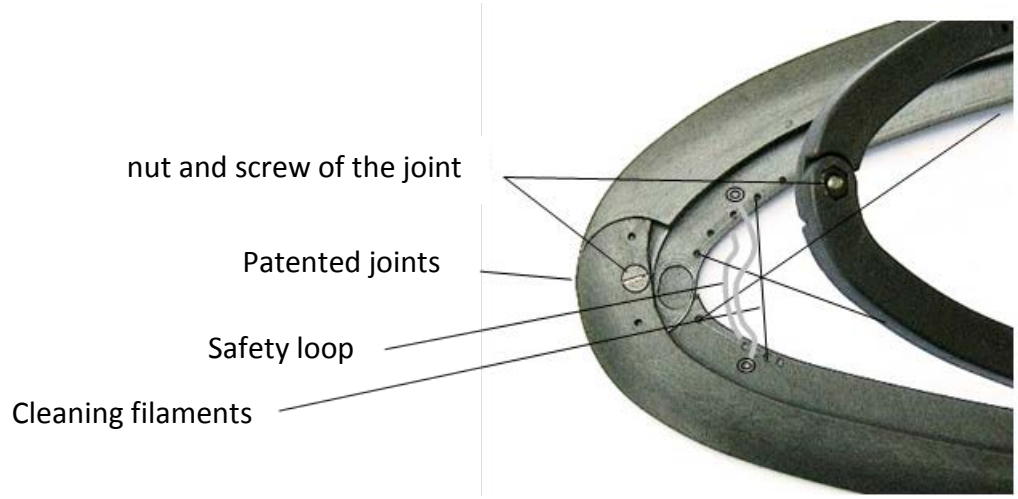
BWS PIRKER & STORKA

BUG WIPER SYSTEMS - MÜCKENPUTZER

BWS-FLEXI-BUGWIPER FOR RETRIEVAL LINE UNDER AND ABOVE WING

The **PATENTED FLEXIBLE JOINTS** are adjustable to nearly any type of glider and their wing profile. They also adapt themselves automatically to the changing profile as they move along the wing from the fuselage towards the wing tip and back again, ensuring in addition to the parallel cleaning filaments both effective cleaning and smooth running on the wing.



Adjusting the BWS-FLEXI-BUGWIPER to the wing profile

After delivery of the bugwiper the cleaning filaments have to be adjusted to the profile of the glider.

- To adjust the Flexi-Bugwiper to the type of glider follow the recommended procedure according to the figures down below:
- Don‘t remove the cable clamp (or cable tie) which press the bows of the Flexi-Bugwiper together and which keep it in the collapsed position.
- Place the Flexi-Bugwiper at the fuselage on the wing-root or wing root fairing.
    - The bugwiper shall be at the fuselage in contact with the upper and lower part of the wing.
    - The vertical part of the cleaning filaments shall touch only lightly the wing leading edge to ensure later the easy opening and closing of the bugwiper.
- The end of the cleaning filament is fixed by a tape. Loosen the tape slightly, but don’t remove it.
- Now pull carefully on the cleaning filament until the lower part of the bugwiper is touching the underside of the wing. Tension the filament a little bit and fix it again by the tape to the bugwiper.
- Take the bugwiper away from the wing.
- Remove the cable clamp (cable tie) so that the bug wiper will open up by the spring.
- Check now at the wing tip - by setting the bugwiper in the open configuration on the wing leading edge - that the bugwiper will move on the cleaning filaments and not on the

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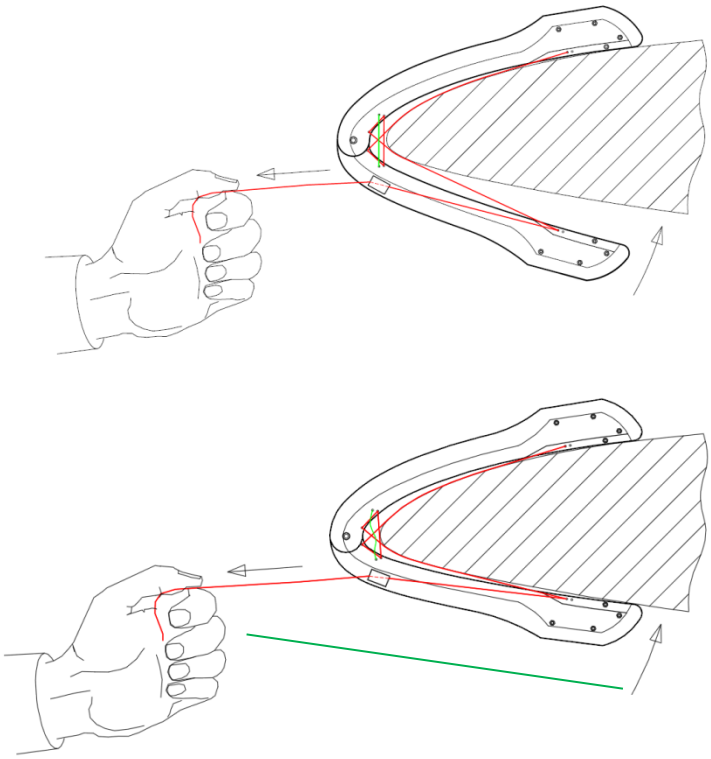
bugwiper frame, otherwise the bugwiper would not be able to clean the wing leading edge! You might have to tighten the cleaning filaments accordingly.

- Check once again that the bugwiper will fit properly at the fuselage.
- Then remove the tape and fix the adjusted length of the cleaning filaments by making four knots.

Adjusting length of cleaning filament :



Safety loop:

In case the cleaning filament will break, the safety loop acts as a stop to prevent the excessive widening of the bugwiper and its falling off from the wing.

Schematic drawing depicting the position of the BWS-FLEXI-BUGWIPER, in the stand-by mode and during cleaning:

Figure 1: **Flexi-Bugwiper, parking at the fuselage** (e.g. 20 mm or more for Ventus, Duo-Discus etc.)

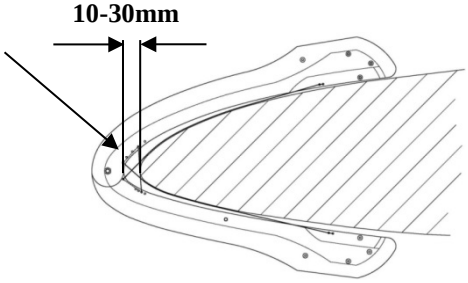
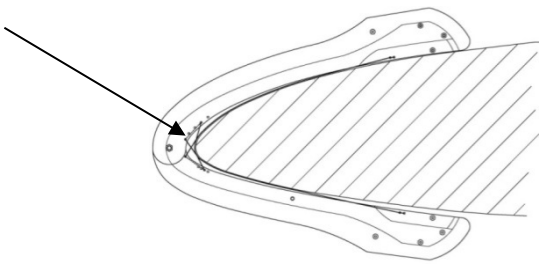


Figure 2: **Flexi-Bugwiper during cleaning** (the bugwiper shall slide on the cleaning filaments and not on the frame)



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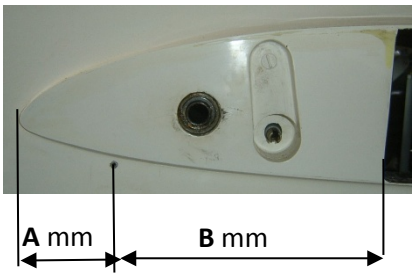
RETRIEVAL LINE UNDER THE WING
(opening spring mounted on the lower part of the bugwiper)

List of holes in fuselage and Flexi-Bugwiper

Recommended hole in fuselage	**Corresponding hole in Flexi-Bugwiper**
Position of the hole in the fuselage for the outlet tube	Mounting of the tilting part and hole in the bug wiper for the retrieval line. See photo: For instance at the fifth small marking hole counted from the front.



Bohrung im Mückenputzer

Table: List of gliders and recommended position of the holes

Hole in fuselage			**Hole in the BWS-FLEXI-PUGWIPER**
Glider	**A mm**	**B** mm	**for the retrieval line and tilting part**
VENTUS	ca.70	--	7th marking hole counted from the front ,**tilting part not necessary**
LS8/LS6/LS7	ca.65	--	7th marking hole counted from the front down below
Discus	ca.70	--	7th marking hole counted from the front down below
Cirrus	ca.70	--	7th marking hole counted from the front down below
DUO-Discus	ca.70	--	7th marking hole counted from the front down below
LS4	ca.65	--	7th marking hole counted from the front down below
LS3/LS1	ca.50	--	5th marking hole counted from the front down below
Nimbus 3	ca.105	170	12th marking hole counted from the front down below.
ASW 15	ca.70	-	10th marking hole counted from the front down below
DG 80x, DG400	ca.50	--	5th marking hole counted from the front down below
DG 1000	ca.80	--	9. Bohrung von vorne unten
Nimbus 4	ca.70	--	According to description
Arcus	--	255	6th marking hole counted from the front down below, tilting part not necessary
Janus	ca.70	--	7th marking hole counted from the front down below
Libelle	ca.60-80	--	According to description
Pik 20	ca.60-80	--	According to description
Jantar	ca.60-80	--	7th marking hole counted from the front down below.

The table shows recommended values. However, make sure that inside the fuselage there are no obstacles (mounted cables, fuel hoses, frames etc.) which might prevent proper access to the hole by the guide line and outlet tube. Therefore, before drilling hole, always check proper position of A and corresponding hole in bug wiper!

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Exact distance can only be marked by holding and leaning the bug wiper at the right position towards the fuselage and to mark the hole by the use of a thin driller or pencil lead which you stick through the recommended hole in the bug wiper parallel to the wing surface.

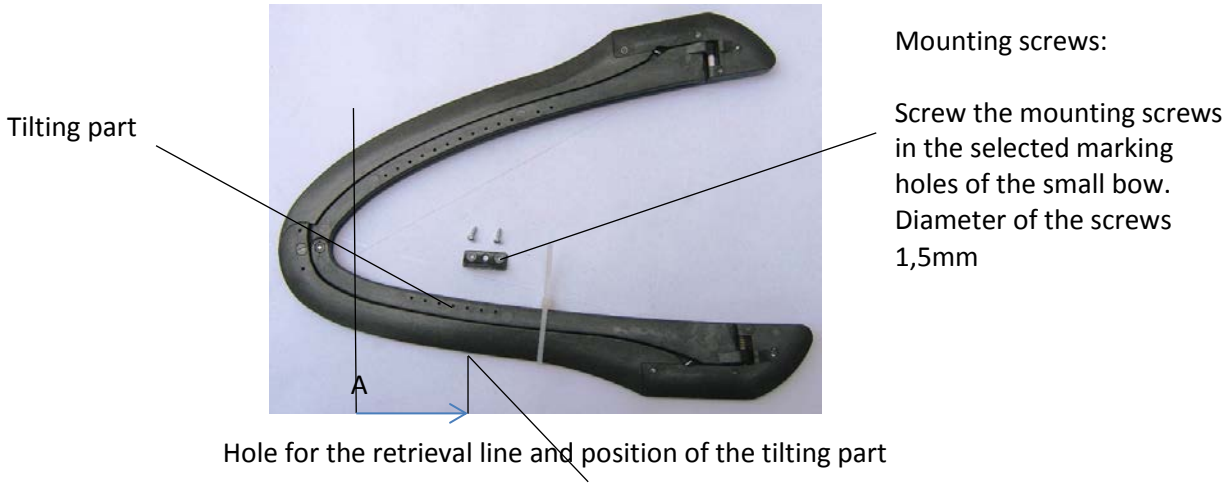
Adjusting the tilting part

(Retrieval Line underneath the wing)

The tilting part has the effect of tilting the bug wiper towards the fuselage in the standby mode. (Exception: no tilting parts needed for the Ventus and some other gliders)

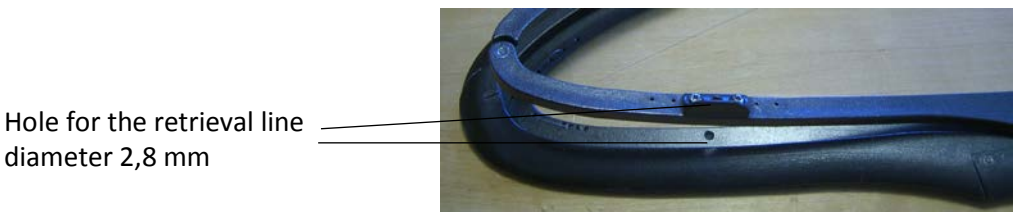
As an example: the tilting part for the retrieval line under the wing

- Select position of tilting part according to Table.
- Then screw the tilting part carefully to the small bow of the bugwiper by the two screws delivered with the set



Drilling the hole for the retrieval line in the bugwiper:

- Collapse the BWS FLEXI-BUGWIPER and drill at the same time at the tilting part a common hole of 2,5 or 2,8mm diameter through both the large and small bow (drive and drag wing).



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Hooking retrieval line to bug wiper with retrieval line on the underside of the wing.

- Make a loop at the end of the retrieval line and thread line through "I" in the small bow as shown down below,
- then through the corresponding hole „II" in the large bow and
- through the adjacent hole „III".
- After that hook loop to pin „IV" and tense the line.

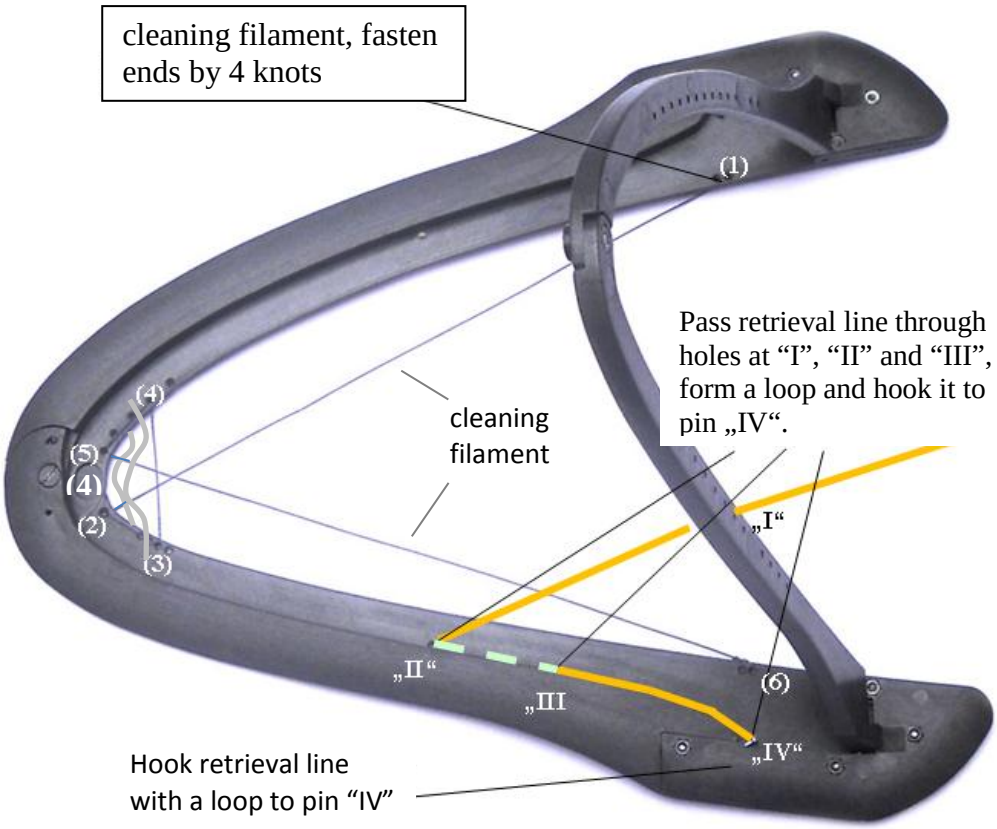
Renewing of the cleaning filament

- Fasten filament with 4 knots at the hole (1), thread it through the holes (2), (3),(4),(5) and (6) and back again through the holes (5), (4),(3),(2) up to (1).
- After having adjusted bug wiper to profile at the fuselage tense filament and fasten it with 4 knots to hole (1).

Important:

Always check before fixing length of cleaning filament, especially at the wing tip (by pressing bugwiper on the wing leading edge) that the bug wiper will always slide on the filaments and NOT on the frame. Otherwise it won't be able to shear off bugs and debris from the wing leading edge.

2) Because of the free moving joints at the front of the bug wiper (which enable automatic adaption to the wing profile during cleaning) make sure that at the fuselage the cleaning filaments are short enough to prevent opening to a thicker profile than necessary. The lower bows of the bugwiper might hang down.



Check that the bugwiper will always slide on the cleaning filaments and not on the frame, especially at the wing tip.

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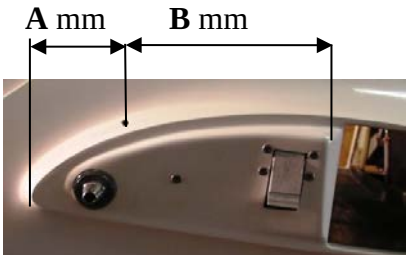
RETRIEVAL LINE ABOVE WING

(opening spring mounted on the upper part of the bugwiper)

List of gliders and recommended position of holes in fuselage and Flexi-Bugwiper for the retrieval line and tilting part

Recommended hole in fuselage	Corresponding hole in Flexi-Bugwiper
Position of the hole in the fuselage for the outlet tube	Mounting of the tilting part and hole in the bug wiper for the retrieval line. See photo: For instance at the 12th small marking hole counted from the front.

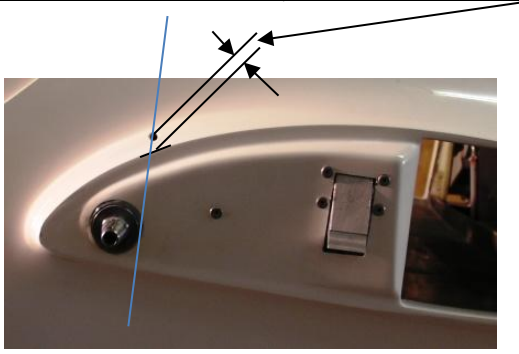


Bohrung im Mückenputzer

Hole in the fuselage			Hole in bugwiper
glider	**A mm**	**B mm**	**Marking holes in upper part of bugwiper**
ASW 19	--	180	12 th upper marking hole counted from the front
ASW 24	ca.60	--	7 th upper marking hole counted from the front
ASW 27	ca.110	--	14 th upper marking hole counted from the front
ASW 28	ca. 60	--	7 th upper marking hole counted from the front
ASG 29	90 (or 35)	--	12 th marking hole counted from the front(or 6th hole)
ASW 20	ca.85	--	12 th upper marking hole counted from the front
ASW 22	ca.85	--	12 th upper marking hole counted from the front
ASH 26 E	ca.65	--	8 th upper marking hole counted from the front
EB 29	ca.85	--	x upper marking hole counted from the front
ASH 25	ca.65?	--	12 th upper marking hole counted from the front
Mi 31	ca.55	--	7 th upper marking hole counted from the
Antares 18m	ca. 65	--	10 th marking hole counted from the front (must be drilled extra, because marking hole is missing)
Arcus	ca.80		12 th upper marking hole counted from the front (yet, retrieval line under the wing recommended, see table on page 3)

Detail for ASG 29: A= ca.90 mm
Detail für Mi 31 A=ca. 28 mm (recommended 90mm)

Exact distance can be found only by putting bugwiper on the wing fairing and marking the hole with the help of a small driller.



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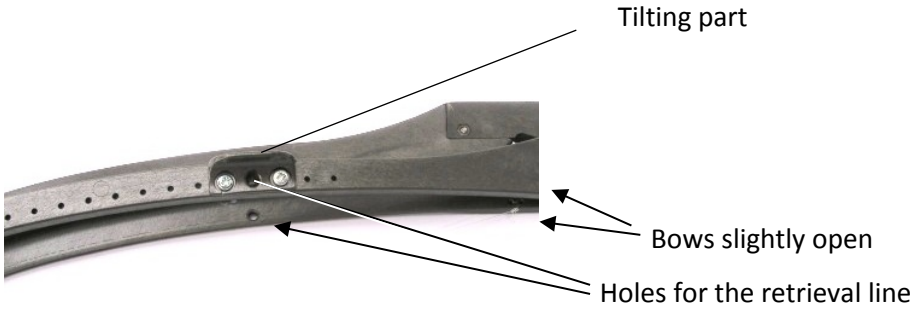
The table shows recommended values. However, make sure that inside the fuselage there are no obstacles (mounted cables, fuel hoses, frames etc.) which might prevent proper access to the hole by the guide line and outlet tube. Therefore, before drilling hole, always check proper position of A and B and corresponding hole in bug wiper ! (remark: for ASG29 hole in fuselage should be just behind the frame in the fuselage).
Exact distance can only be marked by holding and leaning the bug wiper at the right position towards the fuselage and to mark the hole by the use of a thin driller or pencil lead which you stick through the recommended hole in the bug wiper parallel to the wing surface.

Continuous supplementing of the list intended.

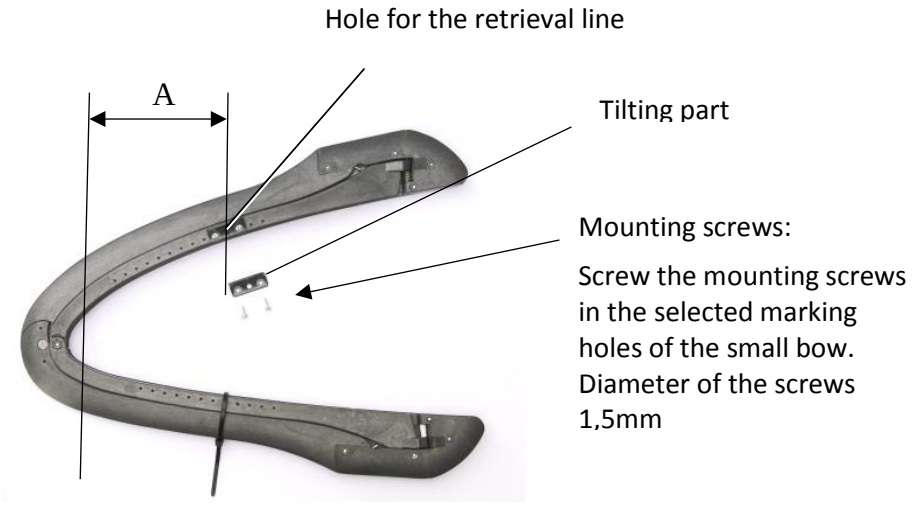
Adjusting the tilting part

(Retrieval Line above the wing)

The tilting part has the effect of tilting the bug wiper towards the fuselage in the parking position.
As an example: the tilting part for the retrieval line above the wing



- Select position of tilting part according to Table.
- Then screw the tilting part carefully to the small bow of the bugwiper by the two screws delivered with the set



Drilling the hole for the retrieval line in the bugwiper:

- Collapse the BWS FLEXI-BUGWIPER and drill at the same time at the tilting part a common hole of 2,5 or 2,8mm diameter through both the large and small bow (drive and drag wing).

Hooking retrieval line to bug wiper with retrieval line on the upper side of the wing.

- Make a loop at the end of the retrieval line and thread line through "I" in the small bow as shown down below,
- then through the corresponding hole „II" in the large bow and
- through the adjacent hole „III".
- After that hook loop to pin „IV" and tense the line.

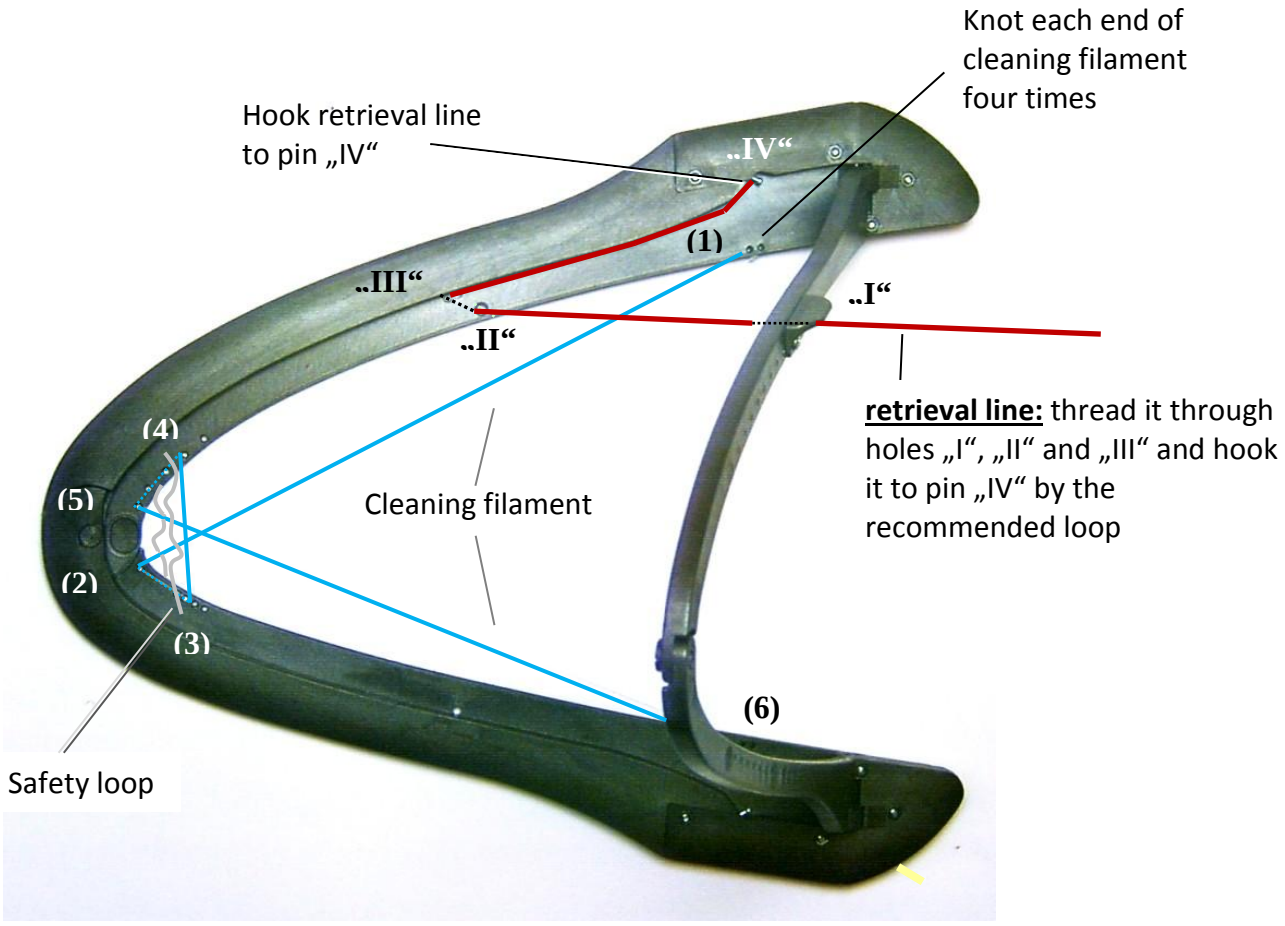
Renewing of the cleaning filament

- Fasten filament with 4 knots at the hole (1), thread it through the holes (2), (3),(4),(5) and (6) and back again through the holes (5), (4),(3),(2) up to (1).
- Adjust bug wiper to profile at the fuselage, tense filament until bugwiper fits nicely to the wing fairing touching the wing on the upper and lower side of the wing and then fasten the cleaning filament by 4 knots to hole (1). Perhaps, for easy adjusting the length of the filament and before making the knots you might use provisionally a linen tape to fix the end of the cleaning filament to the bugwiper.

Important:

Always check before fixing length of cleaning filament, especially at the wing tip (by pressing bugwiper on the wing leading edge) that the bug wiper will always slide on the filaments and NOT on the frame. Otherwise it won't be able to shear off bugs and debris from the wing.

2) Because of the free moving joints at the front of the bug wiper (which enable automatic adaption to the wing profile during cleaning) make sure that in the parking position at the fuselage the cleaning filament is short enough to prevent the hanging down of the lower parts of the bugwiper. Tense the cleaning filament accordingly.



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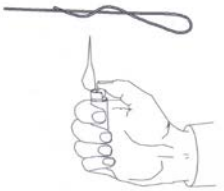
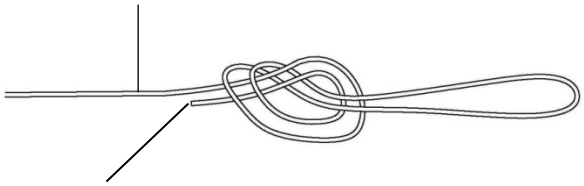
- **Loop for retrieval line made out of plastic coated braided steel, tensile strength app. 15kp (for elder BWS - BASIC only**):



- **Loop for Dyneema retrieval line (**for BWS-ELECTRONIC and BWS-BASIC, electric and manual systems):

Dyneema, tensile strength app. 47 kp

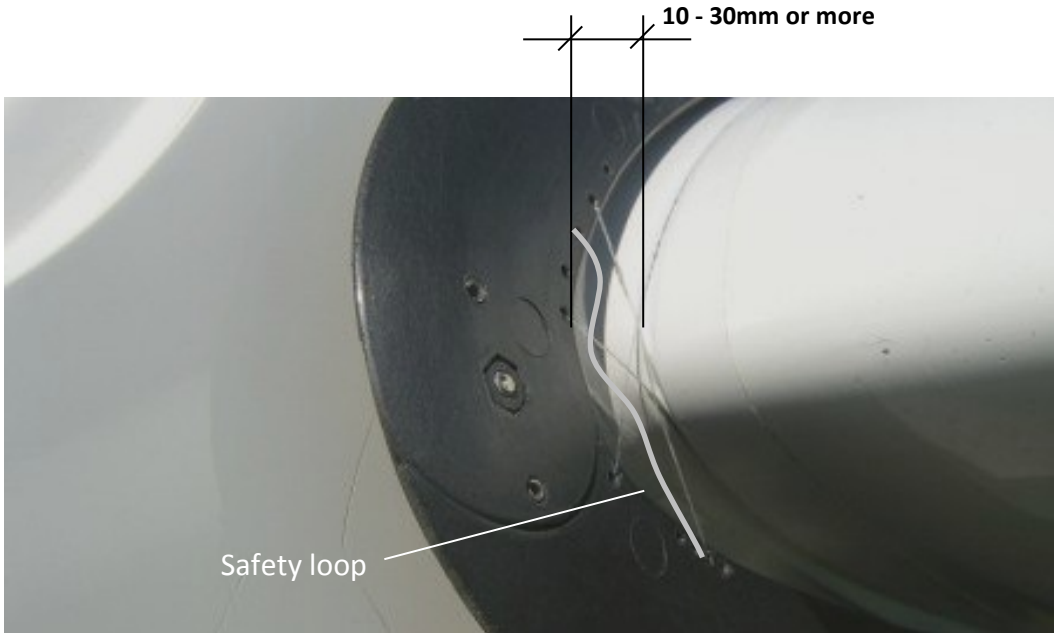


after tightening knot - cut off loose end of line

Attention! A knot weakens the line by about 50%

Check condition of retrieval line before each flight !!

Taping Gap between fuselage and wing



Tape the gap in such a manner that the cleaning filament cannot get stuck there. If necessary, take a thin, but stiff foil of a folder or film as an underlying support. Necessary e.g. for Arcus.

However better than this: mount the bug wiper with enough distance from the wing leading edge (e.g. 20mm – 30mm or more!). **Position of tilting part and hole in bug wiper for retrieval line might then have to be matched to hole in fuselage!!**

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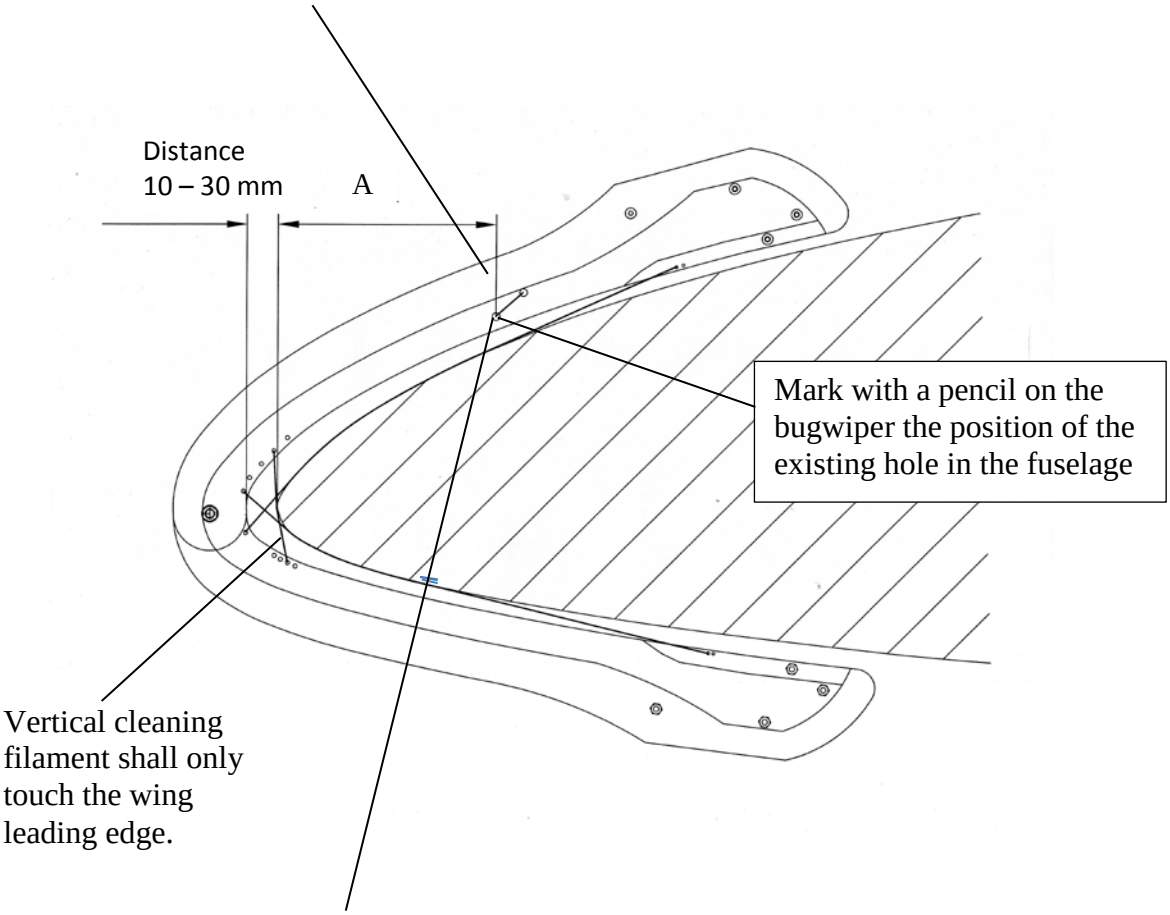
In case other bugwipers had been installed earlier and therefore, the holes for the retrieval lines in the fuselage are already existing:

- Set bugwiper in the collapsed position on the wing at the fuselage in such a manner that the vertical part of the cleaning filament will just touch the wing leading edge. See drawing for a bugwiper with the retrieval line on the upper side of the wing.
- In case the hole for the retrieval line in the fuselage is already existing, copy position of it to the bug wiper by a pencil.



- Then drill the hole for the retrieval line in the collapsed bug wiper at the marked position through both bows (drive and drag wing) by using one of the nearest marking holes on the small bow, and by using a driller of about 2,8mm.

In case of BWS Flexi-BUGWIPERS with the retrieval hole under the wing proceed accordingly.

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Converting a pair of Flexi Bug Wipers used for retrieval lines underneath the wing to Flexi Bug Wipers for retrieval lines above the wing - and vice versa:

The bug wiper opens up by the force of a spring which is positioned either on the lower part of the bug wiper used for retrieval lines underneath the wing or positioned on the upper part of the bugwiper for retrieval lines above the wing.

Converting from retrieval line below the wing to retrieval line above the wing:

If you have got bug wipers which are made for retrieval lines underneath the wing and you want to use them now for retrieval lines above the wing you have got to convert them by removing the springs from the lower parts of the bug wipers and by placing them into the upper parts of the bug wipers.

Proceed in the following manner:

- Attention: Do not dismount the joints **at the front of** the bug wiper. (That means: do NOT unscrew the frontal joint which connect the upper and lower parts of the small bow. Also do NOT unscrew the frontal joint which connect the upper and lower part of the big bow.)
- **At the rear end** of the bug wiper loosen the small Allen (socket) screws of the joints on the upper and lower end of the bug wiper by using an 1,5mm arm hex key with handle (allen key or allen wrench). Do NOT remove totally the small screws and the plate which the screws are fixing at the rear joints.
- Take now a pin of 1,5 mm (you might be able to use the hex key with handle) and push out with it the pins (axle) of the rear joints until you are able to displace them by a plier so much that you are able to remove the small bow from the rear joint.
- Remove now from the lower joints the springs and from the upper joints the spacer sleeves.
- Now stick the spring of the *right* bug wiper into the upper end of the big bow (drive wing) of the *left* bug wiper and the spring of the *left* bug wiper into the upper end of the big bow of the *right* bug wiper.
- In case you have removed the pins (axles): Stick now the pins (axle) of the joints partly into the corresponding holes of the joints.
- Apply some loctite screwlock or thread lock on the pins. (otherwise the pins might come out again after a while and might scratch the wing)
- Place now the end of the small bow in the proper position of the upper joint where the spring is mounted and then by pressing it against the force of the spring down towards the big bow push the pin through the small bow and through the spring to its end position.
- Place now the space sleeve and the other end of the small bow into the lower rear joint of the bug wiper and push the corresponding pin (axle) through the small bow and the space sleeve into its correct position.
- Again, don't forget to apply some loctite screwlock or thread lock fluid for sure to fix the pins (axles).
- After that fix the small Allen (socket) screws again by the hex key.

Converting from retrieval line above the wing to retrieval line under the wing:

If you have got BWS Flexi-Bugwipers with springs on the upper part of the bugwiper (for retrieval lines above the wing) and you want to convert them to bugwipers with the springs placed on the lower part of the bugwiper (for retrieval lines under the wing), then proceed accordingly (analogously) to the above given procedure.

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