

RISK ASSESSMENT RESULTS

Risk assessment

Grenades

Based on the principles of EN ISO 12100:2010 · October 2026

Product type	Nozzles for sewer and pipe cleaning
Family	Grenades
Manufacturer	BRUNA · Roberto Bruña, S.L.
Related document	BRUNA installation instructions - English version, October 2026

Models included

- Grenade 50
- Grenade 60
- Grenade 60 Bullet
- Grenade 70
- Grenade 80
- Grenade 100
- Grenade 120

Intended use

General cleaning and transport of sediment, sand, gravel, stones and debris in pipes.

IMPORTANT This assessment is limited to foreseeable risks associated with the nozzles and their life-cycle phases. It does not replace the risk assessment of the complete system consisting of the high-pressure unit, hose, reel, accessories, vehicle and workplace, which remains the responsibility of the integrator and operator.

1. Assessment method and limits

The assessment follows the hazard identification, risk estimation/evaluation and risk reduction approach described in EN ISO 12100:2010. It considers intended use and reasonably foreseeable misuse during storage, transport, installation, commissioning, operation, maintenance, troubleshooting, dismantling and disposal.

The measures are based on the BRUNA instructions supplied for this family and on general machinery-safety principles. Where a measure depends on the high-pressure equipment or workplace, it is expressly identified as the responsibility of the integrator or operator.

Acceptance criteria

- Eliminate the hazard where possible.
- Where elimination is not possible, reduce risk by design, correct selection/installation, protective measures and user information.
- Verification is by visual inspection, document checks, assembly checks and testing only under safe and controlled conditions.
- Residual risks depending on the workplace must be incorporated into the workplace risk assessment and operator training.

NOTE No numerical probability/severity values are assigned because the available product documentation does not provide statistical data, validated MAWP or sufficient test results to justify objective quantification. This document identifies hazards, consequences, measures and verification criteria.

2. Hygiene, PPE, storage and transport

Life-cycle phase / component	Hazard	Event / consequence	Risk-reduction measures	Reference	Verification criterion
Hygiene / sewer work	Biological contamination	Contact with wastewater, aerosols or contaminated surfaces may cause infection or irritation.	Apply hygiene, washing, decontamination and skin-protection measures appropriate to the work environment.	EN ISO 12100:2010; workplace assessment	Hygiene procedure and PPE available.
All phases	Insufficient PPE	Injury from projection, splashing, falling objects, sharp edges or contamination.	Eye/face protection, suitable gloves, work clothing and non-slip safety footwear; additional PPE as required by the environment.	EN ISO 12100:2010; BRUNA manual - Safety	PPE specified in the instructions and available.
Storage	Movement or falling of product	Impact, product damage or injury when opening a vehicle/case.	Store in a support, tray or case that prevents movement and falling.	EN ISO 12100:2010; BRUNA manual - storage	Product stored in a stable manner.
Storage	Corrosion / retained water	Internal deterioration, blockage or loss of integrity.	Clean and dry after use; allow drainage; avoid prolonged storage with water retained inside.	EN ISO 12100:2010; BRUNA manual - storage	Product clean, dry and free from retained water.
Transport	Drop, impact or trapping	The nozzle may slip because of shape, weight or surface contamination.	Transport in a stable manner; use gloves and safety footwear; do not place near edges.	EN ISO 12100:2010; BRUNA manual - transport	Stable handling and clear area.

3. Installation and preparation

Life-cycle phase / component	Hazard	Event / consequence	Risk-reduction measures	Reference	Verification criterion
Installation	Partially blocked jets	Asymmetric thrust, change of direction, vibration or unexpected behaviour.	Check all jets are clear before connection; clean only with the system disconnected and depressurised.	EN ISO 12100:2010; BRUNA manual - installation	Visual inspection / clear passage verified.
Installation	Incompatible thread or adapter / incomplete assembly	Leakage, separation of the assembly or projection under pressure.	Check thread, adapter and connection condition; screw on without forcing and tighten with the correct tool.	EN ISO 12100:2010; BRUNA manual - installation	Compatibility and tightening checked.
Installation	Twist stored in hose	Sudden release of torsion, nozzle rotation or hose damage.	Do not turn the hose to tighten; turn the nozzle/adapter or use a compatible swivel where appropriate.	EN ISO 12100:2010; BRUNA manual - installation	No visible hose twist.
Installation	Fall into manhole / well during connection	Impact on persons, loss of product or equipment damage.	Make the connection on a stable surface at a safe distance from the edge; secure the equipment where geometry requires it.	EN ISO 12100:2010	Stable assembly area.
Installation	Incorrect model, diameter or flow selection	Blockage, poor effectiveness, unstable movement or damage.	Check application, diameter, flow and calibration before use.	EN ISO 12100:2010; BRUNA manual - technical data	Model and parameters checked.

4. Commissioning and operation

Life-cycle phase / component	Hazard	Event / consequence	Risk-reduction measures	Reference	Verification criterion
Commissioning / use	High-pressure water	Fluid injection, cuts, serious or fatal injury.	Never direct jets at people; insert the nozzle before pressurising; test only inside a pipe or controlled test enclosure.	EN ISO 12100:2010; BRUNA manual - Safety	Warnings present; procedure followed.
Commissioning / use	Unexpected movement / recoil	Impact, hose pull or loss of control during pressurisation.	Increase pressure progressively; keep a safe distance; control forward and return movement.	EN ISO 12100:2010; BRUNA manual - Operation	Progressive start-up and clear area.
Use	Nozzle exits pipe under pressure	Violent movement and direct exposure to jets.	Shut off water and release residual pressure before fully removing the nozzle.	EN ISO 12100:2010; BRUNA manual - Operation	Stopping sequence specified and applied.
Use	Blockage in bends, section changes or obstacles	Overload, hose pull, product or pipe damage.	Do not release by sudden pressure increases; stop, depressurise and inspect.	EN ISO 12100:2010; BRUNA manual - Operation	Safe unblocking procedure.
Use	Pressure or flow outside calibration	Overspeed, damage, unstable behaviour or loss of performance.	Operate within calibration and system limits; consult BRUNA if the equipment does not match.	EN ISO 12100:2010; BRUNA manual - technical data	Equipment parameters checked.
Use	Aerosols / particle projection	Ocular, respiratory or biological exposure.	Maintain a safety zone, use eye/face protection and additional PPE where required by the environment.	EN ISO 12100:2010; workplace assessment	PPE and area control available.
Operation	Optional front jet	High-pressure water exits forward; severe risk if the nozzle leaves the pipe.	Fully insert before pressurising; never operate outside pipe/test enclosure; remove pressure before extraction.	EN ISO 12100:2010; BRUNA manual §3, §7	Warning present; test only in controlled enclosure.
Operation	Impact with sediment, stones or fittings	Sudden stop, pipe damage or change of direction.	Select the correct model, control forward/return movement and avoid repeated impacts on bends or fragile fittings.	EN ISO 12100:2010; BRUNA manual §7	Model selection and feed control specified.
Operation	Insufficient flow on high-drag models	Unstable movement or insufficient performance, increasing blockage risk.	Check published minimum flow and calibration before use; do not compensate with sudden pressure increases.	EN ISO 12100:2010; BRUNA manual §11	Flow/calibration checked before use.
Transport / handling	High weight	Overexertion, dropping the nozzle or injury when handling heavy models.	Assess weight before moving; use two persons or mechanical assistance where necessary; use safety footwear and stable grip.	EN ISO 12100:2010; BRUNA manual	Defined handling method; no unsafe lifting.

5. Maintenance, incidents and end of life

Life-cycle phase / component	Hazard	Event / consequence	Risk-reduction measures	Reference	Verification criterion
Maintenance	Residual pressure	Unexpected movement, high-pressure leakage or injury during dismantling.	Stop, isolate and fully depressurise before any intervention.	EN ISO 12100:2010; BRUNA manual - Maintenance	Zero pressure before intervention.
Maintenance	Use of non-approved inserts/jets/spare parts	Change in balance, flow, trajectory or strength of the assembly.	Use BRUNA parts or expressly approved parts; retain the original configuration/calibration.	EN ISO 12100:2010; BRUNA manual - Maintenance	Spare-part reference checked.
Maintenance	Tools / slipping during assembly	Cuts, impacts or damage to threads and components.	Use the correct tool, gloves and a stable surface; do not force threads.	EN ISO 12100:2010	Assembly undamaged; appropriate tool used.
Troubleshooting	Intervention with system energised	Injury from unexpected start-up or high-pressure jet.	Initial visual diagnosis; all cleaning/dismantling with the system isolated and depressurised.	EN ISO 12100:2010; BRUNA manual - Troubleshooting	No energy during intervention.
Dismantling / end of life	Contamination and sharp edges	Cuts, contact with residues or contamination during dismantling.	Clean, depressurise, wear gloves and separate components by material.	EN ISO 12100:2010; BRUNA manual - disposal	Product clean and managed according to local regulations.

6. Complete-system risks and residual risks

Life-cycle phase / component	Hazard	Event / consequence	Risk-reduction measures	Reference	Verification criterion
Complete system	Unexpected re-energisation	Uncontrolled return of pressure or movement.	The high-pressure system must include controls and procedures preventing unexpected start-up; lock out/isolate before intervention.	EN ISO 12100:2010; high-pressure equipment instructions	Complete system verified by integrator/operator.

RESIDUAL RISK The use of high-pressure water, possible environmental contamination and nozzle movement involve risks that cannot be eliminated by product design alone. They must be controlled by correct selection, confinement, training, PPE, a safety zone and procedures for the complete system.

7. Final verification and residual risks

- The model matches the intended application, pipe diameter, flow and calibration.
- Threads, adapters, body, inserts/jets and moving parts are visually intact.
- All openings are clear and no visible obstructions are present.
- The hose is not twisted during assembly.
- The nozzle is inserted into the pipe or confined area before pressure is applied.
- The system can be isolated and depressurised before maintenance or unblocking.
- The operator has appropriate PPE, training and access control for the work area.
- Functional tests are performed only inside a pipe or controlled test installation.
- BRUNA spare parts or parts expressly approved for the model are used.

Documentary references

- EN ISO 12100:2010 - Safety of machinery - General principles for design - Risk assessment and risk reduction.
- BRUNA installation instructions for this product family (October 2026).
- Instructions and limits of the high-pressure unit, hose, reel and accessories used by the operator.
- Occupational-safety and sewer-work regulations applicable in the country and place of use.

BRUNA

Risk assessment · Grenades · October 2026