

Ascendance Quad Series Advanced Material Tactical Rifle Handguard

White Paper



Ascendance International

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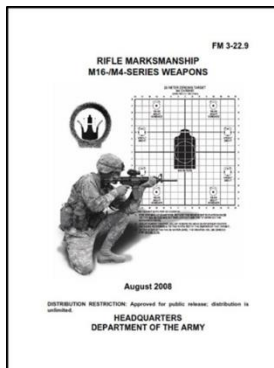
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**UNCLASSIFIED
2015**

1. Background

Aluminum or metal alloy handguards with Picatinny mounting rail systems are one of the most common small arms attachments in use by the military, law enforcement, and shooting enthusiasts today. These handguards provide a standardized mounting platform for a variety of mission essential attachments.

While successful as a mounting system, currently fielded aluminum handguards absorb extremely high levels of radiant barrel heat generated by firing the weapon and transfer that heat through the handguard directly to the operator. High heat levels that can literally burn the skin after firing as few as a 100 rounds distracting even the most battle hardened soldier. The results are a significant degradation of shooter effectiveness, a measurable decrease in accuracy over longer distances, and a loss of basic control during maneuver. These effects, either singularly or in combination reduce the overall combat effectiveness of the shooter.






During both training and combat scenarios that require higher volumes of fire, the user can no longer hold the weapon as it was designed or as they are trained. As seen in the pictures above during actual combat operations in Afghanistan, shooters are forced to use a less than optimal body position and weapons hold. When compared to the U.S. Army FM 3-22.9 Rifle Marksmanship manual, you see two significantly different body positions and weapons hold techniques. ***Training and combat operations no longer match!***

As weapons technology and combat tactics continue to evolve, particularly in the use of suppressors, or more specifically embedded suppressors, heat related problems will increase dramatically! Aluminum or metal alloy handguards will no longer be part of the solution, they will be the problem!

2. The Ascendance Solution

Ascendance International has created a patent pending next generation handguard system for the M4A1 and H&K 416 series of tactical rifles that fixes the inherent design deficiencies of existing metal alloy or aluminum based weapons handguards currently in use with the U.S. military.

Ascendance uses new and innovative approaches to increase the operational performance and combat effectiveness of the modern day rifleman while maintaining and leveraging all necessary capabilities associated with current handguard systems. Ascendance use of new technologies and advanced materials that are distinguished by their high heat protective qualities, light weight characteristics (20% lighter than comparable aluminum handguards), high durability, and resistance to extreme environments. Ascendance handguards serve as thermal barrier that mitigates most or outright negates nearly all of the heat related problems of current handguard system even as barrel temperatures push to >800° F, the equivalent of an infantry soldiers firing a basic load on automatic.

M4A1 - Standard Carbine Hand guard	
<ul style="list-style-type: none"> • Length: 7" • Weight: 5.6 oz • Material: nTHERM™ • Colors: Tactical Black • Design: Standard two piece drop in Quad Rail Configuration • Cost: Retail \$157.95 • Availability: Order Now 	
M4A1 - Carbine 13" Free Floating Hand Guard	
<ul style="list-style-type: none"> • Length: 13" • Weight: 15.2 oz • Material: nTHERM™ • Colors: Tactical Black • Design: Two piece Free Floating Quad Rail Configuration • Cost: Retail \$327.95 • Availability: Order Now 	
M4A1 - Configurable	
<ul style="list-style-type: none"> • Length: 7" - 9" - 11" - 13" • Weight: Varies with size • Material: nTHERM™ • Colors: Tactical Black • Design: Two piece Free Floating Quad Rail Configuration • Cost: Retail max \$295.95 • Availability: Order Now 	
H&K 416 – Configurable	
<ul style="list-style-type: none"> • Length: 9" - 13" • Weight: 15.2 oz • Material: nTHERM™ • Colors: Tactical Black • Design: Two piece Free Floating Quad Rail Configuration • Cost: Retail max \$275.95 • Availability: Order Now 	

3. Operational Benefits

The Department of Defense has spent millions of dollars on marksmanship training programs, improved weapons design, better barrels, better triggers, enhanced optics, even creating more reliable and accurate ammunition to make the average rifleman a superior marksman on the modern day battlefield. But the harsh reality is all of that is negated by the physical distraction, or literal pain caused by radiant barrel heat being absorbed into traditional aluminum or metal alloy handguards.

Ascendance handguard's are designed with a simple purpose, to dramatically enhance individual soldier weapons control and vastly improve the combat effectiveness in any tactical scenario. Control and effectiveness being defined as the ability to accurately engage targets at all tactical ranges and tactical scenarios. Ascendance handguards allow the shooter to fire every round of that basic load as they fired the first round, as the weapon was designed and as the shooter is trained. Not constantly needing to adjust as the weapon gets hotter.

Ascendance handguard's unlike outdated metal alloy or aluminum based handguard designs significantly reduce the negative impact on weapons control cause by radiant barrel heat. Heat radiating from the barrel transitions directly into current handguards and can reach temperatures well over 200°F, well above the pain threshold for human skin. Ascendance handguard's are designed to remain comfortable to the touch and well below the pain threshold for human skin. Ascendance handguard's meet and exceed this previously unobtainable operational requirement and is constantly tested against standard protocols of 300 rounds fired on automatic. By removing heat from the shooting equation, the shooter can more effectively focus on marksmanship principles thus improving accuracy during sustained engagements and/or over extended distances and control during maneuver.

4. Operational Requirements and Design Characteristics

Operational requirements and design characteristics ensure that all Ascendance handguards are compatible with existing military standards. Handguard attachments may include visible laser pointers, visible light illuminators, infrared (IR) laser pointers, IR illuminators, collimator aiming devices, night vision scopes, day scopes, (or integrated day/night scope), or slings.

The use of advanced materials such as *nTHERM* means that handguard designs are no longer restricted to the high heat characteristics of aluminum or metal alloys. This capability and freedom of design will have immediate positive impacts on both weapons and shooter performance. In addition, the use of advanced materials will ensure that future systems that incorporate suppressors will improve mission capabilities and shooter effectiveness and not distract from it.

Ascendance handguard design characteristics include;

- a) Will not exceed 160°F during automatic firing of basic infantry load of 210rds.
- b) Provide significant overall weight reductions. Currently 20% lighter than aluminum.
- c) Modular design allows for a wide range of customized configurations with attachable mission-specific accessories to meet current and future operational requirements.
- d) Attachments are MIL-STD-1913 and/or NATO designation STANAG 2324 compliant.

- e) Meet or exceed United States Military Standard 810G (MIL-STD-810G). Exhibit functional reliability exceeding that of the present baseline at high and low temperature extremes as well as other hostile (sand/dust/dirt/mud/surf/ temperature shock) environmental conditions.
- f) The complete rail system should allow the rifle barrel to adequately dissipate heat.
- g) Sufficient strength and versatility to handle current and future mounting fixtures.
- h) When mounted to host weapon, will not interfere with the normal weapon function.
- i) Workmanship and finish shall be in accordance with the best commercial practice.
- j) Easy to install, remove, or adjust at the operator level.
- k) Will not increase life-cycle support costs beyond currently fielded systems.
- l) Handguards will require high operational availability. The frequency and duration of preventive maintenance will be limited to cleaning. The frequency and duration of scheduled maintenance at the organizational level will be reduced by replacing accessories or by scheduled exchange of the accessories by higher level maintenance.

5. Material Characteristics

nTHERM is a proprietary high performance molding polymer designed specifically for use in Ascendance handguards. Using advanced polymers ensures reliable handguard performance at extremely high temperatures and stress conditions that are generally considered too severe for thermoplastics. In addition to maintaining superior strength at extreme temperatures, our polymers have the advantage of being injection moldable. This means simplified manufacturing and exact replication that provides a cost effective handguard solution. General characteristics include;

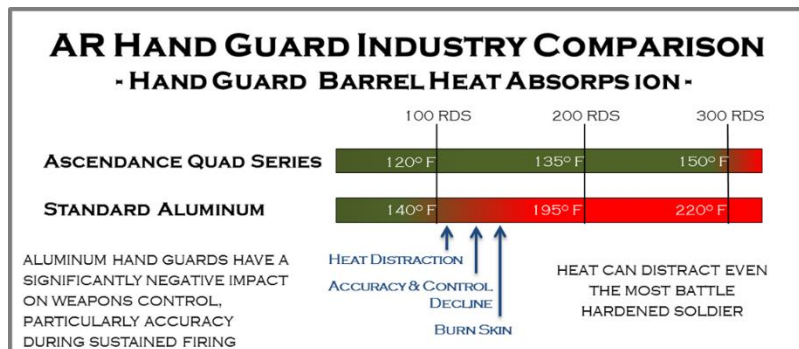
a. High impact strength, exceptional mechanical strength, and excellent retention of these properties in high temperature environments at 500°F (260°C).

b. Superior physical properties are retained after long-term exposure to elevated temperature.

c. Strength retention over a wide range of temperatures and sustained stress, low creep, flame resistance, outstanding electrical properties, and exceptional integrity in severe environments

d. Exceptional compressive strength and higher impact resistance.

e. Extremely low coefficient of linear thermal expansion and high creep resistance deliver excellent dimensional stability over entire use range.



ASTM or UL Test	Property	Value
Physical		
D792	Density (lb/in ³) (g/cm ³)	0.052 / 1.45
D570	Water Absorption, 24 hrs (%)	0.28
D785	Hardness, Rockwell	E70 (M106)
Mechanical		
D1708	Tensile Strength (kpsi)	23.7
D1708	Tensile Modulus (kpsi)	950
D1708	Tensile Elongation at Break (%)	7
D790	Flexural Strength (kpsi)	31.2
D790	Flexural Modulus (kpsi)	1000
D695	Compressive Strength (kpsi)	24.1
D695	Compressive Modulus (kpsi)	770
D732	Shear Strength (kpsi)	16.1
D256	IZOD Notched Impact (ft-lb/in)	1.2
Thermal		
	Coefficient of Linear Thermal Expansion (x 10 ⁻⁵)	1.4
D648	Heat Deflection Temp (°F / °C) at 264 psi	534 / 277
	Glass Transition Temp (°F / °C)	527 / 275
	Max Operating Temp (°F / °C)	500 / 260
C177	Thermal Conductivity (BTU-in/ft ² -hr-°F) (x 10 ⁻⁴ cal/cm-	3.7 / 12.75
	Flammability Rating	94 V-0
Electrical		
D149	Dielectric Strength (V/mil) short time, 1/8" thick	
D150	Dissipation Factor at 1 MHZ	0.037
D257	Surface Resistivity (ohms/square)	8x10 ¹⁷

6. Performance Demonstration

Due to the true leap ahead capabilities of Ascendance handguards, countered by years of false claims by numerous others within the weapons industry; it is difficult to accurately represent the true operational capabilities of the handguards in writing. The proof of operational capabilities is in hands-on live fire demonstrations and testing through independent evaluators. Below are video links to independent testing with brief explanations of each as these more effectively demonstrate the hand guard capabilities;

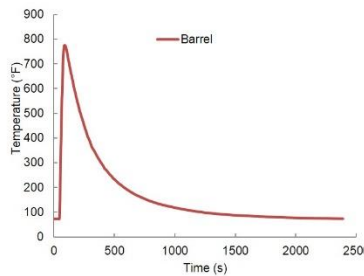
Soldier Equipment Expo at Fort Bragg, NC in June 2013. On range day, various individuals fired 33 iterations back to back, 120 rounds at a time on full automatic, roughly 4000 rounds through one weapon over a three hour period without a single heat complaint. Video shows 240 rounds fired on full automatic while still being able to touch the hand guard and comfortably control the weapon.

<http://www.youtube.com/watch?v=ELjFmxi5Qak>

SIONICS Arms is a weapons manufacturer understandably skeptical of our stated capabilities. Video shows ten magazines, 300 rounds fired in rapid succession. Total round count is 1000 rounds in less than

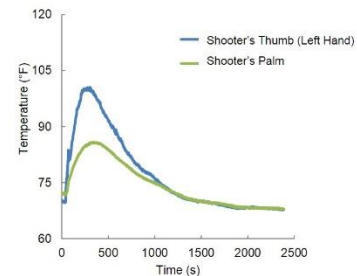
five minutes while still being able to touch the hand guard and comfortably control the weapon.
<http://www.youtube.com/watch?v=VLj68UZ-49M>

Remington Defense fires 210 rounds of M855 ammunition in only 30 seconds. Test results show barrel temperatures spike to 774°F. Improved ventilation capabilities of the Ascendance handguards resulted in a full 90° F cooler barrel temperature than an aluminum hand guard with identical testing. Temperatures collection at key hold positions showed significant heat reductions over aluminum handguards with identical testing. Thumb placement of non-firing hand (left side, middle of hand guard) indicated a 50 percent heat reduction while the palm area (center bottom of hand guard) indicated a 70 percent reduction in radiant heat transferred to the shooter through the hand guard. Temperature measurements also proved that the Ascendance handguards cooled significantly faster than aluminum handguards allowing better control during potential maneuver scenarios. <http://www.youtube.com/watch?v=wAdkGxYkymk>



Barrel Temperature Comparison

Barrel Temp 90°F Cooler



Points of Contact Comparison (nTHERM vs. Aluminum)

Shooter's Thumb – 50% Cooler
 Shooter's Palm – 70% Cooler

This link is a demonstration highlighting the durability and ruggedness of the hand guards.
<http://www.youtube.com/watch?v=6rWLQPdAf2o>

7. DOTMLPF Considerations

- a. **Doctrine.** No new tactical doctrine is required to incorporate capability advantages gained.
- b. **Organization.** No organizational changes are required to commands, units, or tactical formations. No additional manpower or increases to force structure will be required for the hand guard.
- c. **Training.** Hand guard will require minimal operator level training. New generation of hand guard may require inclusion in curriculum of Small Arms Operator-Level Operational and Maintenance courses.
- d. **Material.** Hand guard will not necessitate any other material programs, but may eventually include increments of additional material solutions to future requirements.
- e. **Leadership & Education.** Operator's manuals will be offered to the component commands for inclusion in professional development courses. There are no other leadership and education impacts other than those discussed in "Training" above.
- f. **Personnel.** No change.
- g. **Facilities.** No change.

8. Conclusion

You are invited to visit our website at www.ascendanceintl.com for more information. Be sure to view the videos to get a better understanding of our hand guard capabilities. Please direct any questions that you may have to our Chief Operating Officer, at (813) 362-9779, or via email at jgarst@ascendanceintl.com.