

2-pack via hole filler

SD 2768 NB

Base: Epoxy resin (EP)

- **green transparent**
- safe closing of via holes
- high solids content means low volume shrinkage
- no bleeding on gold or other metal surfaces, thus particularly suitable for via-in-pad applications
- corresponds to the best flame class V-0 according to UL 94
- does not contain substances listed in the RoHS directive 2002/95/EC, the End-of-Life Vehicle directive 2000/53/EC and the WEEE directive 2002/96/EC

Indices: **SD** = **screen printing**
NB = **no bleeding**

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Please read this technical report and the material safety data sheet according to directive 1991/155/EEC carefully before using the product.

1. General information

The 2-pack via hole filler **SD 2768 NB** is applied by screen printing to plug via holes.

2. Application

The via hole filler **SD 2768 NB** is applied to

- fill via holes and thus avoid solder seeping through to the component side
- ensure via holes are sealed for vacuum adaptation during incircuit testing
- avoid flux residues settling in the holes and forming critical microclimates in the holes and/or under components.

Due to the high solids content and when optimally processed plated-through holes can be securely filled with the via hole filler **SD 2768 NB** (see item 8 "Drying/Curing").

3. Special notes

When applying the 2-pack via hole filler **SD 2768 NB** no bleeding onto gold or other metal surfaces occurs (Index **NB** = **n**o **b**leeding), therefore **SD 2768 NB** is particularly suitable for via-in-pad applications.

The via hole filler **SD 2768 NB** can be applied in a temperature range of -40 to +130 °C [-104 to +266 °F], whereby at the lower and upper ends of this range the behaviour and the performance of the material may be negatively affected in some applications. In these cases additional pre-trials and tests are necessary.

For the generation of extra-smooth, metallisable hole plugs, e. g. for SBU technology, plugging pastes are available which are applied by screen printing (**PP 2795-SD**) or roller coating (**PP 2795**). These are solvent-free 1-pack systems, that can be processed bubble-free and are distinguished by good adhesion, grindability and metallisation.

Special technical reports on these products are available upon request. In our report manual these technical reports are filed under group 2. On our report manual CD, technical reports can be accessed in the "Products" section.

4. Safety recommendations

- Please read our material safety data sheet according to directive 1991/155/EEC where you will find detailed specifications of safety precautions, environmental protection, waste disposal, storage, handling, transport as well as other characteristics.
- When using chemicals, the common precautions should be carefully noted.

5. Characteristics

Colour/appearance	green transparent
Solids content of mixture ISO 3251 1 h, 125 °C [257 °F], 1 g weighed quantity	80 ± 2 % by weight
Viscosity* of mixture at 20 °C [68 °F] ISO 3219	35,000 ± 5,000 mPas
Density of mixture at 20 °C [68 °F] ISO 2811-1	1.48 ± 0.05 g/cm³
Pot life of mixture at room temperature, approx. 18-23 °C [64.4-73.4 °F] at 5-10 °C [41-50 °F]	42 h 5 days

* measured with Haake RV 20, PK 1/1°, D = 50 s⁻¹, viscosity measuring unit supplied by:
 Thermo Electron (Karlsruhe) GmbH (formerly Haake-Messtechnik GmbH + Co)
 Dieselstraße 4, 76227 Karlsruhe, Germany
 Telephone +49 (0) 721 - 40 94 - 0, Telefax +49 (0) 721 - 40 94 - 300
 www.thermo.com

6. Properties

The via hole filler **SD 2768 NB** is distinguished by the following properties:

6.1 General properties

- does not contain substances listed in the RoHS directive 2002/95/EC, the End-of-Life Vehicle directive 2000/53/EC and the WEEE directive 2002/96/EC
- safe filling of plated-through holes
- its high solids content and slight thixotropy ensure optimal printing properties
- owing to the long screen open time short breaks in work are possible without interfering with production
- no bleeding onto gold or other metal surfaces
- especially suitable for via-in-pad applications
- excellent solder bath resistance, also in lead-free soldering processes
- very good resistance to electroplating and electroless baths
- virtually insoluble lacquer film after curing
- corresponds to best flame class according to UL 94 V-0.

6.2 Physical and mechanical properties

Property	Test method	Result
Resistance to solvents/cleaning agents	IPC-SM-840C, 3.6.1 Isopropanol 10% alkaline cleaning agent	passed passed
Resistance to solvents	test boards, dipped in methylene chloride (dichloromethane), 30 min at room temperature	no swelling
Thermal cycling test	5 cycles of 15 min boiling water, 2 min iced water (Peters test method LP-13.0)	passed
Solder bath resistance	IPC-SM-840C, 3.7.2 UL 94	passed: 20 s at 265 °C [509 °F] passed: 20 s at 288 °C* [550.4 °F]
Thermal class	based on DIN IEC 60085	B = 130 °C [266 °F]

* With a solder bath resistance of 20 s at 288 °C [550.4 °F] the via hole filler **SD 2768 NB** fulfils the required temperature resistance for lead-free soldering.

6.3 Electrical properties

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 IPC-TM-650, 2.5.6.1	80 kV/mm
Surface resistance	VDE 0303, part 30 DIN IEC 60093	2×10^{14} Ohm
Volume resistivity	VDE 0303, part 30 DIN IEC 60093	10^{16} Ohm x cm
Moisture and insulation resistance	IPC-SM-840C, 3.9.1	class H and T
Comparative Tracking Index (CTI)	DIN EN 60112 on base material with CTI 225 CTI 600	CTI 225 CTI 600
Electromigration	IPC-SM-840C	no migration
Electrocorrosion	after 20 cycles at min. 90 % r. h./100 V direct current 1 cycle = - 1 h heating from 25 °C [77 °F] to 65 °C [149 °F] - 3 h holding at 65 °C [149 °F] - 1 h cooling from 65 °C [149 °F] to 25 °C [77 °F]	no apparent electrolysis

* Among others, the CTI value of the coating also depends on the tracking resistance of the base material. The CTI value of the base material is maintained with the via hole filler **SD 2768 NB**.

Note:

Optimum electrical insulation values can only be achieved when all flux residues are removed thoroughly from the pcb after HAL.

7. Processing



Since the many different permutations make it impossible to evaluate the whole spectrum (parameters, reactions with materials used, chemical processes and machines) of processes and subsequent processes in all their variations, the parameters we recommend are to be viewed as guidelines only. We advise you to determine the exact process limitations within your production environment, in particular as regards compatibility with your specific follow-up processes, in order to ensure a stable fabrication process and products of the highest possible quality.

The specified product data is based upon the standard test conditions of the mentioned norms and must be verified observing suitable test conditions on processed printed circuit boards.

Feel free to contact us if you have any questions or for a qualified consultation with our application technology department.

When processing the via hole filler **SD 2768 NB** the following recommendations must be observed:

7.1 Mixing

The components are mixed together in the following ratio:

Component A : Component B = 5 : 1 (parts by weight).

Both components are already packed in the correct mixing ratio. The volume of the container of component A is sufficiently large to accommodate the entire quantity of component B and allow for perfect mixing.

→ Mix both components in the indicated mixing ratio.

For stirring we recommend mechanical stirring tools. For more detailed information on correct mixing please read our **Technical Information sheet TI 15/10 "Processing of 2-pack systems"**. We will gladly provide you with this technical information sheet upon request. In our report manual, this Technical Information sheet is filed under group 15. On our report manual CD and on our web-site you will find technical information sheets in the "Service" section.

The ink can be processed **immediately** after mixing. Excess mixed ink should be stored in a cool place; this prolongs the pot life (see item 5 "Characteristics").

7.2 Adjustment of viscosity

The via hole filler **SD 2768 NB** is adjusted in such a manner that it can normally be processed in the condition supplied. If necessary, its viscosity can be reduced for processing purposes by adding the universal thinner **UV 5000** or universal retarder **UZ 5100**. The thinning effect of the universal retarder **UZ 5100** is slightly lower compared with the universal thinner **UV 5000**, but a slightly longer screen open time is achieved.



Please consider when adding thinner or retarder that the curing time may have to be prolonged considerably in order to avoid the potential entrapment of solvent residues in the via holes.

7.3 Auxiliary products

- **Screen opener HP 5200**

The screen opener **HP 5200** is a highly active spray for dissolving dried screen printing inks immediately and safely from clogged screens. **HP 5200** is silicone-free and does not contain oils or oily substances, so that no smearing occurs.

- **Anti-static spray HP 5500**

The anti-static spray **HP 5500** prevents and eliminates any electrostatic discharge that occurs during screen printing. **HP 5500** is silicone- and grease-free.

- **Cleaning agents R 5899, R 5821 and R 5817**

The cleaning agent **R 5899** does not have to be marked according to German dangerous goods regulations and can be handled simply and safely. Owing to its high flash point ($> 100\text{ }^{\circ}\text{C}$ [$> 212\text{ }^{\circ}\text{F}$]) it is especially suitable for use in screen washing equipment. The cleaning agent **R 5899** is particularly distinguished by a low vapour pressure ($< 0.1\text{ hPa}$ at $20\text{ }^{\circ}\text{C}$ [$68\text{ }^{\circ}\text{F}$]) and thus is not affected by the EU-VOC regulation 1999/13/EG which judges solvents by their percentage of volatile organic compounds (VOC = volatile organic compounds).

Furthermore, the cleaning agent **R 5821** is available which, owing to its high flash point of $+32\text{ }^{\circ}\text{C}$ [$89.6\text{ }^{\circ}\text{F}$], is also suitable for use in screen washing equipment as well as for cleaning work tools. For the manual cleaning of screens and tools we recommend our cleaning agent **R 5817** with its fast and thorough cleaning properties.



Do not use cleaning agent as a thinner or for washing hands since solvents remove the natural grease from skin.

Special technical reports for these products are available upon request. Further information regarding the content and consequences of the EU-VOC regulation can be found in our **technical information sheet TI 15/110 E "EU-VOC regulations – Content and consequences for the PCB industry"**. In our report manual these technical publications are filed under group 5 and 15. On our report manual CD you will find technical reports in the "Products" section and technical information sheets in the "Service" section.

7.4 Screen printing

→ Ensure that the via hole filler **SD 2768 NB** is printed into clean, dry, grease- and oxide-free via holes.

Recommended screen printing parameters

Screen fabric	steel fabric: - 224/100 (80 mesh standard screen) - 245/65 - 265/50 for initial orientation tests a 35 – 43 T polyester screen is also acceptable
Screen printing stencil	voids in the fabric > hole diameter (about 0.1 – 0.2 mm larger, depending on size of the printing format) A high stencil build-up is not necessary because the ink should be printed into the drill holes only. As a rule it is sufficient to close the screen mesh with a thin coat of emulsion or a thin capillary film.
Snap-off	as low as possible
Flooding squeegee	rubber squeegee
Squeegee	75 Shore A, squeegee profile: 30-45°
Squeegee angle	90°
Squeegee pressure	4 bar
Printing speed	as slow as possible
Printing underlay	thickness of approx. 3 mm, base material that was drilled with the same drill program but where the diameters of the holes are five times the size of the actual via holes. (The printing underlay enables the filling of the holes since there are no air resistances under the holes.) An undergrid would also be acceptable provided it does not permit the printing substrate to spring.



After curing the ink assumes a virtually insoluble state. Therefore, control the printing result thoroughly as not even strippers will dissolve the ink.

8. Drying/Curing

The curing conditions also depend upon the applied quantity of via hole filler.

→ Perform pre-trials to determine the optimum curing parameters. If possible adjust a ramp-formed curing curve in order to expel any entrapped solvent residues, e.g.:

45 min at 80 °C [176 °F], followed by final cure for 45 min at 130 °C [266 °F] (object holding time*).

* object holding time: The curing time is measured from the point when the panels reach the curing temperature.

9. Standard packaging

The via hole filler **SD 2768 NB** is packed for delivery as follows:

Component A	Component B	Selling unit
10 tins of 1 kg	10 plastic bottles of 0.2 kg	12 kg

Partial lots of the selling unit may be ordered but will entail surcharges to cover repackaging costs.

10. Storage

In a cool, dry place, sealed original containers can be stored for at least 9 months. For warehousing reasons, isolated cases may occur where the shelf life upon shipment is less than the shelf life indicated in this technical report. However, it is ensured that our products have **at least** two-thirds of their shelf life remaining when they leave our company.

In accordance with EN ISO 9001, labels on containers show expiry dates.



Moisture and storage temperatures below 5 °C [41 °F] and above 25 °C [77 °F] as well as repeated opening of containers reduce the shelf life.

Any questions?

We would be pleased to offer you advice and assistance in solving your problems. Free samples and technical literature are available upon request.

The above information as well as advice given by our Application Technology Department whether in verbal or written form or during product evaluations is provided to the best of our knowledge, but must be regarded as non-binding recommendations, also with respect to possible third-party proprietary rights.

The products are exclusively intended for the applications indicated in the corresponding technical data sheets.

The advisory service does not exempt you from performing your own assessments, in particular of our material safety data sheets and technical information sheets, and of our products as regards their suitability for the applications intended. The application, use and processing of our products and of the products manufactured by you based on the advice given by our Application Technology Department are beyond our control and thus entirely your responsibility. The sale of our products is effected in accordance with our current terms of sale and delivery.

ATTENTION!

For new products, according to preliminary technical reports, adequate practical results are not always available which would permit a comprehensive assessment of such a product. It is therefore imperative to exercise particular care in the testing of such products with regard to the application intended!

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