(*Switchblade Linear Nozzle*):

Static 0° straight tip nozzle(s), arranged in a linear pattern ideal for trenching applications.
(*Static nozzles are not to be used within 18" of utilities.*)

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NOZZLE SELECTION AND SIZING

Using a smaller nozzle size (less flow) and lowering pressure settings in the presence of underground utilities are critical safety precautions. Select the smallest nozzle size appropriate for the job.

RECOMMENDED NOZZLE SAFETY GUIDELINES

1. **Always wear the proper PPE (Personal Protective Equipment)** when using these nozzles.
2. Do not point nozzle at people or animals. Serious injury can result from high-pressure water from these nozzles.
3. Nozzles are recommended for use with high-pressure spray wand with automatic shut-off (Dead man's switch).
4. Always observe proper grounding procedures when performing hydro-excavation.
5. Urethane coating on the nozzle tip is designed for safety. Replace nozzle when urethane coating is worn.
6. **A distance of at least 8" (20cm) must be maintained between the nozzle tip and the underground facility and/or subsoil. The nozzle should never be inserted into the soil.**
7. **The wand/nozzle shall never remain motionless during excavation. Aiming directly at the underground utilities should be avoided at all times.**
8. **Observe the referenced industry best practices for recommended maximum pressures for rotating nozzles within 18" of utilities. Within 18" (46cm) of utilities the operator should lower water inlet pressure from normal operating pressure and use the nozzle to "wash down" the utility, not to blast.**
9. **Static nozzles are not to be used within 18" (46cm) of utilities.**

!CAUTION: HIGH PRESSURE WATER NOZZLES MAY DAMAGE BURIED UTILITIES!

High-pressure nozzles can damage buried utilities. While Hydra-Flex rigorously tests its product to limit the likelihood of damage in the case of an accidental encounter with buried utilities, it is not possible to completely eliminate the possibility of damage. Using a smaller nozzle size (less flow) and lowering operating pressure when near underground utilities are critical to reducing the likelihood of any damage.

Buried utilities vary dramatically in their ability to resist damage. All utilities become less damage resistant with age, soil conditions and other factors. Hydra-Flex cannot assure this product will not cause damage to all buried utilities.

These high-pressure water nozzles are provided as is without any guarantees or warranty. Hydra-Flex, Inc. makes no warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, of title, or of noninfringement of third party rights. In no event shall Hydra-Flex, Inc. be liable to the buyer or any third party for any indirect, incidental, special, consequential, punitive or exemplary damages including without limitation lost profits, lost savings, or loss of business opportunity arising out of or relating to any product or service provided or to be provided by Hydra-Flex, Inc. or the use or inability to use the same, even if Hydra-Flex, Inc. has been advised of the possibility of such damages. In no event shall Hydra-Flex's liability exceed the buyers purchase price. Use of the product by a user is at the user's risk.

