Product	9012 B
Revision date	03 November 2017
Revision	1

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Safety Data Sheet (SDS)

Section 1: Identification of the substance/preparation and of the company/undertaking

1.1 Product identifier

Product name	**9012 B**
Synonyms, Trade names	No information available.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Vacuum casting.
Uses advised against	Any other purpose.

1.3 Details of the supplier of the safety data sheet

Supplier	Renishaw plc Brooms Road Stone Business Park Stone, Staffordshire ST15 0SH United Kingdom Tel: Tel: +44 (0) 1785 285000 (during UK office hours 09:00 to 17:00 UTC).
Contact person	msds@renishaw.com

1.4 Emergency telephone number

Emergency telephone	999 / 911 or local emergency number

Section 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and chemical hazards	Not classified
Human health	Skin Irrit.2 - H315, Eye Irrit.2A - H319, Resp. Sens 1 - H334, Skin. Sens 1 - H317, Carc. 2 - H351, STOT SE 3 - H335, STOT RE 2 - H373, Acute Tox 4 - H332
Environment	Not classified

2.2 Label elements

Contains 4,4'-methylenediphenyl diisocyanate

Label in accordance with (EC) no. 1272/2008

Signal word Danger

Hazard statements

H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335 May cause respiratory irritation.
H351 Suspected of causing cancer.
H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

Prevention
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/fume/ gas/mist/vapours/spray.
P280 Wear protective gloves/ protective clothing/eye protection/face protection.
P285 In case of inadequate ventilation wear respiratory protection.
Response
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTRE or doctor/physician.
Storage
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

EUH statements

EUH204 Contains isocyanates. May produce an allergic reaction.

2.3 Other hazards

None known.

Section 3: Composition/identification of ingredients

3.1 Substance

Not applicable.

3.2 Mixtures

Name	Product identifier	Reg. EU 1272/2008	%
4,4'-methylenediphenyl diisocyanate	CAS-No.: 101-68-8 EC No.: 202-966-0	Acute Tox 4 - H332, Skin Irrit.2 - H315, Eye Irrit.2A - H319, Resp. Sens 1 - H334, Skin. Sens 1 - H317, Carc. 2 - H351, STOT SE 3 - H335, STOT RE 2 - H373	30-60%

The full text for all hazard statements are displayed in section 16.

Composition comments

The data shown are in accordance with the latest EC Directives.

Section 4: First aid measures

4.1 Description of first aid measures

General information

Provide general first aid, rest, warmth and fresh air. As a general rule, in case of doubt or if symptoms persist, always call a doctor. Seek medical attention for all burns and eye injuries, regardless how minor they may seem. First aid personnel must be aware of own risk during rescue. The first aid procedure should be established in consultation with the doctor responsible for industrial medicine.

Inhalation

If this product is inhaled and symptoms occur, move the exposed person to fresh air promptly. If necessary, clear the airway. If not breathing, give artificial respiration and get medical attention. If breathing is difficult, provide oxygen. If an allergic respiratory reaction occurs, get immediate medical attention.

Ingestion

If this product is ingested get medical attention immediately! Immediately rinse mouth and provide fresh air. If vomiting occurs, the head should be kept low so that stomach content doesn't enter the lungs, and is not swallowed.
Keep airway clear. Provide fresh air, warmth and rest, preferably in comfortable upright sitting position. Induce vomiting only when directed by medical personnel and person is conscious. Never give anything by mouth to an unconscious person.

Skin contact

Remove affected person from source of contamination. Remove contaminated clothing. Wash the skin immediately with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact

Do not rub eye. Avoid contaminating unaffected eye. Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Remove contact lenses if present and easy to do so. Get medical attention immediately.

4.2 Most important symptoms and effects, both acute and delayed

General information

The severity of the symptoms described will vary dependent on the concentration and the

	length of exposure. Symptoms of exposure include: Irritation of eyes, nose, throat; respiratory sensitization; cough, pulmonary secretions, chest pain, dyspnea (breathing difficulty); asthma. Suspected of causing cancer. Causes damage to organs through prolonged or repeated exposure.
Inhalation	Harmful if inhaled. May cause damage to the respiratory system through prolonged or repeated exposure by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Inhalation may cause respiratory irritation. If an allergic respiratory reaction occurs, get immediate medical attention.
Ingestion	May cause digestive tract irritation, pain or vomiting.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to the physician	Treat symptomatically. Sensitising effects: Severe allergic skin reactions, bronchospasm and anaphylactic shock, breathing difficulties, and lachrymation.

Section 5: Fire-fighting measures

5.1 Extinguishing media

Extinguishing media	Use fire-extinguishing media appropriate for surrounding materials: Foam, powder, CO2.
Unsuitable extinguishing media	Do not use water jet as an extinguisher. Water spray may be used if no other available and then in copious quantities. Reaction between water and hot isocyanate may be vigorous.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products	Burning releases carbon monoxide, carbon dioxide, oxides of nitrogen, isocyanate vapors and traces of hydrogen cyanide.
Unusual fire & explosion hazards	No unusual fire or explosion hazards noted.
Specific hazards	Floors may become slippery, avoid falls. Containers can burst violently when heated, due to excess pressure build-up

5.3 Advice for firefighters

Special fire fighting procedures	If possible, fight fire from protected position. Ventilate closed spaces before entering them. Keep up-wind to avoid fumes. Avoid breathing fire vapours. Containers close to fire should be removed immediately or cooled with water if safe to do so. For initial fire, use dry chemical, carbon dioxide or dry sand. In case of a massive fire, use foam extinguisher. After fire is extinguished, neutralize wet isocyanate. Take measures to avoid the spill of the products or chemicals to rivers or drains due to water-discharge from fire fighting. For neutralizing agent: see section 6.3.
Protective equipment for firefighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	Wear protective clothing as described in Section 8 of this safety data sheet. Eliminate all sources of ignition. Avoid inhalation of vapours and contact with skin and eyes. Provide adequate ventilation. In case of inadequate ventilation, use respiratory protection. Do not smoke, eat or drink while using this product. Read and follow manufacturer's recommendations. Do not touch or walk through spilled material. Keep unnecessary and unprotected personnel from entering. Avoid prolonged or repeated exposure.
For emergency responders	Follow safe handling advice and personal protective equipment recommendations for normal use of product.

6.2 Environmental precautions

Environmental precautions	Do not discharge into drains, water courses or onto the ground.

6.3 Methods and material for containment and cleaning up

Spill clean up methods

Stop leak if possible without risk. Wear respirator if ventilation is not adequate. Eliminate all sources of ignition. Ventilate and evacuate the area. Wear necessary protective equipment. DO NOT touch spilled material!
Use non sparking tools or equipment for clean up. Contain and cover the spillage with inert absorbent (sand, earth, vermiculite) and decontaminant/commercial decontaminant. In case of a large scale of spill, dyke area with sand to stop the spill spreading. Neutralize by dispersing neutralizing agent and absorb with sand. Leave to react for at least 30 minutes. Shovel residues into open-top drums and remove for further decontamination if necessary.

Ensure that waste and contaminated materials are collected and removed from the work area as soon as possible in a suitably labelled container. Example of neutralizing agent: water/sodium carbonate/liquid detergent (parts by weight)=90-95 / 5-10 / 0.2-0.5. Suitable decontaminant solution: Commercial solution or water 90-95%, concentrated ammonia solution 5-10%, liquid detergent 0,2-2%.

6.4 Reference to other sections

Reference to other sections

See section 1 for emergency contact. For personal protection, see section 8. For waste disposal, see section 13.

Section 7: Handling and storage

7.1 Precautions for safe handling

Handling

Use proper personal protection when handling (refer to Section 8). Provide good ventilation. Wear appropriate respirator when ventilation is inadequate. Keep away from heat, sparks and open flame. Static electricity and formation of sparks must be prevented. Do not eat, drink or smoke when using the product. Avoid inhalation of vapours.
Avoid contact with skin and eyes. Do not use contact lenses. Avoid prolonged or repeated contact. Read and follow manufacturer's recommendations. Do not mix with other chemicals. Loosen drum bungs before heating to prevent any pressure build up.

7.2 Conditions for safe storage, including any incompatibilities

Storage precautions

Keep locked up and out of reach of children. Keep away from heat, sparks, direct sunlight and open flames. Avoid contact with water, amine compounds and polyol reacting with isocyanate. Store in tightly closed original container in a dry, cool and well-ventilated place. To avoid static electricity, ground equipment. After opening containers, replace with dry nitrogen or dry air and tightly seal the container to prevent leaks. Container can be pressurized by carbon dioxide due to reaction with humid air and/or water.

Storage class

Chemical storage.

7.3 Specific end use(s)

Specific end use(s)

The identified uses for this product are detailed in Section 1.

Usage description

Use only according to directions. Replace and tighten cap after use. Avoid static build up by suitable earthing arrangements.

Section 8: Exposure controls/Personal protection

8.1 Control parameters

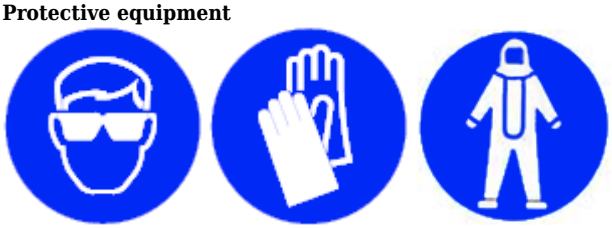
Component	STD	TWA (8 Hrs)		STEL (15mins)		Notes
4,4'-methylenediphenyl diisocyanate	NIOSH	0,005 ppm	0,05 mg/m^3	0,02 (1) ppm	0,2 (1) mg/m^3	
4,4'-methylenediphenyl diisocyanate	WEL		0.02 mg/m^3		0.07 mg/m^3	Sen.

Ingredient comments

WEL - Workplace Exposure Limits - EH40/2005 Workplace exposure limits.
The National Institute for Occupational Safety and Health (NIOSH).
Biological occupational exposure limits: Diphenylmethane- 4,4'-diisocyanate (CAS 101-68-8). Parameter: Urinary diamine. Value:1µmol/mol creatinine. Biological specimen: Urine. Basis: UK. biological monitoring guidance values.

8.2 Exposure Controls

Protective equipment



Engineering measures	Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Facilities for handling this product should be closed system. Ensure surfaces and floors are made from non-permeable material.
Respiratory equipment	Where risk assessment shows air-purifying respirators are appropriate a full face respirator conforming to EN143 should be used, and suitable respirator cartridges as a backup to engineering controls. Recommended: Respirator with combination filter for organic vapour/particulate (EN 141). ABEK (EN 14387). Consult manufacturer for specific advice. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as CEN (EU).
Hand protection	Selection of the glove material depends on consideration of the penetration times, rates of diffusion and degradation, and concentration specific to the workplace. Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374) is recommended. Gloves must be inspected prior to use. Use suitable organic solvent resistant gloves if there is a risk of skin contact. Suggested material: Chloroprene. Nitrile rubber. Consult manufacturer for specific advice. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.
Eye protection	Wear safety goggles or face shield to prevent any possibility of eye contact. Use equipment for eye protection tested and approved under appropriate government standards such as EN 166(EU).
Other protection	Wear appropriate clothing to prevent any possibility of skin contact. Chemical resistant anti-static work clothes and safety shoes are recommended. Select appropriate protective clothing based on chemical resistance data and an assessment of local exposure potential. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handing this product.
Hygiene measures	Wash promptly if skin becomes contaminated. Handle in accordance with good industrial hygiene and safety practice. DO NOT SMOKE IN WORK AREA! Wash hands at the end of each work shift and before eating, smoking and using the toilet.
Process conditions	Use only according to directions. Ensure that eye flushing systems and safety showers are located close by in the work place. Keep container tightly sealed when not in use. Ground/bond container and receiving equipment. Take precautionary measures against static discharge.

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	Viscous liquid.
Colour	No information available.
Odour	Slight.
Odour threshold - lower	No information available.
Odour threshold - upper	No information available.
pH-Value, Conc. Solution	No information available.
pH-Value, Diluted solution	No information available.
Melting point	No information available.
Initial boiling point and boiling range	No information available.
Flash point	204.00 °C
Evaporation rate	No information available.

Flammability state	No information available.
Flammability limit - lower(%)	No information available.
Flammability limit - upper(%)	No information available.
Vapour pressure	No information available.
Vapour density (air=1)	No information available.
Relative density	No information available.
Bulk density	No information available.
Solubility	Completely soluble in: Dimethylformamide. Tetrahydrofuran.
Decomposition temperature	No information available.
Partition coefficient; n-Octanol/Water	No information available.
Auto ignition temperature (°C)	No information available.
Viscosity	No information available.
Explosive properties	Not classified as explosive.
Oxidising properties	No information available.

9.2 Other information

Molecular weight	No information available.
Volatile organic compound	No information available.
Other information	None noted.

Section 10: Stability and reactivity

10.1 Reactivity

Reactivity	Stable under recommended transport and storage conditions and under recommended use.

10.2 Chemical stability

Stability	Relatively stable when stored in a cool and dark place.

10.3 Possibility of hazardous reactions

Hazardous reactions	Reacts with active hydrogen compounds such as water, alcohol and amine and generates heat. If mixed with water, carbon dioxide is generated which may cause containers to rupture or explode. Contact with basic substances or organic metallic compounds, may generate heat due to polymerization.
Hazardous polymerisation	Contact with basic substances or organic metallic compounds, may generate heat due to polymerization.
Polymerisation description	Unknown.

10.4 Conditions to Avoid

Conditions to avoid	Fire and high temperature.

10.5 Incompatible materials

Materials to avoid	Avoid contact with water, alcohol, amines, basic substance or organic metallic compounds. Avoid strong oxidising agents, bases, strong acids.

10.6 Hazardous decomposition products

Hazardous decomposition products	When heated, vapours/gases hazardous to health may be formed. Decomposition products may include: Oxides of carbon. Unburned hydrocarbons. Nitrogen oxides (NOx). Hydrogen cyanide (HCN). Isocyanates.

Section 11: Toxicological information

11.1 Information on toxicological effects

Toxicological information	No toxicological information for the overall finished product. Allergic reactions may develop after inhalation of low concentrations, also several hours after exposure. Regular medical checks, including lung function, are recommended for long term and repeated use of isocyanates.
Acute toxicity (Oral LD50)	4,4'-methylenediphenyl diisocyanate: LD50 (Rat): 31,690 mg/kg.
Acute toxicity (Dermal LD50)	No information available.
Acute toxicity (Inhalation LD50)	No information available.
Serious eye damage/irritation	Causes serious eye irritation.
Skin corrosion/irritation	The product is classified as a skin corrosion/irritation hazard.
Respiratory sensitisation	The product is classified as a repiratory hazard.
Skin sensitisation	The product is classified as a skin sensitisation hazard.
Germ cell mutagenicity	No information available.
Carcinogenicity	The product is classified as a carcinogen hazard.
Specific target organ toxicity - Single exposure:	
STOT - Single exposure	No information available.
Specific target organ toxicity - Repeated exposure:	
STOT - Repeated exposure	No information available.
Inhalation	Harmful if inhaled. May cause damage to the respiratory system through prolonged or repeated exposure by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Inhalation may cause respiratory irritation. If an allergic respiratory reaction occurs, get immediate medical attention.
Ingestion	May cause digestive tract irritation, pain or vomiting.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Waste management	When handling waste, consideration should be made to the safety precautions applying to handling of the product. Curing in large quantities or under improper conditions may cause fire. Dispose of without curing and mixing with other materials. Do not discharge wastewater used for washing of container and equipment into ground or drain without treatment.
Routes of entry	No information available.
Target organs	Eyes, skin, digestive system, respiratory system.
Aspiration hazards:	No information available.
Reproductive toxicity:	No information available.

Section 12: Ecological information

12.1 Toxicity

Acute toxicity - Fish	4,4'-methylenediphenyl diisocyanate: LC50 (Danio rerio (zebra fish)): > 1,000 mg/l Exposure time: 96 h.
Acute toxicity - Aquatic invertebrates	4,4'-methylenediphenyl diisocyanate: LC50 (Daphnia magna (Water flea)): > 1,000 mg/l Exposure time: 48 h.
Acute toxicity - Aquatic plants	No information available.
Acute toxicity - Microorganisms	No information available.
Chronic toxicity - Fish	No information available.
Chronic toxicity - Aquatic invertebrates	No information available.
Chronic toxicity - Aquatic plants	No information available.
Chronic toxicity - Microorganisms	No information available.

Ecotoxicity	No Ecological information on the finished product.
Eco toxilogical information	Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.

12.2 Persistence and degradability

Degradability	No information available.
Biological oxygen demand	No information available.
Chemical oxygen demand	No information available.

12.3 Bioaccumulative potential

Bioaccumulative potential	No data available on bioaccumulation.
Bioacculmation factor	No information available.
Partition coefficient; n-Octanol/Water	No information available.

12.4 Mobility in soil

Mobility	No information available.

12.5 Results of PBT and vPvB assessment

Results of PBT and vPvB assessment	No component classified as PBT / vPvB substance.

12.6 Other adverse effects

Other adverse effects	No information available.

Section 13: Disposal considerations

Waste management	When handling waste, consideration should be made to the safety precautions applying to handling of the product. Curing in large quantities or under improper conditions may cause fire. Dispose of without curing and mixing with other materials. Do not discharge wastewater used for washing of container and equipment into ground or drain without treatment.

13.1 Waste treatment methods

Disposal methods	Dispose of in accordance with national and local regulations for special waste via an appropriately licensed waste contractor.

Section 14: Transport information

14.1 UN number

UN no. (ADR)	Not applicable.
UN no. (IMDG)	Not applicable.
UN no. (IATA)	Not applicable.

14.2 UN proper shipping name

ADR proper shipping name	Not applicable.
IMDG proper shipping name	Not applicable.
IATA proper shipping name	Not applicable.

14.3 Transport hazard class(es)

ADR class	Not applicable.
IMDG class	Not applicable.
IATA class	Not applicable.
Transport labels	Not applicable

14.4 Packing group

ADR/RID/ADN packing group	Not applicable.
IMDG packing group	Not applicable.

IATA packing group	Not applicable.

14.5 Environmental hazards

ADR	No
IMDG	No
IATA	No

14.6 Special precautions for user

EMS	Not applicable.
Emergency action code	Not applicable.
Hazard no. (ADR)	Not applicable.
Tunnel restriction code	Not applicable.

14.7 Transport in bulk according to annex II of MARPOL73/78 and the IBC code

Not applicable.

Section 15: Regulatory information

15.1 Safety, health and environmental regulations/Legislation specific for the substance or mixture

EU legislation	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 with amendments. The UN Globally Harmonized System (GHS) Safety Data Sheet format (Annex IV) is implemented as Annex II of REACH EU No 453/2010 of 20th May 2010 amending regulation (EC) No 1907/2006.
Approved code of practice	Workplace Exposure Limits Guidance Note EH40/2005.
Chemical safety assessment	No chemical safety assessment has been carried out.

Section 16: Other information

General information	This Safety Data Sheet is in accordance with Reach Regulation (EC) No 453/2010.
Revision comments	This is a first issue.
Revision date	03 November 2017
Revision	1
Safety data sheet status	Approved.

Hazard statements in full

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer .
H373	May cause damage to organs through prolonged or repeated exposure .
EUH204	Contains isocyanates. May produce an allergic reaction.

Disclaimer

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.