

*Inventors, Manufacturers...
the Ozone Experts*



Welcome to the World of Hess Machine International

Since 1965, Hess Machine International has been the bottled water industry's leading supplier of ozone purification systems. That leadership is the result of having both the highest quality equipment and the individualized service that meets each customer's specific requirements. Hess Machine International is America's most popular bottled water purification system with more installations in the USA than any other brand, and we're serving over 35 countries internationally as well.

Our system's superior patented design assures consistent, reliable transfer of ozone into the water. It is designed for easy installation, operation and maintenance. This gives you the confidence you need in a cost-effective way.

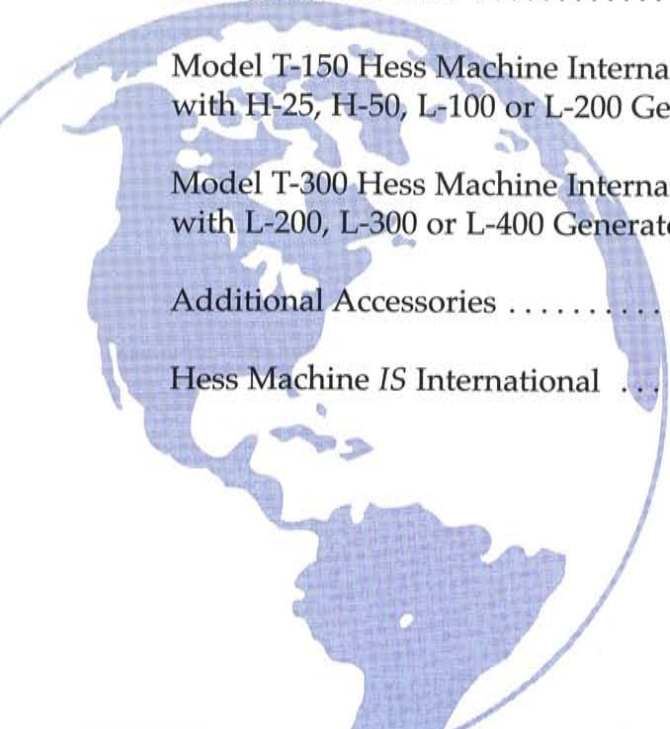
We're proud of our 30+ year history, which brings with it experience. Experience not only with the manufacture of our product, but its operation as well. Hess Machine International employees have a combined 100+ years in the ozone industry. This experience also means leadership. Hess Machine International was the first company with a patented, NSF International certified Ozone Injection Tank.

Today, ozone has many expanded uses. Ozone is used in process water disinfecting, food processing, public water systems, waste treatment, petrochemicals, and cooling towers. Hess Machine International can provide you with the experience and commitment to create installations that will meet or exceed your expectations.



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How Ozone Works

Ozonation is one of the many methods used for the disinfection of water. It is a technology substantially more effective than others.

Ozone has been used to treat ground and surface water in many European cities for years, with Paris, France opening its first ozone treatment plant in 1906. Now, there are more than 2,000 municipal water treatment plants worldwide using ozone. Ozone is also the industry standard for treating bottled water.

Ozone, also referred to as triatomic oxygen, is an unstable gas having life in water of minutes. Oxygen, which is normally bi-atomic, becomes ozone through the addition of a third unstable atom. Ozone, because of its instability, cannot be generated and stored for future use. It must be generated and used for treatment immediately. It is created by one of two generation methods: Ultraviolet radiation or corona discharge. Of the two, corona discharge produces the substantially higher ozone concentration needed for the removal of complex impurities. Generated ozone is pumped into the water through a diffuser of fine porosity, creating very small bubbles which rise slowly through the water. The slower the bubbles rise through the water, the greater the amount of ozone transferred to the water. Most critically for water quality, ozonation does not add chemicals to the water as does chlorine, chlorine dioxide, permanganate, etc. As the ozone passes through the water, the third unstable atom detaches, attacks, and destroys impurities in the water. The residue in the water is pure oxygen, which quickly dissipates in a few minutes. Any excess dissolved ozone which is not needed for treatment, reverts to simple oxygen in approximately 20-30 minutes.

Ozone has also received GRAS (Generally Recognized As Safe) status from the FDA.



Effects of Ozone Disinfection

The primary effects of ozonation of drinking water are:

1. Bacterial disinfection and viral inactivation.
2. Oxidation of inorganics such as iron, manganese, organically bound heavy metals, cyanides, sulfides and nitrates.
3. Oxidation of organics such as detergents, pesticides, herbicides, phenols, taste and odor caused by impurities.

The action of ozone in each of these cases follows:

... Disinfection and Viral Inactivation

The extent of bacteria destruction and viral inactivation is related to the concentration of ozone in the water and its contact time with the microorganisms. Bacteria are the most rapidly destroyed. E-Coli bacteria are destroyed by ozone concentrations just over .01 mg/liter and contact time of 15 seconds at temperatures of 25°C (77°F) and 30°C (86°F).^{*} Streptococcus fecalis are much more easily destroyed. At ozone concentrations of about 0.025 mg/liter, 99.99% inactivation is obtained in 20 seconds or less at both temperatures. Viruses are more resistant than bacteria. Pioneering studies by French public health scientists in the 1960's have shown that poliovirus types I, II, and III are inactivated by exposure to concentrations of dissolved ozone of 0.4 mg/liter over a four-minute contact period.

... Oxidation of Inorganics

In the case of iron, manganese and the several arsenite or arsenate compounds, oxidation takes place very rapidly, leaving insoluble compounds which are easily removed by an activated carbon filter. Sulfide ions are oxidized sequentially to sulfate ions, an innocuous substance. The first stage of this oxidation is very rapid, quickly and efficiently removing any sulfurous odors. Nitrite ions are oxidized to nitrate ions, which are stable and innocuous.

... Oxidation of Organics

Ozone is a very powerful agent in treating organic materials. Organics are either natural (humic and fulvic acids) or synthetic (detergents, pesticides) in nature. Some organics react with ozone very rapidly to destruction, within minutes or even seconds (phenol, formic acid), whereas others react more slowly with ozone (humic, fulvic acids, several pesticides, trichloroethane, etc.). In some cases, organic materials are only partially oxidized with ozone. A major advantage of partial oxidation of organic materials is that in becoming partially oxidized, the organic materials become much more polar than originally, producing complex insoluble materials which are removed by activated carbon filters.

^{*}Ozone in Water Treatment: Applications and Engineering: 1991 printing; Lewis Publishers

How the Hess Machine International Systems Works

Ozone injection is the last treatment before ozonated product water is used. Install our tanks as follows:

The injection tank can be installed that the water can be supplied by gravity or it can be installed on the floor with a pump.

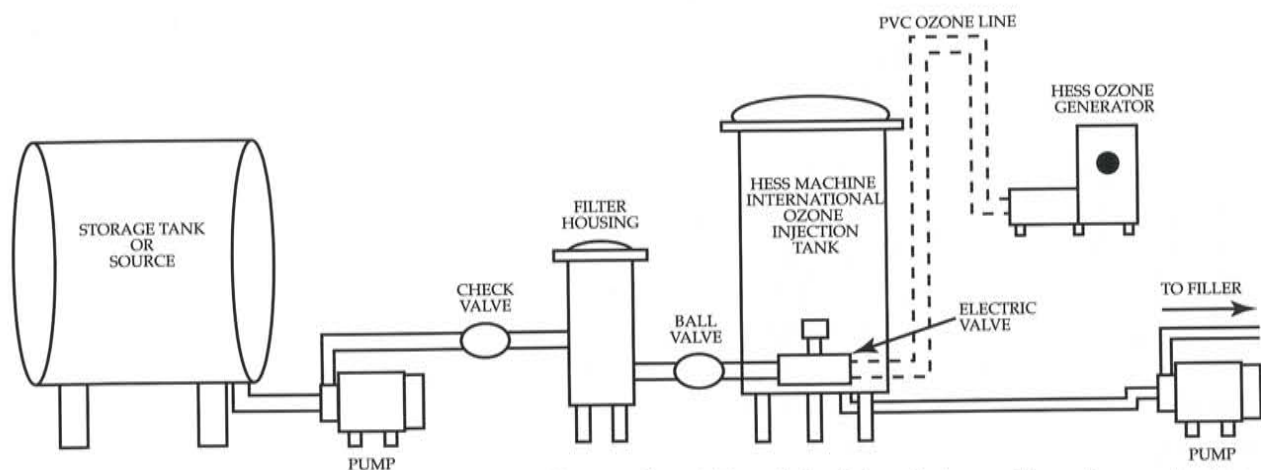
Install a ball valve in the water inlet line before the electric valve. The valve is used to control the flow of water supplied to the injection tank.

Two outlets for the treated water are provided at the base of the injection tank. These outlets are used for supply.

A 1" or 1.5" off-gas vent is provided on the top of the injection tank. Install a vent line to the outside, including a supplied in-line filter.

A 2" outlet located on the side of the injection tank near the top is provided for installation of an overflow line. Install a water trap in the line so that water may flow out, but air is not permitted to flow back into the tank.

Technicians can perform in-plant consultations to ensure proper installation and training. All parts are in stock and can be delivered quickly.



Above is a display of a typical installation but Hess Machine International can design an ozone contacting system designed for your specific needs.

Features of our Generators and Tanks

Each Hess Machine International Generator Features:

- Oil-less Air Compressor
- Heat Exchanger for Incoming Air (except on H-25 and H-50 models)
- Moisture Bowl
- Heatless Puregas Dryer with Moisture Indicator
- Low Pressure Regulators
- High and Low Pressure Gauges
- Adjustable Flow Meter for Air Flow
- High and Low Pressure Relief Valve
- Adjustable Rheostat
- AMP and Volt Meters
- Ozone Breaker Switch
- Ozone Indicator Light
- Safety Door Switches on each door
- Step-up Oil Filled Transformer
- Glass Domes to check corona
- Stainless Steel Double-Walled Dielectric Chamber
- Automatic Electric Cooling Water Valve
- Adjustable Cooling Water Flow Meter
- Cooling Water Pressure Switch
- Stainless Steel Lines for Ozone and Cooling Water
- Cabinets available in Stainless Steel or Powder Coated
- Equipment Designed for Air or Oxygen

Each Hess Machine International Inline Injection Tank Features:

- 1 1/2", 2", and 3" Electric Water Valves
- Stainless Steel Diffuser
- Electric Ozone Valve
- Open and Closed Indicator Lights
- Automated Tank Level Control
- Sight Glass
- 304 Stainless Steel Construction

Model H-25 Ozone Generator



Flow Rates:	Gallons per Minute: 15	Liters per Minute: 57
	Gallons per Hour: 900	Liters per Hour: 3,406
	Gallons per 8 Hours: 7,200	Liters per 8 Hours: 27,252
	Gallons per 24 Hours: 21,600	Liters per 24 Hours: 81,756
Ozone Yield:	lbs/day: 0.25	g/hour: 4.5
Dimensions:	Generator Width: 16"	Shipping Width: 24"
	Generator Length: 37"	Shipping Length: 42"
	Generator Height: 45"	Shipping Height: 50"
	Generator Weight: 140 lbs.	Shipping Weight: 290 lbs.
Electric:	Volts: 110	
	Cycle (Hz): 60/50	
	Current (amp): 5	
	Phase: 1	
	Plug-In Electrical Cord: Yes	
	Electrical Fused Disconnect: No	
	High Current Breaker (amp): 3	
High Voltage Transformer (kVA): 0.25		
Air:	Maximum Air Flow (SCFM): 0.25	
	Maximum Air Flow (SCFH): 15	
	Air Pressure Into Dryer (psi): 80	
	Air Pressure Out of Dryer (psi): 13	
	Oil-Free Air Compressor (hp): 0.5	
	Oil-Free Air Compressor (volts): 110	
Desiccant Cell Size: 6"		
Moisture Indicator: Yes		

Cooling Water: None Required, Air Cooled

*All flow rates are dependent on the characteristics of the source water.

**Generators fed with oxygen double the pounds per day and gpm numbers expressed.

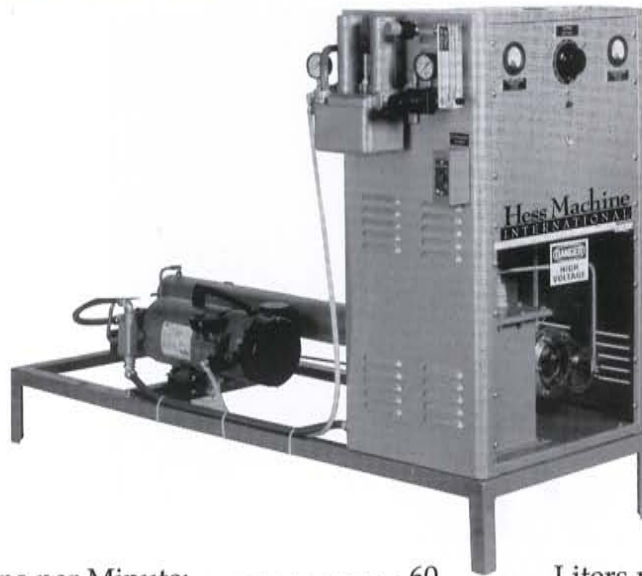
Model H-50 Ozone Generator



Flow Rates:	Gallons per Minute:	30	Liters per Minute:	114
	Gallons per Hour:	1,800	Liters per Hour:	6,813
	Gallons per 8 Hours:	14,400	Liters per 8 Hours:	54,504
	Gallons per 24 Hours:	43,200	Liters per 24 Hours:	163,512
Ozone Yield:	lbs/day:	0.5	g/hour:	9.5
Dimensions:	Generator Width:	16"	Shipping Width:	24"
	Generator Length:	37"	Shipping Length:	42"
	Generator Height:	45"	Shipping Height:	50"
	Generator Weight:	210 lbs.	Shipping Weight:	360 lbs.
Electric:	Volts:	110/220		
	Cycle (Hz):	60/50		
	Current (amp):	10		
	Phase:	1		
	Plug-In Electrical Cord:	Yes		
	Electrical Fused Disconnect:	No		
	High Current Breaker (amp):	5		
High Voltage Transformer (kVA): ...	0.5			
Air:	Maximum Air Flow (SCFM):	0.5		
	Maximum Air Flow (SCFH):	30		
	Air Pressure Into Dryer (psi):	80		
	Air Pressure Out of Dryer (psi):	13		
	Oil-Free Air Compressor (hp):	0.5		
	Oil-Free Air Compressor (volts):	110/220		
	Desiccant Cell Size:	6"		
Moisture Indicator:	Yes			
Cooling Water:	Required Flow (gph):	5		

*All flow rates are dependent on the characteristics of the source water.
 **Generators fed with oxygen double the pounds per day and gpm numbers expressed.

Model L-100 Ozone Generator

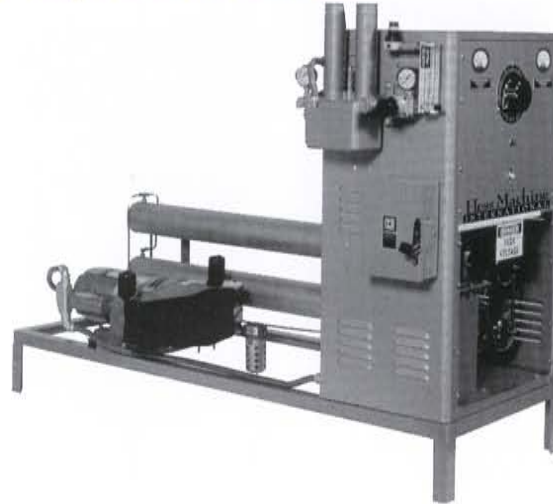


Flow Rates:	Gallons per Minute: 60	Liters per Minute: 227
	Gallons per Hour: 3,600	Liters per Hour: 13,626
	Gallons per 8 Hours: 28,800	Liters per 8 Hours: 109,008
	Gallons per 24 Hours: 86,400	Liters per 24 Hours: 327,024
Ozone Yield:	lbs/day: 1	g/hour: 19
Dimensions:	Generator Width: 28"	Shipping Width: 32"
	Generator Length: 60"	Shipping Length: 70"
	Generator Height: 44.5"	Shipping Height: 48"
	Generator Weight: 260 lbs.	Shipping Weight: 470 lbs.
Electric:	Volts: 110/220	
	Cycle (Hz): 60/50	
	Current (amp): 15	
	Phase: 1	
	Plug-In Electrical Cord: Yes	
	Electrical Fused Disconnect: No	
	High Current Breaker (amp): 10	
High Voltage Transformer (kVA): 1		
Air:	Maximum Air Flow (SCFM): 1	
	Maximum Air Flow (SCFH): 60	
	Air Pressure Into Dryer (psi): 80	
	Air Pressure Out of Dryer (psi): 13	
	Oil-Free Air Compressor (hp): 0.75	
	Oil-Free Air Compressor (volts): 110/220	
	Desiccant Cell Size: 6"	
Moisture Indicator: Yes		
Cooling Water:	Required Flow (gph): 10	

*All flow rates are dependent on the characteristics of the source water.

**Generators fed with oxygen double the pounds per day and gpm numbers expressed.

Model L-200 Ozone Generator (with T-150 Injection Tank)

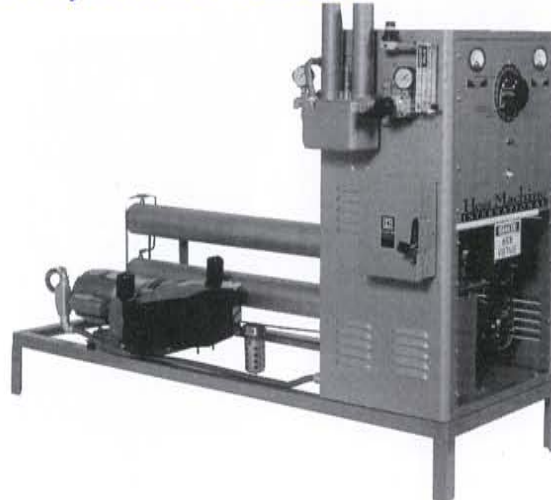


Flow Rates:	Gallons per Minute:	90	Liters per Minute:	341
	Gallons per Hour:	5,400	Liters per Hour:	20,439
	Gallons per 8 Hours:	43,200	Liters per 8 Hours:	163,512
	Gallons per 24 Hours:	129,600	Liters per 24 Hours:	490,536
Ozone Yield:	lbs/day:	2	g/hour:	38
Dimensions:	Generator Width:	30"	Shipping Width:	40"
	Generator Length:	68"	Shipping Length:	72"
	Generator Height:	48"	Shipping Height:	54"
	Generator Weight:	365 lbs.	Shipping Weight:	550 lbs.
Electric:	Volts:	110/220		
	Cycle (Hz):	60/50		
	Current (amp):	20		
	Phase:	1		
	Plug-In Electrical Cord:	No		
	Electrical Fused Disconnect:	Yes		
	High Current Breaker (amp):	20		
High Voltage Transformer (kVA):	2			
Air:	Maximum Air Flow (SCFM):	2		
	Maximum Air Flow (SCFH):	120		
	Air Pressure Into Dryer (psi):	80		
	Air Pressure Out of Dryer (psi):	13		
	Oil-Free Air Compressor (hp):	1		
	Oil-Free Air Compressor (volts):	110/220		
	Desiccant Cell Size:	9"		
Moisture Indicator:	Yes			
Cooling Water:	Required Flow (gph):	20		

*All flow rates are dependent on the characteristics of the source water.

**Generators fed with oxygen double the pounds per day and gpm numbers expressed.

Model L-200 Ozone Generator (with T-300 Injection Tank)



Flow Rates:	Gallons per Minute:	120	Liters per Minute:	454
	Gallons per Hour:	7,200	Liters per Hour:	27,252
	Gallons per 8 Hours:	57,600	Liters per 8 Hours:	218,016
	Gallons per 24 Hours:	172,800	Liters per 24 Hours:	654,048
Ozone Yield:	lbs/day:	2	g/hour:	38
Dimensions:	Generator Width:	30"	Shipping Width:	40"
	Generator Length	68"	Shipping Length:	72"
	Generator Height:	48"	Shipping Height:	54"
	Generator Weight:	365 lbs.	Shipping Weight:	550 lbs.
Electric:	Volts:	110/220		
	Cycle (Hz):	60/50		
	Current (amp):	20		
	Phase:	1		
	Plug-In Electrical Cord:	No		
	Electrical Fused Disconnect:	Yes		
	High Current Breaker (amp):	20		
High Voltage Transformer (kVA):	2			
Air:	Maximum Air Flow (SCFM):	2		
	Maximum Air Flow (SCFH):	120		
	Air Pressure Into Dryer (psi):	80		
	Air Pressure Out of Dryer (psi):	13		
	Oil-Free Air Compressor (hp):	1		
	Oil-Free Air Compressor (volts):	110/220		
	Desiccant Cell Size:	9"		
Moisture Indicator:	Yes			
Cooling Water:	Required Flow (gph):	20		

*All flow rates are dependent on the characteristics of the source water.

**Generators fed with oxygen double the pounds per day and gpm numbers expressed.

Model L-300 Ozone Generator



Flow Rates:	Gallons per Minute: 180	Liters per Minute: 681
	Gallons per Hour: 10,800	Liters per Hour: 40,878
	Gallons per 8 Hours: 86,400	Liters per 8 Hours: 327,024
	Gallons per 24 Hours: 259,200	Liters per 24 Hours: 981,072
Ozone Yield:	lbs/day: 3	g/hour: 57
Dimensions:	Generator Width: 30"	Shipping Width: 42"
	Generator Length: 61"	Shipping Length: 72"
	Generator Height: 45"	Shipping Height: 65"
	Generator Weight: 535 lbs.	Shipping Weight: 750 lbs.
Electric:	Volts: 220	
	Cycle (Hz): 60/50	
	Current (amp): 20	
	Phase: 1	
	Plug-In Electrical Cord: No	
	Electrical Fused Disconnect: Yes	
	High Current Breaker (amp): 30	
High Voltage Transformer (kVA): 4		
Air:	Maximum Air Flow (SCFM): 3	
	Maximum Air Flow (SCFH): 180	
	Air Pressure Into Dryer (psi): 80	
	Air Pressure Out of Dryer (psi): 13	
	Oil-Free Air Compressor (hp): 1.5	
	Oil-Free Air Compressor (volts): 110/220	
	Desiccant Cell Size: 12"	
Moisture Indicator: Yes		
Cooling Water:	Required Flow (gph): 25	

*All flow rates are dependent on the characteristics of the source water.
 **Generators fed with oxygen double the pounds per day and gpm numbers expressed.

Model L-400 Ozone Generator



Flow Rates:	Gallons per Minute:	240	Liters per Minute:	908
	Gallons per Hour:	14,400	Liters per Hour:	54,504
	Gallons per 8 Hours:	115,200	Liters per 8 Hours:	436,032
	Gallons per 24 Hours:	345,600	Liters per 24 Hours:	1,308,096
Ozone Yield:	lbs/day:	4	g/hour:	76
Dimensions:	Generator Width:	31"	Shipping Width:	42"
	Generator Length:	61"	Shipping Length:	72"
	Generator Height:	45"	Shipping Height:	65"
	Generator Weight:	705 lbs.	Shipping Weight:	920 lbs.
Electric:	Volts:	220		
	Cycle (Hz):	60/50		
	Current (amp):	40		
	Phase:	1		
	Plug-In Electrical Cord:	No		
	Electrical Fused Disconnect:	Yes		
	High Current Breaker (amp):	2-25		
High Voltage Transformer (kVA):	4			
Air:	Maximum Air Flow (SCFM):	4		
	Maximum Air Flow (SCFH):	240		
	Air Pressure Into Dryer (psi):	80		
	Air Pressure Out of Dryer (psi):	13		
	Desiccant Cell Size:	12"		
Moisture Indicator:	Yes			
Cooling Water:	Required Flow (gph):	25		

*All flow rates are dependent on the characteristics of the source water.

**Generators fed with oxygen double the pounds per day and gpm numbers expressed.

Ozone Contact Tank

- Available in a range of sizes to fit your needs
- New design
- Contact times can be positively determined
- Observation window
- 316 stainless steel
- Flow control

<u>Tank Size</u>	<u>Dimension</u>
1400 Gallon	46" x 16'
1000 Gallon	46" x 12'
700 Gallon	38" x 12'



All Hess Machine International Equipment Features:

- Rugged, long-lasting construction
- Maintenance friendly design
- Service technicians with over 100 years experience

Model T-150 Hess Machine International Injection Tank with H-25, H-50, L-100, or L-200 Generator



Tank Volumes:	Gallons: 150	Liters: 568
Maximum Flow Rates:	Gallons per Minute: 90	Liters per Minute: 340
	Gallons per Hour: 5,400	Liters per Hour: 20,439
	Gallons per 8 Hours: 43,200	Liters per 8 Hours: . . . 163,512
	Gallons per 24 Hours: 129,600	Liters per 24 Hours: . . 490,536
Dimensions:	Tank Diameter: 31"	
	Tank Diameter with Valve: 35"	
	Tank Height: 85"	
	Tank Weight: 375 lbs.	
	Shipping Width: 40"	
	Shipping Length: 85"	
	Shipping Height: 40"	
	Shipping Weight: 655 lbs.	
Electric:	Volts: 110/220	
	Cycle (Hz.): 60/50	
	Current (amp): 10	
	Phase: 1	
Plumbing:	Untreated Water Inlet FNPT: 1.5"	
	2-Treated Water Outlets FNPT: . . 2"	
	Overflow Outlet FMIP: 2"	
	Off-Gas Vent FMIP: 1"	

Model T-300 Hess Machine International Injection Tank with L-200, L-300, L-400 Generator



Tank Volumes:	Gallons: 300	Liters: 1,136
Maximum Flow Rates:	Gallons per Minute: 240	Liters per Minute: . . . 908
	Gallons per Hour: 14,400	Liters per Hour: 54,504
	Gallons per 8 Hours: 115,200	Liters per 8 Hours: . . . 436,032
	Gallons per 24 Hours: 345,600	Liters per 24 Hours: . . 1,308,096
Dimensions:	Tank Diameter: 44"	
	Tank Diameter with Valve: 50"	
	Tank Height: 85"	
	Tank Weight: 510 lbs.	
	Shipping Width: 60"	
	Shipping Length: 90"	
	Shipping Height: 55"	
	Shipping Weight: 680 lbs.	
Electric:	Volts: 110/220	
	Cycle (Hz.): 60/50	
	Current (amp): 10	
	Phase: 1	
Plumbing:	Untreated Water Inlet FNPT: 2"	
	2-Treated Water Outlets FNPT: . . 2" & 3"	
	Overflow Outlet FMIP: 2"	
	Off-Gas Vent FMIP: 1.5"	

Additional Accessories

Ozone Monitors

ATI - The Dissolved Ozone Monitor electronics package provides you with a real-time display of ozone concentration, external alarm and control outputs, and an isolated analog output while continuously monitoring dissolved ozone concentration in water. The addition of a chart recorder ensures a permanent record of ozone residual quantities for optimal protection and accountability. ATI's advanced electrochemical system uses a direct membrane sensing ozone probe that is specific to molecular ozone.

IN-USA - This low-maintenance system measures dissolved ozone by first stripping the ozone out of the water for measurement in the gaseous phase by a UV analyzer. Your team receives data in a continuous, real-time digital readout. 4-20 milli amp output is standard; R5232 digital outputs are optional. Two field programmable alarms with form C relay contacts are standard.

Automatic Controls

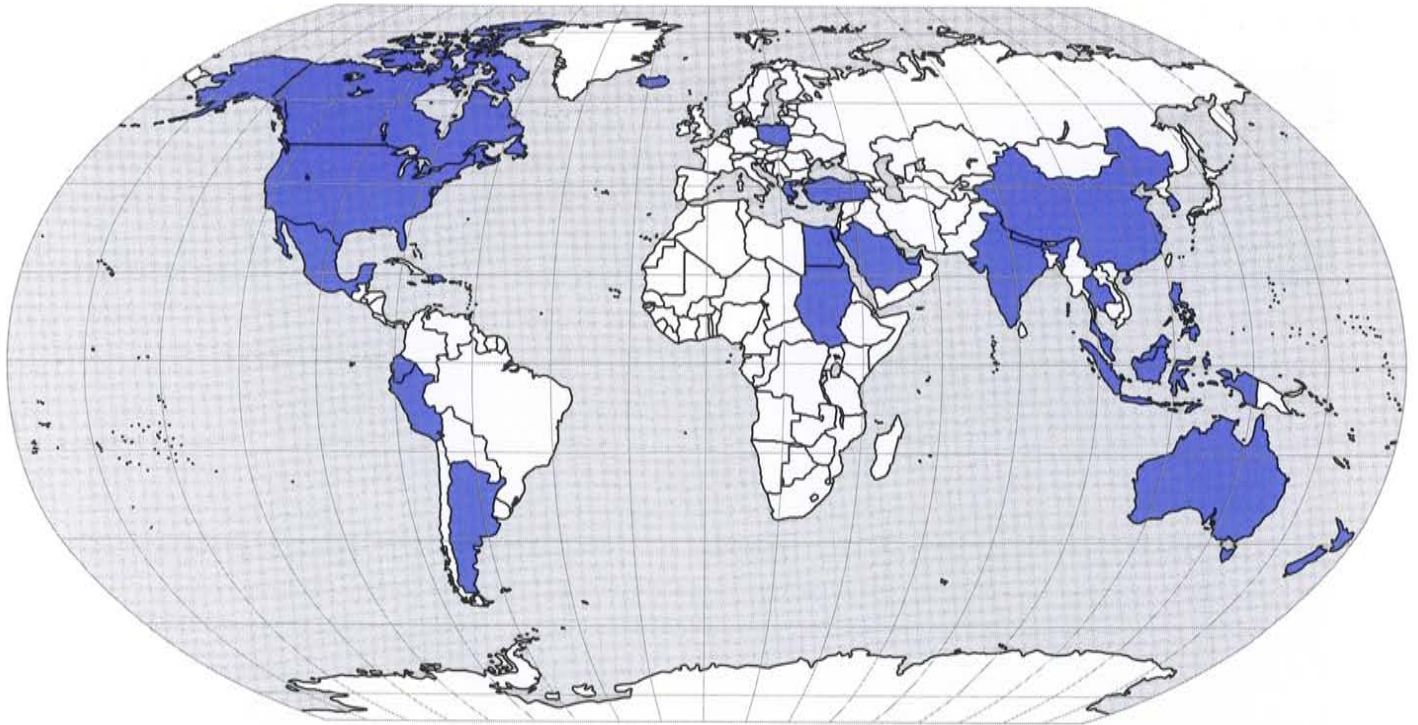
Hess Machine International's Ozone Residual Control System is an option available for use with our ozone generator. The system will maintain a consistent, controlled level of ozone residual, reducing taste issues while helping to avoid conversion of Bromide to Bromate that could put your product over the FDA standard. The control system utilizing a PLC automatically controls the generator's power, maintaining the ozone residual at a preset level. A digital readout allows the operator to monitor and make changes from the PLC's keypad. The Ozone Residual Control System interfaces with an electronic ozone monitor, allowing digital readout and the option of charting a graph.



Ozone Destruct

An economical, reliable method of eliminating ozone in off-gas to acceptable levels prior to discharge into the atmosphere. The compact catalytic device, designed for venting off-gas from contact tanks, effectively converts ozone to environmentally safe oxygen. Constructed of 316 stainless steel, the weather-tight unit is built for outdoor installation.

Hess Machine *IS* International...



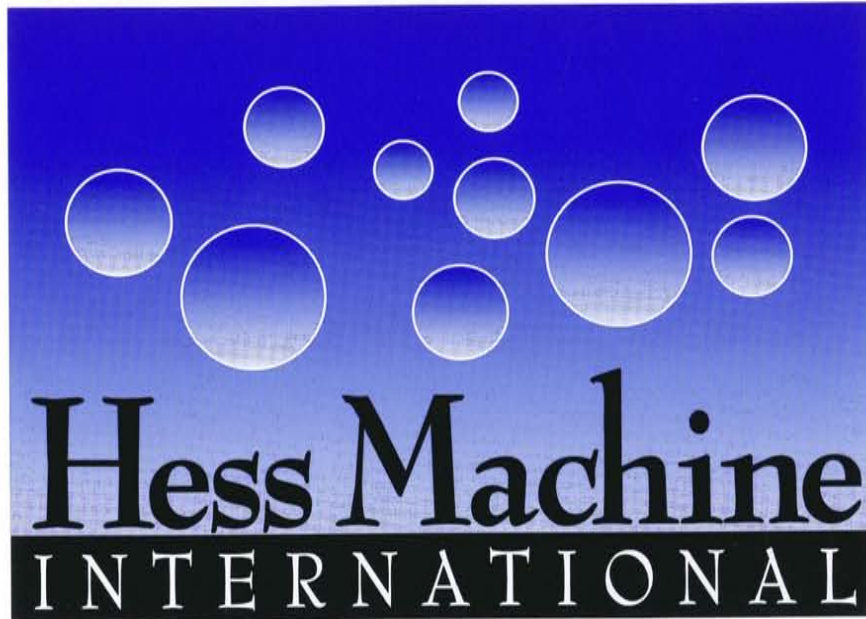
Hess Machine International currently has systems operating in the following countries:

Egypt • China • Hong Kong • Indonesia • South Korea • Malaysia • Nepal
Singapore • Thailand • Canada • New Brunswick • Nova Scotia • Bahamas
Bermuda • Virgin Islands • Dominican Republic • Haiti • Jamaica • Mexico
Puerto Rico • Greece • Iceland • Poland • St. Martins • Saudi Arabia
Turkey • Australia • Guam • New Zealand • Philippines • West Indies
Argentina • Ecuador • Peru • United States • Kenya
India • United Arab Emirates

Outstanding Service

Hess Machine International prides itself on its outstanding service to its customers. Our technicians are always available to answer your questions from 7:00 a.m. till 5:00 p.m. Monday thru Friday eastern standard time and will work with you until all of your questions are answered.

Because our equipment is so user-friendly, the necessary service can be done by your own staff. However, we also provide technical service at your location when requested. Our technicians also make a Hess Maintenance Tour annually to our customers located along the eastern seaboard.



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