

Heraeus Noblelight (1_2017)

New MAX Infrared Oven is Five Times Faster For Glass Tempering

Fast Homogenous Heating Saves Time and Valuable Space

Packaging glass for medications or tablets must be tempered after it is heat-formed, otherwise thermal stresses can lead to glass bottles or ampoules cracking or shattering. The new MAX infrared oven carries out this stress-relieving process in a very homogenous IR radiation field within minutes in contrast to conventional heating processes. As opposed to conventional ovens, the IR method saves significant time and space. For example, the oven needs to be only two meters long for continuous, production line type operations and eliminates the need for long heat-up and cool-down periods associated with ovens providing batch operation. Compared with conventional electric heating methods, glass-heating with a MAX is five times faster and cuts energy consumption by 90%.

Medication, tablets and pills are packaged in small glass bottles or ampoules. These need to be safe and clean but the special shape of this glass packaging makes its manufacture something of a challenge. The glass is formed under heat, which means there are residual thermal stresses. Before they are put into use, these thermal stresses must be removed, otherwise there is a danger that the glass will crack. Stress relief is achieved by tempering. This involves a controlled heating to around 600°C, depending on the type of glass, followed by a slow cool-down. Various technologies can be used for this heating process, including induction ovens and conventional fireclay-clad ovens for batch operation and convection- or standard infrared ovens for high volume continuous operations. A new development is the MAX infrared oven, which offers significant user benefits.

The MAX Infrared Oven – Precisely tailored to meet customer needs

Tempering packaging glass with warm air takes up valuable time and space. As warm air transfers only a limited amount of heat, warm air, or convection, ovens need to be quite long for continuous operations. Batch ovens must be heated up for a long time and then allowed to cool until it is safe to remove the tempered glass.

The new MAX infrared oven from Heraeus is superior to both techniques, as, because of its design, it transfers the energy required in a very short time. With its unique combination of radiation, convection and reflection, heating is especially fast.

In contrast to the fireclay-lined oven, both the process chamber and the feeder system of the new MAX oven are made of pure quartz material. On

one hand, this is extremely resistant to thermal shock and on the other hand it minimizes the possibility of the glass containing unwanted particle impurities.

In cannulas or glass bottles the base is relatively thick and the walls comparatively thin. Consequently, base and walls are heated at different rates. The QRC material used in the MAX oven is made up of quartz glass with a micro- and nano structure so that the infrared radiation is diffused to provide a particularly homogenous heating effect.

Tempering within a few minutes

In order to temper the glass products, they are passed into the MAX oven, heated to 600°C and held for a short time at this temperature. They are then removed from the oven and cooled in a controlled manner. Tests in the Heraeus Applications Centre in Kleinostheim have established that when glass is heated at a rate of 50 degrees C temperature rise per second then the complete tempering process, including cool-down and dependent of sample geometry, can be completed in around five minutes. By using a polarity meter, it was then shown that the stresses in the glass could be successfully removed.

The test oven had a power of 15kW, so that the temperature was held constant at the 600°C necessary for the glass tempering. Juergen Weber, development manager at Heraeus, points out another benefit, "Our calculations also showed that with this oven it is potentially possible to temper around 1000 glass products, at just 15 kW, within one hour!"

MAX Infrared Ovens Save Energy

All MAX infrared ovens share the same compact construction with specially-developed IR mirrors in the process chamber. Energy is then utilized more efficiently because the infrared radiation is reflected in an optimal fashion within the oven. In addition, the natural convection has an extra heating effect.

All tests with customers' own material in the Applications Centre have delivered compelling evidence that, compared with conventional electrical heating methods, the MAX oven is five times faster and, at the same time, uses only one-fifteenth of the energy (over 90% less).

Consequently, the tempering process time can be reduced. This greatly increases the energy efficiency and lowers the operating costs. MAX infrared ovens also allow system solutions as computer simulation in the design phase help to create the most efficient heating process.

MAX ovens can be located in a modular fashion in series and individually controlled, to allow for rapid product change-over. The compact ovens are also easily connected with feeder systems, and if necessary, these can be of quartz glass.

Heraeus, the technology group headquartered in Hanau, Germany, is a leading international family-owned company formed in 1851. With expertise, a focus on innovations, operational excellence and an entrepreneurial leadership, we strive to continuously improve our business performance. We create high-quality solutions for our clients and strengthen their competitiveness in the long term by combining material expertise with technological know-how. Our ideas are focused on themes such as the environment, energy, health, mobility and industrial applications. Our portfolio ranges from components to coordinated material systems which are used in a wide variety of industries, including the steel, electronics, chemical, automotive and telecommunications industries. In the 2015 financial year, Heraeus generated revenues without precious metals of €1.9 bn and a total revenue including precious metal of €12.9 bn. With approximately 12,500 employees worldwide in more than 100 subsidiaries in 38 countries, Heraeus holds a leading position in its global markets.

Heraeus Noblelight GmbH with its headquarters in Hanau and with subsidiaries in the USA, Great Britain, France, China and Australia, is one of the technology- and market-leaders in the production of specialty light sources and systems. In 2015, Heraeus Noblelight had an annual turnover of 158.3 Million € and employed 828 people worldwide. The organization develops, manufactures and markets infrared and ultraviolet emitters, systems and solutions for applications in industrial manufacture, environmental protection, medicine and cosmetics, research, development and analytical measurement techniques.

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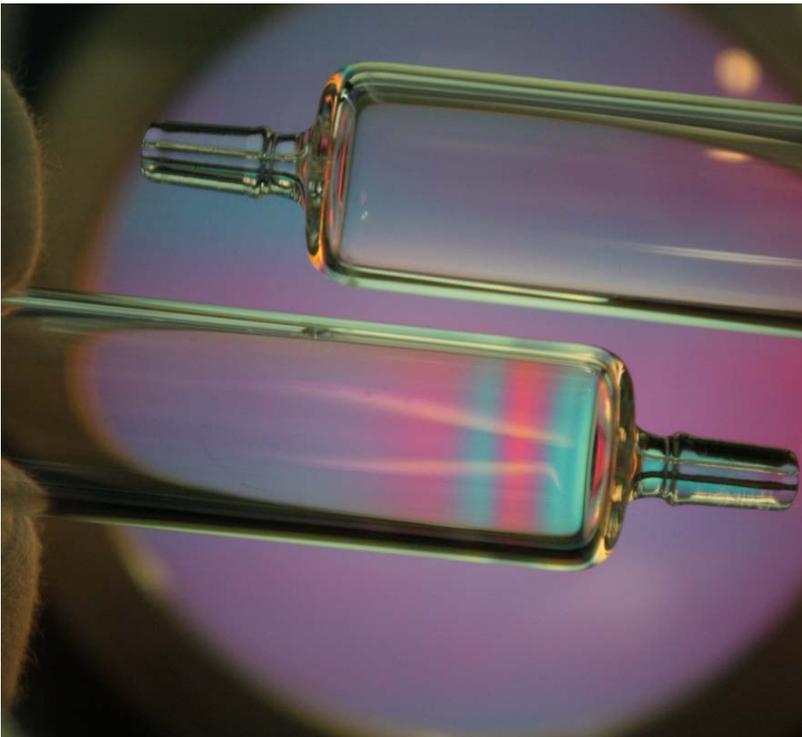
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Pictures



Tempering with the MAX Infrared Oven saves time and space



Polarity meter shows residual stresses below cannula and a stress-free cannula in the top