

November, 2017

## APM Epicol 84S

Description	
APM number:	237428
System:	1K Premixed-frozen conductive Epoxy
Colour:	silver grey
Consistency:	viscous / thixotropic
Solid bodies:	100% / solvent-free
Pot life:	120 minutes
Temp. range:	-55 °C to +175 °C

Specifications	
Directive 2011/65/EC:	RoHS compatible
EC No. 1907/2006:	compliant with REACH

APM Epicol 84S is a universally applicable, silver-filled, electrical conductive epoxy adhesive. Electrical and thermal conductivity is due to silver particles. Epicol 84S HV is used when silver is required due to its excellent electrical and thermal conductivity properties and curing cannot take place at temperatures above 100°C. The epoxy system is very reactive and cures at room temperature for temperature sensitive substrates but heat conductivity and electrical conductivity will increase when cured between 60 – 100 °C. The one component adhesive can be easily dispensed from the cartridge using dispensing needles with a inner diameter of > 0.25 mm. Store the adhesive frozen below -40°C with a shelf life of 2 months. The adhesive is also available in a two component version in plastic bipaks packaging for room temperature shipment. The adhesive easily bonds a wide variety of metals and is therefore suitable for many applications.

Properties of fluid adhesive	
System:	Silver filled epoxy
Viscosity:	10 – 20 Pa.s / thixotropic
Pot life at 25°C:	120 minutes
Density at 25°C:	3.3 g/cm <sup>3</sup>
Particle size:	< 30 um
Dispensability	Needle, ID > 0.25 mm

### Surface pretreatment / cleaning

The surfaces to be bonded must be dry and free from dust, oil, separating agents and other impurities. The selected type of surface treatment depends on the requirements profile

(cleanliness, mechanical strength, resistance). Mechanical treatment, e.g. grinding or sand-blasting, produces an improvement in adhesion and contacting, especially for metals and in many cases also for non-ferrous metals. It is best to clean sensitive surfaces with aqueous ultrasound cleaning methods at high temperature. Metal surfaces can be cleaned using clean solvents. Pretreating surfaces with reducing plasma has proven to be an excellent method to obtain better electrical contacting, Plasma treatment dries the surface and improves wettability. This achieves good adhesion of the adhesive. Do not use primers since they can affect electrical contacting and thermal conductivity.

### Bonding process using frozen adhesives

Processing a two component adhesives poses risks to adhesive bond quality which is not tolerated in certain applications, e.g. space, aviation, electronics or medical technology. The individual components may become crystallized during storage or might separate from the filler; the mixing ratio may be incorrect, the mixture inhomogeneous or air bubbles may become admixed with the adhesive mixture. The bonding process using a one component cartridges is simple and robust since the adhesive is processed as a one component adhesive. Remove the frozen adhesive from the freezer and allow it to tow to room temperature. This needs 5 to 10 minutes depending on the cartridge size. As soon as no water condensation of the humidity on the surface of the cartridge appears, the adhesive is liquid and dispensing can be started.

### Applying the adhesive

The best processing temperature is between 20°C and 28°C. Viscosity lowers at higher temperature and pot life shortens. The adhesive is applied from the cartridge using a pneumatic dispenser. It can also be applied with brush or a spatula. Thin adhesive layers have the best properties. Join the parts together and prevent them from slipping during curing by attaching clamps or fixing devices.

### Curing the adhesive

Room temperature	25°C	24 hours
Heating cabinet	70 °C	2 hours
Heating cabinet	80 °C	1 hour
Heating cabinet	100 °C	15 minutes

The parts can be further processed immediately after curing the adhesive. However, the bonding achieves optimum strength and resistance after a few days. Excellent electrical and thermal conductivity can be achieved by curing at high temperature and/or by subjecting the bond to subsequent ageing treatment at the highest temperature permitted for the component.

### Properties of cured adhesive

Colour:	silver grey
Shore D (25°C):	60 – 70
Tensile strength (25°C):	8.0 N/mm <sup>2</sup>
Volume resistance:	< 0.0005 Ω.cm
Thermal conductivity:	2.9 W/mK
Therm. expansion (0-40°C)	$\alpha = 30 \times 10^{-6}/K$
Softening temperature T <sub>g</sub> :	50 to 75 °C
Temperature range:	-55°C to + 175°C
Decomposition temperature:	300°C

### Cleaning the adhesive

Residue from non-cured adhesive on the substrates and processing equipment can be removed or cleaned using a solvent such as isopropanol or acetone. Organic solvents may lead to component destruction or stress cracking in plastics. For this reason, avoid use of aggressive solvents such as acetone, ketones and esthers. Comply with the official safety regulations when handling combustible solvents. Cured adhesive can only be removed mechanically. The adhesive becomes softer at temperatures over 75 °C.

### Compliance

Epicol 84S and all its constituents comply with the requirements of RoHS and REACH guidelines. Always comply with the safety data sheet when handling the adhesive.

### Safety instructions

Avoid contact with skin and eyes. When applying the adhesive, always wear gloves and safety goggles. If adhesive comes into contact with the skin, do not use solvents to remove. Instead wash the affected area (hands) with warm water and soap and then dry. Before use, please observe the instructions in the safety data sheet.

### Storage

The shelf life of premixed frozen Epicol 84S is minimum 2 months if stored at a temperature of  $-40^{\circ}\text{C}$  or below. Shelf life can be increased to 6 months storing the adhesive at  $-60^{\circ}\text{C}$  or below. Due to the short pot life the premixed frozen product has to be shipped in dry ice at  $-78^{\circ}\text{C}$ . Room temperature shipping can be done for the two component version, which is available in plastic bipaks from 10 grams to 25 grams.

### Disposal

Remove expired cartridges from the freezer and let it cure over night at room temperature. Cured adhesive contains high percentage of pure silver which can be recycled and is valuable.

The specifications in this data sheet are based on meticulous tests and our previous experience in everyday practice. They are non-binding instructions, in the same way as our application advisories are also non-binding, whether verbal, in writing or by trials since we cannot accept any liability due to the wide variety of possible influences during processing and application. APM Technica AG disclaims all other explicit or implicit warranties, conditions and terms, be they of real or legal nature, including those which refer to usual market quality, their suitability for a particular use, satisfactory quality or observance of third-party trademarks. APM Technica excludes all liability to the extent permitted by law – whether arising from contract, quasi contract or tort (including negligence) – for direct, indirect and consequential damages, punitive damages awarded by court, loss of business of all kinds, loss of information or data or any other financial losses which may result from the sale, installation, maintenance, use, performance, failure or interruption of operation of the product or in connection therewith, even if we were informed of the possibility of occurrence of such damages. Data and other specifications concerning the nature and suitability of our products are non-binding general conditions and specifically represents no guarantee of certain characteristics. We advise you to perform your own adequate tests to determine the suitability of our products for your specific application. The user is himself responsible for defining the suitability of production methods mentioned in the technical data sheet for his purposes and for taking precautionary measures which are suitable to protect assets and persons from any danger which may occur during the handling and usage of these products. In all other cases our General Terms and Conditions of Business shall apply.