

Thermometers

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Liquid	Mercury	Mercury	Mercury	Mercury	Mercury	Mercury
Gas filled above liquid	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Temperature range	-17 - 50°C	40 - 100°C	90 - 150°C	140 - 200°C	190 - 250°C	240 - 320°C
Minimum graduation	0.2°C	0.2°C	0.2°C	0.2°C	0.2°C	0.2°C
Longer graduation lines at	each 1°C	each 1°C	each 1°C	each 1°C	each 1°C	each 1°C
Graduation numbered at	each 2°C	each 2°C	each 2°C	each 2°C	each 2°C	each 2°C
Total length (mm)	280 - 300	280 - 300	280 - 300	280 - 300	280 - 300	280 - 300
Stem diameter (mm)	6.0 ± 0.1	6.0 ± 0.1	6.0 ± 0.1	6.0 ± 0.1	6.0 ± 0.1	6.0 ± 0.1
Bulb length (mm)	12 - 15	12 - 15	12 - 15	12 - 15	12 - 15	12 - 15
Distance from bottom of bulb to graduation at the lowest temperature (mm)	75 - 90	75 - 90	75 - 90	75 - 90	75 - 90	75 - 90
Distance from top of thermometer to graduation at the highest temperature (mm)	35 - 50	35 - 50	35 - 50	35 - 50	35 - 50	35 - 50
Distance from bottom of bulb to immersion line (mm)	60	60	60	60	60	60
Form of top of thermometer	loop	loop	loop	loop	loop	loop
Maximum scale error at any point	0.2°C	0.2°C	0.2°C	0.2°C	0.2°C	0.4°C

71. Sterilization and Aseptic Manipulation, and Reverse Osmosis-Ultrafiltration

(1) Sterilization and Aseptic Manipulation

1. Sterilization

Sterilization means a process whereby the killing or removal of all living microorganisms is accomplished. Generally, the sterilization process requires the choice of appropriate procedure and accurately controlled operation and conditions depending on the kind of microorganism, the conditions of contamination and the quality and nature of the substance to be sterilized.

The adequacy of sterilization is decided by means of the sterility test.

The procedure for sterilization should be carried out after confirming that the temperature, pressure, etc. are adequate for the desired sterilization.

For the choice of the conditions for sterilization or verification of the integrity of sterilization, biological indicators suitable for individual conditions of sterilization may be used.

2. Aseptic manipulation

Aseptic manipulation is a technique used for processing the sterile drug products which are not terminally sterilized

in their final containers, and applied to a series of aseptic processing of the sterile products which are prepared by the filtration sterilization and/or with sterile raw materials.

Generally, aseptic manipulation requires the presterilization of all equipments and materials used for processing the sterile products, and then the products are processed in a way to give a defined sterility assurance level in the aseptic processing facilities where microbial and particulate levels are adequately maintained.

(2) Reverse Osmosis-Ultrafiltration

The Reverse Osmosis-Ultrafiltration is a water filtration method by means of crucial flow filtration utilizing either a reverse osmotic membrane or an ultrafilter, or an apparatus combining both.

When Water for Injection is prepared by the Reverse Osmosis-Ultrafiltration, pretreatment facilities, facilities for preparation of water for injection, and facilities for supplying water for injection are usually used. The pretreatment facilities, placed before the preparation facilities, are used to remove solid particles, dissolved salts and colloids in original water, so as to reduce load on the preparation facilities. They are assemblies having a cohesion apparatus, precipitation-separation apparatus, filtration apparatus, chlorine sterilization apparatus, oxidation-reduction apparatus, residual chlorine removing apparatus, precise filtration apparatus, reverse osmosis apparatus, ultrafiltration apparatus, ion exchange apparatus, etc., which are combined properly depending upon the quality of original water. The facilities for preparing water for injection consist of a

pretreatment water supplying apparatus, ultraviolet sterilization apparatus, heat exchange apparatus, membrane module, cleansing-sterilization apparatus, etc. The facilities for supplying water for injection consist of a reservoir with a capacity to meet changing demand, tubes for distributing Water for Injection, heat exchange apparatus, circulation pump, pressure control apparatus, etc. Usually, Water for

Injection prepared by the Reverse Osmosis-Ultrafiltration circulates in the facilities at a temperature not lower than 80°C for prevention of microbial proliferation.

For preparing water for Injection by means of the Reverse Osmosis-Ultrafiltration, use a membrane module which removes microorganisms and substances of molecular masses approximately not less than 6000.