PROTAVIC® ACE 60705

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DEFINITION

PROTAVIC® ACE 60705 is a pure silver filled, fast curing, single component electroconductive adhesive.

It has been specially developed for the conductive gluing of components onto a lead frame or onto a flexible circuit in the field of microchip cards and flexible keyboards.

Its great reactivity allows on-line or low temperature curing in less than a minute at 150°C.

Its high ionic purity is conducive to reliability. It is a more free-flowing version of **PROTAVIC® ACE 60705**.

It has a pot life of over 8 h at 20°C and its rheology enables it to be applied on automatic machines by microdispenser or screen printing.

PRODUCT DESCRIPTION

Nature	Pure silver filled, solvent free, single-component epoxy resin.
Appearance	liquid
Odour	faint
Colour	silver grey

Guaranteed specifications	**Standards**	**Methods**
Resistivity after curing 5 min. at 200°C (mΩ.cm)	≤ 0.3	ECA 1
Plane cone viscosity at 25°C (mPa.s)	12 500 ± 2 500	NFT 51211 - 19/s
% Ash residue (at 900°C)	75 ± 2	PROTEX TGA 1
Peak temperature (°C)	137.5 ± 7.5	PROTEX DSC 1 at 20°C/min.

Other information	
Pot life	8 hours
Storage life	1 month at -25°C 6 months at -40°C
Possible curing cycles	90 to 120 minutes at 60°C 45 to 90 minutes at 80°C 10 to 20 minutes at 100°C 3 to 5 minutes at 125°C 50 to 60 secondes at 150°C

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APPLICATION PROPERTIES

PROTAVIC® ACE 60705 adhesive has been designed for application by microdispenser and by silk screen printing.

It confers the advantages of a single-component epoxy, namely: savings in time and less waste.

Its original formulation provides two outstanding features, namely: constant viscosity at ambient temperatue and a greater reactivity than conventional single and two-component epoxies.

It combines the excellent adhesive properties of epoxy resins with the good electrical conductivity of pure silver.

It possesses good thermal stability due to a decomposition temperature of around 400°C, good adhesion to metals, plastics and ceramics and high ionic purity.

Its high reactivity and good electrical conductivity enable it to be used on flexible circuits which do not tolerate high curing temperatures and in high productivity processes requiring rapid curing.

METHOD OF USE

Before opening the package, condition at ambient temperature for 15 to 30 minutes in order to avoid any condensation.

1 - Homogenization

This operation can be avoided if there has been no break in the cold storage system whilst the product has been transported and stored.

If the product has been allowed to remain at 20°C for over 3 hours, it is advisable to stir slowly for approximately one hour in order to achieve the best results. In applications where inclusions of air cause defects, we recommend that a short treatment under a vacuum of 0.1 to 1.0 mm of mercury should be carried out for approximately 15 minutes.

2 - Applying the product

Surfaces in contact with the adhesive must be clean and free from grease. If necessary, degrease with an unchlorinated solvent, finishing - if possible - with degreasing in solvent fumes, in order to achieve optimum adhesion.

Apply the adhesive with :

- *a microdispenser*

PROTAVIC® ACE 60705 is suitable for use with needles with an internal diameter of approximately 0.3-1.0 mm.

- *a silk screen printing machine*

PROTAVIC® ACE 60705 is suitable for use with stainless steel screens with a mesh of between 70 and 350.

The usual screens are in the region of 120 mesh.

3 - Curing

To obtain a better electrical conductivity, cure as fast as possible after the application.

The recommended curing cycles are minimum conditions which do however enable a good shear strength to be achieved.

Depending on the constraints imposed on the components, re-curing for between 1 and 6 hours at between 100 and 150°C optimizes the mechanical strength, electrical conductivity and moisture absorption.

TYPICAL PROPERTIES OF THE CURED SYSTEM

The properties set out below were obtained after curing for 3 mn at 150°C in a ventilated oven.

They were determined following measurements carried out in the laboratory in a small number of tests.

They are values given by way of guidance, and do not constitute a guarantee. It will be for the user, in all cases, to carry out his own tests to determine the optimum curing conditions for **PROTAVIC® ACE 60705** with regard to his own particular application.

PHYSICO-CHEMICAL PROPERTIES

Properties	Methods	Units	Typical values
Colour	--	--	bright silver
Chlorine content	MIL 883 Method 50112	mg/kg	< 300
Sodium content	MIL 883 Method 50112	mg/kg	< 50
Potassium content	MIL 883 Method 50112	mg/kg	< 50
Shear strength silicone chip stuck onto alumina	MIL 883 Method 50112	daN/cm²	> 400
Shear strength aluminium/aluminium	NFT 76106	daN/cm²	> 50

THERMAL PROPERTIES

Properties	Methods	Units	Typical values
Coefficient of linear expansion - from -50 to +60°C - from 100 to 250°C	PROTEX TMA 1*	$°C^{-1}$	 $40\text{-}50 \times 10^{-6}$ $110\text{-}120 \times 10^{-6}$
Glass transition temperature Tg	PROTEX TMA 1*	°C	70-90
Thermal conductivity	PROTEX CTH 2	W/(m.K)	> 2.5
Decomposition temperature in air	PROTEX TGA 1**	°C	390-400
Weight loss after post-curing for 2 h at 150°C between 25°C : - 100°C - 200°C - 300°C	PROTEX TGA 1**	 % % %	 0.08 0.86 1.86

** Thermomechanical analysis TMA Mettler -20°C/min, force 0.1 N over 1 mm²*
*** Thermogravimetric analysis TG 50 Mettler -10°C/min, in air 200 ml/min.*

APPLICATION

Silver-filled **PROTAVIC® ACE 60705** single-component adhesive is especially suitable for applications which call for the good adhesive properties of epoxy resins and very rapid curing :

- microchip cards - sticking chips onto the card's flexible circuit.
- LEDs -sticking LEDs onto a flexible keyboard.
- transistors, diodes, integrated circuits - sticking onto lead frame with rapid on-line curing.
- surface-mounted components - sticking components onto the circuit - silk screen printing of the conductive circuits on flexible or rigid circuits.

- quartz for oscillators - sticking the quartz crystals onto the electrodes.

- repairing printed circuits.

PROTAVIC® ACE 60705 is also outstanding in terms of its thermal and electrical conductivity and its high ionic purity which eliminate problems of corrosion and contribute towards the reliability of the components in which it is used.

It possesses the good mechanical properties as well as the thermal stability of epoxy resins and the low thermal degassing associated with solvent-free epoxies.

Lastly, it is not toxic and, because it is solvent-free, it does not pose industrial health problems, provided the usual precautions for using epoxy resins are taken.

STORAGE STABILITY

At around 20°C, the viscosity of **PROTAVIC® ACE 60705** doubles in 8 hours; users are advised to only thaw sufficient product for half a days work; under these conditions, the viscosity only increases by 20 % at 20 ± 3°C after 4 hours.

Any **PROTAVIC® ACE 60705** which remains unused can be put back into the freezer at the end of the day and re-used the next day after being thawed without appreciable change in the viscosity.

The storage stability in a freezer at -25°C is 1 month.

PROTAVIC® ACE 60705 can be kept for up to 6 months in a freezer at -40°C.

PRECAUTION OF USE

Refer to the attach safety data sheet.

PACKAGING

The single-component **PROTAVIC® ACE 60705** is supplied in 1.5 kg plastic boxes or in 14 g syringes.