Arctic Silver®

Instructions for Arctic Silver 5

How to apply Arctic Silver 5

Intel or AMD Single Core CPU W/Heatspreader

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1) Initial Precautions

- Don't put it in your mouth.
- Don't give it to children or leave it where children can get a hold of it.
- Keep it away from pets.

2) Technical Precautions

- While much safer than silver greases engineered for high electrical conductivity, Arctic Silver 5 thermal compound should be kept away from electrical traces, pins, and leads. Arctic Silver 5 is slightly capacitive and could cause problems if it bridged two close-proximity electrical paths.
- Never turn on a computer without a heatsink properly mounted on the CPU and thermal interface material between the CPU core and the heatsink. A modern high-performance CPU can be permanently damaged in less than 10 seconds without proper cooling.
- Arctic Silver 5 has no adhesive qualities and is considered grease. It will never dry or set and cannot be used to glue a heatsink to a CPU core. To permanently glue a heatsink to a CPU core that does not have any other attachment method, please use Arctic Silver Adhesive or Arctic Alumina Adhesive.
- We do not recommend using Arctic Silver 5 on the older slot type Intel Xeon processors with large multiple square inch CPU to heatsink interfaces. The huge contact area and large gaps between the processor and the heatsink require a thermal pad or thick mesh-reinforced paste. Arctic Silver 5 can be used on socket type Xeons without a problem.

3) Break-In Period

Due to the unique shape and sizes of the particles in Arctic Silver 5 conductive matrix, it will take a up to 200 hours and several thermal cycles to achieve maximum particle to particle thermal conduction and for the heatsink to CPU interface to reach maximum conductivity. (This period will be longer in a system without a fan on the heatsink or with a low speed fan on the heatsink.) On systems measuring actual internal core temperatures via the CPU's internal diode, the measured temperature will often drop 2C to 5C over this "break-in" period. This break-in will occur during the normal use of the computer as long as the computer is turned off from time to time and the interface is allowed to cool to room temperature. Once the break-in is complete, the computer can be left on if desired.

4) Application Instructions

Important Reminder

Even though Arctic Silver 5 thermal compound is specifically engineered for high electrical resistance, you should keep the compound away from processor, memory, and motherboard traces and pins. There is a possibility that dust or metal particles and/or shavings carried by airflow inside the computer case could contaminate the compound and increase its electrical conductivity.

Heatsink Preparation

If your heatsink has a thermal 'pad' mounted on it, this pad must be removed before using Arctic Silver 5. If your heatsink has thermal interface material applied to it, it must be removed first. After the pad or thermal interface material is removed, ONLY Arctic Silver 5 will be between the CPU heatspreader and the heatsink.

Thermal pads are made with paraffin wax that melts once it gets hot. When it melts, it fills in the microscopic valleys in the heatsink with wax. To minimize permanent contamination of the heatsink mounting surface with wax, the thermal pad should be removed before it is used and melted. Never use heat or hot water to remove the pad, as heat will melt the wax into the heatsink. Take care not to scratch the surface of the heatsink when removing the pad, a plastic tool is recommended in the removal of thermal pads or other thermal interface material. You can then optimally remove the remnants of the wax or other thermal interface material by using ArctiClean 1 and 2. You can adequately clean the remnants with a xylene based cleaner, (Goof Off and some carburetor cleaners) or high-purity isopropyl alcohol. If you use Goof off or xylene based cleaners always follow up with a cleaning of high-purity isopropyl alcohol afterwards.

NEVER use any oil or petroleum based cleaners (WD-40, citrus oil based cleaners and many automotive degreasers) on the base of a heatsink. The oil, which is engineered to not evaporate, will fill in the microscopic valleys in the metal and significantly reduce the effectiveness of any subsequently applied thermal compound.

CPU Preparation:

As you may know the heatspreader is the raised square in the center of the CPU and is highlighted in red and is covering the single core in the photo at left.

New CPU's generally do not have thermal interface material applied to them from the factory, so cleaning the surface is not required but is recommended. If another thermal compound has been previously applied to the CPU heatspreader you MUST clean the surface first. To optimally clean the CPU heatspreader surface use ArctiClean steps 1 and 2 or adequately by using a low residual solvent (high-purity isopropyl alcohol) and a LINT FREE cloth (a lens cleaning cloth or a coffee filter). Important: Keep the surfaces free of foreign materials and do NOT touch the surfaces, a hair, piece of lint, and even dead skin cells can significantly affect the thermal interfaces performance. In addition, oils from your fingers can adversely affect the performance by preventing the micronized silver fill from directly contacting the metal surfaces. (Fingerprints can be as thick as 0.005")

Applying Arctic Silver 5:

Carefully apply Arctic Silver 5 directly to the heatspreader of the CPU. Only apply thermal compound to the top of the actual CPU heatspreader as shown at left. Since we are now in version 5 of our Arctic Silver thermal compound the photos at left and below are for example only. If you are working with an Intel P4 CPU single core with heatspreader the amount of Arctic Silver 5 needed would be equivalent to about one (1) uncooked short-grain of white rice.

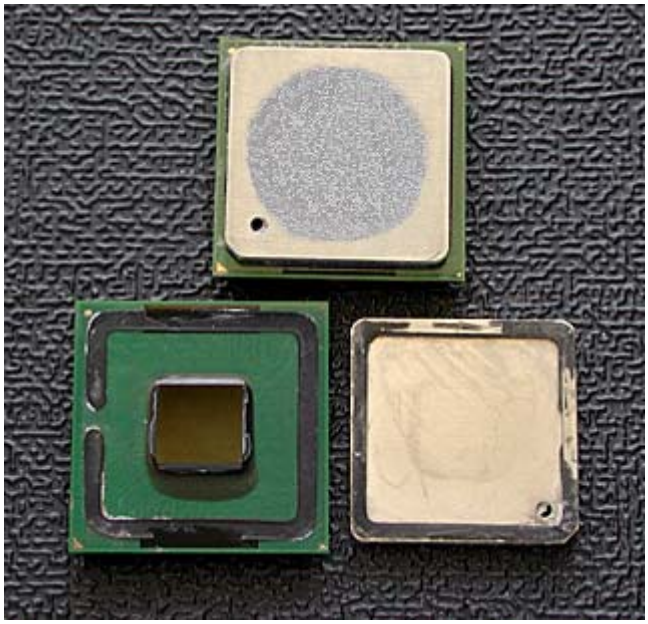
For an AMD 64 single core with heatspreader the amount of Arctic Silver 5 needed would be equivalent to about one and one half (1-1/2) uncooked short-grain of white rice. In any case the rule of thumb here is "a little will go along way".

Finishing the Application:

RECHECK to make sure no foreign contaminants are present on either the bottom of the heatsink or the top of the CPU heatspreader. Mount the heatsink on the CPU per the heatsink instructions. Be sure to lower the heatsink straight down onto the CPU. Once the heatsink is properly mounted, grasp the heatsink and very gently twist it slightly clockwise and counterclockwise one time each if possible (Just one or two degrees or so). Please note that some heatsinks cannot be twisted once mounted. However, our testing has shown

that this method minimizes the possibility of air bubbles and voids in the thermal interface between the heat spreader and the heatsink. Since the vast majority of the heat from the core travels directly through the heat spreader, it is more important to have a good interface directly above the actual CPU core than it is to have the heat spreader covered with compound from corner to corner.

The photo to the right shows how the pressure from the heatsink base spreads the compound on the heatspreader and also shows a P4 with the heat spreader removed to show the location of the actual CPU core that is the source of the heat. Happy cooling.



5) Storage of Arctic Silver 5

To keep Arctic Silver 5 fresh for future applications, always replace the cap on the syringe after each use. The syringe should be stored tip down so that any separation between the particles and suspension fluid will be at the back end of the syringe. Like any mix of particles that are many times heavier than the suspension fluid, there will be some separation in the compound over time when stored in the original syringe. Because all thermal compounds eventually experience some separation in storage, storing in a cool place like a refrigerator will also lessen the separation over time. However, this does not affect the performance of the un-separated or remixed compound.

6) Removal from Hardware

Arctic Silver thermal compound can easily be removed from hardware using the proper cleaners and tools: For general clean up, a cloth or paper towel will work well. Intricate cleaning can be accomplished with Q-tip swabs. An old toothbrush can often get the compound out of crevices that other tools cannot reach.

CPU Core: For optimum cleaning use ArctiClean 1 and 2. For adequate cleaning use high-purity isopropyl alcohol or acetone and a bit of careful rubbing. Do not use nail polish remover as it contains fragrance oils and other contaminants. (If you use acetone, do a final cleaning with high-purity isopropyl alcohol.)

Heatsink: For optimum cleaning use ArctiClean 1 and 2. For adequate cleaning use a xylene based cleaner, (Goof Off and some carburetor cleaners) or high-purity isopropyl alcohol. If you use Goof off or xylene based cleaners always follow up with a cleaning of high-purity isopropyl alcohol afterwards.

CPU Ceramic: Use any of the following cleaners: ArctiClean 1 and 2. Any dish detergent. (Dawn, Lux, Palmolive, Etc.) Do not use soap for an automatic dishwasher to clean a CPU. WD-40, citrus based cleaners. Xylene based products. (Goof Off, some carburetor cleaners and many brake cleaners.) Mineral spirits. (Be careful to keep the mineral spirits away from the core.) Once the majority of the compound has been removed from the ceramic, small patches remaining on the ceramic can be 'erased' with a soft eraser.

If you use any of the suggested products besides ArctiClean 1 and 2 to remove Arctic Silver 5 thermal compound from the CPU ceramic or heatsink base, always do a final cleaning with isopropyl alcohol to remove any residue from the cleaner.

7) Removal from Self

Wash your hands with any dish detergent (Dawn, Lux, Palmolive, Etc.) rather than hand soap. (Do not use soap for an automatic dishwasher.)