



# ABATRON, INC.

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## FLEXIBLE EPOXIES

TDS 811010

### 14 FLEXIBLE EPOXY SYSTEMS COMPARATIVE DATA OF TYPICAL PROPERTIES

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 This series proves that, contrary to general experience, properly formulated epoxies can achieve remarkable flexibility and plasticity without undue sacrifice of adhesive, electrical, structural and other properties. The following test results show the wide range of properties obtainable with Abatron flexibilized epoxies for: **bonding, laminating, casting, embedding, electrical potting, impregnating, coating, etc.** The 14 compounds of this series are all clear (unfilled) basic formulations. Each can be supplied in several variations to modify viscosity, reaction rate, color, most physical and chemical properties, and with many fillers to meet most requirements.  
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	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Resin: <b>ABOCAST</b>	<b>8110-1</b>	<b>8110-1</b>	<b>8110-3</b>	<b>8110-4</b>	<b>8110-2</b>	<b>8110-1</b>	<b>8110-2</b>
(B) Hardener <b>ABOCURE</b>	<b>8110-1</b>	<b>8110-3</b>	<b>7110-3</b>	<b>8110-3</b>	<b>8110-3</b>	<b>8110-2</b>	<b>8110-2</b>
Parts by weight of (A)/(B) blend	100/6	100/8.5	100/11	100/11.5	100/13	100/10	10/16.5
Viscosity of (A), cps/25°C	2930	2640	3460	3800	4650	2640	5500
" of (A)/(B) blend "	2570	1390	1270	1120	1050	2440	2260
Pot life, 200 qms/25°C	2 hrs.	70 min.	35 min.	30 min.	20 min.	3 hrs.	40 min.
Ultimate Tensile Strength, psi (kg/cm)							
" cured 7 days @ 25°C	25 (1.8)	60 (4.2)	245 (17.2)	330 (23.2)	1160 (117)	140 (9.8)	6625 (466)
" " 30 " " "	50 (3.5)	65 (4.6)	245 (17.2)	310 (21.8)	1150 (109)	120 (8.4)	7050 (496)
" " 90 " " "	-	70 (4.9)	260 (18.3)	395 (27.8)	1910 (134)	-	-
" " 2 hours @ 93°C	35 (2.5)	75 (5.3)	275 (19.3)	465 (32.7)	2200 (154)	-	-
" " 8 " " "	110 (7.7)	-	-	-	-	-	-
Elongation at failure							
" cured 7 days @ 25°C	180%	190%	140%	170%	160%	30%	20%
" " 30 " " "	90%	175%	145%	170%	125%	24%	12%
" " 90 " " "	-	155%	130%	-	-	-	-
" " 2 hours @ 93°C	160%	150%	160%	165%	130%	-	-
" " 8 " " "	68%	-	-	-	-	-	-
Volume Resistivity, ohm-cm @ 25°C, cured 7 days @ 25°C	4.3x10 <sup>9</sup>	4.9x10 <sup>9</sup>	4.8x10 <sup>10</sup>	9.2x10 <sup>10</sup>	1.1x10 <sup>12</sup>	.9x10 <sup>11</sup>	7.1x10 <sup>14</sup>
" " 30 " " "	6.6x10 <sup>8</sup>	1.3x10 <sup>9</sup>	1.4x10 <sup>10</sup>	2.7x10 <sup>10</sup>	3.5x10 <sup>11</sup>	.4x10 <sup>9</sup>	3.3x10 <sup>14</sup>
" " 90 " " "	-	2.3x10 <sup>9</sup>	6.4x10 <sup>10</sup>	4.2x10 <sup>10</sup>	5.3x10 <sup>11</sup>	-	-
@ 100°C, " 7 " " "	3.2x10 <sup>8</sup>	-	-	-	-	.1x10 <sup>9</sup>	1.7x10 <sup>10</sup>
" " 30 " " "	3.0x10 <sup>7</sup>	-	-	-	-	.6x10 <sup>8</sup>	4.6x10 <sup>9</sup>
@ 25°C " 2 hours @ 93°C	2.6x10 <sup>9</sup>	3.2x10 <sup>9</sup>	2.7x10 <sup>9</sup>	6.9x10 <sup>10</sup>	7.5x10 <sup>11</sup>	-	-
@ 100°C " " " "	3.4x10 <sup>7</sup>	-	-	-	-	-	-
@ 150°C " " " "	2.9x10 <sup>7</sup>	-	-	-	-	-	-
Tensile Shear Strength, Al/Al lap joint, psi (kg/cm)							
@ 0°C, cured 7 days @ 25°C	-	300 (2.1)	650 (45.7)	960 (67.5)	1300 (91.4)	-	4400 (309)
@ 25°C " " " "	-	-	-	-	-	-	3950 (278)
@ 75°C " " " "	-	-	-	-	-	-	370 (26)
@ 25°C, " 30 " " "	-	210 (14.8)	1060 (74.5)	970 (68.2)	2005 (141)	-	-
" " 90 " " "	-	310 (21.8)	1050 (73.8)	1300 (91.4)	1780 (125)	-	-
@ 0°C, cured 2 hours @ 93°C	1930 (136)	-	-	-	-	-	-
@ 25°C, " " " "	710 (49.9)	545 (38.3)	800 (56.3)	1305 (91.8)	2255 (159)	-	-
@ 75°C, " " " "	520 (36.6)	-	-	-	-	-	-
Hardness, Shore (D) or (A)							
@ -60°C cured 7 days @ 25°C	82(D)	76(D)	85(D)	89(D)	85(D)	83(D)	89(D)
" 0°C " " " "	23(D)	62(A)	98(A)	76(D)	85(D)	53(D)	87(D)
" 25°C " " " "	21(A)	32(A)	86(A)	94(A)	75(D)	64(A)	82(D)
" 75°C " " " "	11(A)	25(A)	47(A)	45(A)	15(D)	63(A)	53(D)
@ -60°C " 30 " " "	77(D)	-	-	-	-	82(D)	89(D)
" 0°C " " " "	23(D)	-	-	-	-	40(D)	86(D)
" 25°C " " " "	40(A)	-	-	-	-	66(A)	84(D)
" 75°C " " " "	28(A)	-	-	-	-	67(A)	42(D)
@ -60°C cured 2 hrs. @ 93°C	83(D)	75(D)	85(D)	86(D)	90(D)	-	-
" 0°C " " " "	60(D)	30(D)	80(D)	85(D)	90(D)	-	-
" 25°C " " " "	47(A)	35(A)	80(A)	55(A)	75(D)	-	-
" 75°C " " " "	38(A)	30(A)	40(A)	15(A)	-	-	-
Water Absorption after 30 days immersion							
cured 7 days @ 25°C	12.2%	5.4%	5.3%	5.2%	4.6%	7.5%	3.3%
" 30 " " "	11.9%	4.4%	4.5%	5.0%	4.5%	7.4%	3.3%
" 90 " " "	-	4.4%	4.5%	5.0%	4.7%	-	-
Water Absorption after 2 hour boil							
cured 2 hours @ 93°C	6.2%	4.9%	4.9%	3.1%	4.6%	-	-

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	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(A) Resin: <b>ABOCAST</b>	<b>8110-2</b>	<b>50-3</b>	<b>8110-5</b>	<b>8110-6</b>	<b>8110-7</b>	<b>8110-8</b>	<b>8110-9</b>
(B) Hardener: <b>ABOCURE</b>	<b>8110-1</b>	<b>8110-1</b>	<b>8110-1</b>	<b>8110-1</b>	<b>8110-1</b>	<b>8110-1</b>	<b>50-1</b>
Parts by weight of (A)/(B) blend	100/9.7	100/13	100/11.6	100/10.2	100/8/8	100/7.4	100/43
Viscosity of (A), cps/25°C	5500	12000	9500	6300	4100	3210	1100
" of (A)/(B) blend "	1600	550	1650	2000	2300	2460	2650
Pot life, 200 gms @ 25°C	30 min.	16 min.	19 min.	22 min.	30 min.	52 min.	3 hrs.
Gel time, 10 gms @ 93°C	-	-	2 min.	6 min.	11 min.	13 min.	-
Ultimate Tensile Strength, psi (kg/cm)							
" cured 7 days @ 25°C	2360 (166)	-	-	-	-	-	-
" " 30 " " "	5500 (387)	-	-	-	-	-	-
" " 2 hours @ 93°C	-	12050 (847)	9955 (700)	6285 (442)	815 (57.3)	215 (15.1)	6050 (425)
" " 8 " " "	-	12560 (883)	10470 (736)	8435 (593)	3975 (280)	1445 (102)	8900 (626)
Elongation at failure							
" cured 7 days @ 25°C	70%	-	-	-	-	-	-
" " 30 " " "	39%	-	-	-	-	-	-
" " 2 hours @ 93°C	-	7.1%	9.8%	13%	76%	117%	21%
" " 8 " " "	-	6.6%	6.4%	11%	23%	62%	14%
Volume Resistivity, ohm/cm							
@ 25°C, cured 7 days @ 25°C	3.0x10 <sup>12</sup>	-	-	-	-	-	-
" " 30 " " "	4.9x10 <sup>13</sup>	-	-	-	-	-	-
@ 100°C, " 7 " " "	7.2x10 <sup>8</sup>	-	-	-	-	-	-
" " 30 " " "	6.2x10 <sup>7</sup>	-	-	-	-	-	-
@ 25°C " 2 hours @ 93°C	-	4.4x10 <sup>16</sup>	1.8x10 <sup>16</sup>	9.4x10 <sup>14</sup>	8.2x10 <sup>12</sup>	1.5x10 <sup>11</sup>	4.8x10 <sup>15</sup>
@ 100°C " " " " "	-	1.6x10 <sup>12</sup>	4.1x10 <sup>10</sup>	2.7x10 <sup>9</sup>	2.9x10 <sup>8</sup>	6.6x10 <sup>7</sup>	2.5x10 <sup>13</sup>
@ 112°C " " " " "	-	7.6x10 <sup>10</sup>	3.2x10 <sup>9</sup>	7.7x10 <sup>8</sup>	2.5x10 <sup>8</sup>	7.4x10 <sup>7</sup>	-
@ 150°C " " " " "	-	9.8x10 <sup>9</sup>	2.0x10 <sup>9</sup>	7.9x10 <sup>7</sup>	6.6x10 <sup>7</sup>	3.4x10 <sup>7</sup>	-
Tensile Shear Strength, Al/Al lap joint, psi (kg/cm)							
@ 0°C, cured 7 days @ 25°C	4470 (314)	-	-	-	-	-	-
@ 25°C, " " " " "	3220 (226)	-	-	-	-	-	-
@ 75°C, " " " " "	340 (23.9)	-	-	-	-	-	-
@ 0°C, cured 2 hrs. @ 93°C	-	3080 (217)	3650 (257)	4190 (295)	5350 (376)	3980 (280)	-
@ 25°C, " " " " "	-	3690 (259)	4810 (338)	6080 (428)	3560 (250)	2280 (160)	-
@ 75°C, " " " " "	-	4970 (350)	3370 (237)	1770 (124)	1360 (95.6)	970 (68.2)	-
Hardness, Shore (D) or (A)							
@ -60°C cured 7 days @ 25°C	89(D)	-	-	-	-	-	-
@ 25°C, " " " " "	75(D)	-	-	-	-	-	-
@ 75°C, " " " " "	37(D)	-	-	-	-	-	-
@ -60°C, " 30 " " " "	89(D)	-	-	-	-	-	-
@ 25°C, " " " " "	85(D)	-	-	-	-	-	-
@ 75°C, " " " " "	58(D)	-	-	-	-	-	-
@ -60°C, " 2 hrs. @ 93°C	-	90(D)	90(D)	90(D)	87(D)	86(D)	90(D)
@ 0°C, " " " " "	-	89(D)	87(D)	87(D)	86(D)	80(D)	86(D)
@ 25°C, " " " " "	-	89(D)	85(D)	83(D)	79(D)	60(D)	80(D)
@ 75°C, " " " " "	-	83(D)	76(D)	75(D)	46(D)	70(A)	-
Water absorption after 30 days immersion							
cured 7 days @ 25°C	4.9%	-	-	-	-	-	-
" 30 " " "	4.5%	-	-	-	-	-	-
" 3 hours @ 100°C	-	-	-	-	-	-	2.4%
Water absorption after 2 hour boil							
cured 2 hours @ 93°C	-	0.7%	2.3%	2.5%	4.5%	5.8%	-

The (1) (ABOCAST 8110-1/ABOCURE 8110-1) system is a typical example of a resin with properties greatly influenced by the length and temperature of the curing cycle. (9), (10), (11), (12) and (13) follow the same pattern. Therefore their room-temperature cure properties were not recorded. (14) also needs heat for optimum results, but its long room-temperature-cure results are satisfactory in most applications. This system is very successful for its versatility and variable-ratio possibilities (the (A)/(B) ratio can be varied up to 100-/100, with increasing flexibility as the ABOCURE percentage increases relative to ABOCAST). The (9) system is the best of this series for high strength, heat, chemical and water resistance. In spite of its low elongation, its toughness and resilience classify it with flexibilized materials. (2), (3), (4), (5), (6), (7) and (8) reach almost the same results with long room temp. cure as with heat. They are least subject to age hardening. Their strength/elongation relationship tends to remain constant at various cure stages.

The above information is the result of accurate laboratory and field tests. However, no guarantee, expressed or implied, is offered, as uses and applications are beyond our control. The above measurements are typical test results rather than specifications. Formulations and parameters may change with the state of the art.