System Data Sheet.

Infrared Drying.

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Infrared technology.

Electromagnetic radiation at a wavelength of 780 nm to 1 mm is known as infrared light, and is invisible to the human eye. When infrared light strikes an object, heat is generated without the air between the light source and the object being heated at the same time. In practice, however, not all the light emitted is converted into heat.
The ability of the object to absorb this light is dictated by its molecular structure.

Three effects can be noticed:

Reflection.

Part of the light striking the surface is reflected. This reflected light therefore does not penetrate the object and so has no effect.

Transmission.

Some of the light that is not reflected passes straight through the object. This light has no effect on the object either.

Absorption.

The light remaining after reflection and transmission is absorbed by the object and converted into heat.

A paint film can also absorb infrared radiation to a greater or lesser extent. The absorbed light is likewise converted into heat, thus causing the paint film to dry.

The following advantages have aroused great interest in the use of infrared technology to accelerate the drying of paint materials in vehicle refinishing.

- Less energy is required (heat is only generated where it is needed).
- No heat is lost in the air between the light source and the object.
- The drying process is shorter (infrared light is available immediately when the heater is switched on).
- It adapts perfectly to the shape of the object to be dried
- Investment costs are lower and less equipment is required.
- It is environmentally friendly and safe to use.

Short- and medium-wave infrared heaters with the following characteristics have been specially developed for the vehicle refinishing sector:

	Medium wave	Short wave
Type	quartz tube	quartz tube
Wavelength	2.6 µm	1.2 µm
Operating	950 °C	2200 °C
Energy density	60 KW/m²	100 KW/m²
Process temperature	500 °C	600 °C
Radiation heat	55%	80%
Convection heat	45%	20%
Heating-up period	30 s	1 s
Life	years	5000 h

Long-wave infrared heaters are less suitable for the fast drying of paint materials, as their heating and cooling times are on average 10 minutes longer (depending on the type).

Important points to consider when using infrared

- The shorter the wavelength, the deeper the radiation penetrates the paint film.
  The paint film dries from bottom to top.
- The shorter the wavelength, the greater the radiation heat and the heat transfer rate.
- The darker the colour of the paint, the higher the absorption of radiation, i.e. the hotter the paint film becomes.
- With metallics and light colours, the loss of energy by reflection is greater, and rises with increasingly shorter wavelengths.

Equipment.

The handling and operation of an infrared heater is simple. The machine is placed in position and the required drying time, and if necessary the power level, is set. The machine switches off automatically, signalling the end of the drying process.

Various forms of heater are available to cater for various sized and shaped objects.

Stand-mounted heaters, with one or two cassettes, for drying small to medium-sized objects.

Heaters with four cassettes, to be mounted on overhead or side wall rails in the spray booth, for drying larger areas.

A paint curing arch is suitable if a conventional drying booth is to be completely dispensed with.

General information.

The instructions for use provided by the manufacturer of the equipment must be followed.

Defects in the paint film such as blisters or peeling can occur if the object is overheated.

Frequent causes are:

Insufficient distance between light source and object

Excessively high power with dark colours

The best drying conditions have to be determined individually. As a basis, the table overleaf shows the drying times required for various systems at a distance between source and object of 80 cm, both for short- and medium-wave and at the appropriate power levels.

Recommended Infrared Drying Times

	medium wave (*1)		short wave (*2)		
Minutes	Flash-off	Drying time	Flash-off	Drying time	Drying time
Distance to object: approx. 80 cm		100% power		50% power and then	100% power
Priming materials					
Raderal® IR Premium Putty 2035	—	5	—	3	—
Raderal® Spray Polyester 3508	5	15	5	10	—
Permasolid® HS 2K surfacer	5	10-12	5	2	8
Priomat® 1K Wash Primer 4085	5	4	5	4-5	—
Permasolid® SpectroFlex 5400					
dark colours **(max. 120 µm)**	5-10	10-15	5-10	2	8
light colours **(max. 150 µm)**	5-10	10-15	5-10	2	8
Permahyd® Base Coat Series 280 **Permahyd® Pearl Base Coat Series 285**					
dark colours	—	3	—	2	—
light colours	—	4-6	—	3-4	—
HS Automotive Top Coat Series 275					
dark colours	5	12	5	12	— (*3)
light colours	5	15	5	5	10
Permasolid® 2K clear coats					
dark base coat	5	13-16	5	13-16	— (*3)
light base coat	5	15-18	5	3	10

(*1) Manufacturer: Heraeus, type: SH 4 Output: 3.0 KW
(*2) Manufacturer: IRT, type: IRT 202 Output: 8.0 KW
(*3) Danger of blisters or pin-holes if overheated

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The relevant Material Safety Data Sheet and Warnings displayed on the product label need to be observed.

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