



### Recommended Cooling Specifications and Requirements:

#### Specifications

- MegaWatt Lasers, Inc. recommends the use of a minimum of 1 Kilowatt (1 kW) cooling, at minimum of 8 liters/min (~2 gal/min), for most of our resonators.
- Careful selection of wetted cooling system components is very important for long laser resonator life.
- Wetted components in the laser resonator include anodized 6061-T6 aluminum, passivated SS 316-L, silicate glass or fused silica, and silicone O-rings.
- It is recommended that the cooling system be laid out as shown above in order to reduce the head pressure of the laser resonator. Laser resonator head pressure should be as low as possible while maintaining a minimum flow rate of 8 liters/min. It is best practice to keep the head pressure below 50 psi (3.44 Bar).

#### Materials

- High quality stainless steel, such as 316-L is acceptable, but parts should be passivated.
- Aluminum must be anodized using a high-quality process, such as MIL-A-8625F, Type II, Class 1.
- Titanium is also acceptable and Grade 2 (unalloyed, standard oxygen) has been used successfully.
- Copper and copper alloys, such as brass, should be avoided.
- Many plastics, including polypropylene, polyethylene, Polyvinylidene fluoride (PVDF), Teflon (PTFE), Delrin, Noryl, etc. have been used successfully, but it is important that these materials do not leach plasticizers into the coolant.
- When considering cooling components, it is important to ensure the components do not introduce contamination into the coolant. This is different from the components being “compatible with distilled or deionized water.”

#### Coolant

- The laser resonator requires clean deionized water as a coolant. The resistivity should be about 1 MΩ/cm<sup>2</sup> (conductivity ~ 1 μS/cm<sup>2</sup>) and should be free of organic contamination.
- Ordinary Steam Distilled Water, available from grocery stores usually has a resistivity of 0. 6- 1.2 MΩ/cm<sup>2</sup> and this is acceptable coolant if laboratory distilled or deionized water is not available.
- The UV from the flashlamp will sterilize biological organisms in the coolant.
- Coolant temperature must be above the dew point to prevent condensation on the laser rod.

#### Deionization Filter

- If all wetted components are inert, it is generally not necessary to use a deionization filter in the cooling system.
- If a deionization filter is used, ensure it does not introduce organic contamination into the coolant.

#### Service

- If the system will not be operated for more than a month, the cooling system should be drained and dried using filtered compressed air or Ultra High Purity (UHP) nitrogen.
- For a system that is used weekly, the coolant should be changed every six months.