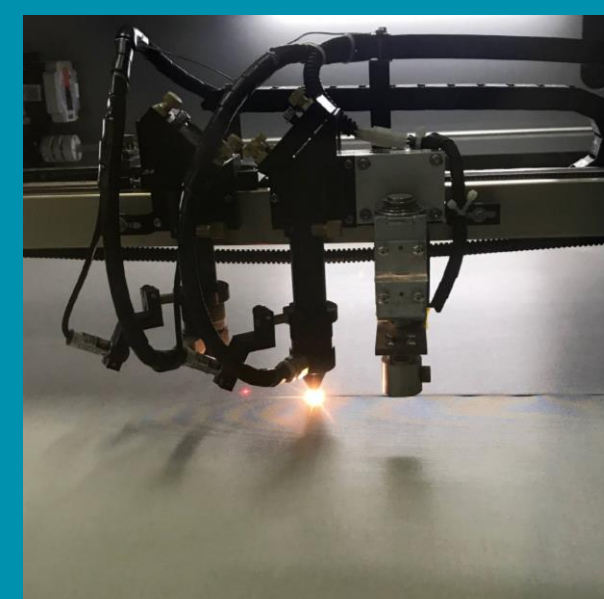


Heating Jacket



Luck Design Company, Limited



Our goal

- To create efficient pipe heating by:
 - ✓ **Preventing pipe clogging** due to exhaust gas condensation
 - ✓ **Preventing gas condensation**
 - ✓ **Decreasing startup** time after cleaning

Where to use it

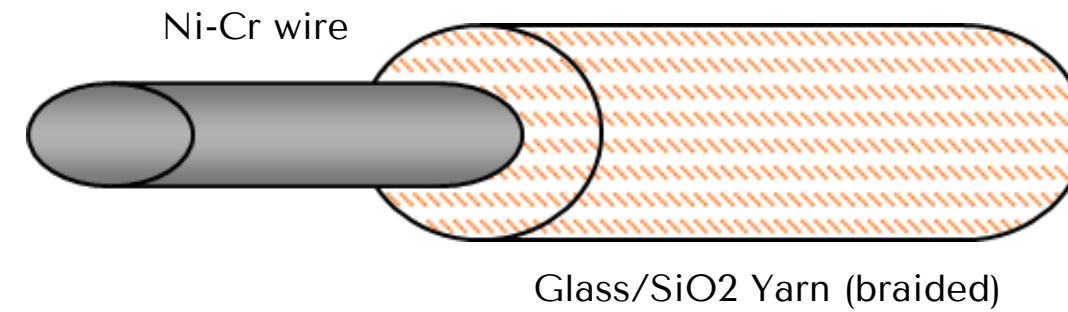
- Semiconductor/FPD manufacturing equipment and exhaust pipes
- Vacuum pump peripherals/ air purifying devices
- Gas supply piping



How we differentiate from other Companies(1)

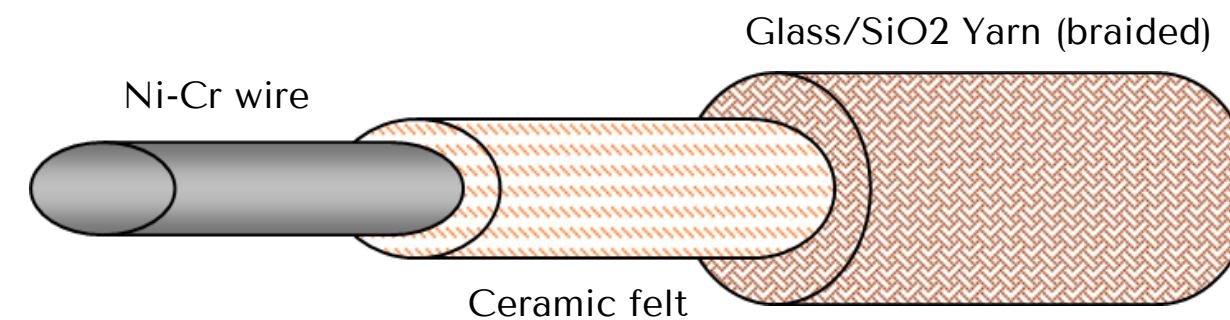
Heating element structure

Other companies



- Short circuits and wire breaks are more likely to occur due to **insulation degradation** caused by heating
- **Insufficient mechanical strength and low reliability**
- **narrow pitch wiring becomes difficult**

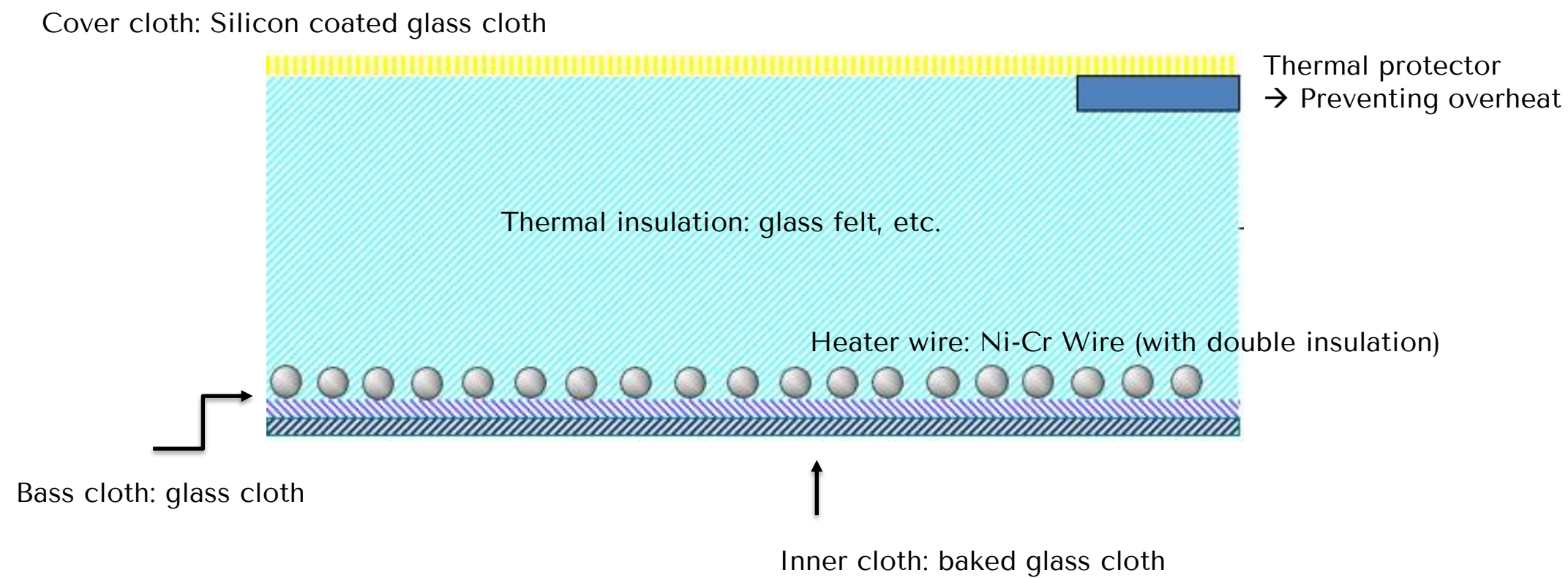
Luck Design



Thermal resistance up to 800°C

- **High reliability and durability** by **double insulation** structure, preventing insulation deterioration
- **Narrow pitch wiring possible**

Cross section of the jacket heater



How we
differentiate
From other
Companies(2)

Incombustibility

How we differentiate from other Companies(3)

Constituent Material

Heater Wire

- Ni-Cr wire with double insulation
- Thermal resistance up to 800°C

Cover cloth

- Silicon coated glass cloth
- Teflon-coated glass cloth

Internal insulation material

- Glass felt, etc.

Inner cloth

- Baked glass cloth

Details about the heater wire, cover cloth, inner cloth, and etc. will be decided and made customized after consulting our clients

The jacket heater that we use at Luck Design, in comparison with rubber heater or heater used by other companies, is **better in insulation** and a more **sustainable** and **energy saving** option

- Heating power → 40% lower
- Surface temperature is 40% lower
95°C → 55°C
- Reduction of air conditioning power consumption

Jacket heater
Luck Design



Rubber heater



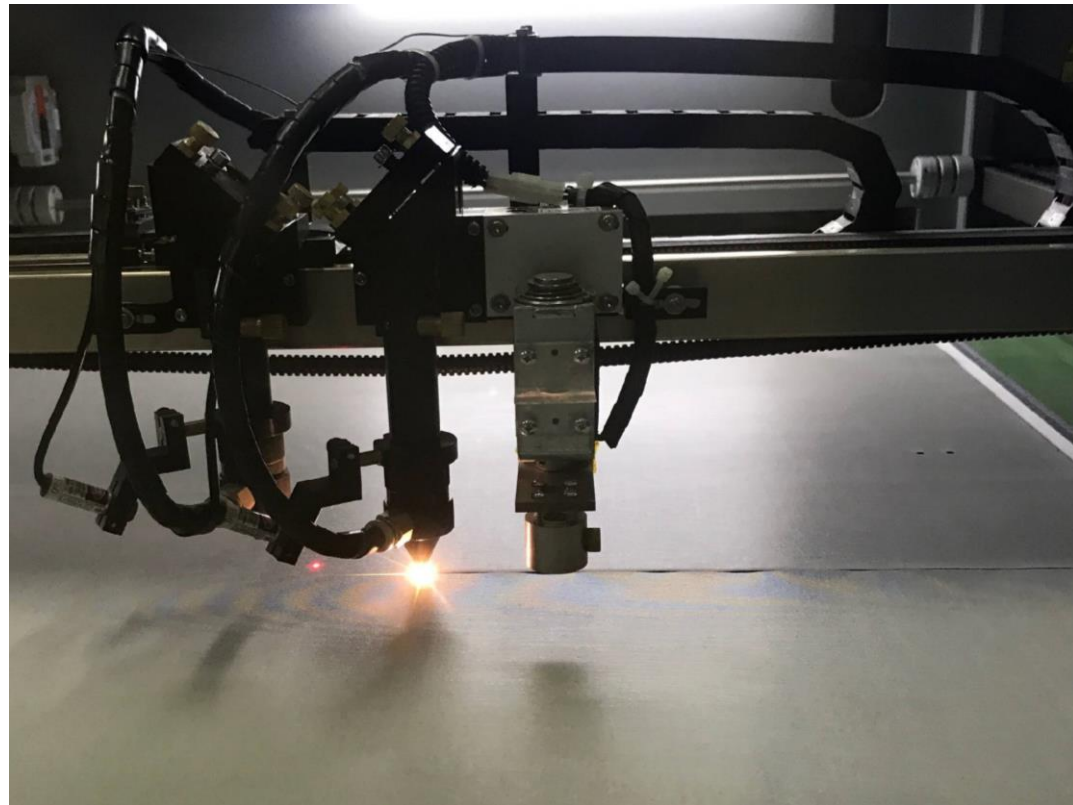
How we differentiate from other Companies(4)

Energy saving

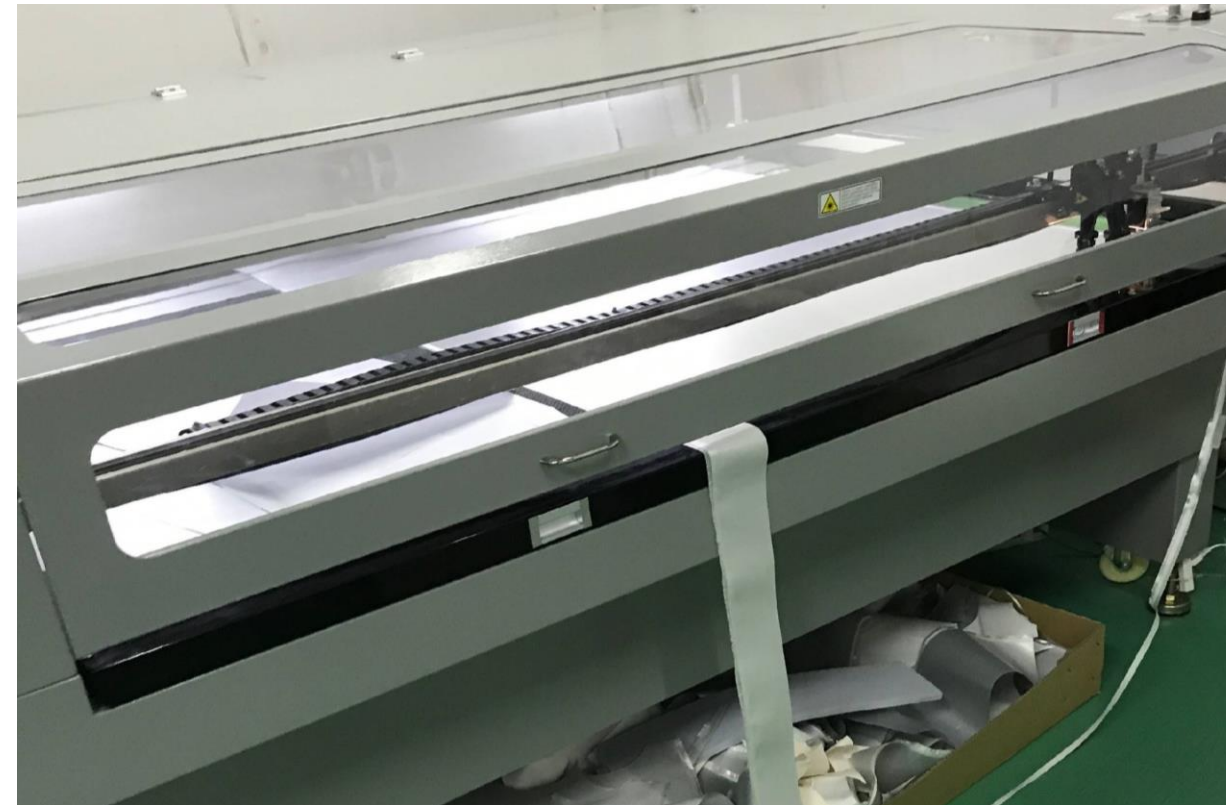
How we differentiate from other Companies(5)

High precision sewing technology

Laser Machine



Computerized cutting machine



Industrial sewing machine



Applicable standard

CE

2006/95/EC Low Voltage Directive

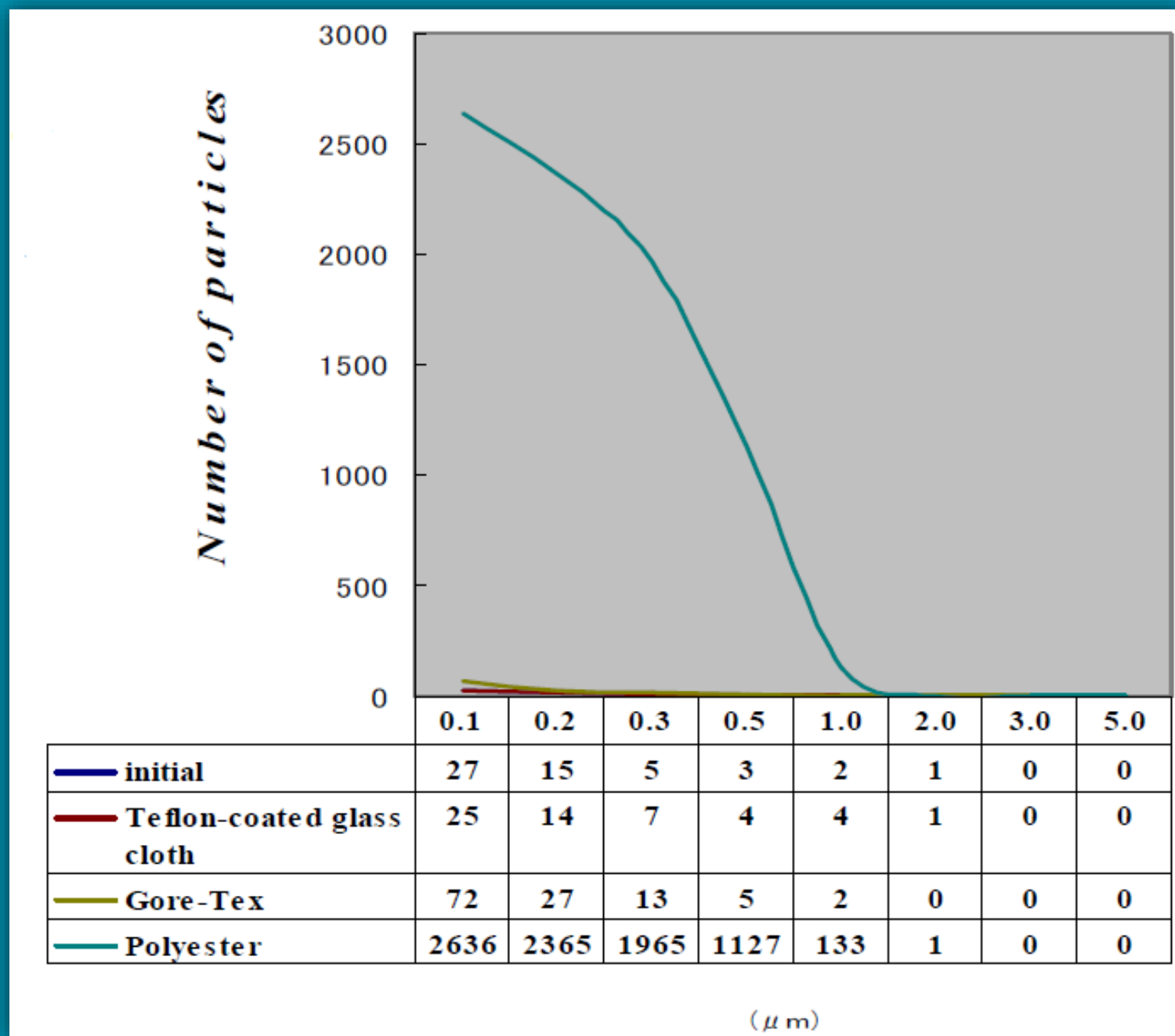
EN60519-2 : 2006 Safety in electro heat installations

→ Part 2 : Particular requirements for resistance heating equipment

RoHS

1. Cadmium and its compounds
RoHS Directive (2002/95/EC)
Threshold: 100 ppm
2. Chromium VI compounds
RoHS Directive (2002/95/EC)
Threshold: 1000 ppm
3. Lead and its compounds
RoHS Directive (2002/95/EC)
Threshold: 1000 ppm
4. Mercury and its compounds
RoHS Directive (2002/95/EC)
Threshold: 1000 ppm
5. Specified PBB family of brominated flame retardants
RoHS Directive (2002/95/EC)
Threshold: 1000 ppm
6. Specified PBDE family of brominated flame retardants
RoHS Directive (2002/95/EC)
Threshold: 1000 ppm

Cleanroom Specifications



Cover Cloth

We are using materials that are less likely to generate particles

Characteristics of Materials Used (cover cloth)

Water resistant
Bend-resistant
Cut-resistant

Material specification

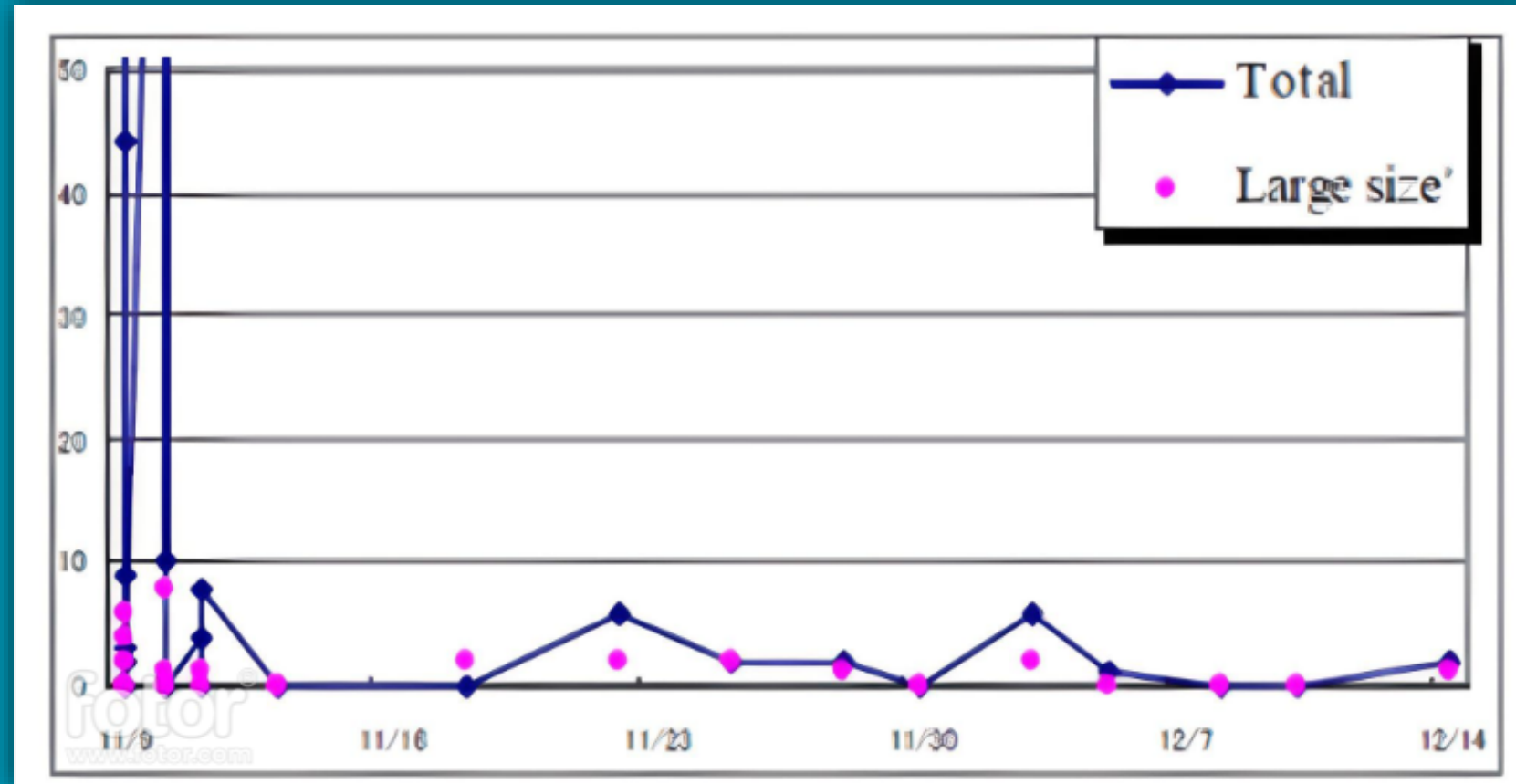
The material used is heat-resistant and non-combustible, and meet Class 10 of the Clean Room specification

Sustainability

In summary, by using our heating jacket, you can create a more sustainable manufacturing process as it can improve product yield and reduce material waste

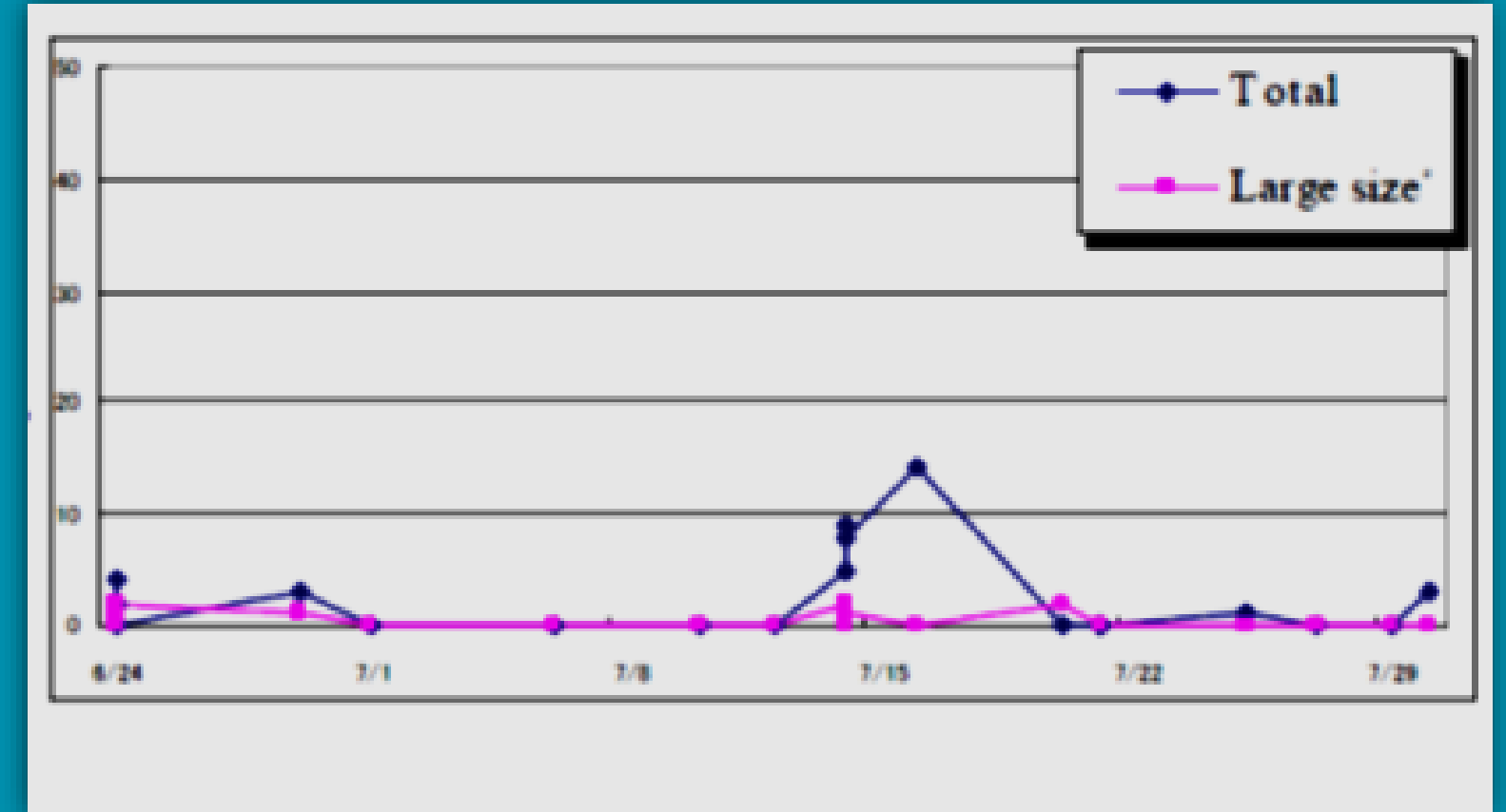
Effectiveness of our Jacket Heater (example1) Convergence of particles inside the chamber

Before installing jacket heater



*Counts all particles with a size of $0.2\mu\text{m}$ or larger

After



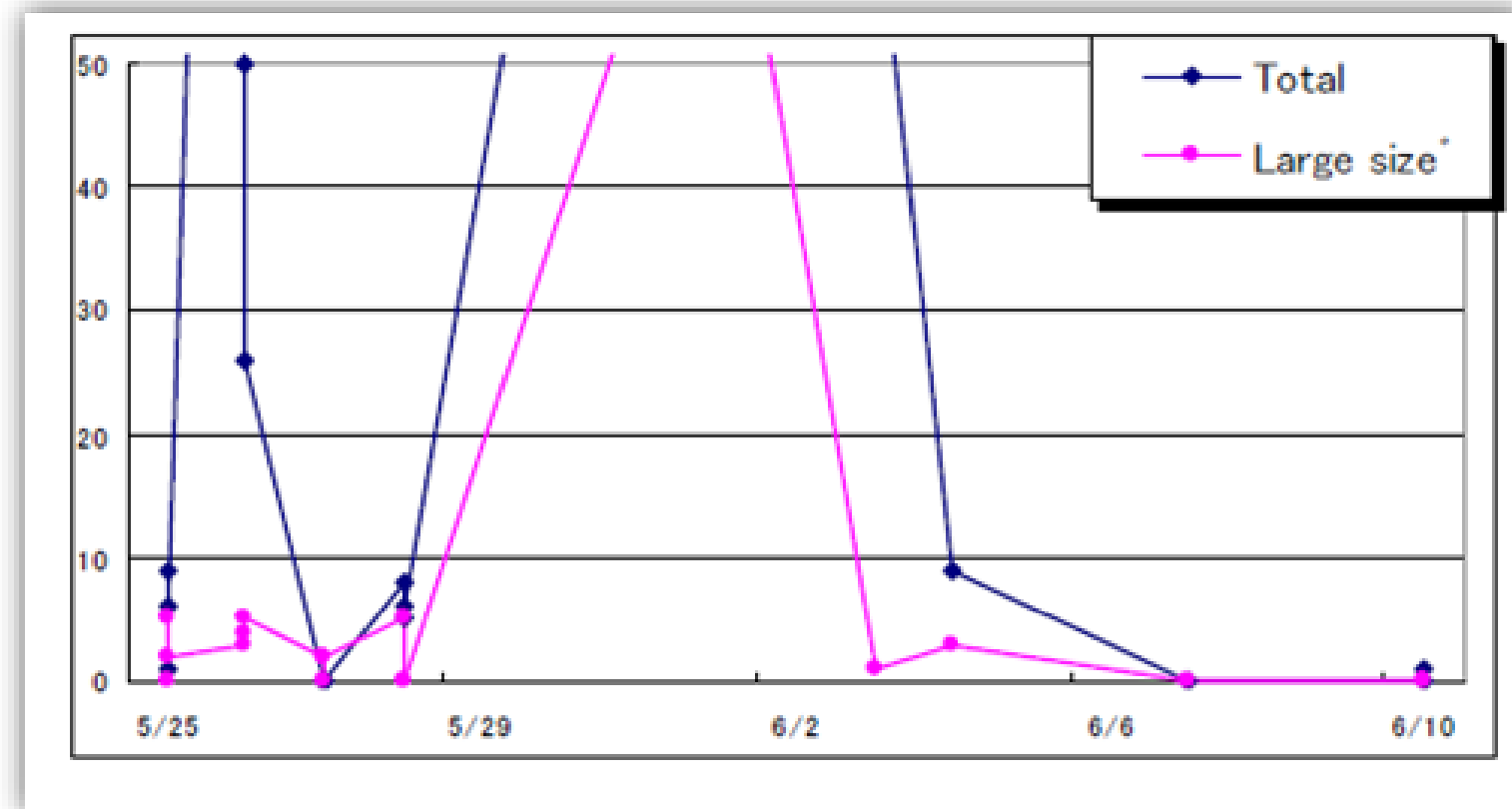
*Large particles with a size of $1\mu\text{m}$ or larger

Particle average: Before 10.9/wafer \Rightarrow After 2.6/wafer

Particle average size: Before 1.1/wafer \Rightarrow After 0.5/wafer

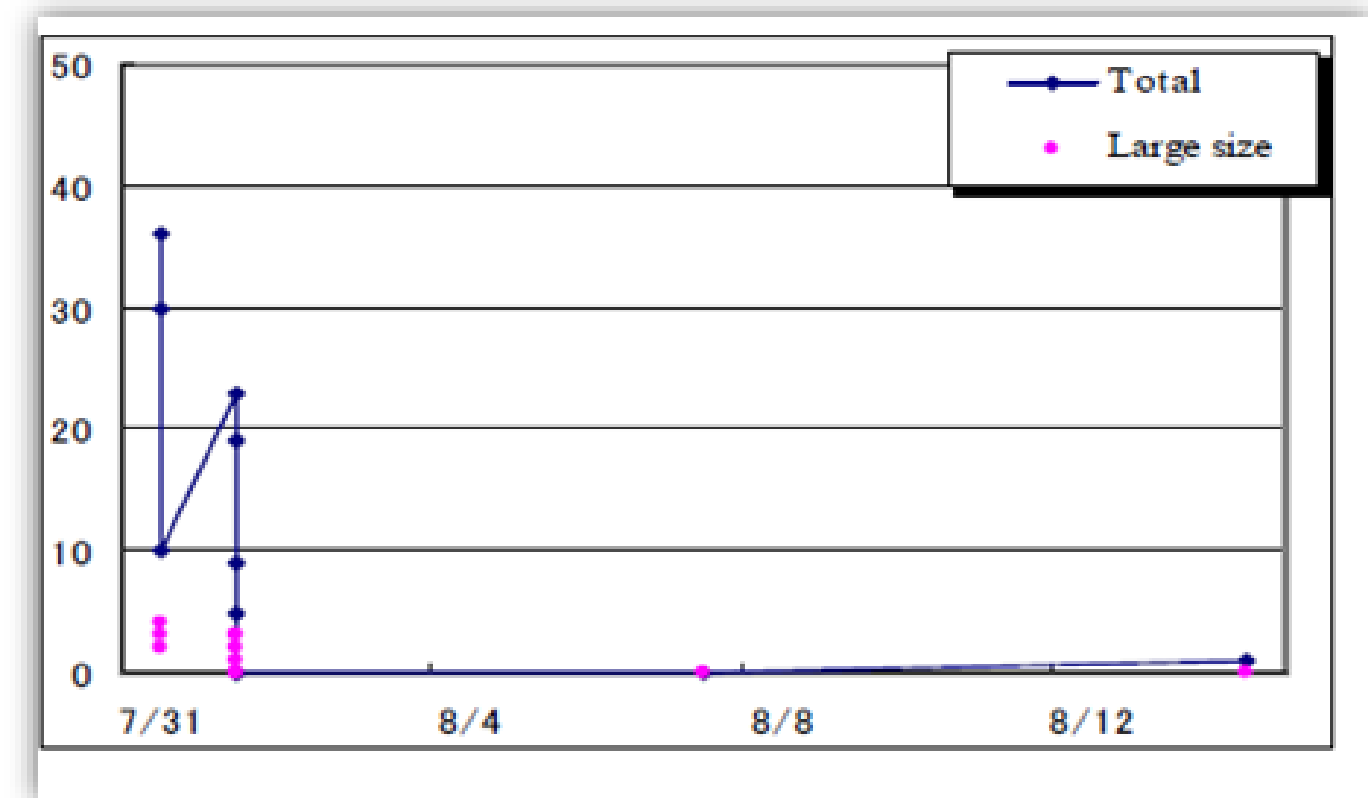
Effectiveness of our Heating Jacket (example2) Convergence of particles inside the chamber

Before installing jacket heater



*Counts all particles with a size of 0.2 μ m or larger

After



*Large particles with a size of 1 μ m or larger

Particle average: Before 28.7/wafer \Rightarrow After 12.1/wafer
Particle average size: Before 6.0/wafer \Rightarrow After 1.6/wafer



Effectiveness of heating jacket: conclusion

	Before	after
Case1	4.2 times	1 time
Case2	5.2 times	3 times

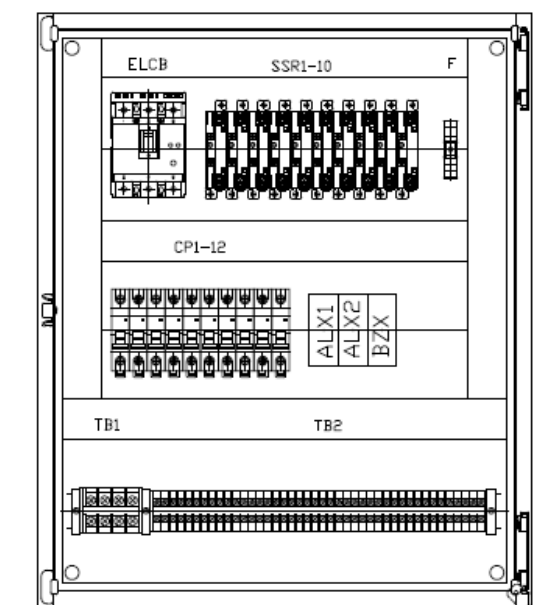
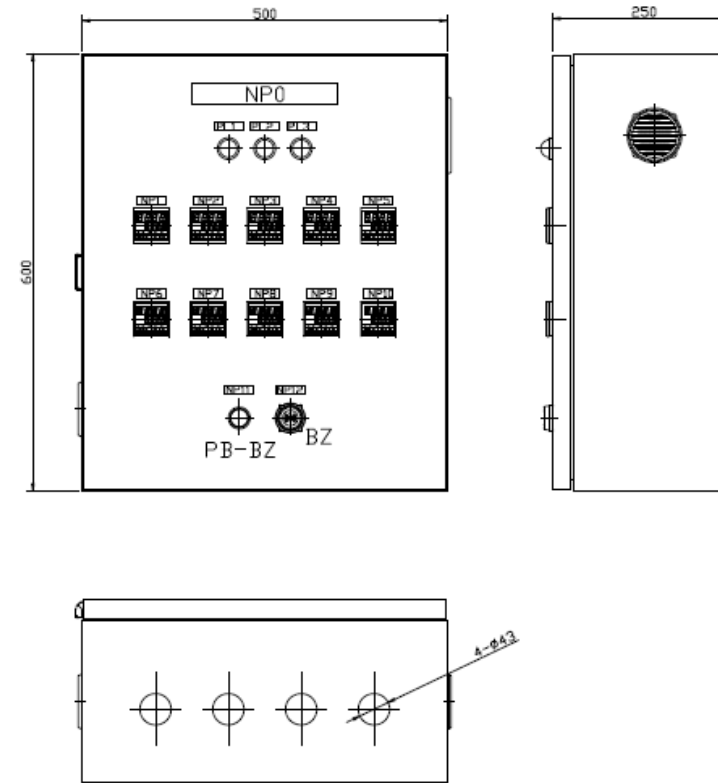
The number of start-up attempts after cleaning to achieve

The number of repeated start-ups until the particle count is below a certain limit.

Temperature Control Panel

To be used together with heating Jacket

Standard type 10-PID control



Other Temperature Control Panel

- 1PID, 7A MAX has a wide range of usage:

For example, in the case of a 50A piping with a $0.125\text{W}/\text{cm}^2$ and 20m, up to 4800W with 24A and 200V can be used with SB1 x 6 units.

- Excellent expandability, capable of being smart enabled
- Retrofitting: PC-monitor, touch-panel, and etc.
- Simple wiring, which means that it's easy for installation and the compensation wiring is short

Piping insulation Jacket Foam

- Insulation material made of sponge that has a heat resistant up to 150 °C
- Easy to be installed on-the-site (scissors)

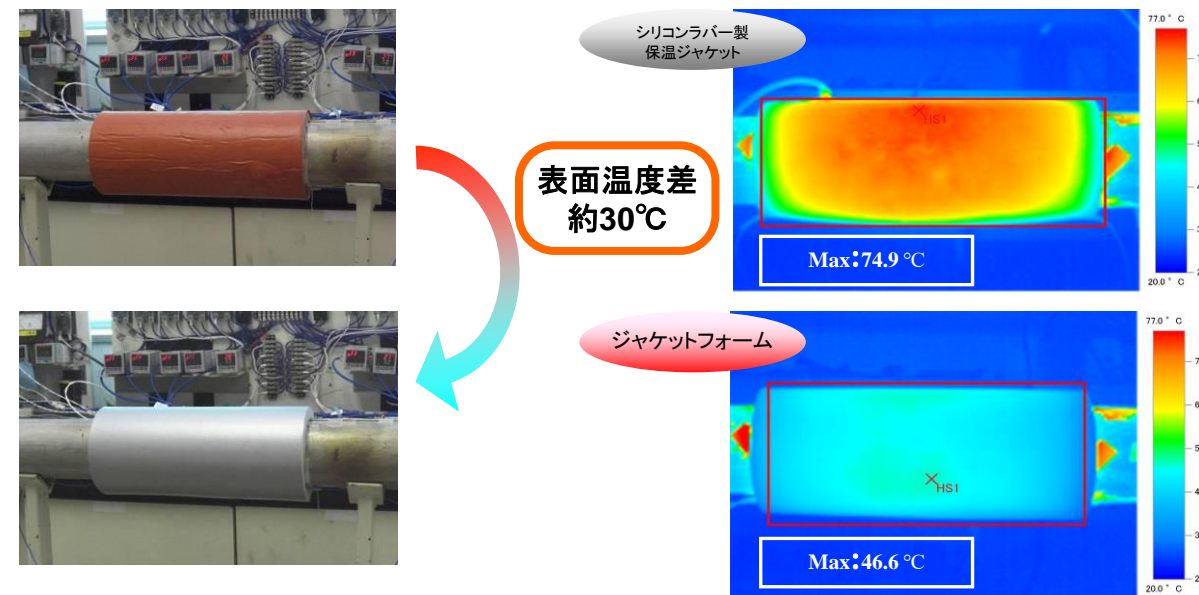


Improves workability: Compared to silicone rubber sponge, its density is about 1/40 and is lightweighted



Jacket Foam insulation performance

- Compared to silicone rubber insulation material, it has about 1.5 times the insulation performance.
- Compared to silicone rubber, the surface temperature also decreases, and the energy-saving effect is superior.



配管加熱時の保温ジャケット表面温度

