

The Principle of Luminous Heaters

Cutting Edge and Energy-Saving Industrial Heating

Innovative. Experienced. Competent.

■ Experience for more safety

For more than 70 years, the name Schwank has stood for high-quality and cost-efficient building heating systems. As the market leader for gas-fired infrared heaters, Schwank has comprehensive experience in using cost-efficient heating systems. More than 150,000 satisfied customers and over 2 million appliances produced speak for themselves [for reference, see www.schwank.co.uk].

As a German manufacturer, we aspire to a high standard of excellence in delivering products and service of the highest quality. Each single Schwank product excels by adopting economic procedures with minimum CO₂ emission.



Luminous Heaters/12SGB/2.0711 [Technische Änderungen vorbehalten]



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The innovative principle of luminous heaters

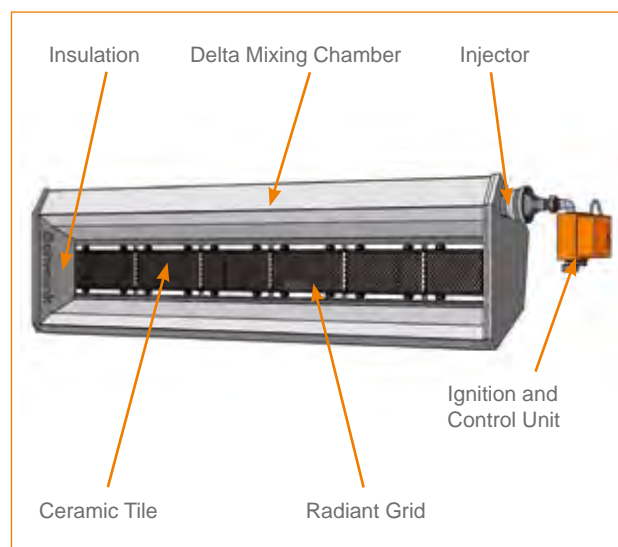
■ The Luminous Heater Technology

Luminous heaters are individual gas-fired infrared heating devices and rank among the group of decentralised heating systems. As opposed to central heating systems, decentralised heating systems are characterised by the fact that the heat is generated precisely at the place where it is needed [warehouse, workplace, production etc.]. No additional heat transfer media is required that can cause additional heat losses and sluggish adaptation processes. A luminous heater predominantly outputs infrared radiation via its brightly radiant ceramic tiles.



■ Design and Characteristics

Gas [natural gas, LP gas or biogas] flows through a nozzle. Due to the pulse of the gas jet, air required for the combustion is aspirated [Venturi principle]. Inside the luminous heater, [delta-mixing chamber] a homogeneous gas-air-mixture is formed. Via a sophisticated distribution system, the mixture is directed towards the perforated burner tiles. Each burner tile comprises approx. 3,000 passages through which the mixture enters. It then burns below the tile surface and heats up the latter to a temperature of approx. 950°C. Through a radiant grid, the efficiency is improved. An additional insulation of the housing reduces the loss of heat energy through hot air stratification below the building's ceiling. In this way, heat is transferred precisely to where it is required – the working level.



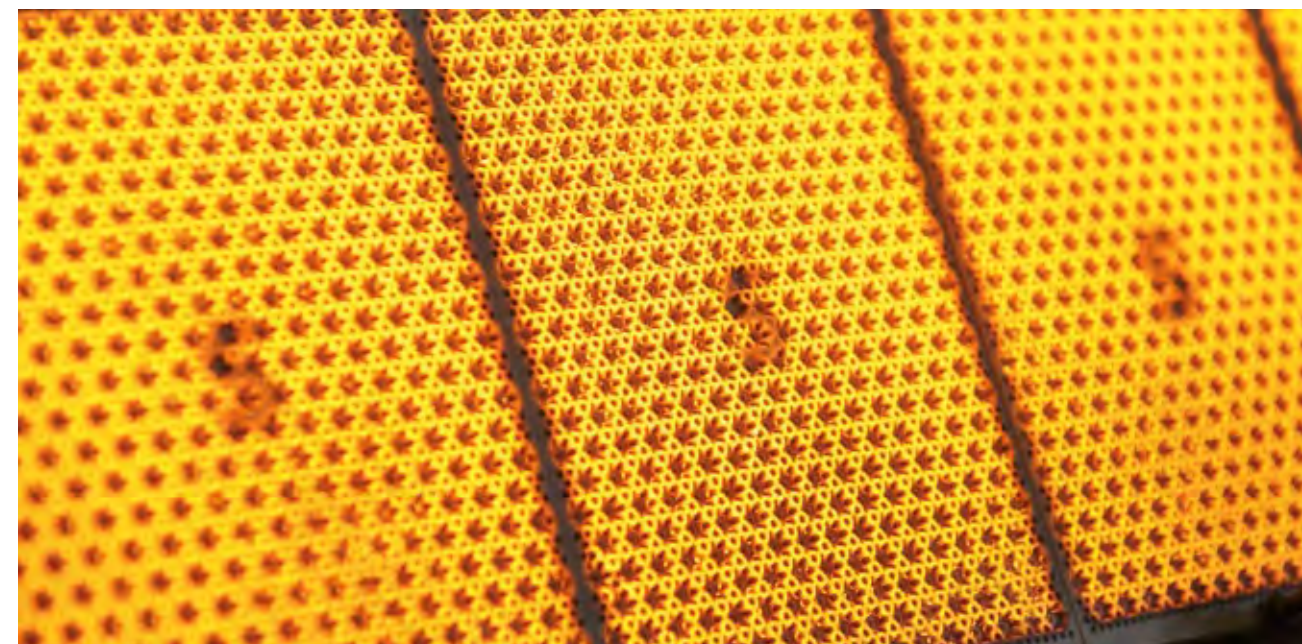
Gas-fired luminous heaters by Schwank

Market Leader in Matters of Quality and Innovator

■ Luminous Heaters – “Made in Germany”

Luminous heaters “Made in Germany” by Schwank excel at innovative detail solutions and are built to outstanding quality standards. The materials used have been carefully selected with regard to long life and preserving value. The core of the Schwank luminous heaters are the patented ceramic tiles.

As the inventor of the first ceramic burner tile and then through continued further development, Schwank is in the position to offer a burner tile with an extraordinarily high capacity and almost unlimited life cycle.



Schwank ceramic tiles at ca. 950°C



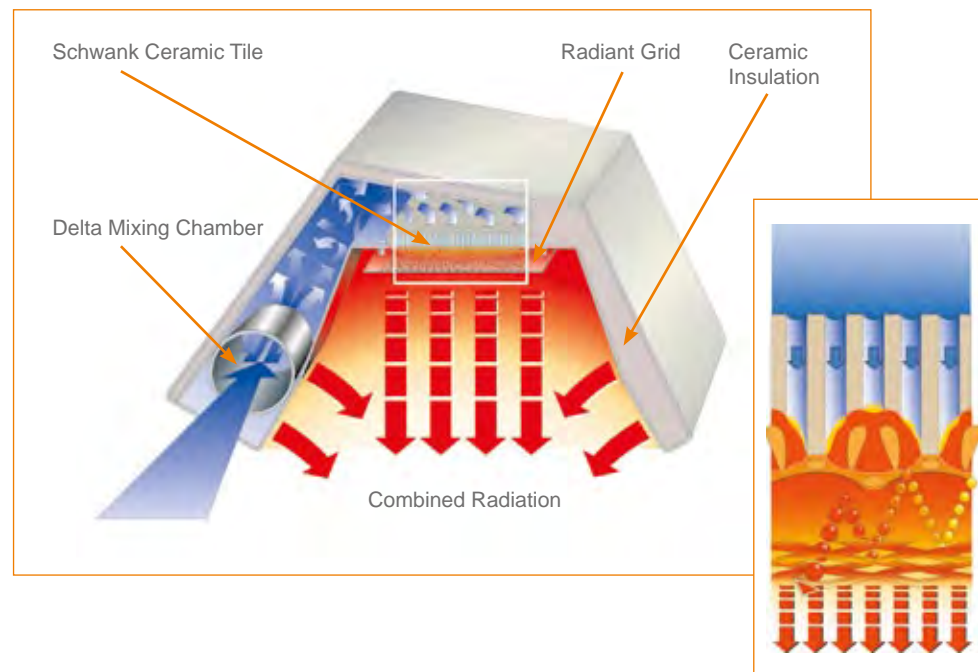
The active Principle

■ Avoiding Hot-air Stratification Below the Ceiling

Inside the patented delta-mixing-chamber, the gas-air-mixture is preheated to 300°C. Radiant grids in front of the ceramic burner tiles lead to a „ping-pong effect“ of the infrared radiation. This causes the surface temperature to rise to approx. 950°C while simultaneously reducing the gas consumption. Through the use of high quality reflector materials [reflection degree of up to 95%] the infrared rays are directed towards the occupancy level. The heated reflector also outputs infrared rays [similar to the principle of a tube heater] and in that way generates the so-called combined radiation using the hot ceramic tile.

Ceramic insulation on the back of the reflector minimises the heat loss towards the building's ceiling. An optional fully modulating operating mode matches the operation of the Schwank heaters to the actual heating requirement of the building. What is crucial to the device efficiency is the radiant factor. The radiant factor [or device efficiency] of commercial devices lies at approx. 50% to 60%. As opposed to this, high-performance devices like the supraSchwank yield factors of up to 80.9% and thus rank among the best of the best.

* Radiant factor of supraSchwank 30 measured by DVGW laboratory according to DIN EN 419-2



Delta Mixing Chamber –
Optimal gas-air-mixture,
additional thermal lift

Advantages at a Glance

■ Patented Ceramic Tile

- Low-pollutant combustion combined with high heat stability
- Special structure [depth effect] to increase the radiant power
- Operation as quiet as a whisper
- In-house development, in-house production, quality "Made in Germany"
- 1-stage, 2-stage or fully modulating control operating modes

■ Radiant Grid

- High heat resistant radiant grid made from chromium-nickel steel
- Radiated heat is reflected back onto the burner tiles [ping-pong effect] and thus increases the radiant power

■ Combined Radiation

- Combination from visible radiant heat [from burner tile] and invisible radiant heat [from reflector]
- Increase in heat emission



■ Patented Delta Mixing Chamber

- Preheating the gas-air-mixture up to approx. 300°C
- Additional increase in efficiency

■ Indirect Exhaust Gas Routing

- Optional connection to the heat recovery system hybridSchwank

■ Reflector Material and Design

- Radiation-optimised reflector geometry
- Insulation of housing through special materials [for supraSchwank] to minimise heat losses to the ceiling
- Reflection optimised reflector material [reflection degree up to 95%]

■ Radiant Factor / Device Efficiency

- Simple entry level products from 50 - 60% up to high-end systems yielding up to 80.9% radiant factor making them rank among the best of the best in the world
- Compared to standard products [as e.g. ecoSchwank], up to 38% energy costs may be saved.

* Radiant factor of supraSchwank 30 measured by DVGW laboratory according to DIN EN 419-2

Product Variety by Schwank

■ The matching technology for each application

Play it safe with luminous heaters by Schwank. Schwank offers the most appropriate industrial heating for each individual application.

Schwank luminous heaters are available in three categories: From the low priced entry level product up to the high-end product.



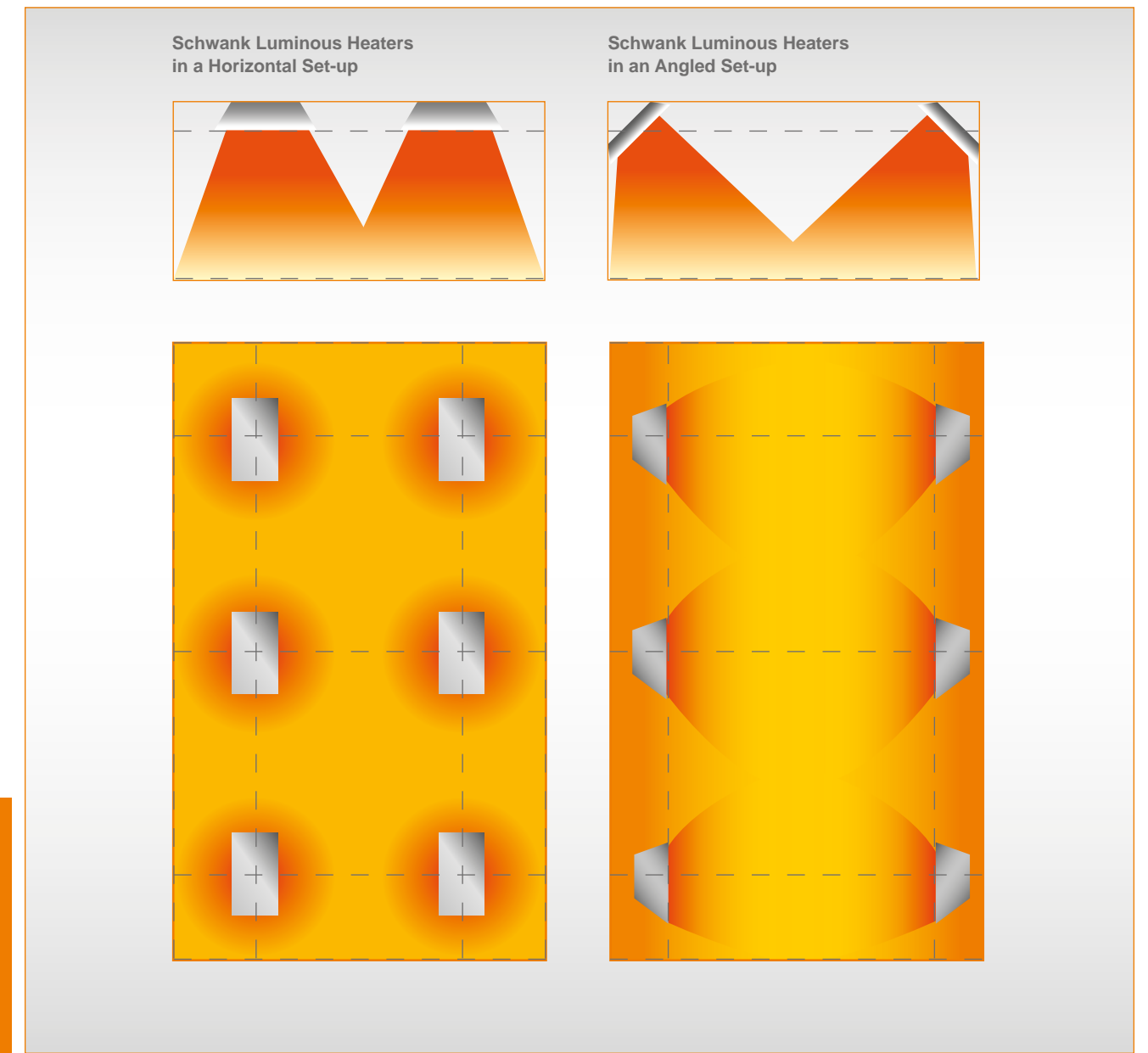
Features	ecoSchwank [basic]	primoSchwank [standard]	supraSchwank [premium]
Power types	6, 10, 13, 18, 26	10, 15, 20, 30, 40	10, 15, 20, 30, 40
Length	637 mm - 1647 mm	898 mm - 2007 mm	911 mm - 2020 mm
Patented ceramic tile	✓	✓	✓
Feran-Reflector	-	✓	✓
Patented Delta Mixing Chamber	-	✓	✓
Combined Radiation	-	✓	✓
Closed Reflector	-	✓	✓
Insulating Reflector	-	-	✓
Radiant Grid	-	-	✓
2-stage or fully modulating operation	-	✓	✓
Connection to building management technology	✓	✓	✓
Heat recovery system	✓	✓	✓
Thermal efficiency	ca. 95%	ca. 95%	ca. 95%
Radiation factor*	50,4%*	69,5%*	80,9%*

* Radiant factor of supraSchwank 30 measured by DVGW laboratory according to DIN EN 419-2

Tailor-made Consulting

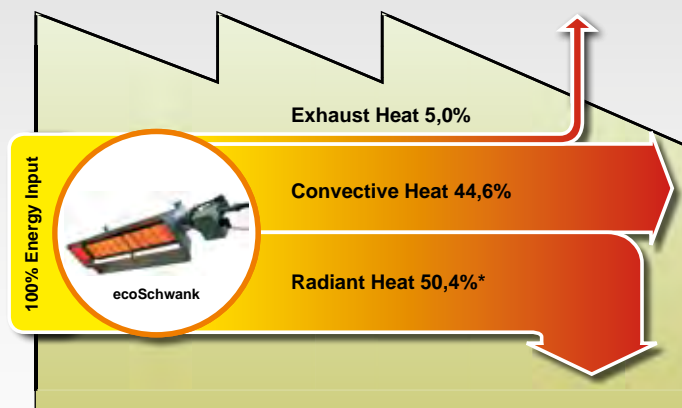
■ Project design

What is important is the uniform heat emission in the area to be heated. An uneven distribution leads to zones with low temperatures, similar to "shadows" in illumination engineering. This may make sense in some cases [storage space], but must be avoided if uniform heating is to be achieved. Our experts will be happy to provide support in planning your individual heating solution. Roughly, the design may be executed as follows:



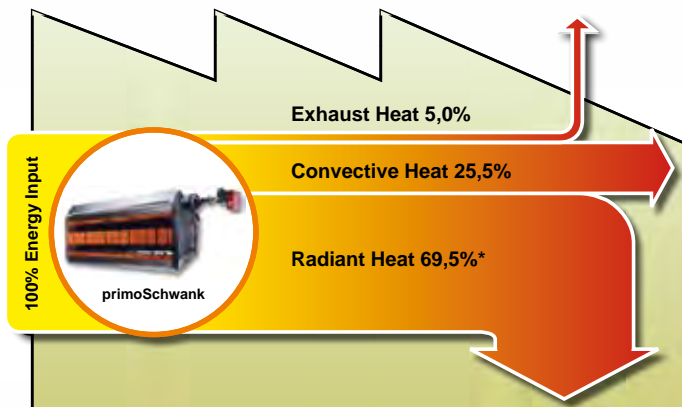
Energy flow charts of Schwank luminous heaters

ecoSchwank



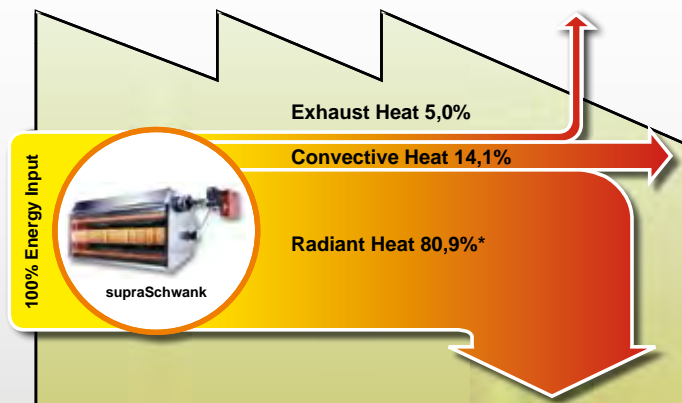
* Radiant factor of ecoSchwank 26 measured by DVGW laboratory according to DIN EN 419-2

primoSchwank



* Radiant factor of primoSchwank 30 measured by DVGW laboratory according to DIN EN 419-2

supraSchwank



* Radiant factor of supraSchwank 30 measured by DVGW laboratory according to DIN EN 419-2

Important terms for infrared heaters

How is the efficiency of a gas-fired infrared heater measured? What does radiation intensity mean and what is thermal system efficiency? Please read the answers to frequently asked questions below:

■ Thermal efficiency:

The ratio between the input power and the output power remaining inside the building. Energy losses through exhaust gas are the only factor analysed here. All infrared heaters have a thermal efficiency of up to 93% [tube heaters] or 95% [luminous heaters].

■ Radiation factor, also device efficiency:

Reflects the share of the energy converted into radiant heat in relationship to the input power inside the occupied or utility area. The higher this value, the better the energy efficiency of the infrared heater and the lower the energy costs. Especially on this point, devices differ considerably. Commercial infrared heaters start at approx. 50%, while Schwank infrared heaters offer a radiation factor of up to 80.9% [measured by DVGW test laboratory on the heater type supraSchwank 30 in accordance with DIN EN 419-2]. This is proven by a test certificate of the DBI [certified test institute] and its conformity with standard DIN EN 419-2.

■ Convection heat:

Convection heat is generated by air heating up at warm surfaces. In the case of infrared heaters, it is primarily generated by heated reflectors. However, if the reflectors are well insulated, the share of convection heat is reduced producing more radiation heat.

■ Radiation temperature / radiation intensity:

The temperature value which represents the infrared radiation. Here, the radiation intensity is measured in W/m^2 and converted to $^{\circ}C$ by multiplication with e.g. the Bedford factor. The radiation temperature may be calculated before the system installation or following the installation using special measuring sensors.

■ Room temperature / comfort temperature:

The temperature felt by people. Essentially, it is composed of the air temperature and the radiation temperature in equal shares.

Individual Solutions for your Heating Demands

Individual planning with a high standard of quality claim

Individual applications and building structures require individual solutions. From industrial or logistics buildings and warehouses up to hangars, railway

stations, outdoor venue heating or sports facilities. Schwank heaters can be found in the most varied applications.



Versatile Use

Approx. 150,000 contented customers are successfully using Schwank solutions. Energy savings of up to 50% compared to conventional systems are

not unusual. BMW for instance was able to save 47% for part of their Mini production, while the US Army even saved 71% energy at one of their bases.

