

60-242

# APOLLO 2004

## Cyanoacrylate Adhesive

**Cyberbond APOLLO 2004** is an extremely fast setting, wicking grade adhesive for bonding all types of preassembled parts. **APOLLO 2004** was developed for bonding rubber and other products with varying acidity levels.

### PHYSICAL PROPERTIES

#### MONOMER (Liquid)

Base Compound	Ethyl Cyanoacrylate
Appearance	Colorless Liquid
Viscosity (cps @ 68F)	15-20 cP
Specific Gravity (g/cc)	1.06
Flash Point (TCC)	185F°
Shelf Life @ 40F	One year in unopened containers
Setting Time:(68F, 65%R.H.)	

Metal/Metal	5 Seconds
Plastic/Plastic	3 Seconds
Rubber/Rubber	2 Seconds

Military Specifications	Mil-A-46050C Type II, Class 1
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#### POLYMER (Cured)

Appearance	Colorless Solid
Service Temperature Range	-65F° to 225F°
Softening Point	322F°
Refractive Index (ND 20)	1.49
Full Cure Time	24 Hours
Dielectric Strength KV/mm	11.6
Dielectric Constant @ 1Kc	5.4
Coefficient of Thermal Expansion (in./in./F)	.000114
Tensile Strength: Steel / Steel	2700 psi
Solubility	Nitromethane, Acetone, Dimethylformamide

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**A. DIRECTIONS FOR USE**

1. Make sure the surfaces to be bonded are clean and dry.
2. Dispense a drop or drops to one surface only. Apply only enough to leave a thin film after compression.
3. Press parts together and hold firmly for a few seconds. Good contact is essential. An adequate bond develops in less than one minute. (Maximum strength is achieved in 24 to 48 hours.)
4. Wipe off excess adhesive from the top of the container and recap. *APOLLO 2004*, if left uncapped, may deteriorate by contamination from moisture in the air.
5. Because *APOLLO 2004* condenses by polymerization, sometimes a whitening will occur on the surface of the container or the bonded materials. Should this happen, wipe surfaces well with acetone.

**B. BOND STRENGTH**

(Tensile shear strength, cured for 48 hours at 20-25°C (68-77°F))

	N/mm <sup>2</sup>
Rigid PVC to Rigid PVC	^5.39
ABS to ABS	^6.37
Polycarbonate to Polycarbonate	^11.17
Polystyrene to Polystyrene	^4.41
Natural rubber to Natural rubber	^0.71
*Neoprene to Neoprene	^0.71
NBR to NBR	^0.64
SBR to SBR	^0.64
Steel to Steel	21.17
Stainless steel to Stainless steel	16.95
Aluminum to Aluminum	18.13
Copper to Copper	15.97
Steel to Rigid PVC	^5.39
Stainless Steel to Neoprene	^0.69
ABS to SBR	^0.69

^ = substrate failure

• = T.M. Du Pont

**C. CURE SPEED (Seconds) 2004**

Rigid PVC to Rigid PVC	3-5	SBR to SBR	3-5
ABS to ABS	3-5	Steel to Steel	7-14
Polycarbonate to Polycarbonate	5-10	Aluminum to Aluminum	7-14
Polystyrene to Polystyrene	5-10	Stainless steel to Stainless steel	7-14
Natural rubber to Natural rubber	3-5	Copper to Copper	2-4
*Neoprene to Neoprene	3-5	ABS to SBR	3-5
NBR to NBR	3-5	Steel to Rigid PVC	5-10

\* = T.M. Du Pont

**D. CHEMICAL RESISTANCE**

Steel to Steel.....Tensile Shear Strength

	Before soak	After 12 months soak
	N/mm <sup>2</sup>	N/mm <sup>2</sup>
Trichloroethylene	21.17	21.17
Gasoline	21.17	21.17
Motor Oil	21.17	21.17
Water	21.17	0
10% NaOH	21.17	0
10% Hcl	21.17	0

**E. PRECAUTION**

Use with proper ventilation. Avoid contact with skin and eyes. If contact with skin occurs, rinse with warm water or dissolve gradually with solvent such as acetone, dimethylformamide, or nitromethane. Do not try to remove forcibly. If adhesive gets into eye, keep eye open and rinse thoroughly. Seek medical attention immediately. Keep out of reach of children. Keep adhesive in a cool, dry place 20-25C (68-77F). For long term storage, refrigeration (5C or 41F) is recommended.

**Cyberbond LLC**

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**Material Safety Data Sheet****1- Chemical Product and Company Identification:**Product Name: **Apollo 2004**

Product Type: Cyanoacrylate Ester

Date revised: 02/28/02

**2- Composition/Information on Ingredients:**

<u>Hazardous Component</u>	<u>CAS Number</u>	<u>%</u>
Ethyl-2 Cyanoacrylate	7085-85-0	80-95
Poly Methyl Methacrylate	9011-14-7	10-15

<u>Exposure Limits (TWA)</u>	<u>ACGIH (TLV)</u>	<u>OSHA (PEL)</u>	<u>OTHER</u>
Ethyl-2 Cyanoacrylate	0.2 ppm	None	None

**Exposure Limits (STEL)****3- Hazards Identification:**

Toxicity: Skin contact may cause burns. Bonds rapidly and strongly to skin.  
Skin and eye irritant. Estimated oral LD50 more than 5000mg/kg.

Primary routes of Entry: Inhalation

Signs of exposure: Vapor is irritating to eyes and mucous membranes above TLV. Prolonged and /or repeated overexposure to vapors may produce symptoms of non-allergic asthma in sensitive individuals.

**4- First Aid Measures:**

Ingestion: Ingestion is unlikely. See supplemental section for emergency action.  
Inhalation: Remove to fresh air. If symptoms persist, obtain medical attention.  
Skin contact: Soak in warm water. See supplemental section for emergency action.  
Eye contact: Flush with warm water. See supplemental section for emergency action.

**5- Fire Fighting Measures:**

Flash Point: 150-200F, Tag Closed Cup  
Extinguishing Media: Foam, Dry Chemical or Carbon Dioxide  
Unusual Fire or Explosion Hazards: Vapors exceeding the flash point will ignite when exposed to flame.  
Special Fire Fighting Procedures: Wear self-contained breathing apparatus.

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**6-Accidental Release Measures**

Steps to be taken in case of spill or leak: Flood with water to polymerize. Soak up with inert absorbent.

**7- Handling and Storage:**

Safe storage: Store away from heat and direct sunlight to maximize shelf life. Store inside in a dry location.  
Handling: Keep container tightly closed. Avoid contact with skin. Avoid breathing vapors.

**8- Protective Equipment:**

Ventilation: Local exhaust ventilation is recommended to maintain vapor level below TLV.  
Respiratory protection: Not applicable with good local exhaust.  
Skin: Polyethylene or non reactive gloves. Do not use cotton or wool. See supplemental page for more information.  
Eye protection: Safety glasses or goggles with side shields.

**9- Physical and Chemical Properties:**

Appearance:	Clear liquid
Odor:	Sharp, pungent
Boiling Point:	Greater than 300F
Vapor Pressure:	Less than .2mmHg @20C
Vapor Density:	Approximately 3 (Air =1)
Evaporation rate:	Not applicable
Specific Gravity:	1.09
Solubility in water:	Negligible. Polymerized by water.
Volatile Organic Compound:	
(EPA Method 24)	98.6% 1025.4 grams per liter
(SCQAMD Method 316B)	0.48% 5.0 grams per liter

**10- Stability and Reactivity**

Stability: Stable  
Hazardous Polymerization: Will not occur  
Incompatibility: Polymerized by contact with water, alcohols, amines, and alkalis.

**11- Toxicological Information**

See Section 3

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**12-Ecological Information**

No Data

**13- Disposal Considerations:**

Spill or accidental release: Flood with water to cure (harden) adhesive. Soak up with an inert absorbent.  
Disposal procedures: Incinerate or dispose of in an approved landfill in accordance with local and EPA regulations. Not a RCRA hazardous waste.

**14- Transportation Information:****Domestic Ground Transport:**

Proper shipping name: Unrestricted (not more than 450 liters)  
Combustible liquid, n.o.s. (more than 450 liters)  
Hazard class or division: Unrestricted (Not more than 450 liters)  
Combustible liquid (more than 450 liters)  
Identification number: None (Not more than 450 liters)  
NA 1993 (More than 450 liters)  
Marine pollutant: No

**15- Regulatory Information**

CA Proposition 65: No information

**16- Other Information**

<u>Hazard</u>	<u>NFPA Hazard Code®</u>	<u>HMIS Hazard Code®</u>
Health	2	2
Fire	2	2
Reactivity	2	2
Specific Hazard	No water	Personal protection: See Section 8

NFPA is a registered trademark of the National Fire Protection Association  
HMIS is a registered trademark of the National Paint and Coatings Association

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**First Aid Supplement**

Cyanoacrylate adhesive is a very fast setting and strong adhesive. It bonds human tissue and skin in seconds. Experience has shown that accidents due to Cyanoacrylates are best handled by passive, non-surgical first aid. Treatment of specific types of accidents are suggested as follows:

**Skin Contact-** Remove excess adhesive. Soak in warm, soapy water. The adhesive will come loose from the skin in several hours. Dried adhesive does not present a health hazard even when bonded to the skin. Avoid contact with clothes, fabric, rags or tissue. Contact with these materials may cause polymerization. The polymerization of large amounts of adhesive will generate heat causing smoke, skin burns, and strong, irritating vapors. Wear rubber or polyethylene gloves and an apron when handling large amounts of adhesive.

**Skin Adhesion-** First immerse the bonded surfaces in warm, soapy water. Peel off or roll the surfaces open with the end of a blunt edge, such as a spatula or a spoon handle, then remove adhesive from the skin with soap and water. Do not try to pull the surfaces apart with a direct opposing action.

**Eyelid Adhesion-** In the event that eyelids are stuck together or bonded to the eyeball, wash thoroughly with warm water and apply a gauze patch. The eye will open without further action, typically in one to two days. There will be no residual damage. Do not try to open the eyes by manipulation.

**Adhesive In eye-** Adhesive introduced into the eyes will attach itself to the eye protein and will disassociate from it over intermittent periods, usually in several hours. This will cause periods of weeping until clearance is achieved. It is important to understand that disassociation will normally occur within a matter of hours, even with gross contamination.

**Mouth-** If lips are accidentally stuck together apply lots of warm water and encourage maximum wetting and pressure from saliva inside the mouth. Peel or roll lips apart. Do not try to pull the lips with direct opposing action. It is almost impossible to swallow Cyanoacrylate. The adhesive solidifies and adheres in the mouth. Saliva will lift the adhesive in one to two days.

**Burns-** Cyanoacrylates give off heat on solidification. In rare cases, large drops will increase in temperature enough to cause a burn. Burns should be treated normally after the lump of Cyanoacrylate is released from the tissue as described above.

**Surgery-** It should never be necessary to use such drastic action to separate accidentally bonded skin.

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