

OVERVIEW

IRD's AS475 Sensor Grout (System 400) is a resin based grout. It is specifically designed to embed permanent axle sensors and their cables into asphalt or concrete pavements.

The AS475 grout serves two purposes:

- acts as an adhesive bond between the sensor and the road pavement material
- acts as isolation medium between the sensor and the road pavement.

The AS475 grout is used when installing a Piezoelectric sensor as well as when installing a Temperature sensor.

This grouting mixture consists of a resin material that has been mixed with a fine mineral aggregate. The aggregate provides strength and consistency to the grout mixture. The aggregate also prevents the resin from cracking, by serving as a heat sink for the significant heat created during the curing of the resin.

The grout mixture will cure (harden) once a catalyst powder is added. The catalyst used with the AS475 grout is a Benzoyl Peroxide Organic (BPO) powder.

IMPORTANT: If ambient temperature is below 10°C (50°F) refer to Appendix L for details regarding the use of epoxy in cold weather.

SAFETY PRECAUTIONS

NOTE: Due to the nature of the grouting material being used, precautions should be taken to ensure the safety of the user.

The following should be noted:

- Read and be familiar with the Material Safety Data Sheet for AS475 Grout and for Benzoyl Peroxide Organic (BPO). (Information follows, starting on page 4 of this document.)
- Avoid contact to skin and eyes. Wear appropriate protective clothing such as boots, overalls, gloves and safety glasses.
- Do not use these products in an enclosed area. Ensure there is good ventilation when using these materials. Avoid inhalation of vapors produced.
- Do not use the BPO powder near heat, sparks or open flame. BPO is a very powerful oxidizer that supplies its own oxygen when burning.
- Use a dust mask to prevent the inhalation of the BPO powder.

HOW MUCH GROUT

The amount of AS475 grout to be used is dependent upon the type of sensor being installed. For details regarding the amount of grout to use, refer to the appropriate section of this document dealing with the installation of the particular sensor. Refer to Section 8 for the installation of Piezoelectric sensors. Refer to Section 10 for the installation of Temperature sensors.

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HOW MUCH CATALYST

The table below gives the amount of catalyst to add to the grouting mixture in order to produce a total curing time of 30-40 minutes. That is, if the amounts below are used, the grout mixture will be totally cured in 30-40 minutes.

North American Container sizes

TEMPERATURE		AMOUNT OF BENZOYL PEROXIDE ORGANIC (BPO) POWDER	
°C	°F	to mix with 18 kg (18 U.S. qt) of grout	to mix with 9 kg (9 U.S. qt) of grout
<13	<55	6 x 33g VIALS	3 x 33g VIALS
13 - 24	55 - 75	4 x 33g VIALS	2 x 33g VIALS
>24	>75	2 x 33g VIALS	1 x 33g VIALS

NOTE: As of July 16, 1996 the supplier has changed the formula for this grout but the volume of the grout and the amount of BPO powder used is the same for all mixes as the old formula.

International Container sizes

TEMPERATURE		AMOUNT OF BENZOYL PEROXIDE ORGANIC (BPO) POWDER	
°C	°F	to mix with 7.5 kg (7.5 U.S. qt) of grout	to mix with 5 kg (5 U.S. qt) of grout
<13	<55	1.5 x 33g VIALS	1.25 x 33g VIALS
13 - 24	55 - 75	1.25 x 33g VIALS	1 x 33g VIALS
>24	>75	1 x 33g VIALS	0.75 x 33g VIALS

RECOMMENDED TOOLS AND MATERIALS

- AS-475 grout
- BPO powder
- electric drill with mixing paddle attachment
- protective clothing such as dust mask, boots, overalls, gloves and safety glasses
- paint thinner

MIXING DIRECTIONS

1. Ensure the roadway and the sensor are ready for installation. All preliminary work to ready the road should be complete prior to the grout being prepared.
2. Ensure that all safety precautions, as outlined at the start of this section, have been observed.
3. Using the drill with the mixing paddle attached, mix the grout in the pail. All of the fine aggregate at the bottom of the pail must be thoroughly mixed. Mix until the grout takes on a smooth texture with no lumps.
4. Using the chart on the previous page, determine the amount of BPO powder to add to the grout mixture.
5. Add appropriate amount of BPO powder to the grout mixture.
6. Mix the grout and the BPO powder thoroughly for an additional 2 minutes. There is now 5-10 minutes of working time where the grout mixture can be used before it partially cures.

7. Use the grout mixture to install a sensor as indicated in the appropriate installation section of this guide. Ensure there are no voids or air bubbles when applying the grout mixture. There is now 30-40 minutes before the grout mixture is completely cured.
8. Clean any uncured grout mixture from tools and equipment with paint thinner. It should be noted that once the grout mixture has cured, it can only be removed by mechanical means.

CURE TIME

Once the BPO powder is added to the mixture, there is 5-10 minutes before the mixture partially cures. AS475 cures fully in 30-40 minutes.

LAFRENTZ ROAD SERVICES LTD. <u>Methyl Methacrylate</u>	
MATERIAL SAFETY DATA SHEET	
Chemical Name:	Acrylate Polymer Dissolved in Methacrylate Monomer
Trade Name:	Degussa Degadur VP460S ** used by Lafrentz Road Services Ltd.
Chemical Family:	Acrylic Resins as key ingredient in Lafrentz System 400
Manufactured By:	Degussa Corporation Cold Plastic Roadmarking Material
Lafrentz Road Services Ltd. 8225 Coronet Road Edmonton, Alberta, Canada T6E 4N7 Telephone: (403) 465-7586	Lafrentz Road Services (Ontario) Ltd. 1071 North Service Road East Oakville, Ontario, Canada L6H 1A6 Telephone: (416) 842-6010

SECTION II - HAZARDOUS INGREDIENTS

Name	CAS #	%	TLV (Units)	Name	CAS #	%	TLV (Units)
Methyl Methacrylate	80-62-6	< 50	100 ppm				
2-Ethylexyl Acrylate	103-11-7	< 20	N/N				

SECTION III - PHYSICAL DATA

Boiling Point (°F) MMA	212°F	Specific Gravity (H ₂ O =1)	0.97-1.05
Vapour Pressure (mmHg.) MMA	30.4 mmHg	Percent Volatile by volume (%)	< 50%
Vapour Density (AIR = 1) MMA	> 1	Evaporation Rate (Butyl Acetate =1)	> 1
Solubility in Water MMA	15g/1 (77°F)	Decomposition Temperature (°F)	Not Determined

Appearance and Odor: Low Viscous, highly turbid fluid with typical Methyl Methacrylate odor (sweet ester odor).

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): 51°F	Flammable Limits: 68°F	LeI 2.1 Vol%	Uel 12.5 Vol%
Extinguishing Media: Water mist, CO ₂ , Foam, Dry Powder, Cover With Sand			
Special Fire Fighting Procedures: Wear self-contained breathing apparatus, and complete protective clothing.			
Unusual Fire & Explosion Hazards: Vapour is heavier than air, and forms explosive mixture with air.			
Explosion limits (for monomer component): 2.1-12.5% by volume (1 atm, 77°F)			

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value: MMA, 2-EHA RAT, ORAL	PEL (OSHA)	LD 50 8400 mg/kg 6500 mg/kg	LC 50 3750 ppm
Effects of Overexposure (Acute & Chronic): Fairly lengthy exposure may cause skin and eye irritation. Chronic toxicity is not known. Acute toxicity on rats: LD50 = 8400 mg/kg (related to Methyl Methacrylate component in Degadur) oral.			
EMERGENCY FIRST AID PROCEDURES:			
Eyes: Rinse out without delay under running cold water for several minutes, with eyelid (palpebral fissure) opened, seek medical advice.			
Skin: Wash the affected skin with soap and water, or if necessary with ethanol.			
Respiratory: After inhaling, ensure victim has an ample supply of fresh air and is kept quiet and warm. Summon the physician.			
Ingestion: Drink two (2) glasses of water. Then induce vomiting by sticking finger down throat. Call a physician. Never give anything by mouth to an unconscious person.			
Clothing: Remove contaminated clothing, wash the affected skin area with soap and water.			

SECTION VI - REACTIVITY DATA

Stability	Unstable		Conditions to avoid: Avoid building up of electrical charge; explosion proofing. Avoid ignition sources; ensure adequate supply of fresh air. Avoid contamination with foreign materials
	Stable	X	
Incompatibility (Materials To Avoid): Radical sources such as peroxides, azo-compound, amines, sulfur compounds, heavy metal ions, alkalis. Material has strong solvent action and can soften paint and rubber.			
Hazard Decomposition Products: --None--			
Hazardous	May Occur	X	Conditions To Avoid: Excessive heat, inadvertent addition of radical source type catalysts.
Polymerization	Will Not Occur		

SECTION VII - SPILL OR LEAK PROCEDURES

Steps To Be Taken In Case Material Is Released Or Spilled: Dike and absorb spill with absorbent material (sand, sawdust, vermiculite, etc.) and collect in leak proof container.
Waste Disposal Method (Including Neutralization): Polymerization to solid with peroxides and mineral filler, or if recycling is impracticable, waste disposal in accordance with locally valid legislation and regulations. (notify authorities if required to do so)

SECTION VIII - SPECIAL PROTECTION INFORMATION



Respiratory Protection (Specify Type): If required, filter A, colour brown.		
Ventilation	Local Exhaust	Special
	Mechanical (General): Explosion proof. Exhaust at point of operation	
Protective Gloves: Made Of Rubber		Eye Protection: Splash proof goggles
Other Protective Equipment: Wear protective clothing made from anti-static, non-melting material.		

SECTION IX - SPECIAL PRECAUTIONS

Precautions To Be Taken In Handling & Storage: Storage over long periods of the time only in inhibited form. Advisable to use within 6 months. Check inhibitor level after 3 months and add more if necessary. Protect from light and contamination. Indoor storage should be restricted to approved areas with overhead sprinklers. Ground all containers when pouring. Provide adequate ventilation. Avoid all ignition sources.
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SECTION X - SHIPPING INFORMATION

Primary Hazard: Flammable liquid		Secondary Hazard:
Proper DOT Shipping Name: Resin Solution		
Hazard Class: Flammable liquid		49 CFR Section Reference: 173.118, 173.119
Hazardous Substance? Yes, Contains Methyl Methacrylate (2270kg)		Reportable Quantity: MMA 5,000lbs.
label(s)	label(s)	UN Number: <u>1866</u> UN Class: <u>3.2 PGII</u> STCC Number: <u>289991</u> NMFC Item: <u>60000</u> UFC Item: <u>33800</u> Shipping Restrictions: 1 Qt passenger a 55 gallon cargo only a/c UPS package - 14 or 17
		
Container/Packaging Data - Authorized Container Type(s): DOT 17E, E-9146 Drum: Metal		

SECTION XI - EMERGENCY RESPONSE

Evacuation: Should occur if product is involved in fire. Keep non-essential personnel upwind a safe distance.
Containment - Immediate & Follow-up: Dike and absorb with absorbent material (sand, sawdust, vermiculite, etc.) and collect in leak proof container.
EMERGENCY RESPONSE CONTACT(S): Degussa Corporation -- Telephone #: (205) 653-0632

SECTION XII - PRODUCT INFORMATION CONTACTS

	Contact(s)	Address	Business Phone: Business Phone:
Degussa AG			
Degussa Corporation	Contact(s) Product Manager Facility Superintendent	Address: Teterboro, New Jersey Theodore, Alabama	Business Phone: (201) 288-6500 Business Phone: (205) 653-7933

LAFRENTZ ROAD SERVICES LTD. <u>B. P. O. POWDER</u>	
MATERIAL SAFETY DATA SHEET	
Chemical Name:	Benzoyl Peroxide (Plegmatized) Synonym: BPO Powder
Trade Name:	Cadox BFF-50 **used by Lafrentz Road Services Ltd.
Chemical Family:	Organic Peroxide Mixture as the hardening agent in Lafrentz System
Formula:	(C ₆ H ₅ CO) ₂ O ₂ 400 Cold Plastic Roadmarking Material
Manufactured By:	Degussa Corporation
Lafrentz Road Services Ltd. 8225 Coronet Road Edmonton, Alberta, Canada T6E 4N7 Telephone: (403) 465-7586	Lafrentz Road Services (Ontario) Ltd. 1071 North Service Road East Oakville, Ontario, Canada L6H 1A6 Telephone: (416) 842-6010

SECTION II - HAZARDOUS INGREDIENTS

Paints, Preservatives, & Solvents	%	TLV (units)	Alloys and Metallic Coatings	N/A	%	TLV (units)
Pigments	N/A		Base Metal	N/A		
Catalyst	N/A		Alloys	N/A		
Vehicle	N/A		Metallic Coatings	N/A		
Solvents	N/A		Filler Metal plus coating or			
Additives	N/A		core flux	N/A		
Others	N/A		Others	N/A		
Hazardous Mixtures Of Other Liquids, Solids, Or Gases					%	TLV (units)
Benzoyl Peroxide					50	5 mg/kg

SECTION III - PHYSICAL DATA

Boiling Point (°F)	Decomposition	Bulk Density	36 lbs.
Vapour Pressure (mmHg)	N/A	Percent, Volatile By Volume (%)	N/A
Vapour Density (AIR=1)	N/A	Evaporation Rate (_____ =1)	
Solubility In Water	Insoluble		
Appearance And Odour: White Granules With Slight Odour			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (method used):	N/A	Flammable Limits:	N/A	Lel	Uel
Extinguishing Media: See Addenda Sheet.					
Special Fire Fighting Procedures: See Addenda Sheet.					
Unusual Fire & Explosion Hazards: See Addenda Sheet.					

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value: 5 mg/m ³ pure Benzoyl peroxide
Effects of Overexposure:
EMERGENCY FIRST AID PROCEDURES: See Addenda Sheet.

SECTION VI - REACTIVITY DATA

Stability	Unstable	Conditions to avoid: See Addenda Sheet.
	Stable	
Incompatibility (Materials To Avoid): See Addenda Sheet.		
Hazard Decomposition Products: Biphenyl T.L.V. (.2 ppm 1 mg/m ³)		
Hazardous Polymerization	May Occur	Conditions To Avoid: N/A
	Will Not Occur	

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SECTION VII - SPILL OR LEAK PROCEDURES

Steps To Be Taken In Case Material Is Released Or Spilled: Any spilled peroxide must be cleaned up and burned immediately. See Addenda Sheet - spillage and waste disposal method.
Waste Disposal Method: See Addenda Sheet.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type):		
Ventilation	Local Exhaust: None	Special
	Mechanical (General): N/A	Other
Protective Gloves: Yes		Eye Protection: Yes
Other Protective Equipment: No		

SECTION IX - SPECIAL PRECAUTIONS

Precautions To Be Taken In Handling & Storage: See Addenda Sheet.
Other Precautions: See Addenda Sheet.

ADDENDA SHEET TO MATERIAL SAFETY DATA SHEET -- CADOX BFF-50

SECTION I: Cadox BFF-50

Formula: 50% active-peroxide, fine granular composition.
Active ingredient: di Benzoyl peroxide (C₆H₅CO)₂O₂

SECTION IV: Fire and Explosion Hazard Data

Extinguishing Media: Small fires are best fought using large amounts of water. Precautions must be taken to avoid disturbing the burning material over a large area by suitably directing the water spray or preferably using a water fog. For small fires, dry chemical, foam, or carbon dioxide extinguishers can be used

Special Fire Fighting Procedures: For large fires, evacuate the area and apply water from a safe distance to cool down the surrounding area. If fire occurs near the peroxide, spray water on the peroxide containers to avoid overheating.

Unusual Fire And Explosion Hazards: In addition to ignition by heat and flame, Cadox BFF-50 can also be ignited by contamination with strong oxidizing or reducing agents, including accelerators for polymerization reactions. See Section VI - Materials To Avoid.

The decomposition of Cadox BFF-50 without flame may generate toxic flammable fumes (biphenyl), confinement and ignition of these fumes constitutes an explosion hazard. The decomposition of Cadox BFF-50 with flame generates large amounts of smoke.

SECTION V: Health Hazard Data

Emergency And First Aid Procedures: In case of contact with skin, wash with soap and water. In case of contact with eyes, wash with plenty of water and consult a physician. In case of ingestion, administer an emetic and call a physician.

SECTION VI: Reactivity Data

Stability: Although Cadox BFF-50 is stable at ordinary handling and storage temperatures, storage below 90°F is recommended.

Conditions To Avoid: This product must be kept away from all sources of heat and ignition such as radiators, steam pipes, direct rays of the sun, open flame and sparks.

Incompatibility - Materials To Avoid: Special care must be taken to avoid contamination with combustible materials, strong oxidizing or reducing agents, including accelerators for polymerization reactions. Do not add accelerators such as dimethyl aniline directly to this material as a vigorous decomposition may result.

Hazardous Decomposition Products: When exposed to high temperatures, Cadox BFF-50 can decompose to form biphenyl, a toxic flammable material (TLV .2 ppm 1 mg/m³).

Section VIII: Spill Or Leak Procedures

Waste Disposal Method: Using a non-sparking shovel, deposit the peroxide in small shallow piles on several sheets of newspaper, ignite with a torch having a six foot handle and back away. No more than one pound of peroxide should be burned at one time.

Section IX: Special Precautions

Storage Area: Cadox BFF-50 must be stored in tightly sealed original containers away from the manufacturing area and separated from other combustibles or materials which could induce decomposition.

Bring into the manufacturing area no more peroxide than will be consumed for immediate use.

Suitable Handling Materials For Cadox BFF-50: Only inert, non-contaminating materials should be used with peroxides. Polyethylene is a suitable material and is commonly used in piping and disbursement equipment. Stainless steel (types 316 or 304), Teflon or nylon are suitable for contact with peroxides. Materials which are susceptible to oxidization should not be used.

Caution: Never mix accelerators such as dimethyl aniline directly with Benzoyl peroxide or Benzoyl peroxide solutions. These mixtures can decompose violently. First disperse thoroughly the required amount of accelerator into the resin and then disperse the peroxide or peroxide solution.

For Additional Information

Write or call: Noury Chemical Corporation
2153 Lockport-Olcott Road
Burt, New York
14028
(716) 778-8554
Customer Service:
(312) 906-7500