

## ► Cold Leakage Due to Thermal Degradation of Gaskets

- Application : Steam Heater
- Operating Period : Approximately 1 year
- Operating Fluids : Steam / Hot Water
- Operating Temperature  
Steam side: 133 °C / Hot water side: 80 °C
- Gasket Material : EPDM

### ● Phenomenon

No external leakage was observed during operation; however, external leakage occurred after the unit was shut down.

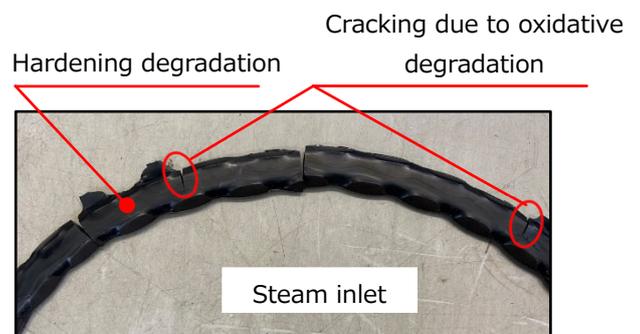
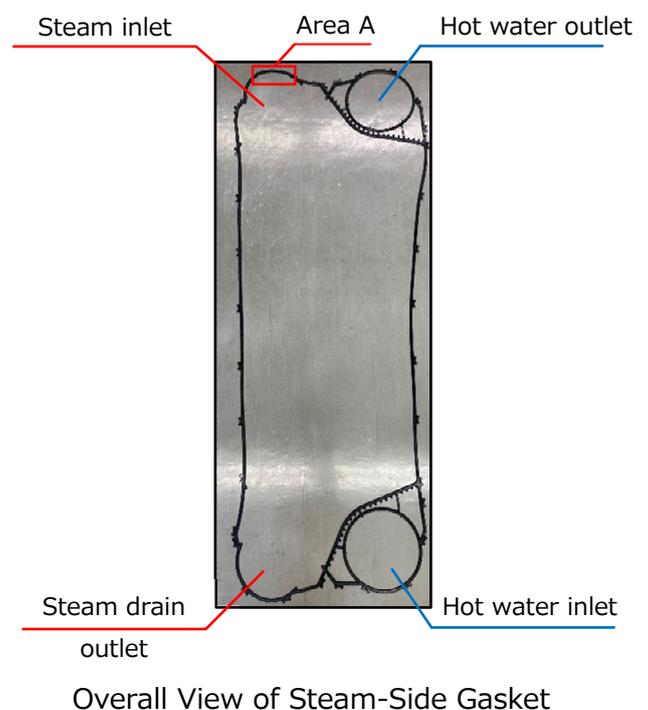
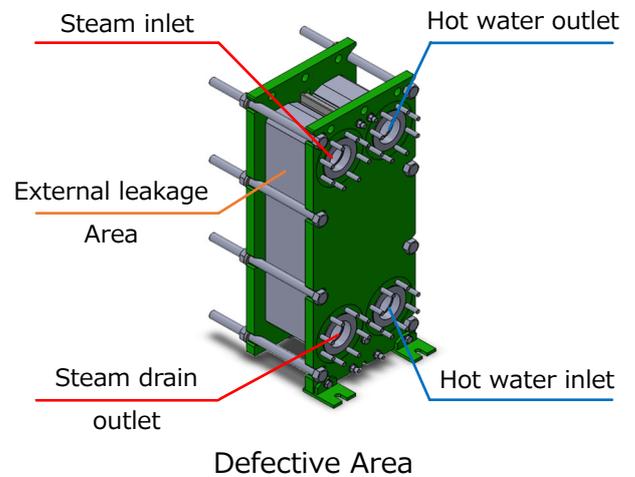
### ● Cause

The above phenomenon is referred to as a cold leak. A cold leak occurs because, during operation, thermal expansion of the gasket improves sealing performance, whereas when thermal factors are absent—such as after steam shutdown—the gasket contracts and sealing performance decreases, leading to leakage.

The synthetic rubber used in the gasket undergoes thermal degradation (compression set, oxidative degradation, hardening) due to aging and repeated heating/cooling cycles, resulting in a gradual reduction of sealing performance. This effect is particularly noticeable at the steam inlet, where thermal stress is greatest, causing a significant decrease in gasket sealing performance.

### ● Countermeasures

Thermal degradation of rubber is unavoidable due to the inherent properties of the material; therefore, periodic gasket replacement is required.



Steam-side gasket (Enlarged view of Area A)