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## Application Instructions for Premium Silver Thermal Compound on a large contact area (Intel P4 AMD64)

Arctic Silver, Arctic Silver II, Arctic Silver 3 and Arctic Silver 5.

### Important 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.

Follow the instructions at the bottom of this page to clean it off of yourself, your CPU, and other hardware.

#### **Caution:**

While much safer than silver greases engineered for high electrical conductivity, Arctic Silver thermal compound should be kept away from electrical traces, pins, and leads. The compound is slightly capacitive and could cause problems if it bridged two close-proximity electrical paths.

#### **Caution:**

Never turn on a computer without a heatsink properly mounted on the CPU with a 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.

#### **Caution:**

Arctic Silver is a grease and does not have any adhesive qualities. It will never dry or set and cannot be used to glue a heatsink to a chip.

To permanently glue a heatsink to a chip that does not have any other attachment method, please use Arctic Silver Adhesive or Arctic Alumina Adhesive.

#### **Caution:**

We do not recommend using Arctic Silver 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 can be used on socket type Xeons without a problem.

### **Important Reminder:**

Due to the unique shape and sizes of the particles in Arctic Silver's 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.

## **Application Instructions**

1. Even though Arctic Silver 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 the airflow inside the computer case could contaminate the compound and increase its electrical conductivity.
2. ONLY Arctic Silver thermal compound should be between the processor core and the heatsink. Remove any thermal pads or other interface material from the heatsink before applying the Arctic Silver. Thermal pads can be scraped off with a plastic tool that will not scratch the bottom then the remnants can be removed with ArctiClean 1 Thermal Material Remover and ArctiClean 2 Thermal Surface Purifier. If you do not have ArctiClean, use a xylene based cleaner, (Goof Off and some carburetor cleaners) acetone, mineral spirits, or high-purity isopropyl alcohol.

Never use any oil or petroleum based cleaners (WD-40, oil based grease removers and many automotive degreasers) on the base of a heatsink. If you use a citrus based cleaner, you must use ArctiClean 2 Thermal Surface Purifier to remove the citrus oil before applying new thermal material, Any oil remaining on the heatsink will fill in the microscopic valleys in the metal and significantly reduce the effectiveness of any subsequently applied thermal compound.

If your heatsink has a thermal 'pad' mounted on it, this pad must be removed before using Arctic Silver thermal compound. Thermal pads are made with paraffin wax that melts once it gets hot. When it melts, it will fill in the microscopic valleys in the heatsink with wax. To minimize the permanent contamination of the 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, the heat will melt the wax into the heatsink.

3. Clean the mating surfaces completely with ArctiClean 2 Thermal Surface Purifier or a low residual solvent (High-purity isopropyl alcohol or acetone will work) and a LINT FREE cloth. (i.e. a coffee filter) If another thermal compound has previously been applied to the heatsink, the mounting surfaces should be thoroughly scrubbed and cleaned with ArctiClean 1 Thermal Material Remover followed by ArctiClean 2 Thermal Surface Purifier. If you do not have ArctiClean, a xylene based cleaner, (Goof Off and some carburetor cleaners) acetone, mineral spirits, or 99% pure isopropyl alcohol can be used. It is important to keep the surfaces free of foreign materials and NOT to 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 surface. (Fingerprints can be as thick as 0.005")

4. **For Arctic Silver 1, 2 and 3:**

Determine what area on the base of the heatsink will contact the CPU core once the heatsink is mounted. **Twist the plunger in the syringe barrel at least 1/2 turn to ensure that it is free.** Squeeze enough Arctic Silver thermal compound onto the center of this area to create a small mound as shown in the photo below.

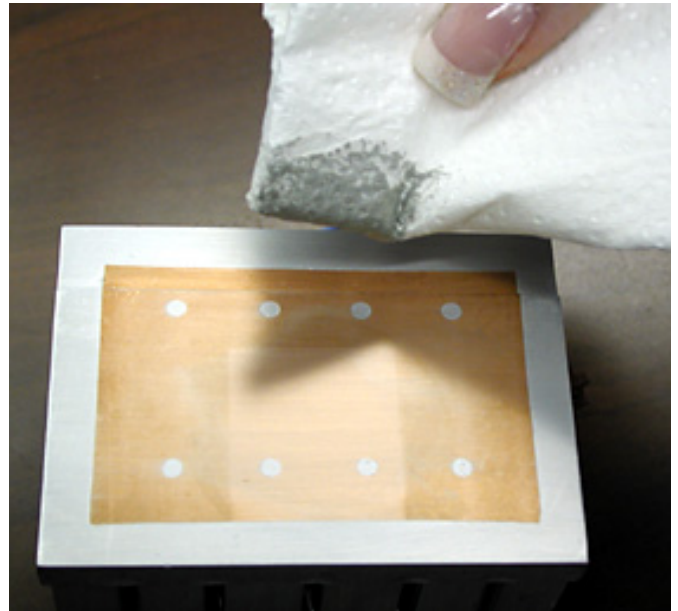


5. Using the compound you applied to the base of the heatsink, tint the bottom of the heatsink in the area where the CPU will contact it. Put a finger into a plastic bag and thoroughly rub the compound into the base of the heatsink using both clockwise and counter-clockwise circular motion. This will ensure optimum filling of the microscopic valleys in the metal.

DO NOT use your bare finger to apply or smooth the compound (skin cells, and oils again).



6. Re-clean the heatsink surface with a LINT FREE cloth. Do not use any solvent or fluid. You may notice that the base of the heatsink is slightly discolored even after all the compound would seem to have been removed. That is the Arctic Silver thermal compound filling the microscopic valleys.



7. **For ALL Arctic Silver versions:**

Put a small amount of Arctic Silver onto the center of the heat spreader/CPU Cap as shown in the photo.

Only a small amount of Arctic Silver is needed

**P4:**

Slightly less than the size of an uncooked grain of short-grain white rice or 1/2 of a BB.

**Athlon64:**

About the size of one and a quarter uncooked grains of short-grain white rice or 2/3 of a BB.



8. **RECHECK** to make sure no foreign contaminants are present on either the bottom of the heatsink or the top of the CPU core. Mount the heatsink on the CPU per the heatsink's 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.)

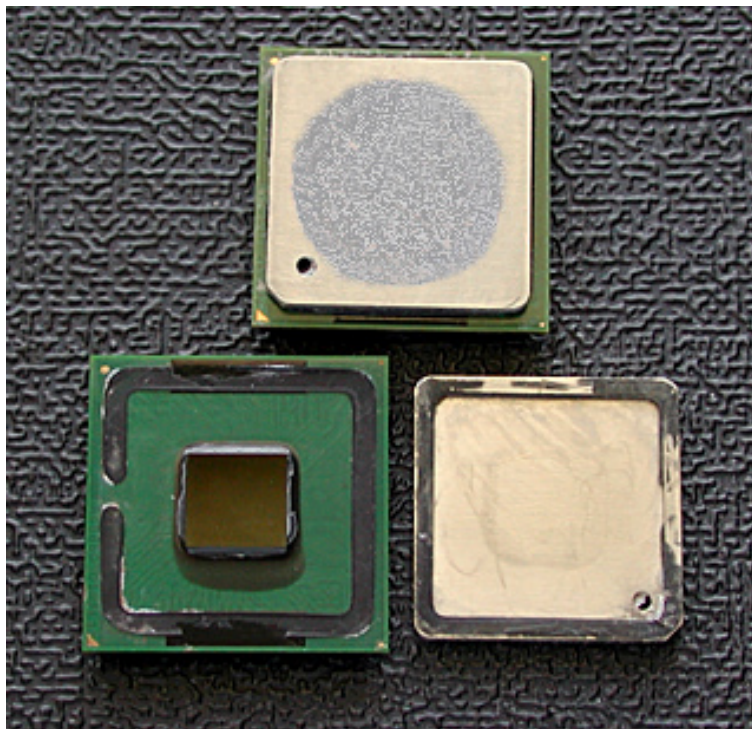
Please note that some heatsinks cannot be twisted once mounted.

**DO NOT REMOVE THE HEATSINK FROM THE CPU TO LOOK AT THE COMPOUND ONCE YOU HAVE MOUNTED THE HEATSINK. This will introduce air into the interface layer and require a fresh application.**

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 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.

While the CPU core on an Athlon64 is slightly larger than the P4 core, it is still much smaller than the metal CPU Cap that covers it.



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## Storage

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. (All thermal compounds eventually experience some separation in storage.) This does not affect the performance of the unseparated or remixed compound.

To keep the compound 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 that occurs will be at the back end of the syringe with fully suspended particles below that. Storing in a cool place like a refrigerator will also lessen separation over time.

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## Removal Instructions (From Hardware)

1. 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.

The recommended cleaners are:

### CPU Core:

ArctiClean 1 Thermal Material Remover followed by ArctiClean 2 Thermal Surface Purifier. If you do not have ArctiClean, 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 isopropyl alcohol.)

### Heatsink:

ArctiClean 1 Thermal Material Remover followed by ArctiClean 2 Thermal Surface Purifier. If you do not have ArctiClean, use xylene based products (Goof Off, some carburetor cleaners and many brake cleaners.), mineral spirits or high-purity isopropyl alcohol.

### Remember:

Once you have applied a thermal grease or melted a thermal pad onto a heatsink, it is impossible to remove all of the grease or pad from the microscopic valleys in the heatsink using standard cleaning chemicals and paper or fabric towels. Any subsequent thermal material will be applied over the remnants of the original material.

Never use any oil or petroleum based cleaners (WD-40, oil based grease removers and many automotive degreasers) on the base of a heatsink. If you use a citrus based cleaner, you must use ArctiClean 2 Thermal Surface Purifier to remove the citrus oil before applying new thermal material, Any oil remaining on the heatsink will fill in the microscopic valleys in the metal and significantly reduce the effectiveness of any subsequently applied thermal compound.

### CPU Ceramic:

Use any of the following cleaners.

### ArctiClean

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.**

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

### **Removal Instructions (From You)**

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

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