Typical Magnesium Die Casting Alloys

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The following is a summary of typical magnesium die casting alloys, including links to supplier property data and links to articles and handbook information.

For additional resources, visit http://www.materialstechnology.org

Alloy	Description	Link to Supplier Information	Article or Handbook	Link to Article or Handbook
AZ91D	Highly castable, most often applied Mg-Al-Zn die casting alloy. Has excellent castability and good strength. Typically used for automobile and computer parts, hand-held tools, household equipment, mobile telephones, housings, covers, brackets, chain saw parts, sporting goods.	Dead Sea Magnesium	Handbook of Materials Selection, ed. Kutz, Myer, 2002 John Wiley & Sons	Read the Full Article
		Magnesium-Elektron	W. Blum, Y. J. X. H. Zeng, P. Zhang, B. Von Grobmann, and C. Haberling, "Creep Deformation Mechanisms in High Pressure Die-Cast Magnesium-Aluminum-Base Alloys", Met. Trans. A, 36A, July 2005, pp. 1721-1728.	Acquire the Article
		AVISMA	R. K. Singh Raman, "The Role of Microstructure in Localized Corrosion of Magnesium Alloys", Met. Trans. A., 35A, August 2004, pp. 2525-2531.	Acquire the Article
		Rima Industrial S/A	M. Regev, A. Rosen, and M. Bamberger, "Qualitative Model for Creep of AZ91D Magnesium Alloy", Met. Trans. A., 32A, June 2001, pp. 1335-1345.	Acquire the Article
		Hydro	J. Senf, E. Broszeit, M. Gugau, and C. Berger, "Corrosion and Galvanic Corrosion of Die Cast Magnesium Alloys", Magnesium Technology 2000, TMS, pp.	Read the Full Article
		AMACOR	For more articles, search Magnesium Article and Presentation Database, Eric Nyberg of Pacific Northwest National Laboratory, 2007.	Search Database
		Lunt Manufacturing		
		Meridian Technologies Inc.		

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AM-lite	Highly castable, cost effective alloy for decoratively finished components. Has excellent cast surface finish, improved diecastability and recyclability with respect to other materials.	AM-Technologies	T. Abbott, M. Murray, G. Dunlop, "AM-lite - New Magnesium Diecasting Alloy for Decorative Applications", Magnesium Technology 2006, TMS p. 481-486.	Acquire the Article
AM20	High ductility and impact strength Mg-Al-Mn alloy. Typically used in automotive safety parts where the highest ductility is needed.	Hydro	L.-Y. Wei, H. Westengen, T. K. Aune, and D. Albright, "Characterisation of Manganese-Containing Intermetallic Particles and Corrosion Behavior of Die Cast Mg-Al Based Alloys", Magnesium Technology 2000, TMS, pp. 153-160.	Read the Full Article
		Meridian Technologies Inc.	K. Pettersen, P. Bakke and D. Albright, "Magnesium Die Casting Alloy Design", Magnesium Technology 2002, TMS, pp. 241-246.	Read the Full Article
AM50A	High ductility Mg-Al-Mn alloy.	Dead Sea Magnesium	Handbook of Materials Selection, ed. Kutz, Myer, 2002 John Wiley & Sons	Read the Full Article
		Magnesium-Elektron	V. Y. Gertsman, J. Li, S. Xu, J. P. Thomson and M. Sahoo, "Microstructure and Second-Phase Particles in Low- and High-Pressure Die-Cast Magnesium Alloy AM50", Met. Trans. A., 36A, August 2005, pp. 1989-1997.	Acquire the Article
		AVISMA	N. Ishimatsu, Y. Terada, T. Sato and K. Ohori, "Creep Characteristics of a Diecast AM50 Magnesium Alloy", Met. Trans. A., 37A, January 2006, pp. 243-248.	Acquire the Article
		Rima Industrial S/A	For more articles, search Magnesium Article and Presentation Database, Eric Nyberg of Pacific Northwest National Laboratory, 2007.	Search Database
		AMACOR		
		Lunt Manfacturing		
		Meridian Technologies Inc.		

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AM60B	High ductility Mg-Al-Mn alloy.	Dead Sea Magnesium	Handbook of Materials Selection, ed. Kutz, Myer, 2002 John Wiley & Sons	Read the Full Article
		Magnesium-Elektron	K. Gall, G. Biallas, H. J. Maier, P. Gullet, M. F. Horstemeyer, and D. L. McDowell, "In-Situ Observations of Low-Cycle Fatigue Damage in Cast AM60B Magnesium in an Environmental Scanning Electron Microscope", Met. Trans. A., 35A, January 2004, pp. 321-332.	Acquire the Article
		AVISMA	J. Senf, E. Broszeit, M. Gugau, and C. Berger, "Corrosion and Galvanic Corrosion of Die Cast Magnesium Alloys", Magnesium Technology 2000, TMS, pp. 137-142.	Read the Full Article
		RIma Industrial S/A	For more articles, search Magnesium Article and Presentation Database, Eric Nyberg of Pacific Northwest National Laboratory, 2007.	Search Database
		AMACOR		
		Lunt Manufacturing		
		Meridian Technologies Inc.		

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Alloy	Description	Link to Supplier Information	Article or Handbook	Link to Article or Handbook
AE42	Elevated temperature, creep resistant Mg-Al-RE alloy up to 150°C. Good room temperature mechanical properties. Properties comparable to AS21.	Hydro	Y. Fasoyinu, R. Bouchard, T. Castles, M. Sahoo and P. Labelle, "Mechanical Properties of High Pressure Die Cast Magnesium Alloys AE42 and Noranda New Alloy (Aj52X) for High Temperature Applications", Presented at Die Casting: Toward the Future, North American Die Casting Association, September 30 - October 2, 2002, Rosemont, IL.	Read the Full Article
		Meridian Technologies Inc.	Y. Fasoyinu, T. Castles, R. Bouchard, M. Sahoo, M. Pekguleryuz, and P. Labelle, "Die Cast Magnesium Alloys AE42 and AJ52x for High Temperature Applications", Magnesium Technology, 2003, TMS, pp. 207-208 (abstract only)	Read the Full Article
		Lunt Manufacturing	B. R. Powell, V. Rezhets, M. P. Balogh and R. A. Waldo, "The Relationship Between Microstructure and Creep Behavior in AE42 Magnesium Die Castings", Magnesium Technology 2001, TMS, pp. 175-182.	Read the Full Article
			D. Wang, R. A. Overfelt, Y. Fasoyinu, and M. Sahoo, "Thermophysical Property Measurement of Magnesium Alloy: AE42", Magnesium Technology, 2002, TMS, pp. 323 (abstract only)	Read the Full Article
			J. Senf, E. Broszeit, M. Gugau, and C. Berger, "Corrosion and Galvanic Corrosion of Die Cast Magnesium Alloys", Magnesium Technology 2000, TMS, pp. 137-142.	Read the Full Article
			P. Bakke and H. Westengen, "The Role of Rare Earth Elements in Structure and Property Control of Magnesium Die Casting Alloys", Magensium Technology 2005, TMS, pp. 291-296.	Acquire the Article

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Alloy	Description	Link to Supplier Information	Article or Handbook	Link to Article or Handbook
AE44	Elevated temperature, creep resistant Mg-Al-RE alloy. Has good strength and ductility and excellent corrosion properties.	Hydro	S. Spigarelli, E. Evangelista, M. Cabibbo, M. El Mehtedi, H. Westengen and P. Bakke, "Creep Response of the AE44 Alloy at 125 and 150°C", Pekguleryuz, M.O. and Mackenzie, L.W.F, eds. (2006) Magnesium Technology in the Global Age, Metallurgical Society of CIM, Montreal Canada.	Acquire the Book
		Meridian Technologies Inc.	P. Bakke, A. L. Bowles, H. Westengen, "Elevated Temperature Alloys - Paths for Further Performance Gains in AE44", Kainer, K.U. ed. (2006) Magnesium: Proceedings of the 7th International Conference on Magnesium Alloys and Their Applications, 2006, DGM, Frankfurt, Germany.	Acquire the Proceedings
		Lunt Manufacturing	S. Xu, M. A. Gharghouri, M. Sahoo, "Tensile-Compressive Creep Asymmetry of Die Cast Magnesium Alloys AM50, Ae44 and AJ62A", Kainer, K.U. ed. (2006) Magnesium: Proceeding of the 7th International Conference on Magnesium Alloys and Their Applications, 2006, DGM, Frankfurt, Germany.	Acquire the Proceedings
			P. Bakke and H. Westengen, "The Role of Rare Earth Elements in Structure and Property Control of Magnesium Die Casting Alloys", Magensium Technology 2005, TMS, pp. 291-296.	Acquire the Article
AS41A, AS41B	Elevated temperature, creep resistant alloy up to 150°C. Good room temperature mechanical properties. Higher strength and castability than AS21 and AE42 but poorer creep resistance.	Hydro	B. Bronfin, M. Katsir, and E. Aghion, "Preparation and Solidification Features of AS Series Magnesium Alloys", Magnesium Technology 2000, TMS, pp. 253-260.	Read the Full Article
		AVISMA	Handbook of Materials Selection, ed. Kutz, Myer, 2002 John Wiley & Sons	Read the Full Article
		Rima Industrial S/A	J. Senf, E. Broszeit, M. Gugau, and C. Berger, "Corrosion and Galvanic Corrosion of Die Cast Magnesium Alloys", Magnesium Technology 2000, TMS, pp. 137-142	Read the Full Article
			B. Bronfin, M. Katsir, and E. Aghion, "Preparation and Solidification Features of AS Series Magnesium Alloys", Magnesium Technology 2000, TMS, pp. 253-260.	Read the Full Article

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Alloy	Description	Link to Supplier Information	Article or Handbook	Link to Article or Handbook
AS21	Elevated temperature, creep resistant Mg-Al-Si alloy up to 150°C. Good room temperature mechanical properties. Properties comparable to AE42. Improved creep resistance with respect to AS41B due to lower aluminum content of former.	Hydro	W. Blum, Y. J. X. H. Zeng, P. Zhang, B. Von Grobmann, and C. Haberling, "Creep Deformation Mechanisms in High Pressure Die-Cast Magnesium-Aluminum-Base Alloys", Met. Trans. A, 36A, July 2005, pp. 1721-1728.	Acquire the Article
		AVISMA	Y. Durandet, M. Mandagie, M. Brandt and M. Jahedi, "Microstructure and Wear Characteristics of Laser Clad Al-12%Si, Al-30% Si and AlSi/WC on AS21 Magnesium Alloy", Magnesium Technology 2005, TMS, pp. 509-514.	Acquire the Article
		Meridian Technologies Inc.	B. Bronfin, M. Katsir, and E. Aghion, "Preparation and Solidification Features of AS Series Magnesium Alloys", Magnesium Technology 2000, TMs, pp. 253-260.	Read the Full Article
AM-HP2	Elevated temperature, creep resistant alloy developed for powertrain applications. Has excellent diecastability and superior creep behavior compared to other materials.	AM-Technologies	M. A. Gibson, C. J. Bettles, M. T. Murray, and G. L. Dunlop, "AM-HP2: A New Magnesium High Pressure Diecasting Alloy for Automotive Powertrain Applications", Magnesium Technology 2006, TMS p. 327-332.	Acquire the Article
MRI-230D	Elevated temperature alloy developed for power train applications like engine blocks, bedplates and high performance gearbox housings operating at 190 to 200°C.	Dead Sea Magnesium	E. Aghion, B. Bronfin, F. Von Buch, S. Schumann, and H. Friedrich, "Newly Developed Magnesium Alloys for Powertrain Applications", JOM, November 2003, pp. 30-33.	Read the Full Article
		Meridian Technologies Inc.	E. Aghion, B. Bronfin, F. Von Buch, S. Schumann and H. Friedrich, "Dead Sea Magnesium Alloys Newly Developed for High Temperature Applications", Magnesium Technology 2003, TMS, pp. 177-182.	Read the Full Article
		Lunt Manufacturing	N. Moscovitch, D. Eliezer and E. Aghion, "The Effect of High Pressure Die Casting Process Characteristics on the Properties and Performance of Advanced Mg Alloys", Magnesium Technology 2005, TMS, pp. 357-364.	Acquire the Article

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MRI-153M	Elevated temperature, beryllium free alloy with good castability, corrosion resistance and mechanical properties at room temperature. Is creep resistant at 130 - 150°C under stresses of 50 - 80 Mpa. Was developed for gearbox housings, valve covers, intake manifolds, oil pans, oil pumps and many under the hood components.	Dead Sea Magnesium	B. Bronfin, E. Aghion, R. vonBuch, S. Schumann and M. Katsir, " Die Casting Magnesium Alloys for Elevated Temperature Applications", Magnesium Technology 2001, TMS, p. 127-130	Read the Full Article
		Meridian Technologies Inc.	E. Aghion, B. Bronfin, F. Von Buch, S. Schumann, and H. Friedrich, "Newly Developed Magnesium Alloys for Powertrain Applications", JOM, November 2003, pp. 30-33.	Read the Full Article
		Lunt Manufacturing	B. Bronfin, E. Aghion, F. von Buch, S. Schumann and M. Katsir, "Die Casting Magnesium Alloys for Elevated Temperature Applications", Magnesium Technology 2001, TMS, pp. 127-130.	Read the Full Article
			E. Aghion, B. Bronfin, F. Von Buch, S. Schumann and H. Friedrich, "Dead Sea Magnesium Alloys Newly Developed for High Temperature Applications", Magnesium Technology 2003, TMS, pp. 177-182.	Read the Full Article
			N. Moscovitch, D. Eliezer and E. Aghion, "The Effect of High Pressure Die Casting Process Characteristics on the Properties and Performance of Advanced Mg Alloys", Magnesium Technology 2005, TMS, pp. 357-364.	Acquire the Article
			T. Sato, B. L. Mordike, J.-F. Nie and M. V. Kral, "An Electron Microscope Study of Internetallic Phases in AZ91 Alloy Variants", Magnesium Technology 2005, TMS, pp. 435-440.	Acquire the Article

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Alloy	Description	Link to Supplier Information	Article or Handbook	Link to Article or Handbook
AJ52	Elevated temperature Mg-Al-Sr alloy. Creep resistant. Excellent elevated temperature tensile properties.		E. Baril, P. Labelle, and M. O. Pekguleryuz, "Elevated Temperature Mg-Al-Sr: Creep Resistance, Mechanical Properties, and Microstructure", JOM, November 2003, pp. 34-39.	Read the Full Article
			W. Blum, Y. J. X. H. Zeng, P. Zhang, B. Von Grobmann, and C. Haberling, "Creep Deformation Mechanisms in High Pressure Die-Cast Magnesium-Aluminum-Base Alloys", Met. Trans. A, 36A, July 2005, pp. 1721-1728.	Acquire the Article
			D. Argo, M. Pekguleryuz, P. Labelle, P. Vermette, R. Bouchard and M. Lefebvre, "Process Parameters and Diecasting of Noranda's AJ52 High Temperature Mg-Al-Sr Alloy", Magnesium Technology 2002, TMS, pp. 87-93.	Read the Full Article
			D. Argo and M. Lefebvre, "Melt Protection for the AJ52 Magnesium Strontium Alloy", Magnesium Technology 2003, TMS, pp. 15-22.	Read the Full Article
AJ62	Elevated temperature Mg-Al-Sr alloy. Creep resistant. Good castability. Exellent corrosion resistance.	Meridian Technologies Inc.	M. Pekguleryuz, P. Labelle, D. Argo, and E. Baril, "Magnesium Diecasting Alloy AJ62x with Superior Creep Resistance, Ductility and Diecastability", Kaplan, H.I. ed. (2003), Magnesium Technology 2003, TMS, pp. 201-206.	Read the Full Article
		Lunt Manufacturing	S. Xu, M. A. Gharghouri, M. Sahoo, "Tensile-Compressive Creep Asymmetry of Die Cast Magnesium Alloys AM50, Ae44 and AJ62A", Kainer, K.U. ed. (2006) Magnesium: Proceeding of the 7th International Conference on Magnesium Alloys and Their Applications, 2006, DGM, Frankfurt, Germany.	Acquire the Proceedings
			E. Baril, P. Labelle, and M. O. Pekguleryuz, "Elevated Temperature Mg-Al-Sr: Creep Resistance, Mechanical Properties, and Microstructure", JOM, November 2003, pp. 34-39.	Read the Full Article
AJ62L	Elevated temperature Mg-Al-Sr alloy. Low strontium level compared to AJ62 for increased tensile strength and ductility. Excellent corrosion resistance.		E. Baril, P. Labelle, and M. O. Pekguleryuz, "Elevated Temperature Mg-Al-Sr: Creep Resistance, Mechanical Properties, and Microstructure", JOM, November 2003, pp. 34-39.	Read the Full Article

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AXJ530	Highly castable and creep resistant Mg-Al-Ca-Sr alloy for elevated temperature applications. Improved creep as compared to AE42. Equivalent corrosion resistance to AZ91D. Good castability.		B. R. Powell, A. A. Luo, V. Rezhets, J. J. Bommarito, and B. L. Tiwari, "Development of Creep-Resistant Magnesium Alloys for Powertrain Applications," SAE 2001 World Congress, Detroit, MI, March 6, 2001, SAE Technical Paper 2001-01-0422, March 6, 2001.	Acquire the Article
			B. R. Powell, V. Rezhets, A. A. Luo, B. L. Tiwari, "Creep-resistant magnesium die castings", US Patent 6,264,763, July 24, 2001.	Read the Patent
			A. Suzuki, N. D. Saddock, J. W. Jones and T. M. Pollack, "Phase Transformation and Creep of Mg-Al-Ca Based Die-Cast Alloys", Magnesium Technology 2005, TMS, pp. 111-116.	Acquire the Article
			B. R. Powell, A. A. Luo, B. L. Tiwari and V. Rezhets, "The Die Castability of Calcium-Containing Magnesium Alloys: Thin-Wall Computer Case", Magnesium Technology 2002, TMS, pp. 123-129.	Read the Full Article