THERMAL CARE | **PLASTICS SIZING GUIDE**

BLOW MOLDING (4.8 gpm/ton at 65 psi)

HDPE = 40#/hr/ton
LDPE = 45#/hr/ton
PET = 40#/hr/ton
PP = 45#/hr/ton

BLOWN FILM

Nominal Air Flow CFM
Single Lip Air Ring = 75 CFM/inch
Dual Lip Air Ring = 150 CFM/inch

Cooling Ton/1000 CFM

	Nominal Tons Air Temp to Air Ring	
Air Inlet Conditions	40°F	50°F
95°F dry bulb/65°F wet bulb	17.9 tons	11.3 tons
100°F dry bulb/80°F wet bulb	18.9 tons	12.1 tons
65°F dry bulb/56°F wet bulb	6.8 tons	2.9 tons

Internal bubble cooling - (gpm x ΔT)/24 = chiller ton
Q (BTUH) = 4.5 x CFM x ΔH

EXTRUSION

Coating (12 gpm/ton for direct roll cooling)
LDPE = 40#/hr/ton

Pipe & Profile (Minimum 4.8 gpm/ton)
ABS = 80#/hr/ton
HDPE = 50#/hr/ton
PVC = 90#/hr/ton

Sheet (8 gpm for direct roll cooling)
ABS = 75#/hr/ton
HDPE = 50#/hr/ton
UHMWPE = 40#/hr/ton
LDPE = 55#/hr/ton
PP = 55#/hr/ton
PS = 75#/hr/ton
PVC = 80#/hr/ton

Machine Cooling (85°F)
Feed throat cooling = 0.33 ton/inch
Gear box cooling = 0.5 ton/inch
Screw cooling = 0.5 ton/inch
Barrel cooling = 1 ton/inch

THERMOFORMING

Minimum process flow of 4.8 gpm/ton
HIPS = 250#/hr/ton
PE = 180#/hr/ton
PVC = 240#/hr/ton
Rail Cooling = 3 tons
Mold Cooling - Tempered water required 80°F-110°F

WEIGHED WATER TESTS

Chiller = 2.4 gpm/ton @ 50°F LWT (@ 10°F ΔT)(Nominal Design)
Cooling Tower = 3 gpm/ton @ 85°F LWT (@ 10°F ΔT)(Nominal Design)

(gpm x ΔT)/24 = chiller ton
(#/min x ΔT)/200

(gpm x ΔT)/30 = tower ton
(#/min x ΔT)/250

1 Refrigeration Ton = 12,000 BTUH
1 Cooling Tower Ton = 15,000 BTUH

INJECTION MOLDING

Mold Cooling

ABS = 50#/hr/ton	Nylon = 40#/hr/ton	PPO = 40#/hr/ton
Acrylic = 35#/hr/ton	PC = 50#/hr/ton	PS = 50#/hr/ton
HDPE = 30#/hr/ton	PET = 40#/hr/ton	PU = 40#/hr/ton
LDPE = 35#/hr/ton	PP = 35#/hr/ton	PVC = 65#/hr/ton

Machine Cooling

10 hp hydraulic motor hp = 1 ton
Feed throat cooling = 1 ton (machines under 500 ton use ½ ton)
Hot runner molds = 1 ton/10.5 kW hot runner

COMMON VALUES

Mold room heating = 25 BTUH/ft²
Mold room cooling = 80 BTUH/ft²
Non-mold room heating = 50 BTUH/ft²
Chiller capacity loss = 20%/10°F
BTUH = gpm x 500 x ΔT (water)
Air comp., w/o after cooler = 0.10 ton/hp
Air comp., w/ after cooler = 0.20 ton/hp
Hydraulic = 0.1 ton/hp
Vacuum pump = 0.1 ton/hp
Water pump = 0.1 ton/hp
Q = M x Cp x ΔT

% Polypropylene Glycol (Volume vs Freeze Protection)

20% = 20°F 30% = 10°F 40% = -5°F 50% = -25°F

PIPE SIZING GUIDE (Based on 10′ hd loss/100′ pipe)

½″ = 2 gpm	2″ = 50 gpm	6″ = 900 gpm
¾″ = 5 gpm	2½″ = 90 gpm	8″ = 1,800 gpm
1″ = 10 gpm	3″ = 160 gpm	10″ = 2,500 gpm
1¼″ = 20 gpm	4″ = 320 gpm	12″ = 3,300 gpm
1½″ = 30 gpm	5″ = 525 gpm	

CHILLER FLOW RATES VS TEMP DIFFERENCE PER TON

1.2 gpm = 20°F ΔT
2.4 gpm = 10°F ΔT (Nominal Design)
4.8 gpm = 5°F ΔT
9.6 gpm = 2.5°F ΔT

COMMONLY USED EQUIVALENT & EQUATIONS

Pump BHP = (gpm x ΔP (Ft Hd)/(3,960 x Pump Eff)
Heat Exchanger = Q = U-factor x area x ΔT
kW = (amps x volts x 0.85 x 1.73)/1,000
1 kW = 3,413 BTUH
1 kW = 1.34 hp
PSI = ft of head/2.31
(°F - 32) x 5/9 = °C
1 HP = 2,544 BTUH
1 gallon = 8.33 lbs (water)
1 ft³ = 7.48 gal (water)
PSI = 14.5 bar
(°C - 9/5) + 32 = °F

TOWER WATER MAKE-UP

Untreated = 2% of Flow Rate
Treated = 1.5% of Flow Rate

CONSULT FACTORY FOR OTHER CONDITIONS