NEW PRODUCT

STRUCTURAL POLYURETHANE ADHESIVE
SIKAFORCE®-436

Bonding of large-dimension composites parts requiring high mechanical performance for the Transport and Marine industry.

BUILDING TRUST

SIKAFORCE®-436
A NEW ADHESIVE TECHNOLOGY

PRODUCT DESCRIPTION

SikaForce®-436 is a bi-component polyurethane structural adhesive. It has been designed to allow bonding of large parts.
This product has a comfortable open time allowing the bonding of complex and large parts, and a setting speed offering a handling time compatible with the production of large series.

Its rheology allows a fast realization of large diameter.

SikaForce®-436 associates structural properties, vibrations absorption, high shear and peel performances.
It is currently used by market leaders in the manufacture of leisure boats for deck/hull or bulkhead/hull bonding applications.
Its natural adhesion allows it to get rid of surface preparations on many materials.
Its performances allow a simplification of designs and the elimination of restratification operation made by traditional methods.

SIKAFORCE®-436 REPLACE THE TRADITIONAL RESTRATIFICATION

BONDING TECHNOLOGY

- Suppress sanding operations
- Elastic product accepting deformation: no need to restratification
- Energy absorption preserves interfaces
- No surface preparation
- Cost saving
- Time saving

RESTRATIFICATION TECHNOLOGY

- Required when a bonding is done with polyester adhesive
- Adhesive break
- Loss of time and cost
- Additional operation
- Long process
- Brittle link without moove absorption
- Not aesthetic

Marine

stringer, dech/hull, bulk/hull

Transportation

bonding of big composite part for front or spoiler

Composites parts

bonding of big parts

Sport car

carbon bonding

BENEFITS

- Easy smothing: time saving
- Limited surface treatment: cost saving
- High elasticity area accept impact and high stress
- Higher performance than composite: no need of restratification
- Reliable product used by Market leader
- 2 cure speeds to offer high production rate for each boat size
- Non sagging: absorb high gap between parts

ADVANTAGES

- Outstanding non sagging properties, can be applied in high thickness
- Thixotropic system
- High mechanical performances
- High elongation at break with elastic properties
- Acoustic comfort
- Gap compensation up to 50 mm
- Allows assembly of large size parts
- Excellent adhesion on composites
- Good compromise between comfort of use (long open time) and a fast initial curing time (handling time).

PROPERTIES

	25'	**120'**
Appearance	1 liquid part - 1 pasty part	
Colors	grey or black	green or white
Open time on Polyester (at 23°C)	25'	120'
Handling time (at 23°C)	3h30	6h
Hardness (shore)	55 D	
Tensile modulus (MPa)	84	
Elongation at break	60%	
RTC (alu 2017)	16 MPa	
RTC (inox)	18,5 MPa	
Peel resistance (alu 2017)	5 N/mm	
RTC Composites (Glass Composite/Infused Polyester)	8 MPa (delamination failure)	
Aging (Wet cataplasm 7 days)	5,5 MPa (delamination failure)	

SIKAFORCE®-436
STRONGER THAN COMPOSITE

CHARACTERISTICS

BONDING VS RESTRATIFICATION

TRACTION	RELAMINATED ASSEMBLIES	ASSEMBLIES BONDED
Composite bulkhead	44,7 N/mm	55.5 N/mm
	Composite failure	Foam failure
Wood bulkhead	30,5 N/mm	40,2 N/mm
	Adhesive failure	Composite failure

PERFORMANCE

The tests made on the assemblies performed with SikaForce®-436 demonstrate impressive break profiles. We notice that there is no bonding failure but only material break.

Initial state

Aged state

BONDING OF POLYESTER SUPPORT

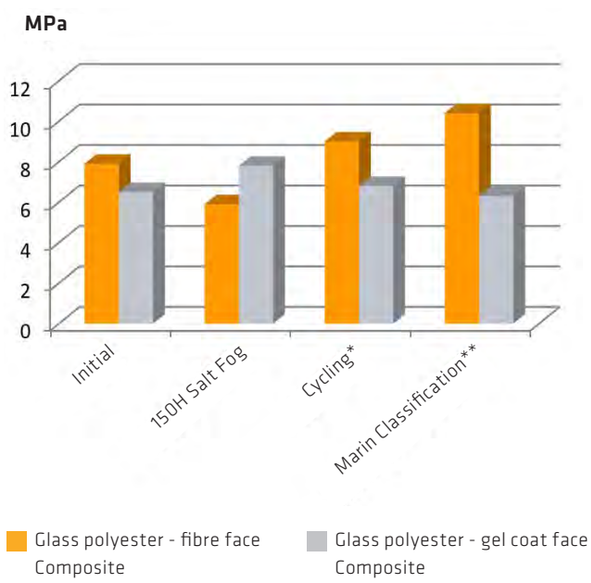
The product was tested at the initial state and at the end of various aging cycles.
We notice that we keep almost the same performances no matter aging cycle applied. During these tests, we observe the same failure profile (delamination of the composite material) and whatever the type of test realized.

*24 cycles

1 cycle

- 1 hour at 80°C-, 90%H
- 1h of descent
- 1h at -20°C-0%H
- 1h of ascent

** 6h hours immersion in water at 100°C



ADVANTAGES OF SIKAFORCE®-436 ON EXISTING TECHNOLOGY

COMPARISON OF ADHESIVES TECHNOLOGIES

	ADVANTAGES	DISADVANTAGES
PU	- Simple surface preparation on composite - Wide mechanical properties - Elasticity on nearly all deformation - Adjustable cure speed - Absorption of dilation - Cost effective solution - Very low exotherm	- Low adhesion on raw metal - Does not withstand high temperatures continuous (> 120 ° C)
Acrylates MMA	- Short handling time - Limited surface preparation on a wide range of substrates (metals, plastics, composites...)	- Exothermic when thickness increase - Storage conditions - Flammable - Limited elastic domain - Non-reversible deformation - Smell
Polyester	- Low cost - Strong adhesion if the bonding is done on fresh polyester - Easy to use - Traditional method	- Very rigid and brittle - Exothermic as soon as quantities increase - Surface preparation needed - Smell

	SIKAFORCE®-436	POLYESTER / MMA
Hand laminate or in simultaneous projection	Application of primer	Sanding
Infusion	Direct bonding	Sanding

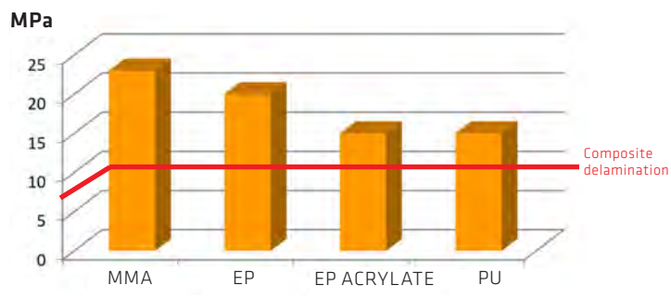
SIKAFORCE®-436
HIGH QUALITY TECHNOLOGY FOR COMPOSITE STRUCTURAL BONDING

PERFORMANCE OF THE DIFFERENT TECHNOLOGIES

Used for bonding structures, PU adhesives have remarkable properties.
PU is renowned for its high mechanical performance, flexibility, low exotherm and low cost.

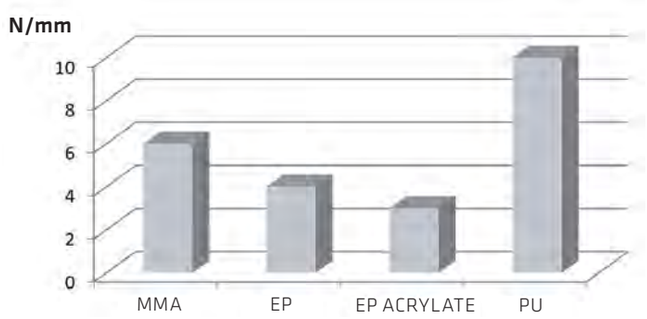
LAP SHEAR

In lap shear the composite (polyester, vinylester) is the weak point.
The composite deliminates between 6 and 10 MPa while adhesive resist to more than 15MPa.



PEEL

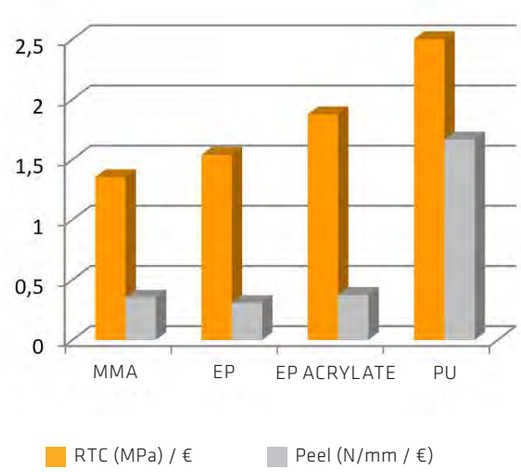
In peel thanks to its elasticity, SikaForce®-436 offers highest performances while others chemistries are brittle.



PERFORMANCE /PRICE

SikaForce®-436 is offering the best economical offer for big composite bonding.
On top it make production easier and faster providing an additional cost saving.

Thanks to its reduced surface preparation, a work saving up to 15% can be obtained in some operations when SikaForce®-436 is used.



BEST PRODUCT LOAD ABSORPTION FOR HIGHER RESISTANCE OF THE ALL STRUCTURE

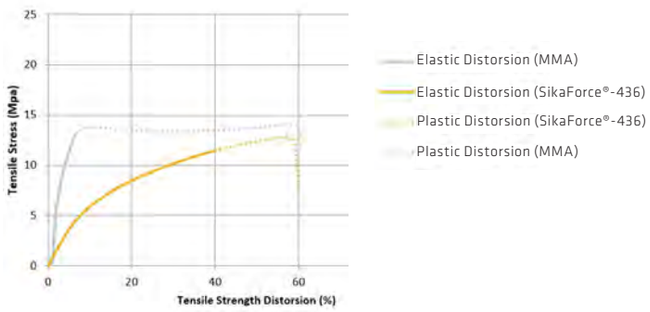
Bulkhead-Composite test sample.
Thanks to its unique elastic distorsion SikaForce®-436 absord the stress applied on the structure: THE COMPOSITE IS NOT DAMAGED.

TENSILE BEHAVIOUR OF THE TECHNOLOGIES

SikaForce®-436 offers a wide elastic area all along its deformation and reduce stress on the structure.

TENSILE BEHAVIOUR

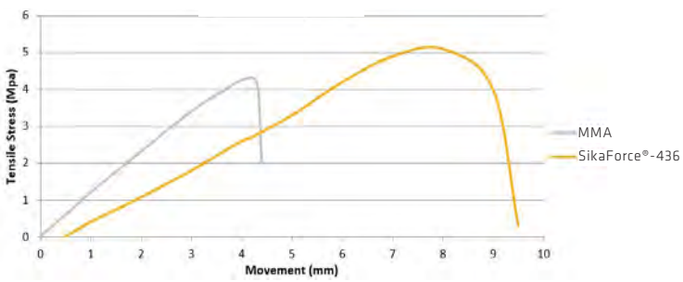
SikaForce®-436 has a much wider elastic domain than methacrylate. Indeed, it can reach up to 60% elongation with an elastic domain up to 40% unlike the MMA which reaches its plastic deformation after about 7%.



LAP SHEAR BEHAVIOUR

Deformations are imposed by the structure. With SikaForce®-436 the stress related to a deformation is much lower than with other technologies. It opens new areas of deformation without composite structure damage.

As an example, when a movement of 3mm is imposed, a shear above 3MPa is imposed with a MMA while only 2MPa is achieved with SikaForce®-436.



SIKAFORCE®-436
READY FOR INDUSTRIAL USE

USE RECOMMENDATIONS - SURFACE PREPARATION

To achieve optimum performance in the use of SikaForce®-436, it is important to clean the surfaces to be bonded and to perform evaluation tests to check adhesion properties.

- RTM - GELCOAT
- RTM - FIBER
- EPOXY STRATIFICATION
- INFUSED PART (Epoxy/Polyester/Vinylester)

ADEKIT CLEANER

- SMC BMC ZMC
- PHENOLIC STRATIFICATION

GRINDING

ADEKIT CLEANER

- POLYESTER STRATIFICATION BY WET LAY UP
- INSERT STEEL/ALUMINIUM/ STAINLESS STEEL
- NON-COATED METAL SUPPORT
- SIMULTANEOUS PROJECTION

ADEKIT CLEANER

PRIMER

USE RECOMMENDATIONS

FOR “READY FOR USE” KIT

The “Ready for use” kit (5,5 + 6 kg) is the intermediate solution between the use of the product in cartridge and its implementation in machine from pails. It has a comfortable open time to facilitate the manual application. It‘s a more economical solution.

- 1. Pour the entire Isocyanate in the Polyol
- 2. Mix until you get a homogenous paste
- 3. Apply with a spatula or a pastry bag

FAST DISPENSING WITH LARGE BEAD DIAMETER

SikaForce®-436 dispensing on hull.
Up to 5 kg/minute with standard dosing equipment for time saving in production.

FOR CARTRIDGES

The cartridges must be stored upright, protected from moisture and at a temperature of between 15 and 25 ° C in their unopened original packaging. The storage is the same for the opened cartridges.

- 1. Open the cartridge by percussion
- 2. Insert the cartridge into the adapted gun
- 3. Perform product extrusion until both components exit the end of the cartridge to balance the pistons
- 4. Fix the mixer without modifications
- 5. Purge about 5 cm of product at the beginning of mixing
- 6. Perform the bonding respecting the open time and the handling time

In order to maintain product tightness, it is important not to remove the mixer from the cartridge after gluing.
We recommend the use of pneumatic guns. It provides a more comfortable use and excellent mixing quality.*

**You can also consult the flyer of best practices for adhesives on www.sikaadvancedresins.com/Products and solutions/Structural Adhesives or https://bit.ly/2LgmWeU.*

PACKAGING

SikaForce®-436 is proposed in several packagings: pails, drums, cartridges and "ready for use" kits in order to allow more convenience in the handling, preparation and application of the product. There is a solution adapted to each type of assembly configuration.

- **Cartridge:**

SikaForce®-436 L25	25'	12 x 400cc
SikaForce®-436 L120	120'	12 x 400cc

- **"Ready for use" kit:**

SikaForce®-436 L120	POLYOL	5,5 kg
	ISOCYANATE	6kg

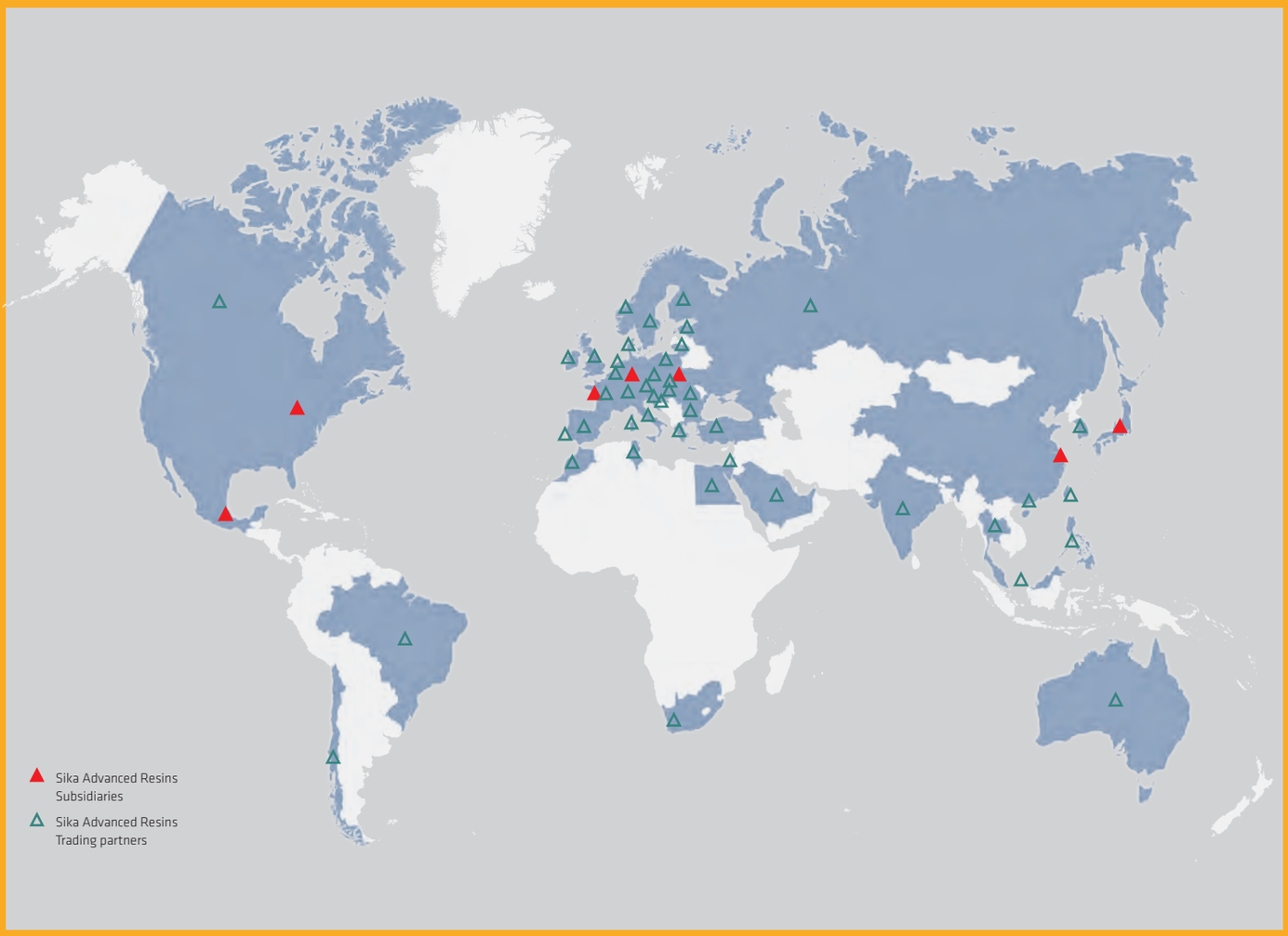
- **Drums:**

SikaForce®-436 L25	POLYOL	28 kg
& SikaForce®-436 L120	ISOCYANATE	30 kg

Cartridge

"Ready for use" kit

Pail and drum



GLOBAL SOLUTIONS – LOCAL SERVICE

Our most current General Sales Conditions shall apply.

Please consult the Product Data Sheet
prior to any use and processing.

Actual Product Data Sheets and information about
additional products please find in:
www.sikaadvancedresins.com

RESPONSIBLE CARE

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Janvier 2025 - Sika France S.A.S. au capital de 46 018 260 € - 572232411 R.C.S. Bobigny