Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF)

Product Identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms</td>
<td>CSP04901, CSP04902, CSP04903, CSP04904</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

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

| Relevant identified uses            | Stabilized urea premix for use in reducing nitrogen oxides in diesel engines. |

Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Registered company name</th>
<th>Cummins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>2 Carribean Drive Scoresby VIC 3179 Australia</td>
</tr>
<tr>
<td>Telephone</td>
<td>+61 3 9765 3222</td>
</tr>
<tr>
<td>Fax</td>
<td>+61 3 9763 0079</td>
</tr>
<tr>
<td>Website</td>
<td>Not Available</td>
</tr>
<tr>
<td>Email</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Emergency telephone number

| Association / Organisation         | Not Available                                            |
| Emergency telephone numbers        | Not Available                                            |
| Other emergency telephone numbers  | Not Available                                            |

CHEMWATCH EMERGENCY RESPONSE

<table>
<thead>
<tr>
<th>Primary Number</th>
<th>Alternative Number 1</th>
<th>Alternative Number 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800 039 008</td>
<td>1800 039 008</td>
<td>+612 9186 1132</td>
</tr>
</tbody>
</table>

Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

<table>
<thead>
<tr>
<th>Poisons Schedule</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Label elements

<table>
<thead>
<tr>
<th>Hazard pictogram(s)</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL WORD</td>
<td>NOT APPLICABLE</td>
</tr>
</tbody>
</table>

Hazard statement(s)

Not Applicable
Precautionary statement(s) Prevention
Not Applicable

Precautionary statement(s) Response
Not Applicable

Precautionary statement(s) Storage
Not Applicable

Precautionary statement(s) Disposal
Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances
See section below for composition of Mixtures

Mixtures

<table>
<thead>
<tr>
<th>CAS No</th>
<th>%[weight]</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>57-13-6</td>
<td>30-50</td>
<td>urea</td>
</tr>
</tbody>
</table>

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact
If this product comes in contact with the eyes:
> Wash out immediately with fresh running water.
> Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
> Seek medical attention without delay; if pain persists or recurs seek medical attention.
> Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact
If skin contact occurs:
> Immediately remove all contaminated clothing, including footwear.
> Flush skin and hair with running water (and soap if available).
> Seek medical attention in event of irritation.

Inhalation
> If fumes or combustion products are inhaled remove from contaminated area.
> Lay patient down. Keep warm and rested.
> Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
> Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
> Transport to hospital, or doctor, without delay.

Ingestion
> If swallowed do NOT induce vomiting.
> If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
> Observe the patient carefully.
> Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
> Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
> Seek medical advice.

Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media
> There is no restriction on the type of extinguisher which may be used.
> Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

<table>
<thead>
<tr>
<th>Fire Incompatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result</td>
</tr>
</tbody>
</table>

Advice for firefighters
Fire Fighting
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves in the event of a fire.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.

Fire/Explosion Hazard
- Non combustible.
- Not considered a significant fire risk, however containers may burn.
- Decomposition may produce toxic fumes of:
  - carbon dioxide (CO₂)
  - nitrogen oxides (NOₓ)
  - other pyrolysis products typical of burning organic material.
- May emit poisonous fumes. In fire situation urea melts and flows, on further heating it decomposes giving off ammonia gas. Thermal and oxidative degradation products can include ammonia, biuret, and cyanuric acid.

HAZCHEM
Not Applicable

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
See section 8

Environmental precautions
See section 12

Methods and material for containment and cleaning up

| Minor Spills | Clean up all spills immediately. |
|             | Avoid breathing vapours and contact with skin and eyes. |
|             | Control personal contact with the substance, by using protective equipment. |
|             | Contain and absorb spill with sand, earth, inert material or vermiculite. |

| Major Spills | Moderate hazard. |
|             | Clear area of personnel and move upwind. |
|             | Alert Fire Brigade and tell them location and nature of hazard. |
|             | Wear breathing apparatus plus protective gloves. |

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

| Safe handling | Avoid all personal contact, including inhalation. |
|              | Wear protective clothing when risk of exposure occurs. |
|              | Use in a well-ventilated area. |
|              | Avoid contact with moisture. |
|              | **DO NOT** allow clothing wet with material to stay in contact with skin |

| Other information | Store in original containers. |
|                  | Keep containers securely sealed. |
|                  | Store in a cool, dry, well-ventilated area. |
|                  | Store away from incompatible materials and foodstuff containers. |

Conditions for safe storage, including any incompatibilities

| Suitable container | Polyethylene or polypropylene container. |
|                   | Packing as recommended by manufacturer. |
|                   | Check all containers are clearly labelled and free from leaks. |

| Storage incompatibility | Urea: |
|                         | forms anhydrous ammonia and nitrous vapours on contact with hot surfaces |
|                         | reacts violently with strong oxidisers, chlorine, inorganic chlorides, chlorites, chromyl chloride, dichromates, dicyanofurazan, fluorine, gallium perchlorate, hydrogen peroxide, lead dioxide, nitrites, nitrates, perchlorates, titanium tetrachloride, triethylene tetramine |
|                         | ignites or explodes on reaction with ammonium nitrate, chromyl chloride, nitrosyl perchlorate, phosphorus pentachloride |
|                         | may form highly explosive nitrogen trichloride on contact with hexanitroethane, perchloryl fluoride, sodium perchlorate, trichloroisocyanuric acid, hypochlorites and other chlorinating agents |
|                         | is incompatible with oxalic acid, sodium dichlorocyanurate |
|                         | Avoid reaction with oxidising agents |
SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA
Not Available

EMERGENCY LIMITS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Material name</th>
<th>TEEL-1</th>
<th>TEEL-2</th>
<th>TEEL-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>Urea</td>
<td>30 mg/m³</td>
<td>280 mg/m³</td>
<td>1,700 mg/m³</td>
</tr>
</tbody>
</table>

Exposure controls

Appropriate engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are:

- Process controls which involve changing the way a job activity or process is done to reduce the risk.
- Enclosure and/or isolation of emission source which keeps a selected hazard “physically” away from the worker and ventilation that strategically “adds” and “removes” air in the work environment.

Personal protection

Eye and face protection

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.

Skin protection

See Hand protection below

Hands/feet protection

- Wear chemical protective gloves, e.g. PVC.
- Wear safety footwear or safety gumboots, e.g. Rubber

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care.

Body protection

See Other protection below

Other protection

- Overalls.
- P.V.C. apron.
- Barrier cream.

Thermal hazards

Not Available

Respiratory protection

Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content. The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear colourless slightly alkaline liquid with an ammoniacal odour; mixes with water.</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Relative density (Water = 1)</td>
<td>1.094</td>
</tr>
</tbody>
</table>
**SECTION 10 STABILITY AND REACTIVITY**

**Reactivity**
- See section 7

**Chemical stability**
- Unstable in the presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

**Possibility of hazardous reactions**
- See section 7

**Conditions to avoid**
- See section 7

**Incompatible materials**
- See section 7

**Hazardous decomposition products**
- See section 5

**SECTION 11 TOXICOLOGICAL INFORMATION**

**Information on toxicological effects**

**Inhaled**
There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Urea is generally regarded as non-harmful in small amounts. However, exposure should be kept as low as practicable. People with asthma should avoid prolonged contact with urea dust. Urea may cause irritation of the respiratory tract, causing coughing and shortness of breath.

**Ingestion**
Urea may cause irritation to the digestive tract, nausea, vomiting, diarrhoea, salt depletion, headache and confusion.

**Skin Contact**
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Urea is a common ingredient of skin ointment and acts to soften dry scaly skin. Prolonged skin contact may cause stinging sensation, irritation and skin inflammation in some people. High doses in clinical application has caused nausea and vomiting. Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

**Eye**
The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

**Chronic**
Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
Urea is a body metabolic waste but high exposure to it was reported to cause emphysema, disturbances in protein metabolism and chronic weight loss. However skin exposure of rats produced no reddening but low brain and prostate weights were recorded. It should be avoided in those with kidney or liver impairment.

**Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF)**

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

**Chemwatch: 22-2890**

**Version No: 4.1.1.1**

**Page 5 of 8**

**Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF)**

**Issue Date: 27/06/2017**

**Print Date: 16/01/2018**

Continued...
**TOXICITY**

**IRRITATION**

- Oral (rat) LD50: 8471 mg/kg
- Skin (human): 22 mg/3 d (I)- mild

**Legend:**

1. Value obtained from Europe ECHA Registered Substances - Acute toxicity
2. Value obtained from manufacturer's SDS.

**NOTE:** Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA. Altered sleep time, change in motor activity, antipsychosis, dyspnea, methaemoglobinemia, convulsions, lymphomas recorded. Carcinogenic by RTECS criteria.

**Cummins Aqueous Urea Solution Diesel Exhaust Fluid (DEF) & UREA**

Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

For urea:

- Urea is used in ointments and creams to treat dry skin. Long-term follow-up studies have indicated that the substance does not cause allergy, and is virtually free from side effects. It is usually tolerated well, although diarrhea is sometimes reported after ingestion of very large amounts (60-90 grams/day). There is the possibility that infection of H.

**Acute Toxicity**

- Carcinogenicity

**Skin Irritation/Corrosion**

- Reproductivity

**Serious Eye Damage/Irritation**

- STOT - Single Exposure

**Respiratory or Skin sensitisation**

- STOT - Repeated Exposure

**Mutagenicity**

- Aspiration Hazard

**Legend:**

- Data available but does not fill the criteria for classification
- Data available to make classification
- Data Not Available to make classification

**SECTION 12 ECOLOGICAL INFORMATION**

**Toxicity**

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Test Duration (HR)</th>
<th>Species</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Test Duration (HR)</th>
<th>Species</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50</td>
<td>96</td>
<td>Fish</td>
<td>5mg/L</td>
<td>4</td>
</tr>
<tr>
<td>EC50</td>
<td>48</td>
<td>Crustacea</td>
<td>3910mg/L</td>
<td>4</td>
</tr>
<tr>
<td>BCF</td>
<td>24</td>
<td>Algae or other aquatic plants</td>
<td>0.05mg/L</td>
<td>4</td>
</tr>
<tr>
<td>EC100</td>
<td>24</td>
<td>Crustacea</td>
<td>&gt;10000mg/L</td>
<td>1</td>
</tr>
<tr>
<td>NOEC</td>
<td>96</td>
<td>Crustacea</td>
<td>1000mg/L</td>
<td>4</td>
</tr>
</tbody>
</table>

**Legend:**

- Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

**DO NOT** discharge into sewer or waterways.

**Persistence and degradability**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>
Bioaccumulative potential

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Bioaccumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>LOW (BCF = 10)</td>
</tr>
</tbody>
</table>

Mobility in soil

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>urea</td>
<td>LOW (KOC = 4.191)</td>
</tr>
</tbody>
</table>

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Legislation addressing waste disposal requirements may differ by country, state and/or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use.

- **DO NOT** allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licensed to accept chemical and/or pharmaceutical wastes or incineration in a licensed apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers.

SECTION 14 TRANSPORT INFORMATION

Labels Required

<table>
<thead>
<tr>
<th>Marine Pollutant</th>
<th>HAZCHEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Land transport (ADG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

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

**UREA(57-13-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

Australia Inventory of Chemical Substances (AICS)

<table>
<thead>
<tr>
<th>National Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - AICS</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - DSL</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - NDSL</td>
<td>N (urea)</td>
</tr>
<tr>
<td>China - IECSC</td>
<td>Y</td>
</tr>
<tr>
<td>Europe - EINEC / ELINCS / NLP</td>
<td>Y</td>
</tr>
</tbody>
</table>
SECTION 16 OTHER INFORMATION

Other information
Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations
- PC—TWA: Permissible Concentration-Time Weighted Average
- PC—STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ACGIH: American Conference of Governmental Industrial Hygienists
- STEL: Short Term Exposure Limit
- TEEL: Temporary Emergency Exposure Limit.
- IDLH: Immediately Dangerous to Life or Health Concentrations
- OSF: Odour Safety Factor
- NOAEL: No Observed Adverse Effect Level
- LOAEL: Lowest Observed Adverse Effect Level
- TLV: Threshold Limit Value
- LOD: Limit Of Detection
- OTV: Odour Threshold Value
- BCF: BioConcentration Factors
- BEI: Biological Exposure Index

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