GLAUNACH

THE SILENCER HANDBOOK

HYDROGEN SILENCERS

1. WHY HYDROGEN SILENCERS ARE ESSENTIAL?

The release of hydrogen generates extremely high noise levels.

This noise can:

- Damage system components through vibrations
- Endanger personnel
- Mask critical warning sounds
- Reduce the acceptance of hydrogen technologies
- Prevent compliance with noise regulations and delay project approvals

Without proper silencers, safe hydrogen operation is not possible!

2. WHERE ARE HYDROGEN SILENCERS USED?

Hydrogen silencers are used wherever hydrogen is transported, compressed, stored, vented, or released under pressure, generating high flow and discharge noise levels. Typical applications include:

- Electrolyzers for hydrogen production
- Hydrogen refueling stations and fueling systems
- Hydrogen storage and compressor systems
- Fuel cell and energy supply systems
- Hydrogen pipelines and distribution networks
- Industrial venting and blow-off systems
- Safety relief and pressure release systems
- Chemical and petrochemical plants

Glaunach manufactures customized silencers that are specially designed for each customer’s system. Whether for single units or large production series, we are happy to help you find the right solution.

3. WHICH TYPES OF HYDROGEN SILENCERS EXIST?

3.1 Vent Silencers / Blow-Off Silencers

Installed at the end of piping systems for venting and pressure relief applications. Designed to reduce the high noise levels generated during the release of hydrogen to the atmosphere, especially at high flow velocities and pressure differences. Typically used in vent stacks, safety relief systems, and blow-off lines.

3.1.1 Reactive Silencers

Use chambers and flow redirection to reduce noise without absorbent material.
The pressure is reduced inside the silencer.
Noise reduction takes place where the noise is generated.

3.1.2 Absorptive Silencers

Reduce noise by absorbing sound energy through acoustic insulation materials.
No pressure is built up inside the silencer, as it is directly connected to the atmosphere.

3.1.3 Combined Silencers

Combination of absorptive and reactive principles for broad-band noise reduction.

3.2 Inline Silencers

Installed directly into piping systems. Can also be designed as reactive, absorptive, or combined silencers. Used wherever installation space requirements make this necessary.

4. TYPICAL APPLICATION EXAMPLES

4.1 H_2 Micro Silencer

For applications where some back pressure in the vent line is acceptable, our hydrogen micro silencers offer a compact and efficient solution for noise reduction.

The pressure reduction takes place directly inside the silencer. This allows smaller pipe sizes before the silencer. At the same time, the controlled pressure release inside the micro silencer reduces noise directly at its source.

The result is high noise reduction with a compact design and easy system integration.

Our micro silencers are designed according to the ASME Boiler & Pressure Vessel Code and the Pressure Equipment Directive (PED), ensuring high safety, reliability, and efficiency.

high pressure

4.2 H_2 Purge Silencer

For applications where high back pressure or pressure loss in the vent line is not acceptable, our purge silencers provide an effective solution for noise reduction during purging and venting.

Noise reduction is mainly achieved through sound absorption. This allows hydrogen to be vented with very low pressure loss while still reducing flow noise effectively.

This type of silencer is often used in fuel cell systems and electrolysis plants, where low back pressure is an important requirement.

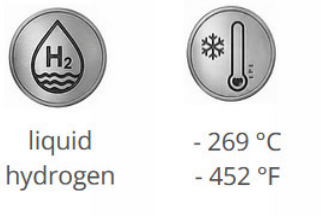
low pressure

4.3 LH_2 Silencer

Our solution specially developed for **liquid hydrogen applications** takes into account the specific requirements of cryogenic hydrogen systems.

The design specifically considers the thermal material behavior at extremely low temperatures as well as the significant volume expansion of liquid hydrogen.

In consultation with our customers, additional project specific requirements and standards such as PED, ASME, or NASA recommendations can also be considered during design and manufacturing.



4.4 H_2 Inline Silencer

The inline silencer, specially developed for hydrogen applications, can be designed as a diffuser silencer, absorptive silencer, or a combined design, depending on the allowable back pressure.

Thanks to its compact inline design, the silencer can be easily integrated into existing piping systems while effectively reducing noise.

Typical applications include hydrogen systems with high flow velocities, limited installation space, and increased requirements for safety and controlled gas flow.

sign and manufacturing are carried out in accordance with the Pressure Equipment Directive (PED) and ASME requirements.

5. ACCESSORIES FOR HYDROGEN SILENCERS

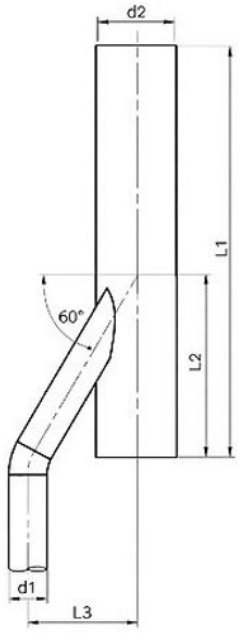
5.1 Lambda Vent

The ideal addition to inline silencers

The upward-directed discharge supports the rapid dilution of the released hydrogen with ambient air and helps to maintain safety-related hazardous areas in accordance with the requirements of DVGW G 442.

Upon request, Glaunach can supply suitable lambda vents as an optimally matched addition to the inline hydrogen silencers.

The required safety distance at vent outlets of gas installations can be determined in accordance with **DVGW G 442**



	d1		d2		L1		L2		L3	
	DN	NPS	DN	NPS	mm	inch	mm	inch	mm	inch
*	25	1"	40	1½"	350	14	160	6	130	5
*	32	1¼"	50	2"	450	18	200	8	160	6
	40	1½"	65	2½"	500	20	200	8	190	7
*	50	2"	80	3"	560	22	250	10	200	8
	65	2½"	100	4"	750	30	250	10	200	8
	80	3"	125	5"	900	35	400	16	250	10
*	80	3"	150	6"	900	35	400	16	250	10
*	100	4"	150	6"	900	35	400	16	320	13

* Standard blow-off devices in accordance with DVGW Code of Practice G 442.
This design is the preferred option.

5.2 Rain Cap

The H_2-Rain-Cap is equipped with a rain-resistant vent that enables the controlled release of hydrogen after operation while protecting the silencer against rain and snow ingress.

By minimizing the risk of hydrogen buildup in the silencer, it supports safer operating conditions.

5.3 Vertical discharge deflector

A vertical discharge deflector is a cylindrical shroud installed around a horizontal vent outlet to redirect the gas discharge vertically upward. It helps improve dispersion and reduce horizontal gas jet impact and radiation exposure. It is typically applied where project or safety requirements specify that hydrogen shall only be discharged horizontally.

5.4. Drainage

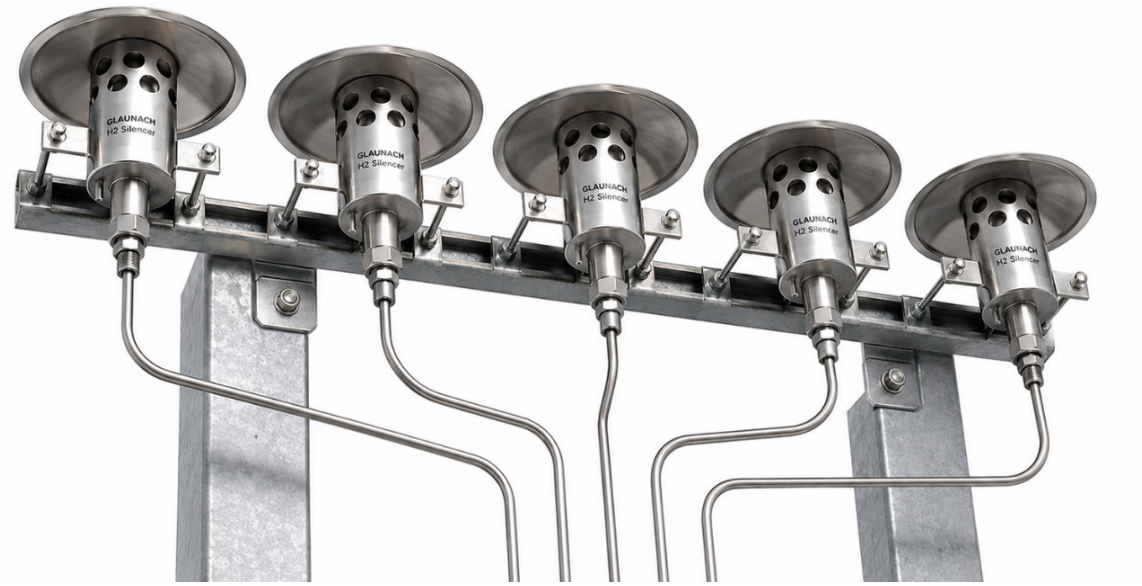
The drainage system of each hydrogen silencer is designed to remove water or condensate from the silencer. This prevents liquid accumulation inside the silencer and avoids water entering the vent line.

The design and positioning of the drainage connection are individually adapted to the installation situation and implemented in coordination with the customer.

5.5 Earthing, Lifting and Support Lugs

Each hydrogen silencer is equipped with at least one earthing lug. This connection must be properly connected to the plant grounding system in order to safely dissipate static electrical charges.

In addition, lifting lugs and support lugs can be provided depending on installation and handling requirements.



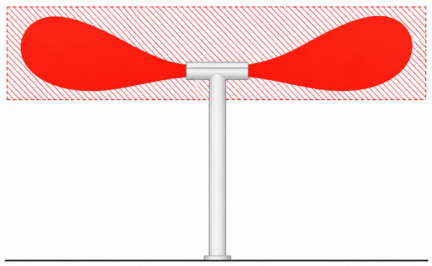
6. Installation Notice

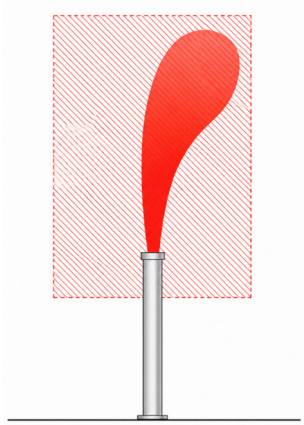
Hydrogen silencers must be installed in accordance with the applicable project specifications, local regulations and good engineering practice. Proper installation, support, grounding and safe operation are the responsibility of the installer and plant operator. In case of doubt, a qualified local specialist shall be consulted.

Hydrogen silencers shall be installed in a manner that does not adversely affect the blowdown or venting process, ensures reliable drainage.

7. Safety Area Assessment

Upon request, we can perform a conservative assessment of the required safety area in accordance with the principles of **DVGW G 442 or API 521**. The evaluation is based on the available operating and design data and is intended solely as a technical guidance. Final determination of hazardous areas, safety distances, and regulatory compliance remains the responsibility of the operator and the responsible engineering authority.





8. Safety Notice on the Use of Hydrogen Silencers

Design

Hydrogen silencers are custom-designed based on customer-specific operating and process conditions to ensure safe and compliant operation.

Operating Mode

Hydrogen silencers are intended for normal operating conditions only. In the event of malfunction or emergency conditions, hydrogen shall be discharged via a dedicated emergency vent system.

Emergency Venting

Where required by applicable regulations, or where a flow restriction through the silencer cannot be safely excluded, a separate emergency vent shall be provided to ensure the safe and unrestricted discharge of hydrogen during malfunction or emergency conditions.

Ignition Source Control

Potential ignition sources must be evaluated and shall not be located within the designated safety area around the hydrogen silencer or muffler. Due to the special properties of hydrogen, special attention shall be given to electrical equipment, hot surfaces, static electricity, sparks, open flames, smoking, vehicles, and others.

Compliance

The hydrogen silencer design shall comply with all applicable local regulations and project requirements at the installation site (e.g. EIGA, NFPA, CGA, API, or equivalent standards). Final responsibility for regulatory compliance, installation suitability, hazardous area classification, and operational safety remains with the customer, installer, and plant operator.