

SONEX® T Noise Control for Transformers

General information



■ SONEX® T

In their role as power supply hubs, transformer substations are becoming increasingly important due to the rapid increase in energy requirements around the globe. Transformers are used whenever the mains voltage needs to be converted to the next level down so as to minimise losses when transporting the energy generated at the power station to the end consumer. This is necessary at both the high/medium-voltage level and the medium/low-voltage level. However, the noise immissions generated during the transformation process have a negative impact

on the environment and thus on people. G+H Schallschutz GmbH has developed three innovative, highly customised solutions for reducing the transformers' disruptive noise immissions (< 60 Hz) so as to comply with the reference values required according to § 48 of the BImSchG (Federal Immission Control Act). In this way, G+H Schallschutz GmbH is making a significant contribution to independent site selection for transformer substations - and this is a real advantage for grid operators.

■ Design

- System 1: Direct unit attachment
- System 2: Noise control enclosures
- System 3: Screening walls



System 1: Direct unit attachment

■ The enclosure system based on direct unit attachment

Transformer plants in residential areas need to be particularly space-saving and quiet. G+H Noise Control has developed the method of directly attaching pre-fabricated units specifically for these requirements. Already a success in Manhattan's urban canyons and in Canada, the cost-effective, streamlined casing offers numerous benefits:

- The transformer enclosure is far more compact than conventional solutions and requires less space and material, which also cuts costs.
- Using G+H's AVIB-P and MAFUND insulating systems optimises protection against vibrations and structure-borne noise.
- Inspection openings make it easy to carry out maintenance and repair work.
- Control cabinets are installed on the outside, which means they offer quick and easy access at all times.
- The process of forming the enclosure around the fully pre-assembled transformer can be performed at the factory, as can any measurements required to comply with noise control limits.
- Transportation is easier, too. Transformers can be delivered to the installation site – complete with their pre-tested casing – by train or flatbed truck.
- G+H SONEX® T can be supplied in any RAL colour.
- Short delivery times
- Fast installation at the factory
- Subsequent cutting to size and testing on site are no longer required, which simplifies installation and cuts costs.



System 2: Noise control enclosures



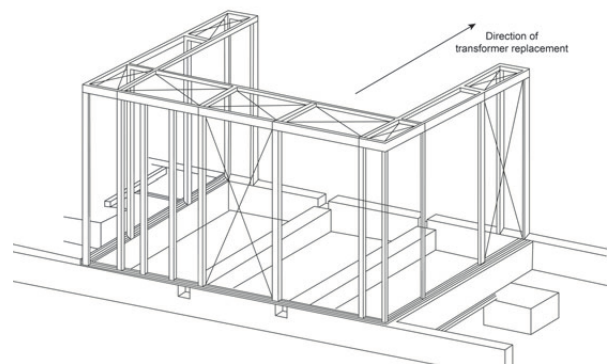
■ Supporting structure

- Stable frame structure comprising double T-beams and rectangular pipes to support the wall and roof units.
- The supporting structure is erected on a foundation and fixed in place.

■ Advantages

- This system maximises noise control.
- Problem-free maintenance work thanks to access door and ladder
- Non-slip roof surface with fall protection
- G+H SONEX® T can be supplied in any RAL colour.

Transformer replacement – variant 1



- Short delivery times
- All noise control requirements are easily complied with.
- Using G+H's AVIB-P and MAFUND insulating systems optimises protection against vibrations and structure-borne noise.



System 3: Screening walls



■ Supporting structure

Stable frame structure comprising double T-beams, sectional steels and edging to support the wall units.

■ Advantages

- Ability to screen large transformer substations
- Problem-free maintenance work thanks to access door and sufficient space
- Transformers require no additional ventilation.
- Screening walls are easy to remove and reinstall if replacing a transformer.
- G+H SONEX® T can be supplied in any RAL colour.
- Short delivery times

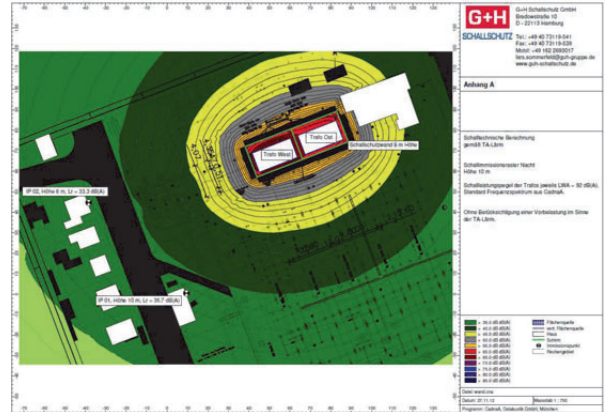


Engineering/technical data

■ Our services

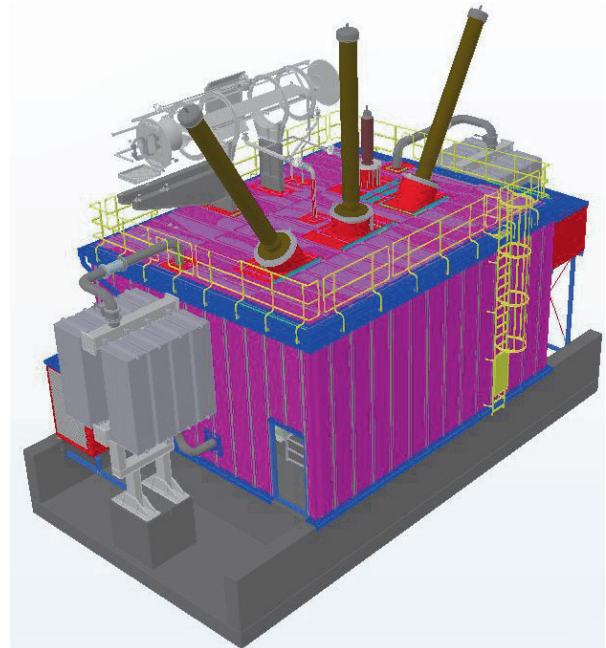
■ Propagation calculation

If the customer so requires, we perform propagation calculations and a subsequent evaluation. This enables specific reduction of noise levels at the planned points of immission, which delivers the planning security and project success our customers are looking for.



■ 3D modelling

We use 3D modelling of the noise control enclosure to provide our customers with a clear idea of the construction project. This also identifies potential collisions between transformer and noise control enclosure at an early stage so that measures can be taken if necessary.



■ Use of AVIB-P and MAFUND insulating systems

G+H's AVIB-P and MAFUND insulating systems play a key role in ensuring the SONEX® T transformer casing's effectiveness.

- AVIB-P satisfies the toughest demands when it comes to protecting against vibrations. The product is a cellular elastomer and is made from a special polyether urethane. Elastomer springs are the solution of choice for vibration decoupling in the mechanical engineering and construction sectors.

- MAFUND sheets are made from a highly elastic rubber mixture. They protect against vibrations not by cushioning, but by reducing the impulses originating from the source of disturbance. This significantly lowers the transmission of vibrations and structure-borne noise. Further advantages include a long service life and excellent resistance to weathering.

Acoustic data

General information

- G+H Noise Control has a QM system certified to DIN EN ISO 9001–2008.
- G+H Schallschutz GmbH is certified in line with the SCC^P safety management system.
- Each project has its own specific acoustic design based on customer's requirements.

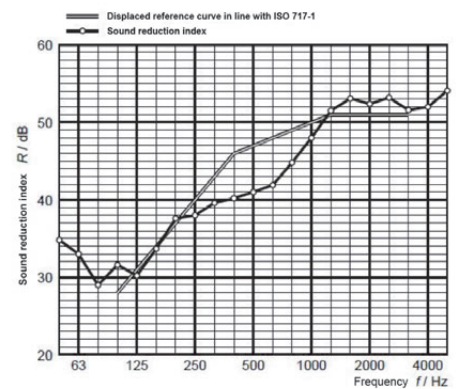
System 1: Direct unit attachment

- Depending on the customer's requirements, insertion losses (IL) of between 3 and 14 dB can be achieved.
- A separate propagation calculation and noise control report are produced if the customer so requires.

System 2: Noise control enclosures

- 120 mm wall thickness
- Modular structure as standard
- Cover strip: Standard design with no filler

Frequency [Hz]	R 1/3 octave [dB]	R octave [dB]
50	34,8	
63	33,0	31,6
80	29,0	
100	31,6	
125	30,2	31,6
160	33,7	
200	37,6	
250	38,0	38,3
315	39,6	
400	40,2	
500	41,0	41,0
630	41,9	
800	44,8	
1000	48,0	47,3
1250	51,5	
1600	53,1	
2000	52,4	52,9
2500	53,2	
3150	51,6	
4000	52,0	52,4
5000	54,1	



Weighted sound reduction index $R_w(C; C_{tr}) = 47 (-2; -5) \text{ dB}$

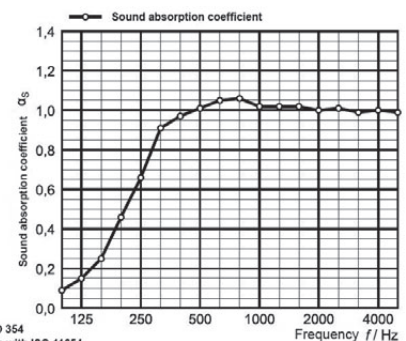
Determined based on test stand measurement results obtained in third-octave bands.

	100 - 3150 Hz	100 - 5000 Hz	50 - 3150 Hz	50 - 5000 Hz
C	-2 dB	-1 dB	-2 dB	-1 dB
C _{tr}	-5 dB	-5 dB	-6 dB	-6 dB

System 3: Screening walls

- It is possible to customise the design according to the specific noise control requirements.
- Wall thicknesses of between 50 and 100 mm
- Exemplary absorption curve: 50 mm wall unit with highly noise-absorbing mineral wool.

Frequency [Hz]	α_g 1/3 octave	α_p octave
100	0,08	
125	0,15	0,15
160	0,25	
200	0,46	
250	0,66	0,70
315	0,91	
400	0,97	
500	1,01	1,00
630	1,05	
800	1,06	
1000	1,02	1,00
1250	1,02	
1600	1,02	
2000	1,00	1,00
2500	1,01	
3150	0,99	
4000	1,00	1,00
5000	0,99	



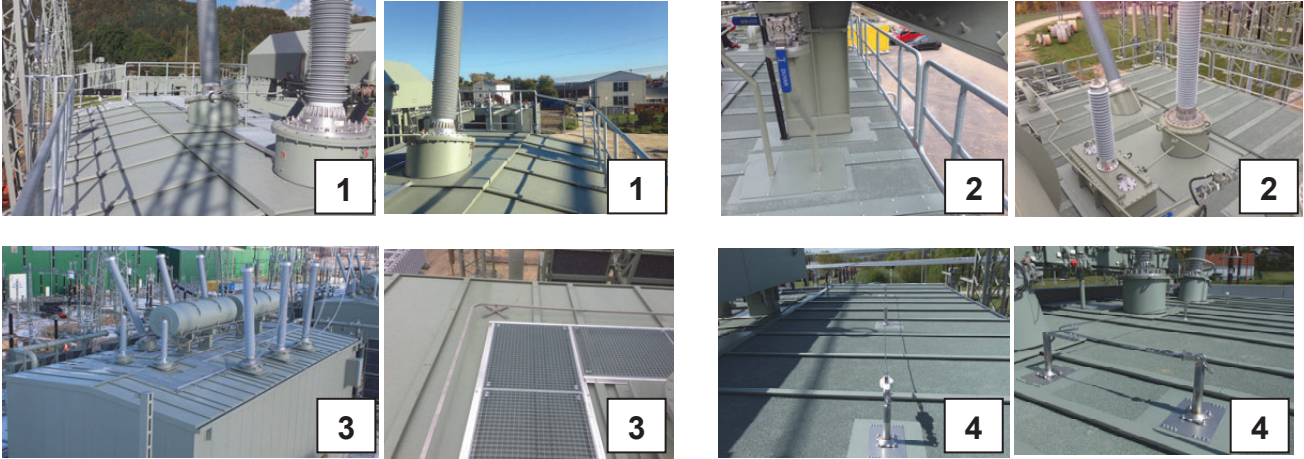
α_g Sound absorption coefficient in line with ISO 354

α_p Practical sound absorption coefficient in line with ISO 11654

Evaluation in line with ISO 11654:
Weighted sound absorption coefficient
 $\alpha_w = 1,00$
Sound absorber class A

Evaluation in line with ASTM C423:
Noise Reduction Coefficient $NRC = 0,90$
Sound Absorption Average $SAA = 0,93$

Special roof area designs



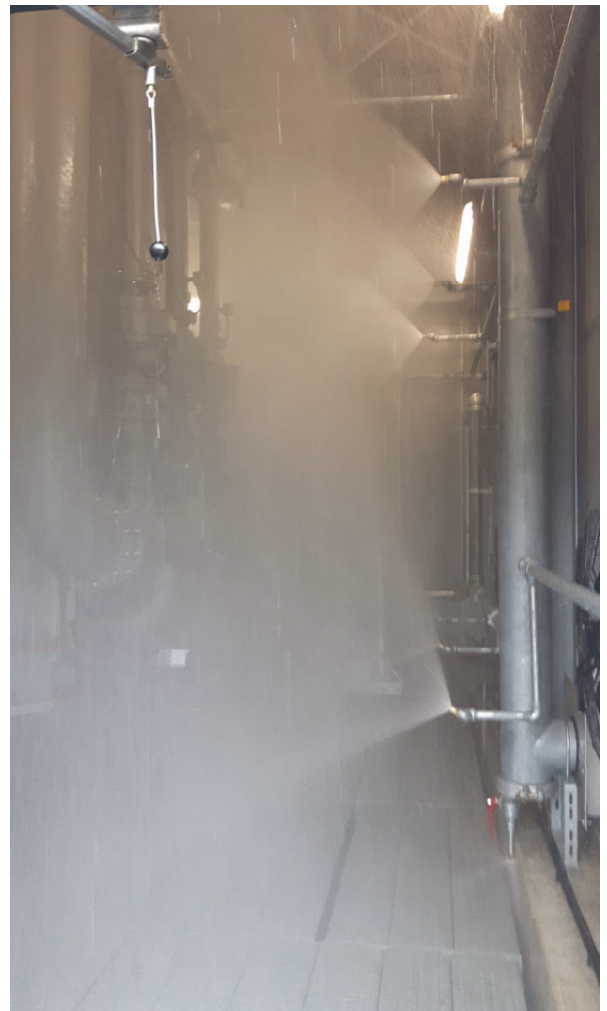
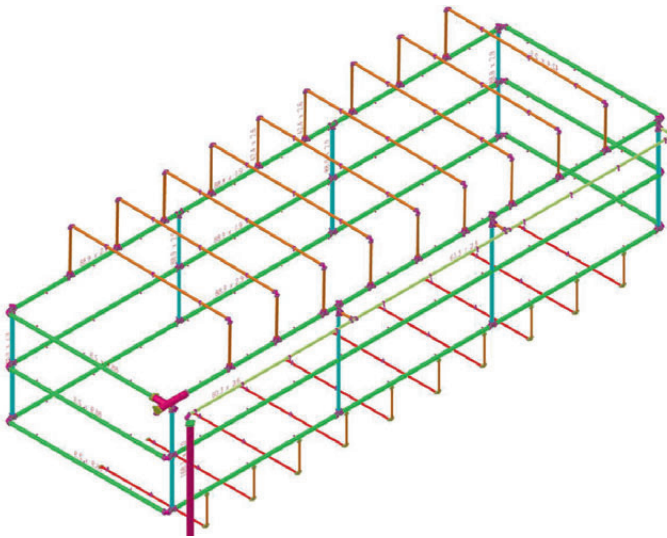
	Walkway grating	Sand-surfaced
Railings	<ul style="list-style-type: none"> Free mobility on pre-defined walkways Cost-effective design Benefits in poor weather conditions, enhanced slip resistance Maintenance-free <p style="text-align: right;">1</p>	<ul style="list-style-type: none"> Free mobility over entire roof area Excellent slip resistance Maintenance-free <p style="text-align: right;">2</p>
Fall protection	<ul style="list-style-type: none"> High occupational safety standard <p style="text-align: right;">3</p>	<ul style="list-style-type: none"> Work in areas at edge of roof possible – no interfering contours <p style="text-align: right;">4</p>

Other roof designs are possible if the customer so requires.



Transformer fire-extinguishing systems

- Design in line with specifications/directives such as VdS, NFPA, etc.
- Transformers are protected by stationary spray deluge systems.
- Extinguishing systems are installed on all sides of the transformer, thereby forming a protective pipe cage.
- Water flow rates of 15 to 30 mm/min with an operating period of 5 minutes.
- Example: Transformer 14 x 3 x 4 m (L x W x H) → 10,000 l/min extinguishing water required
- Triggered by Buchholz relay or fire alarm



The data given in this product information corresponds to our know-how and is subject to alterations. Guarantees are only valid on individual contracts when executed by G+H Noise Control