TECHNICAL NOTE 3.0 (Rev A.)

Aluminum "Hat" Chemical Composition & Physical Characteristics for 2-Piece Floating Iron and Carbon Ceramic Rotors.

Background

The use of light-weight aluminum alloyed hubs/hats/domes ("hats") in a 2-piece rotor configuration is a well-known and well documented advantage over solid 1-piece iron and dual-cast/bi-metallic rotors. The floating geometry of the configuration allows for the differential expansion between the rotor disc(iron/CCB) and the lightweight aluminum hat.

In the iron disc format, the weight savings using aluminum hats over traditional iron is in the range of low 30 lbs to a reduction in the mid-20lbs range, resulting in a 17-22% reduction in un-sprung weight at each corner.

In the CCB format, the overall weight reduction between iron rotors and CCB's is even more dramatic, with weights losses from the low 30lbs to between 11-14lbs, resulting in a 55-65% reduction in un-sprung mass. For perspective; a reduction of 20lbs at each corner (80lbs total) has the dynamic "feel" equivalent of reducing the vehicular weight by 6 x 80lbs = 480lbs.

In addition to the stated above benefits, this reduction in un-sprung weight savings at the wheels creates a significant, dynamic improvement in both the suspension and steering response, as the wheels keep a closer grip onto the road surface during cornering and undulating road surfaces.

Composition

Performance Brake Systems (PBS) uses Aerospace Grade 7075-T6 Aluminum vs Grade 6061 used in competitive hats.

This 7000 series alloy (also known as a "ZnMgCu" alloy) imparts the highest degree of overall strength, heat and corrosion resistance. It is typically employed where a high degree of

mechanical strength is required in harsh conditions, such as high thermal friction, mechanical load and corrosive environments. See Table 1 below.

Aerospace Grade 7075-T6 Aluminum

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Chemical Composition (Alloy %)

Zn	Mg	Cu	Fe	Si	Mn	Cr	Ti	Others Each	Others Total	Al
5.2-5.7	2.1-2.1	1.2-2.1	0.5	0.4	0.3	0.18-0.26	0.06	0.05	0.15	88.4-89.9

Physical Characteristics

Alloy-Temper	$T6$ [1.]
Shear Strength	26.9Gpa (3.9*106psi)
Elastic Modulus	71.0Gpa (10.3*106psi)
Hardness	60HB
Density	2.8g/cm3
Grey Iron Comparison	7.2 g/cm3, or 2.6X heavier

1. T6 designation denotes "Solution heat-treated and artificially aged". This process involves heat-treatment (alloy heated to a high temperature then raidly cooled (quenched). After heat-treatment, the alloy is re-heated to a lower temperature following an additional solution treatment. This process instills the alloy with the highest heat-treated strength level.

Our hats come in two grades, depending on the application. For 2-piece iron application, that hats are _green sand casted_, heat-treated and hard anodized. For the increased physical stresses and high thermal environments associated with CCB usage, the aluminum hats are not cast, but rather _hot-forged_ to create a more stabile and stronger metallic crystal matrix. This accounts for significant increased costs for the forged CCB hats.

NOTE 1: If the CCB's are not going to see any "track days", the standard cast hats are acceptable and a less costly alternative.

NOTE 2: As stated in our warranty disclaimer; there is no warranty nor guarantee of performance for any of our products used on a track or racing environment. Although our products are manufactured to the highest tolerances, there can be no warranty as tracked vehicles are by definition; operated outside of the manufactures recommended operating conditions. We accept no responsibility for damages, injuries or product failures as a result of motorsport activities.