

# ORATEX® EK 9855 EPOXY RESIN ADHESIVE 9855 SYSTEM INCL. HARDENER FOR APPLICATION IN AVIATION

## PRODUCT DESCRIPTION

ORATEX® EK 9855 provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Amine
Appearance (Resin)	White opaque paste
Appearance (Hardener)	Black opaque paste
Appearance (Mixture)	Gray paste
Components	Two part - Resin & Hardener
Viscosity	Thixotropic
Mix Ratio, by volume - Resin : Hardener	1 : 1
Mixing ratio by weight, - Resin : Hardener	100 : 100
Cure	Room temperature cure after mixing
Application	Bonding
Maximum Gap	3,0 mm
Specific Benefit	<ul style="list-style-type: none"> <li>- Excellent peel strength</li> <li>- Excellent tensile shear strength</li> <li>- Impact and fatigue resistant</li> <li>- Non-sag slump resistance</li> <li>- Easy to mix and dispense</li> </ul>

ORATEX® EK 9855 is a thixotropic, two component epoxy adhesive formulated for ease of use as well for a good balance of properties. This adhesive couples high peel strength and excellent shear strength in a smooth, non-sag paste that is easily dispensed. The product has a medium working life with a quick heat cure response if required. The tough nature of this structural adhesive makes it useful for bonding dissimilar substrates including metals, engineering thermoplastics and thermoset laminates such as sheet moulding compound(SMC).

## TYPICAL PROPERTIES OF UNCURED MATERIAL

### Resin Properties

Specific Gravity @ 25 °C	1,35
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s <sup>-1</sup>	85.980
Shear rate 50 s <sup>-1</sup>	38.570
Thixotropic Index	2,8
Flash Point - See SDS	

### Hardener Properties

Specific Gravity @ 25 °C	1,31
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s <sup>-1</sup>	59.530
Shear rate 50 s <sup>-1</sup>	42.860
Thixotropic Index	2
Flash Point - See SDS	

### Mixed Properties

Application time @ 22 °C:	immediately
Processing is only permitted from double cartridge via mixing nozzle with dispensing gun	

## TYPICAL CURING PERFORMANCE

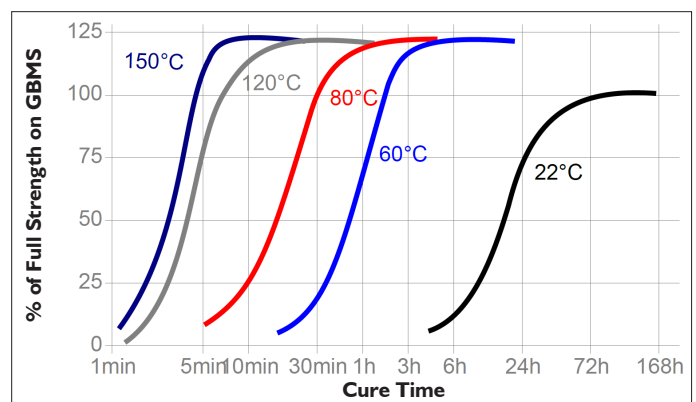
### Fixture Time

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm<sup>2</sup>.

Fixture Time, mixed, @ 22 °C, minutes 240

### Cure Speed vs. Time/Temperature

ORATEX® EK 9855 will achieve handling strength in 4 to 5 hours at room temperature (note: this can vary with different bond configurations and ambient temperatures). Elevated temperatures may be used to accelerate the cure. The graph below shows the shear strength developed with time on grit blasted steel lap shears at different temperatures and tested according to ISO 4587.



## TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 7 days @ 22 °C, 1.2 mm thick samples

### Physical Properties :

Shore Hardness, ISO 868, Durometer D	80
Elongation , ISO 527-2, %	3,5
Tensile Strength, ISO 527-2	N/mm <sup>2</sup> 30
	(psi) (4.400)
Tensile Modulus , ISO 527-2	N/mm <sup>2</sup> 2.757
	(psi) (400.000)

### Electrical Properties:

Dielectric Strength, KV/mm	36,6
Dielectric Constant / Dissipation Factor :	
@ 1 KHz	4,1/0,023
@ 1MHz	3,8/0,04
@ 10MHz	3,6/0,057
Surface Resistivity, IEC 60093, ohms	≥ 1,9×10 <sup>17</sup>
Volume Resistivity, IEC 60093, ohm-cm	1,8×10 <sup>14</sup>

## TYPICAL PERFORMANCE OF CURED MATERIAL

### Adhesive Properties

Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:	
Mild steel (grit blasted)	N/mm <sup>2</sup> 25
	(psi) (3.600)
Aluminum (abraded)	N/mm <sup>2</sup> 21
(Silicon Carbide Paper, A166 grit, P400A grade)	(psi) (3.100)
Aluminum (etched in acidic ferric sulphate)	N/mm <sup>2</sup> 21
	(psi) (3.100)

Stainless steel	N/mm <sup>2</sup>	19
	(psi)	(2.800)
Galvanized Steel (Hot Dipped)	N/mm <sup>2</sup>	16
	(psi)	(2.300)
Brass	N/mm <sup>2</sup>	11
	(psi)	(1.600)
Zinc dichromate	N/mm <sup>2</sup>	16
	(psi)	(2.300)
Polycarbonate	N/mm <sup>2</sup>	6,5
	(psi)	(940)
ABS	N/mm <sup>2</sup>	6,2
	(psi)	(900)
GRP (Polyester resin matrix)	N/mm <sup>2</sup>	5
	(psi)	(720)
Glass Fiber Reinforced Epoxy	N/mm <sup>2</sup>	13
	(psi)	(1.900)

180° Peel Strength, ISO 8510-2:

Mild Steel (grit blasted)	N/mm	10
	(lb/in)	(57,1)

IZOD Impact Resistance, ISO 9653 J/m<sup>2</sup>:

Mild Steel (grit blasted)	8,3
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## TYPICAL ENVIRONMENTAL RESISTANCE

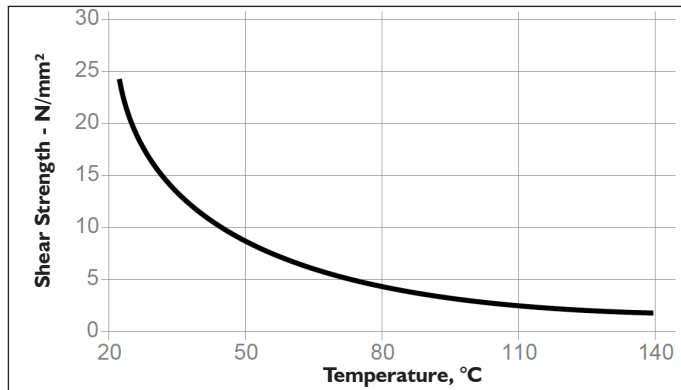
Cured for 7 days @ 22 °C

Lap Shear Strength, ISO 4587:

Mild Steel (grit blasted)

## Hot Strength

Tested at temperature



## Heat Aging

Aged under conditions indicated and tested at 22 °C.

Temperature	% % Initial strength retained after		
	500 h	1.000 h	3.000 h
50°C	110	105	105
80°C	115	125	120
100°C	110	100	100
120°C	125	125	125
150°C	135	125	120

## Chemical/Solvent Resistance

Immersed in conditions indicated and tested at 22 °C.

Environment	°C	% of initial strength		
		500 h	1000 h	3000 h
Motor oil	22	100	95	100
Unleaded gasoline	22	75	70	60
Water/glycol 50/50	87	75	75	95
Sodium hydroxide, 4 %	22	85	80	80
98% RH	40	85	70	70
Water	60	85	75	75
Water	90	85	80	55
Acetone	22	65	35	35
Acetic Acid, 10%	22	75	65	50
Salt water solution, 7.5 %	22	80	80	80

## GENERAL INFORMATION

**This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.**

**For safe handling information on this product, consult the Safety Data Sheet, (SDS).**

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

## Directions for use

- For best performance surfaces for bonding should be clean, dry and free of grease. For high strength structural bonds, special surface treatments can increase the bond strength and durability.
- To use, resin and hardener must be blended. Product can be applied directly from dual cartridges by dispensing through the mixer head supplied. Discard the first 7 cm of bead dispensed. Using bulk containers, mix thoroughly by weight or volume in the proportions specified in the Product Description Matrix. For hand mixing, weigh or measure out the desired amount of resin and hardener and mix thoroughly. Mix approximately 15 seconds after uniform color is obtained.
- It is recommended that this product is not mixed and cured in bulk quantities of greater than 4 kg as excessive heat build-up can occur. Mixing smaller quantities will minimize the heat build-up.
- Apply the adhesive as quickly as possible after mixing to one surface to be joined. For maximum bond strength apply adhesive evenly to both surfaces. Parts should be assembled immediately after mixed adhesive has been applied.
- For working life please see section, 'Typical Properties of Uncured Material'. Higher temperatures and larger quantities will shorten this working time.
- Keep the assembled parts from moving during cure. The joint should be allowed to develop full strength before subjecting to any service loads.
- Excess uncured adhesive can be wiped away with organic solvent (e.g. Acetone).
- After use and before adhesive hardens, mixing and application equipment should be cleaned with hot soapy water.

Important notice for the gluing of easy oxidising services (e.g. aluminium) referring to the high cross copisity of the adhesive:

## KONDENSATION TEST BOARD ACCORDING TO ISO 6270-2

In the condensation test board condensation water is generated on

the specimen at 40 °C chambre temperature To do so deminearlised water is conducted into the test chambre and heated up so that it evaporates  
Relative humidity 100 %  
Max. seize of components 620 x 590 x 450 mm  
Typical storage period 7 – 10 days

## 1. Procedure

### 1.1. Laboratory conditions

Temperature in °C appr. + 20 °C  
Relative humidity in % appr. 50 % rel. humidity

### 1.2. Manufacture of specimens

For the examination beats of adhesive will be appr. dimensions of 5 mm x 8 mm x 40 mm (height x width x length) are being made.

The beats of adhesive are being dosed on an appropriate Teflon® plate for final hardening.

After a hardening period of 7 days at room temperature each specimen is being weight to identify its initial value at room temperature.

### 1.3. Hardening

Hardening for 7 days of room temperature

### 1.4. Aging

Afterwards the following intercalation takes place in

- water at room temperature (appr. + 20 °C)
- in a Kesternich board at + 40 °C and rel.humidity of appr. 98 % with thewing of the specimen

### 1.5. Testing

The specimens are being weight after 4 weeks of intercalation directly after the removal in a dried off condition.

The weight increase is being listed in the following charts as a percentage increase of the initial value.

## 2. Results

	specimen	Initial value weight [g]	„After 4-weeks-intercalation in Kesternich-board at + 40 °C total weight [g]“	Weight increase [g]	„Increase to the initial value in %“
EK 9855	1	1,6323	1,6439	0,0116	0,71
	2	2,3276	2,3423	0,0147	0,63
	3	1,8371	1,8502	0,0131	0,71
	4	2,1981	2,213	0,0149	0,68
	5	2,1819	2,197	0,0151	0,69
	6	2,351	2,3663	0,0153	0,65
	7	2,4453	2,4604	0,0151	0,63
	8	2,2171	2,2314	0,0143	0,64
	9	1,7614	1,7739	0,0125	0,71
	10	1,9834	1,9954	0,012	0,61
Average value				0,01386	0,67

	specimen	Initial value weight [g]	„After 4-weeks-intercalation in Kesternich-board at + 40 °C total weight [g]“	Weight increase [g]	„Increase to the initial value in %“
EK 9855	A	2,4511	2,4744	0,0233	0,95
	B	1,8176	1,835	0,0174	0,96
	C	2,3358	2,3594	0,0236	1,01
	D	1,7444	1,7601	0,0157	0,9
	E	1,9683	1,9856	0,0173	0,88
	F	2,4012	2,4233	0,0221	0,92
	G	1,9654	1,9829	0,0175	0,89
	H	2,289	2,3106	0,0216	0,94
	J	2,2423	2,2626	0,0203	0,91
	K	2,1887	2,2087	0,02	0,91
Average value				0,01988	0,927

### 3. Summary

A weight increase of the hardened ORATEX EK 9855 beats of adhesive after a 4-week-intercalation in direct water at room temperature an increase of short 0,7 % and after a 4-week intercalation in the Kesternich board an increase of 0,9 % were identified

#### Not for product specifications

The technical data contained herein are intended as reference only. Please contact our quality department for assistance and recommendations on specifications for this product.

#### STORAGE:

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

**Optimal Storage: 8 °C to 21 °C. Storage below 8 °C or greater than 28 °C can adversely affect product properties.**

**Material removed from containers may be contaminated during use.**

Do not return product to the original container. Lanitz Aviation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

#### Conversions

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$   
 $\text{kV/mm} \times 25.4 = \text{V/mil}$   
 $\text{mm} / 25.4 = \text{inches}$   
 $\text{N} \times 0.225 = \text{lb}$   
 $\text{N/mm} \times 5.71 = \text{lb/in}$   
 $\text{psix } 145 = \text{N/mm}^2$   
 $\text{MPa} \times 145 = \text{psi}$

$\text{N}\cdot\text{mx}8.851 = \text{lb}\cdot\text{in}$   
 $\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$   
 $\text{N}\cdot\text{mmx} 0.142 = \text{oz}\cdot\text{in}$   
 $\text{mPa}\cdot\text{s} = \text{cP}$

#### Disclaimer

##### Note:

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Lanitz Aviation is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product. Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

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