

Indigo Xtreme™

Installation Guide for P/Ns: 775-X1

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 waterblock 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 Quad
- Core™ 2 Duo
- Xeon™



Supported heat sink/waterblock types:

Heat sink/waterblocks 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. For a list of incompatible heat sinks/waterblocks, please see our Heat Sink Compatibility Application Note 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. **For this and additional cautionary advice please see our Indigo Xtreme Installation Advisory at: <http://www.indigo-xtreme.com/documentation.html>**

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:

- (2) Indigo Xtreme ETIs
- (2) Type TR solvent wiper pouches
- (2) Cleanroom-grade dry wiper cloths
- (1) Pair of powder-free nitrile gloves
- (1) Detailed Installation Guide



Check the condition of the ETI kit before installation; if any problem is found, contact Enerdyne Solutions for a replacement.

Installation Steps



Read entire instructions before beginning installation. Contact Enerdyne Solutions if you have any questions.

1. Motherboard, CPU and Heat Sink 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 the supplied 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, the supplied powder-free nitrile gloves must 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 the solvent wiper.



Stray grease compound can be mitigated as gloves are applied immediately following the Thermal Interface Compound Removal step.

4. Degrease CPU lid and Heat Sink Surfaces:

Remove the Type TR solvent wiper from the foil pouch, unfold wipe, and thoroughly wipe the CPU lid and 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 opening the foil pouch as the solvent will quickly evaporate. When finished, seal the wiper in the ETI kit clear bag. New CPUs or heat sinks must be degreased as well.



Use only the supplied Type TR solvent wipers for the degreasing step. Do not use isopropyl alcohol (IPA) or any other solvent. Use the solvent wipe in a well-ventilated area.

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.



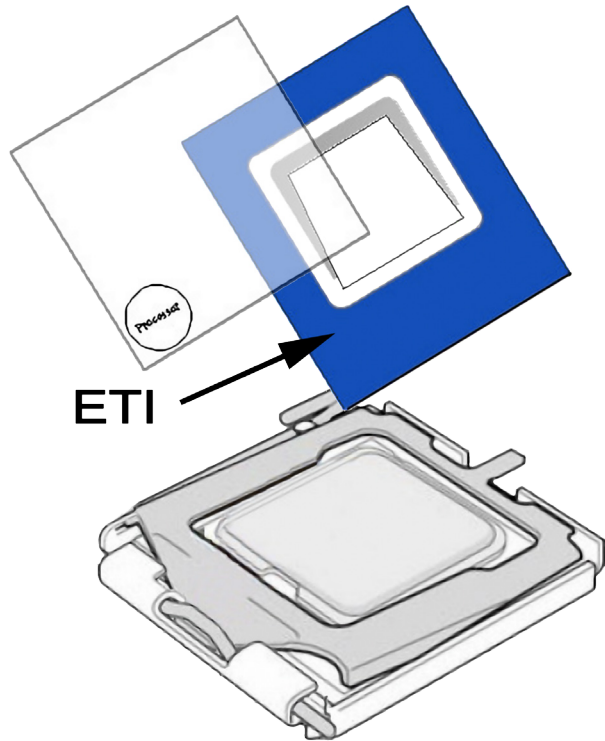
Do not remove the clear Top and Bottom liners prior to the specific installation step. Do not bend, flex or puncture any portion of the ETI. Keep all chemical agents (solvent wipers, etc.) away from the ETI.

7. Bottom Side Liner Removal:

Remove the "Bottom" side square clear liner by slowly peeling the liner, beginning from the corner with the white label.



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 figures below for correct placement).



Orientation and alignment of the ETI to the CPU lid and socket is critical. Refer to the figures below 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.



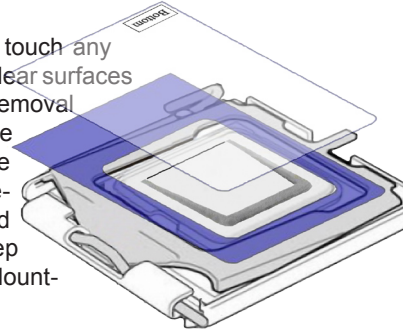
Temporarily tape the heat sink clip to the heat sink base to keep the assembly stable during heat sink mounting.

10. Top Side Liner Removal:

Remove the "Top" side square clear liner by slowly peeling the liner, beginning from the corner with the white 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 Mounting.



11. Heat Sink Mounting:



It is imperative that the heat sink 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) until fully tightened.



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

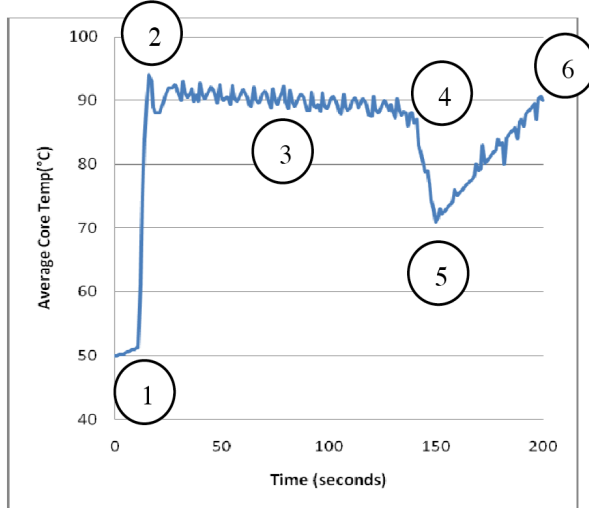
1. Turn off computer and unplug the power cord.
2. Unplug the CPU (heat sink) fan and case fan(s). For water cooled systems, turn off liquid pump.
3. Orient the computer such that the motherboard and CPU are in a horizontal position.
4. Plug in power cord and boot the computer. Clock frequency and voltage must be set back to default.
5. Use a CPU temperature monitoring program (such as SpeedFan™) and select the graphing option to track the profile of all core temperatures during reflow.
6. Exercise the CPU with a "burn" program (such as CPU Burn™) to generate adequate heat for reflow. Multi-core CPUs require one copy of the burn program for each core to be running simultaneously (Quad Core CPUs require four programs running). Refer to References for links to burn utilities.



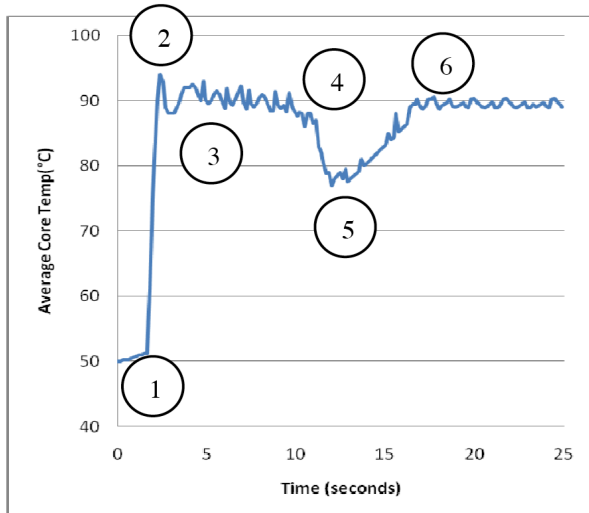
Intel multi-core processors have built-in protection (Adaptive Thermal Monitor) that prevents the processor from exceeding maximum core temperatures, thereby preventing any damage to the CPU.

7. Follow the average core temperature profile (with the temperature monitoring program) illustrated in the graphics below for your specific thermal solution: Heat Sink or Waterblock. Larger heat sinks will require longer reflow times.

With Heat Sinks:



With Waterblocks:



| | Heat Sinks | Waterblocks |
|----|--|--|
| #1 | All burn programs have been activated. | All burn programs have been activated. |
| #2 | Core temperatures will initially rise to peak of ~90°C. | Core temperatures will initially rise to peak of ~90°C. |
| #3 | Core temperatures will somewhat stabilize. | Core temperatures will immediately begin to drop. |
| #4 | Typically, within a few minutes of activating all burn programs, 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 temperatures will slowly rise again. | Following the Bottoming Point, core temperatures will quickly rise. |
| #6 | Once the average core temperature has reached ~85-90°C, reflow is complete; deactivate all burn programs; carefully reconnect CPU and case fans. | Once the average core temperature has reached ~85-90°C, reflow is complete; deactivate all burn programs; turn on liquid pump. |



Avoid any bumping or excessive pressure on the heat sink/waterblock and keep the computer in the horizontal position until the average core temperature has dropped below 60°C.



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.

Removal

To disassemble, release the clamping force from the heat sink. The ETI may then be peeled off. The ETI is designed to adhesively capture excess alloy (from differences of CPU lid/heat sink interfacial roughness and planarity) on its surfaces. Any residual adhesive or alloy on the CPU or heat sink/exchanger may be removed with the edge of a credit card along with a cotton swab and solvent such as acetone, xylene, etc.



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 (with the surface cleaning supplies including in the ETI kit only) 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 and plastic bag.

References

Burn in Program:
<http://users.bigpond.net.au/cpuburn/>

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 processor burn-in:
<http://www.almico.com/speedfan.php>

The Material Safety Data Sheet (MSDS) for the pre-saturated solvent wiper can be found at:
<http://www.polywater.com/downloads/TR1msds.pdf>

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.

Intel, Intel Core i7, Core 2 Quad, Core 2 Extreme, Core 2 Duo and Xeon are trademarks of the Intel Corporation, USA.

Indigo Xtreme is a trademark of:

Enerdyne Solutions, Inc.,
 125 West North Bend Way, PO Box 2660,
 North Bend, WA., 98045
 Tel:425-888-1880 Fax:425-831-0773



ENERDYNE
 SOLUTIONS

enerdynesolutions.com
 Cool solutions for hot problems