



Safety Data Sheet

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| Document Group: | 34-5035-0 | Version Number: | 3.05 |
| Issue Date: | 07/11/19 | Supersedes Date: | 03/05/19 |

SECTION 1: Identification

1.1. Product identifier

3M™ Novec™ 1902 Electronic Grade Coating

Product Identification Numbers

98-0212-4860-8, 98-0212-4861-6, 98-0212-4862-4, 98-0212-4875-6
7100059103, 7100054757

1.2. Recommended use and restrictions on use

Recommended use

Protective Barrier Coating. For Industrial Use Only. Not Intended for Use as a Medical Device or Drug.

Restrictions on use

One or more components in this material are approved for specific commercial use(s) under a U.S. EPA low volume exemption. Approved commercial use: Coating for components in electronic devices.

3M Electronics Markets Materials Division (EMMD) will not knowingly sample, support, or sell its products for incorporation in medical and pharmaceutical products and applications in which the 3M product will be temporarily or permanently implanted into humans or animals. The customer is responsible for evaluating and determining that a 3M EMMD product is suitable and appropriate for its particular use and intended application. The conditions of evaluation, selection, and use of a 3M product can vary widely and affect the use and intended application of a 3M product. Because many of these conditions are uniquely within the user's knowledge and control, it is essential that the user evaluate and determine whether the 3M product is suitable and appropriate for a particular use and intended application, and complies with all local applicable laws, regulations, standards, and guidance.

1.3. Supplier's details

| | |
|----------------------|--|
| MANUFACTURER: | 3M |
| DIVISION: | Electronics Materials Solutions Division |
| ADDRESS: | 3M Center, St. Paul, MN 55144-1000, USA |
| Telephone: | 1-888-3M HELPS (1-888-364-3577) |

1.4. Emergency telephone number

1-800-364-3577 or (651) 737-6501 (24 hours)

SECTION 2: Hazard identification

2.1. Hazard classification

Not classified as hazardous according to OSHA Hazard Communication Standard, 29 CFR 1910.1200.

2.2. Label elements

Signal word

Not applicable.

Symbols

Not applicable.

Pictograms

Not applicable.

2% of the mixture consists of ingredients of unknown acute dermal toxicity.

SECTION 3: Composition/information on ingredients

| Ingredient | C.A.S. No. | % by Wt |
|--------------------------------|---------------|---------|
| Ethyl nonafluoroisobutyl ether | 163702-06-5 | 60 - 70 |
| Ethyl nonafluorobutyl ether | 163702-05-4 | 25 - 35 |
| Fluoroaliphatic polymer | Trade Secret* | 1 - 5 |
| METHYL NONAFLUROBUTYL ETHER | 163702-07-6 | < 5 |
| METHYL NONAFLUROISOBTYL ETHER | 163702-08-7 | < 5 |

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:

Remove person to fresh air. If you feel unwell, get medical attention.

Skin Contact:

Wash with soap and water. If you feel unwell, get medical attention.

Eye Contact:

Flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. If signs/symptoms persist, get medical attention.

If Swallowed:

Rinse mouth. If you feel unwell, get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

See Section 11.1. Information on toxicological effects.

4.3. Indication of any immediate medical attention and special treatment required

Not applicable.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Use a fire fighting agent suitable for the surrounding fire.

5.2. Special hazards arising from the substance or mixture

Exposure to extreme heat can give rise to thermal decomposition.

Hazardous Decomposition or By-Products

| <u>Substance</u> | <u>Condition</u> |
|-------------------|-------------------|
| Carbon monoxide | During Combustion |
| Carbon dioxide | During Combustion |
| Hydrogen Fluoride | During Combustion |

5.3. Special protective actions for fire-fighters

When fire fighting conditions are severe and total thermal decomposition of the product is possible, wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Observe precautions from other sections.

6.2. Environmental precautions

Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities. Clean up residue with an appropriate solvent selected by a qualified and authorized person. Ventilate the area with fresh air. Read and follow safety precautions on the solvent label and SDS. Seal the container. Dispose of collected material as soon as possible in accordance with applicable local/regional/national/international regulations.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Do not breathe thermal decomposition products. Store work clothes separately from other clothing, food and tobacco products. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid release to the environment. No smoking: Smoking while using this product can result in contamination of the tobacco and/or smoke and lead to the formation of hazardous decomposition products.

7.2. Conditions for safe storage including any incompatibilities

No special storage requirements.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

| <u>Ingredient</u> | <u>C.A.S. No.</u> | <u>Agency</u> | <u>Limit type</u> | <u>Additional Comments</u> |
|-----------------------------|-------------------|---------------|---------------------------|----------------------------|
| Ethyl nonafluorobutyl ether | 163702-05- | Manufacturer | TWA(as total isomers):200 | |

| | | | | |
|---------------------------------|-------------|-------------------------|---|--|
| | 4 | determined | ppm(2160 mg/m3) | |
| Ethyl nonafluoroisobutyl ether | 163702-06-5 | Manufacturer determined | TWA(as total isomers):200 ppm(2160 mg/m3) | |
| METHYL NONAFLUOROBUTYL ETHER | 163702-07-6 | AIHA | TWA:750 ppm | |
| METHYL NONAFLUOROISOBUTYL ETHER | 163702-08-7 | AIHA | TWA:750 ppm | |

ACGIH : American Conference of Governmental Industrial Hygienists
 AIHA : American Industrial Hygiene Association
 CMRG : Chemical Manufacturer's Recommended Guidelines
 OSHA : United States Department of Labor - Occupational Safety and Health Administration
 TWA: Time-Weighted-Average
 STEL: Short Term Exposure Limit
 CEIL: Ceiling

8.2. Exposure controls

8.2.1. Engineering controls

Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

8.2.2. Personal protective equipment (PPE)

Eye/face protection

None required.

Skin/hand protection

Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. Selection should be based on use factors such as exposure levels, concentration of the substance or mixture, frequency and duration, physical challenges such as temperature extremes, and other use conditions. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible gloves/protective clothing.

Gloves made from the following material(s) are recommended: Nitrile Rubber

Respiratory protection

None required.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

| | |
|----------------------------------|--------------------------|
| General Physical Form: | Liquid |
| Odor, Color, Grade: | Clear colorless liquid |
| Odor threshold | <i>No Data Available</i> |
| pH | <i>Not Applicable</i> |
| Melting point | <i>Not Applicable</i> |
| Boiling Point | 165 °F |
| Flash Point | No flash point |
| Evaporation rate | <i>No Data Available</i> |
| Flammability (solid, gas) | Not Applicable |
| Flammable Limits(LEL) | <i>Not Applicable</i> |
| Flammable Limits(UEL) | <i>Not Applicable</i> |
| Vapor Pressure | 200 mmHg |
| Vapor Density | <i>No Data Available</i> |
| Density | 1.5 g/ml |
| Specific Gravity | 1.5 [Ref Std: WATER=1] |

| | |
|--|--------------------------|
| Solubility In Water | 4 ppm |
| Solubility- non-water | <i>No Data Available</i> |
| Partition coefficient: n-octanol/ water | <i>No Data Available</i> |
| Autoignition temperature | <i>Not Applicable</i> |
| Decomposition temperature | <i>No Data Available</i> |
| Viscosity | 2 centipoise |
| Percent volatile | 98 % |

SECTION 10: Stability and reactivity

10.1. Reactivity

This material is considered to be non reactive under normal use conditions.

10.2. Chemical stability

Stable.

10.3. Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

None known.

10.6. Hazardous decomposition products

| <u>Substance</u> | <u>Condition</u> |
|-------------------------------|--|
| Carbon monoxide | At Elevated Temperatures - at extreme conditions of heat |
| Carbon dioxide | At Elevated Temperatures - at extreme conditions of heat |
| Hydrogen Fluoride | At Elevated Temperatures - at extreme conditions of heat |
| Perfluoroisobutylene (PFIB) | At Elevated Temperatures - at extreme conditions of heat |
| Toxic Vapor, Gas, Particulate | At Elevated Temperatures - at extreme conditions of heat |

Refer to section 5.2 for hazardous decomposition products during combustion.

If the product is exposed to extreme condition of heat from misuse or equipment failure, toxic decomposition products that include hydrogen fluoride and perfluoroisobutylene can occur.

SECTION 11: Toxicological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

11.1. Information on Toxicological effects

Signs and Symptoms of Exposure

Based on test data and/or information on the components, this material may produce the following health effects:

Inhalation:

No known health effects.

Skin Contact:

May be harmful in contact with skin.

Eye Contact:

Contact with the eyes during product use is not expected to result in significant irritation.

Ingestion:

May be harmful if swallowed.

Toxicological Data

If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Acute Toxicity

| Name | Route | Species | Value |
|---------------------------------|----------------------------|---------|--|
| Overall product | Dermal | | No data available; calculated ATE2,000 - 5,000 mg/kg |
| Overall product | Ingestion | | No data available; calculated ATE2,000 - 5,000 mg/kg |
| Ethyl nonafluoroisobutyl ether | Dermal | | LD50 estimated to be 2,000 - 5,000 mg/kg |
| Ethyl nonafluoroisobutyl ether | Inhalation-Vapor (4 hours) | Rat | LC50 > 989 mg/l |
| Ethyl nonafluoroisobutyl ether | Ingestion | Rat | LD50 > 2,000 mg/kg |
| Ethyl nonafluorobutyl ether | Dermal | | LD50 estimated to be 2,000 - 5,000 mg/kg |
| Ethyl nonafluorobutyl ether | Inhalation-Vapor (4 hours) | Rat | LC50 > 989 mg/l |
| Ethyl nonafluorobutyl ether | Ingestion | Rat | LD50 > 2,000 mg/kg |
| METHYL NONAFLUOROISOBUTYL ETHER | Dermal | | LD50 estimated to be > 5,000 mg/kg |
| METHYL NONAFLUOROISOBUTYL ETHER | Inhalation-Vapor (4 hours) | Rat | LC50 > 1,000 mg/l |
| METHYL NONAFLUOROISOBUTYL ETHER | Ingestion | Rat | LD50 > 5,000 mg/kg |
| Fluoroaliphatic polymer | Ingestion | Rat | LD50 > 2,000 mg/kg |
| METHYL NONAFLUOROBUTYL ETHER | Dermal | | LD50 estimated to be > 5,000 mg/kg |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation-Vapor (4 hours) | Rat | LC50 > 1,000 mg/l |
| METHYL NONAFLUOROBUTYL ETHER | Ingestion | Rat | LD50 > 5,000 mg/kg |

ATE = acute toxicity estimate

Skin Corrosion/Irritation

| Name | Species | Value |
|---------------------------------|---------|---------------------------|
| Ethyl nonafluoroisobutyl ether | Rabbit | No significant irritation |
| Ethyl nonafluorobutyl ether | Rabbit | No significant irritation |
| METHYL NONAFLUOROISOBUTYL ETHER | Rabbit | No significant irritation |
| Fluoroaliphatic polymer | Rabbit | No significant irritation |
| METHYL NONAFLUOROBUTYL ETHER | Rabbit | No significant irritation |

Serious Eye Damage/Irritation

| Name | Species | Value |
|------|---------|-------|
|------|---------|-------|

| | | |
|---------------------------------|--------|---------------------------|
| Ethyl nonafluoroisobutyl ether | Rabbit | No significant irritation |
| Ethyl nonafluorobutyl ether | Rabbit | No significant irritation |
| METHYL NONAFLUOROISOBUTYL ETHER | Rabbit | No significant irritation |
| METHYL NONAFLUOROBUTYL ETHER | Rabbit | No significant irritation |

Skin Sensitization

| Name | Species | Value |
|---------------------------------|------------|----------------|
| Ethyl nonafluoroisobutyl ether | Guinea pig | Not classified |
| Ethyl nonafluorobutyl ether | Guinea pig | Not classified |
| METHYL NONAFLUOROISOBUTYL ETHER | Guinea pig | Not classified |
| METHYL NONAFLUOROBUTYL ETHER | Guinea pig | Not classified |

Respiratory Sensitization

For the component/components, either no data are currently available or the data are not sufficient for classification.

Germ Cell Mutagenicity

| Name | Route | Value |
|---------------------------------|----------|---------------|
| Ethyl nonafluoroisobutyl ether | In Vitro | Not mutagenic |
| Ethyl nonafluoroisobutyl ether | In vivo | Not mutagenic |
| Ethyl nonafluorobutyl ether | In Vitro | Not mutagenic |
| Ethyl nonafluorobutyl ether | In vivo | Not mutagenic |
| METHYL NONAFLUOROISOBUTYL ETHER | In Vitro | Not mutagenic |
| METHYL NONAFLUOROISOBUTYL ETHER | In vivo | Not mutagenic |
| METHYL NONAFLUOROBUTYL ETHER | In Vitro | Not mutagenic |
| METHYL NONAFLUOROBUTYL ETHER | In vivo | Not mutagenic |

Carcinogenicity

For the component/components, either no data are currently available or the data are not sufficient for classification.

Reproductive Toxicity

Reproductive and/or Developmental Effects

| Name | Route | Value | Species | Test Result | Exposure Duration |
|---------------------------------|------------|--|---------|----------------|-------------------|
| Ethyl nonafluoroisobutyl ether | Inhalation | Not classified for development | Rat | NOAEL 260 mg/l | during gestation |
| Ethyl nonafluorobutyl ether | Inhalation | Not classified for development | Rat | NOAEL 260 mg/l | during gestation |
| METHYL NONAFLUOROISOBUTYL ETHER | Inhalation | Not classified for female reproduction | Rat | NOAEL 129 mg/l | 1 generation |
| METHYL NONAFLUOROISOBUTYL ETHER | Inhalation | Not classified for male reproduction | Rat | NOAEL 129 mg/l | 1 generation |
| METHYL NONAFLUOROISOBUTYL ETHER | Inhalation | Not classified for development | Rat | NOAEL 307 mg/l | during gestation |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation | Not classified for female reproduction | Rat | NOAEL 129 mg/l | 1 generation |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation | Not classified for male reproduction | Rat | NOAEL 129 mg/l | 1 generation |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation | Not classified for development | Rat | NOAEL 307 mg/l | during gestation |

Target Organ(s)

Specific Target Organ Toxicity - single exposure

| Name | Route | Target Organ(s) | Value | Species | Test Result | Exposure Duration |
|------|-------|-----------------|-------|---------|-------------|-------------------|
|------|-------|-----------------|-------|---------|-------------|-------------------|

| | | | | | | |
|---------------------------------|------------|------------------------|--|-----|----------------|------------|
| Ethyl nonafluoroisobutyl ether | Inhalation | cardiac sensitization | Some positive data exist, but the data are not sufficient for classification | Dog | NOAEL 204 mg/l | 17 minutes |
| Ethyl nonafluoroisobutyl ether | Inhalation | respiratory irritation | Not classified | Rat | NOAEL 989 mg/l | 4 hours |
| Ethyl nonafluorobutyl ether | Inhalation | cardiac sensitization | Some positive data exist, but the data are not sufficient for classification | Dog | NOAEL 204 mg/l | 17 minutes |
| Ethyl nonafluorobutyl ether | Inhalation | respiratory irritation | Not classified | Rat | NOAEL 989 mg/l | 4 hours |
| METHYL NONAFLUOROISOBUTYL ETHER | Inhalation | nervous system | Not classified | Dog | LOAEL 913 mg/l | 10 minutes |
| METHYL NONAFLUOROISOBUTYL ETHER | Inhalation | cardiac sensitization | Not classified | Dog | NOAEL 913 mg/l | 10 minutes |
| METHYL NONAFLUROBUTYL ETHER | Inhalation | nervous system | Not classified | Dog | LOAEL 913 mg/l | 10 minutes |
| METHYL NONAFLUROBUTYL ETHER | Inhalation | cardiac sensitization | Not classified | Dog | NOAEL 913 mg/l | 10 minutes |

Specific Target Organ Toxicity - repeated exposure

| Name | Route | Target Organ(s) | Value | Species | Test Result | Exposure Duration |
|--------------------------------|------------|--|----------------|---------|-----------------------|-------------------|
| Ethyl nonafluoroisobutyl ether | Inhalation | liver kidney and/or bladder respiratory system heart endocrine system gastrointestinal tract bone marrow hematopoietic system immune system nervous system | Not classified | Rat | NOAEL 263.4 mg/l | 4 weeks |
| Ethyl nonafluoroisobutyl ether | Ingestion | blood liver kidney and/or bladder heart endocrine system bone marrow hematopoietic system immune system nervous system respiratory system | Not classified | Rat | NOAEL 1,000 mg/kg/day | 28 days |
| Ethyl nonafluorobutyl ether | Inhalation | liver kidney and/or bladder respiratory system heart endocrine system gastrointestinal tract bone marrow hematopoietic system immune system nervous system | Not classified | Rat | NOAEL 263.4 mg/l | 4 weeks |
| Ethyl nonafluorobutyl ether | Ingestion | blood liver kidney and/or bladder heart endocrine system bone marrow hematopoietic system immune system nervous system respiratory system | Not classified | Rat | NOAEL 1,000 mg/kg/day | 28 days |
| METHYL NONAFLUROISOBUT | Inhalation | liver | Not classified | Rat | NOAEL 155 mg/l | 13 weeks |

| | | | | | | |
|--|------------|---|----------------|-----|-----------------------------|----------|
| YL ETHER | | | | | | |
| METHYL NONAFLUOROISOBUT YL ETHER | Inhalation | bone, teeth, nails, and/or hair | Not classified | Rat | NOAEL 129 mg/l | 11 weeks |
| METHYL NONAFLUOROISOBUT YL ETHER | Inhalation | heart skin endocrine system gastrointestinal tract hematopoietic system immune system muscles nervous system eyes kidney and/or bladder respiratory system | Not classified | Rat | NOAEL 155 mg/l | 13 weeks |
| METHYL NONAFLUOROISOBUT YL ETHER | Ingestion | endocrine system liver heart hematopoietic system immune system nervous system eyes kidney and/or bladder respiratory system | Not classified | Rat | NOAEL 1,000 mg/kg/day | 28 days |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation | liver | Not classified | Rat | NOAEL 155 mg/l | 13 weeks |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation | bone, teeth, nails, and/or hair | Not classified | Rat | NOAEL 129 mg/l | 11 weeks |
| METHYL NONAFLUOROBUTYL ETHER | Inhalation | heart skin endocrine system gastrointestinal tract hematopoietic system immune system muscles nervous system eyes kidney and/or bladder respiratory system | Not classified | Rat | NOAEL 155 mg/l | 13 weeks |
| METHYL NONAFLUOROBUTYL ETHER | Ingestion | endocrine system liver heart hematopoietic system immune system nervous system eyes kidney and/or bladder respiratory system | Not classified | Rat | NOAEL 1,000 mg/kg/day | 28 days |

Aspiration Hazard

For the component/components, either no data are currently available or the data are not sufficient for classification.

Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.

SECTION 12: Ecological information

Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material

and/or its components.

SECTION 13: Disposal considerations

13.1. Disposal methods

Dispose of contents/ container in accordance with the local/regional/national/international regulations.

Dispose of waste product in a permitted industrial waste facility. As a disposal alternative, incinerate in a permitted waste incineration facility. Proper destruction may require the use of additional fuel during incineration processes. Combustion products will include HF. Facility must be capable of handling halogenated materials. Empty drums/barrels/containers used for transporting and handling hazardous chemicals (chemical substances/mixtures/preparations classified as Hazardous as per applicable regulations) shall be considered, stored, treated & disposed of as hazardous wastes unless otherwise defined by applicable waste regulations. Consult with the respective regulating authorities to determine the available treatment and disposal facilities.

EPA Hazardous Waste Number (RCRA): Not regulated

SECTION 14: Transport Information

For Transport Information, please visit <http://3M.com/Transportinfo> or call 1-800-364-3577 or 651-737-6501.

SECTION 15: Regulatory information

15.1. US Federal Regulations

Contact 3M for more information.

EPCRA 311/312 Hazard Classifications:

Physical Hazards

Not applicable

Health Hazards

Not applicable

Additional TSCA Information

| <u>Components</u> | <u>CAS No</u> | <u>Additional Information</u> |
|-------------------------|---------------|-------------------------------------|
| Fluoroaliphatic polymer | Trade Secret | Allowed use(s): Protective coating. |

15.2. State Regulations

Contact 3M for more information.

15.3. Chemical Inventories

The components of this product are in compliance with the new substance notification requirements of CEPA.

The components of this product are in compliance with the chemical notification requirements of TSCA. One or more of the components in this material is not listed on the TSCA inventory, but is approved for specific commercial use(s) under a US EPA low volume exemption.

Contact 3M for more information.

15.4. International Regulations

Contact 3M for more information.

This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: Other information

NFPA Hazard Classification

Health: 3 Flammability: 1 Instability: 0 Special Hazards: None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

The NFPA Health code of 3 is due to emergency situations where the material may thermally decompose and release Hydrogen Fluoride and Perfluoroisobutylene (PFIB). During normal use conditions, please reference Section 2 and Section 11 of the SDS for additional health hazard information.

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|------------------------|-----------|-------------------------|----------|
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