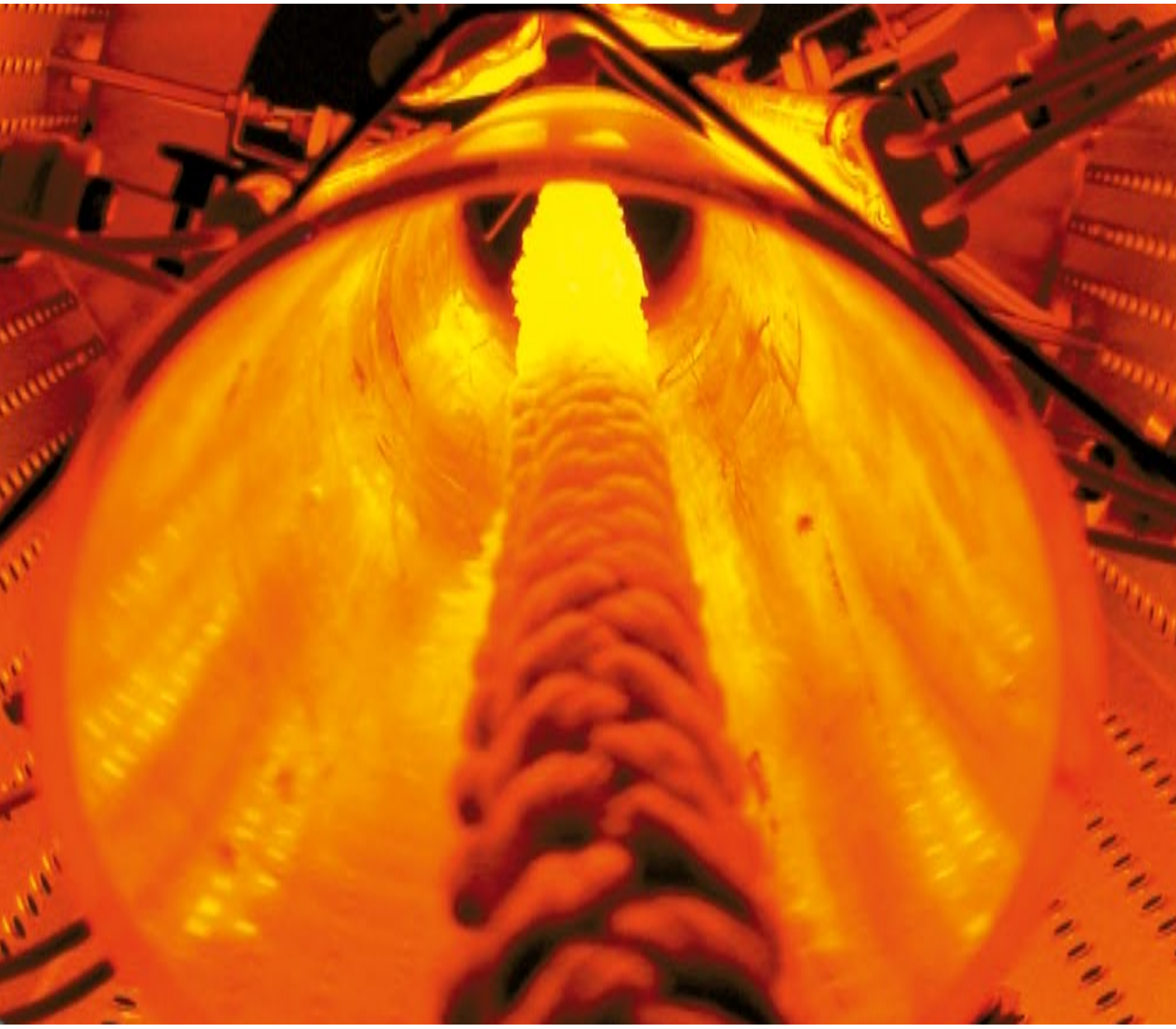
Heraeus

Infrared Emitters for Industrial Processes

Heraeus Noblelight
A Powerful Partner



Contents

Heraeus Noblelight understands the need of manufacturers to make industrial heating processes more efficient. A Heraeus heater is always matched to the process – and not vice versa. Experience with thousands of heat processes, own application centers and competent and responsive people are the foundation to make heat processes faster, more energy-efficient, space-saving and quality-orientated.

Heraeus Noblelight – Decades of experience
The origins of Heraeus Noblelight are to be found in the Heraeus Organization in the year 1899, when high purity quartz glass was melted from mountain crystal for the first time. Shortly afterwards, the world's first industrial quartz lamp was developed, which paved the way for today's light source technology.

With a background of many decades of experience, Heraeus now develops, manufactures and markets a wide range of infrared and ultraviolet emitters and components, which find application in all important sectors and areas of industry.

Modern production processes need intelligent heat
Infrared thermal technology is efficient and precise. Today there is scarcely a product which doesn't come into contact at least once with infrared radiation during its manufacture – and this is a growing trend. Consequently, it is even more important that the correct emitter is selected for every application.

Heraeus Noblelight covers the total spectrum of technically usable wavelengths and can help find the optimum light source to suit specific processes.

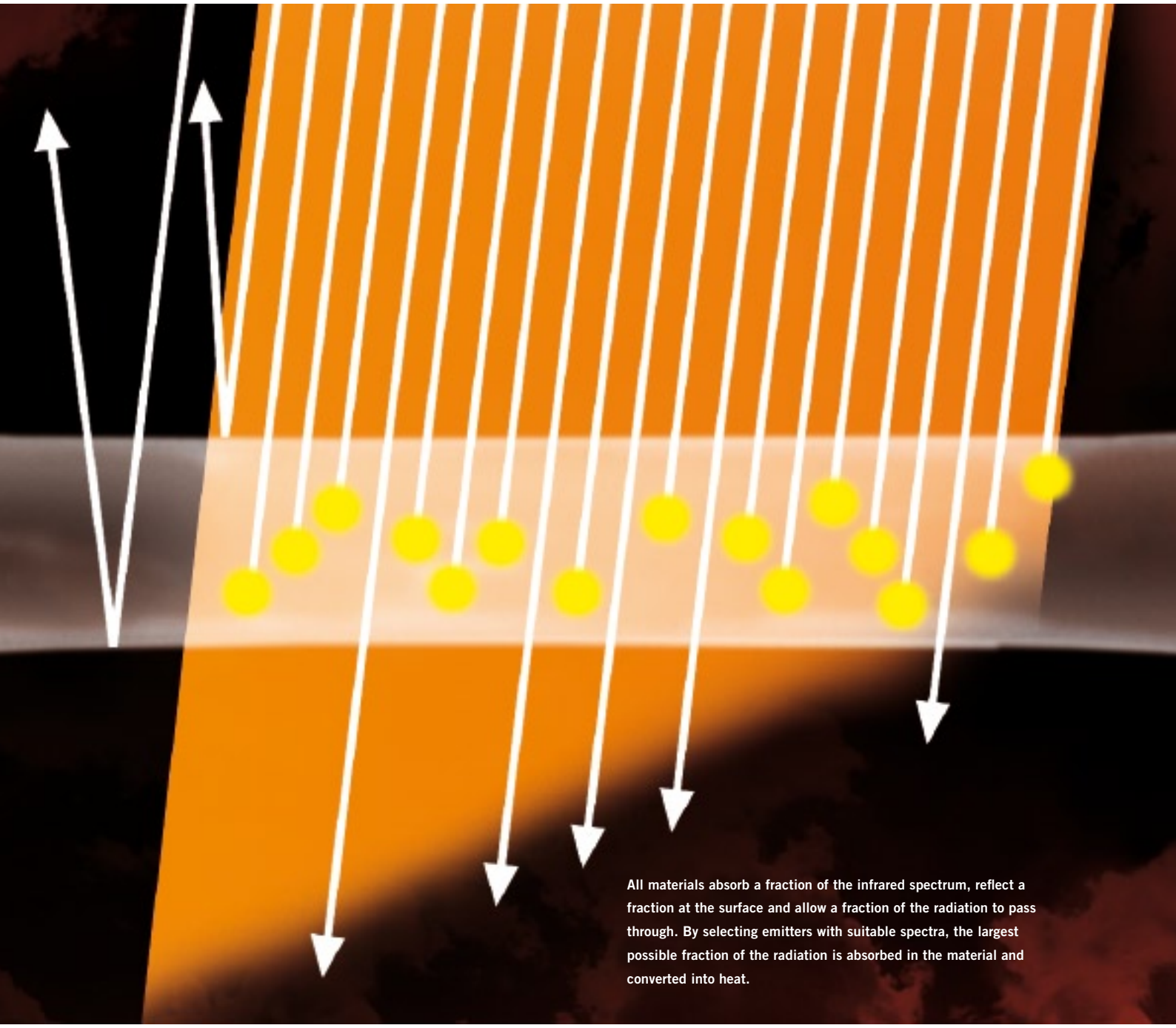
Perfectly matched infrared emitters allow heating processes to be carried out at great efficiency with the right amount of energy. Reliable and reproducible manufacturing processes save costs.

More information

Still got questions? Our CD "nearly all about infrared" contains lots of information about infrared technology and Heraeus emitters
Obtain your copy of the CD simply by e-mailing:
hng-marketing@heraeus.com

Infrared

Intelligent Heat – precise and efficient



All materials absorb a fraction of the infrared spectrum, reflect a fraction at the surface and allow a fraction of the radiation to pass through. By selecting emitters with suitable spectra, the largest possible fraction of the radiation is absorbed in the material and converted into heat.

Quartz glass infrared emitters frequently prove superior to conventional heating sources such as warm air, steam, ceramic, gas or metal emitters, because they transfer large amounts of energy very quickly and can be precisely matched to the product and the manufacturing step – the ideal heating process.

- Infrared radiation requires neither contact nor intermediate transfer medium
- Quartz glass infrared emitters are precisely matched to the materials to be heated
- Fast response times allow controllable heat
- Heat is applied precisely where and only for so long as it is required

Compared for example to warm air heating, this often means less energy consumption, higher line speed, a smaller footprint and better heating results.

To achieve successful process heating, it is important that the infrared emitter is carefully matched to the properties of the product to be heated in terms of its wavelength, its shape and its power output. Radiation which precisely matches the absorption characteristics of the product is quickly converted into heat in the product, without unnecessary heat being transferred to the surroundings. It also saves time and money if products can be transferred quickly for further processing after the heating stage.

The correct wavelength

Depending on the temperature of the heating element, an infrared emitter delivers distinctly different radiation at various wavelengths.

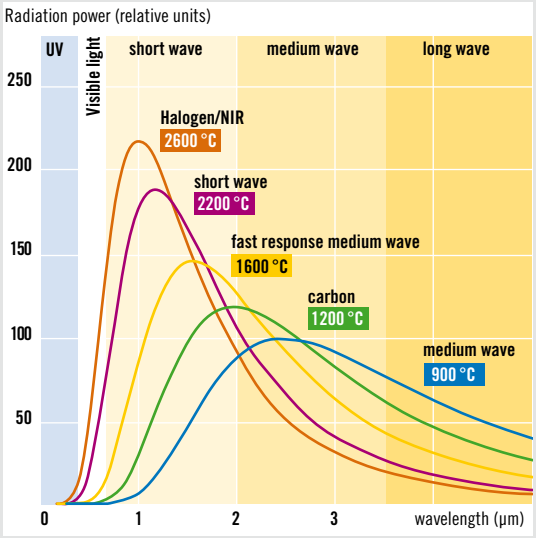
It is important to select the correct emitter for the product, as the wavelength has a significant influence on the heating process. Short wave radiation can penetrate deep into some solid materials and ensure a uniform through heating. Medium wave radiation is absorbed mostly in the outer surface and predominantly heats the surface. Medium wave radiation is particularly well absorbed by many plastics, glass and especially water and is converted directly into heat.

Proportion of heat

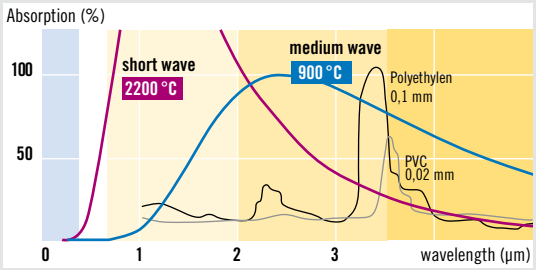
	< 2µm	2–4µm	> 4µm	Typical emitter
600 °C	2,2 %	37,2 %	60,6 %	Ceramic/Metal Sheathed
900 °C	13,0 %	46,4 %	40,6 %	Standard Medium Wave
1200 °C	26,1 %	46,9 %	27,0 %	Carbon
1600 °C	43,2 %	40,1 %	16,7 %	Fast Response Medium Wave
2200 °C	62,5 %	28,7 %	8,8 %	Short Wave
2700 °C	73,3 %	21,0 %	5,7 %	Halogen/NIR
3000 °C	77,9 %	17,6 %	4,5 %	High Powered Halogen/NIR

Correct selection of heaters

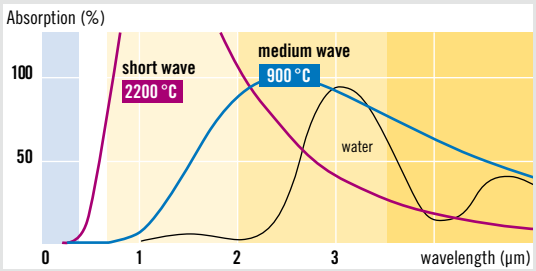
If the temperature of the heating element of a short wave emitter is greatly reduced, medium wave infrared radiation can be emitted. However, the emitter power output then drops so much that economical heating is no longer possible. Consequently, for applications in the medium wave range, only medium wave emitters should be used, as these offer five times the power out put at the same temperature.



Spectral radiation curves for different infrared emitters, normalised to the same power.



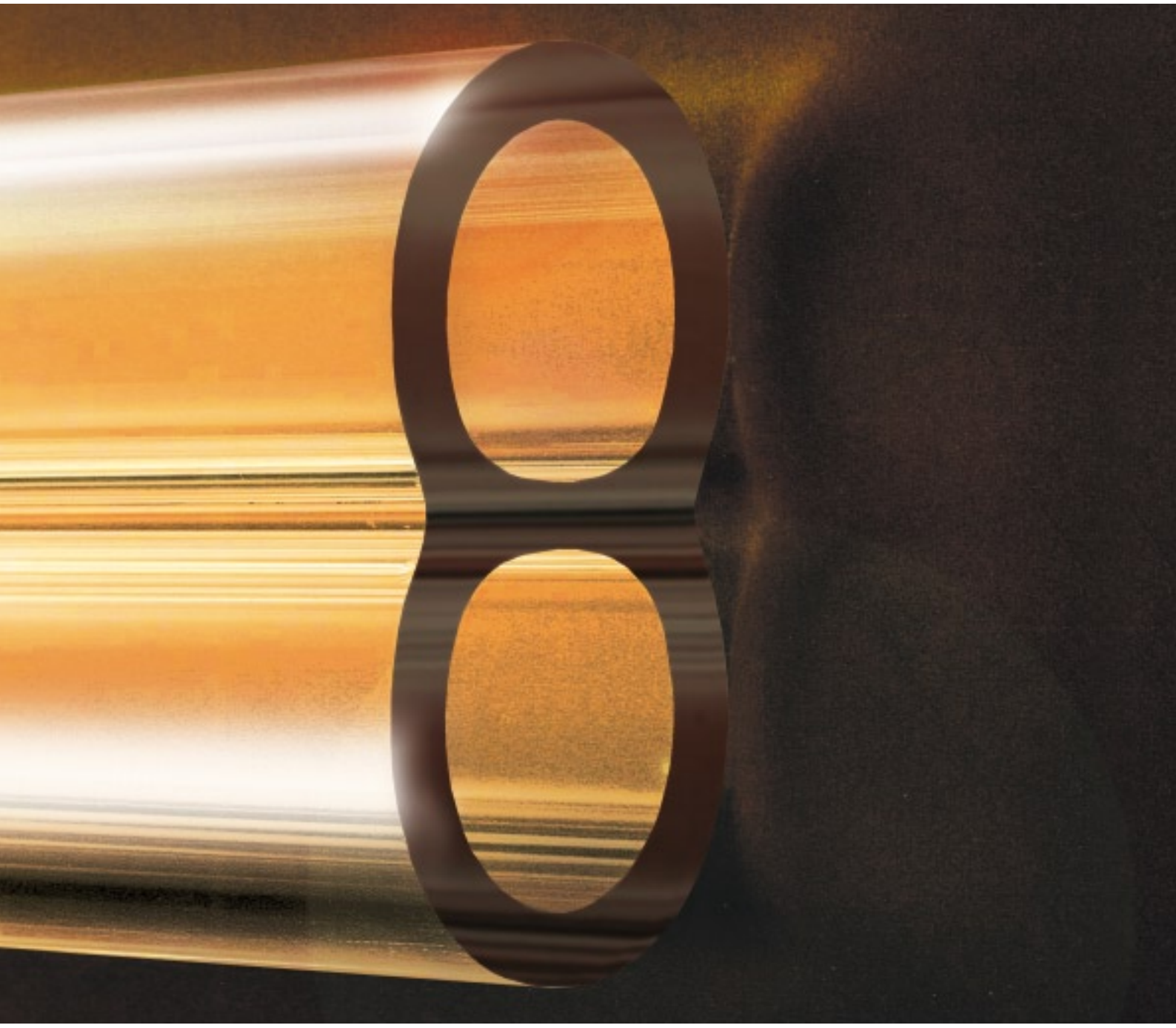
Plastics such as polyethylene and polyvinylchloride are particularly good absorbers of infrared radiation in the medium wave region.



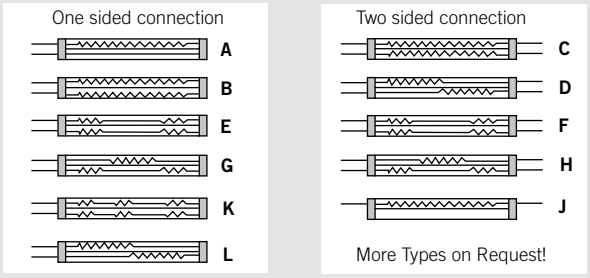
Water evaporates more quickly with medium wave infrared emitters as water absorbs radiation particularly well in this region.

Golden 8

Packaged Heat at the ready



Design of the twin tube emitter

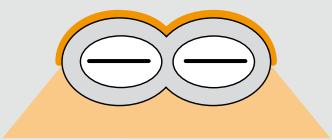


Emitter characteristics

— Robust ceramic socket

— Top quality quartz glass for good transmission and temperature resistance

— Gold reflector for directed radiation and high efficiency



— Heating filament, available in designs to suit different wavelengths

— Twin tube (the Golden 8) for high stability and twice the power, available in different lengths

Golden 8
A reliable sign of competence and quality in infrared heating: the Golden 8 is the basis of all our twin tube emitters and is the starting point for new solutions in heating processes.

Quartz Glass
Heraeus Golden 8 infrared emitters are manufactured from high quality quartz tubes. Quartz glass is very pure and provides good transmission and temperature resistance.

Twin Tube
The unique twin tube design offers high radiation power and very good mechanical stability – allowing emitters of lengths up to 6.5 metres. Emitters are available in short wave, medium wave, or fast response medium wave versions. That gives you the possibility to select the optimum wavelength for the material to be heated. Dimensions and filaments are matched to requirements.

Gold Reflector
Heraeus Noblelight offers infrared emitters which by virtue of a gold reflector can emit heat directly to the product. A gold coating on the infrared emitters reflects the infrared radiation. Consequently the infrared radiation impinging on the product is virtually doubled.

Best materials and technologies
Heraeus Noblelight has inhouse access to advanced quartz glass and gold technology in the Heraeus group. This ensures consistently high quality and performance of all Heraeus emitters and makes new developments for special needs possible.

Infrared emitters fixing innovative technical textiles

Carbon twin emitters flow and cure powder coatings efficiently

Carbon Infrared Emitters CIR®
Heraeus Carbon infrared emitters feature a unique heating filament design so that medium wave radiation offering very fast reaction times is possible. All Carbon infrared emitters CIR® offer high surface power densities and speed up heating processes at high efficiency.

Comprehensive tests have shown that Carbon emitters dry water-based coatings significantly more efficiently than short wave infrared emitters. A Carbon infrared emitter may require only up to 30% of the energy for the same drying process as a conventional short wave infrared emitter. Moreover, many materials such as glass and plastics show a decided preference for thermal radiation in the medium wave region.

Carbon emitters combine medium wave radiation at high Watts densitiy with response times in terms of seconds.

Short wave twin tube emitters are similar to halogen emitters in terms of spectrum but offer significant benefits in terms of lifetime, strength and durability.

Fast response medium wave emitters are twin tube emitters with a spectrum between those of short wave and medium wave emitters. These emitters are offered at lengths of up to 6.5m.

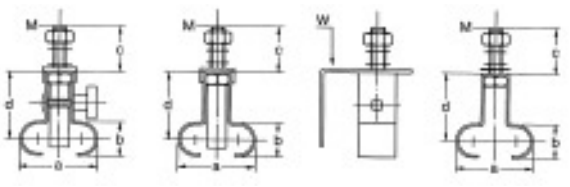
Medium wave emitters distinguish themselves with their high cost-efficiency, stability and operating life. The spectrum is suitable for heating processes in most materials.

Infrared emitters need a flexible but firm holder so that they can operate correctly

Accessories Needed For Installation

Every infrared emitter requires a clamping spring and a holding spring to ensure that the emitter is held elastically. Long emitters should be supported in the middle and medium wave emitters have a longer operating life when they are supported by a right angled safety bracket. These springs and other accessories can be found on the internet at: www.heraeus-noblelight.com/infrared on the Products/Accessories pages. For further information please contact us!

	Tube format	Dimensions					Item number
	mm	a	b	c	d	M	
Clamp Holder	18 x 8	18	8	20	25	M 5	0975 8010
	22 x 10/23 x 11	22	10	20	25	M 5	0975 8013
	33 x 15/34 x 14	33	15	25	30	M 6	0975 8016
Spring Holder	18 x 8	18	8	20	25	M 5	0975 8011
	22 x 10/23 x 11	22	10	20	25	M 5	0975 8014
	33 x 15/34 x 14	33	15	25	30	M 6	0975 8017
Central Support	18 x 8	18	8	20	25	M 5	0975 8012
	22 x 10/23 x 11	22	10	20	25	M 5	0975 8015
W = Safety Right							
Angle Support	33 x 15/34 x 14	33	15	25	30	M 6	0975 8018



Technical data

Twin tube emitter	**Short wave**	**Fast response medium wave**	**Medium wave**	**Carbon**
Max. specific power W/cm	< 200	80	18/20/25*	80
Max. heated length mm	6400/2400*	6400/2400*	1500/2000/6500*	3000
Cross-section mm	34 x 14	34 x 14	18 x 8	34 x 14
	23 x 11	23 x 11	22 x 10	
			33 x 15	
Filament temperature °C	1800–2400	1400–1800	800– 950	1200
Peak wavelength µm	1.0–1.4	> 1.4	2.4–2.7	2
Max. surface power density kW/m²	200	150	60	150
Response time s	1	1–2	60-90	1–2

* Depending on cross-section

Golden 8 standard emitters

	Power [Watts]	Voltage [Volts]	Heated length [mm]	Total length [mm]	Emitter type	Item number
Medium wave	500	230	300	400	B	09752439
	1000	230	500	600	B	09755167
	2000	230	800	900	B	09755054
	2500	230	1000	1100	B	09755255
	3250	230	1300	1420	B	09753187
	3750	230	1500	1600	B	09754585
	4100	400	1700	1800	B	09754863
	4500	400	1800	1920	B	09754783
	5750	400	2300	2400	B	09756083
	6250	400	2500	2600	B	09753874
	2500	230	1200	1300	C	09753923
Short wave	3000	400	1000	1100	A	09751720
	600	115	80	145	B	09751713
	1500	230	200	300	B	09751751
	1200	230	340	405	B	09751741
	3000	400	500	600	B	09751740
	3000	400	500	600	B	09751340
	3000	230	500	650	C	09751761
	4200	230	700	850	C	09751765
	6000	400	1000	1150	C	09751760
	7000	400	1300	1450	C	09751731
Carbon	4600	230	600	745	B	45134868
	4000	230	700	845	B	80009221
	8000	400	1000	1145	B	45134870
	7800	400	1100	1245	B	80012442
	9000	230	1250	1400	C	80012443

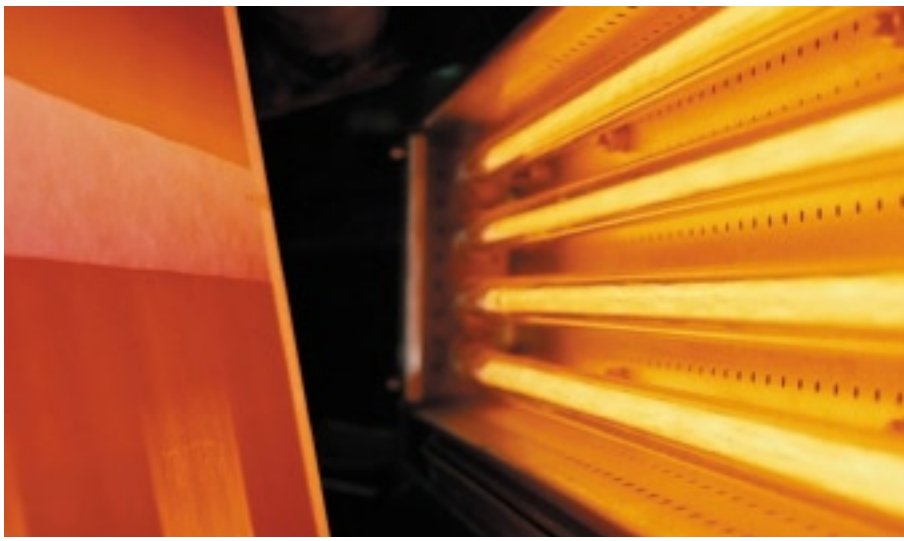
Specials available on request!

Starting current

When switching on an emitter, it can reach peak current in a very short time. This needs to be considered when designing your system. For further information please contact us!

Emitter type	**Element temperature**	**Switch-on current factor**
SW	1800-2400 °	12–17
FRMW	1400–1800 °	10–13
MW	800–950 °	1–1,05
Carbon	1200 °	0,8

Round Tube Emitters



Technical data

	Carbon round tube IR emitter
Max. specific power W/cm	40
Max. heated length mm	1500
Cross-section mm	19
Filament temperature °C	1200
Peak wavelength µm	2
Max. specific power kW/m²	100
Response time s	1–2

For many applications, an infrared emitter consisting of just a heating element in a quartz tube is the perfect choice. Such emitters are, in the main, shorter than twin tubes. Obviously, round tube emitters can also be fitted with a gold reflector.

Halogen short wave (NIR) radiation
is provided by halogen infrared emitters with a spectrum in the near infrared region, a maximum power density of 1 MW per square metre and very fast response times. These emitters are manufactured in top quality quartz glass and are conventionally round tubes. An optional gold reflector can virtually double the amount of effective radiation drop out on the product.

Round tube standard emitters

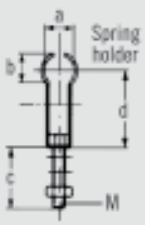
Power [Watts]	Voltage [Volts]	Heated length [mm]	Total length [mm]	Diameter [mm]	Item number
Carbon round tube emitter (without gold reflector)					
1000	57,5	300	430	19	45132877
2000	115	600	730	19	45132876
Carbon round tube emitter (with gold reflector)					
1000	57,5	300	430	19	45132828
2000	115	600	730	19	45132833
4000	200	1000	1145	19	45134446
Short wave round tube (without gold reflector)					
500	115	120	270	10	09741010
1000	230	290	415	10	09741020
3000	400	640	800	10	09741030

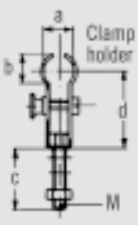
Halogen Short Wave/NIR

Carbon round tube

Clamp and holding springs
Every infrared emitter needs a clamping- and holding-spring to ensure that the emitter is held correctly.
For further information please contact us!

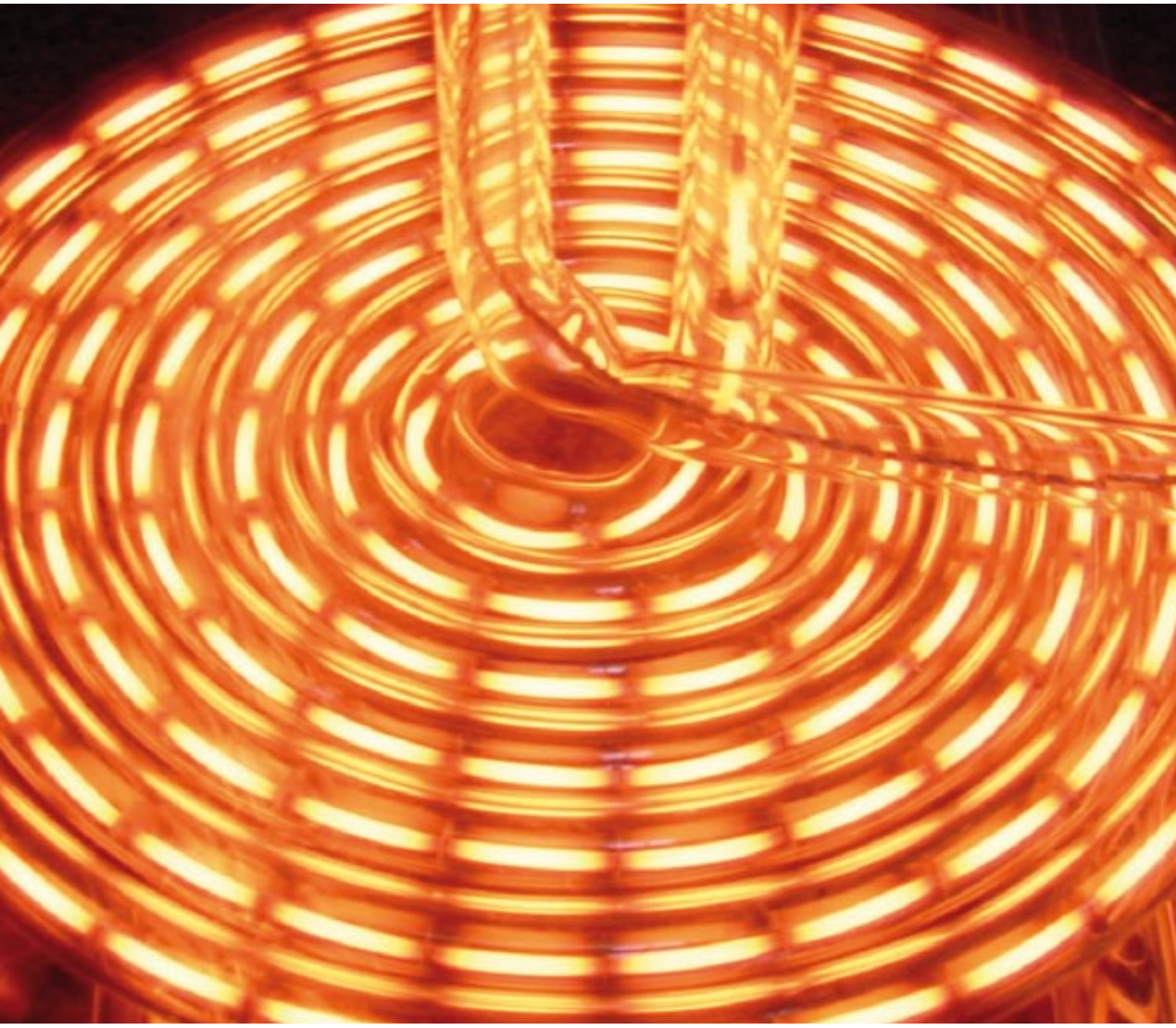
Tube format mm		Dimensions mm					Item number
		a	b	c	d	M	
Spring holder	10	10	10	20	25	4	09 759 292
	19	19	19	25	30	6	45 106 267
Clamp holder	10	10	10	20	25	4	09 759 293
	19	19	19	25	30	6	45 106 266





Special Emitters

Heat precisely where it's needed



Edges, corners and contours are followed exactly and heated in a focused manner

Infrared emitters need not always be long and straight. We are guided totally by the product and process

When riveting two components together, an Omega emitter only has to heat the rivet and not the whole component

Heraeus infrared emitters are precisely matched to the relevant production process. They heat large surfaces as well as small edges. The potential for flexible design also allows emitters to be produced to match complex geometry work pieces and because infrared emitters can be switched on and off in seconds, they allow significant savings in both energy and operating costs. Plastic components are welded, riveted or de-burred efficiently within seconds because heat can be rapidly and precisely applied to the right place.

All these emitters can be designed in terms of shape, size and spectrum to suit the relevant process. Heat is then generated precisely where it is required. Energy losses to the environment are incredibly small and production process times can be reduced or more parts can be produced in the same time.

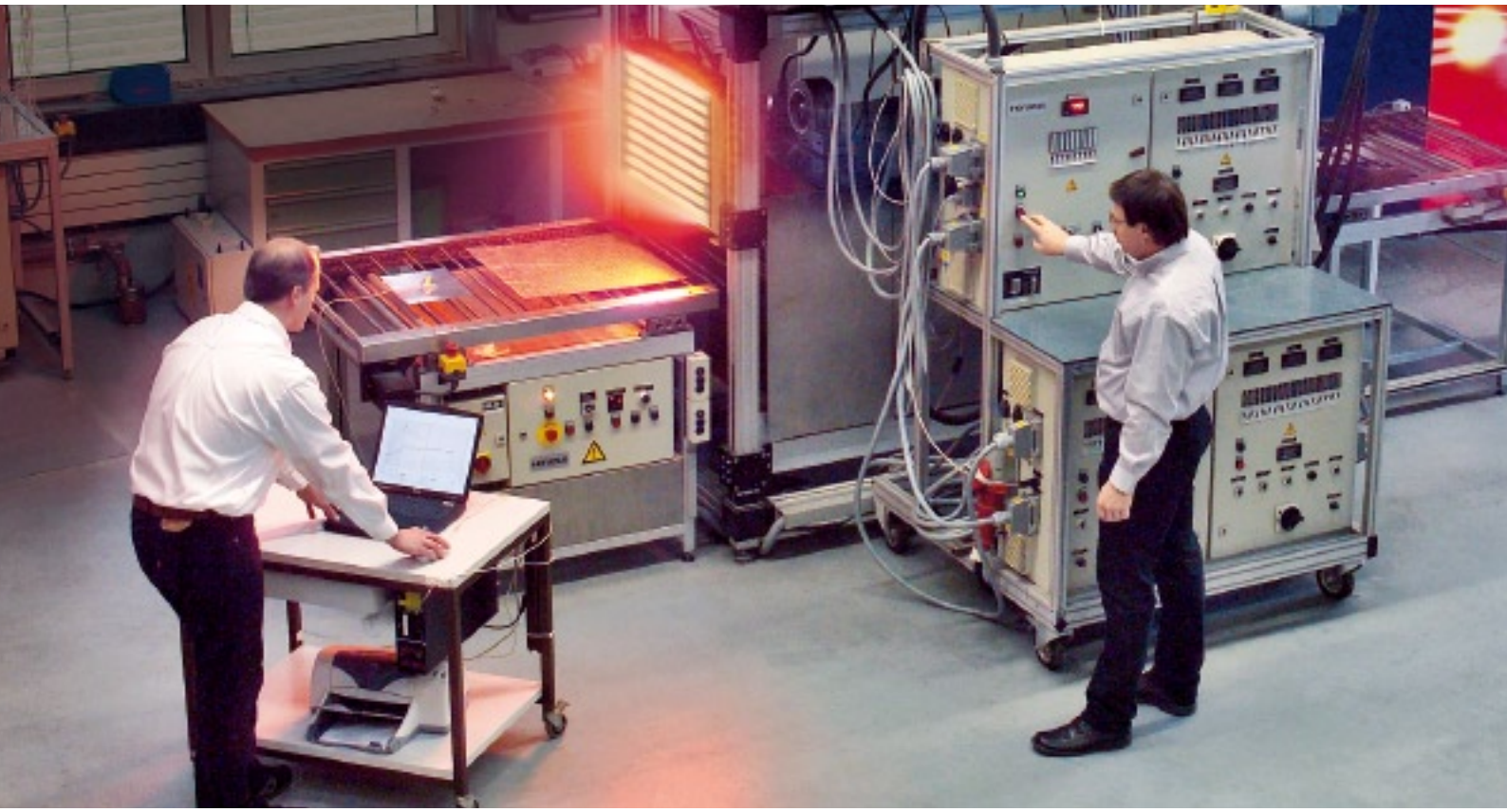
Emitters for vacuum processes
Heating for production processes under vacuum conditions is a real industrial need, which conventional heating methods, such as warm air ovens, cannot meet. Infrared emitters transfer heat without the need for an intermediate medium. Infrared emitters with quartz reflectors working in vacuum focus the heat precisely on the product. They can even be used when acids or alkalis are present and under other extreme process conditions.

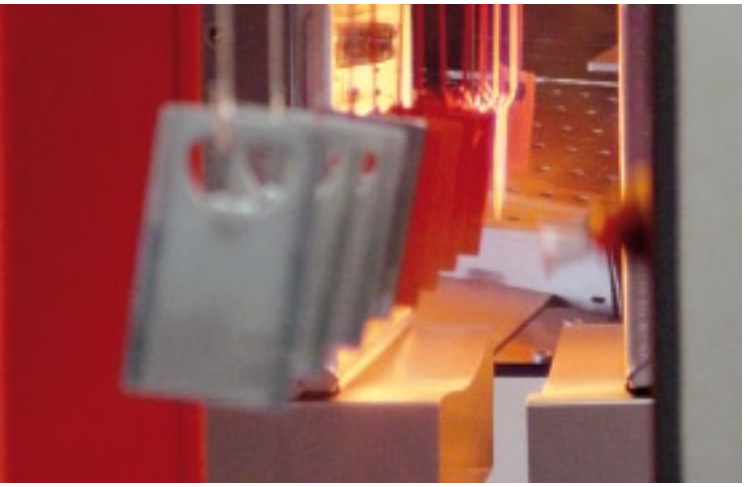
Contoured emitters
Individually shaped emitters can follow work piece corners and edges to allow any required bending process or for the local activation of adhesives.

Small surface emitters
Short wave emitters heat complex geometries so that two surfaces can be joined without adhesive.

Omega emitters
Circular short wave emitters for hot staking. With heat up and cooling times in terms of seconds, very short process times can be realised.

Application Center
Practically-based Support





There is scarcely a product manufactured which does not pass at least once through a heating process during its manufacture. Coatings are dried, adhesives activated and plastics heated before forming.

More efficient heating processes are achieved by better energy utilization. As a result, heating is shorter, in terms of time or in terms of space requirement, so that the complete production plant is more cost-efficient.

You have to understand the different applications to exploit infrared heating productively. Heraeus Noblelight has set up Applications Centers to increase its knowledge through investigations and tests and to share experiences with customers. With its Application Centers, Heraeus offers all its customers the opportunity to answer important questions, from a practical rather than a merely theoretical viewpoint:

- Can my process be optimized with infrared?
- Is my material suitable for infrared?
- Which emitters are best suited to my process?
- How should these emitters be designed?
- How can they be integrated into my production process?

Application examples:

Modern textiles need modern heat

High quality technical textiles must be perfectly fixed and coatings on webs must be dried as quickly as possible. Demands are ever increasing and heating processes must keep pace. Infrared transfers heat precisely where it is needed, quickly and at high power.

Better processing of foodstuffs with Carbon emitters

Carbon infrared emitters can be used to brown the breadcrumb topping or other garnishing on ready meals, without cooking the meal through. Carbon emitters prove more efficient than conventional heating sources, saving energy and valuable production space, as well as minimizing maintenance costs.

More efficient car manufacture

Increasing competition forces finishing and coating departments in the automotive industry to reduce energy costs and shorten manufacturing times. Infrared modules can be fitted before existing drying ovens to bring the product quickly to the correct temperature before the existing drying oven holds the product at this temperature for as long as necessary. This arrangement helps to maintain production throughput and, frequently, increase it.

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