

General -5-XX0-00-TS-X02.R0

Binder Raw Materials - Technical Specification

Rev	Description	Edited	Check	Iss'd	Appr'd	Date
00	Revision 0	FIB	BER	INFO	MLG	18/08/15
01						
02						
03						
04						
05						

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RAW MATERIALS FOR BINDER

Here below the chemical and physical characteristics of the raw materials to be used for prepare the Binder for Glass Wool production.
Other suppliers raw materials can be used after STM Technologies approval.

1 PHENOLIC RESIN

Product Data		Units
Appearance	Reddish brown liquid (Resol)	
Dry solid binder	42 - 52	wt%
Viscosity at 25°C	13 cps	cPoise
Density at 25°C	1.165 – 1.180	g/cm ³
pH at 25°C	7.5 – 8.5	
Free formaldehyde	7 - 9	%
Free phenol	0.80 – 1.8	%
Water compatibility	unlimited	g/g
Delivery temperature	10	°C
Storage temperature	12	°C

See annexes for reference Technical Data Sheet and Safety Data Sheet

Possible suppliers: Dynea, Hexion (Bakelite)

2 UREA (Technical Pellet Urea)

Product Data		Units
Appearance	White spherical grains	
Purity	Min. 98	wt%
Nitrogen content	Min. 46	wt%
Moisture content	Min. 0.50	wt%
Ashes	Max. 35	ppm
Free ammonia	Max. 200	ppm
Iron content	Max. 5	ppm
Water solubility at 25°C	1193 g/l	g/l

See annexes for reference Technical Data Sheet and Safety Data Sheet

3 AMMONIA SOLUTION

Product Data		Units
Appearance	Colourless, transparent and irritating smell liquid not containing insoluble materials	
Density at 25°C	Max. 0.932	g/cm^3
Ammonium content	Min. 18	wt%

See annexes for reference Technical Data Sheet and Safety Data Sheet

4 AMMONIUM SULFATE

NOTE: normally not used

Product Data		Units
Appearance	White crystalline powder	
Purity	Min. 99	wt%
Iron	Max. 50	ppm
Moisture content	Max. 1.00	%
Ashes	Max. 500	ppm
Free H ₂ SO ₄	Max. 0.12	%
Water solubility at 20°C	760	g/l

See annexes for reference Technical Data Sheet and Safety Data Sheet

5 SILANE A – 1100 (gamma-Aminopropyltriethoxysilane)

Product Data		Units
Appearance	Colourless liquid	
Density at 25°C	Max. 0.950	g/cm^3
Refractive index nd _{25°C}	1.420	
Purity	more than 99	wt%

See annexes for reference Technical Data Sheet and Safety Data Sheet

6 MULREX 88 (Oil-water emulsion)

NOTE: compatible with liquid phenolic resin

Product Data		Units
Appearance	Clear yellow emulsion	
Solid content	51÷53	wt%
pH	7.5÷8.5	
Dynamic viscosity	600	Needle N.3 at 100 rpm

See annexes for reference Technical Data Sheet.

Possible supplier Exxon - Mobil

7 SILICONE EMULSION (Polydimethylsiloxane)

NOTE: to be used just for special hydro repellent products.

Product Data		Units
Appearance	Aqueous emulsion	
Density at 25°C	0.950	g/cm ³
pH	6.5±1.0	

See annexes for reference Technical Data Sheet.

ANNEX A. – PHENOLIC RESIN Technical Data Sheet

Farfen: Phenolic Resins for Insulation

Farfen	Code			Properties										
	Resin	Form	Solvent	Solid Content DIN	Density	Viscosity TF Ø 4	pH	Cure time at 150° C	Water Compatibility	Free phenol	Free formaldehyde	Melting point	Flow at 150° C	Examine
				%	g/cm³	seconds	-	minutes	g/g	%	%	° C	mm	%
LW363	phenolic	liquid	H2O	51±1	1,170±0,02 (20° C)	14±1 (20° C)	8,5±0,5	200"±30"	unlimited	<1	6±1	-	-	Nil
LW957				51±1 (3h a 135° C)	1,180±0,01 (25° C)	15±1 (25° C)	0,5	4' 20"±20"		<1,8	9,3±0,5	-	-	Nil
P412 T-A	modified phenolic	powder	-	-	-	-	-	55"±5"	-	<0,2	-	86±2	31±6	6±0,4
P760Z			-	-	-	-	-	60"±10"	-		-	83±2	30±5	6,7±0,3 (theoric)
P793			-	-	-	-	-	90"±10"	-	<0,5	-	82±4	-	9±0,4 (theoric)
P800			-	-	-	-	-	70"±10"	-		-	80±3	40±5	4±0,3 (theoric)
P1083			-	-	-	-	-	85"±15"	-		-	80±3	50±5	5,5±0,4
P939			-	-	-	-	-	95"±15"	-		-	78±3	50±5	8,5±0,4
P1357			-	-	-	-	-	100"±10"	-		-	88±4	30±5	8,8±0,5
P739/I			-	-	-	-	-	85"±15"	-		-	82±4	-	9±0,4 (theoric)

Farfen	Applications: Insulating Panels					
	Thermoinsulating panels of glass wool	Thermoinsulating panels of rock wool	Insulating felts made by vegetable fiber	Insulating felts made by vegetable and synthetic fiber	Insulating felts with flame retardant	Ecological insulating felts with flame retardants
LW 363	●	●	-	-	-	-
LW 957	●	●	-	-	-	
P 412 T-A	-	-	●	●	-	-
P 760 Z			-	-	●	
P 793					●	
P 800					-	
P 1083			-	●	-	●
P 939				●		-
P 1357				●		
P 793/I				-	●	-

Technical Data Sheet

prefere[™]
by dynea

Prefere 72 6446M

APPLICATION

Prefere 72 6446M is a liquid condensation product of phenol and formaldehyde used as a bonding agent in the insulation wool manufacture.

TYPICAL VALUES

Appearance	Reddish brown liquid
pH at 20°C	abt. 8,6
Density at 20°C	abt. 1,185 g/cm ³
Viscosity Brookfield at 20°C	abt. 10 mPa.s
Solids content 0,6g / 2h / 130°C	52,0 ± 1 %
Free phenol	< 0,6 %
Free formaldehyde	< 11 %
Gelation time at 150°C	abt. 3 min.
Ash	< 0,1 %
Water dilutability at 20°C	> 20 g/g
Storage stability at 20°C	abt. 3 weeks

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VAT. No FI0887148-4

28.11.2003

Technical Data Sheet

prefere[™]
by dynea**Prefere 72 6446M****APPLICATION**

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ANNEX B. – PHENOLIC RESIN Safety Data Sheet

Product name:	PHENOLIC RESIN	Page:	1/5
Revision Date:	2006-06-29	Print date:	2006-06-29
P/N-no.:	M1203148	SDS-ID:	US/2.0

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

<u>Product name:</u>	PHENOLIC RESIN		
<u>Application:</u>	For embedding of materialographic specimens	<u>Container size:</u>	-
<u>Supplier:</u>	Struers A/S Pederstrupvej 84 DK-2750 Ballerup Tel: +45 44 600 800	<u>Emergency telephone:</u>	Infotrac: 1-800-535-5053 Struers US: 1-440-871-0071

2. COMPOSITION/INFORMATION ON INGREDIENTS

The product contains: resin and fillers.

%:	CAS-No.:	EC No.:	Chemical name:	Hazard classification:	Notes:
<1	108-95-2	203-632-7	Phenol	T;R24/25 C;R34	
30-60	-	-	Resin	-	
30-60	-	-	Filler	-	

3. HAZARDS IDENTIFICATION

The product is not classified.

Human health: The hazardous properties of the product are considered to be limited during normal use.

Environment: The environmental hazard of the product is considered to be limited.

4. FIRST-AID MEASURES

Inhalation: Move injured person into fresh air and keep person calm under observation. If uncomfortable: Seek hospital and bring these instructions.

Skin contact: Remove contaminated clothing immediately and wash skin with soap and water.

Eye contact: Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids widely. If irritation persists: Continue flushing during transport to hospital. Bring along these instructions.

Ingestion: Immediately rinse mouth and drink plenty of water. Keep person under observation. If person becomes uncomfortable seek hospital and bring these instructions.

5. FIRE-FIGHTING MEASURES

Extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.



Product name:	PHENOLIC RESIN	Page:	2/ 5
Revision Date:	2006-06-29	Print date:	2006-06-29
P/N-no.:	M1203148	SDS-ID:	US/2.0

6. ACCIDENTAL RELEASE MEASURES

<u>Personal precautions:</u>	Avoid inhalation of dust. Avoid inhalation of vapors and contact with skin and eyes.
<u>Environmental precautions:</u>	Do not discharge into drains, water courses or onto the ground.
<u>Methods for cleaning up:</u>	Collect spillage with shovel, broom or the like. Dispose of collected dust according to agreement with local authorities.

7. HANDLING AND STORAGE

<u>Safe handling advice:</u>	Avoid inhalation of dust. Avoid contact with skin and eyes. Wash hands before breaks and before smoking, eating or drinking. Observe good chemical hygiene practices.
<u>Technical measures:</u>	Work practice should minimize contact.
<u>Technical precautions:</u>	Local exhaust is recommended.
<u>Technical measures for safe storage:</u>	No special precautions.
<u>Storage conditions:</u>	Store in tightly closed original container.



Product name:	PHENOLIC RESIN	Page:	3/ 5
Revision Date:	2006-06-29	Print date:	2006-06-29
P/N-no.:	M1203148	SDS-ID:	US/2.0

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering measures: Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust. Local exhaust is recommended.

<u>Chemical name:</u>	<u>Exposure limits:</u>		<u>Type:</u>	<u>Notes:</u>	<u>References:</u>
Phenol	5 ppm	19 mg/m³	TWA	Skin	OSHA
Phenol	5 ppm		TWA	Skin; A4	ACGIH
Particles (Insoluble or Poorly Soluble) Not Otherwise Specified [PNOS]-inhalable particles		10 mg/m³	TWA	-	ACGIH
Particles (Insoluble or Poorly Soluble) Not Otherwise Specified [PNOS]-respirable particles		3 mg/m³	TWA	-	ACGIH
Particulates not otherwise regulated (PNOR), Total dust		15 mg/m³	TWA	-	OSHA
Particulates not otherwise regulated (PNOR), Respirable fraction		5 mg/m³	TWA	-	OSHA

Personal protection: Personal protection equipment should be chosen according to the the CEN standards and in collaboration with the supplier of the personal protective equipment.

Respiratory equipment: No special precautions.

Hand protection: Wear protective gloves. Butyl rubber gloves are recommended.



Product name:	PHENOLIC RESIN	Page:	4/ 5
Revision Date:	2006-06-29	Print date:	2006-06-29
P/N-no.:	M1203148	SDS-ID:	US/2.0

10. STABILITY AND REACTIVITY

<u>Stability:</u>	Stable under normal temperature conditions.
<u>Conditions/ materials to avoid:</u>	None specific.
<u>Hazardous decomposition products:</u>	When heated and in case of fire, toxic vapours/gases may be formed.

11. TOXICOLOGICAL INFORMATION

<u>Inhalation:</u>	Dust may irritate throat and respiratory system and cause coughing.
<u>Skin contact:</u>	Phenol can be absorbed through the skin and cause chronic poisoning.
<u>Eye contact:</u>	Dust may cause irritation.
<u>Ingestion:</u>	May irritate and cause malaise.
<u>Specific effects:</u>	None known. Carcinogenicity: National Toxicology Program (NTP): No. I.A.R.C. Monographs: No. OSHA: No.



Product name:	PHENOLIC RESIN	Page:	5/ 5
Revision Date:	2006-06-29	Print date:	2006-06-29
P/N-no.:	M1203148	SDS-ID:	US/2.0

15. REGULATORY INFORMATION

Labelling: Based on information from the manufacturer regarding the chemical composition, the product is not liable to classification and labelling.

NFPA Rating: -

Specific provisions: TSCA: Listed.

National regulation: Europe/USA:
This Safety Data Sheet has been prepared according to the EU-regulation.

Threshold Limit Values (2006), ACGIH, by the American Conference on Governmental Industrial Hygienists.
The Code of Federal Regulation, Title 29, part 1910. Occupational Safety and Health Standards, Air contaminants.

16. OTHER INFORMATION

The user must be instructed in the proper work procedure and be familiar with the contents of these instructions.

ANNEX C. – TECHNICAL UREA Technical Data Sheet



UTECH[®] 46 Technical Urea - CO(NH₂)₂

Product code : PA 38 AP

PLANT :
Yara France-Le Havre(76).

	SPECIFICATIONS	METHODS
Aspect	Whites prills	Calculated
Nitrogen	> 46,20%	
Water	< 0,50%	NFT 20589 – NFT 20052
Biuret	≤ 0,60%	Q 09455I (SNA)
Anti caking (expressed in formaldehyde)	< 0,30%	Ana. Chem 301437-1958
	TYPICAL ANALYSIS	
Insoluble in water	< 15 ppm	NFU 42116
Ash	< 20 ppm	NFT 20592
pH value (10% solution)	8 to 10	NFT 20589
Arsenic(As)	< 0,01 ppm	NFT 20060 – ISO 6685
Cadmium(Cd)	< 0,2 ppm	
Chrome(Cr)	< 2 ppm	
Cobalt(Co)	< 1 ppm	
Copper(Cu)	< 0,5 ppm	
Iron(Fe)	< 5 ppm	
Mercury(Hg)	< 0,01 ppm	
Nickel(Ni)	< 2 ppm	
Lead(Pb)	< 2 ppm	
Selenium(Se)	< 0,1 ppm	
SIEVE ANALYSIS		
1 < Ø < 2,5 mm	> 95%	ISO 2591-1 (X11507)
Ø Average diameter	1,7 mm +/-0,2	
Ø < 1 mm	< 3%	

PACKAGING:

Bulk, Bags on pallets: net weight 25 kg /bag, 1250 kg net/pallet, Big Bags 500 kg or 1000 kg
For other packaging, consult Yara France Industrial.

TRANSPORT REGULATION

None

STORAGE, MANIPULATION, CHEMICAL PROPERTIES, TOXICITY

No alteration of properties in intact original packaging
Protect from moisture.
See material safety data sheet

Yara France
Industrial
100, rue Henri Barbusse
92751 Nanterre Cedex
tél. : 01 55 69 96 00
Fax: 01 55 69 98 56

Date de création : 01/10/1991
Date de modification : 19/08/2003

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ANNEX D. – TECHNICAL UREA Safety Data Sheet

Product Name: Urea, Industrial Pellets – Low Biuret & Formaldehyde Free

Page 1 of 5

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Urea, Industrial Pellets, Low Biuret & Formaldehyde Free
Generic Name: Carbamide
Chemical Family: Organic salt

Responsible Party: Cervantes~Delgado, Inc.
P.O. Box 9083
Brea, California 92822

For further information contact MSDS Coordinator
8am -4pm Pacific Time, Mon- Fri: 714-990-3940

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:

For Chemical Emergencies:

Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

For Health Emergencies:

California Poison
Control System
Cont. US: (800) 356-3129
Outside US: (415) 821-5338

Health Hazards: Avoid contact with eyes, skin a thoroughly after handling.

Physical Hazards: None Anticipated

Physical Form: Solid
Appearance: White pellets
Odor: None

NFPA HAZARD CLASS: Health: 0 (Least)
Flammability: 0 (Least)
Reactivity: 0 (Least)

Issue Date: 12/15/05

Status:1.01-06

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% Weight	EXPOSURE LIMITS		
		Limits	Agency	Type
Nuisance Dust, If Generated		10 mg/m ³	ACGIH	TWA-Tot.
		3 mg/m ³	ACGIH	TWA-Resp.
		15 mg/m ³	OSHA	TWA-Tot.
		5 mg/m ³	OSHA	TWA-Resp.
		10 mg/m ³	MSHA	TWA
		10 mg/m ³	Cal. OSHA	TWA-Tot.
		5 mg/m ³	Cal. OSHA	TWA-Resp.
OTHER COMPONENTS	% Weight	EXPOSURE GUIDELINE		
		Limits	Agency	Type
Urea CAS# 57-13-6	99	(See Nuisance Dust, If Generated)		
Biuret CAS# 108-19-0	<0.1	Not Established		

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Contact may cause mild skin irritation including redness and burning. No harmful effects from skin absorption have been reported.

Inhalation (Breathing): No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

Ingestion (Swallowing): No harmful effects reported from ingestion.

Signs and Symptoms: Effects of overexposure may include irritation of the nose, throat and digestive tract, headaches, coughing, nausea, vomiting, and transient disorientation.

Cancer: Inadequate data available to evaluate the cancer hazard of this material.

Target Organs: No data available.

Developmental: Inadequate data available for this material.

Pre-Existing Medical Conditions: None known.

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops and persists, seek medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash Point: No data
OSHA Flammability Class: Not applicable
LEL/UEL: No data
Autoignition Temperature: No data
Burn Rate (solids): No data

Unusual Fire & Explosion Hazards: No unusual fire or explosion hazards are expected.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area and keep unauthorized personnel out. Contain spill if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Cool equipment exposed to fire with water, if it can be done with minimal risk.

6. ACCIDENTAL RELEASE MEASURES

Stay upwind and away from spill. Isolate immediate hazard area and keep unauthorized personnel out. Contain spill if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8). Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems, and natural waterways. Notify appropriate federal, state, and local agencies. Minimize dust generation. Sweep up and package appropriately for disposal.

7. HANDLING AND STORAGE

Handling: Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8). Wash thoroughly after handling. Do not wear contaminated clothing or shoes. Use good personal hygiene practice.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to minimize exposure, additional ventilation or exhaust systems may be required.

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air-purifying respirator with a N95 filter may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2). Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is potential for uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. A respiratory protection program that meets OSHA's 29CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: The use of gloves impermeable to the specific material handled is advised to prevent skin contact, possible irritation, and absorption (see glove manufacturer literature for information on permeability).

Eye/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Flash Point:	Not applicable
Flammable/Explosive Limits (%):	Not applicable
Autoignition Temperature:	Not applicable
Burn Rate (solids only):	No data
Appearance:	White crystal
Physical State:	Solid
Odor:	Slight ammonia
Vapor Pressure (mm Hg):	Not applicable
Vapor Density (air=1):	Not applicable
Boiling Point:	Not applicable
Freezing/Melting Point:	271°F (133°C)
Solubility in Water:	100%
Specific Gravity:	>1
Bulk Density:	46 lbs/ft ³

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions of storage and handling.

Conditions To Avoid: None known

Incompatible Materials: Avoid contact with strong oxidizing agents such as chlorine (bleach), peroxides, chromates, nitric acid, perchlorates, concentrated oxygen or permanganates. Contact can generate heat, fires, explosions and release toxic fumes.

Hazardous Decomposition Products: If involved in a fire, oxides of carbon and nitrogen may be generated. Exposure to heat may generate ammonia and ammonium cyanate fumes.

Hazardous Polymerization: will not occur.

11. TOXICOLOGICAL INFORMATION

No definitive information available on carcinogenicity, mutagenicity, target organs or developmental toxicity.

12. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, is not a RCRA "listed" or "characteristic" hazardous waste. Use resulting in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials consult state and local regulations regarding the proper disposal of this material.

13. TRANSPORT INFORMATION

Hazard Class or Division: Not classified as hazardous

14. REGULATORY INFORMATION

This material contains the following chemicals subject to the reporting requirements of **SARA 313** and 40 CFR 372.

--None--

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of **California Proposition 65** (CA Health & Safety Code Section 25249.5)

--None Known--

This material has not been identified as a carcinogen by NTP, IARC, or OSHA.

EPA (CERCLA) Reportable Quantity: --None--

15. DOCUMENTARY INFORMATION

Issue Date: 12/15/05
Previous Issue Date: 11/01/01

16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. **HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.** This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assumes the risk of his use thereof.

ANNEX E. – AMMONIA SOLUTION Technical Data Sheet



Our manufacturing plant is located at M.I.D.C Rabale (Chemical Zone), Navi Mumbai placed at an equidistant of 40 kms from Mumbai(Bombay) - the business capital of India and Nhava Sheva port.

The plant has a capacity of producing 15 M.T. per day of AMMONIA SOLUTION 23-25%.

The finished product can be supplied in

- HDPE DRUMS (99 kgs & 180 kgs Net capacity),
- HDPE Jerry cans (30 kgs Net capacity) or
- Road Tankers (9/10 M.T. Net capacity)

Specification of Liquor Ammonia 23-25%

The liquor ammonia is clear and colourless & is the only liquor ammonia manufactured in India that passes FCC IV

Description	A clear, colourless liquid, odour strongly Pungent and characteristic.
Assay	Content of Ammonia (NH ₃) = 25.00% w/w. min.
Residue on evaporation	0.044 % w/v.
Content of oil	0.008 % w/v.
Non Volatile Matter	0.02 % W/W Max.
Chloride as Cl	0.005% W/W Max.
Sulphate as So4	NIL
Phosphate Po4	NIL
Copper as Cu	0.00008% W/W Max
Iron as Fe	0.0002% W/W Max
Arsenic as As	NIL
Food Chemicals Codex Test (Readily Oxidisable Substance)	Complies
Lead	Less Than 0.5 PPM (by AAS) [Limit : as per FCC IV heavy metals as Lead not more than 5 PPM]
Sodium as Na	0.0181% Max (By Flame photometry)
Calcium as Ca	0.0077% (By Flamephotometry)
Magnesium as Mg	0.00067% (By AAS)



ANNEX F. – AMMONIA SOLUTION Safety Data Sheet

SIEMENS

Water Technologies

Material Safety Data Sheet

SECTION 1 – CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: Ammonium Hydroxide Solutions
Part Number: none **Chemical Family:** Ammonia solution, aqua ammonia

Manufacturer's Name: Siemens Water Technologies Corp.
Address: 181 Thorn Hill Road, Warrendale, PA 15086
Product/Technical Information Phone Number: (412) 772-0044
Medical/Handling Emergency Phone Number: Call CHEMTREC at 800/424-9300
24 hours a day
Transportation Emergency Phone Number: Call CHEMTREC at 800/424-9300
24 hours a day

Issue Date: September 26, 2000

SECTION 2 – COMPOSITION INFORMATION

<u>Chemical Name</u>	<u>Percent by Weight</u>	<u>CAS#</u>
Ammonium Hydroxide*	varies	1336-21-6

*No other ingredients are considered hazardous per OSHA's Hazard Communication Standard (29CFR1900.1200).

SECTION 3 – HAZARDS IDENTIFICATION

Appearance & Odor: Clear, colorless liquid with strong ammonia odor

Emergency Overview: INHALATION MAY BE FATAL as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin. Prolonged eye contact may cause permanent damage to the cornea or blindness.

Ingestion is harmful and may be fatal.

Contact with skin may cause severe irritation or burns.

Fire & Explosion Hazards: Gives off toxic vapors when heated. Flammable vapors may accumulate in confined spaces.

Primary Route(s) of Exposure: inhalation, ingestion, skin contact, eye contact

Inhalation – Acute Effects: Inhalation can severely irritate the nose, throat, mucous membranes and lungs causing coughing, wheezing and shortness of breath. Exposure to high concentrations of ammonia vapor (above approximately 2500 ppm) is life threatening, causing severe damage to the respiratory tract and resulting in bronchitis, chemical pneumonitis, and pulmonary edema, which can be fatal.

Skin Contact – Acute Effects: Skin contact can result in severe irritation and burns; contact with the liquid results in cryogenic burns as well.

Material Safety Data Sheet

Eye Contact – Acute Effects: Eye contact with ammonia vapor is severely irritating, and exposure of the eyes to ammonium hydroxide can result in serious damage including burns and may cause permanent eye injury and blindness.

Ingestion – Acute Effects: May be fatal if swallowed. Ingestion of ammonium hydroxide burns the mouth, throat, and gastrointestinal tract and can lead to severe abdominal pain, nausea, vomiting, collapse and death.

SECTION 4 – FIRST AID MEASURES

Inhalation First Aid: Remove affected person from area to fresh air and provide oxygen if breathing is difficult. Give artificial respiration ONLY if breathing has stopped and give CPR ONLY if there is no breathing and no pulse. Obtain medical attention.

Skin Contact First Aid: Immediately remove clothing from affected area and wash skin for 15 minutes with flowing water. Clothing and shoes should be discarded or washed before reuse. Obtain medical attention immediately. DO NOT instruct person to neutralize affected skin area.

Eye Contact First Aid: Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. Contacts should be removed before or during flushing. Obtain medical attention immediately. DO NOT instruct person to neutralize.

Ingestion First Aid: If swallowed, do NOT induce vomiting. If conscious, give large amounts of water - follow with diluted vinegar, fruit juice or whites of eggs (beaten, with water). If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in of vomitus. Rinse mouth again and give more water to drink. Obtain medical attention.

Medical Conditions Aggravated: Persons with pulmonary disorders, pre-existing eye disorders or impaired respiratory function may be more susceptible to the effects of this material.

Note to Physician: Treat patient symptomatically.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point/Method: non-flammable

Auto Ignition Temperature: not applicable

Upper/Lower Explosion Limits: not applicable

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Fire Fighting Procedures: Firefighters should wear proper protective equipment and self-contained (positive pressure if available) breathing apparatus with full facepiece. Use water to keep fire-exposed containers cool.



SIEMENS

Water Technologies

Material Safety Data Sheet

Fire & Explosion Hazards: Gives off toxic vapors when heated. Flammable vapors may accumulate in confined spaces.

Hazardous Products of Decomposition and/or Combustion: Burning may produce ammonia and oxides of nitrogen.

NFPA Ratings:

HEALTH- 3 FLAMMABILITY- 1 REACTIVITY- 0 OTHER- none

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Ventilate area. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Carefully neutralize spill with dilute acetic acid or take up with alkali spill kit. Absorb neutralized caustic residue with clay, vermiculite or other inert substance and package in a suitable container for disposal. Flush area with large amounts of water.

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State, Local and Provincial laws and regulations.

Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

SECTION 7 – HANDLING AND STORAGE

Handling: Follow good handling and housekeeping practices to prevent spills. Use with adequate exhaust ventilation to draw vapors away from workers' breathing zones.

Storage: Keep container tightly closed. Store in a cool, dry, corrosion-proof area. Store below 80 °F. Keep separate from incompatible materials.

General Comments: Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

SECTION 8 – PERSONAL PROTECTION/ EXPOSURE CONTROL

Respiratory Protection: Use appropriate NIOSH/MSHA-approved respirator

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.

Eye Protection: Wear chemical safety goggles and/or full face shield.

Ventilation Protection: Use local exhaust to meet TLV requirement. Use only in an approved fume hood.



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Water Technologies

Material Safety Data Sheet

Other Protection: Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored.

Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather.

Exposure Limits:

OSHA PEL-TWA: 50 ppm

NIOSH REL-TWA: 25 ppm; STEL: 35 ppm

ACGIH TLV-TWA: 25 ppm; STEL: 35 ppm

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Clear, colorless liquid with strong ammonia odor.

Vapor Pressure: 115 @ 20°C, 68°F

Vapor Density (Air=1): 0.60

Boiling Point: 36°C, 97°F

Melting Point: -72°C, -98°F

Specific Gravity: <1

Solubility in Water: Complete in all proportions

Volatile Percentage: ND*

pH: 11-12

Flash Point/method: NA**

Auto Ignition Temperature: NA

Upper/Lower Explosion Limits: NA

Other: ND

*ND=Not determined

**NA=Not applicable

SECTION 10 – STABILITY AND REACTIVITY

Stability: Stable under normal conditions of use and storage.

Incompatibilities: acids, acrolein, dimethyl sulfate, halogens, silver nitrate, propylene oxide, nitromethane, silver oxide, silver permanganate, oleum, beta-propiolactone, most common metals, mercury, strong oxidants, copper and copper alloys

Polymerization: Will not occur.

Decomposition: Burning may produce ammonia and oxides of nitrogen.

Conditions to Avoid: Heat, sunlight, sources of ignition and incompatible materials.



SIEMENS

Water Technologies

Material Safety Data Sheet

SECTION 11 – TOXICOLOGICAL INFORMATION

Inhalation – Acute: Inhalation can severely irritate the nose, throat, mucous membranes and lungs causing coughing, wheezing and shortness of breath. Exposure to high concentrations of

ammonia vapor (above approximately 2500 ppm) is life threatening, causing severe damage to the respiratory tract and resulting in bronchitis, chemical pneumonitis, and pulmonary edema, which can be fatal.

Inhalation – Chronic: Repeated exposure to low concentrations may cause bronchitis to develop with cough, phlegm and/or shortness of breath. Chronic exposure to ammonia can cause respiratory irritation and damage.

Skin Contact – Acute: Skin contact can result in severe irritation and burns; contact with the liquid results in cryogenic burns as well.

Skin Contact – Chronic: Repeated skin contact can cause dryness, itching and redness.

Eye Contact – Acute: Eye contact with ammonia vapor is severely irritating, and exposure of the eyes to ammonium hydroxide can result in serious damage including burns and may cause permanent eye injury and blindness.

Ingestion – Acute: May be fatal if swallowed. Ingestion of ammonium hydroxide burns the mouth, throat, and gastrointestinal tract and can lead to severe abdominal pain, nausea, vomiting, collapse and death. The oral LD50 (rat) is 350 mg/kg.

Ingestion – Chronic: There are no known chronic ingestion effects.

Carcinogenicity/Mutagenicity: There are no known carcinogenic/mutagenic effects.

Reproductive Effects: There are no known reproductive effects.

Neurotoxicity: There are no known neurotoxic effects.

Other Effects: There are no other known toxic effects.

Target Organs: Target organs include the eyes, skin, respiratory and digestive tracts.

SECTION 12 – ECOLOGICAL INFORMATION

This material is expected to be very toxic to aquatic life.

SECTION 13 – DISPOSAL CONSIDERATIONS

Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations.

NOTE: State and local regulations may be more stringent than federal regulations.



SIEMENS

Water Technologies

Material Safety Data Sheet

SECTION 14 – TRANSPORTATION INFORMATION

DOT Shipping Description: see shipping papers

SECTION 15 – REGULATORY INFORMATION

CERCLA SECTION 103 (40CFR302.4): yes RQ: 1000 lbs

SARA SECTION 302 (40CFR355.30): no

SARA SECTION 304 (40CFR355.40): no

SARA SECTION 313 (40CFR372.65): no

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: yes CHRONIC: yes FIRE: no REACTIVE: no SUDDEN RELEASE: no

OSHA PROCESS SAFETY (29CFR1910.119): yes TQ: 15000 lbs

CALIFORNIA PROPOSITION 65: no

Ammonium Hydroxide Solutions, Page 6 of 6

SECTION 16 – OTHER INFORMATION

Disclaimer: The information contained herein is based on data considered accurate.

However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

DSM Fibre Intermediates

Product Data Sheet

Ammonium sulphate, technical grade

CAS No.: 7783-20-2

Formula	(NH4)2SO4		
	Molecular weight	:	132.14
Appearance	Crystals, white colour Non-hygroscopic		
Specifications	Assay	:	min. 99% by mass AS-1401-SU
	Ammonia-nitrogen	:	min. 21% by mass AS-1401-SU
	Free acid (as H2SO4)	:	max. 0.01% by mass AS-0643-SU
	Water	:	max. 0.2% by mass AS-1993-SU
	Sulphate ash	:	max. 0.05% by mass AS-1998-SU
	Iron (total)	:	max. 5 mg/kg AS-1379-SU
	Heavy metals (as Pb)	:	max. 5 mg/kg AS-0206-SU
Characteristics	Particle Size	Average & Tolerances	
	> 2,00	2 ± 2%	
	1,41 - 2,00	18 ± 10%	
	1,01 - 1,40	38 ± 10%	
	0,50 - 1,00	37 ± 15%	
	< 0,50	7 ± 4%	
Solubility	Readily soluble in water		
Main applications	Ammonium sulphate, technical grade is a common ingredient in a variety of applications like: - Nutritive constituent in fermentation processes - Flameproofing formulations - Animal Feed - Water treatment - Dyeing of textiles - Spinning bath and tanning processes - Metal treatment		
Packing	25 kg bags, 50 kg bags and various sizes big bags		
Hazardous Chemicals Classification	IMCO class	:	non-restricted
	ADR/VRG	:	non-restricted
Toxicity	LD50 Oral(rat)	:	3000 mg/kg
Hazards	Contact with eyes and skin, should be avoided.		
Handling	No hazards with handling; however prolonged contact with skin should be avoided. Store in a dry area separated from strong bases. Process the product as quickly as possible, the product hardens during storage.		

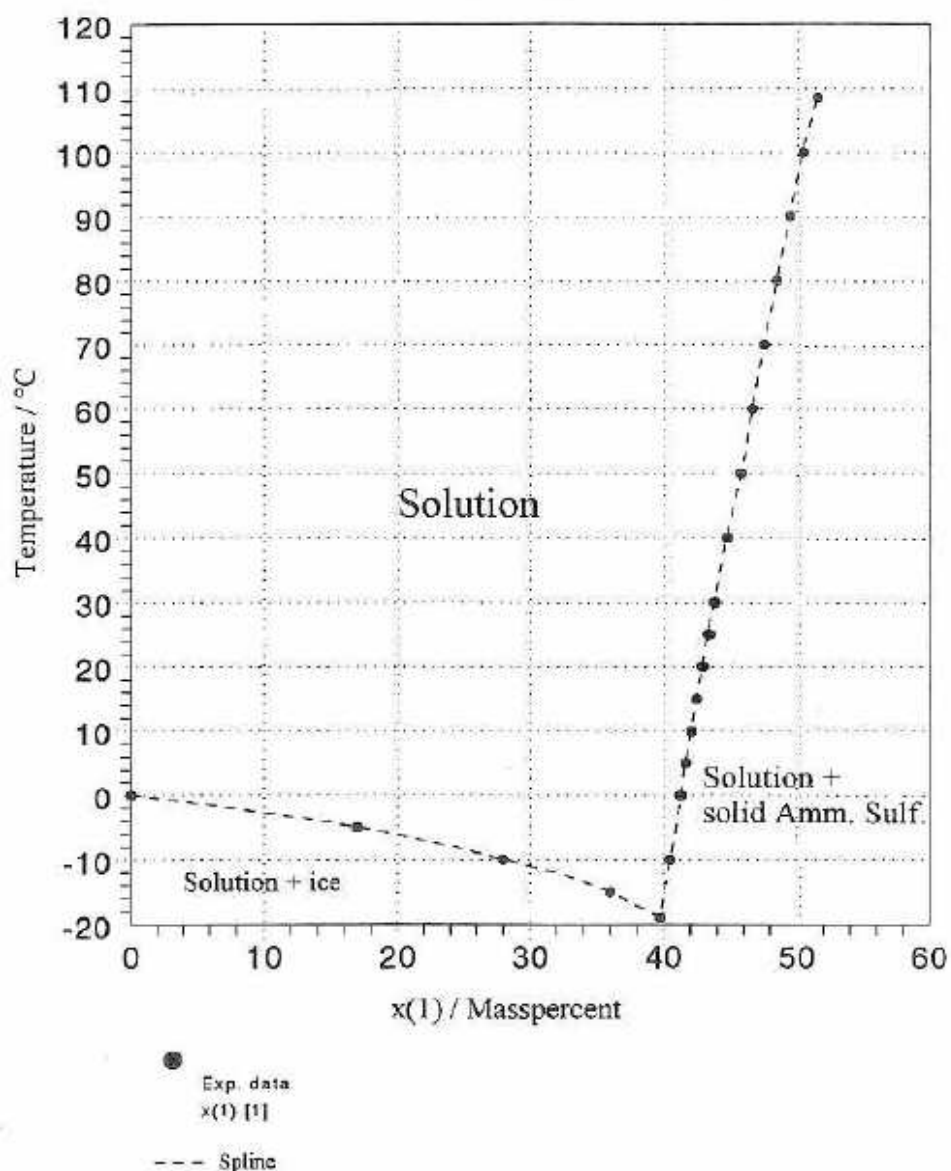
DSM Fibre Intermediates.
P.O. Box 43
6130 AA Sittard, the Netherlands
Telephone: (31) 46 4770035 / Telefax: (31) 46 4770033

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DSM Fibre Intermediates

Product Data Sheet

Solid-Liquid Equilibrium Ammonium sulphate (1) / Water (2)



DSM Fibre Intermediates

Business Development & Technology

To:
To Whom It May Concern:

From:
Technical Service Caprolactam

Shelf life Technical Ammonium Sulphate

This document informs about the shelf life of Technical Ammonium Sulphate.





- We don't have reference data.
- No guarantee data is available.
- TAS will not change during storage, except for the **water content**.
- The water content (if > 0.05 w%) will influence the caking effect.
- No other effects are known.
- If well stored under dry conditions, the water content will remain within specifications for a period of 6 months approximately. As storage and transport conditions are not under the responsibility of DSM, we don't guarantee a shelf life.

DSM Technical Service Caprolactam

ANNEX H.- AMMONIUM SULFATE Safety Data Sheet

Agrium

Material Safety Data Sheet

NFPA Classification	DOT / TDG Pictograms	WHMIS Classification	HMIS	PROTECTIVE CLOTHING
 Health: 1, Flammability: 0, Reactivity: 0, Specific Hazard: 0			Health: 1 Flammability: 0 Reactivity: 0 PPE: E	

Section I. Chemical Product and Company Identification

PRODUCT NAME/TRADE NAME Ammonium Sulfate, Granular Grades	
SYNONYM	This Material Safety Data Sheet applies to the following Agrium products: 20-0-0-24 Granular Ammonium Sulfate 20.5-0-0-24 Granular Ammonium Sulfate 21-0-0-24 Granular Ammonium Sulfate
CHEMICAL NAME	Ammonium sulfate
CHEMICAL FAMILY	Ammonium salt.
CHEMICAL FORMULA	(NH ₄) ₂ SO ₄
MATERIAL USES	Agricultural industry: Fertilizer. Industrial applications: Manufacture of specialty fertilizers.
MANUFACTURER	Various
SUPPLIER	Agrium North American Wholesale 13131 Lake Fraser Drive, S.E. Calgary, Alberta, Canada, T2J 7E8 Agrium U.S. Inc. Suite 1700, 4582 South Ulster St. Denver, Colorado, U.S.A., 80237
MSDS NUMBER: 16001 REVISION NUMBER: 1.0 MSDS prepared by the Environment, Health and Safety Department on: September 18, 2006 24 HR EMERGENCY TELEPHONE NUMBER: Transportation: 1-800-792-8311 Medical: 1-888-670-8123	

Section II. Hazardous Ingredients

		Exposure Limits (ACGIH)						
NAME	CAS #	TLV-TWA mg/m ³	TLV-TWA ppm	STEL mg/m ³	STEL ppm	CEIL mg/m ³	CEIL ppm	% by Weight
Ammonium sulfate	7783-20-2	N/A						>98
ACGIH TLV notations: --- No assigned TLV (C) - Ceiling - the concentration not to be exceeded at any time (I) - measured as the inhalable fraction of the aerosol (R) - measured as the Respirable fraction of the aerosol (T) - measured as the Thoracic fraction of the aerosol								
TOXICOLOGICAL DATA ON INGREDIENTS Ammonium Sulfate TFI Product Testing Program Results: Acute oral LD ₅₀ , rat: >2,000-4,250 mg/kg Acute oral LD ₅₀ , mouse: 840 mg/kg Acute dermal LD ₅₀ : >2,000 mg/kg (rat, mouse) Ecotoxicity: Acute toxicity to fish, Coho salmon, rainbow trout, largemouth bass, bluegill, fathead minnow, 24-96 hr LC ₅₀ : >90->1500 mg/L								

Continued on Next Page

<i>Ammonium Sulfate, Granular Grades</i>	<i>Page Number: 2</i>
<p>Acute toxicity to aquatic invertebrates, <i>Daphnia magna</i>, 50-96 hr LC₅₀: >433 mg/L Amphipod, 96 hrs, LC₅₀=40-82 mg/L Snails, 48-96 hrs, LC₅₀=>100-700 mg/L Toxicity to aquatic plants, <i>Chlorella vulgaris</i>, 21 days, NOEC=250 mg N/L Chronic toxicity to fish, Rainbow trout, 12 & 36 days, LC₅₀: 0.26-0.68 mg unionized NH₃/L Pink salmon, 21, 40, & 61 days, NOEC=1.2mg unionized NH₃/L Channel catfish, 6 months, LOEC=100-500 mg/L</p>	

<i>Section III. Hazards Identification.</i>	
POTENTIAL ACUTE HEALTH EFFECTS	This product may irritate eyes and skin upon prolonged or repeated contact. Over-exposure by inhalation may cause respiratory tract irritation. Ingestion of this substance may produce irritation of the gastro-intestinal tract, characterized by burning and diarrhea.
POTENTIAL CHRONIC HEALTH EFFECTS	<p>CARCINOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA. MUTAGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA. TERATOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA. There is no known effect from chronic exposure to this product.</p>

<i>Section IV. First Aid Measures</i>	
EYE CONTACT	May cause eye irritation by mechanical abrasion. Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Obtain medical attention if irritation persists.
MINOR SKIN CONTACT	May cause skin irritation. Wash contaminated skin with soap and water. Cover dry or irritated skin with a good quality skin lotion. If irritation persists, seek medical attention.
EXTENSIVE SKIN CONTACT	No additional information.
MINOR INHALATION	Repeated or prolonged inhalation of dust may lead to respiratory irritation. Loosen tight clothing around the individual's neck and waist. Allow the person to rest in a well ventilated area. Obtain medical attention if irritation persists.
SEVERE INHALATION	In emergency situations use proper respiratory protection to evacuate affected individuals to a safe area as soon as possible. Loosen tight clothing around the person's neck and waist. Oxygen may be administered if breathing is difficult. If the person is not breathing, perform artificial respiration. Obtain immediate medical attention.
SLIGHT INGESTION	If conscious, have person drink several glasses of water or milk and induce vomiting. NEVER induce vomiting or give anything by mouth to an unconscious person. Obtain medical attention.
EXTENSIVE INGESTION	No additional information.

<i>Section V. Fire and Explosion Data</i>	
THE PRODUCT IS	Non-flammable.
AUTO-IGNITION TEMPERATURE	Not applicable.
FLASH POINT	Not applicable.
FLAMMABILITY LIMITS	Not applicable.
PRODUCTS OF COMBUSTION	Material will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and combustible gases: ammonia, nitrogen oxides (NO, NO ₂ ...), sulfur oxides (SO ₂ , SO ₃ ...)
FIRE HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	Not applicable.

Continued on Next Page

<i>Ammonium Sulfate, Granular Grades</i>		Page Number: 3
EXPLOSION HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	This product is non-explosive. Sensitizer. Increases explosion hazard of ammonium nitrate when mixed together.	
FIRE FIGHTING MEDIA AND INSTRUCTIONS	Material will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and combustible gases. Use extinguishing media suitable for surrounding materials.	
SPECIAL REMARKS ON FIRE HAZARDS	Non combustible. Flammable/toxic gases will form at elevated temperatures (>280 °C) by thermal decomposition (ammonia, sulfur oxides, nitrogen oxides). A self contained breathing apparatus should be used to avoid inhalation of toxic fumes.	
SPECIAL REMARKS ON EXPLOSION HAZARDS	No additional remark.	

<i>Section VI. Accidental Release Measures</i>	
SMALL SPILL	Use appropriate tools to put the spilled solid in a suitable container for intended use or disposal.
LARGE SPILL	Prevent additional discharge of material, if possible to do so without hazard. Prevent spills from entering sewers, watercourses, wells, etc. Product will promote algae growth which may degrade water quality and taste. Notify downstream water users. Sulfate in potable drinking water should be maintained below 500mg/L (Canada) and 250 mg/L (U.S). Will dissolve and disperse in water. Reclaiming material may not be viable. Recover and place material in suitable containers for recycle, reuse, or disposal. Ensure disposal complies with government requirements and local regulations.

<i>Section VII. Handling and Storage</i>	
PRECAUTIONS	Avoid contact with skin and eyes. Do not breathe dust. Do not ingest. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. Keep away from incompatible materials.
STORAGE	Keep away from food, drink and animal feed. Store in a dry, cool and well ventilated area. Keep out of reach of children.

<i>Section VIII. Exposure Controls/Personal Protection</i>	
ENGINEERING CONTROLS	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, use ventilation to keep exposure to airborne contaminants below the exposure limit.
PERSONAL PROTECTION	The selection of personal protective equipment varies, depending upon conditions of use. Wear appropriate respiratory protection for dust/mist when ventilation is inadequate. A filtering facepiece dust mask is recommended for most applications if respiratory protection is needed. Where skin and eye contact may occur as a result of brief periodic exposures, wear long sleeved clothing, coveralls, chemical resistant gloves, and safety glasses with side shields.
PERSONAL PROTECTION IN CASE OF LARGE RELEASE	No additional information.
EXPOSURE LIMITS	OSHA PEL: 15 mg/m ³ , total dust, 5 mg/m ³ respirable, for Particulates Not Otherwise Regulated (nuisance particulates). Federal, State or Provincial exposure limits may vary by jurisdiction. Consult local authorities for acceptable exposure limits in your area.

Continued on Next Page

Ammonium Sulfate, Granular Grades

Page Number: 4

Section IX. Physical and Chemical Properties

PHYSICAL STATE AND APPEARANCE	Solid white crystalline granules.		
MOLECULAR WEIGHT	132.14	COLOR	White.
pH (10% SOLN/WATER)	3-4	ODOR	Odorless.
BOILING POINT	Decomposes.	ODOR THRESHOLD	~17 PPM (recognition) as ammonia.
MELTING POINT	235°C (455°F)	TASTE	Acrid.
CRITICAL TEMPERATURE	Not available.	VOLATILITY	Not applicable.
SPECIFIC GRAVITY g/cc	0.913 (Water = 1)	SOLUBILITY	Easily soluble in hot water. Soluble in cold water.
BULK DENSITY kg/m ³ ; lbs/ft ³	Loose: ~913 kg/m ³ ; 57 lbs/ft ³ ; Tapped: ~945 kg/m ³ ; 59 lbs/ft ³	DISPERSION PROPERTIES	See solubility in water.
VAPOR PRESSURE	Not applicable.	WATER/OIL DIST. COEFF.	Not available.
VAPOR DENSITY	Not applicable.		

Section X. Stability and Reactivity Data

STABILITY	The product is stable.
INSTABILITY TEMPERATURE	Not available.
CONDITIONS OF INSTABILITY	No additional remark.
INCOMPATIBILITY WITH VARIOUS SUBSTANCES	Slightly reactive with oxidizing agents, metals, alkalis, or moisture. Non-reactive with reducing agents, combustible materials, organic materials, acids.
CORROSIVITY	A mineral salt. Highly corrosive to aluminum, zinc, and copper. Slightly corrosive to steel and 304 stainless steel. Non-corrosive to 316 stainless steel.
SPECIAL REMARKS ON REACTIVITY	Avoid contact with moisture. Hydrolysis will slowly produce acids corrosive to metals.
SPECIAL REMARKS ON CORROSIVITY	Incompatible with copper alloys. Corrosive to brass. Corrosive to ferrous metals and alloys. Contact your sales representative or a metallurgical specialist to ensure compatibility with your equipment.

Section XI. Toxicological Information

SIGNIFICANT ROUTES OF EXPOSURE	Ingestion. Inhalation.
TOXICITY TO ANIMALS	See Section II.
SPECIAL REMARKS ON TOXICITY TO ANIMALS	The product itself and its products of degradation are not toxic under normal conditions of use. Will release ammonium ions. Ammonia is a toxic hazard to fish. May be harmful to livestock and wildlife if ingested. Clean up all spilled material, especially where bulk fertilizer loading of equipment occurs.
OTHER EFFECTS ON HUMANS	Our data base contains no additional remark on the toxicity of this product
SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS	No additional remark.
SPECIAL REMARKS ON OTHER EFFECTS ON HUMANS	No additional remark.

Continued on Next Page

Ammonium Sulfate, Granular Grades

Page Number: 5


Section XII. Ecological Information

ECOTOXICITY	<p>Non-persistent. Non-cumulative when applied using normal agricultural practices. The product itself and its products of degradation are not harmful under normal conditions of careful and responsible use.</p> <p>Aquatic/Marine Toxicity: Will disperse with current. Release to watercourses may cause effects down stream from the point of release. Will release ammonium ions. Ammonia is a toxic hazard to fish. Avoid spills or release to watercourses. U.S. D.O.T.: This material is NOT listed as a Marine pollutant.</p>
BOD and COD	Not available.
PRODUCTS OF DEGRADATION	Nitrogen oxides (NO, NO ₂ ...). Sulfur oxides (SO ₂ , SO ₃ ...).
TOXICITY OF THE PRODUCTS OF DEGRADATION	The product itself and its products of degradation are not harmful under normal conditions of use. Avoid spills or releases to watercourses.
SPECIAL REMARKS ON THE PRODUCTS OF DEGRADATION	Product will promote algae growth which may degrade water quality and taste. Notify downstream water users. Sulfate in potable drinking water should be maintained below 250mg/L (U.S.) and 500 mg/L (Canada). Will dissolve and disperse in water. Reclaiming material may not be viable.

Section XIII. Disposal Considerations

WASTE DISPOSAL OR RECYCLING	Recover and place material in a suitable container for intended use or disposal. Recycle to process, if possible. Ensure disposal complies with government requirements and local regulations.
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Section XIV. Transport Information

DOT / TDG CLASSIFICATION	Not controlled under TDG (Canada) or D.O.T. (U.S.A.)
PIN and Shipping Name	Not applicable.
SPECIAL PROVISIONS FOR TRANSPORT	Exempt Material
DOT (U.S.A) (Pictograms)	

Section XV. Other Regulatory Information and Pictograms

OTHER REGULATIONS	<p>CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): This product is on the Domestic Substances List (DSL), and acceptable for use under the provisions of CEPA.</p> <p>TSCA (Toxic Substance Control Act): This product is listed on the TSCA Inventory.</p> <p>CERCLA/SUPERFUND, 40 CFR 117.302: This product contains no Reportable Quantity (RQ) Substances.</p> <p>This product is not considered as a priority pollutant as regulated under the Clean Water Act.</p> <p>This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:</p> <p>Aqueous ammonia from water dissociable ammonium ions, 10% of which is reportable under this listing, as AS CAS# 7783-20-2. Refer to EPA doc 745-R-00-005 and the specific product analysis for your product to determine your reporting requirements under this regulation.</p> <p>Not controlled under WHMIS (Canada). This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and is not subject to control under WHMIS (Canada), or the Hazoom Standard (US).</p>	
OTHER CLASSIFICATIONS	HCS (U.S.A.)	Not controlled under the HCS (United States).
	DSCL (EEC)	Not controlled under DSCL (Europe).

Continued on Next Page

<i>Ammonium Sulfate, Granular Grades</i>		Page Number: 6
National Fire Protection Association (U.S.A.)	Hazards presented under acute emergency conditions only: <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">Health</div> <div style="text-align: center;">  </div> <div style="margin-left: 10px;"> Fire Hazard Reactivity Specific Hazard </div> </div>	
TDG (Pictograms - Canada)		
DSCL (Europe) (Pictograms)		
ADR (Europe) (Pictograms)		

<i>Section XVI. Other Information</i>	
REFERENCES	<ul style="list-style-type: none"> -Transportation of Dangerous Goods Act and Clear Language Regulations, current revision. -Canada Gazette Part II, Vol. 122, No. 2 Registration SOR/88-64 31 December, 1987 Hazardous Products Act "Ingredient Disclosure List". -Domestic Substances List, Canadian Environmental Protection Act. -29 CFR Part 1910 -33 CFR Parts 151, 153, 154, 156 -40 CFR Parts 1-799 -48 CFR Part 153 -49 CFR Parts 1-199 -American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances, 2006. -NFPA 704, National Fire Codes Online, National Fire Protection Association, current edition at time of MSDS preparation. -Corrosion Data Survey, Sixth Edition, 1985, National Association of Corrosion Engineers -TOMES® System: Heitland G & Hurlbut KM (Eds) (electronic version): MICROMEDEX, Greenwood Village, Colorado, USA. Available at: http://csi.micromedex.com (2006). The TOMES® System includes MEDITEXT® Medical Management; HAZARDTEXT® Hazard Management; INFOTEXT® Documents; ERG2000 Emergency Response Guidebook Documents; REPROTEXT®: Heitland G & Hurlbut KM (Eds); CHRIS Hazardous Chemical Data: U.S. Department of Transportation, U.S. Coast Guard, Washington, D.C. (2006); HSDB: Hazardous Substances Data Bank. National Library of Medicine, Bethesda, Maryland (2006); IRIS: Integrated Risk Information System. U.S. Environmental Protection Agency, Washington, D.C. (2006); NIOSH: Pocket Guide to Chemical Hazards. National Institute for Occupational Safety and Health, Cincinnati, Ohio (2006); OHMTADS: Oil and Hazardous Materials Technical Assistance Data System. U.S. Environmental Protection Agency, Washington, D.C. (2006); REPROTOX®: Scialli A.R. Georgetown University Medical Center and Reproductive Toxicology Center, Columbia Hospital for Women Medical Center, Washington, D.C. (2006); RTECS®: Registry of Toxic Effects of Chemical Substances. National Institute for Occupational Safety and Health, Cincinnati, Ohio (2006); and SHEPARDS: Shepard T.H.: Shepard's Catalog of Teratogenic Agents (2006). -The Fertilizer Institute Product Testing Program Results, March 2003 -Michigan Office of Regulatory Reform R325.51101et seq
OTHER SPECIAL CONSIDERATIONS	Rev data: All granular ammonium sulfate grades represented on this one sheet. HMIS ratings included.
FOR FURTHER SAFETY, HEALTH, OR ENVIRONMENTAL INFORMATION ON THIS PRODUCT, CONTACT	AGRIUM Wholesale Environment, Health and Safety Telephone (780) 998-6906 or Fax (780) 998-6677
<i>Continued on Next Page</i>	



NOTICE TO READER

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SILQUEST® A-1100® Silane

Crompton
OSi Specialties

■ Introduction

Silquest A-1100® silane, *gamma*-Aminopropyltriethoxysilane, is a versatile amino-functional coupling agent used over a broad range of applications to provide superior bonds between inorganic substrates and organic polymers.

■ Product Description

The silicon-containing portion of the molecule provides strong bonding to substrates. The primary amine function reacts with a wide array of thermoset, thermoplastic and elastomeric materials. Silquest A-1100 silane has the following structural formula:



■ Typical Physical Properties

Physical Form	Liquid
Color	Clear, colorless
Specific Gravity at 25/25°C.	0.9500
Boiling Point at 760 mm Hg, °C (°F)	220 (428)
Refractive Index, $n_D^{25^\circ\text{C}}$	1.420
Flash Point, Pensky-Martens Closed Cup ⁽¹⁾ , °C (°F)	96 (205)

(1) ASTM Method D 93

Solubility

Silquest A-1100 silane is completely and immediately soluble in water (with reaction), alcohol and aromatic and aliphatic hydrocarbons. Ketones are not recommended as diluents. Hydrolysis is noticeably exothermic and releases ethanol.

OSi Specialties, a Crompton business, is a leading producer of organofunctional silanes and specialty silicones for the transportation, construction, electronics, consumer care, textile, agricultural and other major industries. We have set the pace and the standard in these industries, earning a global reputation for technical innovation and support.

Specialty silicones, such as silicone surfactants, antifoams, organomodified and reactive fluids, emulsions and others, provide improved performance and unique properties in a wide variety of industries, including coatings, paints and inks, personal care and textiles. Silicone surfactants and catalysts are the essential ingredients in the manufacture of polyurethane foams.

Silanes are widely used as coupling agents, adhesion promoters and crosslinkers in the manufacture of tires and rubber, coatings, adhesives and sealants, electrical components, thermoplastics, glass fiber reinforced plastics and many other products.

Major plants and technical centers in the United States, Europe, Asia and Latin America support sales in nearly 100 countries worldwide.

Visit our website at www.cromptoncorp.com



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Middlebury, CT 06749
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SILQUEST[®] A-1100[®] Silane

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■ Applications and Performance

Coatings, Adhesives and Sealants

This aminosilane is an excellent adhesion promoter in acrylic coatings, adhesives and sealants. With polysulfide, urethane, RTV silicones, epoxy, nitrile, and phenolic adhesives and sealants, the product improves pigment dispersion and maximizes adhesion to glass, aluminum and steel.

Glass-Reinforced Resin Systems

In glass-reinforced thermosets, Silquest A-1100[®] silane enhances the flexural, compressive and interlaminar shear strengths before and after exposure to humidity. This product greatly improves wet electrical properties. Glass-reinforced thermoplastics, polyamides, polyesters and polycarbonates exhibit increased flexural and tensile strengths before and after wet exposure when this silane is used.

Glass Fiber and Mineral Wool Insulation

As a phenolic resin binder additive, Silquest A-1100 silane imparts moisture resistance and allows recovery after compression.

Mineral-Filled Resin Systems

Silquest A-1100 silane maximizes the physical and electrical properties of mineral-filled phenolics, epoxies, polyamides, polybutylene terephthalate and a host of other thermoset and thermoplastic composites. Filler wetting and dispersibility in the polymer matrix are also improved.

Foundry Applications

In shell molding, this silane strengthens the bond between the phenolic binder and foundry sand.

Grinding Wheels

The product promotes an improved, water-resistant bond between the abrasive grit and phenolic resin binder.

■ Product Safety

When considering the use of any OSI Specialties products in a particular application, review our latest Material Safety Data Sheets and ensure that the use intended can be accomplished safely. For Material Safety Data Sheets and other product safety information, contact the OSI Specialties sales office nearest you. Before handling any of the products mentioned in the text, please obtain available product safety information and take necessary steps to ensure safety of use.

SILQUEST® A-1100® Silane

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■ Emergency Service

OSi Specialties maintains an around-the-clock emergency service for its products. As well, the American Chemistry Council (CHEMTREC), Transport Canada (CANUTEC), and the Chemical Emergency Agency Service maintain an around-the-clock emergency service for all chemical products:

Location	OSi Specialties Products	All Chemical Products
Mainland U.S., Puerto Rico	800.809.9998	CHEMTREC: 800.424.9300
Alaska, Hawaii	304.926.8418 (collect)	CHEMTREC: 800.424.9300
Canada	304.926.8418 (collect)	CANUTEC: 613.996.6666 (collect) or CHEMTREC: 800.424.9300
Europe, Middle East, Africa	+32.(0)14.58.45.45 (Belgium)	CHEMTREC: +1-703.527.3887 (collect)
Latin America, Asia/Pacific, all other locations worldwide	+304.926.8418 (collect)	CHEMTREC: +1-703.527.3887 (collect)

At sea, radio U.S. Coast Guard, which can directly contact OSi Specialties at 800.809.9998, or CHEMTREC at 800.424.9300.

DO NOT WAIT. Phone if in doubt. You will be referred to a specialist for advice.

Literature Hotline 1.800.295.2392
Outside the U.S.A. and Canada call +1.607.786.8131 (Hours: 8:00 a.m. to 5:00 p.m. EST)

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Principal Locations

Worldwide Sales Offices		Phone	Fax
Asia	12 Science Park Drive #03-04 The Mendel Singapore Science Park Singapore 118225	65.6774.4800	65.6770.5148
Brazil	Av. Juscelino Kubitschek, 1830 10º andar - Torre I São Paulo - SP - Brazil 04543-900	55.11.3896.1500	55.11.3078.2969
Canada	565 Coronation Drive West Hill, Ontario M1E 2K3	416.724.3628	416.284.6077
Europe, Africa and Middle East	7, rue du Pré-Bouvier CH-1217 Meyrin, Switzerland	41.22.989.2111	41.22.989.2393
Mexico	Av. Insurgientes Sur, 1685 11-B Col. Guadalupe Inn Mexico, D.F. 01020	52.5.480.0800	52.5.661.9433

United States Sales Offices		Toll Free U.S.	Phone	Fax
California	One Park Plaza, Suite 360 Irvine, CA 92614	800.441.3280	949.553.6500	949.553.6501
Georgia	6525 The Corners Parkway Suite 311 Norcross, GA 30092	800.622.4435	770.242.9500	770.242.9511
Illinois	Westwood of Lisle 2443 Warrenville Road, Suite 100 Lisle, IL 60532	800.287.8310	630.245.1610	630.245.1617

Worldwide Customer Service Centers				
Canada	1893 rue Moreau Street Montreal, Quebec H1W 2L8	<i>Within U.S. & Canada</i> <i>Outside U.S. & Canada</i>	800.363.0496 514.524.0999	514.524.7504
Europe, Africa and Middle East	Nieuwe Weg 1 B-2070 Zwijndrecht, Belgium		+32.(0)32.50.26.00	+32.(0)32.50.26.50
U.S.A.	318-24 Fourth Avenue, Plaza IV P.O. Box 38002 South Charleston, WV 25303-3802	<i>Silanes</i> <i>Specialty Silicones</i>	800.523.5862 800.334.4674	304.746.1623 304.746.1623

Worldwide Literature Hotline	800.295.2392	+1.607.786.8131	+1.607.754.7517
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The information contained herein is correct to the best of our knowledge. Your attention is directed to the pertinent Material Safety Data Sheets for the products mentioned herein. All sales are subject to Crompton Corporation's standard terms and conditions of sale, copies of which are available on request and are printed on the reverse of Crompton invoices. Except as expressly provided in Crompton Corporation's standard terms and conditions of sale, no warranty, express or implied, including warranties of merchantability or fitness for a particular purpose, is made with respect to the products described herein. Nothing contained herein shall constitute permission or recommendation to practice any invention covered by a patent without a license from the owner of the patent.

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Mulrex 88 - Oil Emulsion

Product Description

Mulrex 88 is a fine homogeneous dispersion of petroleum oil particles in water, held in suspension with carefully selected and balanced emulsifiers.

The quality of ExxonMobil wax emulsions is assured for every delivery. These products are produced and controlled according to the ExxonMobil Product Quality Management System, EN ISO 9000 or equivalent standards.

Applications

Mulrex 88 has been designed to provide effective dust control in the manufacture and use of glass wool and mineral wool insulating materials. Mulrex 88 has a specially designed emulsifier system that ensures good compatibility with phenolic resins and other binders used by the industry and also has a good stability with hard water.

The flash point of the oil phase minimises fire hazards during oven curing of wool mats, while its low volatility reduces or eliminates fumes, smoke and stack deposits. The oil also lubricates the fibres, thereby reducing fibre breakage and thus minimising short fibre dust, which is injurious to health. In all applications, typically between 0.3 and 0.6% of oil is required for good dust control. Where loose pellets are being manufactured, the Mulrex 88 emulsion may be sprayed directly onto the hot, newly formed fibres. In the case of mats or felts, Mulrex 88 is usually premixed with the phenolic resin binder and the mixture is applied at or just after the point of fibre formation.

Properties and Specifications

Property	Method	Typical	Specification	
			Min	Max
Appearance	Visual	Yellow Fluid Emulsion		
Emulsifier Type	-	Anionic, Acid Stable		
Base Material	-	Mineral Oil		
Solids Content, % wt	AM-S 1435		51	55
Brookfield Viscosity No 2 Spindle/10rpm, (mPa.s)	AM-S 1428		500	1500
pH	AM-S 1436	8.0		

Typical values may vary within modest ranges and specifications may be subject to change.



Health and Safety

Detailed health and safety information for this product is provided in the Material Safety Data Sheet (MSDS), available upon request through your local sales representative or from www.ExxonMobil.com

Storage and Handling

Storage temperatures should not be allowed to fall below 4oC as freezing can irrevocably damage the emulsion. Also, temperatures should not be allowed to rise above 40oC as skinning and phase separation can occur. The optimum storage and handling range is 15-30oC. Storage tanks should be shaded and drums should not be left in direct sunlight or adjacent to hot areas.

Further Information

ExxonMobil supplies a full range of waxes, wax emulsions, white oils, process oils, bitumen and a full range of lubricants, fuels and chemical products worldwide. Please contact your local ExxonMobil representative, or contact us at www.ExxonMobil.com, for more information on other products.

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ANNEX K. – SILICONE SILRES BS 1042 Technical Data Sheet

WACKER

SILICONES

SILRES®

Characteristics

SILRES® BS 1042 is an aqueous emulsion of a reactive polydimethylsiloxane. It is used to impart water-repellency to glass wool mat or rock wool mat bound with phenolic resin or to low-density bulk goods such as perlite or vermiculite.

Application

To impart water repellency to glass wool or rock wool, SILRES® BS 1042 can be mixed with the phenolic resin solution or other additives. As the shelf life of the various mixtures greatly depends on the composition of the phenolic resin or the additives, no general comments can be made on compatibility.

With suitable equipment, SILRES® BS 1042 can either be applied at the same time as or shortly before application of the binder.

Treatment of glass wool mat or rock wool mat with SILRES® BS 1042 after drying and hardening is not recommended.

Processing

SILRES® BS 1042 is applied by spraying. For this purpose it can be diluted with any quantity of water. The usual amount of SILRES® BS 1042 applied ranges between 0.2 and 2 % based on the weight of material to be treated.

The quantity of SILRES® BS 1042 to be applied depends on the desired water repellency of the end product; a general recommendation cannot be given. Individual tests must always be conducted in order to define the necessary quantity. Excess SILRES® BS 1042 will cause a significant deterioration of the water-repellent effect in perlite or similar materials.

To impart water repellency to perlite or similarly porous materials, SILRES® BS 1042 is applied by spraying as

well. It can be sprayed onto the warm material in order to avoid an additional drying process. Prolonged heating of the siliconized material must however be avoided.

Guide formulation for laboratory tests to make perlite water-repellent

Mix 0.80 g SILRES® BS 1042 with 400 g of deionized water. Thoroughly stir 200 g of perlite with this impregnating solution in a mixer until the liquid has been completely absorbed. Fill the moist material into a large dish and dry in a drying oven at 50 °C for seven days.

Fill the impregnated perlite into fine-meshed nylon sacks and immerse in deionized water. The sacks must be covered by 5 cm of water.

Weigh the samples at fixed intervals. The results show that the perlite absorbs about 5 % of its dry weight in water after one day. Untreated perlite absorbs far more than 100 % of its dry weight in water in the same period.

Storage

SILRES® BS 1042 has a shelf life of at least 6 months when stored between 0 °C and 30 °C in the tightly closed original container. The containers must be protected against sunlight. The 'Best use before end' date of each batch appears on the product label.

Storage beyond the date specified on the label does not necessarily mean that the product is no longer usable. In this case however, the properties required for the intended use must be checked for quality assurance reasons.

Safety information

Detailed safety information is contained in each material data safety sheet, which can be obtained from our sales offices.

Product data

Appearance	white liquid		
Active substance content, approx.			
Density at 25 °C, approx.	[g/cm³]	1.0	
pH, approx.		5 - 7	
Flash point, approx.	DIN 51758	[°C]	> 60
Ignition point, approx.	DIN 51794	[°C]	410
These figures are intended as a guide and should not be used in preparing specifications.			