

PROTOCOL[®] SC-101

APPLICATION GUIDELINES

Operating Conditions

Mechanical circulation or agitation of the cleaner is recommended, but not required. However, excessive circulation rates should be avoided. If circulation rates are too high, the cleaning solution may cause erosion corrosion and attack metallic components in the system. To avoid this erosion effect, we recommend continuous circulation rates corresponding to linear velocities of less than 10 feet per second for ferrous metals and less than 6 feet per second for non-ferrous metals through the narrowest passage.

PROTOCOL SC-101 cleaner is relatively corrosive to metallic zinc, which is commonly used to coat (galvanize) sheet or tubular products. This product should not be used in galvanized systems unless etching of the galvanized steel is acceptable.

Materials Compatibility

PROTOCOL SC-101 has no significant effect of commonly used elastomer, polyolefins, and nonmetallic films.

- ❖ Buna N
- ❖ Neoprene
- ❖ Butyl Rubber
- ❖ Polypropylene
- ❖ L.D. Polyethylene
- ❖ PVC
- ❖ Zinc chromate primer
- ❖ Epoxy
- ❖ Polyurethane
- ❖ Tygofilm

Types of Scales Removed

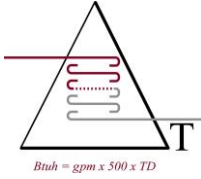
Scale	Classification	Effectiveness
1. Rust	corrosion	excellent
2. Lime	mineral	excellent
3. Mag Hydroxide	mineral	excellent
4. Cupric Oxide	corrosion	excellent
5. Solder Bloom	corrosion	excellent
6. Black Rust	corrosion	excellent
7. Cuprous Oxide	corrosion	excellent
8. Aluminum Oxide	corrosion	very good
9. Ferric Hydroxide	corrosion	good
10. Ferrous Hydroxide	corrosion	good to fair
11. Zinc phosphate	corrosion	good to fair
12. Aluminum Phosphate	corrosion	fair
13. Calcium phosphate	mineral	fair
14. Calcium sulfates	mineral	fair

With scales containing two or more of the minerals mentioned above, the cleaner will tend to dissolve preferentially according to their placement in the table.

While Thermal Fluid Technologies believes that this information is accurate and factual as of the date printed, this information is intended to be used only as a guide in providing general information with respect to the product mentioned; and therefore is not to be taken as a warranty or representation for which TFTI assumes legal responsibility, nor is it to be understood as permission or recommendation to practice any patented invention without a license.

Since the user's product formulation, specific use application, and conditions of use are beyond TFTI's control, TFTI makes no warranty or representation regarding the results that may be obtained by the user. It shall be the responsibility of the user to determine the suitability of the product mentioned for the user's specific application.





PROTOCOL SC-101

CLEANING PROCEDURE

Time is required for the cleaning solution to become exhausted and this depends on several factors such as temperature, rate of circulation, and solution strength. Under normal circumstances the exposure time is typically 8 to 24 hours. PROTOCOL SC-101 and SD-102 are commissioned in a pH range of 6.0 to 6.5. Depletion of the cleaner is generally recognized when the pH rises above 8. Once the higher pH is achieved the cleaning solution is spent and should then be removed from the system.

- 1.) Drain the original fluid from the system and select an appropriate inspection site. This site is necessary for determining the scale thickness and will be used later for inspection after the cleaning procedure has been completed. ****Note**** Be sure to locate and drain all low points.
- 2.) Fill the system with fresh water with all air bleeds in the open position and circulate for 30 minutes.
- 3.) Stop circulation and drain the entire system as quickly as possible through the low point drains. This is necessary to remove any loose debris.
- 4.) Refill the system with fresh water and the suggested concentration of PROTOCOL System cleaner and degreaser.
- 5.) Operate the system at as high a temperature as possible, but do not exceed 190°F (88°C) continue to operate until the cleaning solution is spent (pH ~ 8.0). Note: Air should be excluded from the cleaning solution by venting through the air bleeds.
- 6.) Discontinue circulation and drain the system as quickly as possible through the low point drains. Then flush the system with fresh water.
- 7.) Inspect the system for cleanliness. If the system has not been satisfactorily cleaned, repeat steps 4-7.
- 8.) Once the cleaning procedure is satisfactory flush with fresh water until the water runs clear.
- 9.) It is suggested that the final rinse be done with deionized water and 1-2 vol-% of PROTOCOL "lay-up inhibitor" #S-317. The purpose is to minimize the potential for flash rusting if the now-cleaned system remains empty and wet for a short period prior to recharging the system with the new coolant. The final rinse with Deionized Water is recommended to ensure the removal of any calcium, magnesium, sulfate, and chloride ions that may be left behind after flushing the system with tap water. The engine/pumps should run long enough to insure that the thermostats open and coolant flows to all piping and/or heat exchangers.
- 10.) Recharge the system with industrially inhibited PROTOCOL or SubZero Heat Transfer Fluid premixed with Deionized Water.

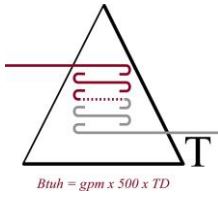
NOTE: Systems containing significant amounts of mixed metals (iron, copper, and steel) are susceptible to galvanic corrosion, which can be detrimental to long term system cleanliness. However, this copper metal deposition can be avoided by injecting air into the cleaning solution...after the cleaning solution is spent. Air injection should be done at a low rate and downstream of the engine/pump to minimize cavitation of the liners and/or pump impellers. Continue circulating the spent cleaning solution for approximately 1 hour before draining the cleaning solution.

Special Consideration

PROTOCOL System cleaners and degreaser are fairly corrosive to metals containing zinc. Metallic zinc is commonly used to coat galvanized steel sheets or tubular products. Therefore, the cleaner should not be used in systems containing galvanized parts. The same is true for magnesium based metals, and therefore, this cleaner should not be used unless etching of either metal is acceptable.

PROTOCOL SC-101 and SD-102 do not contain heavy metals and are biodegradable. However, the disposal of the cleaning solution and flush water should be done in compliance with all regulatory agencies at a federal, state, and local level.

Thermal Fluid Technologies, Inc. hereinafter referred to as TFTI, believes the information and recommendations contained herein to be accurate and reliable as June 1, 2000. However, since any assistance furnished by TFTI with reference to the proper use and disposal of its products is provided without charge. And, since use conditions and disposal are not within its control, TFTI assumes no obligation or liability for such assistance and does not guarantee results from the use of such products or other information contained herein. No warranty, expressed or implied is given.



PROTOCOL[®] SC-101

INDUSTRIAL SYSTEM CLEANER

Product Description

PROTOCOL SC-101 is a complex blend of water-soluble chelating and sequestering agents dissolved into a deionized water base. This highly effective system cleaner functions by converting insoluble compounds into water-soluble compounds, making the removal of unwanted contaminants easy and effortless.

PROTOCOL SC-101 is also very effective at removing corrosion and mineral scales, as well as converting compounds containing elements of copper, aluminum, zinc, iron, and lead into water soluble compounds for easy removal from your Hydronic system.

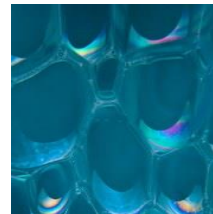
PROTOCOL SC-101 is non-corrosive, non-alkaline, easy to use, and does not require repetitious water rinses. SC-101 is generally used at a 1 to 5 volume percent concentration depending on the amount of scale or hydrocarbon foulants found in the piping system. The cleaning solution starts with a pH slightly below neutral and slowly increases during the cleaning process to a pH of approximately 8.0 (4 to 12 hours). Depending on how fouled or dirty the system is initially will dictate how rapidly the cleaner is depleted. Field use has proven that SC-101 is highly effective in cleaning most systems in just one application.

PROTOCOL SC-101 does not contain heavy metals, is not classified as a hazardous substance, and is biodegradable.

** We highly recommend storing this product at a temperature above 40 °F to prevent crystallization.*

Technical Data

However, the contaminants withdrawn from a cleaned system could possibly contain hazardous materials and therefore, disposal of the depleted cleaning solution should be done in accordance with all regulatory agencies at a Federal, State, and Local level.



Before



After

Physical Properties

Boiling Point @ 760 mm Hg	212 - 220 °F
Flash Point	None
VP mm Hg (100°F)	15 - 18
Vapor Density (air = 1)	< 1.0
Specific Gravity (H ₂ O=1)	1.065 – 1.075
Coef. of Expansion (at 130 ° F)	0.00018
Evaporation rate	< 1.0
Solubility in water	complete
Appearance	Blue liquid-clear
pH (as is)	5.5 - 7.0
Freeze point (°F)	15 - 20

"Performance products of unparalleled quality and value"