

## Instructions: How to use "Coollaboratory Liquid Pro"

Congratulations on the purchase of our product. You now own a heat conducting paste surpassing all other heat conducting pastes in its heat conductivity by many times - this is not just an advertising phrase, it is really true. To ensure both maximum cooling and handling without difficulties, please study these instructions carefully.

### Why do we need heat conducting paste and how does it work?

You could think that it is sufficient to install a CPU-cooler on the CPU and it does its work. Under optimum conditions this would work well, meaning that the bottom of the CPU-cooler and the surface of the CPU (which needs cooling) are completely flat and even. Unfortunately this is never the case in practice. Even a well polished cooler possesses extremely fine unevenness on the contact surface with the CPU, and the surface of the CPU is also slightly curved in most cases. We are not talking about millimetres, but micrometers and even smaller dimensions. You can often see the light falling through in between CPU and the cooler if you hold them both (assembled) against the window.

The cooler works in spite of this unevenness. However, its effectiveness is inadequate, because the contact surface between CPU and the cooler is reduced - and air is generally known to be a very poor heat conductor. Thus particularly high-quality cooling systems (using water cooling) lose on efficiency. The heat does not reach the cooler as continuously as it is able to lead it away. Result: The CPU might boils while the cooler remains cold.

Here the heat conducting pastes comes into operation. Its task is to fill the "gaps" between the CPU and the cooler displacing the insulating air. By filling the gaps with a heat conducting substance, the heat is passed on to the cooler much more effectively.

Compared to air, all solid or liquid substances serve as good heat conductors. Thus, compared to air, you can even indicate typical insulating materials, such as porcelain, silicone or metal oxides as heat conducting substances. This is why quite a few materials are sold as a "heat conducting agent", which according to their actual heat conducting capability would rather be seen as an insulator.

Buying "Coollaboratory Liquid Pro" you possess the first heat conducting agent that really deserves its name.

### To ensure optimum results applying our product, please note the following:

- 1.) "Coollaboratory Liquid Pro" was designed for use with high quality coolers made of copper or silver. Aluminum coolers are unsuitable (of course this applies only to the cooler's contact surface onto which "Coollaboratory Liquid Pro". is spread).

Note: Do not use cheap aluminum coolers. Their quality is not very high, and aluminum is not resistant against our Liquid Metal. Aluminum could form an alloy with "Coollaboratory Liquid Pro" which would react with the surrounding air's humidity. A black stain forms after a while, showing insulating qualities. ' Therefore: No contact of "Coollaboratory Liquid Pro" with aluminum. **NO ALUMINUM COOLERS!**

Use coolers made of copper or silver. Copper coolers are available at Ebay's for about 4 €.

- 2.) Like all metals, our Liquid Metal may act as an electric conductor. This forms no problem if applied according to our instructions, as your cooler is made of conducting metal as well. Make sure "Coollaboratory Liquid Pro" does not touch any electric components. This could lead to shortcuts when turning the computer's power on. If you spill some of the Liquid Metal, wipe it away thoroughly before turning your PC on. Larger quantities can be sucked away with a syringe, or use a paper towel for smaller amounts. For final cleaning some scrubbing detergent might be helpful.

Note: Even non-electricity conducting heat conducting pastes may acquire electric conductivity after some time. The reason is the possible contamination with dust and metal particles by the cooling fan.

## Preparation

"Coollaboratory Liquid Pro" conducts heat better than conventional, previously used heat conducting pastes (improvement by the factor 9 to 150). If these pastes have entered the cooler surface's microscopically small unevenness, they will form an insulating layer between Liquid Metal and the cooler's surface.

All remains of previously used heat conducting pastes have to be removed thoroughly (!) before applying "Coollaboratory Liquid Pro". Sometimes, this might not be easy. Often cooler surfaces previously (mis-) treated with conventional heat conducting pastes need to be polished or ground slightly (1/100 mm).

It is extremely important to clean both the CPU and the cooler - even if they are new. Use a clean cloth tissue and apply some organic solvent to it. Suitable are acetone or pure alcohol. Not suitable are scrubbing detergents, oil- or petroleum based detergents or any other substances leaving remains. Carefully clean both the cooler's and CPU's surfaces chosen for heat transport. The surfaces must be free of dust and grease (no finger prints!).

**Important:** In the case of insufficient cleaning, contact problems may occur between cooler and CPU. Liquid Metal would form drops running off.

If your cooler is equipped with a thermal pad, it needs to be removed before using Liquid Metal. Thermal pads carry paraffin wax that melts when heated, filling the microscopically small unevenness of the cooler's surface. To avoid this contamination, remove the pad before it has been used and got melted. Do not use hot water: the paraffin wax would melt and enter the unevenness. If this has happened already, grind and polish the cooler's surface.

The optimum for the application of "Coollaboratory Liquid Pro" is a new copper cooler from which you wipe your finger prints with an organic solvent. Do not touch the cleaned surfaces with your fingers anymore. A finger print may be as thick as 0.005 mm. Liquid Metal cannot enter at these areas, reducing the overall effectiveness.

## How to apply "Coollaboratory Liquid Pro"

Now you may apply a small amount of "Coollaboratory Liquid Pro" to the cooler surface's center. Do not use too much, you will be amazed at how little you need. To begin with, do not use more than a little drop. Remember that Liquid Metal's purpose is to fill tiny gaps, not to drip from the cooler. Now spread out the "Coollaboratory Liquid Pro" evenly across the cooler's surface from center to the sides. You may use a thin paint brush, a "Q-Tip" cotton swab or anything similar. Do not use your finger (greasy surface). Powder free rubber gloves may be used. Once done with this work, your cooler's surface should shine like a mirror.

Note: You may also apply Liquid Metal to both the die or to the cooler's surface and the die. Make sure the applied amount is not too large.

Please note: "Coollaboratory Liquid Pro" will cling to the CPU and the cooler's surface by means of adhesion forces. It must not be applied to thickly. Compare with a perpendicular wall that is being painted. If too much paint is applied, runs will form. This should not happen.

The CPU's and cooler's surfaces normally need a layer of 0.003 to 0.005 mm to fill the relevant air gaps. This compares to the thickness of a newspaper page. Thoroughly ground and polished coolers only need a transparent layer of Liquid Metal. Not so ideally prepared surfaces will require a little more.

Once the substance is applied to the cooler, hold it vertically: No metal should run downwards. If it happens though, you have applied too much. Any Liquid Metal in excess can be sucked in by the syringe. Or use a paper towel to wipe it away.

At period about 48 hours after the application (depending on the thickness of the application) the applied liquid metal consolidates. Thereby the already really good heat conduction changes for the better continuing, as also the safety of use.

Whether you will remove sometime the liquid metal of the cooler and/or CPU (for example before selling), just wipe it. Residues that aren't removable this way (solidified residues) will be disposed with metal polish, as use for instance for cleaning chrome parts at the car.



### **Installation of the cooler**

Now press the cooler onto the CPU. Do not turn or slide the contacting surfaces against each other. Otherwise, corresponding depressions and dips in the contacting surfaces cannot fill up with Liquid Metal. This way, air cushions could form between the corresponding surfaces, reducing the thermal effectiveness. Pressure from above is completely sufficient to form a thermal connection between the two surfaces. Now mount the cooler and its devices according to the manufacturer's instructions. Check the contact between CPU core and the cooler's surface. The cooler must rest flat and even on the CPU. The cooler's and CPU ceramic's edges should be parallel. Do not forget to connect the fan's electrical wire to the board.

### **Removing Liquid Metal**

Should you desire to remove Liquid Metal from cooler and/or CPU (e. g. before selling), just wipe it off. Remains that will not come off easily that way can be removed with help of metal polish that is e. g. used for polishing chrome body parts in automobiles.

**Advise:** Please note, that the Coollaboratory Liquid Pro provides the best performance if the liquid metal invade the smallest unevenness at the processor / cooler. As a result of this manner is it possible, that the letter at the processor is limited or unreadable.

**Please note:** When applying Liquid Metal, a little more care is necessary compared to the application of conventional pastes. But you are rewarded with a much better performance! Anyone without any experience in dealing with computer hardware should pick another paste with a much poorer performance from other manufacturers.

We grant the right to return any unopened merchandise within two weeks after delivery. Any further claims, especially regarding liability due to any damage occurring, are excluded. Upon purchase and use of "Coollaboratory Liquid Pro" you recognize and accept these terms and conditions.

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