

Sustainable  
Development



## This section provides our ninth annual sustainability report, which evaluates and compares AMG's social and environmental performance to previous years.

The reporting boundaries have not changed significantly since 2015; one operational site has been divested. The 29 locations reporting in 2016 (in which AMG has a 51% or greater stakeholding) are detailed in the table below.

They include mining and manufacturing operations and sales and administrative offices in 13 countries across 4 continents. This report covers the same two segments as described in 2015: AMG Critical Materials and AMG Engineering. 2015 data are included so that comparisons can be made and trends can be identified. AMG will continue to assess the boundaries of this report based on the corporate ownership structure on an ongoing basis.

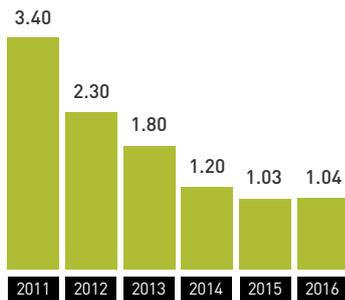
SITE NAME <sup>1</sup>	LOCATION	COUNTRY	DIVISION
AMG Headquarters	Amsterdam	Netherlands	AMG Corporate
AMG USA Headquarters	Pennsylvania	USA	AMG Corporate
ALD USA <sup>3</sup>	Connecticut	USA	AMG Engineering
ALD France	Grenoble	France	AMG Engineering
ALD Vacuum Technologies <sup>2</sup>	Hanau	Germany	AMG Engineering
ALD Vacuheat <sup>2</sup>	Limbach	Germany	AMG Engineering
ALD TT USA <sup>2</sup>	Michigan	USA	AMG Engineering
ALD Dynatech <sup>3</sup>	Mumbai	India	AMG Engineering
ALD TT Mexico <sup>2</sup>	Ramos Arizpe	Mexico	AMG Engineering
ALD Japan <sup>3</sup>	Shinjuku-ku	Japan	AMG Engineering
ALD C&K <sup>3</sup>	Suzho	China	AMG Engineering
AMG Antimony	Chauny	France	AMG Critical Materials
Bogala Graphite Lanka <sup>2</sup>	Colombo	Sri Lanka	AMG Critical Materials
AMG Graphite <sup>2</sup>	Kropfmühl	Germany	AMG Critical Materials
AMG Antimony	Lucette	France	AMG Critical Materials
AMG Mineração <sup>2</sup>	Nazareno	Brazil	AMG Critical Materials
AMG Silicon <sup>2</sup>	Pocking	Germany	AMG Critical Materials
AMG Graphite	Qingdao	China	AMG Critical Materials
AMG Graphite Tyn	Tyn	Czech Republic	AMG Critical Materials
AMG Alpoco	Anglesey	UK	AMG Critical Materials
AMG Titanium Alloys and Coatings <sup>2</sup>	Brand Erbisdorf	Germany	AMG Critical Materials
AMG Aluminum <sup>3</sup>	Jiaxing	China	AMG Critical Materials
AMG Aluminum	Kentucky	USA	AMG Critical Materials
AMG Alpoco	Minworth	UK	AMG Critical Materials
AMG Titanium Alloys and Coatings <sup>2</sup>	Nürnberg	Germany	AMG Critical Materials
AMG Vanadium <sup>2</sup>	Ohio	USA	AMG Critical Materials
AMG Superalloys and AMG Aluminum <sup>2</sup>	Rotherham	UK	AMG Critical Materials
AMG Superalloys <sup>2</sup>	São João del Rei	Brazil	AMG Critical Materials
AMG Aluminum	Washington	USA	AMG Critical Materials

<sup>1</sup> The chart indicates which facilities were included in the scope of the sustainable development data. Only data from these facilities are included in this section, which may therefore show inconsistency with other sections of this annual report covering all facilities.

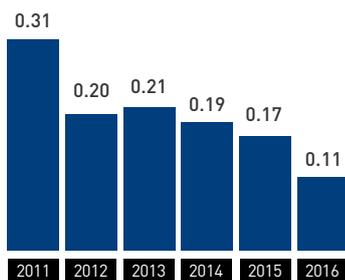
<sup>2</sup> 2016 remote externally audited data.

<sup>3</sup> Minor or office facilities with estimated data.

LOST TIME INCIDENT RATE



INCIDENT SEVERITY



All locations report their performance at the end of the fourth quarter and no forecast data are used. However, sales and administrative offices and some smaller engineering sites (typically with less than 10 employees or with environmental impacts <1% in all aspects) have been determined to be non-material to the report, and therefore estimated data have been used for these in 2016. Those sites utilizing estimated data are indicated in the table on page 39.

SCOPE OF THIS REPORT

AMG utilizes some of the Global Reporting Initiative (GRI), Mining and Metals Sector Supplement aspects as a basis for this report but includes only those which are material to its business units. The report covers aspects that:

- Reflect the organization’s significant economic, environmental and social impacts; or
- Substantively influence the assessments and decisions of stakeholders.†

AMG utilizes a standard template, which sites use to report their data in order to ensure consistency in the interpretation of definitions of the key indicators. The report is independently verified by GHD. The environmental key performance data for both segments are summarized in the table on page 47.

AMG Advanced Metallurgical Group N.V. amg-nv.com

Contact: [global.sustainability@amg-nv.com](mailto:global.sustainability@amg-nv.com)

AMG PEOPLE

GRI INDICATORS LA1, LA4, LA6, LA7, LA10, LA13 AND MM4

The size of AMG’s workforce has been relatively stable over the last year and at year-end 2016, AMG Critical Materials had 2,110 employees and AMG Engineering had 778. For the facilities covered by this report, the total AMG workforce was 2,888 (other facilities not yet covered in this section employ a further 165 people). Geographically, these were located in Asia (301), Europe (1,589), North America (545) and South America (453).

In addition to direct employees, a further 238 directly supervised contract workers were employed at AMG sites in 2016. AMG assesses the diversity of its workforce in terms of gender and age, but not ethnicity. The multinational, and therefore multicultural, nature of AMG’s business means that ethnic diversity is significant, but it is not possible to define minority employees in such an environment. Of the total employees, 16% are female; 19% are under 30 years of age, 54% are between 30 and 50, and 27% are over 50.

The Management Board is 100% male. The Supervisory Board is 89% male and 11% female. One Supervisory Board member is aged 30-50 while 8 are over 50.

The rights and freedoms for individual employees to join, or choose not to join, unions, as described in Article 23 of the Universal Declaration of Human Rights, are fully respected by AMG. Across AMG, 1,924 employees (67%) were covered by

† GRI, G4 Sustainability Reporting Guidelines, Reporting Principles and Standard Disclosures, 2013, p.17.

such collective bargaining agreements. 72% of AMG Critical Materials are covered by these arrangements, while AMG Engineering, which includes a higher proportion of professional salaried staff, has 52% of its employees covered. Once again in 2016, AMG facilities had no strikes or lockouts.

AMG is pleased to report that no fatal incidents occurred to its workforce in 2016. AMG's medium-term goal is to become a zero lost time incidents workplace—we cannot accept that any incident is inevitable. Since 2008, there has been year-over-year safety improvement across AMG, although this trend slowed in 2016. For AMG as a whole, the Lost Time Incident Rate<sup>1</sup> was relatively unchanged at 1.04 (1.03 in 2015). The incident severity<sup>2</sup> was, however, significantly lower at 0.11 compared to 0.17 in 2015 (a 35% improvement). Of the 29 locations included in this report, 17 achieved zero lost-time incidents in 2016. While lost time incident rate improvement slowed, total incident rates (including all medically treated injuries) improved 16% from 2.00 in 2015 to 1.68 in 2016. No specific occupational diseases were reported in 2016.

Formal safety management systems continue to be important to achieving zero harm to employees and fifteen of AMG's larger sites are OHSAS 18001 certified. In 2016, 86% of the AMG workforce was represented in formal health and safety committees and they are in place at every major production facility and many of the smaller facilities. In these committees, representatives from all levels of the organization become pivotal decision makers regarding safety at their facilities. The average absenteeism rate across AMG was 2.75%.

AMG also collects data on the hours we invest in our people to develop their skills, categorized into management; professional, technical, sales and administration; and production and maintenance employees. The categories of training tracked included technical and professional development, quality, anti-corruption policies, human rights policies and health and safety.

This is important to our safety, environmental and ethics programs, and in maintaining our technical competitive advantage. In 2016, the training provided was: management (158 employees trained, averaging 28.3 hours per person), professional, technical, sales and administration (958 employees trained, averaging 32.3 hours) and production and maintenance (1,722 employees trained, averaging 35.5 hours).

Across all the reporting sites, AMG employees received an average of 32.3 hours of training time in 2016 (approximately 1.75% of total hours worked).

<sup>1</sup> Lost time incident frequency rate equals the number of lost time incidents multiplied by 200,000 divided by the total hours worked. Lost time injury was defined using local regulations.

<sup>2</sup> Incident severity is defined as the number of scheduled work days lost as a result of disabling injuries per thousand hours worked. In some locations, calendar days are counted by local regulators and these data are used here if scheduled work days are unavailable.

## HUMAN RIGHTS AND ETHICS

### GRI INDICATORS HR 3, HR 5, HR 6 AND SO 3

Protection of internationally proclaimed human rights is an area in which AMG is both highly aware and fully committed, and the Company strives to make sure it is not complicit in human rights abuses. Each AMG site is assessed during site visits and internal audits to identify if there is the possibility of freedom of association or collective bargaining being put at risk because of political or business factors. In 2016, it was found that no sites were at risk, with the exception of China, where the formation of unions remains restricted. Similarly, the Company has reviewed sites to ensure that they are not at risk for employing child labor or exposing young workers to hazards. No sites have been identified that pose a risk at this time. AMG also aims to ensure rights are protected in our supply chain through its Supplier Code of Conduct. Our policy on human rights is included in the Company Code of Business Conduct and Ethics and detailed in the Company's human rights policy; all are available on the AMG website.

Refresher human rights and ethics training was performed in 2016, and employees were given refresher training in ethical businesses practices, including 1,568 in human rights and anti-bribery based materials. Compliance officers at the major sites monitor and implement the Code of Business Conduct and Ethics.

## RESOURCE EFFICIENCY AND RECYCLING

### GRI INDICATORS EN 1 AND EN 2

The use of resources varies between AMG business units, ranging from those that locally mine or purchase primary raw materials to produce metals, alloys, and inorganic chemicals, through those that produce metals and alloys from secondary, recycled resources, to those that provide technology and engineering services. AMG resource usage data comprise raw materials, associated process materials, semi-manufactured goods and parts and packaging, by weight.

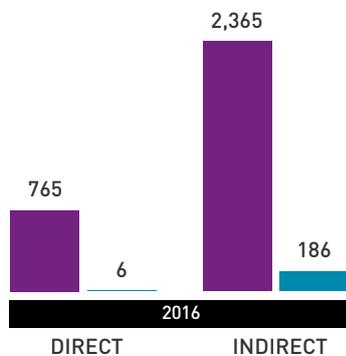
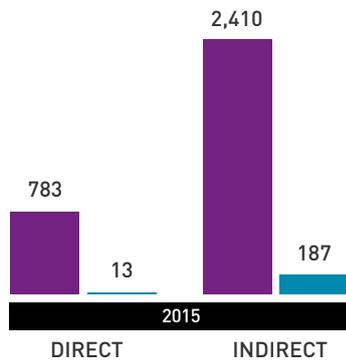
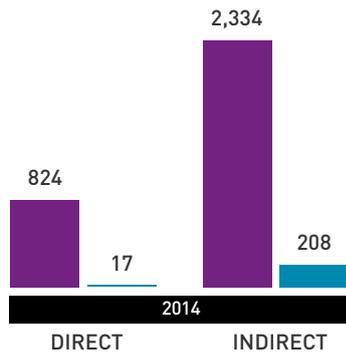
The predominantly furnace technology and engineering services provided by AMG Engineering, including furnace assembly operations and heat treatment services means this segment utilizes limited amounts of resources. Resources used are mainly complex component parts for furnaces, which are routinely measured in units rather than by mass. Unlike the chemicals and alloys business units, this means only limited data are available on resource mass. In 2016, AMG Engineering reported using 3,370 mt of resources, all of which were classified as primary.

AMG Critical Materials uses a much more diverse range of resources, including mined ores for tantalum, lithium and graphite production, power plant wastes and spent refinery catalysts for the production of vanadium alloys, and metal salts for aluminum alloy production. The segment uses recycled iron, steel, aluminum and titanium in processes when possible. The segment utilized 1,099,980 mt of resources in 2016, of which 40,650 mt were secondary or recycled materials. In 2016,

SUSTAINABLE DEVELOPMENT



ENERGY USAGE (TJ)



AMG Engineering  
AMG Critical Materials

the primary utilization of resources was by AMG Mineração (711,400 mt of mined ore) and AMG Silicon (190,900 mt of quartz, coal and other raw materials) with the remaining AMG Critical Materials sites using 157,100 mt.

ENERGY CONSUMPTION

GRI INDICATORS EN 3 AND EN 4

Energy remains a major area of focus for AMG for both environmental and economic reasons. In particular, high-temperature metallurgical processes and mining operations utilized in AMG Critical Materials are energy intensive.

The two most significant energy carriers are electricity and natural gas, although other fuels and energy sources are captured in the data discussed here.<sup>3</sup>

The reported energy usage for AMG Critical Materials was marginally lower in 2016 compared to 2015, decreasing from 3,193 terajoules (TJ) in 2015 to 3,130 TJ in 2016. Direct energy usage was 765 TJ and indirect was 2,365 TJ.

The energy used by low-energy heat treatment processes utilized by AMG Engineering remains low in comparison.

The segment used 192 TJ in 2016, 4.5% lower than in 2015 (199 TJ). Indirect energy, in the form of electricity, accounted for 186 TJ, while direct energy use, primarily through natural gas, totaled 6 TJ.

Across AMG, the split between renewable and non-renewable indirect energy sources is difficult to determine since utilities do not generally publish this information (with some exceptions; e.g. CEMIG in Brazil now produces this data).

However, AMG does generate its own renewable energy. In 2016, AMG's hydroelectric generating facility near São João del Rei, Brazil generated 55,530 gigajoules (15,425 MWh). This supplied AMG's local requirements at its São João del Rei, Brazil plant. Additionally, AMG Vanadium's solar power system generated 911 gigajoules (253 MWh) in 2016.

WATER CONSUMPTION

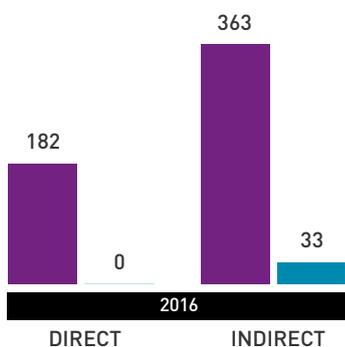
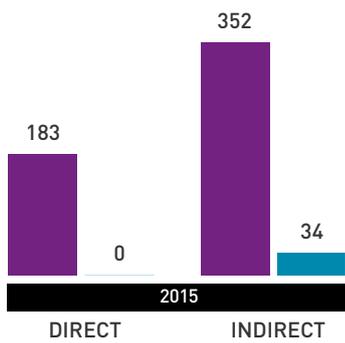
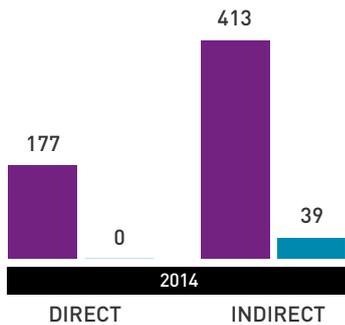
GRI INDICATOR EN 8

Water is essential to many manufacturing processes and is used by AMG primarily for non-contact, evaporative or single-pass cooling purposes, although a small number of AMG facilities do use wet chemical processes for the production of metal oxides and other chemicals. In addition, mining operations can utilize water from mine dewatering or for ore processing. Water utilized for cooling, processing and sanitation is reported by AMG facilities. Reported water use for AMG Critical Materials was lower in 2016 at 4,220,000 cubic meters (a 10% decrease). AMG Engineering's water consumption was 100,800 cubic meters during 2016, also similar to that of 2015 (99,600 cubic meters).

AMG Critical Materials has its largest water use at the mine sites in Brazil, Germany and Sri Lanka, and the silicon metal production plant in Germany. Of these, the mine in Nazareno,

<sup>3</sup> Indirect energy consumption does not include the energy consumed by electricity producers to generate the electricity or transmission losses.

GHG EMISSIONS ('000 MT)



AMG Engineering  
AMG Critical Materials

Brazil remains the largest user with 2,495,000 cubic meters in 2016, a 15% decrease 2015, and a result of process water recycling and improved measurement. Full data are provided in the table on page 47.

**BIODIVERSITY**

**GRI INDICATOR EN 11**

Of the 29 locations reporting for 2016, there were three reported land areas on or adjacent to AMG’s properties which had high biodiversity value, sensitive habitats or were protected. These areas are: native forest in São João del Rei, Brazil; river frontage and setback areas in Nazareno, Brazil; and wetlands in Ohio, United States. AMG remains very aware of the need to be responsible stewards of these important areas.

**CLIMATE CHANGE**

**GRI INDICATOR EN 16**

AMG facilities utilize processes that are associated with both direct and indirect greenhouse gas (GHG) emissions, and both types are reported here. Electricity used for the generation of heat for metallurgical processing has been, and remains, the most significant source of GHG emissions for AMG. This electricity use gives rise to indirect GHG emissions of carbon dioxide equivalent (CO<sub>2</sub>e), which are dependent on the nature of its generation. Whenever possible, emissions have been calculated using up-to-date emission factors available from the electricity supplier, the local environmental agency, or the GHG protocol. Indirect emissions are defined as those emissions generated by sources outside of AMG’s control, but where AMG ultimately uses the energy.

Direct GHG emissions result primarily from the combustion of carbon-containing materials often as part of the metallurgical process, such as using coke as a reductant, but also for the generation of heat, such as burning natural gas in a boiler. Other GHGs occurring from processes other than combustion, such as hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride, are minimal for the AMG business units, but are included if relevant.

AMG Critical Materials’ GHG emissions were marginally higher in 2016 at 546,000 mt of CO<sub>2</sub>e (2015, 535,000 mt). 67% of these emissions are attributed to indirect sources (electricity) while 33% are attributed to direct sources. Emissions remain dominated by the silicon metal production activities which account for 390,000 mt of CO<sub>2</sub>e (approximately 6.62 kg CO<sub>2</sub>e per kg silicon metal produced). This activity also dominates AMG’s overall GHG emissions, accounting for 67% of total group emissions. Further, changes in supply mix, including reduction of nuclear and variations in renewable energy in Germany, resulted in lower emission factors for this electricity and accounted for some of this increase. These factors, outside of AMG’s control, outweighed additional reductions achieved elsewhere.

AMG Engineering GHG emissions in 2016 were 33,000 mt, a decrease from 33,000 mt in 2015. 99% of these emissions are indirect and associated with electricity usage.

AMG provides a complex mix of products and services, and it has become clear that year-on-year comparisons are difficult as product mix varies. GHG intensity is therefore defined on the basis of revenue rather than, for example, mt of product. Normalized to a revenue basis, AMG Critical Materials emitted 546,000 mt CO<sub>2</sub>e, with revenue of \$702 million, equivalent to 778 mt CO<sub>2</sub>e per million \$ revenue. AMG Engineering generated 32,900 mt CO<sub>2</sub>e and \$270 million in revenue, or 122 mt CO<sub>2</sub>e per million \$ revenue. This wide range reflects the diversity of AMG but also guides focus on reduction opportunities.

For AMG as a whole in 2016, GHG emissions were 579,000 mt, up 2% from 569,000 mt in 2015. Revenue was \$971 million, giving a GHG intensity of 596 mt per million \$ revenue, again an increase of 2% from 2015.

### EMISSIONS TO AIR

#### GRI INDICATORS EN 19 AND EN 20

The emissions of ozone-depleting substances remain de minimis for AMG. AMG Engineering also has de minimis air emissions for other pollutants, resulting from only small sources such as heating and hot water boilers. AMG Critical Materials' production facilities do have some other air emissions, including SO<sub>x</sub> (777 mt), NO<sub>x</sub> (627 mt) and particulate materials (74 mt). Data are only available for regulated sources where measurements have been made. The largest particulate emissions come from silicon metal production activities.

### EMISSIONS TO WATER AND SPILLS

#### GRI INDICATORS EN 21 AND EN 23

AMG facilities continue to maintain records of the volume of aqueous effluents, including process water and non-sanitary sewer discharges to local water courses. Clean water (typically freshwater used for cooling purposes that has not been affected in the process) is included in the figures given below. Chemical analysis of the effluent is utilized to determine the total mass of primary constituents of the water emissions.

In 2016, the total water disposed to water courses by AMG Critical Materials equaled 3,257,000 cubic meters compared to 3,629,000 cubic meters in 2015. This decrease is attributed to improvements in efficiencies at the AMG Mineração mine, production levels and product mix. Of the total amount, 1,970,000 million cubic meters of water were discharged to the same water body from which it is withdrawn at the mine site in Brazil, a 15% reduction from 2015.

After mining activities, most of AMG Critical Material's water is used for cooling purposes and therefore produces clean water discharges, and some of the wet chemical processes generate aqueous waste streams. This included cooling water used by the silicon metal furnaces as well as mine water from dewatering pumps. In several locations, mine water is utilized for process water before final discharge. For the 8 production sites reporting industrial process water disposal, the major constituents were metals (712 kg), fluoride (6,180 kg), sulfate (1,039 mt) and total suspended solids (36 mt).

AMG Engineering utilizes minimal water for non-contact, closed-cycle cooling purposes, and the discharges are therefore clean water and not considered material to this report. The only significant water discharge of non-contact cooling water takes place at the site in Michigan, USA (37,000 cubic meters in 2016).

In 2016, there were no significant spills (defined as one which would affect the Company's financial statements as a result of the ensuing liability, or is recorded as a spill) of tailings or other process materials at any AMG site.

### WASTE DISPOSAL

#### GRI INDICATOR EN 22

Detailed information was collected in 2016 for waste streams generated by AMG, along with documentation of their recycling or disposal method. AMG continues to minimize waste streams by avoiding generation, increasing reuse and recycling and minimizing landfill disposal. Landfill is a last resort. Wastes as defined here encompass materials not purposefully produced for sale and with no commercial value.

The total landfill or incineration disposal for AMG Critical Materials was 19,356 mt, a decrease of 19% over 2015 (24,000 mt). 46% of these materials (8,970 mt) were non-hazardous, with the remaining 10,380 mt disposed to licensed hazardous waste landfills.

The waste produced by AMG Engineering is much different in composition, and much smaller in volume. Just 193 mt were disposed to landfills in 2016 (109 mt in 2015), composed mainly of general waste, contaminated oil and metals that could not readily be recycled, and almost no hazardous waste.

Overall, the Company disposed of 19,550 mt of waste to landfills or incineration in 2016 compared to 24,500 mt in 2015. Hazardous waste accounted for 46% of the total.

### SIGNIFICANT FINES FOR NON-COMPLIANCE WITH ENVIRONMENTAL AND OTHER LAWS

#### GRI INDICATOR EN 28

AMG Mineração received a fine of thirty-two thousand dollars as a result of a routine environmental inspection. No other facility received any significant fine or equivalent penalty for non-compliance with environmental laws in 2016.

#### GRI INDICATOR S08

In 2016, AMG Engineering and AMG Critical Materials did not receive any fines.

### PRODUCT RESPONSIBILITY

#### GRI INDICATOR MM 11

AMG continues its progress regarding its responsibilities under the REACH regulations in Europe, and is continuing to prepare for its 2018 registrations for products with volumes greater than 1 mt. European operations are working with Consortia in developing the health, safety and environmental data required for these registrations and have taken on the role as lead

registrant in several cases. Industry groups continue to focus on developing health and safety knowledge of their products as the regulatory framework grows and expands across the world. AMG units are involved in, among others, the Vanadium International Technical Committee and the International Antimony Association.

### GRI CONTENTS

This section provides an overview of how AMG's Annual Report correlates with the GRI guidelines for the voluntary reporting of sustainable development indices. The table on the next page serves as a reference guide to the sections of the report where information about each item can be found. The GRI guidelines facilitate measurement of economic, environmental, and social dimensions of company performance. Third-party verification has been conducted relative to determining consistency with the GRI reporting principles. For brevity, only the most pertinent data are included in this report.

### UNITED NATIONS GLOBAL COMPACT

AMG commits its support to the principles of the United Nations Global Compact. The Global Compact, which is overseen by the United Nations, is a strategic policy initiative for businesses that, like AMG, are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labor, the environment and anti-corruption. In 2009, the AMG Management Board approved its commitment to the Global Compact and the intent of AMG to support the ten principles of the Global Compact. AMG will reaffirm its support and submit its fifth Communication on Progress in April 2017.



### EXTRACTIVE INDUSTRIES TRANSPARENCY INITIATIVE

AMG continues its support of the Extractive Industries Transparency Initiative (EITI, [eiti.org](http://eiti.org)), a global initiative to improve governance in resource-rich countries through the verification and full publication of Company payments and government revenues from oil, gas and mining. EITI works to build multi-stakeholder partnerships in developing countries in order to increase the accountability of governments. Over 30 countries have now committed to the EITI principles and criteria. As of today, AMG does not have any extractive operations in an EITI-implementing country, although it does have exploration and development activities in Mozambique.

Further information on AMG Sustainable Development and our commitments to these organizations, including our United Nations Global Compact Communication on Progress, can be found on the AMG website ([amg-nv.com](http://amg-nv.com)).



## ENVIRONMENTAL, HEALTH, SAFETY AND SOCIAL REPORTING STATEMENT OF ASSURANCE

### SCOPE, OBJECTIVES & RESPONSIBILITIES

AMG's environmental, health, safety and social performance reporting has been prepared by the management of AMG who are responsible for the collection and presentation of the information. GHD was retained by AMG to conduct an independent review and assurance of the key information\* and data reported in the Sustainable Development section of this report. The objective of the assurance process is to check the materiality of the issues included in the report and the completeness of reporting. Any claims relating to financial information contained within the report are excluded from the scope of this assurance process. GHD's responsibility in performing our assurance activities is to the management of AMG only and in accordance with the terms of reference agreed with them. GHD does not accept or assume any responsibility for any other purpose or to any other person or organization. Any reliance that any third party may place on the report is entirely at its own risk.

### APPROACH AND LIMITATIONS

GHD's assurance engagement has been planned and performed in accordance with AMG's internal guidance and definitions for the reported indices. The assurance approach was developed to be consistent with the GRI Guidelines and international standards for assurance appointments. Remote audits utilizing telephone and web-based methods were carried out for 12 facilities (see table on page 39) identified by AMG, representing approximately 41% of the total number of AMG facilities. Stakeholder engagement was not within the scope of the assurance activities.

### CONCLUSIONS/RECOMMENDATIONS

Based on the method and scope of work undertaken, and the information provided to GHD by AMG, the process undertaken by AMG provides a balanced representation of the issues concerning AMG's sustainability performance and is an appropriate presentation of AMG's environmental, safety, health and social performance in 2016. In our opinion, the processes for collecting and reporting sustainability-related data that AMG introduced in 2007 continue to be enhanced through better communication and awareness, and more consistent application of the environmental indices. Some challenges remain, related to providing consistent and complete data in an efficient manner. It is recommended that AMG continue to focus on these challenges to improve reporting, but they do not materially affect the conclusions presented herein.

**JULIAN HAYWARD, P. ENG.**

GHD

**ASHLEY VALENTINE, P.E.**

GHD

\* LA1, LA4, LA7, LA13, EN1, EN2, EN3, EN4, EN8, EN16, EN20, EN21, and EN22

## SOCIAL AND ENVIRONMENTAL KEY PERFORMANCE INDICATORS AND GRI CONTENT INDEX

## SELECTED SOCIAL AND ENVIRONMENTAL KEY PERFORMANCE INDICATORS\*

GRI INDICATOR	DESCRIPTION	UNITS	AMG CRITICAL MATERIALS		AMG ENGINEERING		AMG GROUP	
			2015	2016	2015	2016	2015	2016
LA1	Total workforce		2,055	2,110	789	778	2,844	2,888
LA4	% of employees covered by collective bargaining agreements		71	72	49	52	65	67
LA7	Accident Rates	Total	1.22	1.19	0.46	0.58	1.03	1.04
LA7	Accident Severity Rate	Total	0.22	0.13	0.02	0.03	0.17	0.11
LA10	Average Hours of Training Per Year	Per person	25.1	26.3	69	49.2	37.1	32.3
EN2	% Recycled Raw Materials	%	10	10	0	0	3.2	3.7
EN3	Direct Energy Consumption	TJ	783	765	12	6	796	771
EN4	Indirect Energy Consumption	TJ	2,410	2,365	187	186	2,596	2,550
EN8	Water consumption (manufacturing)	'000 cubic meters	1,247	1,133	100	101	1,343	1,234
EN8	Water consumption (mining)	'000 cubic meters	3,497	3,092	NA	NA	3,497	3,092
EN16	CO <sub>2</sub> equivalent emissions	mt	535,000	546,000	34,000	33,000	569,000	579,000
EN20	SOx emissions	mt	628	627	0	0	628	627
EN20	NOx emissions	mt	780	777	0	0	780	777
EN20	Particulates discharged to air	mt	81	73	0	0	81	74
EN21	Metals discharged	kg	807	712	0	0	807	712
EN22	Hazardous waste (including recycled)	mt	5,480	5,730	63	153	5,543	5,884
EN22	Non-hazardous waste (including recycled)	mt	26,130	27,600	114	217	26,245	27,800
EN22	Percent of waste recycled	%	23	38	39	23	23	37
EN22	Waste disposed to landfill	mt	24,406	19,356	109	193	24,514	19,500
EN23	Spills	L	0	0	0	0	0	0
EN28	Environmental Fines	\$	32,000	0	0	0	0	32,000
S08	Fines for non-compliance with laws	\$	0	0	0	0	0	0

\* For a full list see pages 40-46.

## GRI CONTENT INDEX

PART	SECTION	REFERENCE	PAGES
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	Report Parameters	3.1 to 3.13	47
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