

**DELRIN® AFDE588 acetal resin**

Version 3.1

Issue Date : 12/15/2020
Revision Date : 12/02/2020

Ref. 130000020906

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : DELRIN® AFDE588 acetal resin
Product Use : Polymer

Restrictions on use : For manufacturing and research use only

Manufacturer/Supplier : DuPont
974 Centre Road
Wilmington, DE 19805, USA

Product Information : +1-833-338-7668 (outside the U.S. +1-302-996-8439)
Medical Emergency : 1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency : +1-800-424-9300 (outside the U.S. & Canada +1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Product hazard category
Combustible dust

Label content

Pictogram : not required

Signal word : Warning

Hazardous warnings : If small particles are generated during further processing, handling or by other means, may form combustible dust concentrations in air.

Hazardous prevention measures : not required

Other hazards

No applicable data available.

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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Formaldehyde	50-00-0	<0.005 %

This product does not contain any components that require disclosure according to OSHA Hazard Communication Standard 2012.

SECTION 4. FIRST AID MEASURES

General advice	: No applicable data available.
Inhalation	: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. Move to fresh air in case of accidental inhalation of fumes from overheating or combustion. Symptoms may be delayed for several hours.
Skin contact	: The material is not likely to be hazardous by skin contact, but cleaning the skin after use is advisable. Cool skin rapidly with cold water after contact with molten material. Do not peel polymer from the skin. Obtain medical treatment for thermal burn.
Eye contact	: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.
Ingestion	: No specific intervention is indicated. Consult a physician if necessary.
Most important symptoms/effects, acute and delayed	: No applicable data available.
Protection of first-aiders	: No applicable data available.
Notes to physician	: No applicable data available.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Water, Foam, Dry chemical, Carbon dioxide (CO₂)

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Unsuitable extinguishing media : No applicable data available.

Specific hazards : Combustible . Burns with invisible flame. Large molten masses may ignite spontaneously in air. Water quenching is good practice. Minimize the generation and accumulation of dust. Failure or malfunction of temperature control systems on processing equipment, such as extruders, may create explosion hazards. Hazardous combustion products may include: (see also section 10) Carbon monoxide, Carbon dioxide.

Special protective equipment for firefighters : Wear self-contained breathing apparatus and protective suit.

Further information : Evacuate personnel and keep upwind of fire. Protect from hydrogen fluoride fumes which react with water to form hydrofluoric acid. Wear neoprene gloves when handling refuse from fire.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel) : Spilled material is a slipping hazard.

Environmental precautions : Do not discharge to streams, ponds, lakes or sewers.

Spill Cleanup : Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Clean up fines, dusts, and/or fibers with high efficiency particulate air (HEPA) filtered vacuum equipment. Remove all sources of ignition. Use only non-sparking tools.

Accidental Release Measures : No applicable data available.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel) : Open container only in well-ventilated area. Wash hands thoroughly after handling. Do not breathe dust. Do not breathe vapours or fumes that may be

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evolved during processing. Provide appropriate exhaust ventilation at dryers, machinery and at places where dust or volatiles can be generated. Remove and wash contaminated clothing before re-use. Wash thoroughly with soap and water after performing operations that involve fiber or dust handling. Prevent contamination of cigarettes or tobacco with dust from this material. Keep waste disposal equipment near work areas involving operations where there is potential for dust generation. Minimize the generation and accumulation of dust. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Pneumatic conveying and other mechanical handling operations can generate combustible dust. Clean up fines, dusts, and/or fibers with high efficiency particulate air (HEPA) filtered vacuum equipment.

As with any acetal polymer, low levels of formaldehyde may occur in the headspace of containers as received or in containers of formed parts after processing. Closed containers of resin or formed parts should be opened in well ventilated areas. Measurements on representative acetal grades yielded formaldehyde levels of less than 2 ppm. Levels of formaldehyde can vary according to time, temperature, ventilation, & specific product grade. Please note that the formaldehyde level in a finished part is influenced by material/part handling and processing conditions.

Handling (Physical Aspects) : No applicable data available.
Dust explosion class : No applicable data available.
Storage : Residual monomer vapours can accumulate in the headspace of closed containers. Store in a cool, dry place. Keep containers tightly closed to prevent moisture absorption and contamination. Keep in an area equipped with sprinklers. Store in a well-ventilated area away from heat and sunlight.

Storage period : No applicable data available.

Storage temperature : No applicable data available.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : General mechanical ventilation is normally adequate but use local exhaust where necessary to maintain exposures below acceptable limits. Use local exhaust to completely remove vapors and fumes liberated during hot processing from the work area.

Personal protective equipment
Respiratory protection : Additives in this product do not present a respiration hazard unless the product is ground to a powder of respirable size and the dust is inhaled. All dusts are potentially injurious to the respiratory tract if respirable particles are

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generated and inhaled. A respiratory protection program that meets country requirements must be followed whenever workplace conditions warrant respirator use. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer. Where there is potential for airborne exposures in excess of applicable limits, wear NIOSH approved respiratory protection with dust/mist cartridge. Use a positive pressure air supplied respirator if exposure levels are not known or there are any other circumstances where air purifying respirators may not provide adequate protection.

Consult the OSHA respiratory protection information located at 29CFR 1910.134.

Hand protection : Additional protection: Wear leather or cotton gloves when grinding, sawing, routing, drilling or sanding., When handling hot material, use heat resistant gloves.

Eye protection : Wear safety glasses with side shields. Wear tightly fitting chemical splash goggles and face shield when possibility exists for eye and face contact due to spattering or splashing of molten material. A full-face mask respirator provides protection from eye irritation.

Skin and body protection : If there is a potential for contact with hot/molten material wear heat resistant clothing and footwear.
Remove and wash contaminated clothing before re-use.

Exposure Guidelines**Exposure Limit Values**

This product does not contain any exposure limits that require disclosure according to OSHA Hazard Communication Standard 2012.

Formaldehyde			
TLV	(ACGIH)	0.1 ppm	TWA
TLV	(ACGIH)	0.3 ppm	STEL
REL	(NIOSH)	0.016 ppm	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
REL	(NIOSH)	0.1 ppm	Ceiling value not be exceeded at any time.
PEL (Permissible Exposure Limit)	(OSHA)	0.75 ppm	8 hr. TWA
PEL (Permissible Exposure Limit)	(OSHA)	2 ppm	STEL

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REL	(NIOSH)	0.016 ppm	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek Formaldehyde
REL	(NIOSH)	0.1 ppm	Ceiling value not be exceeded at any time. Formaldehyde
AEL *	(DuPont)	0.1 ppm	12 hr. TWA

Non-Constituent(s)

Dust (inhalable and respirable fraction)

PEL (Permissible Exposure Limit) (OSHA) 50 Million particles per cubic foot TWA total dust

PEL (Permissible Exposure Limit) (OSHA) 15 mg/m3 TWA total dust

PEL (Permissible Exposure Limit) (OSHA) 5 mg/m3 TWA respirable fraction

PEL (Permissible Exposure Limit) (OSHA) 15 Million particles per cubic foot fraction TWA respirable

TLV (ACGIH) 3 mg/m3 TWA Respirable particulate matter

TLV (ACGIH) 10 mg/m3 TWA Inhalable particulate matter

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state : solid
 Form : pellets
 Color : dark brown

Odor : slight, formaldehyde-like

Odor threshold : 0.6 ppm
 formaldehyde

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pH	: Not applicable
Melting point/freezing point	: Melting point/range 175 - 183 °C (347 - 361 °F)
Boiling point/boiling range	: Not applicable
Flash point	: Not applicable
Evaporation rate	: Not applicable
Flammability (solid, gas)	: May form combustible dust concentrations in air during processing, handling or other means.
Upper explosion limit	: Not applicable
Lower explosion limit	: Not applicable
Vapor pressure	: Not applicable
Vapor density	: Not applicable
Specific gravity (Relative density)	: > 1
Water solubility	: insoluble
Solubility(ies)	: No applicable data available.
Partition coefficient: n-octanol/water	: No applicable data available.
Auto-ignition temperature	: Not applicable
Decomposition temperature	: Thermal decomposition of the resin accelerates above temperature listed. Decomposition can occur below the recommended processing temperature limit. Decomposition is a function of both processing temperature and time at that temperature.
Viscosity, kinematic	: Not applicable
Viscosity, dynamic	: Not applicable

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SECTION 10. STABILITY AND REACTIVITY

- Reactivity : Stable at normal ambient temperature and pressure.
- Chemical stability : Stable at normal ambient temperature and pressure.
- Possibility of hazardous reactions : Polymerization will not occur.
- Conditions to avoid : polymer melt temperature > 230 °C (> 446 °F)
Avoid prolonged exposure at or above the recommended processing temperatures.
Decomposes on heating. At temperatures above the "conditions to avoid" temperature, thermal decomposition of the resin accelerates. Decomposition can occur below the recommended processing temperature limit.
Decomposition is a function of both processing temperature and time at that temperature.
- Incompatible materials : Incompatible with strong acids and bases (decomposes forming formaldehyde) and strong oxidizing agents. At melt temperatures, acetal resins are incompatible with halogenated polymers such as PVC and PVDC and any elastomers containing halogenated polymers., Even small amounts of such contaminants can cause sudden and spontaneous formaldehyde gas formation to occur., Workplace fume concentrations well above threshold levels are likely., Unsafe pressurization of equipment, e.g., extruders, molds, can result., Do not contaminate either virgin resin or rework. Do not mix this resin with pigments or additives other than those designated by the Company. Do not mix this grade with other grades of acetals, nor with any other resins, without first consulting the Company. Doing any of the above may change the thermal stability of this resin and potentially cause decomposition.
- Hazardous decomposition products : Decomposition of this material depends on the length of time it is exposed to elevated temperature, as well as pressure.
At the recommended processing temperatures decomposition should not be significant until after 30 minutes.
Decomposition may be accelerated by contaminants, pigments and/or other additives.
Autoclaving with pressurized steam may lead to a rapid decomposition and should be done for only minimum amounts of time.
Cool completely before opening the autoclave.
Overheating may generate fluoroplastics fume.
Hazardous thermal decomposition products may include:
Fluorinated compounds, fluoroplastic fume, Hydrogen fluoride ,
Formaldehyde , Carbon dioxide, Carbonyl difluoride, Carbon monoxide

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SECTION 11. TOXICOLOGICAL INFORMATION

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Further information	: No data is available on the product itself. For additional toxicity data, write to the company address or call the non-emergency number shown in Section 1.
Formaldehyde	
Inhalation 4 h LC50	: 490 ppm , Rat Target Organs: Respiratory system Respiratory effects
Dermal LD50	: 270 mg/kg , Rabbit
Oral Acute toxicity estimate	: 100 mg/kg , Rat Gastrointestinal effects
Skin irritation	: Corrosive after 3 minutes to 1 hour of exposure, Rabbit
Eye irritation	: Corrosive, Rabbit
Skin sensitization	: Probability or evidence of high skin sensitisation rate in humans, human Does not cause respiratory sensitisation., Mouse
Repeated dose toxicity	: Inhalation Mouse - 13 Weeks gasMethod: OECD Test Guideline 413 No toxicological effects warranting significant target organ toxicity classification were seen below the recommended guidance values for classification. Ingestion Rat - 105 Weeks NOAEL: 21 mg/kg LOAEL: 109 mg/kgMethod: OECD Test Guideline 453 Gastrointestinal effects
Carcinogenicity	: Possible human carcinogen An increased risk of cancer in humans has been shown in workplace-

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based studies.

Animal experiments showed a statistically significant number of tumours.

- Mutagenicity** : Positive result(s) from in vivo non-mammalian somatic cell mutagenicity tests, supported by positive results from in vitro mutagenicity assays.
Genetic damage in cultured bacterial cells was observed in some laboratory tests but not in others.
Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others.
Genetic damage in animals was observed in some laboratory tests but not in others.
- Reproductive toxicity** : No toxicity to reproduction
Evidence suggests the substance is not a reproductive toxin in animals.
- Teratogenicity** : Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

Carcinogenicity

The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ from those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION**Aquatic Toxicity**
Formaldehyde

- 96 h LC50 : Fish (unspecified species) 6.7 mg/l
- 72 h ErC50 : Desmodesmus subspicatus (green algae) 4.89 mg/l OECD Test Guideline 201
- 48 h EC50 : Daphnia pulex (Water flea) 5.8 mg/l OECD Test Guideline 202
- 28 d : NOEC Oryzias latipes (Orange-red killifish) > 48 mg/l

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21 d : NOEC Aquatic invertebrates 25 mg/l

Environmental Fate**Formaldehyde**

Bioaccumulation : OECD Test Guideline 305
Bioaccumulation is unlikely.

Additional ecological information : No data is available on the product itself. Toxicity is expected to be low based on insolubility in water.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste disposal methods - Product : Preferred options for disposal are recycling or incineration with energy recovery. The high fuel value of this product makes incineration very desirable for material that cannot be recycled. Incinerator must be capable of scrubbing out acidic combustion products. Treatment, storage, transportation, and disposal must be in accordance with applicable federal, state/provincial, and local regulations.

Contaminated packaging : No applicable data available.

SECTION 14. TRANSPORT INFORMATION

Not classified as dangerous in the meaning of transport regulations.

SECTION 15. REGULATORY INFORMATION

TSCA : In compliance with TSCA-active Inventory requirements for commercial purposes.

SARA 311/312 Hazard classification : Combustible dust

SARA 313 Regulated : This material does not contain any chemical components with known CAS

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Chemical(s)	numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Polytetrafluoroethylene, Methanol
NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): None known.
California Prop. 65	: This product can expose you to substances including Formaldehyde, which is/are known to the State of California to cause cancer, and Methanol, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov .

SECTION 16. OTHER INFORMATION

Restrictions for use : Do not use DuPont materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless the material has been provided from DuPont under a written contract that is consistent with DuPont policy regarding medical applications and expressly acknowledges the contemplated use. For further information, please contact your DuPont representative. You may also request a copy of the DuPont POLICY Regarding Medical Applications and DuPont CAUTION Regarding Medical Applications.

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Read the product information datasheet for this product or the molding guide for this resin family.

Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.



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Components: Formaldehyde, CAS No. 50-00-0

Warning

Hazard statements: If small particles are generated during further processing, handling or by other means, may form combustible dust concentrations in air.

Refer to Safety Data Sheet (SDS) for further information.

DuPont
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