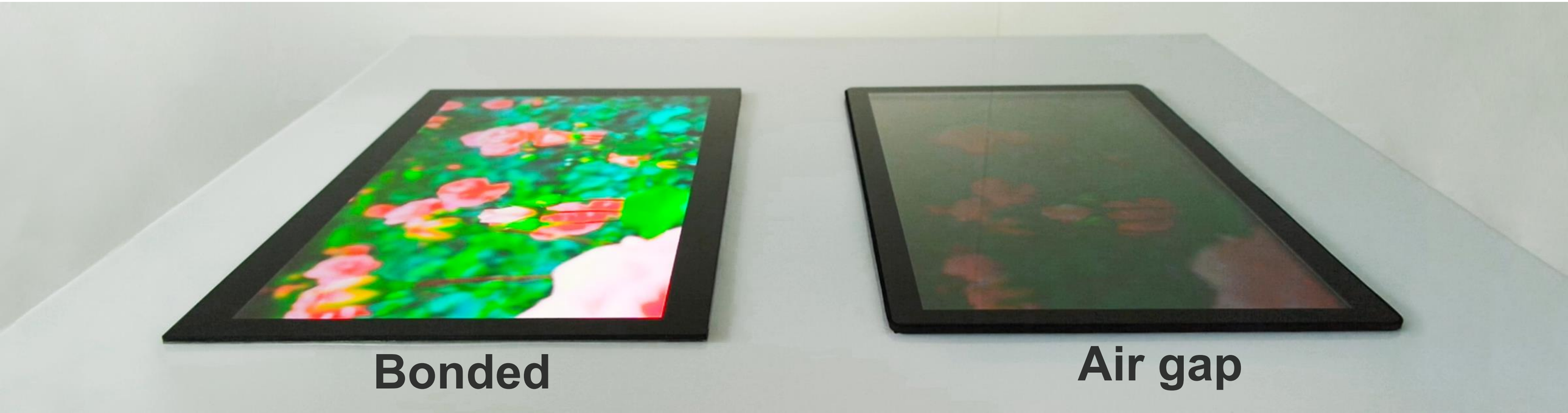
faytech
Touch Solutions of Tomorrow

CLEAR BOND

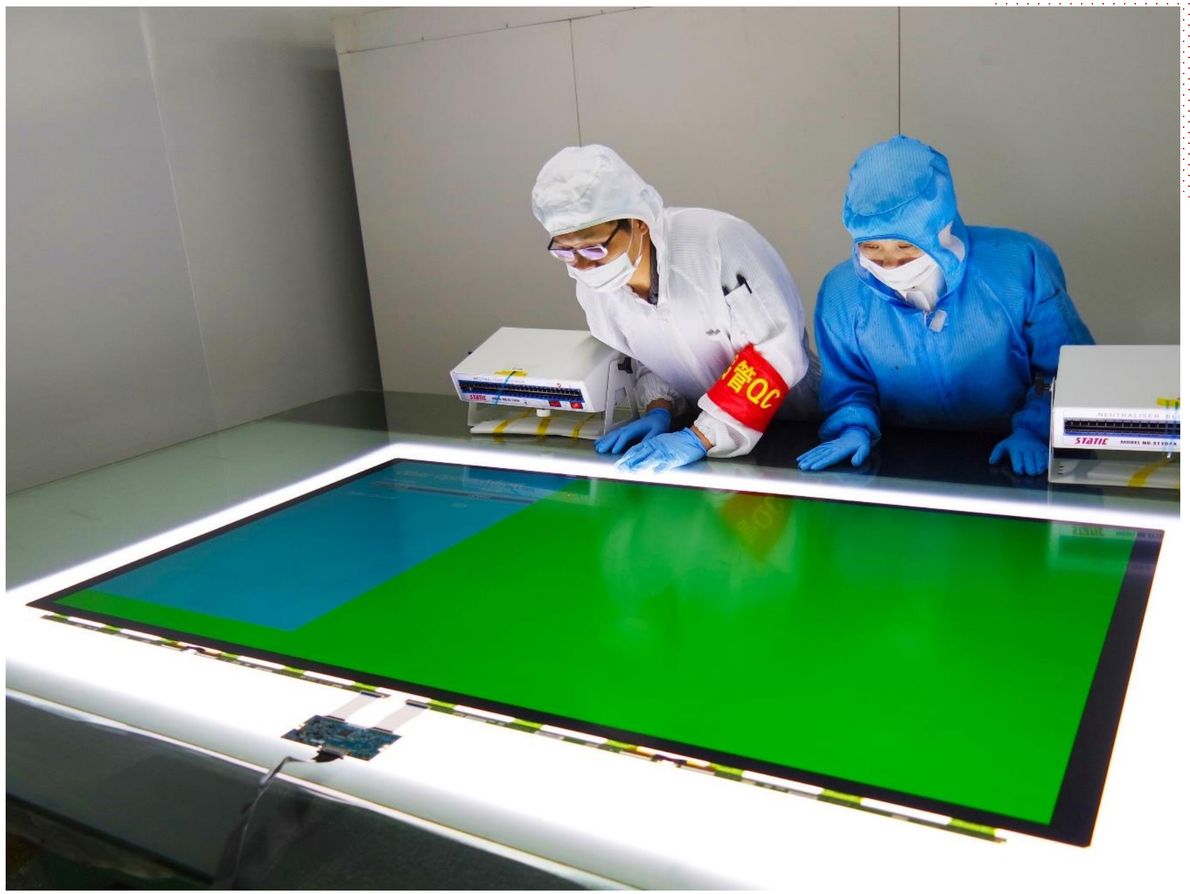
Optical Bonding



What is Optical Bonding

“Optical bonding is the process of filling up the airgap between the cover glass / touch panel and LCD cell / module to improve the visual and material features and with that the quality and value of the bonded device.“

CLEAR-BOND uses silicone based liquid adhesive with the best properties available to date for this process.



What is CLEAR-BOND I

The silicone-glue formula used is the 9102-220-2 faytech-X6-1688, also known as 'CLEAR-BOND'. This formula has been specifically created to provide the best optical bonding performance in the market.

This silicone-glue formula consists of two components, referred to in the documentations as component A and B.

The silicone liquid AB-glue is especially suitable for:

- Large size optical bonding
- Optical bonding to be used in extreme environments:
  - Temperature ranges of -40°C to +85°C
  - Tested altitudes of at least 6000 meters
  - Impact energy without damage increased by about 20%
  - Military usage standards

CLEAR BOND

Should you see this logo, you can be sure the device is optically bonded and meets the highest quality standards in the market!

What is CLEAR-BOND II

CLEAR-BOND produces its glue in Tongling, China, under the highest quality standards. Every single batch is tested to meet the highest quality criteria, which guarantee the flawless optical bonding mass production.

With more than 100 ton of yearly glue production, CLEAR-BOND is the leading supplier of glue for large format optical bonding.

CLEAR-BOND focuses on all bonding related services & projects and is a separate business unit and registered trademark of faytech, the first company bringing a large format optical bonding process into mass production.

Mechanical Test

Test Item	Measuring Method	Test Condition	Result
Vibration Test	TDS-US106	1 hour	No bubble or delamination
Shock Test	TDS-US106	40g, 11ms pulse ±X, ±Y, ±Z axes	
Altitude		15,000 feet above sea level, climb / descent change rate 10m/s decompression withing 15 seconds	
Pull Test	GB/T 1040.2-2006	Force until separation	0.278 N/mm^2
Lap Shear Test	GB/T 1040.2-2006	Force until separation	0.205 N/mm^2

Test Item	Measuring Method
High Temperature	MIL-STD-810-2003
Low Temperature	MIL-STD-810-2003
Constant Temperature & Humidity	IEC 60068-2-78-2012
Thermal Cycle	IEC 60068-2-14-2009
UV Resistance	G154-06
Mechanical Shock	TDS-US106
Vibration	TDS-US106

What is CLEAR-BOND III

Besides the 'CLEAR-BOND' formula faytech-X6-1688. There are 2 other standardized formulas in the market, allowing the client to pick the best bonding glue to suit their needs.

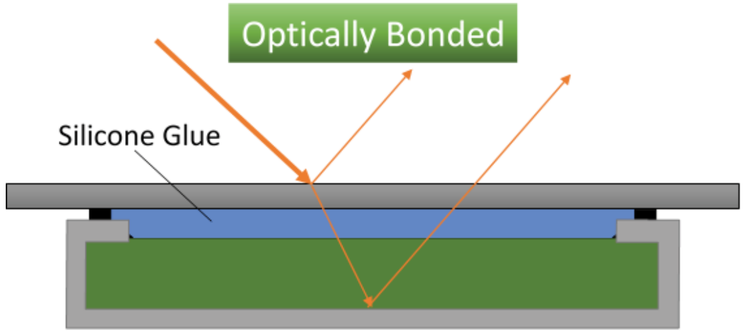
- 'faytech-XA-1688' – Softer formula, allowing more flexibility
- 'faytech-T50-1688' – Specifically created for low and high temperature applications of below -50 °C and +110 °C

Additionally, faytech would be able to adapt the materials properties, such as hardness, viscosity, curing speed, etc., upon request. This is done due to possessing their own silicone formulations and own in-house production.

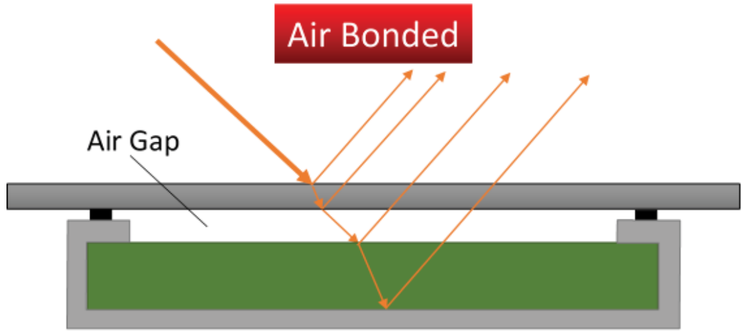
faytech-X6-1688 'CLEAR-BOND'	faytech-XA-1688	faytech-T50-1688
Standard formula – 1:1 ratio (component A and B). Specifically created to provide the best optical bonding performance in the market. Adjustable to a certain extend by adjusting the mixing ratio.	Softer formula, allowing more flexibility.	Specifically created for low and high temperature applications of below -50 °C. to 110°C

Advantages of Optical Bonding I

Optical bonding **reduce reflections** by about 65%

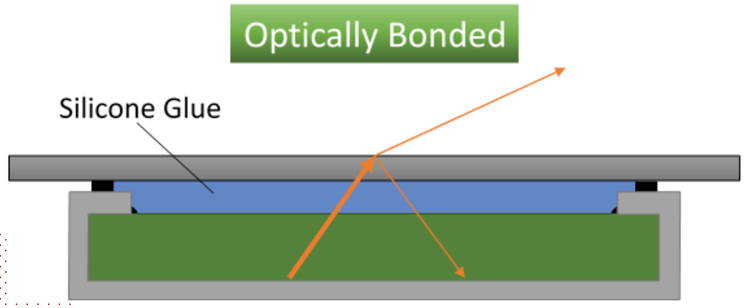


100% - 4% = 96%
Total reflection about 4%

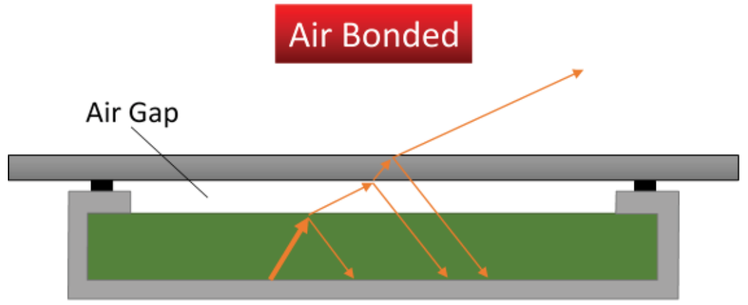


100% - 96% - 96% - 96% = 88.47%
Total reflection about 11.5%

Optical bonding **increases the brightness** by about 10%



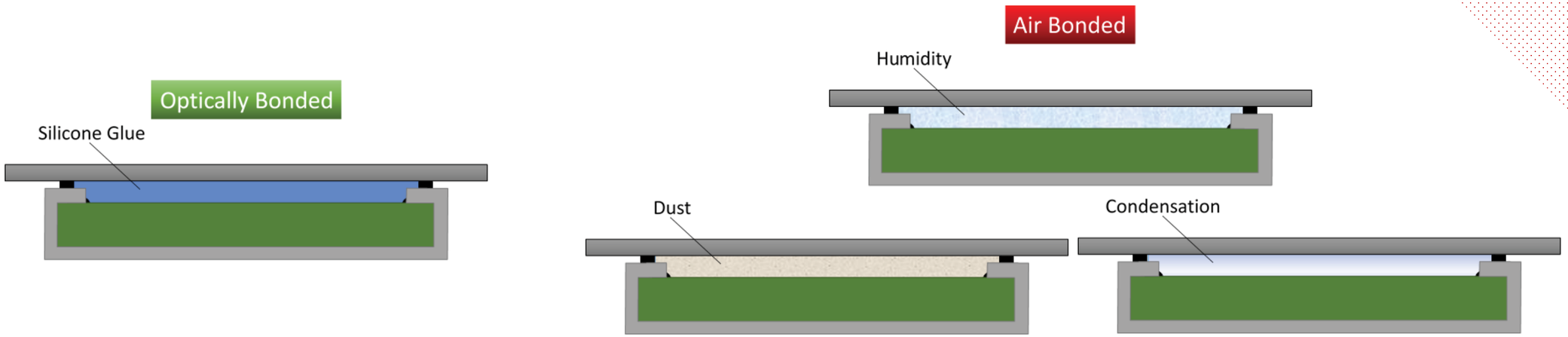
(100% - 4%) * 98% = 94.08%



(100% - 4% - 4% - 4%) * 98% = 86.70%

Advantages of Optical Bonding II

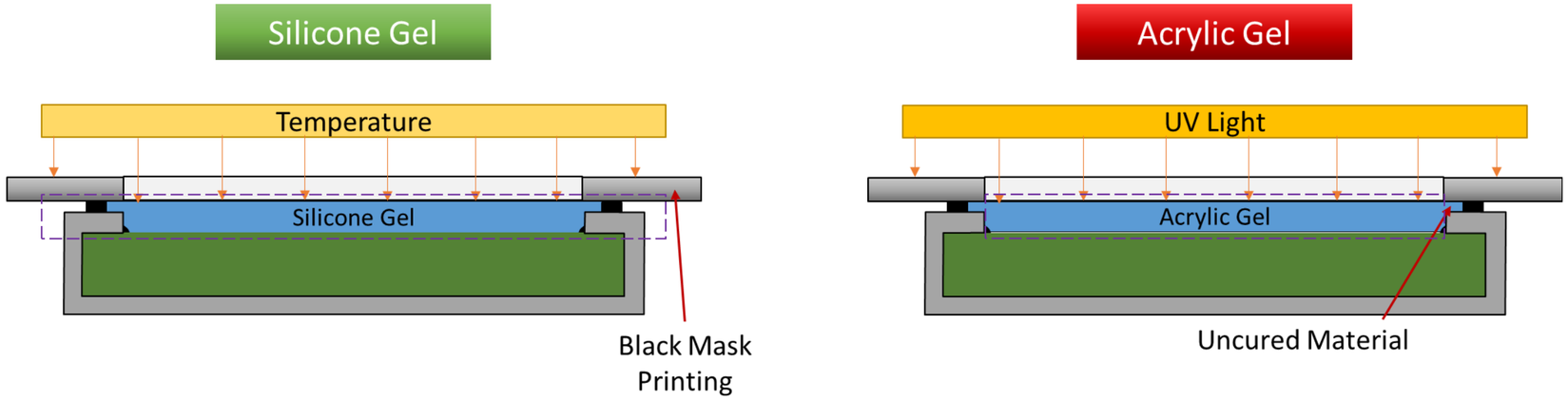
No humidity or dust can enter between the touch panel and LCD cell



Additional **resistance towards environmental forces** onto the glass

The impact energy without damage is **increased by about 20%**

Advantages of Silicone gel over Acrylic gel



Silicone cures automatically when the components get mixed and spread the cure to non-active material. However, acrylic only cures the areas exposed to the UV light

During curing, **the shrinkage rate of silicone is below 0.1%**, whereas acrylic is about 4%

With silicone the hardness is flexible and depends on the mixture, while acrylics have a predefined hardness

Silicone barely yellows, whereas acrylics does

Silicone is more stable over large temperature ranges, whereas acrylics get very unstable

Renowned Customers using CLEAR-BOND

Technical Data CLEAR-BOND I

Cured Mixture of components - faytech-X6-1688 - 'CLEAR-BOND'

Typical Characteristics	Measuring Method	Value
Color		Clear
Yellowing Index	ASTM E313-15e1	<1
Density at 23 °C	ISO 2781	0.97 g/cm³
Needle Penetration (50 g)	GB/T269	220 ±20 mm/10
Relative Permittivity	IEC 60250	2.7
Dielectric Strength	GB/T 1693-2006	400 µm/m°C
Volume resistivity	GB/T 1692-92	1015 Ω cm
Surface resistivity	IEC 93	1014 Ω
Refractive index	n_D^{25}	1.404
Flame retardancy		94 HB
Transmission (path length 1.5 mm)		> 98.9 %
Thermal conductivity	GB/T 10297-1998	0.20 W/m K
Coefficient of linear thermal expansion	ISO 11359 - 1- 2014	300 x 10-6 m/m K
Temperature Range		-40 to 85 °C
Shrinkage		< 0.1 %

Technical Data CLEAR-BOND II

Uncured components A and B - faytech-X6-1688 - 'CLEAR-BOND'

Typical Characteristics	***Measuring Method***	***Value***
Color		Clear
Viscosity at 23 °C	ISO 3219	Typ. 950 mPas
Density at 23 °C	ISO 2781	0.97 g/cm³
Haze	ASTM D 1003	< 0.3 %

Catalyzed Mixture of components A + B - faytech-X6-1688 - 'CLEAR-BOND'

Typical Characteristics	***Measuring Method***	***Value***
Platinum-catalyst in component		B
Mixing ratio	A : B	1 : 1
Viscosity of mixture	ISO 3219	950 mPas
Pot life at 23 °C		150 min
Curing method		Hydrosilylation

Technical Data CLEAR-BOND III

Uncured components A and B - faytech-T50-1688 '

Typical Characteristics	***Measuring Method***	***Part A***	***Part B***
Color		Clear	Clear
Viscosity at 23 °C	GB/T 10247-2008	typ. 500 mPas	typ. 650 mPas
Density at 23 °C	ISO 2781	0.99 g/cm³	0.99 g/cm³
Haze	ISO7027-1999	< 0.2 %	< 0.3 %

Catalyzed Mixture of components A + B - faytech-T50-1688 '

Typical Characteristics	***Measuring Method***	***Value***
Mixing ratio	A : B	1 : 1
Pot life at 23 °C		> 10h

Technical Data CLEAR-BOND IV

Cured Mixture of components - faytech-T50-1688

Typical Characteristics	Measuring Method	Value
Color		Clear
Density at 23 °C	ISO 2781	0.99 g/cm³
Penetration (Needle)	GB/T269	240 ±15 mm/10
Relative Permittivity	IEC 60250	2.7
CTE	GB/T 20673-2006	400 µm/m°C
Dielectric Strength (25°C)	GB/T 1693-2007	20 kV/mm
Dielectric Constant (25”C)	GB/T 1693-2007	<3.0 (1MHz)
Refractive index	n_D^{25}	1.404
Transmission (path length 1.5 mm)	UV-VIS	> 99 %
Thermal conductivity	GB/T 10297-1998	0.20 W/m K
Temperature Range		-60 to 140 °C
Shrinkage		< 0.1 %

Contact

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THANK YOU

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