OPTIC COOLING

Choosing the correct coolant temperature is important to the proper operation and longevity of water-cooled optical components. When the coolant temperature is lower than the dew point, condensed water will build up on optical surfaces. This condition will lead to accelerated deterioration of the optical coatings.

The greatest risk of condensation damage occurs in a high heat/high humidity environment where the coolant temperature is colder than the dew point of the surrounding air or when the system is shut down, but the coolant continues to flow through the optics for extended periods of time.

It is important that the temperature of the water-cooled optics be maintained above the dew point temperature at which the onset of condensation occurs. The conditions below must be met to avoid the problem:

1) Make sure that the water temperature is above the ambient dew point. See chart.

2) Reduce the relative humidity (dew point temperature) of the environment. This can be accomplished by air conditioning or dehumidifying the room in which the system is used.

To use table, look down the Air Temp column and locate an air temperature in Fahrenheit or Centigrade (deg C are shown in parentheses) that corresponds to the air temperature in the area where the optics are operating. Follow this row across until you reach a column matching the relative humidity at your location. The value at the intersection of the Air Temp and Relative Humidity columns is the Dew Point temperature in deg F (or deg C). The chiller's temperature setpoint must be set above the dew point temperature. For example, if the air temperature is 85 deg F (29 deg C) and the relative humidity is 60%, then the dew point temperature is 70 deg F (21 deg C). Adjust the chiller's temperature setpoint to 72 deg F (22 deg C) to prevent condensation from forming on the optics.

Dew Point Temperature Chart °F (°C)

	Relative Humidity (%)															
Air Temp °F (°C)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
60 (16)	—	—	—	32 (0)	36 (2)	39 (4)	41 (5)	44 (7)	46 (8)	48 (9)	50 (10)	52 (11)	54 (12)	55 (13)	57 (14)	59 (15)
65 (18)	—	—	33 (1)	37 (3)	40 (4)	43 (6)	46 (8)	48 (9)	51 (11)	53 (12)	55 (13)	57 (14)	59 (15)	60 (16)	62 (17)	64 (18)
70 (21)	—	33 (1)	37 (3)	41 (5)	45 (7)	48 (9)	51 (11)	53 (12)	56 (13)	58 (14)	60 (16)	62 (17)	64 (18)	65 (18)	67 (19)	69 (21)
75 (24)	—	37 (3)	42 (6)	46 (8)	49 (9)	52 (11)	55 (13)	58 (14)	60 (16)	62 (17)	65 (18)	67 (19)	68 (20)	70 (21)	72 (22)	73 (23)
80 (27)	35 (2)	41 (5)	46 (8)	50 (10)	54 (12)	57 (14)	60 (16)	62 (17)	65 (18)	67 (19)	69 (21)	71 (22)	73 (23)	75 (24)	77 (25)	78 (26)
85 (29)	40 (4)	45 (7)	50 (10)	54 (12)	58 (14)	61 (16)	64 (18)	67 (19)	70 (21)	72 (22)	74 (23)	76 (24)	78 (26)	80 (27)	82 (28)	83 (28)
90 (32)	44 (7)	50 (10)	54 (12)	59 (15)	62 (17)	66 (19)	69 (21)	72 (22)	74 (23)	77 (25)	79 (26)	81 (27)	83 (28)	85 (29)	87 (31)	88 (31)
95 (35)	48 (9)	54 (12)	59 (15)	63 (17)	67 (19)	70 (21)	73 (23)	76 (24)	79 (26)	81 (27)	84 (29)	86 (30)	88 (31)	90 (32)	92 (33)	93 (34)
100 (38)	52 (11)	58 (14)	63 (17)	68 (20)	71 (22)	75 (24)	78 (26)	81 (27)	84 (29)	86 (30)	88 (31)	91 (33)	93 (34)	95 (35)	97 (36)	98 (37)

Coolants

The coolant medium must contain no less than 90% water (distilled or tap) by volume.
In closed loop systems, avoid glycol-based additives because they can lower the thermal conductivity. A corrosion inhibitor/algicide is recommended such as Optishield, or equivalent, that does not effect the coolant's thermal conductivity. In applications where biocides containing chlorides are used, concentrations should not exceed 25 parts per million (PPM).

In case where the coolant is supplied from the tap, a 200um filter may be required. Water must be free from algae and other organisms, with a pH factor between 7.5 and 9.00, and maximum hardness of 300ppm.

Haas laser components may incorporate the following materials in the coolant path: aluminum, brass, copper, Delrin, polyethylene, PBT, stainless steel, and Viton.