

ENDUR^{AL}

Efficiency by design

The business benefits of aluminium for commercial vehicles are indisputable: weight savings that allow substantially higher payloads and fuel efficiency, ease of working and repair, durability, superior corrosion resistance and minimal maintenance.

To bring these operational advantages to the highly-abrasive work environment of tipper trailers, SLIM has perfected an ultra-rugged shate material of exceptional surface hardness and abrasion resistance: Endur-Al.

Endur-Al is an advanced 5456 alloy in H34 temper that was originally developed to withstand the extreme rigours of maritime applications. Drawing on our vast experience of freight transport applications, exhaustive testing in the lab and in the field proved its performance characteristics to be uniquely suited to tipper trailer sides and floors:

- Extreme surface hardness
- Outstanding resistance to abrasion
- Excellent corrosion resistance
- Superior workability



Aluminium: The Benefits

Harder surface = less wear + longer life

Whatever the cargo, Endur-Al's exceptionally hard surface resists abrasive wear like no other comparable alloy. As well as reducing the need for ongoing repair, this gives Endur-Al tipper trailers a considerably longer working life than is possible with conventional materials.

Proven abrasion resistance

Endur-Al's resistance to wear by abrasion was determined to ISO 8251. Testing was performed under a 3.9N load over sliding distances equivalent to 1600 movements of 300mm at a constant speed of 60 mm/s using abrasive paper of SiC grit 320. Wear losses were obtained by weighing the samples before and after testing. Weight loss values were obtained in the rolled and transverse directions, both from the as-rolled surface and after removing 1mm in depth and polishing. The table overleaf shows the averaged weight losses values and the Brinell hardness values (measured according to EN-10003-1).

Less weight = bigger payloads + lower operating costs

Tipper trailer designs optimized for aluminium normally weigh between 20 and 30% less than steel bodies of equivalent strength, stiffness and durability. With the high density loads normally carried, this dramatic reduction in dead weight not only increases payloads by about 1 ton for the average trailer box, but also improves fuel efficiency when empty. For the operator, this means significantly more revenue for each delivery and/or cost savings that can allow more competitive rates.

Corrosion resistance = longer life + less maintenance

Using Slim Fusina Rolling's market-leading experience of optimizing the natural corrosion resistance of flat rolled aluminium alloys, Endur-Al was originally formulated to withstand extremely hostile marine and off-shore environments. In tipper trailer applications, these characteristics ensure a significantly longer service life, irrespective of the materials being transported – and with no protective surface coating needed, cleaning is easy and the maintenance requirement is minimal compared to steel. In

addition to the environmental benefits of sidestepping the painting process, the attractively bright, clean appearance of unpainted aluminium enhances the operator's brand image – and as many can confirm, drivers take more care of vehicles that they're proud to drive.

Fuel savings + local recyclability = smaller carbon footprint

The average one ton reduction in the dead weight of a tipper trailer is estimated to save some 1,300 liters of diesel over 100,000 km. Over the lifespan of the vehicle, the consequent reduction in CO₂ emissions is in the region of 42 tones. Taking primary production, operational use and eventual recycling into account, every kilo of aluminium in a large trailer saves at least 20kg of CO₂. And because aluminium is so easy and inexpensive to recycle, Endur-Al bodied trailers retain consistently high residual value right up to the end of the vehicle lifecycle. Not only does this deliver financial benefits for operators, but they have the reassurance of knowing that the energy required to produce primary aluminium is 'stored in the metal' rather than lost.

Design versatility

Available in thicknesses between 4mm and 8mm, Endur-Al is ideally suited to the construction of all styles and sizes of tipper trailer whether large or small volume, rounded or rectangular. Specially formulated for ease of fabrication as well as durability, it has high yield strength and offers excellent welding and cold bending performance.

Market-leading expertise

Endur-Al is available exclusively from Slim Fusina Rolling, a world leader in flat rolled aluminium alloys. With state-of-the-art production in Italy, our company supplies a tremendous variety of specialized products for packaging, transport, construction and engineering applications. From Slim Industries, you can choose from a complete portfolio of differently tempered aluminium alloys for virtually every aspect of trailer and tipper production (including chassis, body panels, covers, sides and floors), together with expert technical support for your design team.

Chemical composition

	Si %	Fe %	Cu %	Mn %	Mg %	Cr %	Zn %	Ti %
Min.	-	-	-	0,5	4,7	0,05	-	-
Max.	0,25	0,40	0,10	1,0	5,5	0,20	0,25	0,20

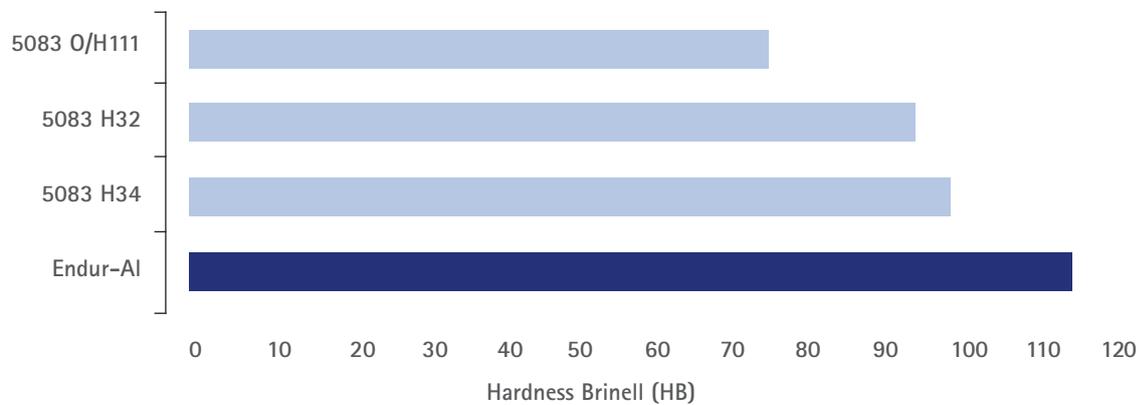
Mechanical properties

	Rm (MPa)	R _{p,02} (MPa)	A%	HB Hardness
Thickness range 4-8mm	370 - 430	≥ 270	≥ 8	≥ 110

Typical values at room temperature

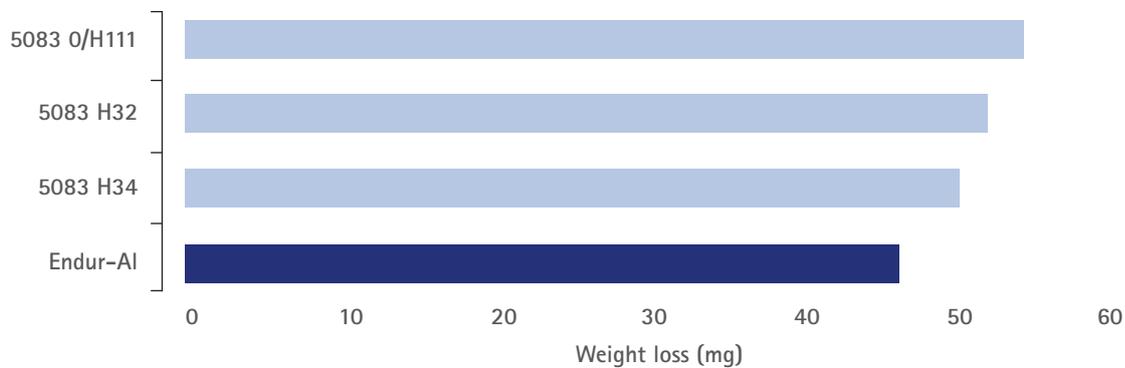
	Rm (MPa)	R _{p,02} (MPa)	A%	HB Hardness
Thickness range 4-8mm	380	300	13	114

Typical hardness values



Abrasive wear resistance test

The abrasive wear test has been performed using an Erichsen 317 apparatus (ISO 8251), where a rim of a rotating wheel coated with abrasive paper slides back and forth on the surface of a specimen. The sliding distance is 480m and the speed is 60mm/s.



Bending capability

5456 H34 sheets are capable of cold bending at an angle of 90° around a pin having a radius equal to “t” times the thickness of the plates without cracking:

Thickness range	Minimum bending radii	
	180°	90°
4,0 – 6,0 mm	---	3.5t
6,1 – 8,0 mm	---	4.5t

Dimensional range

Thickness (mm)		Width (mm)		Length (mm)	
min	max	min	max	min	max
4	4,75	980	2230	1000	14000
4,75	8,0	980	2500	1000	14000

Physical properties

	Endur-Al
Density	2.66 x 10 ³ kg/m ³
Average Coefficient of Thermal Expansion (20–100 °C)	23.9 x 10 ⁻⁶ per °C
Approximate Melting Range	570–640 °C
Thermal Conductivity	117 W/m °C (at 25 °C)
Modulus of Elasticity	71 GPa
Poisson's ratio	0.33

SLIM FUSINA

Via dell'Elettronica, 31
30176 Venezia VE, Italy

Tel. +39 041 2917111
info.fusina@slimalu.com

