

Suppressing CO₂ emissions with nuclear power generation and the Sumitomo Steam Generator Tube, which has high reliability and strikes a balance between high corrosion resistance and high strength

Heat Transfer Tube for Steam Generator for PWR

Features

- High corrosion resistance suitable for use in a PWR (pressurized-water reactor)
- High-strength SG tube (heat transfer tube for steam generator) has long-term reliability even under high-temperature, high-pressure conditions and can detect deterioration with age at an early stage.
- Used for nuclear power generation to save approximately 120 million tons of CO₂ emissions per year compared with LNG-combined thermal power generation (calculated on the condition that the operation rate of the nuclear power plants in Japan is 68% and that in the rest of the world is 50%).



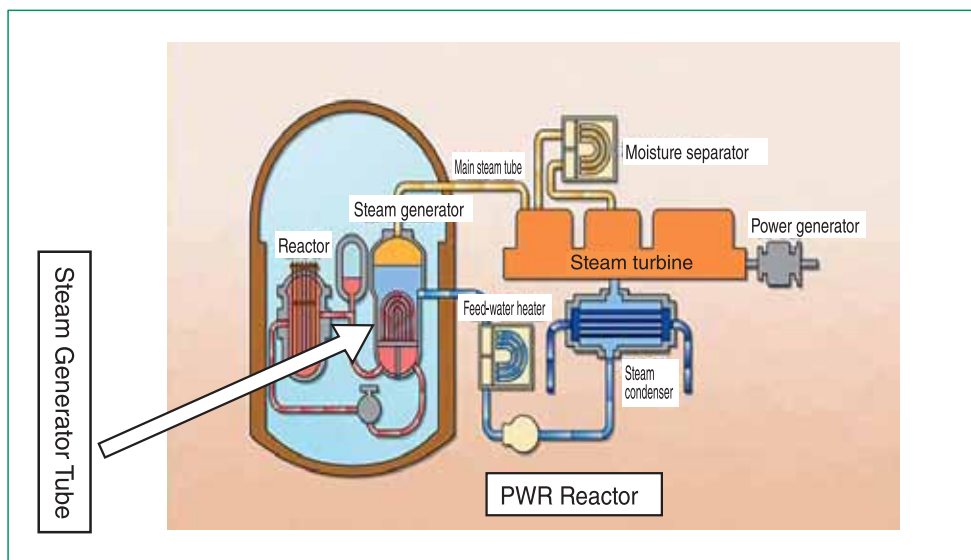
External appearance of heat transfer tubes for steam generator

Overview

(Technical principles, actions, etc.)

Nuclear power generation does not emit CO₂. It does not emit sulfur oxides or nitrogen oxides, either. Nuclear power generation, however, requires a high level of safety because its energy source is nuclear. There are two methods of nuclear power generation. The world's mainstream method uses a PWR (pressurized-water reactor) and SG (steam generator). The SG transfers heat and produce steam for turbines that generate power.

Several thousand SG tubes approximately 20 mm in diameter are used in each reactor. High corrosion resistance, high strength, and high dimensional accuracy are required from these SG tubes to withstand a high-temperature and high-pressure environment. Sumitomo Metal developed an Alloy 690TT (30% Cr-60% Ni alloy) SG tube to replace the conventional Alloy 600 (15% Cr-75% Ni alloy) SG tube for PWRs. The excellent corrosion resistance of the Alloy 690TT SG tube prolongs the lives of PWRs. Furthermore, the high dimensional precision of the Alloy 690TT SG tube makes it possible to detect the secular change of materials in use at early stages. The high reliability of the tube is greatly evaluated by both domestic and overseas users.



External appearance of PWR nuclear reactor

Introductory Track Record

- This development item, the SG tube for PWR, has a 100% share of the domestic market because it has been adopted in all 24 of the PWR-type nuclear reactors in Japan. It has a 33% share of the world market, mainly in Europe and America.
- This product has recently been introduced into Korea and China, where it is expected to make a significant contribution to CO₂ suppression.

Effects

- Virtually zero CO₂ emissions with nuclear power generation, which does not rely on fossil fuels.
- The result of a trial calculation indicates that 55 domestic and overseas PWR nuclear reactors using Sumitomo SG tubes suppress approximately 120 million tons of CO₂ emissions per year.

Objective power plants: 24 domestic reactors (total output of 20.28 million kW); 31 overseas reactors (total output of 29.94 million kW)
 Operation rate of power plant: Calculated on the condition that the operation rate of the nuclear power plants in Japan is 68% and that in the rest of the world is 50% in 2008.

Difference in CO₂ emission coefficient between LNG-combined thermal power generation and nuclear power generation

$$5.19 \text{ (LNG-combined power generation)} - 0.22 \text{ (Nuclear power generation)} = 4.97 \text{ tons of CO}_2\text{/10,000 kWh}$$

Japan: 20.28 million kW x 24 hours/day x 365 days/year x 0.68 x 4.97 = Approx. 60 million tons

Overseas: 29.94 million kW x 24 hours/day x 365 days/year x 0.5 x 4.97 = Approx. 65 million tons

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*Note: This publication introduces examples of technologies and products believed useful towards solving environmental and energy issues. In no way does it constitute guarantees concerning their transfer or sale.

Applicable field
PWR Pressurized-Water Reactor
(Heat Transfer Tube for Steam Generator)

Water

Energy saving/Energy recovery

Energy storage/Energy creation

New energy

Waste disposal/
Recycling/
Resource saving

Air

Soil

Other