



DOCUMENT TITLE Temporary Water Treatment Plant; 5/6 Bay
INSTALLATION NAME Shotton Works
PERMIT NUMBER BR7321
AUTHOR Shaun McKenna
DATE 06/03/2014

Dear Alison/Ceri,

The following submission is being made to satisfy **Condition 1.5.1** of the Environmental Permit BR7321.

Tata Steel request approval to operate a water treatment plant within their Shotton Installation for a period of approximately 6 weeks. It is anticipated that the plant would be mobilised to site no later than Monday 17th March 2014. The purpose of the plant is to treat groundwater, pumped from an excavation to facilitate engineering works, such that it can be discharged to a drainage ditch within the site without compromising the existing discharge consent. A description of the proposed treatment system is attached together with a process schematic and associated MSDS datasheet.

Kind Regards,

Shaun McKenna
Senior Environment & Energy Officer

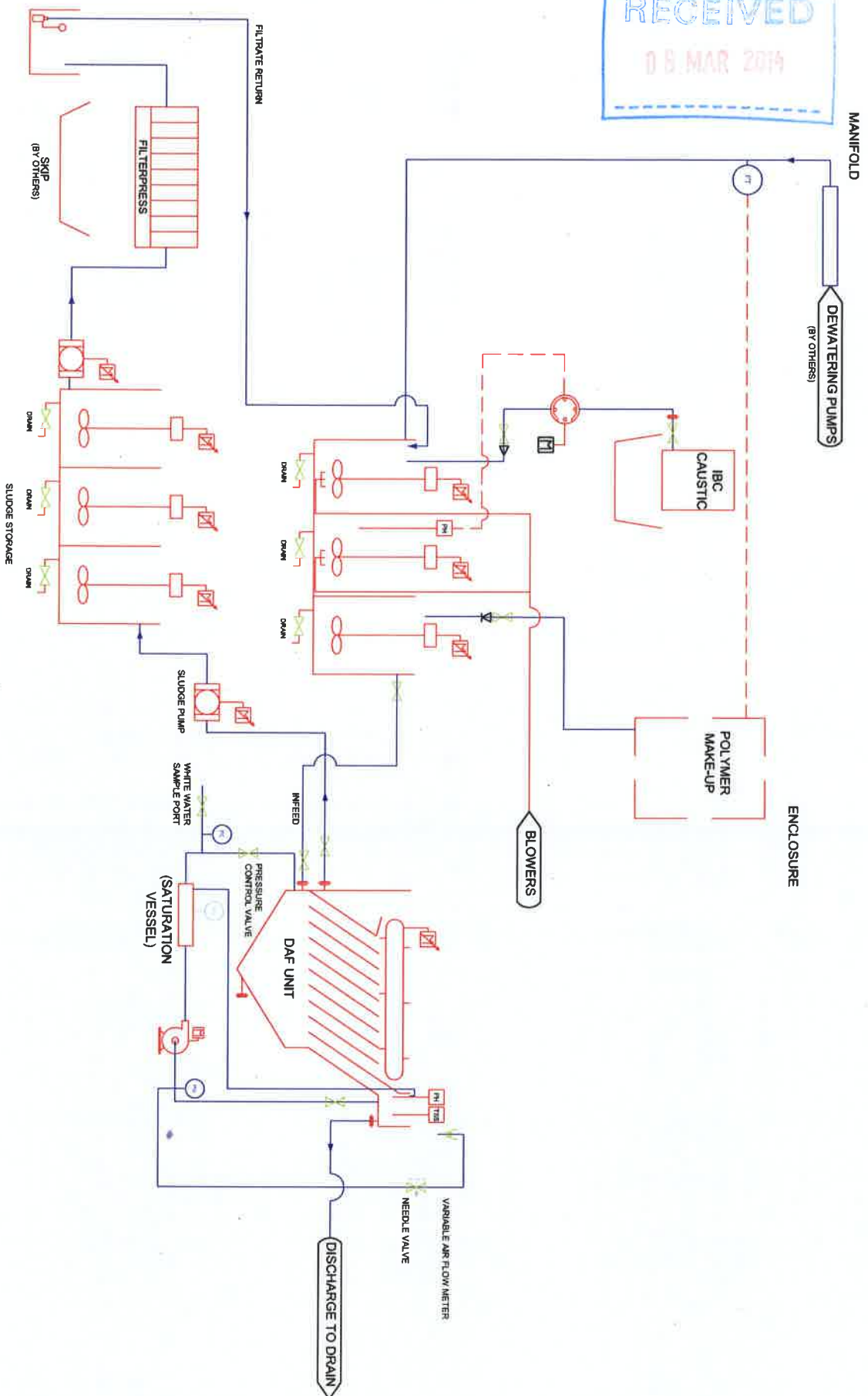


TATA STEEL

Tata Steel Colors/Shotton Works
Deeside Industrial Park, Flintshire, North Wales, CH5 2NH, United Kingdom
T: +44 (0) 1244 892 922 (direct) F: +44 (0) 1244 892 345 shaun.mckenna@tatasteel.com

Tata Steel UK Limited Registered Office 30 Millbank London SW1P 4WY Registered in England No. 2280000

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NOTES:

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Saltmaster

Project	TATA SHOOTON	Rev	1
Title	EFFLUENT PLANT PROPOSED P & ID	Rev	1
Drawing No.		Rev	1
		Rev	1

1.0 Application at Tata, Shotton

We understand that you require a solution for removing dissolved iron from groundwater pumped at a continuous flowrate of 35l/s (126m³/hr). This operation is to facilitate construction of a 6m x 2m x10m deep pit, required to accommodate new production equipment. Currently, the dewatering operation has ceased due to the iron concentration being higher than the permitted 10mg/l discharge limit.

There are currently 10 dewatering pumps, split into 2 lots of 5 pumps each lot pumping into a separate 6" pipe with flowmeter, terminating at a break tank, before discharging to drain under the terms of an existing Environmental Permit. The purpose of the break tank was to capture any settleable solids pumped forward from the dewatering process, but to date this has not been required since the water is reportedly clear, and devoid of solids.

The design requirements are understood to be:

Design requirement	Value
Flow to treatment	35l/s
Dissolved Iron Concentration	Range expected 81-245mg/l
Discharge Concentration (Total Iron)	10mg/l
Discharge concentration (TSS)	100mg/l
Discharge pH limits	5-9

2.0 Proposed Solution

Siltbuster are well versed at designing and implementing temporary and permanent solutions for the treatment of water contaminated with dissolved metals, having completed several minewater treatment plants in the UK, and overseas. This expertise, coupled with an extensive fleet of mobile treatment equipment enables Siltbuster to provide technically robust and quick response solutions to large volume applications such as this one at Shotton. We currently have treatment equipment on hire through a third party at Tata's Port Talbot site, and, as per document shown today, have recently been approved to undertake work on Tata Steel UK sites.

In outline, we would propose to remove the iron by means of single pass, conventional precipitation process generally as follows:

- Connecting the existing 2 No 6" ground water discharge pipes to a common manifold.
- Connecting the discharge side of the new manifold to the inlet of a 30m³, 3 stage mixed reaction tank (magnetic flowmeter to be included by SPS)
- Elevating the pH to 8.5 by use of 32% Sodium Hydroxide (dosing equipment and chemical IBC's housed within a purpose built dosing container) – the Sodium Hydroxide dosing pump to be controlled by the pH controller.
- The mixed reaction tank also to contain coarse air diffuser which will accelerate the reaction process – required at ~110m³/hr airflow rate
- Precipitated hydroxide solids will be light and fluffy in nature (see Figure 1 below)
- Low concentration of dilute polymer will be dosed (proportional to incoming flow) into the last stage of reaction tank (flocculation stage)
- Flocculated solids will be transferred by gravity (via 2 No 8" semi rigid pipes) to a Siltbuster packaged lamella Dissolved Air Flotation (DAF) Unit for solids/liquid separation and removal by top mounted scraper.

- Floated solids to be removed and transferred from the integral hopper of the DAF to a storage tank for pressing or tankering for disposal (filter press costs are presented as an option).
- Gravity discharge of treated water to drain - with secondary pH monitoring and turbidity monitoring.



Figure 1: Formation of hydroxide solids through pH adjustment and floating by use of simulated DAF

Please see attachments for General Arrangement drawings of the unit, along with a Technical Specification sheet for the D100 DAF unit.

The dosing equipment would be housed in a 20ft purpose built container, generally as shown in Attachment 4.

3.0 Sludge Production

The quantity of sludge produced will depend completely on the concentration of Iron in the water, and the thickness of sludge achieved through recovery by the DAF unit. It is understood that site would prefer to press the sludge to form a filtercake, which could then be disposed of on the site's own landfill.

Using a conservative 2% d.s for the DAF sludge, and a peak iron concentration of 245mg/l, some 60m³ of sludge would be produced per day. If we achieve 4% d.s. from the DAF, this volume would reduce to 30m³/d. If a filter press was used, this would equate to approximately 3m³ of filtercake per day, or 3m³ every 2 days respectively, (both assuming filtercake at 30% d.s).

If the iron concentration reduced to say 25mg/l, sludge production would reduce substantially, to around 6m³/d at 2% d.s. or 3m³/d at 4% d.s.

The potential for large variation in iron concentration therefore makes optimal sizing of a filter press very difficult. For now, we have assumed that it is preferable to allow for a filter press that caters for the worst case scenario, and we have therefore provided option costs for provision of a 2.8m³ filter press, mounted on a trailer. See scope of supply and cost sections below.

4.0 Reagent Use

As discussed, the polymer usage (anionic, liquid emulsion) will be minimal, being a very low dose (~2mg/l active) to aid flocculation and solids / liquid separation within the DAF unit. This is a proprietary water treatment chemical, commonly used in a wide variety of treatment applications.

However, the quantity of Sodium Hydroxide will vary significantly according to Iron concentration, and it is estimated that at 245mg/l Iron concentration, usage would be around 3m³/d, whereas at an Iron concentration of 25mg/l, this could reduce to around 300 litres per day.

For the time being, we assume that delivery of the Sodium Hydroxide will be in 1m³ IBC's and that the polymer can be supplied in 25Kg drums.

Though it is our preference that the client purchases chemicals direct from the supplier, we are able to offer this facility, if required, at cost +10%.

5.0 Scope of supply

The proposed scope of supply to cater for maximum flow to treatment is as follows:

Mixed Reaction Tank

- 1 No 30m³ 3-stage reaction tank c/w
 - Inlet manifold (for connection of 2 no existing 6" pipes)
 - Semi-rigid connecting pipe to reaction tank
 - Magnetic flowmeter
 - 1 no pH controller
 - 3 No top mounted, vertical shaft driven mixers
 - Control panel with mixer inverter drives
 - Access walkway (with ship's ladder to access)

Dosing Container

- 1 No 20 ft purpose built dosing container c/w
 - Flow meter display
 - Caustic dosing pump
 - Automated Polymer dilution batching / ageing system
 - Dilute polymer solution dosing pump
 - IBC bund for minimum 2 No IBC's
 - Electrical distribution to all ancillary equipment
 - Blower for coarse bubble aeration of reaction tank 1st stage
 - Lighting and heating for container

DAF treatment system

- 1 No D100 Dissolved Air Flotation unit comprising:
 - Painted Mild steel carcass
 - Access Walkway to one long side
 - uPVC lamella plates
 - Edur multiphase DAF pump
 - Stainless steel white water contact vessel
 - Top mounted scraper and drive motor
 - External mesh guard
 - Locally mounted control panel complete with local starter for:
 - White water pump
 - Sludge scraper (operated via an asymmetric on/off timer and variable speed drive).
- 1 No positive displacement sludge forwarding pump (duty only) with semi-rigid suction and delivery pipework
- 1 no pH controller for discharge monitoring
- 1 no turbidity or TSS meter for discharge monitoring
- Semi-rigid connecting pipework from DAF to drain

Sludge Containment

- 1 no 30m³ open topped sludge storage tank (based on 20ft container footprint)

Critical Spares

- Boxed spares of critical items will be provided with the hire equipment, to facilitate quick replacement by Tata or SPS engineering staff as appropriate.

5.1 Optional Filter Press

As discussed on site, we are able to offer for hire a trailer mounted filter press as below:



Figure 2: Trailer Mounted 2.8m³ filter press

The press comes complete with its own 12m³/hr feed pump, manually operated plate shifter, and a screw conveyor to transfer the filter cake to the rear. Containment is excluded and a RO-RO skip or similar would need to be positioned under the conveyor exit for storage of the filter cake.

A small filtrate tank would be provided along with a float operated submersible pump to transfer the filtrate to the reaction tank inlet.

In the scenario where 60m³/d of sludge were generated e.g. 245mg/l Iron and 2% sludge off the DAF, this would require 1 No press cycle per day. At the lower iron concentrations, the press would have more than ample capacity for the required duty.

6.0 Site Requirements

- 1 No power supply (63A 415v 3 phase N&E) – **NOTE** - a second 63 A supply would be required if the trailer mounted filter press is selected.
- Access to the building / hall where the equipment is to be positioned – TATA to confirm dimensions of doorways.
- Water supply for polymer dilution and for wash down at end of hire.
- Personnel for operating the equipment and for daily checks / first line maintenance.
- Relevant regulatory permissions (where applicable).
- Receptacle for storage and facility for disposal of filter cake (if press is selected) or facilities for disposal of liquid sludge.
- Relevant regulatory permissions (where applicable).

7.0 Exclusions and Clarifications

- Items listed above are excluded and are to be provided by TATA or representatives.
- Chemical costs are currently excluded but SPS are able to offer at cost plus 10%.
- Any enabling works on site are excluded.
- Operation of equipment is excluded.
- Pumping to the treatment system is excluded.
- Lightning external to the dosing container.
- Provision of telemetry is normally excluded from our scope of supply. However, we are prepared to provide a GSM modem or similar to facilitate general alarm notification.
- No liabilities are accepted in relation to the performance or availability of the equipment once in operation.

**SAFETY DATA SHEET**

According to Regulation (EC) No. 1907/2006 article 31

Section 1: Identification of the substance/mixture and of the company/undertaking**1.1 Product Identifier****Product Name:** POLYGOLD AD985**1.2 Relevant identified uses of the substance or mixture and uses advised against****Use:** Flocculation agent.**1.3 Details of the supplier of the safety data sheet**

Company name: Goldcrest Chemicals Ltd.
Address: Dodworth Business Park
Great Cliffe Road
Dodworth
Barnsley
South Yorkshire S75 3SP
Web address: www.goldcrestchemicals.co.uk
Tel: 03707 800 100
Fax: 03707 800 101
E-mail: enquiries@goldcrestchemicals.co.uk

1.4 Emergency telephone number**Tel:** 03707 800 100 (will be redirected out of office hours)**Section 2: Hazards identification****2.1 Classification of the substance or mixture**

Classification Xi - Irritant.
1999/45/EC R36/38 - Irritating to eyes and skin.

2.2 Label elements

Labelling
1999/45/EC



Irritant
R36/38 – Irritating to eyes and skin.
S26 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S28 – After contact with skin wash immediately with plenty of water.

2.3 Other hazards

Spilled product is slippery underfoot and becomes very slippery when it comes into contact with water. This product does not contain any substance that meets the criteria for PBT or vPvB in accordance with Annex XIII of Regulation (EC) No. 1907/2006.

Section 3: Composition/Information on ingredients**3.2 Mixtures**

Chemical nature: An anionic polyacrylamide dispersed in light mineral oil.

INGREDIENT NAME	CONTENT	EC No.	/ CASNo.	/Annex VI No. /	CLASSIFICATION
		REACH Reg.No.			
Naphtha (petroleum), hydrotreated heavy.	<3%	265-150-3 /	64742-48-9 /	649-327-00-6 /	Xn: R10, 65, 66.
		n/a			
Alcohol ether phosphate.	<1%	n/a	/ 9046-01-9 /	n/a /	Xi: R38, 41.
		n/a			N: R51/53.
Distillates (petroleum), hydrotreated light.	<3%	265-149-8 /	64742-47-8 /	649-422-00-2 /	Xn: R65, 66.
		n/a			

For full text of R phrases see section 16

Section 4: First aid measures**4.1 Description of first aid measures**

Skin contact:	Remove all contaminated clothing and wash before wearing again. Wash affected area with soap and plenty of water. Seek medical attention if any irritation or symptoms persist.
Eye contact:	Remove contact lenses if worn and rinse eye with plenty of water for at least 10 minutes holding eye open. Seek medical attention.
Ingestion:	Wash out mouth with plenty of water. DO NOT INDUCE VOMITING. Give plenty of water to drink. Seek medical attention and show this safety data sheet or label.
Inhalation:	Move to fresh air and seek medical attention if any irritation or symptoms persist.

4.2 Most important symptoms and effects, both acute and delayed

Skin contact:	Likely to cause irritation.
Eye contact:	Likely to cause irritation and redness.
Ingestion:	Likely to cause irritation to digestive system.
Inhalation:	Inhalation of spray or mist may cause irritation to respiratory system.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.
No specific antidote known.

Section 5: Firefighting measures**5.1 Extinguishing media**

Use dry powder or foam.
It is preferable not to use water as the floor will become very slippery.

5.2 Special hazards arising from the substance or mixture

Irritating and toxic fumes are likely to be emitted in fire conditions.
Floor is likely to be slippery underfoot.

5.3 Advice for firefighters

Wear full protective clothing and self contained breathing apparatus.

Section 6: Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedure**

Wear suitable equipment for protection of eyes and skin.
Respiratory equipment should be worn if there is insufficient ventilation.
Take care; floor is likely to be slippery underfoot and will become very slippery when wet.

6.2 Environmental precautions

Prevent product from entering drains and prevent further spillage if safe to do so.
Advise local authorities if large spills cannot be contained.

6.3 Clean-up procedures

Do not use water as it will render the area very slippery.
Absorb with inert absorbent material and transfer to suitable labelled container for disposal.
Common salt can be used to aid removal.

6.4 Reference to other sections

Suitable equipment for eye/face, skin and respiratory protection is quoted in section 8.
Suitable methods for disposal are quoted in section 13.

Section 7: Handling and storage**7.1 Precautions for safe handling**

Avoid contact with skin and eyes.
Wear suitable equipment for protection of eyes and skin.
Respiratory equipment should be worn if the product is in the form of a spray or mist and if there is insufficient ventilation.
Do not eat or drink in working area and wash hands after use.

7.2 Conditions for safe storage, including any incompatibilities

Store in original containers and keep well sealed.

Store in a dry, well ventilated area at normal room temperature.

Do not allow to freeze.

7.3 Specific end use

There is no specific end use in addition to that shown in section 1.

Section 8: Exposure controls/personal protection**8.1 Control parameters**

Not applicable.

8.2 Exposure controls

Engineering controls:	Ensure adequate ventilation of the working area. Eyewash facilities should be provided in the working area.
Eye /face protection:	Safety goggles (EN166).
Skin protection:	Chemical resistant gloves (EN 374), lightweight protective overalls and protective footwear.
Respiratory protection:	Full or half mask respirator with filter for organic vapours (EN14387 type A).
Thermal hazards:	Not applicable.

Section 9: Physical and chemical properties**9.1 Information on basic physical and chemical properties**

Appearance:	Off-white liquid
Odour:	Mineral oil-like
pH:	Approx. 4 (1% aqueous solution)
Melting point/freezing point:	n/a
Boiling point or boiling range:	>100°C
Flash point:	>93°C
Evaporation rate:	n/a
Flammability:	Combustible
Upper/lower flammability or explosive limits:	n/a
Vapour pressure :	n/a
Vapour density:	n/a
Relative density:	Approx, 1.1g/cm ³ @ 20°C
Solubility:	Disperses in water.
Partition coefficient: n-octanol/water:	n/a
Auto-ignition temperature:	n/a
Decomposition temperature:	n/a
Viscosity:	n/a
Explosive properties:	None
Oxidising properties:	None

9.2 Other information

None available.

Section 10: Stability and reactivity**10.1 Reactivity**

No reactivity is likely if stored and handled as prescribed.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

No hazardous reactions are likely if stored and handled as prescribed.

10.4 Conditions to avoid

Temperature extremes. Freezing will affect the physical condition but will not damage the product.
Avoid ignition sources such as heat, sparks or an open flame.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

Evolution of oxides of carbon and nitrogen is possible when exposed to excessive heat.

Section 11: Toxicological information**11.1 Information on toxicological effects**

Information based on a structurally or compositionally similar product.

Acute toxicity: LD50/oral/rat >2,000 mg/kg

Irritation/ corrosivity: Irritating to eyes and skin.
Prolonged or frequent exposure may lead to skin rashes or dermatitis.

Sensitisation: Not reported.

Repeated dose toxicity: Not reported.

Carcinogenicity: Not reported.

Mutagenicity: Not reported.

Section 12: Ecological information**12.1 Toxicity**

Information based on a structurally or compositionally similar product.

Aquatic toxicity:	LC50/96hr/fish	>100 mg/l
	EC50/48hr/daphnia	>100 mg/l

12.2 Persistence and degradability

Not readily biodegradable.

12.3 Bioaccumulative potential

Based on its structural properties, the polymer is not biologically available.
Accumulation in organisms is not expected.

12.4 Mobility in soil

Adsorption to soil phase is expected.

12.5 Results of PBT and vPvB assessment

Not applicable.

12.6 Other adverse effects

None known.

Section 13: Disposal considerations**13.1 Waste treatment methods**

Disposal of product: This is classed as hazardous waste and must be disposed of via a licensed waste disposal company.

Disposal of packaging: Packaging should be sent for recycling or disposed of as for the product.

Section 14: Transport information

This product is not classified as dangerous for carriage by, road, sea or air.

Section 15: Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

Council Directive 67/548/EEC (Classification, packaging and labelling of dangerous substances) and subsequent amendments.

Commission Directive 1999/45/EC (Classification, packaging and labelling of dangerous preparations) and subsequent amendments.

Regulation (EC) No. 1907/2006 (REACH) and its amendment, Commission Regulation (EU) No. 453/2010.
Directive 648/2004/EC (Detergents Regulations)

15.2 Chemical safety Assessment

Not applicable.

Section 16: Other information

This safety data sheet is the original version in the format according to Commission Regulation (EU) No. 453/2010 therefore it has been given the revision number 00.

Text for risk phrases and hazard statements not written in full in sections 2 and 3:

R10 – Flammable.

R38 – Irritating to skin.

R41 – Risk of serious damage to eyes.

R51/53 – Toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

R65 – Harmful; may cause lung damage if swallowed.

R66 – Repeated exposure may cause skin dryness or cracking.

n/a = not applicable or not available.

This data sheet is produced in accordance with Commission Regulation (EU) No. 453/2010 which amends Regulation (EC) No. 1907/2006. The information given in this document is based on current knowledge and experience and is given in good faith. No warranty expressed or implied is made, and data is only relevant to the use for which the product is supplied.

