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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in Dobeckan FT 2015

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Street Address:	334 - 336 Illawarra Road MARRICKVILLE NSW 2204, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

Director
NICNAS

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Siemens Ltd
885 Mountain Highway
BAYSWATER VIC 3153
ABN 98 004 347 880

NOTIFICATION CATEGORY

Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:

Chemical name
CAS number
Molecular formula
Structural formula
Polymer composition

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA
None

NOTIFICATION IN OTHER COUNTRIES
Not stated

2. IDENTITY OF CHEMICAL

OTHER NAME(S)
Polymer in Dobeckan FT 2015

MOLECULAR WEIGHT (MW)

Number Average Molecular Weight (Mn)	5020
Weight Average Molecular Weight (Mw)	278 407
Polydispersity Index (Mw/Mn)	55.46
% of Low MW Species < 1000	0
% of Low MW Species < 500	0

SPECTRAL DATA

METHOD	IR spectroscopy
Remarks	Genesis II FTIR.for Dobeckan FT 2015 containing the notified polymer. Major peaks at 1725, 11705, 1400, 1370, 1295, 1255, 1155, 1115, 1020, 985, 905, 825 and 790 cm^{-1}.
TEST FACILITY	Not stated

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL METHOD	IR spectroscopy
Remarks	The notifier has submitted an IR spectrum of Dobeckan FT 2015 containing the notified polymer.
TEST FACILITY	Not stated

3. COMPOSITION

DEGREE OF PURITY
High.

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS
None.

DEGRADATION PRODUCTS
None expected.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
None.

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will be imported as a component of an impregnating agent (Dobeckan FT 2015) at a concentration of 55% in predominantly vinyltoluene. The liquid impregnating agent will be transported to Australia in 216.5 L drums by air or sea. Within Australia, it will be transported by rail or road.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	*1*	*2*	*3*	*4*	*5*
Kilograms	3000	500	500	500	500

USE
The solution containing the notified polymer is used as electric insulating resin for impregnating electrical windings, for example, coils of magnet wire in motors, generators, and transformers.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
Melbourne.

IDENTITY OF MANUFACTURER/RECIPIENTS
342 South Pine Road
BRENDALE QLD 4500

TRANSPORTATION AND PACKAGING
The notified polymer will be imported as a component of the product Dobeckan FT 2015 in 216.5 L Dangerous Goods Approved steel drums.

5.2. Operation description

Dobeckan FT 2015 is used for impregnating electrical windings, for example, coils of magnet wire in

motors, generators and transformers. Impregnation of electrical winding is done by highly specialised companies.

Dobeckan FT 2015 is processed according to all impregnating methods conventional in electrical engineering and transformer construction, such as dipping, flooding and trickle impregnation. Owing to low vapour pressure of vinyl toluene in Dobeckan FT 2015, impregnation under vacuum or vacuum pressure and dip rolling of pre-heated components is also possible. The notifier states that in Australia, impregnation will be done under vacuum pressure.

For vacuum pressure impregnation, a stator coil is hand wrapped with a fibrous wicking material and loaded into a pressure vessel and immersed in the impregnating resin. All gas, including that held by surface tension, is evacuated under vacuum. The resin is drawn into the stator core, completely occupying all voids in the winding. After a series of processes, ending in a controlled bake, the winding is 100% impregnated and sealed. Each stator then receives a 24-hour submergence test under water that has been treated to maintain stringent surface tension values.

Treatment of stator windings with the product is usually followed by curing at 150ºC in ovens. During these 'draining' and 'curing' steps, gelled or cured resins are formed which are removed periodically and sent to a licensed burning system.

The product (Dobeckan FT 2015) will not be diluted or blended with other chemicals but will be used as received from the manufacturer.

5.3. Occupational Exposure

Number and Category of Workers

Category of Worker	*Number*	*Exposure Duration*	*Exposure Frequency per Yr*
Transport and warehousing	3	1 hours/day	2 days/year
Product application			
Electrical tradesmen and apprentice – Rewinding section	3	2 hour/day	220 days/year
Fitting tradesmen – Fitting section	2	3 hours/day	220 days/year
Quality control	1	1 hour/day	12 days/year

Exposure Details

Transport and storage

Exposure to the notified polymer is not expected during the importation, warehousing or transportation of the product containing the notified polymer except in cases where the packaging is accidentally breached.

No further dilution of the product or manufacture of other products using the notified polymer will take place in Australia.

Dobeckan FT2015 will be used for impregnating electrical windings in motors, generators and transformers by dip-and-bake method, trickle method or vacuum pressure impregnation method. All these methods are fully automated thereby minimising the potential for occupational exposure. Workers will connect a vacuum hose line to the drums from which the polymer solution will be pumped to the impregnating machinery. Skin contact with splashes, drips and spills may occur as vacuum lines are connected or disconnected. Inhalation exposure is also possible.

Workers monitor the viscosity of the product before and after each treatment and incidental skin contact may occur during sampling and analytical procedures.

Treatment (impregnation) of stator windings with the product is usually followed by curing at 150ºC in ovens. Workers may be exposed to the product by dermal and ocular routes when transferring the treated motors to ovens for curing. Inhalation exposure to the product vapours is also possible during the curing process. The product MSDS states that vapours of the product solvent are heavier than air and may spread along floors. Vapours may also form explosive mixtures with air. All operations

involving transfer are carried out under exhaust ventilation.

In addition, workers dismantling or reassembling electric motors for overhauling or rewinding may be exposed (inhalation) to fine powder produced from buffing or sanding the treated coils. Workers may also be exposed to the notified polymer via the dermal and ocular routes while cleaning and rinsing the impregnating equipment using recirculated solvent.

Exposure to significant amounts of the notified polymer will be limited due to the engineering controls and personal protective equipment worn by workers. Workers in the treatment areas will be equipped with respiratory protection, eye protection, hand protection conforming to AS and NZ standards.

5.4. Release

RELEASE OF CHEMICAL AT SITE

The notified polymer will not be manufactured in Australia. Environmental release during importation, storage and transportation is unlikely except in the event of accidental spillage. The notified polymer (supplied as a 55% mixture in vinyl toluene) does not undergo any further reformulation or dilution and is used as is supplied.

RELEASE OF CHEMICAL FROM USE

Release of the notified polymer to the environment during application of the insulating resin is expected to be low. Industrial applications, i.e. impregnating electrical windings, will be undertaken by highly specialised companies. The method used will be impregnation under vacuum, whereby a stator coil is treated with impregnating resin and after the desired time it is cured in an oven. During these steps, gelled or cured resins are formed which are removed periodically and sent to a licensed incinerator. It is estimated that losses due to these processes and those involving the rinsing of application equipment are estimated to be 15-25% or up to 450-750 kg per annum. No release of the notified polymer is expected once the coatings are applied and cured. Upon curing the polymer is incorporated into the polymer matrix where it will become inert.

The majority of the polymer will be tied to the fate of the finished product. Empty drums containing 1% dry polymer residue (containing 30 kg of the notified polymer per annum) will be consigned to landfills.

The notified polymer is not expected to cross biological membranes due to its high molecular weight and therefore is not expected to bioaccumulate (Connell,1989).

5.5. Disposal

Waste notified polymer or coating not recycled is collected and sent to landfill sites or incinerated at the end usage site. Import containers will be disposed of to landfill. Thus approximately 30 kg of notified polymer will be disposed of to landfill across Australia.

5.6. Public exposure

No DIY applications of the product are available and therefore public exposure to the notified polymer as it occurs in solution is not expected. `

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Clear liquid (Dobeckan FT2015).
Boiling Point	Not determined.
Remarks	No data available
Density	1050 kg/m^3 at 20°C (Dobeckan FT2015)
Remarks	Test method not stated.
Vapour Pressure	0.147 kPa at 23°C.

Remarks Vapour pressure is due to vinyl toluene. The notified chemical is a solid resin.

Water Solubility 0.09 g/L @ambient temperature (Dobeckan FT2015).

Remarks Test method not stated, but the solubility is said to be caused by vinyl toluene. The resin is a hydrophobic polyester, and the actual water solubility may be expected to be much lower.

Hydrolysis as a Function of pH Not determined

Remarks Despite the presence of potentially hydrolysable functional groups, hydrolysis in a pH range of 4–9 and ambient temperature is very unlikely due to the low water solubility.

Partition Coefficient (n-octanol/water) log Pow = 3.35 (Dobeckan FT 2015).

Remarks No supporting information provided but consistent with low solubility.

Adsorption/Desorption Not determined

Remarks Will adsorb to and associate with soils and sediments due to low solubility.

Dissociation Constant Not determined.

Remarks Dissociation in water of any residual acidic or basic is very unlikely due to the low water solubility and the lack of dissociable groups.

Viscosity >60 s 6 mm at 20°C.

METHOD ISO 2431
Remarks The viscosity value is for Dobeckan FT 2015. The notified polymer is a solid at ambient temperature.
TEST FACILITY Not stated

Particle Size Imported only in solution form.

Remarks No data provided.

Flash Point 52°C (Dobeckan FT 2015).

METHOD DIN 53213
TEST FACILITY Not stated.

Flammability Limits Not determined.

Remarks The polymer does not form flammable vapours. The product, Dobeckan FT2015, is a flammable liquid.

Autoignition Temperature Not determined.

Remarks No data provided.

Explosive Properties Not determined.

Remarks Not expected to be explosive based on structure.

Reactivity

Remarks The product, Dobeckan FT 2015, is stable under recommended storage and

handling conditions. When exposed to high temperatures may produce hazardous decomposition products such as carbon monoxide, oxides of nitrogen.

7. TOXICOLOGICAL INVESTIGATIONS

No toxicity data were submitted.

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted. The notified polymer is not expected to cross biological membranes due to its high molecular weight and therefore is not expected to bioaccumulate (Connell,1989).

8.2. Ecotoxicological investigations

No ecotoxicological data were submitted.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

Very little environmental exposure of the notified polymer is expected under normal usage as the polymer is not expected to enter soil or aquatic compartments. Most of the polymer will be incorporated into the polymer matrix of the impregnating resin, which upon curing become inert. Once incorporated into the coating formulation, the notified polymer is expected to be immobile in the environment. At the end of their useful life, the stator windings coated with the polymer are likely to be either recycled or placed into landfill.

As a worse case scenario, up to 750 kg of notified polymer could be generated for disposal each year. Most of this will be landfilled, but some may be incinerated.

9.1.2. Environment – effects assessment

No data were provided on environment effects, and the use and properties of this chemical indicate low exposure to the aquatic environment. Furthermore, Nabholz *et.al* (1993) indicates that non-ionic polymers with NAMW >1000 are of low concern.

9.1.3. Environment – risk characterisation

Based on the proposed use pattern, the environmental exposure and the overall environmental hazard is expected to be low.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

During transport and storage, workers are unlikely to be exposed to the notified polymer unless packaging is breached. In the event of an accident, spills will be removed in accord with the MSDS and government regulations.

The main potential for occupational exposure to the notified polymer is when using the product for impregnating electrical windings. In Australia, the vacuum pressure method is normally used for impregnation. This is a fully automated and metered process and worker intervention is not required unless the filling line requires adjustment.

Workers may be exposed to the notified polymer from drips and spills when connecting hoses between drums and treatment chambers and when checking the viscosity of the treating solution. Workers may also be exposed to the liquid product when placing (and removing) the stators or

motors in (or from) the treatment chambers. Dermal exposure would be the predominant route of occupational exposure although there is also a likelihood of the development of vapour from the reactive thinner, vinyltoluene. However, exposure to significant amounts of the notified polymer will be limited due to the engineering controls and personal protective equipment worn by workers. The workers will be equipped with respiratory protection, eye protection, hand protection conforming to AS and NZ standards.

Workers may also be exposed to the fine powder of the insulating material from buffing or sanding the treated coils when dismantling or reassembling electric motors for overhauling or rewinding.

Workers may also be exposed to the notified polymer via the dermal and ocular routes while cleaning and rinsing spray equipment using recirculated solvent.

9.2.2. Public health – exposure assessment

The notified polymer or the product containing the notified polymer will not be available for sale to the public. It will be used by highly specialised companies for insulating motor windings. As a component bound in the resin substrate, routine exposure of the general public is expected to be minimal.

During the transport and handling of the notified polymer, the public will only be exposed if there is an accident resulting in spillage. Therefore, the overall public exposure to the notified polymer will be low.

9.2.3. Human health - effects assessment

Toxicological information on the notified polymer is not available. It is of a high molecular weight (>1000 daltons), and is unlikely to cross biological membranes and thus it is expected to have a low order of toxicity.

Based on the available data, the notified polymer could not be classified as a hazardous substance in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2002).

9.2.4. Occupational health and safety – risk characterisation

Worker exposure during transport, storage and distribution of the notified polymer and its product is unlikely, except in the event of an accidental spill. Exposure after a spill should be controlled by the recommended practices for cleaning up of spills stated in the MSDS.

The product containing the notified chemical will be used as received from overseas. No blending or re-formulation is involved. At the motor impregnation sites, workers may be exposed to the notified polymer during treatment and cleaning procedures. However, the risk of exposure for workers performing these tasks is expected to be low, as all treatment procedures are closed systems except for viscosity testing.

Workers handling hose connections or equipment will be properly protected with PPE as recommended in the MSDS. In addition, areas where containers are opened and connected to the treatment machinery would be under the control of exhaust ventilation to deal with the hazards associated with other ingredients such as vinyltoluene. Eye contact is only likely in the case of accidental splashes and is controlled by the use of safety glasses or goggles.

Workers may also be exposed to the fine powder of the insulating material from buffing or sanding the treated coils when dismantling or reassembling electric motors for overhauling or rewinding. However, at this stage, the notified polymer would be fully cured and would have formed a cross-linked resin with other constituents of the product.

Viscosity testing and cleaning of equipment is carried out in well-ventilated areas, which significantly reduces the risk of exposure to the notified polymer.

Overall, the occupational risk is low for handlers of the notified polymer, as it is expected to have low hazard due to its high molecular weight. The occupational risk due to the notified

polymer would be further reduced due to measures taken to control exposure to other components of the formulation, such as the use of enclosed systems for treating coils and the wearing of protective clothing during these procedures and when cleaning the equipment.

9.2.5. Public health – risk characterisation

The notified polymer is to be used as a component of a product used for impregnating electric motor and stator windings. These tasks are carried out by specialised companies; and at no time will the general public come in contact with the solution or the cured insulating layer. The notified polymer will not pose a significant risk to public health when used in the proposed manner.

10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

10.1. Hazard classification

Based on the available data the notified chemical is not classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

10.2. Environmental risk assessment

The chemical is not considered to pose a risk to the environment based on its reported use pattern.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

10.3.2. Public health

There is Negligible Concern to public health when used as described in the notification.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the product containing the notified chemical provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 2003). It is published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for the product containing the notified chemical, provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer as introduced in the product [Dobeckan

FT 2015]:

- Exhaust ventilation when the containers are opened and the product containing the notified polymer poured into treating chambers, and when impregnating electrical windings.
- Enclosed system when impregnating electrical windings.

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced:

  - Protective gloves,
  - safety glasses or goggles,
  - half-facepiece respirator and
  - industrial clothing

  Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment

- Do not allow the polymer/resin to enter sewer or containers to contaminate drains or waterways or sewer.

Disposal

- Wastes generated during industrial application should be disposed of through a licensed waste contractor or consigned to landfill.

Emergency procedures

- Spills/release of the notified polymer should be handled by qualified personnel. Do not flush into surface water or sanitary sewer system. Take up mechanically or with an adsorbent material, either sand, diatomaceous earth, universal adsorbent or saw dust and dispose of appropriately.

12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(2) of the Act:
  - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

13. BIBLIOGRAPHY

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Nabholz, JV, Miller P and Zeeman M. “Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act (TSCA) Section Five,” *Environmental Toxicology and Risk Assessment, American Society for Testing and Materials, ASTM STP 1179*, W.G. Landis, J.S. Hughes, and M.A. Lewis Eds. Philadelphia, 1993, pp 40-55.

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