1. SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name: **TN-34A**

Product Description: Nozzle for Flow Control

The substances contained in the product and detailed in the following sections must not be registered according to REACH, article 7 paragraph 1.

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

The product is an Alumina nozzle used as a refractory in the sliding gate system for Ladle and Tundish.

1.3. Details of the supplier of the SDS

Supplier	DUFERCO SA
Street address/P.O. Box:	Via Bagutti 9
Country ID/Postcode/Place:	6900 Lugano Switzerland
Telephone number:	+41 91 8225600

1.4. Emergency telephone number

Austria –	Tel +43 1 31 00472
Belgium –	Tel. 0800 120 33
Czech Republic –	Tel. +420 267 225 212
Finland –	Tel. +358 400 393 033
France –	Tel. +33 8 20 20 18 16
Germany –	Tel. + 49 231 9071 2971
Poland –	Tel. +48 42 2538 424
Slovenia –	Tel. +386 1 478 6051
Spain –	Tel. +34 914 345 730
Sweden –	Tel. +46 8 519 41 345
Italy	Tel. +39 0266101029
U.S.A.	Tel. 1-800-222-1222
U.S.A.	Tel. 1-800-424-8802

2. SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The information provided below is based on the classification according to the criteria of Regulation (EC) No 1272/2008, Regulation (EC) No 1907/2006 and Directive 67/548/EEC.

2.1.1. Classification according to Regulation (EC) No 1272/2008 (CLP/GHS)

The article does no meet the classification requirements of the current European legislation on classification and labelling. The product is not classified.

Alumina (Al_2O_3, CAS N° 01344-28-1), Graphite (C, CAS N° 07782-42-5) Amorphous Silica (SiO_2, CAS N° 07631-86-9) contained in the plate are not classified in Annex VI of Directive 1207/2008/EEC.

Silica (SiO_2) may transform in small quantity in crystalline silica, after being exposed to high temperature (> 900°C) during product service life. Both NIOSH and IARC list crystalline silica as a potential occupational human carcinogen. Long term breathing of respirable crystalline silica in concentration greater than the exposure limit may lead to the development of silicosis and/or lung cancer.. As a solid refractory shape, there is no consequential health hazard.

Coal Tar Pitch (CAS N° 65996-93-2) is classified in Annex VI of Directive 1272/2008 as Carcinogen 1A, H350, because of the aromatic hydrocarbons that it contains. Although Coal Tar Pitch is an ingredient in these products, it is substantially transformed to reduce the residual volatile components during the curing process. The risk of exceeding exposure limits is therefore significantly decreased by removing substantially all pitch volatiles during the manufacturing process. As a consequence, even if a component of the plate in very low percentage, it does not represent a risk for the health, safety of the workers or environment since the product is stable and inert.

The plate is inert and stable, and the product as delivered doesn't show any risk to the health, safety or environment.

Dusts produced by the mechanical operations during the maintenance operations, can cause skin, eyes and breathing irritations. Dusts can be also absorbed by inhalation or ingestion.

The smoke (Coal Tar Pitch volatiles) produced when the nozzles are in operation (i.e. they are in contact with the hot liquid) can cause eyes irritation or breathing problems as well as severe injuries to the lung and kidneys and skin if over exposed).

2.1.2. Classification according to Directive 67/548/EEC or Directive 1999/45/EC

The product and substances do not meet any classification criteria according to Directive 67/548/EEC or Directive 1999/45/EC.

Alumina (Al_2O_3, CAS N° 01344-28-1), Graphite (C, CAS N° 07782-42-5) Amorphous Silica (SiO_2, CAS N° 07631-86-9) contained in the plate are not classified in Annex I of Directive 67/548/EEC. See previous section 2.1.1.

Coal Tar Pitch in Annex I of Directive 67/548/EEC is classified as R45, carcinogen, Category 2. See previous section 2.1.1.

2.1.3. Information concerning particular hazards for human and environment:

The product as delivered doesn't show any risk for the health or the environment.

The dusts produced by the handling of the mass could cause skin and eyes irritation.

The smokes, produced during the first heating, can cause eyes irritation or breathing problems as well as liver and kidney injury after long exposure.

2.1.4. Information concerning hazards according to NFPA, HMIS and IARC Regulations:

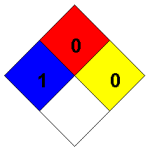
NFPA ratings (scale 0-4)

Health = 1

Fire = 0

Reactivity = 0

Special Hazards = n.a.



HMIS Classification (scale 0-4)

Health =2

Fire = 0

Reactivity = 0

Personal Protection = E

IARC

SiO_2 (CAS N° 7631-86-9) Silicon Dioxide, chemically prepared is classified as Class 3 according to IARC, therefore the agent is not classifiable as to its carcinogenicity to humans.
Crystalline Silica (quartz) is classified in IARC Group 1, based on sufficient evidence for carcinogenicity in experimental animals and humans.
Coal Tar Pitch has been classified as carcinogenic to humans (Group 1), based on sufficient evidence for carcinogenicity in experimental animals and humans.
The other substances in the product are not listed in the IARC as classified carcinogen agents.

2.2. Label elements

2.2.1. Labelling according to Regulation (EC) No 1272/2008 (CLP/GHS)

Substances in the product do not meet any classification criteria, so no labelling is not needed.

2.2.2. Hazard pictograms : *Void*

2.2.3. Signal word : *Void*

2.2.4. Hazard-determining components of labelling *Void*

2.2.5. Hazard statements *Void*

2.3. Other hazards

2.3.1. Results of PBT and vPvB assessment

Substances do not meet the criteria of PBT or vPvB substances. No environmental, toxicological or physical-chemical hazards were identified. **PBT:** Not Applicable. **vPvB:** Not Applicable.

3. SECTION 3: Composition/information on ingredients

2.4. Description of the product

3.1.1 Chemical Characterization: Article

3.1.2 *Description:* Shaped refractory consisting of the following main substances:

Chemical name	CAS N°	EINECS N°	% in weight	Class. acc. 67/548/EEC	Class. Acc. 1272/2008 EEC	Symbol of danger	ACGIH TLV
Aluminium oxide (Al_2O_3)	01344-28-1	215-691-6	70-90	NC	NC	-	10 mg/m^3
Graphite (C)	07782-42-5	231-955-3	3 -10	NC	NC	-	2 mg/m^3
Amorphous Silica (SiO_2)	07631-86-9	231-545-4	2-10	NC	NC	-	3 mg/m^3
Crystalline Silica (SiO_2)	14808-60-7	238-878-4	<1	R48/20 R40	H351	T	0.025 mg/m^3
Pitch, Coal Tar	65996-93-2	266-028-2	1-5	R45	H350	T	0.2 mg/m^3

NC = Not Classified

R40 = Limited evidence of a carcinogenic effect

R45 = May cause cancer

R48/20 = Harmful: danger of serious damage to health by prolonged exposure through inhalation

H351 = Suspected of causing cancer

H350 = May cause cancer

Impurities and dangerous elements: There are no other impurities or dangerous elements relevant for classification and labelling.

4. SECTION 4: First aid measures

4.1. Description of first aid measures

4.1.1. General Information

No special advice must be considered.

4.1.2. In case of eye contact

Remove glasses or contacts if easily possible. Go to the open air. Rinse thoroughly the eyes with fresh clean water for at least 15 min. in case of persistent irritation consult an eye specialist.

4.1.3 In case of Inhalation

Bring the person into the open air and position comfortably. Supply fresh air. In case of breathing difficulties, oxygen may be administered. Keep patient warm. Seek medical attention.

4.1.4 In case of skin contact

Remove dirty clothing. Rinse thoroughly the skin with fresh water and soap for at least 15 min; take off and wash cloths; in case of persistent irritation consult a doctor.

4.1.5 In case of ingestion

As delivered, product not likely to be ingested; but if it occurs, do not induce vomiting. Immediately consult a doctor, never make a senseless person drinking, place in a safe position.

4.1.5 Self protection of the first aider

Only personnel trained in first aid has to supply assistance. All the possible emergency measures have to be applied and the required personal protective equipment has to be used.

4.2. Indication of any immediate medical attention and special treatment needed

In case of inhalation if breathing has stopped, practice artificial respiration. If needed consult immediately a doctor.

5. SECTION 5: Fire-fighting measures

5.1. Extinguishing media

5.1.1 Suitable extinguishing media:

The product is incombustible. Use the appropriate extinguisher for surrounding material. In case of fire, bring a breathing machine to protect yourself from the smokes.

5.1.2 For safety reasons unsuitable extinguishing agents.

No special restriction to extinguishing media.

5.2. Special hazards arising from the product

5.2.1 Hazardous combustion products

Product will not burn, but may generate combustion products when subjected to fire conditions.

5.3. Advice for fire-fighters

Fire fighters have to ensure that all the areas surrounding the fire are protected and kept cool. Fire fighters have to wear self-contained breathing apparatus (SCBA) and full protective clothing including mechanical and chemical resistant gloves and boots when fighting fire. No other special measures are requested.

6. SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

The product is solid and no spills or leakage can occur. Clean up procedures have to be implemented in order to face the generation of a great quantity of dusts.

6.1.1 For non-emergency personnel

Skin, eye, and respiratory protection as needed by conditions. No other special requirements.

6.1.2 For emergency responders

See previous section 6.1.1.

6.2. Environmental precautions

No special requirements. Not an environmentally-sensitive material. The product is solid and no spills or leakage in drains, surface and groundwater and soil are expected to occur. Avoid dispersion of dust in the environment. The reject must be disposed, upon legal procedures.

6.3. Reference to other sections

Refer to protective measures listed in section 7 and 8 and 13 for more information on personal protection, exposure controls or disposal considerations.

7. SECTION 7: Handling and storage

7.1. Precautions for safe handling

7.1.1. *Protective measures*

Handling:	Avoid formation of airborne dust and install exhaustion if not avoidable. Keep away from sparks, heat and open flame. Chunks may have razor-sharp edges. Provide proper protective gear for handling dusty materials. Vacuum dust at point of formation.
Respiratory Protection:	Use respirators approved by competent authority.
Eye Protection:	Use face shields, face screens, goggles or safety glasses with side shields.
Skin Protection:	Not normally required. Take care about possible sharp edges. Use proper gloves.

7.1.2. Advice on general occupational hygiene

Wash with soap and water after handling and before eating, drinking, or smoking. It should clean up after handling.

7.2. Conditions for safe storage, including any incompatibilities

7.2.1. Safe Storage

The product had to be stored in a fresh, dry and ventilated area.

Dust cannot form an explosive mixture with air. In any case, it is recommended to keep away from source of heat and fire sparks (furnaces, boilers, etc.), and open flame in a well-ventilated area away from combustible materials. Avoid exposure to water.

Minimise dust formation using suitable working equipment. Provide good ventilation. Avoid direct contact by provide respiratory protection and protective clothing. If necessary wear safety glasses.

8. SECTION 8: Exposure controls/personal protection

8.1 Control parameters

8.1.1 Occupational exposure limits

At the Workplace

Substance	CAS Number	PEL (mg/m^3)	REL (mg/m^3)	TLV (mg/m^3)
Aluminium oxide (Al_2O_3)	01344-28-1	10 -Total Dust 5 - Respirable Dust	1.5 Short term value: as Respirable Fraction	10 – Respirable Dust
Graphite (C)	07782-42-5	15 – mppcf Respirable Dust	2.5 Respirable Dust	2.0 – Respirable Dust
Amorphous Silica (SiO_2)	07631-86-9	6 Inhalation Total	-	10.0 – Total Dust 3.0 – Respirable Dust
Crystalline Silica (SiO_2)	14808-60-7	$10/(\%SiO_2+2)$	0.05	0.025
Pitch, Coal Tar	65996-93-2	0.2 (as benzene-soluble fraction)	0.1 (as Hexane-extractable fraction)	0.2 (as Benzene- soluble fraction)

OSHA PEL: Occupational Safety and Health Administration (USA). *Permissible Exposure Limit*

NIOSH REL: National Institute for Occupational Safety and Health (USA). *Recommended Exposure Limit*

ACGIH TLV: American Conference of Governmental Industrial Hygienists. *Threshold Limit Value*

8.2 Exposure controls

The product and substances are not classified as hazardous substances and no substance-specific toxicological or eco-toxicological hazards are expected. In consequence, no specific exposure controls are applicable. Nevertheless, the generic advice on accidental release measures and on handling and storage provided in sections 6 and 7 should be followed to minimize release/exposure and technical measures should be applied to comply with national OELs where applicable.

8.3 Appropriate engineering controls

Machining and grinding can result in dust that may contain small quantity of Crystalline Silica. Ensure adequate ventilation. Provide appropriate exhaust ventilation at places where dust is formed in order to control dust below exposure limits. Avoid procedure that cause sparks. Refer to protective measures listed under “handling and storage”.

8.4 Individual protection measures, such as personal protective equipment

Protection of	First Effect
Breathing	the product can be handled as delivered without particular precaution In case of dusts emission, install dust hovers and if necessary, use a mask (EN 149) against dusts; the TVL the total inhalation of non-classified dust is of 10 mg/m3, the one of breathable dust is of 3 mg/m^3. In case of smoke emission, renew the air, and if necessary wear a mask (EN149) suitable against dusts, gas and organic particles
Skin	Wear cloths with long sleeves closed at the wrist, long pants and non-skid abrasive resistant gloves. After manufacturing of these products, only a small residual amount of pitch is left (< 0.3%); nevertheless when handling, safe

	industrial hygiene practices should be followed to avoid exposure.
Eyes:	Wear glasses with side protection
Other	Wear safety boots.

8.5 Environmental exposure controls

Please refer to 8.2.

9. SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

(a) Appearance	Black Solid
(b) Odour	Odourless.
(c) Odour threshold	Not applicable.
(d) pH	Slight Alkaline
(e) Melting point	> 1700°C
(f) Initial boiling point and boiling range	> 2100°C
(g) Flash point	Not applicable
(h) Evaporation rate	Not applicable
(i) Flammability (solid, gas)	Not flammable
(j) Upper/lower flammability or explosive limits	Neither flammable nor explosive.
(k) Vapour pressure	Not applicable
(l) Vapour density	Not applicable.
(m) Relative density to water (=1)	2.80 to 3.20 at room temperature
(n) Solubility	Insoluble in Water
(o) Partition coefficient n-octanol/water	Not applicable
(p) Auto-ignition temperature	Not applicable
(q) Decomposition temperature	Not applicable
(r) Viscosity	Not applicable
(s) Explosive properties	Non explosive.
(t) Oxidising properties	Not oxidising.

10. SECTION 10: STABILITY AND REACTIVITY

10.1 Chemical Reactivity

The product is stable and non reactive under normal pressures and temperatures.

10.2 Chemical Stability

The product is stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No specific hazardous reactions identified.

10.4 Conditions to avoid

Avoid situations which cause dusting.

10.5 Hazardous decomposition products

No hazardous decompositions products have been identified.

11. SECTION 11: Toxicological information

11.1 Information on toxicological effects

11.1.1 Product

The product as delivered doesn't show any health risk. Giving its physical characteristics, it cannot be absorbed by inhalation, skin contact or ingestion.

The smokes utter during the first heating can cause liver and kidneys injury in case of over exposure.

Specific effects:

Cause	**First Effect**	Symptoms
Dusts inhalation:	It can cause breathing irritation.	Cough, Suffocation.
Smoke inhalation:	It can cause irritation to the breathing system.	Cough, Breathing difficulties
Dusts eyes contact	It can cause irritation from abrasion	Pain, redness
Smoke eyes contact	It can cause strong irritation	Pain, redness
Dusts skin contact	It can cause irritation from abrasion	Pain, redness
Ingestion	Side effect is not known effects, not recommended	

Routes of Entry: Inhalation. Ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause drying of the skin. Eyes: Dust may cause irritation. Inhalation: May cause respiratory tract irritation and drying of the mucous membranes. May affect lungs and respiration. Ingestion: Low hazard expected for normal industrial handling and use.

Long term inhalation to high concentration of respirable crystalline silica has been shown to cause silicosis. Evidence exists that suggest chronic exposure to respirable crystalline silica may result in lung cancer, especially when combined with smoking. At this is a high strength solid the correct use of this product will not result in the generation of dust and the consequential exposure to crystalline silica.

12. SECTION 12: Ecological information

12.1 Toxicity

The product is not classified dangerous in the meaning of the European 67/548/EEC Directive and the Regulation (EC) N° 1272/2008.

12.2 Persistence and degradability

The product is enough stable and inert.

12.3 Bio-accumulative potential

12.3.1 Aquatic compartment:

There is no bio-accumulative potential in fish and aquatic invertebrates. There is no indication for biomagnification in marine food chains.

12.3.2 Terrestrial compartment:

No bio-accumulative potential in terrestrial plants.

12.3.3 Secondary poisoning

Based on the available data, there is no indication of a bioaccumulation potential, hence, secondary poisoning is not considered to be critical.

12.4 Mobility in soil

The product in the chemical and physical delivery conditions has not mobility in soil.

12.5 Results of PBT and vPvB assessment

The product is not bio-available, owing to its extreme insolubility in water, it is not systemically available or bio-accumulative, and hence it does not fulfil either of the PBT and vPvB criteria for classification.

12.6 Hazard data

PNEC is not required and cannot technically be calculated.

13. SECTION 13: Disposal Considerations

13.1 Waste treatment methods

13.1.1 Product.

This product does not contain main hazardous ingredients. A waste code in accordance with European Waste Catalogue (EWC) may not be assigned to this product since it admits of a classification only when the consumer uses it for some purpose. During removal, consideration should be given to the potential formation of small quantity of Crystalline Silica, as may have occurred during use at elevate temperature. Exposure to respirable dust should be minimised by appropriate engineering controls and protective equipment. Loose material should be contained to prevent airborne dust.

13.1.2 Unclean packaging:

This product does not possess characteristics which may qualify as hazardous waste. Waste and containers may be disposed of in accordance with applicable national or local guidelines.

14. SECTION 14: Transport information

The product is not defined under national/international road, rail, sea and air transport regulations as a Hazardous Substance.

14.1 UN-Number

Not applicable.

14.2 UN proper shipping name

Not applicable.

14.3 Transport hazard class(es)

ADR (Road)	The mixture is not under ADR regulation. No hazardous classes can be identified
ADR (Rail)	The mixture is not under ADR regulation. No hazardous classes can be identified
IMDG / GGV (Sea)	Not Applicable
IATA – DGR / ICTAO – TI (Air)	Not Applicable

14.4 Packing group

On the basis of the CE N° 1272/2008 on Classification, Labelling and Packaging (CLP) of substances and mixtures, which amends the 67/548/CEE and 1999/45/CE and modifies the CE N° 1907/2006 Directive (REACH) the product does not need classification and Labelling according to par. 1.3.4 of the Annex I to the regulation above mentioned.

14.5 Environmental hazards

The preparation if utilised according to regulation does not represent any hazard for the environment.

14.6 Special precautions for user

Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

According to above mentioned Annex II of MARPOL 73/78 the preparation is not classified as a hazardous, and as a solid substance does not need of IBC code.

15. SECTION 15: REGULATORY INFORMATION

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

15.1.1 EU regulations

Authorisations and/or restrictions on use:

Authorisations:	No authorizations needed.
Restrictions on use:	No restrictions on use have been identified.

Other EU regulations: The product is not subject to particular regulation (e.g. regulation on ozone depleting substances, Seveso directive, regulation on persistent organic pollution, regulation about limitation of emissions of volatile organic compounds, etc.).

Hazard symbol:	Not applicable
Hazard Statements (s) H:	Not applicable
Precautionary Statement (s) P:	Not applicable
Risk phrase (s) R:	Not applicable
Safety phrase (s) S:	Not applicable

15.2. Chemical Safety Assessment:

A Chemical Safety Assessment has not been carried out.

16. SECTION 16: OTHER INFORMATION

16.1 Revision and Indication of changes

This is a new version of the SDS for TN-5 Nozzles for Flow Control, Version 2011.Previous version of SDS has been revised according to Regulation (EC) No. 1907/2006 (“REACH”) and Regulation EC No. 453/2010 (Annex II). All chapters of this SDS have been revised according to Regulation (EC) No. 1272/2008 (CLP).

16.2 Key literature references and sources for data

Literature references:

- Regulation (EC) No 1907/2006.
- Regulation (EC) No 45/1999
- Regulation (EC) No 548/1967
- Regulation (EC) No 1272/2008
- Chemportal: The global portal to information on chemical substances.
- ESIS: The European chemical substances information system
- HSDB: National library of medicine, Hazardous substances data bank.
- IPCS INCHEM: International program on chemical safety.
- Haz-map: occupational exposure to hazardous agents.
- United States Department of Labour.
- NIOSH Pocket Guide to Chemical Hazards
- NIOSH Chemical Listing and Documentation of Revised IDLH Values
- International Chemical Safety Cards (WHO-IPCS-ILO)
- NFPA National Fire Protection Association
- HMIS Hazardous Materials Information System
- IARC International Agency for Research on Cancer

16.3 Training advice

All the workers have to be trained and informed of all the risks and safety measures detailed in this safety datasheet.

16.4 Disclaimer

DUFERCO SA provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. The information given herein are taken from our knowledge and from sources believed to be accurate, right and complete to the date of issue of this material safety data sheet.

It applies only to the mentioned product, and doesn't give any warranty for the quality and deepness of the characteristic of the product that can vary upon the origins, the composition and the concentration of the composing substances.

This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information shall exercise their independent judgment in determining its appropriateness for a particular purpose. Furthermore, this SDS has been generated based on legal requirements according to EC 1907/2006 (REACH) and based on information available as of October 2011.