Hysol® Underfills

The proliferation of handheld devices and the trend toward thinner, less rigid PCB's are driving the demand for improved shock resistance and increased electronic device reliability.

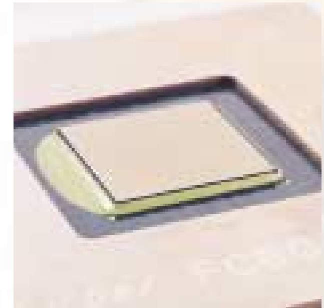
Hysol® package level underfill encapsulants meet stringent JEDEC level testing requirements and are compatible with the high temperature processing required for lead free assembly. Our green materials are developed to meet demanding end use requirements, including low warpage/low stress, fine pitch, high reliability, and high adhesion.

Hysol® CSP/BGA underfills offer easy reworkability as well as excellent vibration and impact resistance. These underfills offer many processing advantages such as fast flow, fast cure, and long pot life. Our new Cornerbond technology fits easily into an SMT process flow and **eliminates a separate underfill dispense and cure process,** saving time and money.

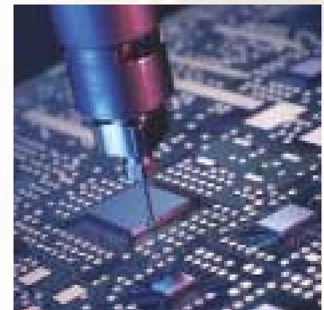
The industry standard for flip chip, Hysol® underfills are used in devices such as FC CSPs and FC BGAs for ASICs, chipsets, graphics chips, digital processors, and microprocessors. These fast flow materials permeate easily under large die. Offering excellent adhesion when used with a variety of no-clean fluxes, these underfills will not crack after thermal shock or thermal cycling.

The latest technology from Henkel Loctite includes underfills for low k die, new chemistries offering pot life measured in weeks, rather than hours, fast flowing snap cure, unique reworkable formulations, fluxing no-flow underfills, wafer/pre applied for flip chip and CSPs, and preapplied corner bond adhesives for CSPs that eliminate post-reflow dispense and cure steps.

Henkel Loctite is partnering with leading technology companies and research universities to develop future technologies such as **low k dielectric underfills, wafer-applied, reworkable and fluxing underfills** for direct microchip attachment.



Package Level Underfill



DCA Underfill

Cornerbond 3515

Hysol® Semiconductor Liquid Encapsulants

Package Level Underfills

Product	Description/Application	Pot Life @ 25°C	Recommended Cure	Flow Speed	Viscosity @ 25°C	Tg, °C	CTE (1) (ppm/°C)	% Filler	Storage Temp.	Item*
FP4511	Flip Chip, 1 mil/25 µm gap	24 hrs.	2 hrs. @ 150°C	Slow	8,500 cps	150	22	70	-40°C	FP4511-V20-10 ml FP4511-V19-30 ml
FP4526	Flip Chip, 3 mil/75 µm gap	24 hrs.	15 min. @ 165°C	Fast	4,700 cps	133	25	63	-40°C	FP4526-V19-30 ml FP4526-V20-10 ml
FP4544	Flip Chip, 1/2 mil/13 µm gap	24 hrs.	30 min. @ 165°C	Very Fast	2,600 cps	140	45	50	-40°C	FP4544-V19-30 ml FP4544-V20-10 ml
FP4546	Flip Chip, 3 mil/75 µm gap	32 hrs.	30 min. @ 165°C	Fast	12,000 cps	130	35	60	-40°C	FP4546-V20-10 ml FP4546-V19-30 ml
FP4547	Flip Chip, 3 mil/75 µm gap	24 hrs.	30 min. @ 165°C	Medium	18,000 cps	135	21	69	-40°C	FP4547-V20-10 ml FP4547-V19-30 ml
FP4549 (White)	Flip Chip, 1/2 mil/13 µm gap	24 hrs.	30 min. @ 165°C	Very Fast	2,300 cps	140	45	50	-40°C	FP4549-V20-10 ml FP4549-V19-30 ml
NEW FP4549HV (White)	Flip Chip, 1/2 mil/13 µm gap	24 hrs.	30 min. @ 165°C	Very Fast	4,000 cps	140	45	50	-40°C	FP4549HV-V20-30 ml FP4549HV-V19-10 ml
FP4549G (Gray)	Flip Chip, 1/2 mil/13 µm gap	24 hrs.	30 min. @ 165°C	Very Fast	2,300 cps	140	45	50	-40°C	FP4549G-V20-10 ml FP4549G-V19-30 ml
NEW FP4549SI	Flip Chip, 3 mil/75 µm gap	24 hrs.	30 min. @ 165°C	Very Fast	2,500 cps	138	46	42	-40°C	FP4549SI-V20-10 ml FP4549SI-V19-30 ml
FP4547FC (Flux Compatible)	Flip Chip, 3 mil/75 µm gap	24 hrs.	30 min. @ 165°C	Medium	25,000 cps	120	22	65	-40°C	FP4547FC-V20-10 ml FP4547FC-V19-30 ml
NEW FP4580	Flip Chip, 3 mil/75 µm gap	48 hrs.	1 hr @ 165°C	Very Fast	900 cps	150	60	20	-40°C	FP4580-V20-10 ml FP4580-V19-30 ml

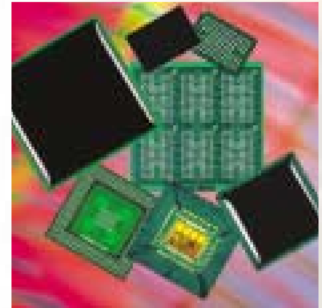
CSP and DCA Underfill Encapsulants

Product	Description/Application	Viscosity @ 25°C	Pot Life	Cure Schedule	Tg, °C	CTE(1) (ppm/°C)	Capillary Flow	Storage Temp.	Items*
3515	CSP Cornerbond	7,400 cps	7 days	reflow cure (see TDS)	73	98	N/A	5°C	34418-30 ml
3563	Snap Cure Rapid Flow CSP or FCOB	8,000 cps	8-12 hrs.	5 min @ 150°C	130	35	<15 sec +	-40°C	29992-10 ml 29993-30 ml
3568	Reworkable CSP or FCOB	500 cps	30 hrs.	7 min @ 165°C	70	40	30 sec +	-40°C	32901-10 ml 32902-30 ml
3593	Snap Cure Rapid Flow CSP	4,500 cps	7 days	5 min @ 150°C	110	50	100 sec ++	5°C	35093-6 oz 35095-30 ml
3594	Fluxing, Solder reflow cure CSP or FCOB	11,700 cps	4 hrs.	Solder reflow cycle	103	61	N/A	-40°C	35876-10 ml 35877-30 ml
3595	Snap Cure Rapid Flow CSP or FCOB	12,200 cps	8-12 hrs.	5 min @ 165°C	116	24	<20 sec +	-40°C	36186- 10 ml 36188-30 ml
FF2000	Fluxing, Volcano Reflow cure CSP or FCOB	2,500 cps	16 hrs.	volcano reflow cycle (see TDS)	128	75	N/A	-40°C	FF2000-V20-10 ml
FF2200	Fluxing, Solder reflow cure CSP or FCOB	3,600 cps	16 hrs.	solder reflow cycle (see TDS)	128	72	N/A	-40°C	FF2200-V20-10 ml
FP4526	FCOF, 3 mil/75 µm gap	4,700 cps	24 hrs.	15 min @ 165°C	133	25	45 sec ++	-40°C	FP4526-V20-10 ml FP4526-V19-30 ml
FP4527	FCOB, 1 mil/25 µm gap	12,000 cps	24 hrs.	30 min @ 165°C	140	26	60 sec ++	-40°C	FP4527-V20-10 ml FP4527-V19-30 ml
FP4530	FCOF, 1 mil/25 µm gap	3,000 cps	24 hrs.	7 min @ 160°C	148	44	20 sec ++	-40°C	FP4530-V20-10 ml FP4530-V19-30 ml
FP4531	FCOF, FCOB, 3 mil/75 µm gap	9,000 cps	24 hrs.	7 min @ 160°C	144	28	30 sec ++	-40°C	FP4531-V20-10 ml FP4531-V19-30 ml
NEW FP4532	FCOF, 3 mil/75 µm gap	16,000 cps	12 hrs.	5 min @ 150°C	140	30	30 sec ++	-40°C	FP4532-V20-10 ml FP4532-V19-30 ml
FP6100	Reworkable CSP	7,900 cps	16 hrs.	5 min @ 165°C	0	94	15 sec ++	-40°C	FP6100-V24-10 ml FP6100-V25-30 ml
NEW FP6101	Reworkable CSP	3,700 cps	14 days.	5 min @ 165°C	15	80	15 sec ++	5°C	FP6101-V24-10 ml FP6101-V25-30 ml

Legend: FCOF = Flip Chip on Flex • FCOB = Flip Chip on Board • DCA = Direct Chip Attach • COB = Chip on Board * Standard sizes. Other sizes may be available.

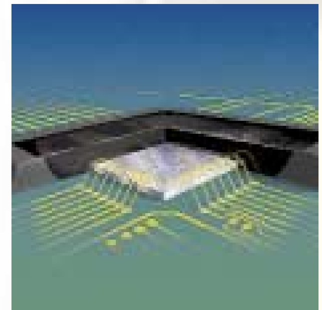
+100C, 1 mil gap, 1/2 inch, 25 µm
++ 90C, 3 mil gap, 1/2 inch, 75 µm

Hysol® Encapsulants



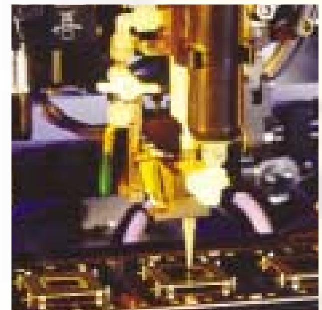
Semiconductor Liquid Encapsulants

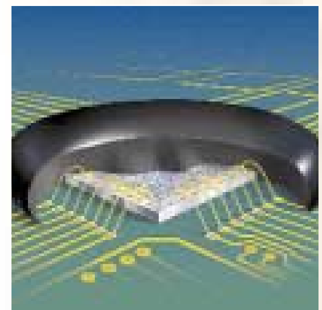
For today's smaller, thinner, and lighter packages, high purity Hysol® encapsulants are self-leveling materials that offer unprecedented performance for transistors, system in package, microprocessors, and ASICs. Our co-cure dam and fill encapsulants cure in one easy step, requiring no pre-cure of the dam material. High purity liquid epoxy encapsulants are designed to work together as dam and fill materials for bare chip encapsulation, protecting gold wire bonds and silicon die from mechanical damage and corrosion. Although these materials are typically used together in dam and fill applications, the low viscosity "fill" materials can be used alone in devices that contain a cavity. Hysol® encapsulants meet stringent JEDEC level testing requirements and are compatible with the high temperature processing demanded for lead-free assembly. Our green materials are developed to meet the demands of end-use requirements.



Chip on Board Liquid Encapsulants

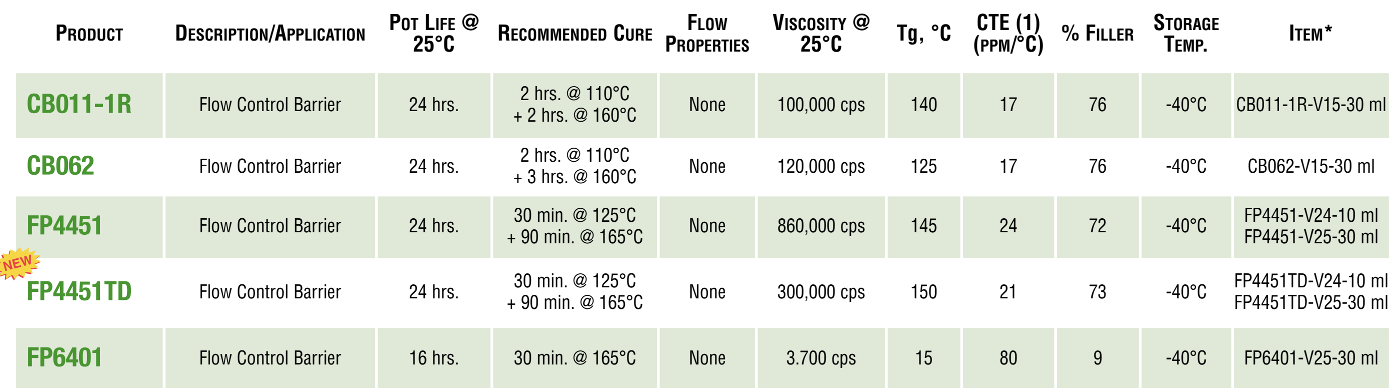
Henkel Loctite provides unmatched technology for chip-on-board encapsulation applications. These products cure to form void-free globs when exposed to heat, with formulations for low CTE, minimizing stress on wire bonds during thermal cycling. These encapsulants are easy-to-dispense, minimize induced stresses, provide improved temperature cycling performance, and offer excellent chemical resistance.





Hysol® Semiconductor Liquid Encapsulants

Flow Control/Dam Materials



Product	Description/Application	Pot Life @ 25°C	Recommended Cure	Flow Properties	Viscosity @ 25°C	Tg, °C	CTE (1) (ppm/°C)	% Filler	Storage Temp.	Item*
CB011-1R	Flow Control Barrier	24 hrs.	2 hrs. @ 110°C + 2 hrs. @ 160°C	None	100,000 cps	140	17	76	-40°C	CB011-1R-V15-30 ml
CB062	Flow Control Barrier	24 hrs.	2 hrs. @ 110°C + 3 hrs. @ 160°C	None	120,000 cps	125	17	76	-40°C	CB062-V15-30 ml
FP4451	Flow Control Barrier	24 hrs.	30 min. @ 125°C + 90 min. @ 165°C	None	860,000 cps	145	24	72	-40°C	FP4451-V24-10 ml FP4451-V25-30 ml
NEW **FP4451TD**	Flow Control Barrier	24 hrs.	30 min. @ 125°C + 90 min. @ 165°C	None	300,000 cps	150	21	73	-40°C	FP4451TD-V24-10 ml FP4451TD-V25-30 ml
FP6401	Flow Control Barrier	16 hrs.	30 min. @ 165°C	None	3.700 cps	15	80	9	-40°C	FP6401-V25-30 ml

Fill Encapsulants

Product	Description/Application	Pot Life @ 25°C	Recommended Cure	Flow Speed	Viscosity @ 25°C	Tg, °C	CTE (1) (ppm/°C)	% Filler	Storage Temp.	Item*
CB011R-2	High Performance Packages	24 hrs.	2 hrs. @ 110°C + 2 hrs. @ 160°C	High	80,000 cps	150	10	83	-40°C	CB011R-2-V15-30 ml
CB011R-3	BGA, PGA, Hybrids	48 hrs.	30 min. @ 125°C + 90 min. @ 165°C	High	120,000 cps	145	8	80	-40°C	CB011R-3-V15-30 ml
CB013	High Density Packages	48 hrs.	3 hrs. @ 100°C + 2 hrs. @ 165°C	High	80,000 cps	150	10	82	-40°C	CB013-V15-30 ml
CB064	High Performance Packages	24 hrs.	2 hrs. @ 110°C + 2 hrs. @ 160°C	High	80,000 cps	150	8	86	-40°C	CB064-V24-10 ml CB064-V25-30 ml
CB0260	Lead-free Packages	3 days	1 hr. @ 110°C + 2 hrs. @ 160°C	High	40,000 cps	145	18	74	-40°C	CB0260-V15-30 ml
FP4450	ICs, COB, BGA, PGA	3 days	30 min. @ 125°C + 90 min. @ 165°C	High	50,000 cps	155	22	73	-40°C	FP4450-V25-30 ml FP4450-A33-6 oz
FP4450LV	ICs, COB, BGA, PGA	3 days	30 min. @ 125°C + 90 min. @ 165°C	High	35,000 cps	155	22	72	-40°C	FP4450LV-V25-30 ml FP4450LV-A33-6 oz
FP4450HF	High Performance Commercial/Automotive	4 days	30 min. @ 125°C + 90 min. @ 165°C	Very High	32,000 cps	160	19	73	-40°C	FP4450HF-V25-30 ml FP4450HF-A33-6 oz
FP4450HA	High Performance High Adhesion	4 days	30 min. @ 125°C + 90 min. @ 165°C	Very High	22,000 cps	150	20	73	-40°C	FP4450HA-V25-30 ml FP4450HA-A33-6 oz
FP4470	Lead-free Packages	5 days	30 min. @ 125°C + 90 min. @ 165°C	High	48,000 cps	148	18	75	-40°C	FP4470-V25-30 ml FP4470-A33-6 oz
NEW **FP4480**	Lead-free Packages, JEDEC	24 hrs.	60 min. @ 120°C + 120 min. @ 65°C	High	80,000 cps	55	18	72	-40°C	FP4480-V25-30 ml FP4480-A33-6 oz
FP4651	Fine Wire Pitch and Cavity Fill	48 hrs.	1 hr. @ 125°C + 90 min. @ 165°C	High	130,000 cps	150	11	82	-40°C	FP4651-V25-30 ml FP4651-A33-6 oz
FP4652	Large Cavity Fill or Dam and Fill	8 hrs.	15 min. @ 110°C + 30 min. @ 165°C	High	180,000 cps	150	14	80	-40°C	FP4652-V25-30 ml FP4652-A33-6 oz

* Standard sizes. Other sizes may be available.

Hysol® Chip On Board Liquid Encapsulants

Product	Description/Application	Pot Life @ 25°C	Recommended Cure	Flow Properties	Viscosity @ 25°C	Tg, °C	CTE (1) (ppm/°C)	% Filler	Storage Temp.	Item*
E01016	COB, Watch ICs	3 months	15 min. @ 150°C	Medium	70,000 cps	115	40	40	4°C	E01016-V24-10 ml
E01060	Chip on Board	25 days	4-6 hrs. @ 125°C	High	15,000 cps	125	40	61	4°C	E01060-V24-10 ml E01060-V25-30 ml
E01061	Chip on Board	25 days	4-6 hrs. @ 125°C	Medium	45,000 cps	125	40	61	4°C	E01061-V24-10 ml E01061-V25-30 ml
E01062	Chip on Board	25 days	4-6 hrs. @ 125°C	Low	160,000 cps	125	40	64	4°C	E01062-V24-10 ml E01062-V25-30 ml
E01070	Chip on Board	1 month	2 hrs. @ 150°C	High	28,000 cps	135	26	66	4°C	E01070-V19-30 ml
E01072	Chip on Board	1 month	5 min. @ 140/150°C	Medium	80,000 cps	135	43	50	4°C	E01072-V24-10 ml
E01074	Chip on Board	30 days	5 min. @ 140°C	Variable	60,000 cps	150	43	48	5°C	E01074-V24-10 ml
E01080	Chip on Board	3 months	20 min. @ 150°C	Medium	60,000 cps	121	35	50	4°C	E01080-V24-10 ml E01080-V25-30 ml
FP4322	Chip on Board	24 hrs.	1 hr. @ 170°C or 4 hrs. @ 150°C	High	52,500 cps	160	39	65	-40°C	FP4322-V24-10 ml FP4322-V25-30 ml
FP4323	Chip on Board	48 hrs.	1 hr. @ 170°C or 4 hrs. @ 150°C	Low	100,000 cps	160	29	65	-40°C	FP4323-V24-10 ml FP4323-V25-30 ml
FP4401	Chip on Board	24 hrs.	3 hrs. @ 170°C or 6 hrs. @ 150°C	Low	375,000 cps	160	22	75	-40°C	FP4401-V24-10 ml FP4401-V25-30 ml
FP4460	IC Memory Cards, Chip Carriers, COB, BGA, PGA Applications	48 hrs.	1 hr. @ 125°C + 2 hrs. @ 160°C	Low	300,000 cps	170	20	75	-40°C	FP4460-V25-30 ml FP4460-A33-6 oz

* Standard sizes. Other sizes may be available.