Polytech
Wind for life™

INSTALLATION INSTRUCTION

ELLE® Shells Installation

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1. General Information

1.1 Change Description

The table below describes changes compared to the previous revision of the document.

Section	Description
	Version 5.0
Document	Document name changed to "*LE-I007 5.0_en ELLE® Shells Installation*"
All	Replace "*ELLE™*" with "*ELLE®*" all over.
1.4 Installation Instruction	Update document names.
2.2 Consumables	Replace "*Isopropanol 99.9%*" with "*isopropanol 95% (Minimum)*"
All	Everywhere Isopropanol is mentioned, "*95% (minimum)*" is added.
3.1.2 step 2	"*LE-I006 Surf….*" Is replaced with "*LE-I006 ELLE® Shells Surface Preperation*"
3.6 step 1	Text from LE-I038 punkt 3.4 step 2 is added.
3.7.1 step 1	Text update.
3.11.2 step 3	Test "*Do not overfill*" is removed.
3.11.6 step 1	Photo updated.
3.11.6 step 2	Text and photo updated.
3.11.6 step 3	Text update and photo update.
3.11.6 step 3	Text "*smoothing*" changed to "*cleaning*"
3.12.2 step 2	Text change "*a G240 sanding disc*" to "*sandpaper grit 220 to 240*"
3.13	Minor text changes.
All	Minor text adjustments.
	Version 4.0
All	New template. Various editorial changes throughout.
1.3 Icons and Notes	New section added.
1.4 Required Documentation	*LE-Q003_Acceptance Catalog – Installation of ELLE™ Shell* added.
2.2 Tools and Consumables	**Tools:** Type of application roller, application squeegee and ELLE™ application template changed to Special Polytech tool. **Consumables:** Cloths and sandpaper added.
2.1 Environmental Conditions	Reference to *PolyTech TDS ELLE™* added.
3.7.2 ELLE™	New pictures.
3.8.1 Application of ELLE™ on Leading Edge	New pictures.
3.8.3 Application of ELLE™ on Leading Edge – Continued	New picture.

3.9 Pressure-activation of ELLE™ on Sides	New picture.
3.12 Discontinuation of Application	Section rewritten.
3.13 Curing Time	Information regarding release of rotor and WTG idle mode added.

1.2 Safety

1.2.1 Qualifications of Personnel

The table below defines which tasks can be assigned to qualified, trained and instructed personnel.

Task	Personnel
All	Qualified personnel ■ Personnel who, based on their specialist training, knowledge and experience and knowledge of the relevant regulations, are able to assess the work assigned to them and identify possible hazards.
Installation	Trained personnel ■ Personnel trained in the operation and safe use of the product.
Packaging and Transport	Instructed personnel ■ Personnel instructed in the tasks assigned to them.

1.2.2 PPE (Personal Protective Equipment)

Wear PPE as defined in the table below.

	**For all tasks** Wear foot protection.
	**For all tasks** Wear eye protection.
	**For all tasks** Wear protective gloves.
	**For tasks where sufficient venting is not possible** Wear respiratory protection. ■ Recommended filter type: A2, P2.

1.3 Icons and Notes

The table below defines the meaning of icons that appear in this document.

Icon	Definition
	**Caution** or **Warning** Details about risk of personal injury.
	**Note** Details about risk of property damage.
	Reference to additional documentation.
	Details about time constraints.

1.4 Required Documentation

The table below lists other required documentation.

Safety Data Sheet	■ CENTAUR 960 SDS ■ IPA Sprit 99,9% Polytech ■ Sika® Aktivator-205
Technical Data Sheet	■ PolyTech TDS Centaur 960 ■ PolyTech TDS ELLE® ■ Sika® Aktivator-205
Installation Instruction	■ LE-Q003 ELLE® Shells Acceptance Catalog Installation ■ LE-I006 ELLE® Shells Surface Preparation
Other	■ ELLE® layout specification

1.5 Abbreviations

The table below defines the abbreviations used in this document.

Abbreviation	Full Form
ELLE®	Everlasting Leading Edge
IPA	Isopropanol Alcohol
LE	Leading Edge
PPE	Personal Protective Equipment
PSA	Pressure-sensitive Adhesive tape
SDS	Safety Data Sheet
SMT	Solid Metal Tip
TDS	Technical Data Sheet
WTG	Wind Turbine Generator

2. Preparation

2.1 Environmental Conditions

The table below defines the temperature and humidity requirements during installation.



Refer to Technical Data Sheets for storage and transportation requirements.

Property	Value	Unit
Ambient temperature	5 ... 35 41 ... 95	°C °F
Surface temperature:	5 ... 50 41 ... 122	°C °F
Permitted relative humidity	30 ... 90	%

2.2 Tools and Consumables

Tools	
Item	**Type**
Application gun	-
Application roller	Special Polytech tool
Application squeegee	Plastic spatula, special Polytech tool
ELLE® application template	Special Polytech tool
Permanent marker	-
Safety knife	-
Scissor	-
Sprayer	-
Tape measure	-
Consumables	
Item	**Type**
Adhesive	Centaur 960
Cleaning agent	Isopropanol 95% (minimum)
Cloths	Lint-free
Masking tape	-
Sanding disc	Grit 240
Sandpaper	Grit 220 to 240
Surface activator	Sika® Aktivator-205

3. Installation

3.1 Check of Surface Condition

3.1.1 Inspection of Blade

Step 1

Inspect the leading edge for any erosion or damages.

End

3.1.2 Repair of Leading Edge

Step 1

Repair any detected damages in accordance with specifications of the blade manufacturer.

Step 2

Rework any detected erosion in accordance with *LE-I006 ELLE® Shells Surface Preparation*

Note

For blade with solid metal tip (SMT): The joint between the blade and the SMT must be without any damages or cracks, otherwise the joint must be reworked in accordance with specifications of the blade manufacturer.

End

3.2 Cleaning of Surface

Step 1

Clean/wash substrate to remove contamination, for instance salt sediment.

Step 2

Use either:

- A neutral soap dispersed in water and a brush if blade is very dirty or full of salt,
  or:
- Isopropanol 95% (minimum) and a brush

to clean the eroded area.

Note

- Surface cleaned with isopropanol 95% (minimum) will dry out fast.
- Surface cleaned with water and soap will take longer time to dry out.
- Applying isopropanol 95% (minimum) to the surface can help evaporating remaining water on the surface.

End

3.3 Marking of Positions

3.3.1 Tip Start Position

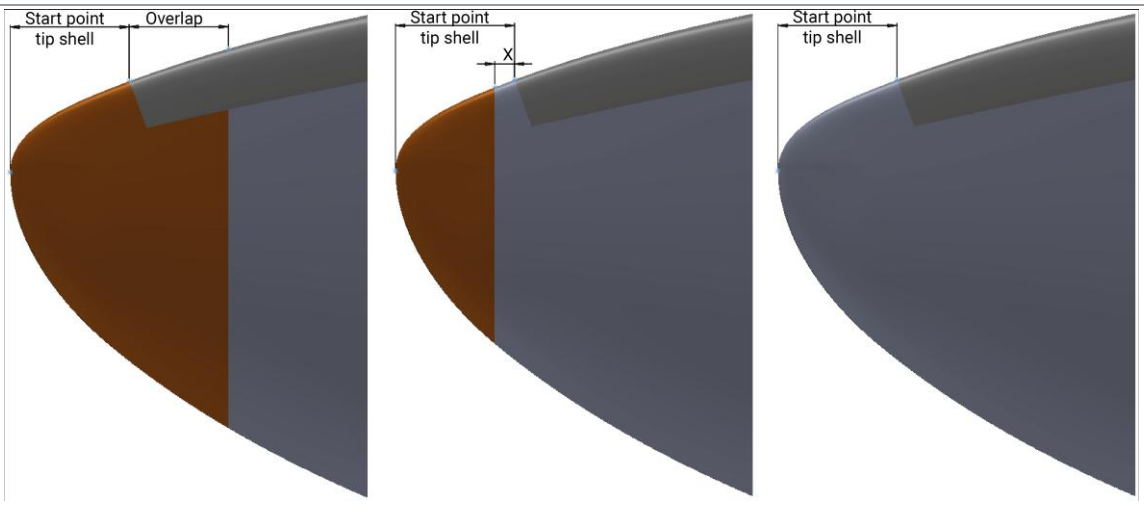
Before Starting

See the start position in the ELLE® layout specification, delivered in the box with the ELLE® shells.

Step 1

Mark start position of the tip section for every blade.

Note
Do not use a black marker or a pencil.



End

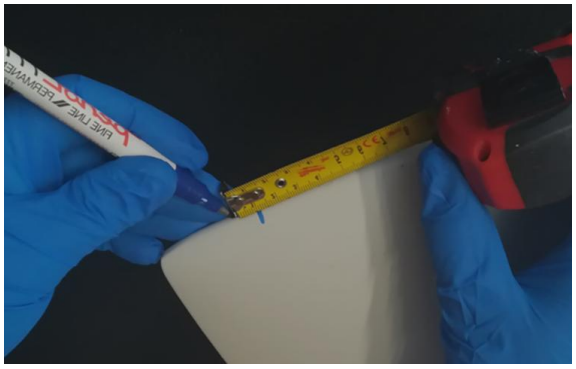
3.3.2 Tip Sealing Area

Step 1

Make a mark 10 mm from the tip start position towards the tip-end.

- This mark is used for positioning of masking tape later.

Note
Do not use a black marker or a pencil.



End

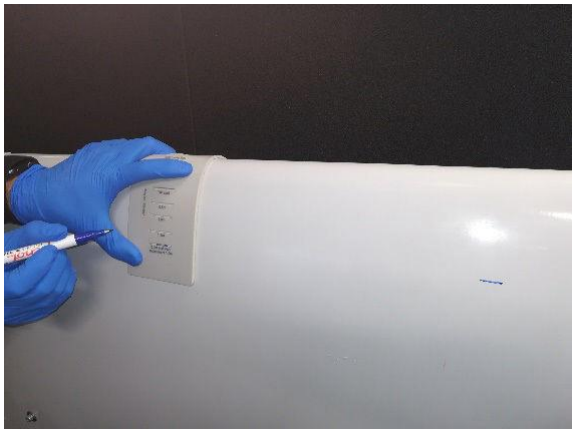
3.3.3 Application Area

Step 1

Use template to mark position of ELLE® sections, to be able to mask the whole area of application.

Step 2

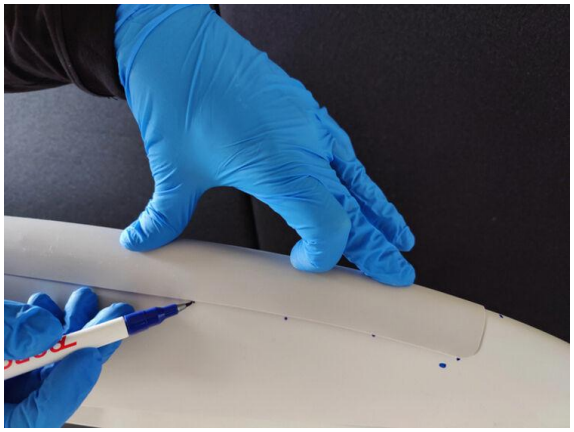
Set the marking according to the specified targets on the template.



Step 3

Place the ELLE® tip shell at the tip.

- Start marking and align it evenly between the markings along the sides that were just made with the marking template.
- Do not remove the liner from the tape



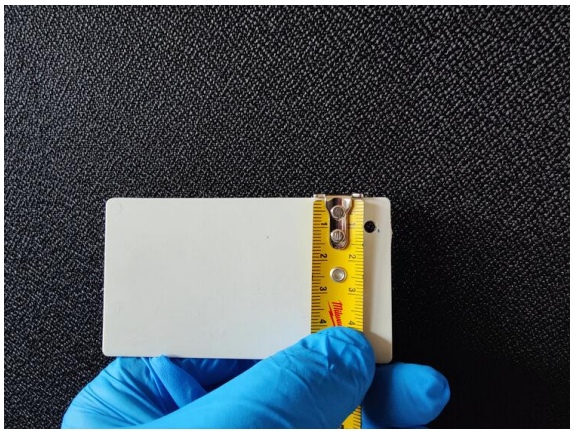
Step 4

- For the first half meter from the tip, start along the edge on both sides of the ELLE® tip shell.
- Small marks with approx. 5 cm between them must be made.

Step 5

Use the application squeegee to make a new mark 10 mm outside the marks that were just made along the edge of the ELLE® tip shell.





Note
Make sure to use the side of the application squeegee where there is 10 mm from the center of the hole to the edge for the markings.

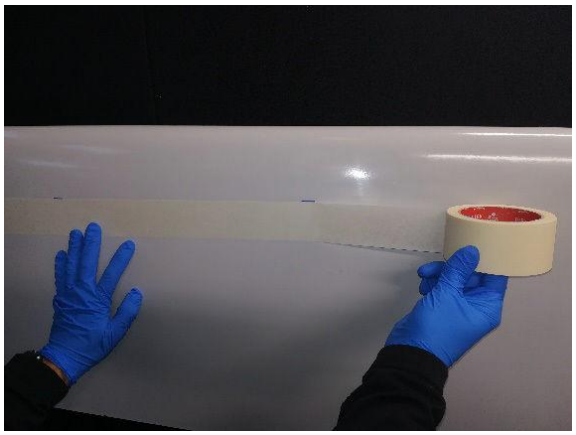
End

3.4 Masking of Surface

Step 1

Place the masking tape along the markings and along the sealing area mark at the tip-end.

Note
Do not cover the marks.



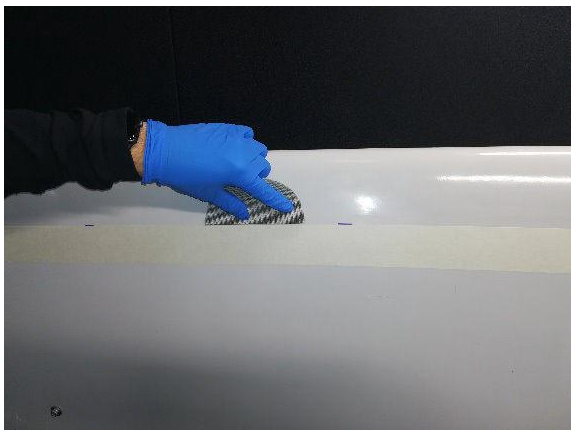
End

3.5 Sanding of Surface

Step 1

Sand the entire masked application area.

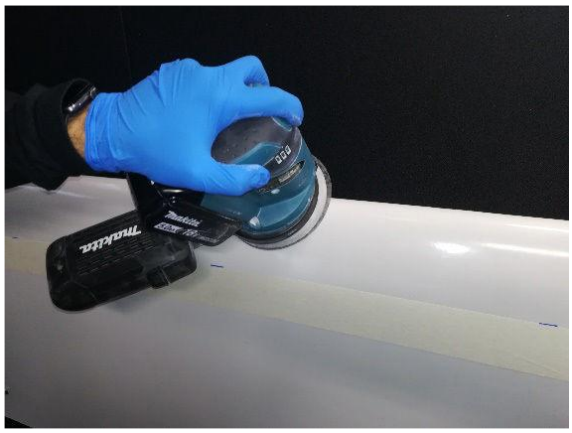
- Use sandpaper grit 220 to 240.
- No shiny areas on the sanded surface are allowed after sanding.



Note

For blade with solid metal tip (SMT): Sand the entire masked application area. Make sure that all loose paint, glue, filler and similar has been removed.

- Use sandpaper grit 220 to 240.



End

3.6 Cleaning of Surface

Step 1

After sanding. Clean the blade surface and remove all dust.

Remove dust using a hand brush, air-blower or vacuum cleaner starting from the top and moving downwards.

1 When brushing/blowing/vacuuming is finalized go back to the top and spray the surface with isopropanol 95% (minimum) and wipe the surface with a lint free cloth. Change the cloth regularly.



2 When finished wiping with IPA, go back to the top and repeat the process one more time.

If dust is still present on the surface, repeat the wiping process until the surface is dust free.

Note: It is very important that the surface is only brushed/wiped in the downwards direction.

Note: Make sure to clean dust from the surrounding surfaces to avoid contamination of the installation surface.

End

3.7 Activation of Surface and ELLE®

3.7.1 Surface

Before Starting

Note
Wear clean, powder-free nitril gloves for the remaining installation process.

Step 1

Wipe the substrate with a lint free cloth dampened with Sika® Aktivator-205.

Wait between 10 and 120 minutes for the Sika® Aktivator-205 to evaporate before applying ELLE®.

Note

- Never apply Sika® Activatior-205 on a visibly wet surface.
- If the substrate is visibly wet, wipe it with a cloth dampened with isopropanol 95% (minimum) before applying Sika® Activatior-205.
- For blade with solid metal tip (SMT): Wipe the sanded area at the SMT with a lint free cloth dampened with Sika® Aktivator-205.

End

3.7.2 ELLE®

Step 1

Wipe the substrate with a lint free cloth dampened with Sika® Aktivator-205.



Step 2

Wipe all inside surfaces of ELLE® which are not covered by PSA tape, and the outside overlap, with a lint free cloth dampened with Sika® Aktivator-205.

Wait between 10 and 120 minutes for the Sika® Aktivator-205 to evaporate before applying ELLE®.



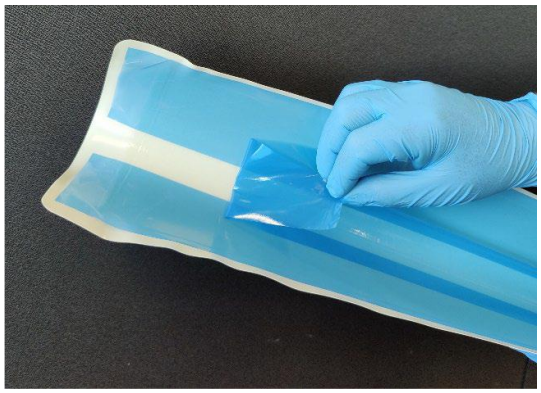
End

3.8 Application of ELLE®

3.8.1 Application of ELLE® on Leading Edge

Step 1

Remove center liner from PSA patch.

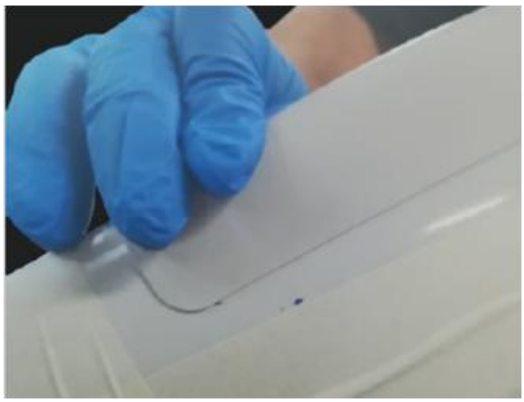


Step 2

Position ELLE® starting from the tip end starting position.

Step 3

Align ELLE® in accordance with the marked position.



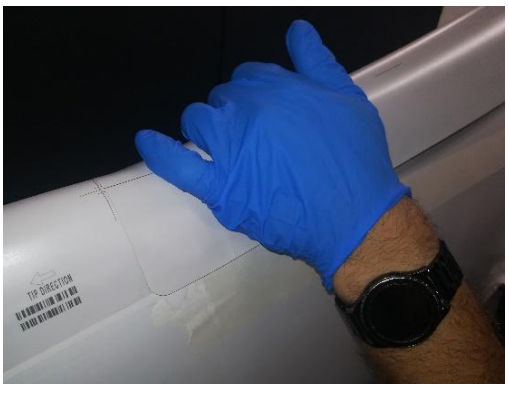
Step 4

Position ELLE® on the leading edge in accordance with respecting alignment marks.

Step 5

Keep ELLE® straight and slightly stretched while attaching it.

Note
For blade with winglet: Winglet ELLE® shell must not be stretched.



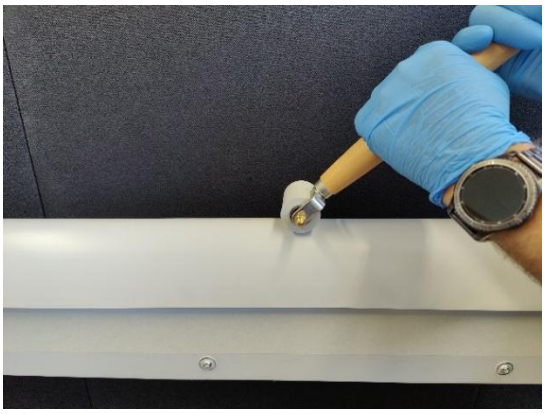
End

3.8.2 Pressure-activation of ELLE® on Leading Edge

Step 1

Activate the fixed ELLE® with roller on the leading edge.

- Make sure that all the PSA is activated.
- Ensure a pressure of approximately 5 kg.



End

3.8.3 Application of ELLE® on Leading Edge – Continued

Step 1

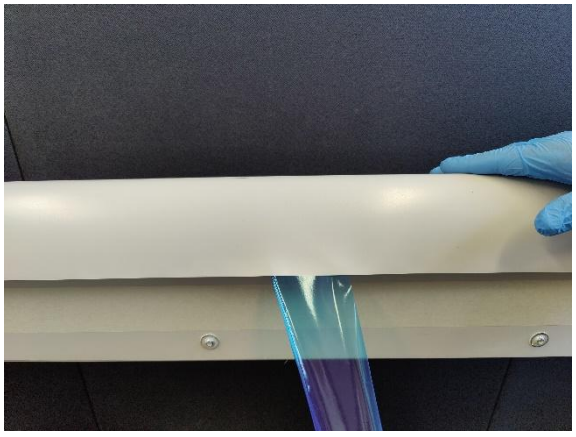
Remove liner from the ELLE® on the sides.

Step 2

Pull off the liner in a downward-angled movement.

- While pulling off the liner, use your hand to squeeze ELLE® onto the blade from leading edge towards center blade.

Note
Make sure there are no wrinkles and air pockets.



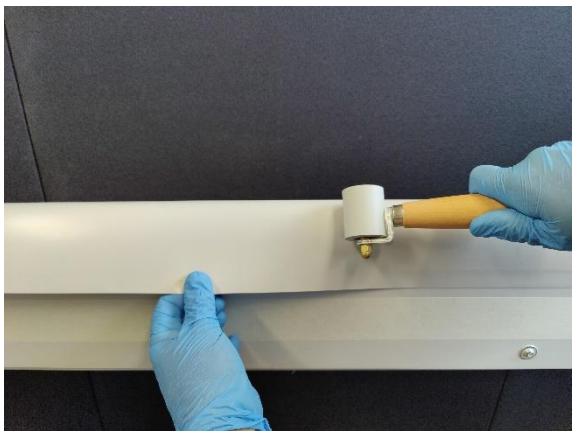
End

3.9 Pressure-activation of ELLE® on Sides

Step 1

Activate ELLE® with a roller, starting from leading edge working towards the edges of ELLE®.

- Make sure there are no air pockets.
- Ensure a pressure of approximately 5 kg.



End

3.10 Masking of ELLE®

3.10.1 Tip

Step 1

Apply masking tape on ELLE® closely along the edges.



End

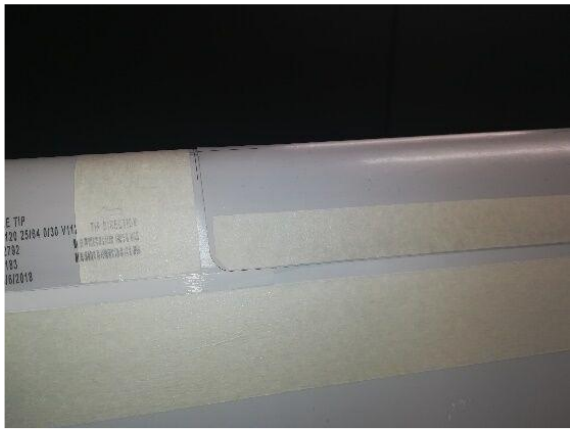
3.10.2 Transition and Straight

Step 1

Apply masking tape on ELLE® closely along the edges.

Step 2

Apply masking tape on the previous shell 5±2 mm from the overlap.

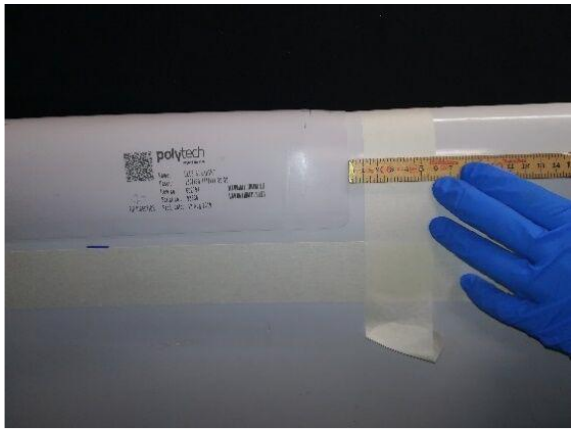


End

3.10.3 Straight Root

Step 1

Apply masking tape 10±5 mm from end.



End

3.11 Sealing of ELLE®

3.11.1 Tip

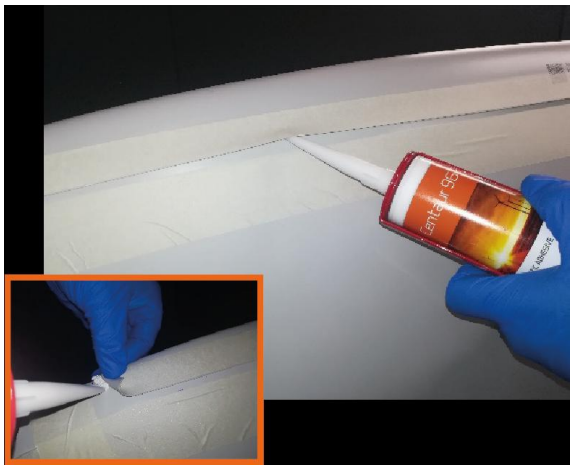
Step 1

Apply Centaur 960.

Note
Make sure not to contaminate next section of ELLE® while applying adhesive.

Step 2

Place the nozzle under the edge of the ELLE® section to seal.



Step 3

Start sealing in tip end and then along the sides.

Note
Make sure that the sealant is applied all the way to the edge of the PSA and so far back in the overlap that it seals onto the blade surface.

- If the front tip-end of ELLE® tends to lift, a piece of masking tape can be put across to keep it down until the adhesive has cured. Remember to remove it again before leaving the blade.

End

3.11.2 Overlap

Step 1

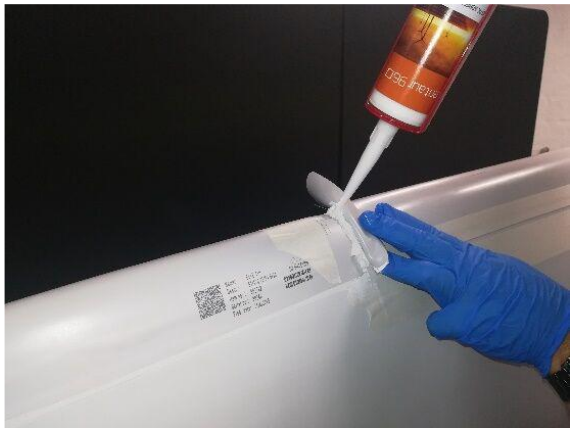
Apply Centaur 960.

Step 2

Flip the overlap and place the nozzle close to the edge of the PSA.

Step 3

Fill the overlap with Centaur 960.



End

3.11.3 Edges

Step 1

Apply Centaur 960.

Step 2

Place the nozzle under the edge of ELLE® to seal along the sides.

Note
Make sure that the sealant is applied all the way to the edge of the PSA.



End

3.11.4 Straight Root

Step 1

Flip the root end to fill all the area with Centaur 960.



End

3.11.5 Squeezing of Centaur 960

Step 1

Use the application squeegee in a circular movement, squeezing the Centaur 960 towards the edge of the PSA before squeezing the excessive sealant out onto the masking tape.



Step 2

Apply circular movement to ensure sealant reaches PSA.

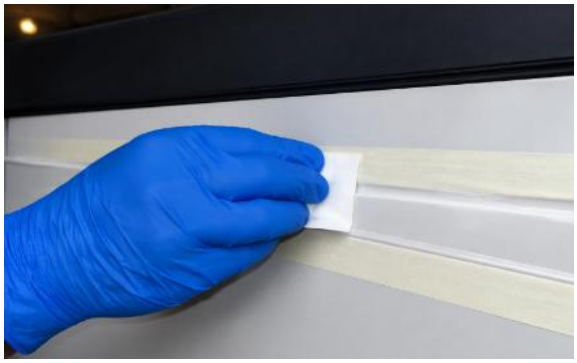
End

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3.11.6 Smoothening of Centaur 960

Step 1

Smoothen out the sealant, moving the application squeegee in longitudinal direction and making sure that the sealant is applied all the way to the edge of the PSA.



Step 2

Remove all masking tape.
Spray a thin layer of isopropanol 95% (minimum) on the sealer and wipe the sealer chamfer using a lint free cloth with isopropanol 95% (minimum).



Step 3

Clean the blade and ELLE of sealer residues using a lint free cloth with isopropanol 95% (minimum)



End

Discontinuation of Application

3.11.7 Interrupted Application

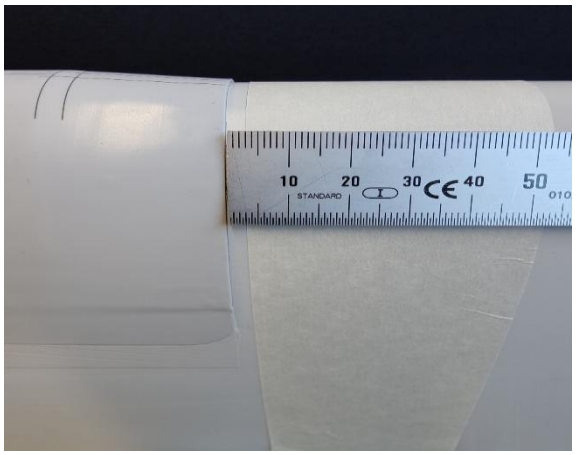
If the application of ELLE® must stop before full installation is completed, perform the steps below.

Step 1

Apply the ELLE® as normal in accordance with the installation instruction.

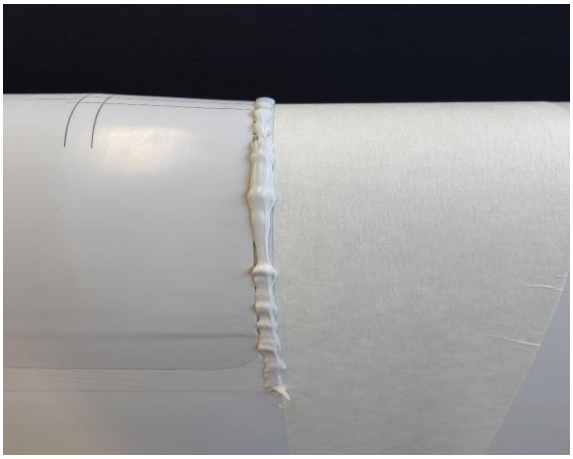
Step 2

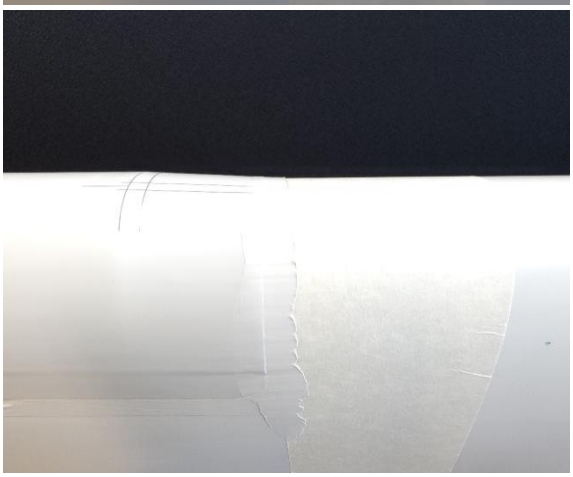
Apply masking tape approximately 2 to 3 mm from the end of ELLE®.



Step 3

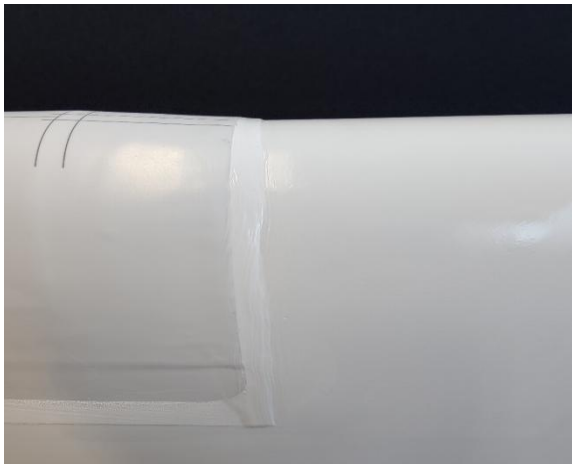
Apply a thin layer of centaur 960 sealer along the end of ELLE® and smoothen it using the application squeegee so that the sealer gets a smooth transition.





Step 4

1 Remove the masking tape and smoothen the sealer with isopropanol 95% (minimum).
2 Make sure that the sealer at no point is higher than the ELLE®.



End

3.11.8 Continuation of Application After Interruption

When continuing the application of ELLE®, perform the steps below.

Step 1

Clean the full chamfer at the end of ELLE®. Clean at least 50 mm.

Step 2

Sand the surface of the sealer in the root end using sandpaper grit 220 to 240.



Step 3

Clean the sanded surface using isopropanol 95% (minimum) on a lint free cloth.

Step 4

Continue the application in accordance with the installation instruction, including activation of the surface of the of the ELLE® root chamfer, using Sika® Aktivator-205.

End

3.12 Curing Time

The rotor can be released and the WTG set to idle mode immediately after finalized application, but the ELLE® must cure in accordance with the table below before the WTG can be put into operation.

Relative Humidity [%]	Temperature [°C]	Temperature [°F]	Minimum curing time [hours]
> 30	5 … 10	41 to 50	12
> 30	10 … 15	50 to 59	9
> 30	15 … 20	59 to 68	7
> 30	20 … 25	68 to 77	5
> 30	25 … 30	77 to 86	4
> 30	30 … 35	86 to 95	3
> 30	35 … 40	95 to 104	2

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4. Technical Support

E-mail

support@polytech.com
Answers will be sent within one working day.

Please include the following information in your support request:

- Product name.
- Product type.
- Serial number.
- Description of the problem, including detailed, high-resolution pictures.