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

1.1. Product identifier
Trade name or designation of the mixture: LP™ Arctic Grade™ Flow Improver
Registration number: If a registration number is not provided, then the substance is either exempt or still within the transition period for registration.
Synonyms: None.
Issue date: 16-May-2017
Version number: 03
Revision date: 18-September-2018
Supersedes date: 09-February-2018

1.2. Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Flow Improver.
Uses advised against: Other uses are not recommended unless an assessment demonstrates potential exposures will be controlled.

1.3. Details of the supplier of the safety data sheet
Manufacturer: LiquidPower Specialty Products Inc.
Address: One BriarLake Plaza
2000 W Sam Houston Pkwy S
Suite 400
Houston, TX 77042
Telephone: 1.713.339.8703 or 1.800.897.2774
Email: SDS@LiquidPower.com
Website: www.LiquidPower.com
Emergency telephone: +1 703.527.3887 (USA)
+1 800.424.9300 (USA)
CHEMTREC UK: +(44)-870-8200418 & 1 703-527-3887

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards
Serious eye damage/eye irritation: Category 2
H319 - Causes serious eye irritation.

Environmental hazards
Hazardous to the aquatic environment, long-term aquatic hazard: Category 3
H412 - Harmful to aquatic life with long lasting effects.

Hazard summary: Causes serious eye irritation. Dangerous for the environment if discharged into watercourses. Occupational exposure to the substance or mixture may cause adverse health effects.

2.2. Label elements
Label according to Regulation (EC) No. 1272/2008 as amended

Signal word: Warning

Hazard statements:
H319: Causes serious eye irritation.
H412: Harmful to aquatic life with long lasting effects.
Precautionary statements

Prevention
- P264: Wash thoroughly after handling.
- P273: Avoid release to the environment.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response
- P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage
- P403 + P235: Store in a well-ventilated place. Keep cool.

Disposal
- P501: Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information
- None known.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>%</th>
<th>CAS-No. / EC No.</th>
<th>REACH Registration No.</th>
<th>Index No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohols, C7-9-iso-, C8-rich</td>
<td>35 - 45</td>
<td>68526-83-0 / 271-231-4</td>
<td>01-2119449923-30-0002 -</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Classification:</td>
<td>Skin Irrit. 2;H315, Eye Irrit. 2;H319, Aquatic Chronic 3;H412</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,2-Propylene glycol</td>
<td>15 - 20</td>
<td>57-55-6 / 200-338-0</td>
<td>01-2119456809-23-0028 -</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Classification:</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octan-1-ol</td>
<td>2 - 10</td>
<td>111-87-5 / 203-917-6</td>
<td>01-2119486978-10-0012 -</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Classification:</td>
<td>Eye Irrit. 2;H319</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Composition comments
- All concentrations are in percent by weight. Components not listed are either non-hazardous or are below reportable limits. The full text for all H-statements is displayed in section 16.

SECTION 4: First aid measures

General information
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

<table>
<thead>
<tr>
<th>Inhalation</th>
<th>Skin contact</th>
<th>Eye contact</th>
<th>Ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move to fresh air. Call a physician if symptoms develop or persist.</td>
<td>Wash off with soap and water. Get medical attention if irritation develops and persists.</td>
<td>Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</td>
<td>Rinse mouth. Get medical attention if symptoms occur.</td>
</tr>
</tbody>
</table>

4.2. Most important symptoms and effects, both acute and delayed
- Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

4.3. Indication of any immediate medical attention and special treatment needed
- Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards
- No unusual fire or explosion hazards noted.

5.1. Extinguishing media

Suitable extinguishing media

Unsuitable extinguishing media
- Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture
- During fire, gases hazardous to health may be formed.

5.3. Advice for firefighters

Special protective equipment for firefighters
- Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Special fire fighting procedures
Move containers from fire area if you can do so without risk.

Specific methods
Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel
Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained.

For emergency responders
Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up.

6.2. Environmental precautions
Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so.

6.3. Methods and material for containment and cleaning up
Use water spray to reduce vapours or divert vapour cloud drift. Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use.

6.4. Reference to other sections
For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Avoid release to the environment.

7.2. Conditions for safe storage, including any incompatibilities
Store in original tightly closed container. Store away from incompatible materials (see section 10 of the SDS).

7.3. Specific end use(s)
Flow Improver.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
Occupational exposure limits

<table>
<thead>
<tr>
<th>UK. EH40 Workplace Exposure Limits (WELs)</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,2-Propylene glycol (CAS 57-55-6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>474 mg/m3</td>
<td>Total vapour and particulates.</td>
</tr>
<tr>
<td></td>
<td>10 mg/m3</td>
<td>Particulate.</td>
</tr>
<tr>
<td></td>
<td>150 ppm</td>
<td>Total vapour and particulates.</td>
</tr>
</tbody>
</table>

Biological limit values
No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures
Follow standard monitoring procedures.

Derived no effect levels (DNELs)
Not available.

Predicted no effect concentrations (PNECs)
Not available.

8.2. Exposure controls
Appropriate engineering controls
Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide easy access to water supply and eye wash facilities.

Individual protection measures, such as personal protective equipment
General information
Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection
Wear safety glasses with side shields (or goggles). Wear a face shield if there is a risk of splashing.
Skin protection
- Hand protection Wear appropriate chemical resistant gloves. Nitrile, butyl rubber or Viton (fluoroelastomers) gloves are recommended.
- Other Normal work clothing (long sleeved shirts and long pants) is recommended.
Respiratory protection In case of inadequate ventilation or risk of inhalation of vapours, use suitable respiratory equipment with gas filter (type A2).
Thermal hazards Not applicable.

Hygiene measures Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental exposure controls Inform appropriate managerial or supervisory personnel of all environmental releases.

SECTION 9: Physical and chemical properties
9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Form</td>
<td>White</td>
</tr>
<tr>
<td>Odour</td>
<td>Sweet, pungent</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>&lt; -40 °C (&lt; -40 °F)</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>185 °C (365 °F)</td>
</tr>
<tr>
<td>Flash point</td>
<td>83.0 °C (181.4 °F)</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Less than water</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability limit - lower (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability limit - upper (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>1 mmHg (37.8°C)</td>
</tr>
<tr>
<td>Vapour density</td>
<td>&lt; 1 (Air = 1)</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.87 - 0.89 (15.6°C)</td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td>Negligible in water</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>150 cP @ 511s-1 (Non-Newtonian) (25 °C)</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>Not oxidising</td>
</tr>
</tbody>
</table>

SECTION 10: Stability and reactivity
10.1. Reactivity The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability Material is stable under normal conditions.
10.3. Possibility of hazardous reactions No dangerous reaction known under conditions of normal use.
10.4. Conditions to avoid Avoid temperatures exceeding the flash point. Contact with incompatible materials.
10.5. Incompatible materials Strong oxidising agents.
10.6. Hazardous decomposition products Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours.

SECTION 11: Toxicological information
General information Occupational exposure to the substance or mixture may cause adverse effects.
Information on likely routes of exposure

Inhalation
No adverse effects due to inhalation are expected.

Skin contact
Prolonged skin contact may cause temporary irritation.

Eye contact
Causes serious eye irritation.

Ingestion
May cause discomfort if swallowed. However, ingestion is not likely to be a primary route of occupational exposure.

Symptoms
Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

11.1. Information on toxicological effects

Acute toxicity
Not expected to be acutely toxic.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octan-1-ol (CAS 111-87-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Guinea pig</td>
<td>&gt; 500 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Rabbit</td>
<td>&gt; 5 g/kg</td>
</tr>
<tr>
<td>Oral</td>
<td>Rat</td>
<td>&gt; 5 g/kg</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation
Prolonged skin contact may cause temporary irritation.

Corrosivity
LP™ Arctic Grade™ Flow Improver

<table>
<thead>
<tr>
<th>OECD 404</th>
<th>Result: Very slight irritant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species: Rabbit</td>
<td></td>
</tr>
</tbody>
</table>

Serious eye damage/eye irritation
Causes serious eye irritation.

Respiratory sensitisation
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Skin sensitisation
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Germ cell mutagenicity
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Carcinogenicity
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Reproductive toxicity
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Specific target organ toxicity - single exposure
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Specific target organ toxicity - repeated exposure
No information available on the mixture. However, none of the components are classified in respect of this hazard (or are present at a level below the concentration threshold for classification).

Aspiration hazard
Not an aspiration hazard.

Mixture versus substance information
The product is a mixture.

Other information
None known.

SECTION 12: Ecological information

12.1. Toxicity
Harmful to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohols, C7-9-isos-, C8-rich (CAS 68526-83-0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algae</td>
<td>ErC50</td>
<td>Pseudokirchnerella subcapitata 23 mg/l, 72 h</td>
</tr>
<tr>
<td>Crustacea</td>
<td>LC50</td>
<td>Daphnia magna        31.8 mg/l, 48 h</td>
</tr>
</tbody>
</table>

LP™ Arctic Grade™ Flow Improver

937352 Version #: 03 Revision date: 18-September-2018 Issue date: 16-May-2017

SDS UK
Components Test Results

<table>
<thead>
<tr>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pimephales promelas</td>
<td>14 mg/l, 96 h</td>
</tr>
<tr>
<td>Ceriodaphnia dubia</td>
<td>0.28 mg/l, 6 day</td>
</tr>
<tr>
<td>Pimephales promelas</td>
<td>&gt; 0.28 mg/l, 33 day</td>
</tr>
</tbody>
</table>

Octan-1-ol (CAS 111-87-5)

Aquatic

<table>
<thead>
<tr>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fathead minnow (Pimephales promelas)</td>
<td>12.3 - 13.4 mg/l, 96 hours</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

No data is available on the degradability of this product.

12.3. Bioaccumulative potential

The product is not expected to bioaccumulate.

Partition coefficient

<table>
<thead>
<tr>
<th>n-octanol/water (log Kow)</th>
<th>Octan-1-ol (CAS 111-87-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Bioconcentration factor (BCF)

Not available.

12.4. Mobility in soil

Expected to have low mobility in soil and sediments with adsorption being the predominant physical process.

12.5. Results of PBT and vPvB assessment

This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.

12.6. Other adverse effects

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste

Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging

Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

EU waste code

16 03 05*

This code has been assigned based upon the most common uses for this material and may not reflect contaminants resulting from actual use. Waste generators/producers are responsible for assessing the actual process used when generating the waste and it's contaminants in order to assign the proper waste disposal code.

This material, if discarded as produced, should be assigned the following hazardous waste properties: HP 4, HP 14.

Disposal methods/information

Waste material from this product should not be exposed to waste streams or sumps containing any concentration of hydrocarbon. This will cause formation of gelled substances that may plug pipes. Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Special precautions

Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. - 14.6.: Not regulated as dangerous goods.

RID

14.1. - 14.6.: Not regulated as dangerous goods.

ADN

14.1. - 14.6.: Not regulated as dangerous goods.

IATA

14.1. - 14.6.: Not regulated as dangerous goods.

IMDG

14.1. - 14.6.: Not regulated as dangerous goods.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not established.

SECTION 15: Regulatory information

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

EU regulations
Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended
Not listed.
Not listed.
Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended
Not listed.
Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended
Not listed.
Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended
Not listed.
Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended
Not listed.
Not listed.
Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA
Not listed.

Authorisations
Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended
Not listed.

Restrictions on use
Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended
Not listed.
Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.
Not listed.

Other EU regulations
Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended
Not listed.

Other regulations
This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended. The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended.

National regulations
Follow national regulation for work with chemical agents.

15.2. Chemical safety assessment
No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations
EC50: Effective Concentration, 50%.
ErC50: EC50 in terms of reduction of growth rate.
LC50: Lethal Concentration, 50%.
LD50: Lethal Dose, 50%.
PBT: Persistent, bioaccumulative, toxic.
TWA: Time weighted average.
vPvB: very Persistent, very Bioaccumulative.

References
EPA: AQUIRE database

Information on evaluation method leading to the classification of mixture
The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

Full text of any H-statements not written out in full under Sections 2 to 15
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H412 Harmful to aquatic life with long lasting effects.

Training information
Follow training instructions when handling this material.

Disclaimer
LiquidPower Specialty Products Inc. cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user’s responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.