



MultiTherm FF-1®

The Logical First Step in Heat Transfer System Start-Up!

FLUSHING FLUID

For Start-Up & General Maintenance of Heat Transfer Systems

Purpose

MultiTherm FF-1® flushing fluid is for use in start-up or general maintenance of heat transfer fluid systems. During new equipment start-up, it is an economical way to remove loose material such as weld splatter, fines, particulate matter, etc. left in lines and equipment, along with oil and some preservative coatings. It is useful for general maintenance purposes for removing particulate matter and used heat transfer fluid from a system prior to recharge or changeover from one fluid to another.

MultiTherm FF-1® flushing fluid is formulated to be compatible with MultiTherm® and most other heat transfer fluids so that small residual amounts left in equipment will not be a problem.

System Preparation

New systems may contain mill scale, weld splatter, slag, flux, quench oil, protective coatings, dirt and water. The abrasive contamination can damage pump seals, bearings, and control valves. Mill scale and weld splatter can promote fluid oxidation and cracking. The oil, coatings and flux are thermally unstable and can cause fluid degradation.

Some say to leave the system as is, and explain that buying replacement fluid a little earlier is cheaper than the cost of cleanout. However, the cost of mechanical seal replacement and control valve rebuilds probably exceed the cleanout cost. When the expense of unscheduled downtime is added, the cost of professional cleanout is usually justified.

Removing mill scale, oil and coatings from all pipe sections and fittings before installation can avoid problems. Use Robvon or equal back-up rings at each

weldment. Clean and dry out the heater and all heat users before installation.

It is strongly recommended that water not be used for cleanout of an assembled system or for “hydro” pressure testing. Water in a hot oil system will cause pump cavitation and can easily ruin pump seals and bearings. Trapped in a dead leg and hit by high-temperature fluid, water can literally blow up the pipe, or the expansion can push hot fluid from a vent, possibly jeopardizing personnel. To pressure test a system, use either MultiTherm FF-1® flushing fluid or heat transfer fluid or inert gas in lieu of water. Pressurize fluid with nitrogen, not air.

System Filling

If a system has been flushed, cleaned or pressure tested with water, blow out residual water, ideally with nitrogen. Then add MultiTherm FF-1® flushing fluid.

Slowly pump the fluid into the system from the bottom up to vent air. Filling

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MAXIMUM USE TEMPERATURE

Open System	225°F
Closed System	Up to 600°F for several days only. Use nitrogen blanket or cold seal/thermal Buffer tank connected to expansion tank.

TYPICAL PROPERTIES

Base Oil	Light Distillate	Flash Point, coc, ASTM D92	320°F / 160°C
Appearance	Clear, pale straw to water white	Autoignition Temp, Estimated	650°F / 343°C
Odor	Slight oily	Initial Boiling Point, ASTM D1160	520°F / 271°C
Specific Gravity @ 59°F (15°C)	0.910	Viscosity, SUS, @ 100°F (38°C)	110
Density @ 59°F (15°C)	7.578 lb/gal / 3.437 kg/gal	Pumpable, Centrifugal @ 465 cP	32°F / 0°C
Pour Point, ASTM D97	-40°F / -40°C	Average Molecular Weight	305

Stocking Distributor



MultiTherm FF-1®

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from the top (pouring into the expansion tank) hinders air venting and needlessly aerates the fluid. Air in the fluid can lead to pump cavitation and fluid oxidation. Often, a convenient place to fill is through the blow down connection on the strainer. Use a small positive displacement pump to transfer fluid rather than the system pump.

Particulate Removal

Circulate fluid at room temperature. When circulating pump suction pressure drops to zero or a negative number, clean the filter. Continue to repeat this procedure until suction pressure stays at the normal positive reading. Typical filters are 60-mesh stainless steel, however, some pump manufactures recommend 100-mesh to protect seals.

Water Removal

The more complex the system, the more difficult the water removal will be. One method is to locate the valve nearest to the system's low point and drain a small quantity of cold fluid into a beaker and allow it to stand for several minutes. If you notice a phase separation (fluid

floating on top of the water), keep sampling until you draw pure fluid. Start the system's pump, shut down, allow the system to stand, and repeat the sampling procedure. Do this until no water is observed in the beaker.

Now, bring the system up to about 180°F and heat very slow to 225°F (above the boiling point of water, but below the fluid's oxidation point). While the system is heating to 180°F, open expansion tank warm-up valve to include the tank in the loop. Water vapor from the outside air will often condense in the tank. Open the vent to allow the water to "steam" off. Be sure to close both valves and properly hook up the inert gas blanket or cold seal tank once all water is exhausted from the system. Continue to run the system until the vent stops "steaming".

After the water has been boiled out, heat the system slowly to a maximum of 500°F. Continue to watch pump suction pressure and if it falls to zero or a negative number, clean out the filter. At elevated temperatures more protective coating material may be removed, weld splatter and scale loosened and dirt produced. During the start-up of a new system, filters may require cleaning 3 to 20 times over a two day period. Turn off the heat

and allow the pump to run until the MultiTherm FF-1® flushing fluid is cool enough to dump safely. With some systems, safe dumping can be accomplished at 225°F while others may require lowering temperature to 150°F. Clean the filter once again before charging with heat transfer fluid.

General Maintenance

MultiTherm FF-1® flushing fluid is useful to remove particulate contamination and for flushing a system when changing heat transfer fluids. Generally follow the above instructions so that the expansion tank is also flushed and check for water from condensation to be safe.

Please Note

MultiTherm FF-1® is not a cleaner. It cannot be expected to remove all tightly bonded carbonaceous varnish or "coked-on material" that can form during operation or well-bonded preservative coatings. Where any severe dirt or fouling problem occurs

MultiTherm® can recommend professional cleaning service companies. Call 800-225-7440 for assistance.

PHYSICAL PROPERTIES

Temperature		Density			Thermal Conductivity		Specific Heat		Viscosity			Vapor Pressure	
°F	°C	lb/ft ³	lb/gal	kg/l	Btu/hr-ft-°F	W/m-°C	Btu/lb-°F	kJ/kg-°C	Centistoke	Centisposise	lb/ft-hr	mm Hg	PSI
0	-18	58.17	7.78	0.932	0.0753	0.1303	0.39	1.63	1515	1412	3416	—	—
50	10	57.05	7.63	0.914	0.0742	0.1284	0.42	1.76	110.7	101.2	244.8	—	—
100	38	55.99	7.49	0.897	0.0730	0.1264	0.45	1.88	22.9	20.5	49.59	0.00005	0.000001
150	66	54.86	7.33	0.879	0.0718	0.1243	0.48	2.01	8.27	7.27	17.59	0.00047	0.000009
200	93	53.74	7.18	0.861	0.0707	0.1223	0.51	2.14	4.10	3.53	8.54	0.00320	0.000062
250	121	52.62	7.03	0.843	0.0696	0.1205	0.54	2.26	2.45	2.07	5.01	0.01600	0.000309
300	149	51.49	6.88	0.825	0.0684	0.1184	0.57	2.39	1.66	1.37	3.31	0.06700	0.001296
350	177	50.37	6.73	0.807	0.0673	0.1165	0.60	2.51	1.21	0.98	2.37	0.23000	0.004447
400	204	49.25	6.58	0.789	0.0660	0.1142	0.63	2.64	0.93	0.73	1.77	0.69000	0.013342
450	232	48.12	6.43	0.771	0.0650	0.1125	0.65	2.72	0.74	0.57	1.38	1.84000	0.035580
500	260	46.94	6.28	0.752	0.0638	0.1104	0.67	2.81	0.61	0.46	1.11	4.41000	0.085275

Warranty: MultiTherm® warrants that MultiTherm FF-1® conforms to the data set forth in this brochure. We present this information in good faith, but because we cannot control or anticipate the many different conditions under which our information and product may be used, no other warranty, expressed or implied, is given.