

# Magnesium Die Casting Alloy with High Quality Surface Finish

## Technical Information Sheet

- high quality electroplated coatings
- superior diecastability
- cost competitive with zinc, aluminium, AZ91 and plastics

AM-lite® is a new magnesium high pressure die casting alloy aimed at a wide range of applications that currently utilise zinc, aluminium and magnesium AZ91D die casting alloys, and also injection moulded plastics. While retaining advantages common to magnesium alloys such as light weight, AM-lite offers superior as-cast surface quality and improved surface definition, and can fill thinner sections than either AZ91D or other magnesium alloys. AM-lite® is particularly suitable for die castings requiring electroplating or other decorative surface finishing processes such as painting and powder coating.

### Main attributes of AM-lite®

- Reduced costs
- Low density
- Similar electroplating process to zinc alloys
- Reduced rejects in other coating processes
- Excellent die castability
- High quality as-cast surface finish
- Improved mechanical properties
- Wide operating window for die casting parameters
- Melt is resistant to burning and excessive oxidation

### Key advantages of AM-lite®

#### Compared to zinc die casting alloys AM-lite offers

- significantly reduced costs (metal costs reduced by 70-75%)
- light weight (70% reduction of density)
- similar electroplating process
- higher design strength
- reduced defects in surface coating operations

#### Compared to magnesium AZ91D AM-lite offers

- reduced costs (lower diecasting and surface finishing costs)
- improved die castability
- better as-cast surface finish
- electroplating process similar to zinc diecastings
- reduced defects in surface finishing
- higher strength
- improved recyclability

#### Compared to aluminium die casting alloys AM-lite offers

- reduced costs (lower metal, diecasting and surface finishing costs)
- lighter weight (26% reduction in density)
- superior as-cast surface finish
- improved electroplating

#### Compared to plastics AM-lite® offers

- reduced costs (lower surface finishing costs, lower material costs than engineering plastics)
- metallic "feel"
- higher strength and stiffness
- increased design freedom
- electrical conductivity for electromagnetic shielding
- good thermal conductivity



Electroplated AM-lite diecasting



Car Door Handle in AM-lite

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## Diecasting of AM-lite®

AM-lite is suitable for both hot chamber and cold chamber diecasting processes.

The high diecastability of AM-lite allows for:

- production of very thin sections
- reproduction of fine detail from the die
- reduction of runner cross sectional area (higher yield)
- wider operating window
- greater stability of operation
- improved productivity

Extensive industrial trials have demonstrated: reduced cover gas usage; low melt losses (~1% for AM-lite, compared with ~4% for AZ91); reduced burning during removal of dross and sludge; and significantly reduced fuming.

## Surface finishing

The high quality surface finish of AM-lite die castings makes them highly suitable for surface finishing operations such as electroplating, painting and electrophoretic coating. In addition, the smooth as-cast surface of AM-lite die castings reduces the need for costly polishing and buffing operations. Elimination of a second buffing operation, commonly required for electroplating of conventional magnesium alloys, can yield major cost savings. The high creep strength of AM-lite substantially reduces blister defects that can arise during baking of painted and powder coated surfaces.



Mirror finish on as-cast AM-lite surface

## Electroplating

An electroplating process has been developed specifically for AM-lite by MacDermid Inc. Compared to electroplating of AZ91D diecastings, MacDermid's Bondal® Mg process for AM-lite is much simpler and cheaper. The resultant electroplated coating is vastly superior to coatings on AZ91D and aluminium alloys (which are extremely difficult and expensive) and is of similar quality to coatings on zinc diecastings.

## Typical properties of AM-lite®

### Mechanical properties at room temperature (2 mm thick die castings)

Hardness VHN (300 g) Brinell	85-90 76-80
0.2 % proof stress (MPa)	160-170
Ultimate tensile strength (MPa)	230-250
Fracture elongation %	3-4
Young's modulus (GPa)	45.3
Poisson's ratio	0.35
Shear modulus (GPa)	16.8
Compressive 0.2% proof stress (MPa)	150
Compressive Strength (MPa)	446

### Physical properties

Density at 20°C (g/cm³)	2.0
Solidification Range (°C)	585-330
Latent heat (kJ/kg)	340
Specific heat at 25°C (kJ/kg·°C)	0.95
Heat release during casting (600-250°C) (kJ/cm³)	1.0
Coefficient of Thermal Expansion (K <sup>-1</sup> )	24.9·10 <sup>-6</sup>

## Handling AM-lite®

As for all magnesium alloys, precautions should be taken when handling and melting AM-lite. These precautions are broadly outlined in AMT's Technical Information Sheet "Safe Handling of Magnesium".

When handling AM-lite in the molten state it is recommended that the AM-cover™ protective gas system is used. AMT's Technical Information Sheet "The AM-cover System for Protecting Molten Magnesium" provides an introduction to the advantages and usage of AM-cover.

For in-cell recycling of diecasting returns it is recommended that the AM-converter™ technology is used. AMT's Technical Information Sheet. "AM-converter – the solution for efficient magnesium melting" provides an introduction to this technology.

Advanced Magnesium Technologies has made every effort to ensure the information contained in this document is relevant and up-to-date, but makes no representation as to its comprehensiveness or accuracy. The information is general in nature, and is not intended for use without careful consideration of each specific application. Persons receiving this information should exercise their independent judgement in determining its appropriateness for a particular purpose, and should seek further information or advice as required.

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Further information on **AM-lite®**  
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