

Safety Guideline for Gases and Fluids in Silencers and Dump Tubes

This document summarizes safety risks of gases and vapors used in silencers and dump tubes, including flammability, reactivity, toxicity, and asphyxiation. It also addresses hazards specific to ORC systems and relief vents.

Pressurized gases may cause explosive damage, injury, and hearing loss.

Gas Classification and Hazards

Medium *	Category	Hazards / Notes
Air	Oxidizing (contains O ₂)	Supports combustion of other gases.
Argon (Ar)	Inert, Asphyxiating	Odorless, colorless; oxygen displacement risk. Use signage, O ₂ monitoring, and ventilation.
Carbon Dioxide (CO ₂)	Non- flammable	Heavier than air and can displace oxygen in confined or low-lying areas. Odorless and colorless → accumulation may go unnoticed without gas detection. Use signage, O ₂ monitoring, and ventilation.
Carbon Monoxide (CO)	Toxic, Flammable	Extremely toxic even at low concentrations. Colorless, odorless, tasteless gas.
H ₂ O (Water/Steam)	Non- flammable	Condensation risk; liquid ingress must be prevented. Only gaseous phase allowed. Additionally, exposure to high temperatures may lead to thermal decomposition, overpressure, or ignition depending on the fluid.
Hydrogen (H ₂)	Highly flammable	Wide explosive range (4–75% vol); follow EIGA. Use gas-tight systems, detectors, and EX zoning. Silencers for normal use only— emergency blow-off requires separate discharge. Evaluate backpressure in design.
Methane (CH ₄)	Flammable	Explosive limits 5–15% vol. in air. Upon rapid depressurization and associated cooling, the gas mixture can become heavier than air and accumulate in low-lying areas near the

		discharge point. Adequate ventilation and hazard zone assessment are required.
Natural Gas	Flammable	Flammable; primarily methane. May be mixed with hydrogen or other gases depending on the application.
Nitrogen (N2)	Inert, Asphyxiating	Displaces oxygen; risk of suffocation in confined spaces. Use signage, O2 monitoring, and ventilation.
ORC working fluids Cyclopentane, n-Pentane etc.	Flammable	Low flash point, explosive vapors; avoid contact with hot surfaces. Vapors may be harmful if inhaled; ensure adequate ventilation and prevent exposure to decomposition products. Avoid auto-ignition and ensure surfaces remain below ignition temperatures
Oxygen (O2)	Oxidizer, Reactive	Supports combustion; must avoid oil/organic contamination. Silencers are delivered degreased. Oxygen systems require clean construction. No oils or contaminants allowed.
Syngas	Flammable + Toxic	Contains CO; toxic and explosive. Use extreme caution.

Applicable Standards and Guidelines

- EIGA: Doc 23 (Hydrogen), Doc 13 (Oxygen), Doc 30 (Ventilation and Leak Safety)
- API 521: Pressure relief design for flammable gases
- ATEX / IECEx: Explosive atmosphere classification
- EN ISO 23273, ISO 10156: Classification of gas mixtures (flammable, toxic, inert)

The selection and application of standards, including this and other relevant guidelines, are the responsibility of the operator of the system in which the silencer is installed.

* For medias not listed, consult the manufacturer