

# INEX Inc.

## Innovators in Radiant Tube Technology

In 1983, a company was founded for one reason and one reason only: to provide longer-life and higher heat flux radiant tubes to the heat-treating industry using a patented silicon/silicon-carbide composite material.

Now, three decades later, that same company is thriving by doing exactly what it set out to do. INEX Inc., which is celebrating its 30th anniversary this year, designs and manufactures radiant tubes. In fact, the Holland, N.Y.-based company is the sole producer of Si-SiC composite radiant tubes in the world.

INEX's U-tubes and SER (single-ended recuperative) and EGR tubes are currently highest in demand throughout the industry, but the company regularly provides many of the original straight-type tubes that are commonly used in older-style Ipsen and similar furnaces. Its internally finned tubes are a unique, higher-efficiency design often used to upgrade over the older straight type.

INEX radiant tubes are manufactured using a patented melt-infiltration process, which produces tubes directly from the raw materials in just two steps. Standard tube sizes range from 1-6 inches in outer diameter with single-piece lengths up to 96 inches. Multiple tubes can also be joined to 200 inches in overall length by silicon brazing.

INEX composite radiant tubes last indefinitely. Why? Because when properly installed, many life-limiting problems are eliminated, including:

- Creep (no deformation, distortion, sagging, rupture)
- Carburization (no embrittlement fracture)
- Thermal shock (no ramp-up delays)
- Weld failure
- Oxidation (no scaling)

INEX composite tubes have a maximum service temperature of 2450°F

(1340°C) and operate with twice the heat flux of common heat-treating alloys, typically to 110 BTU/hr-in<sup>2</sup> (50 KW/m<sup>2</sup>). This allows furnace cycles to be shorter, increasing both throughput and productivity. There are also advantages over metal alloys in terms of better thermal conductivity, thermal expansion and weight.

One of the reasons INEX has been around for 30 years is because of its business model. Namely, the company's goal is no replacement business. Ideally, Si-SiC composite radiant tubes last the life of the furnace ... or at least the life of the furnace refractory. Unlike all metal alloy tubes, which typically fail in just two years carburizing service, INEX tubes last indefinitely (most over five years, some over 15). This all adds up to a minimum of repeat business. INEX instead focuses its efforts on new customer relationships and new furnace installations, expanding the user base of its products year by year.

Who are INEX customers? About half are commercial heat treaters, which perform contract processing of everything from fasteners to sophisticated aerospace components. The balance is captive heat treaters, which process their own manufactured products in-house. Recently, however, additional users in the aluminum, energy and heat-transfer industries are discovering the advantages of Si-SiC composites over conventional heat-resistant metal alloys.



In any given year, INEX supplies radiant tubes to hundreds of customers, both large and small. Some are very well-known industry leaders, while others are family-owned heat-treat shops. Despite company size and revenue, INEX pays close attention to each client's needs with long service-life objectives in mind. The focus is always on what's best for the end user.

At the beginning of 2013, INEX's new silicon-brazed joining technology was expanded across the entire SER and EGR product line, replacing the former refractory cement construction. These integral Si-SiC composite joints for flanges, end plugs and EGR centering pins have had zero defects in field testing since first introduced in 2008.

What began as a strategic partnership with the Gas Research Institute 30 years ago has turned into an ever-evolving business, from straight-type to internally finned tubes, then to SERs and EGRs and now to advanced-performance U-tubes. And end users often request new product features that gradually develop into new radiant tube products, such as non-scaling protection tubes for electrical heating elements that eliminate shorting.

Continuous improvement is still the name of the game as INEX pursues the practical goal of longer life in heat-treating furnace environments. Visit [www.inexc.net](http://www.inexc.net) for more information.

