

Instructions for the safe handling of AGM Lead-Acid Batteries

(Absorbent Glass Material)

1. Identification of the article and the company

Data on the product:
Trade name

AGM battery with absorbed diluted sulphuric acid

Data on the manufacturer:

Johnson Controls Autobatterie GmbH & Co. KGaA
Am Leineufer 51
D-30419 Hanover

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2. Hazard identification

No hazards in case of an intact battery and observation of the instructions for use.

AGM batteries have two significant characteristics:

- They contain absorbed diluted sulphuric acid, which may cause severe acid burns, when the material is touched.
- During the charging process they develop hydrogen gas and oxygen, which under certain circumstances may turn into an explosive mixture.

For this reason, the batteries have been marked with the following hazard symbols:



The significance of the hazard symbols is:

1. No smoking, no open flames, no sparks.
2. Wear safety goggles.
3. Keep away from children.
4. Sulphuric acid.
5. Observe operating instructions.
6. Explosive gas mixture.

Additionally: Do not clean batteries with dry wishers, use only wet wishers.

3. Composition / Information on Ingredients

EINECS-No.	CAS-No.	Description	Content [% of weight] ¹	Classification 67/548/EEC (DSD)	Classification 1272/2008 (CLP)
231-100-4	7439-92-1	Lead and lead alloys	~ 32	-	-
231-100-4	7439-92-1	Active mass (battery lead paste)	~ 32	Xn; R20/22 R33 T ² , Repr. Cat. 1; R61 Repr. Cat. 3; R62 R52/53 ³	GHS 07, Acute Tox. 4, H 302, H 332 GHS 08, Repr. 1 A, H 360 GHS 08, STOT RE 2, H 373 Aquatic Chronic 3, H 412 Signal word: Danger
231-639-5	7664-93-9	Absorbed diluted sulphuric acid ⁴	~ 29	C-Corrosive R 35	GHS 05, H314 Signal word: Danger
-	-	Plastic container ⁵	~ 7	-	-

¹ Content may vary

² As a result of the harm to the unborn children lead compounds are classified as toxic for reproduction, Category 1. As this category is not described with a specific hazard symbol, lead compounds have to be labelled with the "skull" symbol. Lead compounds are not classified "toxic".

³ The former classification of lead compounds as toxic for the aquatic environment R50/53 had been triggered from test results generated in the 1980's for soluble lead compounds (e.g. lead acetate). The hardly soluble lead compounds such as battery lead oxide were not tested at that time. Tests on battery lead oxide were carried out in 2001, 2005 and 2006. The respective test results conclude that battery lead oxide is not toxic for the environment, neither R50 nor R50/53 nor R51/53. From this it follows that the general classification for lead compounds (R50/R53) does not apply to battery paste. As the result of this the Risk Phrase R52/53 (Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment) applies to battery lead oxide and active mass.

⁴ Concentration of the absorbed, diluted sulphuric acid varies in accordance to the state of charge.

⁵ Composition of the plastic may vary due to different customer requirements.

The information below is of relevance only, if the battery is broken and direct contact to the contained mixture occurred.

Absorbed, diluted sulphuric acid

Hazard Statement according 67/548/EEC (DSD):

R 35 Causes severe burns.

Precautionary Statements according 67/548/EEC (DSD):

- S 2 Keep out of reach of children
S 16 Keep away from sparks or naked flame – No smoking
S 26 In case of contact with eyes rinse immediately with plenty of water and seek medical advice.
S 45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)

Hazard Statement according EC 1272/2008 (CLP):

- H314 Causes severe skin burns and eye damages

Precautionary Statements according EC 1272/2008 (CLP):

- P264 Wash hands thoroughly after handling.
P301+P330+P331 If swallowed: rinse mouth. Do not induce vomiting.
P280 Wear protective gloves/protective clothing/eye protection.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P363 Wash contaminated clothing before reuse.
P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

Battery lead paste:

Precautionary Statements according 67/548/EEC (DSD):

- R 61 May cause harm to the unborn child.
R 20/22 Harmful by inhalation and if swallowed.
R 33 Danger of cumulative effects.
R 62 Possible risk of impaired fertility.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Precautionary Statements according 67/548/EEC (DSD):

- S 52 Not recommended for interior use on large surface areas.
S 45 In case of accident or if you feel unwell, seek medical advice immediately.
S 60 Refer to manufacturer/supplier for information on recovery/recycling.
S 61 Avoid release to the environment. Refer to special instructions / Safety data sheets.

Hazard Statements according EC 1272/2008 (CLP):

- H302 Harmful if swallowed.
H332 Harmful if inhaled.
H360 May damage the unborn child. Suspected of damaging fertility.
H373 May cause damage to organs (the central nervous system and system For reproduction) through prolonged or repeated exposure.

Precautionary Statements according EC 1272/2008 (CLP):

P101	If medical advice is needed, have product container or label at hand.
P202	Do not handle until all safety precautions have been read and understood.
P263	Avoid contact during pregnancy/while nursing.
P273	Avoid release to the environment.
P308+P313	If exposed or concerned: Get medical advice/attention.
P405	Store locked up.
P501	Dispose of contents/container according to the local waste management regulations.

4. First-aid measures

The information below is of relevance only, if the battery is broken and direct contact to the contained mixture occurred.

Absorbed, diluted sulphuric acid:

after contact to skin	rinse with water; remove and wash wetted clothing
after inhalation of acid mist*)	inhale fresh air
after contact with the eyes*)	rinse under running water for several minutes
after swallowing*)	drink a lot of water immediately, and swallow activated carbon, do not induce vomiting.

Seek to advice a doctor.

Battery lead paste:

after skin contact:	clean with water and soap
after inhalation of lead compounds:	inhale fresh air
after contact with the eyes:	rinse under running water for several minutes
after swallowing:	wash mouth with water

Seek advice of a medical doctor

5. Fire-fighting measures

- Suitable extinguishing agents:	Water, CO ₂ or dry powder fire extinguishing agents
- Special protective equipment:	Protective goggles, respiratory protective equipment, acid proof clothing

6. Accidental release measures

Cleaning / take-up procedures

Use a bonding agent, such as sand, use lime or sodium carbonate for neutralisation; dispose with due regard to the official local regulations; do not permit penetration into the sewage system, the earth or water bodies.

7. Handling and storage

Store under roof in cool ambience-charged lead-acid batteries do not freeze up to -50°C; prevent short circuits. Seek agreement with local water authorities in case of larger quantities. If batteries have to be stored in storage rooms, it is imperative that the instructions for use are observed.

Additional Information about the storage of lead-acid batteries can be requested from Johnson Controls Autobatterie GmbH Co. KGaA.

8. Exposure controls / personal protection

8.1 No exposure caused by lead and lead containing battery paste when handling properly.

8.2 In case of a broken battery and with direct contact with compounds

Dermal: Sulfuric acid is corrosive. DNEL values for local dermal effects are not derived.

Inhalation 0,1 mg/m³

Personal protective equipment

In case of broken battery and with direct contact with its compounds:

Eye protection: Safety glasses (are necessary during recharging also)

Recommend safety gloves for contact with compounds:

Type of material: nitrile rubber
Thickness of material: 0,11 mm
Breakthrough time of material: > 480 minutes

9. Physical and chemical properties

Diluted sulphuric acid (30 to 38.5 %)	Lead
Appearance	Appearance
form: liquid	form: solid
colour: colourless	colour: grey
odour: odourless	odour: odourless
Safety-related data	Safety-related data
pH-value(25°C): 0,3 (49 mg/l water)	pH-value(25°C): 7 – 8 (100 mg/l water)
solidification point: -35 to -60 °C	solidification point: 327 °C
boiling point: approx. 108 to 144°C	boiling point: 1.740 °C
solubility in water: Sulphuric acid is miscible with water	solubility in water: low (0.15 mg/l) (25 °C)
density (20 °C): (1.2 to 1.3) g/cm ³	density (20 °C): 11.35 g/cm ³
vapour pressure (20 °C) 14.6 mbar	vapour pressure (20 °C) -
flash point: non combustible	flash point: non combustible
explosive properties: non explosive	explosive properties: non explosive

10. Stability and reactivity

Absorbed, diluted sulphuric acid

10.1 Reactivity

Attacks many metals producing extremely flammable hydrogen gas which can form explosive mixtures with air.
Destroys organic materials, such as cardboard, wood, textiles.

10.2 Chemical stability

Thermal decomposition at 338 °C

10.3 Possibility of hazardous reactions

Reaction with many metals produced extremely flammable hydrogen gas which can form explosive mixtures with air.

10.4 Incompatible materials

Vigorous reactions with alkalis.

10.5 Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should be produced.

11. Toxicological information

- Sulphuric acid

Information on toxicological effects

Sulphuric acid immediately dissociates to the hydrogen and sulphate ions, with the hydrogen ion being responsible for the local toxicity (irritation and corrosivity) of sulphuric acid.

Acute toxicity

Oral, rat, LD50: 2140 mg/kg bw (similar to OECD 401)

Inhalation, rat LC50 : 375 mg/m³ air (OECD Guideline 403)

Dermal: No data on acute dermal toxicity in animals are available. Although this is a potential route of exposure for workers, testing is not justified for scientific reasons and on animal welfare grounds. The effects of acute dermal exposure to sulphuric acid on animals can be readily predicted, and the data from human exposure are sufficient to characterise the effects.

No classification for acute toxicity is proposed according to current EU criteria.

Irritation and corrosion

Skin irritation / corrosion: corrosive

Eye irritation: corrosive

Sulphuric acid is listed on Annex I of Directive 67/548/EEC with classification as 'CORROSIVE' (R35)

'Causes severe burns'. Specific concentration limits are R35 for concentrations of $\geq 15\%$;

'IRRITANT' (R36/38) 'Irritating to eyes and skin for concentrations of $\geq 5\%$ to $< 15\%$.

No studies of dermal irritation / corrosion have been performed with the substance and none are proposed, based on scientific considerations and for reasons of animal welfare.

Sensitisation

No classification is proposed for skin sensitisation or respiratory sensitisation based on theoretical considerations and in the absence of any findings in exposed humans following occupational use over a long period of time.

Subacute, subchronic and prolonged toxicity
Repeated dose toxicity

Inhalation (subacute, inhalation: aerosol, nose only), rat NOAEC: 0.3 mg/m³ air (OECD Guideline 412).
Target organs: respiratory: larynx
Classification for severe effects after repeated or prolonged exposure (R48) is not proposed.

Mutagenicity

Genetic toxicity: negative.
No classification is proposed for genotoxicity

Carcinogenicity:

The available animal data do not support the classification of sulphuric acid for carcinogenicity.

Reproductive toxicity:

Inhalation, rabbit, mouse: NOAEC: 19.3 mg/m³ air (OECD Guideline 414).
No classification is proposed for reproductive or developmental toxicity

STOT-single exposure

Sulfuric acid is not classified for STOT SE.

STOT-repeated exposure

Sulfuric acid is not classified for STOT RE.

Aspiration hazard

Sulfuric acid is not classified for aspiration hazard.

Other information on acute toxicity

No other information available.

- **Battery lead paste:**

Information on toxicological effects

The toxicity of this product has not been tested. The assessment of the toxicity has been done using the test data with similar inorganic lead compounds.

Toxicokinetic assessment:

Inorganic lead compounds are slowly absorbed by ingestion and inhalation and poorly absorbed through the skin. If absorbed, lead will accumulate in the body with low rates of excretion, leading to long-term build up. Part of risk management is to take blood samples from workers for analysis to ensure that exposure levels are acceptable.

Acute toxicity:

Sparingly soluble inorganic lead compounds have generally been found to be of relatively low acute toxicity by ingestion, in contact with skin, and by inhalation. Nevertheless current EU regulations require this substance to be classified as harmful by ingestion and inhalation.

Toxicity data:

LD50 (oral, rat) > 2000 mg/kg
LD50 (dermal, rat) > 2000 mg/kg
LC50 (4 hr inhalation, rat) > 5 mg/L

No toxicity data available for Lead metal (lead metal powder, particle < 1mm).

Irritation and corrosion

Skin: Studies of similar sparingly soluble inorganic lead compounds have shown that they are not corrosive or irritating to the skin of rabbits. This is supported by the lack of reports of irritant effects from occupational settings.

Eyes: Studies of lead monoxide and similar sparingly soluble inorganic lead compounds have shown that they are not corrosive or irritating to the eyes of rabbits.

Respiratory: No symptoms of respiratory irritation were noted during long-term inhalation studies involving lead monoxide.

Sensitization

There is no evidence that sparingly soluble inorganic lead compounds cause respiratory or skin sensitization.

Subacute, subchronic and prolonged toxicity**Germ cell mutagenicity:**

The evidence for genotoxic effects of highly soluble inorganic lead compounds is contradictory, with numerous studies reporting both positive and negative effects. Responses appear to be induced by indirect mechanisms, mostly at very high concentrations that lack physiological relevance.

Carcinogenicity:

There is evidence that highly soluble inorganic lead compounds may have a carcinogenic effect, particularly on the kidneys of rats. However, the mechanisms by which this effect occurs are still unclear. Epidemiology studies of workers exposed to inorganic lead compounds have found a limited association with stomach cancer. This has led to the classification by IARC that inorganic lead compounds are probably carcinogenic to humans (Group 2A).

Reproductive toxicity:

Exposure to high levels of inorganic lead compounds may cause adverse effects on male and female fertility, including adverse effects on sperm quality. Prenatal exposure to inorganic lead compounds is also associated with adverse effects on neurobehavioral development in children.

STOT-single exposure:

Sparingly soluble inorganic lead compounds have generally been found to be of relatively low acute toxicity by ingestion, in contact with skin, and by inhalation, with no evidence of any local or systemic toxicity from such exposures, reproductive function and the central nervous system.

STOT-repeated exposure:

Inorganic lead compounds are cumulative poisons and may be absorbed into the body through ingestion or inhalation. Inorganic lead compounds have been documented in observational human studies to produce toxicity in multiple organ systems and body function including the haematopoietic (blood) system, kidney function.

Aspiration hazard

Inorganic lead compounds is not classified for aspiration hazard.

Other information on acute toxicity

No other information available.

12. Ecological information

- Diluted sulphuric acid

Toxicity

Aquatic toxicity

This substance is not classified as hazardous to the aquatic environment.
Results on aquatic toxicity in freshwater:

Short-term toxicity

Fish, *Lepomis macrochirus*, LC50 (96 h): > 16-< 28 mg/L. (no information on test methodology)

Aquatic invertebrates, *Daphnia magna*, EC50 (48 h):> 100 mg/L(OECD Guideline 202)

Algae (based on: growth rate) , *Desmodesmus subspicatus*, EC50 (72 h): > 100 mg/L(OECD Guideline 201)

Long-term toxicity

Fish, *Jordanella floridae*, NOEC (65 d): 0.025 mg/L (no information on test methodology)

Aquatic invertebrates, *Tanytarsus dissimilis*, NOEC : 0.15 mg/L (no information on test methodology)

Toxicity to other organisms

Toxicity to aquatic micro-organisms

Aquatic micro-organisms, activated sludge, NOEC (37 d): ca. 26 g/L (Non-standard study investigating effects on bacteria in sewage sludge)

Persistence and degradability

Biodegradation

Sulphuric acid is a simple inorganic substance, which will not biodegrade. The substance dissociates readily in water to form hydrogen ions and sulphate ions (at environmentally relevant pH) and is totally miscible with water. The hydrogen ions, although not degraded as such due to their elemental nature will react with and be neutralised by (OH) to form water. The sulphate ions are incorporated into the various mineral species present in the environment. No further information is necessary.

Chemical degradation

Hydrolysis:

Sulphuric acid is a strong mineral acid (pKa = 1.92) that dissociates readily in water to hydrogen ions and sulphate ions (at all environmentally relevant pH levels), and is totally miscible with water. At all environmentally relevant concentrations, the substance will therefore exist as the environmentally ubiquitous sulphate (SO₄²⁻) anion and hydronium (H₃O⁺) cation, that reacts with hydroxyls to form water. No further studies on hydrolysis or additional information are required.

Phototransformation:

Sulphuric acid is a strong mineral acid that will react with minerals and other soil constituents e. g. carbonates, liberating carbon dioxide, and forming the corresponding sulphate. Phototransformation will not occur.

Bioaccumulative potential

Sulphuric acid is a strong mineral acid ($pK_a = 1.92$) that dissociates readily in water to hydrogen ions and sulphate ions (at environmentally relevant pH) and is totally miscible with water. The resulting hydrogen ions and sulphate ions are naturally present in water/sediment and no bioaccumulation of these ions is predicted.

Mobility in soil

Sulphuric acid is a strong mineral acid that dissociates readily in water to hydrogen ions and sulphate ions (at environmentally relevant pH) and is totally miscible with water. The resulting hydrogen ions and sulphate ions are naturally present in water/sediment. The hydrogen ions will contribute to local pH and are potentially mobile; sulphate ions may be incorporated into naturally occurring mineral species.

Results of PBT and vPvB assessment

Sulphuric acid is neither a PBT nor a vPvB substance.

Other adverse effects

No other information available.

- Battery lead paste

Toxicity

Aquatic toxicity

Battery lead oxide which is comparable to the inorganic lead compounds within a lead acid battery is classified as R 52/53 (aquatic chronic 3, H412)

Short term toxicity:

Toxicity for fish	96 h LC 50 > 100 mg/l
Toxicity for daphnia	48 h EC 50 > 100 mg/l
Toxicity for alga	72 h IC 50 > 10 mg/l

Bioaccumulative potential

Inorganic lead is considered to be bioaccumulative in the environment, and may accumulate in aquatic and terrestrial plants and animals. The following bioaccumulation/bioconcentration factors have been derived for Pb inorganic compounds:

Aquatic compartment:

Bioaccumulation/bioconcentration factors in freshwater: 1,553 L/kg (wet weight)

Soil compartment:

Bioaccumulation/bioconcentration factors in soil: 0.39 kg/kg (dry weight).

Mobility in soil

This product contains inorganic lead compounds which are sparingly soluble and are expected to be adsorbed onto soils and sediments. Mobility is expected to be low.

Results of PBT and vPvB assessment

The PBT and vPvB criteria in Annex XIII of the REACH Regulation do not apply to inorganic substances.

Other adverse effects

No other information available.

13. Disposal considerations

The point of sale, the manufacturers and importers of batteries take back used batteries, and render them to the secondary lead smelters for processing.

Johnson Controls has established a collection system called ecosteps. More information is available on:

http://www.johnsoncontrols.de/content/de/de/products/power_solutions/recycling.html

Spent lead-acid batteries (EWC 160601*) are subject to the regulation of EU (Battery Directive) and its adoptions into national legislation on the composition and end-of-life management of batteries. They are marked with the recycling / return symbol and with a crossed-out roller container. Other battery chemistries have to be separated from lead-acid batteries to avoid any risks during transport and recycling.

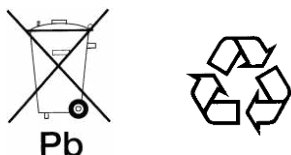
14. Transport information

Land Transport	<p>Land Transport (ADR/RID)</p> <p>UN N°: UN2794 Classification ADR/RID: Class 8 Proper Shipping Name: BATTERIES,WET,FILLED WITH ACID electric storage not assigned</p> <p>Packing Group ADR: not assigned Label required: Corrosive ADR/RID:</p> <p>Batteries are exempted from all ADR/RID regulations, if requirements of special provision 598 are met</p> <p>(a)New storage batteries when</p> <ul style="list-style-type: none">- they are secured in such a way that they cannot slip, fall or be damaged- they are provided with carrying devices, unless they are suitably stacked, e.g. on pallets- there are dangerous traces or acids on the outside- they are protected against short circuits
Sea Transport	<p>Sea Transport (IMDG Code)</p> <p>UN N°: UN 2794 Classification: Class 8 Proper Shipping Name: BATTERIES,WET,FILLED WITH ACID electric storage not assigned</p> <p>Packing Group: not assigned EmS: F-A, S-B Label required: Corrosive</p>

Air Transport	Air Transport (IATA-DGR)
	UN N°: UN 2794
	Classification: Class 8
	Proper Shipping Name: BATTERIES, WET, FILLED WITH ACID electric
	storage: not assigned
	Packing Group: Corrosive
	Label required:

15. Regulatory information

In accordance with Battery Directive and national laws lead-acid batteries have to be marked by a crossed out refuse bin with the chemical symbol for lead Pb shown below, together with the ISO return/ recycling symbol.



The manufacturer, respectively the importer of the batteries shall be responsible for labelling batteries with the symbols. In addition, a consumer / user information on the significance of the symbols has to be attached.

16. Other information

16.1 Key or legend to abbreviations and acronyms

- AF - Assessment factor
- CLP - Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
- DNEL - Derived no-effect level
- DSD - Council Directive 67/548/EEC (Dangerous Substances Directive)
- EC50 - Concentration of the substance that causes 50 % reduction of a certain effect on test organisms
- EWC - European Waste Catalogue
- LC50 - Concentration of the substance that causes 50 % mortality of the test population
- NOAEC - No observed adverse effect concentration
- NOAEL - No observed adverse effect level
- OECD - Organisation for Economic Co-operation and Development
- PBT/vPvB - Persistent, bioaccumulative and toxic/ very persistent and very bioaccumulative
- PNEC - Predicted no-effect concentration
- REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals
- STOT RE - Specific Target Organ Toxicity, Repeated Exposure
- STOT SE - Specific Target Organ Toxicity, Single Exposure
- STP - Sewage treatment plant

16.2 Emergency telephone numbers

Europe-wide emergency number: 112
Contact a poison control centre. List of phone numbers:

AUSTRIA (Vienna Wien) +43 1 406 43 43; **BELGIUM** (Brussels Bruxelles) +32 70 245 245; **BULGARIA** (Sofia) +359 2 9154 409; **CZECH REPUBLIC** (Prague Praha) +420 224 919 293; **DENMARK** (Copenhagen) 82 12 12 12; **ESTONIA** (Tallinn) 112; **FINLAND** (Helsinki) +358 9 471 977; **FRANCE** (Paris) +33 1 40 0548 48; **GERMANY** (Berlin) +49 30 19240; **GREECE** (Athens Athinai) +30 10 779 3777; **HUNGARY** (Budapest) 06 80 20 11 99; **ICELAND** (Reykjavik) +354 525 111, +354 543 2222;

IRELAND (Dublin) +353 1 8379964; **ITALY** (Rome) +3906 305 4343; **LATVIA** (Riga) +371 704 2468; **LITHUANIA** (Vilnius) +370 5 236 20 52 or +370 687 53378; **MALTA** (Valletta) 2425 0000; **NETHERLANDS** (Bilthoven) +31 30 274 88 88; **NORWAY** (Oslo) 22 591300; **POLAND** (Gdansk) +48 58301 65 16 or +48 58 349 2831; **PORTUGAL** (Lisbon Lisboa) 808 250 143; **ROMANIA** (Bucharest) +40 21 3183606; **SLOVAKIA** (Bratislava) +421 2 54 77 4166; **SLOVENIA** (Ljubljana) + 386 41 650500; **SPAIN** (Barcelona) +34 93 227 98 33 or +34 93 227 54 00 bleep 190; **SWEDEN** (Stockholm) 112 or +46 833 12 31 (mon-fri 9.00-17.00); **UNITED KINGDOM** (London) 112 or 0845 4647 (NHS Direct).

16.3 Disclaimer of Liability

The information in this data sheet for safe handling of lead-acid batteries is provided in good faith based on existing knowledge. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the article are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the article. This data sheet was prepared and is to be used only for this article.

Articles such as batteries are not in the scope of any regulation which requires the publication of a Safety Data Sheet according (EC) No. 1907/2006 (REACH), as amended by Annex I to Commission Regulation (EU) No. 453/2010.

More information is available:
<http://www.johnsoncontrols.com/>