Heat Loss and Energy Consumption in Immersion and Ultrasonic Washers

Lowering wash temperatures from 160°F (71°C) to 120°F (49°C) in one 600-gallon immersion washer can reduce energy costs by $2,273.00 per year. (Check out the data at the end of this article)

Industrial in-process washing of machined, stamped, or fabricated parts is often accomplished in heat-ed immersion or ultrasonic tanks. Heat is applied to the water/ deter-gent mixture in the washer Heat Loss and Energy Consumption in Immersion and Ultrasonic Washers system to increase chemical action, soften soils, and control foam.

Typical in-process immersion washing temperatures are from 140°F (60°C) to 180°F (82°C) with the most common recommendation being around 150°F to 160°F (66°C to 71°C).

While heating has many benefits, it is also costly, and this cost impact is becoming more significant as energy prices skyrocket.

Fortunately, twenty-first-century chemical advances are making it possible to wash parts faster and with less heat than ever before. Since these new cleaner technologies often cost more than older formulations, it is important to predict the cost savings that will be realized by reducing heat energy in the washing process.

Washer systems lose heat energy in several ways:

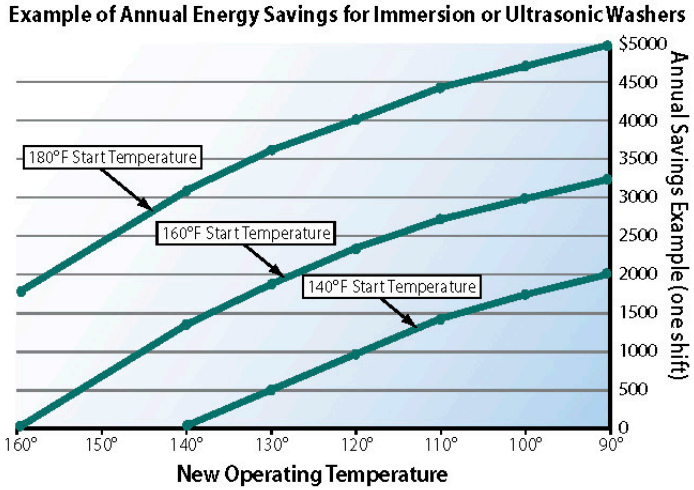
- The parts being washed absorb heat from the washer and carry it out of the system.
- Heat is radiated from all surfaces of the washer.
- Usually the most significant heat energy loss comes from evaporation, which increases rapidly as the wash water temperature rises.

To help our customer calculate the potential savings from reducing washer temperatures, we have re-searched proven engineering data and made it available in this bul-letin, and as a calculating spreadsheet on our CoolTools website.

The chart below gives an example of a 600-gallon immersion washer that is kept heated all workweek and shut off on weekends, using electric heat at $0.06/kWh.

©2025 Master Fluid Solutions | Master Fluid Solutions™ is a trademark of Master Chemical Corporation d/b/a Master Fluid Solutions.

Heat Loss and Energy Consumption in Immersion and Ultrasonic Washers



Potential savings of $2,273.00 per year!

To use this chart, First find the curve representing the starting washer temperature, then find the proposed lower washer tempera-ture on the bottom axis. The point along the curve where the new temperature intersects will give you an example of the annual sav-ings if you had a washer of similar size and similar energy costs.

Please note that the results are for steady-state operation and do not include the cost of bringing a cold washer bath up to temperature at the start of each workday, or the cost of holding the washer bath at operating temperature during weekends.

Additional Benefits Of Lowering Wash Temperature:

Saving a bundle on electricity or natural gas is the number one sav-ings from lowering wash tempera-ture but there are several other benefits:

- Water evaporation from wash-ers increases exponentially with temperature.
    1. If you are using tap water, the minerals in the water are left behind, rapidly increas-ing water hardness which consumes cleaner chemistry and shortens bath life. This results in increased chemical and disposal costs.
    2. If you are using deionized or R-O water, your water treatment costs also go up directly with temperature.
- Heating aggravates problems with staining or smutting aluminum, brass, and zinc.

Apply This Data To Other Washing Systems:

The figures given in the graph above are specific to the particular washer and energy cost we used to calculate it. We have created a spreadsheet to calculate annual en-ergy costs for electric and natural gas heated tanks. The spreadsheet is based on accepted engineering data. Your Master Fluid Solutions distributor or District Manager can access this spreadsheet to calculate approximate savings for you. You can also request an analysis from us by e-mailing info@masterfluids.com.

You will have to send us the following data:

1. Tank capacity in gallons
2. Open surface dimensions (water surface)
3. Hours/week that the washer heater is switched on
4. Energy cost in $/kWh or $/CCF
5. If tank walls are insulated, how many inches of insulation?
6. Original operating temperature (rounded to nearest 10°F)
7. Proposed operating temperature (rounded to nearest 10°F)
8. Description of part to be washed, including metals and soils
9. Current wash cycle time

If you have a spray washer, please see our technical bulletin “Heat Loss and Energy Consumption in Spray Washers” which is avail-able from your Master Fluid Solutions representative.

Example Data:

Washer: :

1. Uninsulated tank with open top 60” x 48”
2. Water capacity: 600 gallons
3. Heating method: Thermostatic control, electric immersion heaters
4. Duty cycle: Washers are heated 132 hrs/week
5. Electricity cost/kWh: $0.06

©2025 Master Fluid Solutions | Master Fluid Solutions™ is a trademark of Master Chemical Corporation d/b/a Master Fluid Solutions.

Heat Loss and Energy Consumption in Immersion and Ultrasonic Washers

	@ 160°F	@ 120°F	Savings	
BTU/Hr loss from open surface	26,200	9,400	16,800	(64%)
BTU/Hr loss from sides and bottom of tank	5,884	3,082	2,802	(48%)
Total BTU/Hr loss	32,084	12,482	19,602	(61%)
Energy Cost/Year	$3,720.45	$1,447.41	$2,273.04	(61%)

©2025 Master Fluid Solutions | Master Fluid Solutions™ is a trademark of Master Chemical Corporation d/b/a Master Fluid Solutions.