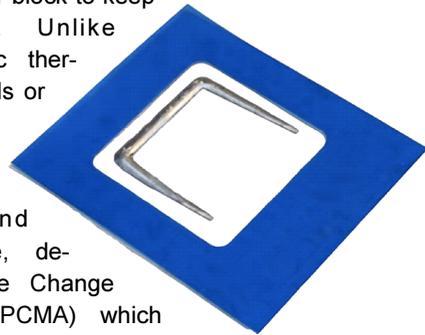


Indigo Xtreme™

Engineered Thermal Interface for Intel Core™ 2 Quad, Core™ 2 Extreme, Core™ 2 Duo and Xeon processors

Indigo Xtreme™ is an Engineered Thermal Interface (ETI) that fits neatly between a CPU lid and heat sink or water block to keep CPUs cooler. Unlike greases, metallic thermal interface pads or liquid metal alloys, Indigo Xtreme is a self-contained and sealed structure, deploying a Phase Change Metallic Alloy (PCMA) which reflows and fills surface defects on the CPU lid and heat sink. The resultant interfacial layer is void-free and robust, with low thermal contact and bulk resistance.



 Important: Unlike most thermal interface products, the Indigo Xtreme form-factor is optimized for each application.

 Attempting to use Indigo Xtreme with CPUs or heat sinks other than those specified may result in degraded performance or failure of the interface (See: Supported Hardware).

Supported Hardware

Supported CPUs:

- Core™ 2 Quad
- Core™ 2 Extreme
- Core™ 2 Duo
- Xeon



Supported heat sink/water block types:

In general, heat sink/water blocks that contact entire surface of CPU lid are compatible with Indigo Xtreme.



Unsupported heat sink types:



Heat sinks that do not contact entire surface of CPU lid, or surfaces with channels between mounting base and heat pipes, are incompatible with Indigo Xtreme. Please see our compatibility document and other application notes for installation tips specific to your cooler at: <http://www.indigo-xtreme.com/documentation.html>

 Prior to the installation and reflow of Indigo Xtreme, **Do Not** disable the Thermal Control feature that protects your CPU from overheating.

ETI Kit Contents

The Indigo Xtreme ETI is offered as part of an Engineered Thermal Interface Kit. This kit includes several cleanroom-grade surface cleaning products for (2) complete installations.

- The ETI kit includes:
- Indigo Xtreme ETIs (2 installations)
 - Cleanroom-grade dry wiper cloths
 - Indigo Xtreme Clean™ (sample size)
 - Pair of powder-free nitrile gloves

Installation Steps:

 **Read entire instructions before beginning installation. Computer operating system and temperature monitoring utilities must be installed prior to use. Contact Enerdyne Solutions if you have any questions.**

1. Motherboard, CPU and Heat Sink/Water Block Removal:

Remove the motherboard (from the PC case) and all heat sink clips and support mechanisms from the motherboard. Remove the CPU from the motherboard socket and place on a non-abrasive, lint-free surface for cleaning.

 Motherboard and clip support removal will facilitate proper alignment of the ETI to the CPU lid and heat sink. It is recommended that all heat sink mounting hardware be re-installed during Step #9.

2. Thermal Interface Compound Removal:

Using a dry wiper cloth, apply pressure to thoroughly remove any existing interface grease from the CPU lid and heat sink. Clean with fresh areas of the wiper cloth until no visible grease residue is detected on the wiper.

 If removing metal pad or liquid metal TIM residue, refer to manufacturer's specific cleaning methods.

3. Put on Gloves:

Prior to the final degreasing step, powder-free gloves should be worn to prevent any finger oils or contaminants from contacting the CPU lid, heat sink and ETI surfaces and to prevent skin contact with Indigo Xtreme Clean™.

4. Degrease CPU lid and Heat Sink/Water block Surfaces:

Saturate a dry wiper cloth with Indigo Xtreme Clean™; use ~1/2 trial size bottle per ETI installation; thoroughly wipe the CPU lid; repeat with the heat sink interfacial surfaces. Continue to wipe each surface with fresh areas of the wiper until no visible residue is detected on the wiper. Wipe all surfaces of any visible lint, fibers, or particulates.

 Be prepared to wipe the CPU lid and heat sink surfaces immediately upon saturating each dry wiper cloth as the Xtreme Clean™ solvent will quickly evaporate. When finished, dispose of the used wiper properly. New CPUs or heat sinks must be degreased as well. Use only the supplied Indigo Xtreme Clean™ for the degreasing step.

 Use the Indigo Xtreme Clean™ solvent in a well-ventilated area. Avoid contact with plastics (such as keyboards, computer cases, cooling fans, some water block housings, coolant tube fittings, cables, etc.) Also, avoid contact with elastomers (coolant tubing, gaskets, etc.).

5. CPU Installation:

Install the CPU in the motherboard. Refer to motherboard or CPU installation instructions.

 The ETI can only be applied after correct installation of the CPU.

6. Indigo Xtreme Handling:

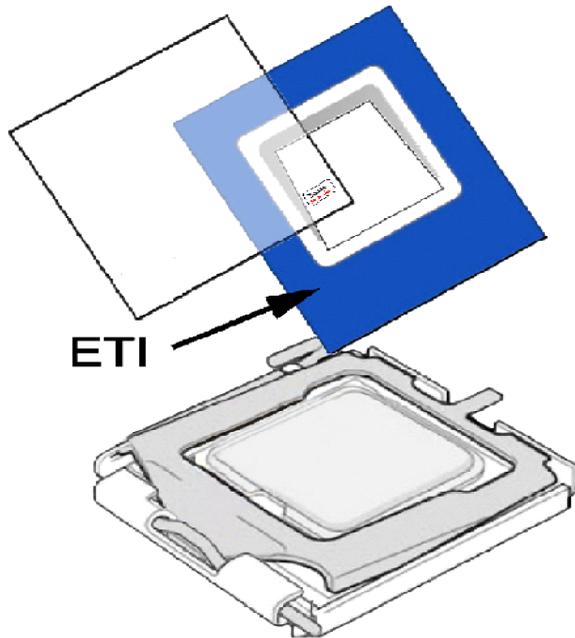
 The Indigo Xtreme ETI may be handled on the blue surfaces only. ETI installation requires a lint-free environment.

 Do not remove the clear Top and Bottom liners prior to the specific installation step. Do not bend, flex or puncture any portion of the ETI. Keep all solvents away from the ETI.

7. Bottom Side Liner Removal:

Remove the “Bottom” side rectangular clear liner by slowly peeling the liner, beginning from the corner with the white “BOTTOM” label. Do not remove the “Top” liner at this step

 Do not touch the exposed adhesive area after removal of the clear liner. Once the liner



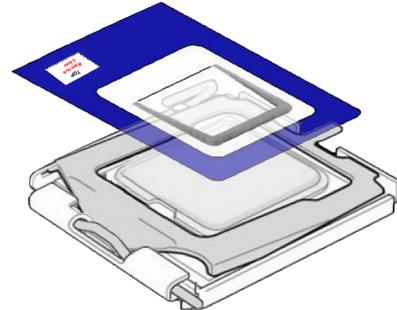
has been removed, proceed immediately to Step #8: Alignment and Placement.

8. Alignment and Placement:

Orient the ETI such that the Bottom side is facing the CPU lid. (Refer to the following figures for correct placement).

Hold the ETI on the blue edges (with both hands to prevent any wrinkling or warping) and carefully lower onto the CPU lid surface. With moderate, downward finger pressure, completely press down all ETI surfaces onto the CPU lid by following the square blue alignment ring.

Ensure that the ETI is oriented with CPU lid/socket as shown. Align the square blue ring to the edge of the CPU lid before making contact.



 It is critical that the square blue alignment ring is completely on the CPU lid and all blue ring surfaces are thoroughly pressed down.



ETI on CPU lid with correct alignment and placement

9. Heat Sink Mounting Hardware Installation:

Any heat sink clip supports may now be mounted over the installed ETI.

 The ETI must extend beneath any heat sink clip support/frame and must not be bent by the frame.



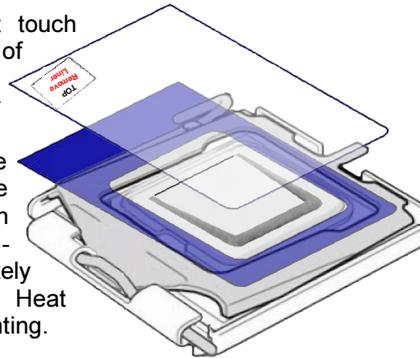
Temporarily tape the heat sink clip to the heat sink base to keep the assembly stable during heat sink mounting.

10. Top Side Liner Removal:

Remove the “Top” side rectangular clear liner by slowly peeling the liner, beginning from the corner with the white “TOP” label.

 Do not touch any of the clear

surfaces after removal of the clear liner. Once the liner has been removed, proceed immediately to Step #11: Heat Sink /Block Mounting.



11. Heat Sink/Block Mounting:

 It is imperative that the heat sink or water block is aligned correctly before it makes contact with the ETI. Avoid any twisting on the ETI as the heat sink is bolted/clamped down. Apply a uniform pressure to the sink (while clamping) to prevent it from shifting.

For Clip and Bolt mounted sinks:

 Initially tighten each bolt to latch onto the clip support threading. Apply uniform torque to all of the bolts (by alternating the tightening of bolts). Mounting force recommendations for specific coolers and water blocks can be found at: <http://www.indigo-xtreme.com/documentation.html>

For plastic Push-Pin mounted sinks:

 Attach push-pins to the motherboard by starting with the two push-pins opposite the socket hinge. Apply enough force to lock the final two push-pins. Be certain the push-pins are all securely locked.

12. ETI Reflow:

As part of installation, the Indigo Xtreme ETI must first be heated with the CPU running under load in order to reflow (melt) the PCMA.

 The interface is highly thermally resistive without a complete reflow. Failure to perform the exact reflow procedure may result in unacceptable thermal performance.

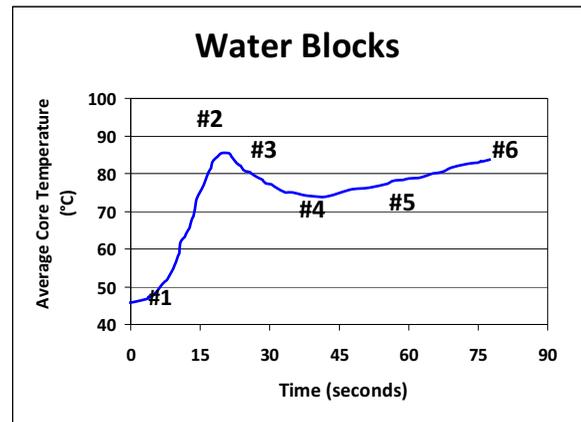
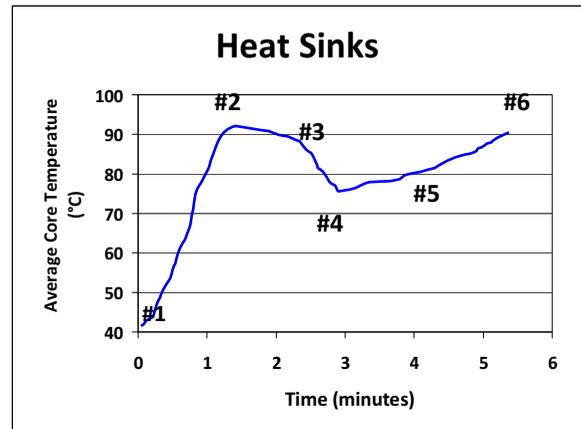
 A video demonstration of ETI reflow can be found at: <http://www.indigo-xtreme.com/documentation.html>

ETI Reflow Procedure

1. Connect up any liquid lines to the water block.
2. Orient the computer such that the motherboard and CPU are in a horizontal position.
3. Plug in the CPU (heat sink) fan and case fan(s). For water cooled systems, turn on liquid pump.
4. Boot the computer. Clock frequency and voltage must be set back to default.
5. Open a CPU temperature monitoring program (such as SpeedFan™) and select the graphing option to track the profile of all core temperatures during reflow. Be certain the graph is open with all core temperatures selected before proceeding to the next step.
6. Exercise the CPU with a “burn” program (such as Prime 95™) to generate adequate heat for reflow. Multi-core CPUs require one copy of the burn program for each core to be running simultaneously. Refer to References for links to burn utilities.
7. Unplug the CPU (heat sink) fan and case fan(s). For water cooled systems, turn off the liquid pump.

 Intel multi-core processors have built-in protection (Adaptive Thermal Monitor) that prevents the processor from exceeding maximum core temperatures, thereby preventing any damage to the CPU.

8. Follow the average core temperature profile (with the temperature monitoring program) illustrated in the graphics below for your specific thermal solution: Heat Sink or Water block. Larger heat sinks and all copper water blocks will require longer reflow times.



If the average core temperature does not follow a similar temperature profile as seen in the previous graphics, then improper reflow may have occurred. Proceed to "Removal" and re-install a new Indigo Xtreme ETI.



Avoid any bumping or excessive pressure on the heat sink/water block and keep the computer in the horizontal position while cooling down.

	Heat Sinks	Water blocks
#1	All burn programs have been activated.	All burn programs have been activated.
#2	Core temperatures will initially rise to peak of ~80-90°C.	Core temperatures will initially rise to peak of ~80-85°C.
#3	Core temperatures will stabilize slightly (85°C).	Core temperatures will immediately begin to drop.
#4	Within ~2-3 minutes, all core temperatures will drop rapidly to a Bottoming Point.	Core temperatures will drop within seconds of the initial peak to a Bottoming Point.
#5	Following the Bottoming Point, average core temps will slowly rise again. Allow core temperatures to return to ~90°C.	Following the Bottoming Point, core temperatures will quickly rise. Allow core temperatures to return to ~90°C.
#6	Once the average core temperature has reached ~85-90°C, de-activate all burn programs and shut down computer; allow to cool for at least 10 minutes before booting and connecting fans.	Once the average core temperature has reached ~85-90°C, de-activate all burn programs and shut down computer; allow to cool for at least 20 minutes before booting and plugging in pump.

Removal

To disassemble, release the clamping force from the heat sink/water block. The ETI may then be removed (intact) by first slowly peeling each corner. The ETI is designed to adhesively capture excess alloy (from differences of CPU lid/heat sink interfacial roughness and planarity) on their surfaces.

Any residual adhesive on the CPU or heat sink/water block may be removed with acetone, xylene, or Xtreme Clean and a clean wiper or cotton cleaning swab. Residual alloy is best removed by wetting a swab with solvent and gentling rotating the swab to loosen and collect the alloy particles.



Indigo is a single-use interface product and any removal of the heat sink (pre/post-reflow) will require a new ETI. All interface material and adhesive residue must be removed and the CPU and heat sink re-cleaned prior to the re-installation of a new ETI.

Storage

Store Indigo Xtreme at room temperature conditions of 72°F (22°C) and 50% R.H., preferably in the original sealed enclosure.

References

Burn in Program:

<http://files.extremeoverclocking.com/file.php?f=103>

Temperature monitors:

Motherboard manufacturers usually supply a hardware monitor utility for their boards. SpeedFan is the most popular temperature monitoring tool. It includes a real-time graphing mode that will aid in the CPU burn-in:
<http://www.almico.com/speedfan.php>

The Material Safety Data Sheet (MSDS) for Indigo Xtreme Clean™ can be found at: <http://www.indigoxtreme.com/documentation.html>

Contact us for more information about this or other Indigo Xtreme applications at our website:
<http://www.Indigo-Xtreme.com>

Disclaimer

Enerdyne Solutions is not responsible for any damages due to external causes, including but not limited to, improper use, accident, neglect, alteration, repair, improper installation, improper testing, or damages caused by overclocking.

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