



Water as a tool
for a clean environment

High-Pressure Water Tools

Overview



Lances · Guns · Nozzle Carrier Heads · Applications

WOMA designs, manufactures and markets high-pressure water tools for cleaning, decoating, decontamination, paint stripping, surface preparation, cutting and demolition. The high-pressure water tools are suitable for manual applications (for jet reaction forces lower than 250 N) as well as for applications in mechanized devices and in automated or manipulator-guided systems. WOMA's high-pressure water tools meet the requirements of the "Richtlinien für Flüssigkeitsstrahler" ZH 1/406, October 1987.

Tool programme:

- ▶ Rotating high-pressure water jetting lances for operating pressures up to 3,000 bar for manual cleaning of tube bundles.
- ▶ Electrically or pneumatically operated high-pressure water jetting guns for operating pressures up to 3,000 bar.
- ▶ Ultra-high pressure water jetting tools for operating pressures up to 3,000 bar for emission-free surface preparation including vacuum recovery of the removed material and the water.
- ▶ Self propelling rotating nozzle carrier heads for operating pressures up to 3,000 bar for surface preparation, partly magnetically braked.
- ▶ Pneumatically driven rotating nozzle carrier heads for operating pressures up to 3,000 bar for surface preparation and heavy coating removal.
- ▶ Hydraulically driven rotating nozzle carriers for operating pressures up to 1,400 bar for heavy hydro-demolition.
- ▶ Tank cleaning devices with nozzle carrier heads rotating in two planes for internal cleaning of containers, vessels and autoclaves.
- ▶ Pipe cleaning devices for mechanized cleaning and decoating of internal pipeline walls.
- ▶ On-site abrasive-water jet cutting tools for operating pressures up to 3,000 bar for cutting steel and reinforced concrete structures.
- ▶ High-pressure water tools for manipulator- or robot-controlled systems.
- ▶ Exclusively designed tools as requested by customers.



Pneumatic abrasive-water jet cutting tool type Eco Top for demolishing reinforced concrete

Ultra-high pressure water jetting tool type Eco Top Rotating Cleaner for emission-free surface preparation



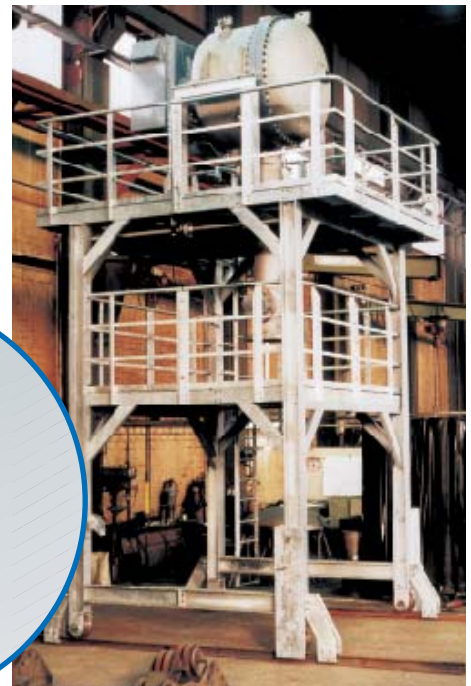


Exclusively designed manipulator-guided high-pressure water jetting tool with several rotating nozzle carrier heads for sensitive paint stripping

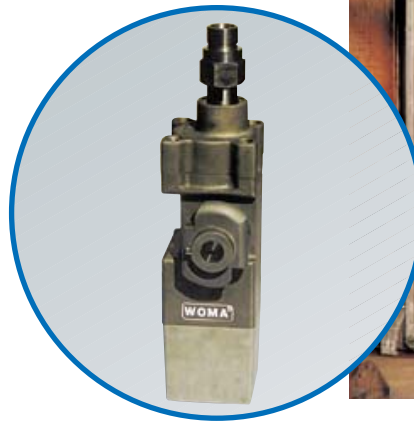
Pneumatically driven high-pressure water jetting tool type **TubeMaster®** for internal pipe cleaning



Self propelling cleaning tool type **Tankmaster®** for internal vessel and container cleaning



Pneumatically driven water jetting tool type **Top Cutter** for steel and rebar structures



Selective removal of concrete



Demolition of vessels



Cleaning of tube bundles



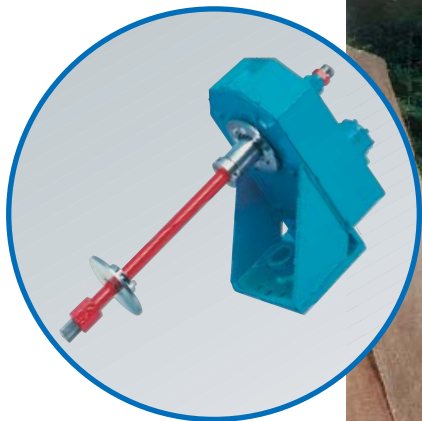
In-factory enamel stripping



Water as a tool for a clean environment

WOMA designs and manufactures high-pressure water jet-tools for the following tasks:

- ▶ Internal cleaning of vessels, autoclaves and containers
- ▶ Cleaning of sewers, pipes, tube bundles, etc.
- ▶ Enamel stripping from gridirons and body skids
- ▶ Rehabilitation of structures and buildings
- ▶ Maintenance of heavy technical equipment
- ▶ Environmentally friendly surface preparation
- ▶ Heavy hydro-demolition and reinforcement exposing
- ▶ Emission-free paint stripping
- ▶ Cutting and demolition of constructions and heavy equipment



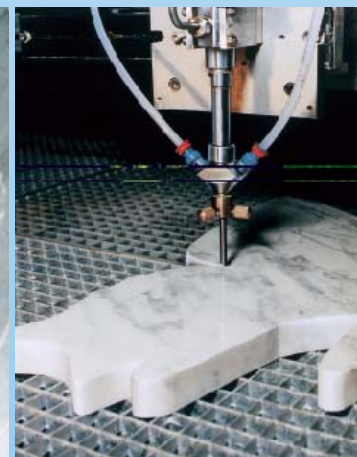
Hydraulically driven high-pressure water jetting tool **type Orbiter** for concrete hydrodemolition



Emission-free surface preparation



Cleaning of vessels and autoclaves



Jet-Cutting of rock material

High-Pressure Guns

WOMA's high-pressure guns can be run with operating pressures up to 3,000 bar. Due to the WOMA Component-System the guns can be suited ideally for any problem that needs to be solved.

Gun components:

- 1 – Body support
- 2 – Standard hand grip
- 3 – Remote control adapter (here: electrically)
- 4 – Pressure housing

- 5 – Self propelling rotating nozzle carrier heads
- 6 – Pneumatically driven lead-through
- 7 – Externally driven rotating nozzle carrier heads



High-pressure gun with single nozzle **type Form 8** for paint stripping of steel girders



High-pressure gun with pneumatically driven rotary lead-through **type Speedy 3000** and rotating nozzle carrier head **type E 09** for concrete de-coating



High-pressure gun with self propelling rotating nozzle carrier head **type TD 2100** for derusting of steel panels

Estimation of Back Thrusts



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The WOMA Back Thrust-Chart

The WOMA Back Thrust-Chart enables the estimation of the back thrust generated by the exiting water jets at different levels

of volume flow rate and operating pressure. For operating parameters not addressed in the chart, the back thrust can be approximated by:

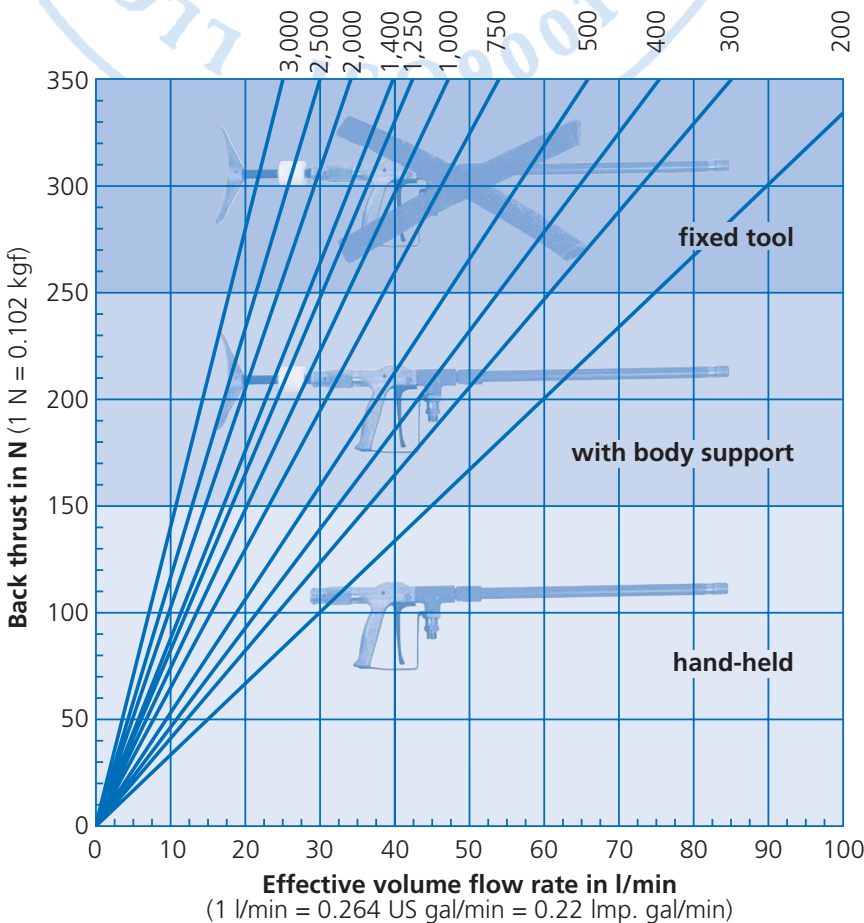
SI-units:

$$\text{Back-thrust in } N = 0.233 \cdot \text{Effective volume flow rate in } l/min \cdot \sqrt{\text{Operating pressure in bar}}$$

US-units:

$$\text{Back-thrust in } lb = 0.052 \cdot \text{Effective volume flow rate in US gal/min} \cdot \sqrt{\text{Operating pressure in psi}}$$

Operating pressure in bar (1 bar = 14.5 psi)



Application of the WOMA Back Thrust-Chart:

Example: Effective volume flow rate: 30 l/min, Operating pressure: 1,400 bar, Back thrust ?
Solution: Mark the effective volume flow rate value at the horizontal axis → go upward up

to the inclined 1,400-bar-line → from the intersection point go to the left meeting the back thrust-axis → read value: 262 N (calculated value: 261,5 N) → the value is located in the dark blue area → manual operation is not permitted

Permissible values for critical back thrusts:

- **UVV Arbeiten mit Flüssigkeitsstrahlern (VGB 87), Germany, 1995:**
 - Back thrust ≤ 150 N: Manual operation with plain hand-held gun
 - Back thrust > 150 N ≤ 250 N: Manual operation with body support
 - Back thrust > 250 N: Manual operation not permitted
- **Code of Practice for the Use of High Pressure Water Jetting Equipment, Association of High Pressure Water Jetting Contractors, London, UK, 1993:**
 - Back thrust > 25 kgf (250 N): Additional support for hand-held guns required
- **Recommended Practices for the Use of Manually Operated High Pressure Water Jetting Equipment, Water Jet Technology Association, St. Louis, USA, 1994:**
 - Back thrust > 1/3 of operator's body weight: Manual operation not recommended (for the example calculated above, this is a required body weight of about 79 kg)

Delivery Programme

High-pressure plunger pumps
 High-pressure water jet systems
 High-pressure water tools and accessories

Fields of Application

Agriculture
 Automotive and aviation industry
 Beverage industry
 Cement industry
 Chemical industry
 Construction and concrete industry
 Engineering industry
 Food industry
 Glass, porcelain, ceramic industry
 Iron, steel and metal industry
 Mining
 Municipal services
 Offshore industry
 Power industry
 Public transport
 Pulp and paper industry
 Ship building
 Wood working industry