DEFENSE ALUMINUM ALUSTA





ALUSTAR CHARACTERISTICS

STRONG AND LIGHT ARMOUR PLATE

Aluminum stands out as an important alternative for secure ballistic protection, either in civilian or tactical vehicles and infrastructure.

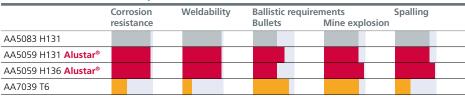
The use of aluminum optimizes the weight efficiency ratio of armoured vehicles and heavy constructions like military bridges.

PROVEN TRACK RECORD

Aleris has many years of experience in the manufacture of armour plate for ballistic protection. AA5059 is a top alloy which has a proven track record on renowned tactical vehicles such as the MRAP vehicles supplied to the U.S. Department of Defense.

AA5059 is produced following the military specifications MIL-DTL-46027 rev K and TL 2350-0004 rev 4.

Characteristics of AA5083, AA5059 and AA7039



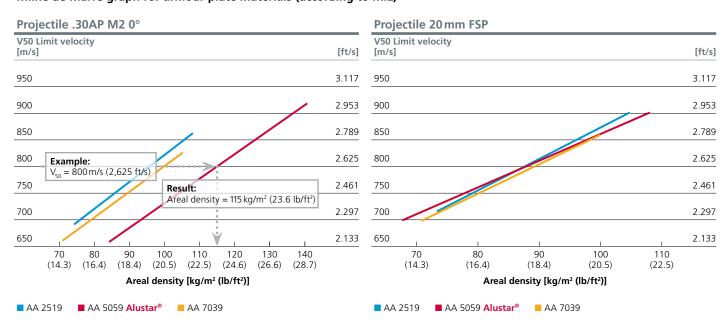
not suitable — ▶ excellent

BALLISTIC PERFORMANCE

The following Milne de Marre graphs have been generated to offer a design guide to engineers and designers of armoured vehicles, as well as to demonstrate the ballistic performance and weight efficiency of most commonly used Aleris armour plate alloys.

They allow a simple estimation of the weight of an aluminum plate under consideration of the ballistic performance according to the appropriate MIL standard and the individual alloy density.

Milne de Marre graph for armour plate materials (according to MIL)



How to use the graph:

Requirement V_{so} : 800 m/s 2.625 ft/s Areal density AA 5059 **Alustar®**: 115 kg/m² 23.6 lb/ft² Assumed plate dimension: $t \times 2,000 \times 3,000$ mm $t \times 78.7 \times 118.1$ in Assumed plate weight: 690 kg 1.521 lb

MECHANICAL PERFORMANCE

Mechanical Properties of AA5083, AA5059 and AA7039

Alloy	Temper	Specification	Plate thickness mm	in	Tensile MPa	e strength R _m ksi	Yield s MPa	trength R _{p0.2}	Elongation A %
AA 5083	H131	MIL-DTL-46027K (MR) (table II)	6.35 - 12.69 12.7 - 50.8 50.81 - 76.2	0.250 - 0.499 0.500 - 2.000 2.001 - 3.000	310 310 303	45.0 45.0 44.0	241 255 241	35.0 37.0 35.0	8 8 9
AA 5059 Alustar®	H131 H136	MIL-DTL-46027K (MR) (table II)	6.35 - 12.69 12.7 - 50.8 50.81 - 76.2	0.250 - 0.499 0.500 - 2.000 2.001 - 3.000	365 359 324	53.0 52.0 47.0	269 269 269	39.0 39.0 39.0	8* 7* 8*
AA 7039	T6	MIL-DTL-46063G	≤38.1 >38.1	≤1.5 >1.5	414 393	60.0 57.0	352 331	51.0 48.0	9 8

^{*} H136 temper usually achieves a higher elongation value of minimum 10% versus a minimum of 7% for H131 temper, which makes it favourable for e.g. protection against mine explosions.

MINE BLAST PERFORMANCE

The mine blast test results shows that the aluminum alloys absorb the blast energy better then steel alloys. In comparison to steel alloys, the distance between mine and plate can be reduced.

Deformation after Mine Blast

Alloy	Temper	Plate thi mm	ckness in	Distance mm	e: Plate-Mine in	Deformed mm	l height in
5059 Alustar®	H136	15.0	0.59	350	13.78	298	11.73*
5059 Alustar®	H131	15.0	0.59	360	14.17	285	11.22*
7020	T6	15.0	0.59	370	14.57	261	10.28*
7017	T6	15.0	0.59	390	15.35	229	09.02*
2519	T87	15.0	0.59	540	21.26	cracked	cracked

^{*} Without cracks





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Issue 6/12 · 1st release