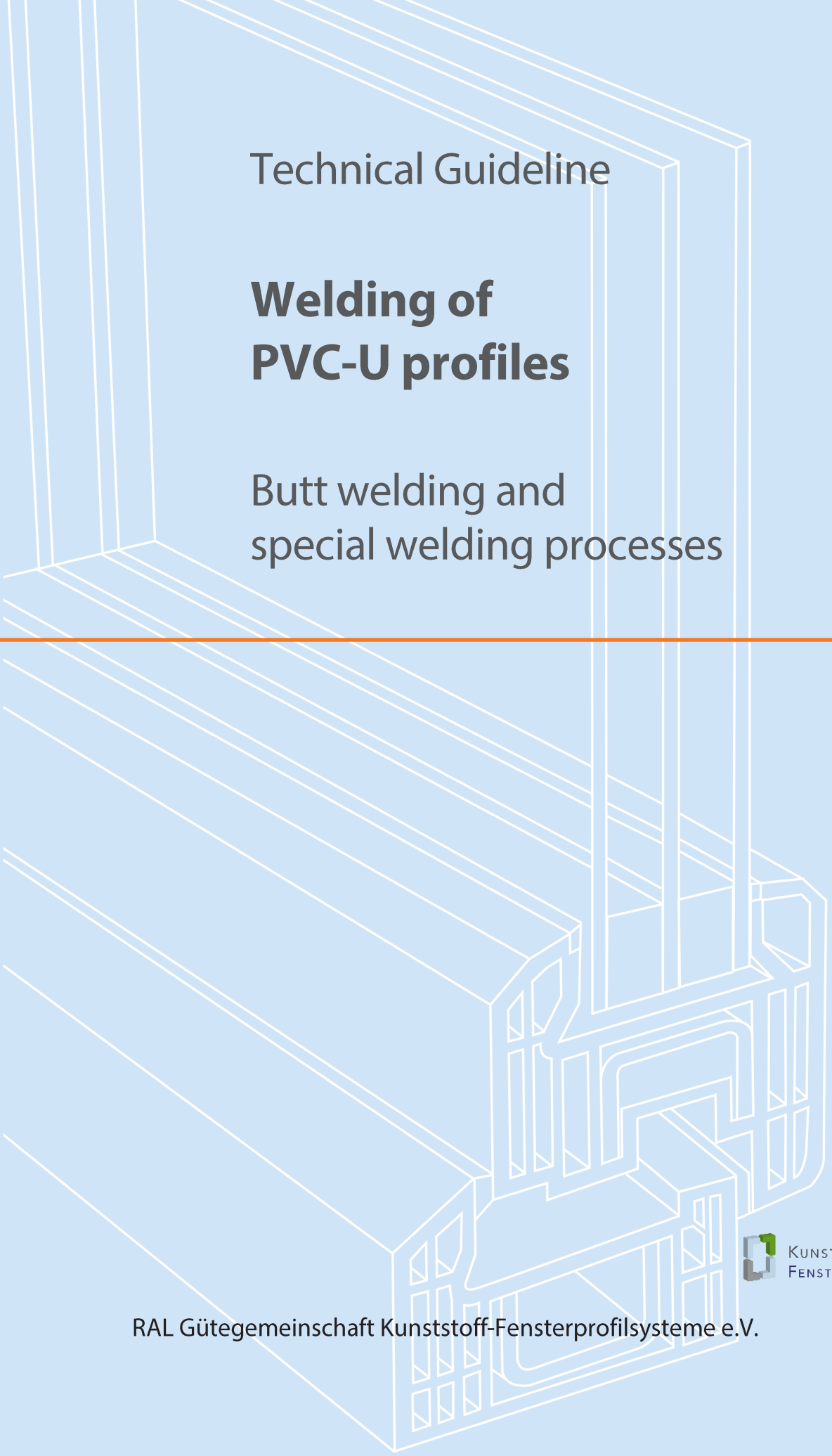
Technical Guideline

Welding of PVC-U profiles

Butt welding and special welding processes



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Welding PVC-U profiles

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A technical guide for window manufacturers, profile system manufacturers, and machine and component suppliers. The guide was created by the Quality Association for Plastic Window Profile Systems.

Bonn, April 2026

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1 Why this guideline

The welding of plastic profiles has been successfully established on the market for decades – and is crucial for the long-term usability of a window. However, both plastic window profiles and processing techniques have become more complex in the meantime. Our guide is therefore intended to serve as a reference: it clarifies terminology and thus simplifies cooperation between all parties involved in the process. It is aimed at window manufacturers, profile system suppliers, and machine and component suppliers (e.g., for film, reinforcement, and seals).

In our guide, we summarize the current "state of the art" from the above-mentioned industries. It considers all relevant standards and rules. In addition, the system descriptions for profile systems and the operating instructions of the machine manufacturers apply.

The guide starts with profile storage and provides tips on everything from correct cutting and welding to the finished corner. You will learn useful information about miter welding.

To ensure welding quality, we point out the necessity of regular factory production control (FPC) at important points in the welding process.

Our recommendations apply specifically to the profile categories described in RAL-GZ 716 (Technical Appendix):

- PVC-U profiles
- PVC-U fiber-reinforced profiles
- PVC-U profiles coextruded with PMMA
- Profiles with surface finishes (film-laminated and coated)

and which meet the specifications for tolerances and corner strengths specified therein.

2 Requirements for welded and finished profile connections

Correctly executed corner welding is crucial for the long-term serviceability of a window. In this respect, the welding process, including its preparatory and follow-up work, plays a central and quality-determining role.

Throughout the entire service life of the window, the welded and finished frame connection is exposed to a wide variety of forces. These include:

- Traffic loads (glass weight, continuous operation, wind load)
- Fastening and mounting fittings
- Additional loads due to the absorption of forces, e.g., safety rails and burglary resistance
- Length changes in the profiles due to the influence of temperature

3 Storage and in-plant transport

In general, before welding, attention must be paid to temperature control and cleanliness, avoiding dirt and moisture, direct sunlight, and heat sources.
After welding, it is particularly important to protect the welded corner (to prevent corner breakage). Before sawing and welding, it is recommended to store the profiles indoors for 24 hours at a minimum temperature of 17°C (see also 5.1 Operators/window manufacturers). For further information, please refer to the system descriptions provided by the profile system suppliers.

4 Cutting profiles correctly

Precise cutting is a basic requirement for ensuring that the strength requirements of the corner connections can be met. In addition, cutting has a decisive influence on the flawless appearance of the profile.

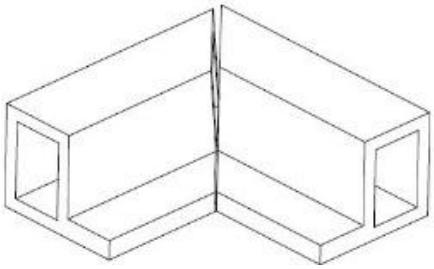

Figure 1 : incorrect example

Therefore, when cutting the profiles to size, please note the following:

- Dimensional and angular accuracy
- Smooth, clean, grease-free, silicone-free, and chip-free cut surfaces, including in the sealing area
- Splinter-free inner webs of the water-bearing chambers

The quality of the cut depends on various parameters: These include profile geometries and their tolerances as well as machine parameters, saw blades, fixtures and profile position. Please note: A double cut—both miter cuts in one operation—can lead to greater tolerance deviations. Industry-standard cutting machines are suitable for cutting profiles. It is important that the equipment is regularly maintained and cleaned to be able to cut the profiles precisely. Requirements for the tools to be used and machine settings can be obtained from the manufacturer of the welding machines. The use of supports may be necessary for sawing some profiles. You can ensure cutting quality through factory production controls (FPC). To check the cut, we recommend suitable tools and a procedure as shown below (see Fig. 2, 3 and 4).

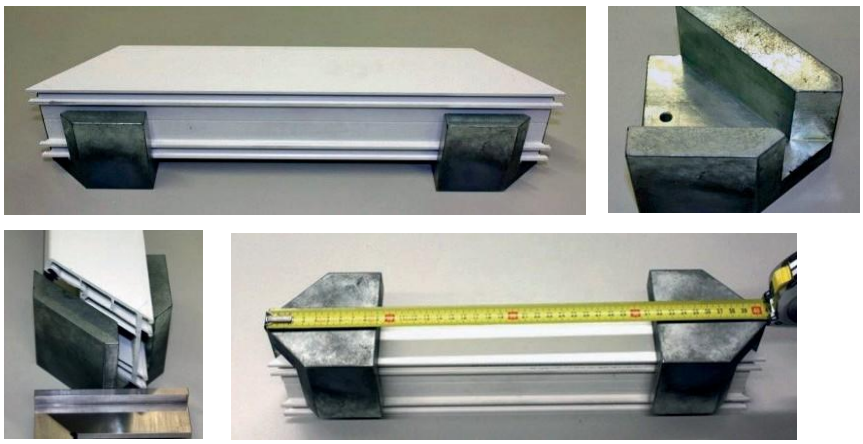

Figure 2 : Manual measurement

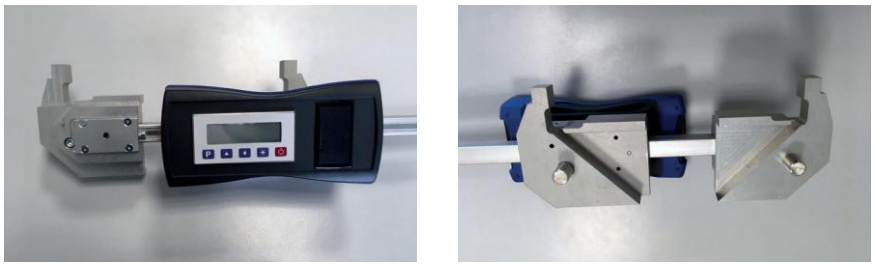

Figure 3 : Electronic measuring device

Figure 4 : Three examples of different measurement positions: external and internal dimensions, angle deviation, and cut surface

4.1 Length allowance / Melting loss

When cutting the profile rods, allow for an additional length to the finished dimension to compensate for the joining and alignment gap. As a rule, the additional length corresponds to twice the melting-loss and is required for subsequent welding.
Figure 5 illustrates the difference between the cut length and the finished dimension.

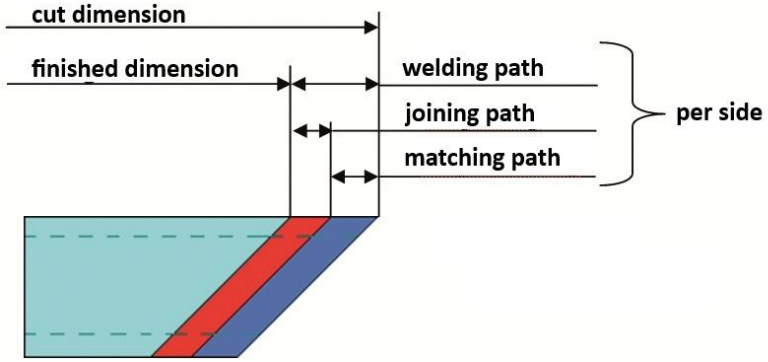

Figure 5 : Length allowance per side

The melting-loss depends on the process and machine and affects both the optical properties and the strength of the welded corner. This measurement is usually between 2.5 and 3.5 mm. The lower the melting-loss, the more important it is to adhere to all process parameters from cutting to finishing.

4.2 Weldable seals

When processing weldable seals, there are several specifications to be observed in order to prevent errors such as those shown in Figure 6 .

Figure 6 : Errors when processing seals (from left: seal frayed or too short)

Please note:

- Cut the seal precisely and cleanly (to the correct length).
- No detachment of the seal from the profile.
- An intact seal (slight fraying that does not impair the welding process or function is permissible).

To achieve a clean seal cut, use the saw blade suitable for the profile and seal type and observe the cutting direction. The use of profile supports or seal hold-downs may also be necessary. You can discuss the necessity of this with your machine manufacturer or system provider.

Depending on the design and properties of the seal, additional back milling of the seal before welding can improve the flexibility of the seal corner. It is important that the milling process does not negatively affect the subsequent function of the seal and thus ensures the agreed performance characteristics (e.g., air tightness, resistance to heavy rain) of the window.

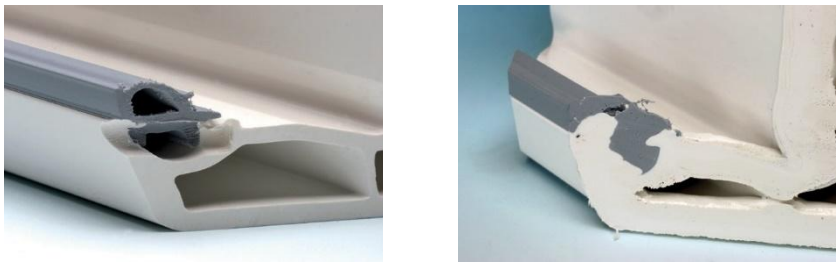

Figure 7: Example of undercutting (left) | Material accumulation without undercutting (right)

5 Welding

During welding, the cut profiles are permanently and firmly joined together. The welded element must meet the three requirements mentioned above:

- the corner strength specified by the system provider
- the tightness of the water-bearing chambers
- the finished dimensions of the window

The following diagram (Figure 8) shows examples of the individual steps in the welding process. The actual temperatures, times, and pressures depend on the equipment used and are specified by the machine manufacturer in consultation with the system provider.

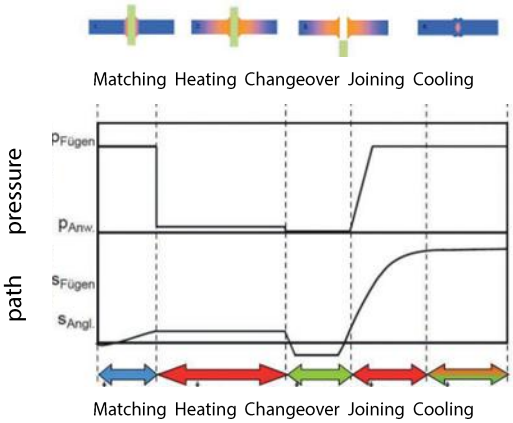

Figure 8 : The welding process consists of several steps

5.1 Influencing factors

There are three key influencing factors in welding: the machine, the operator/window manufacturer, and the profile.

Machine

Profiles can be welded on all standard butt welding machines. The following machine parameters are crucial for the quality of the welded joint:

- Temperature of the heating element at the working surface
- Clamping pressure
- Matching time and pressure
- Heating time
- Joining time and pressure
- Cooling time

Please refer to the machine manufacturer's instructions for the settings parameters. Please observe the specified target values and tolerances for these parameters. If even one value changes, this will affect all the others.

Operator/window manufacturer

In addition to the machine, you as the user also have a major influence on the welding result. Therefore:

- Avoid draughts around the machine to prevent uncontrolled cooling of the heating mirrors.
- Ensure a room temperature of ≥ 17 °C.
- Bring the profiles to the correct temperature before processing if they come from outdoor storage or delivery (24 hours/17 °C as a rough guide) to prevent condensation and excessive cooling of the welding mirrors.
- Weld the cut profiles as soon as possible (recommendation: within two working days) to keep the cut surface clean and dry.
- Maintain and clean your machines and equipment regularly. This will prevent any negative impact on the welding process.

It is generally not necessary to remove the protective film before welding, provided that the film does not have a negative impact on the welding result. Also ensure that there is sufficient space between the inserted steel reinforcement and the welding surface so that it does not become dirty or damaged when inserted. Please note that steel can be contaminated by emulsions (water-oil mixture) or other lubricating fluids during sawing. If you plan to carry out additional processing on the loose bar (e.g., pre-assembly of fittings), please clarify this with the machine manufacturer in advance, as this may lead to adjustments in the further process

when inserting the profiles and transporting the welded elements.

Profile

Depending on the profile and system used, it is important to use suitable welding fixtures (mating contour of the profile being sealed). You can find out more about this topic in section 5.5. Also consider the possible influences of color foils or other colored surfaces.

Note: Use RAL quality-assured profiles. This ensures that the weldability of the material and the dimensional accuracy of the profiles are guaranteed.

5.2 Types of welding

In miter welding, a basic distinction is drawn between diagonal and parallel contact pressure processes. Both methods are established on the market and meet the requirements for corner strength, appearance, and functionality of the finished window.

Diagonal contact welding

In this process, one rod is pressed diagonally against the other rod with friction. When looking at a corner, only one rod is moved. The other rod remains fixed in position (Figure 9).

This causes material to be displaced at the joint, so that it or the weld is not distributed evenly across the rods, as shown by the asymmetrical weld beads in view shows Figure 10 (right-hand side of the sketch).

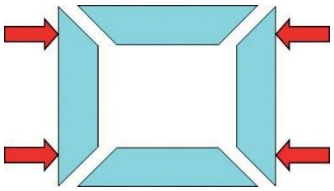

Figure 9 : The corner view shows that only one bar is moved

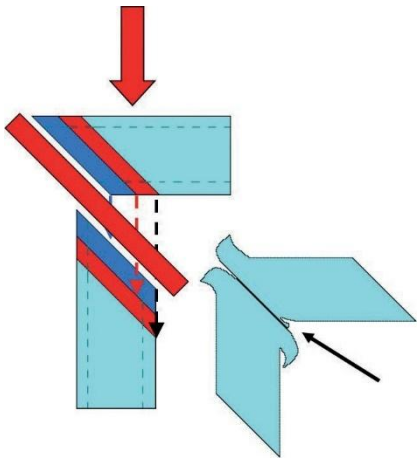

Figure 10 : The direction of movement is diagonal. i.e., at a 45° angle to the joining surfaces (left part of the sketch before joining, right after joining)

Parallel contact welding

In parallel contact welding, both bars of a corner are pressed together (as far as possible) simultaneously and the welding surfaces are pressed together parallel to each other (Figure 11, Figure 12). This results in the formation of a symmetrical weld bead.

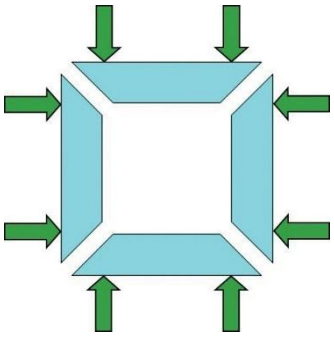

Figure 11:
The parallel pressure method

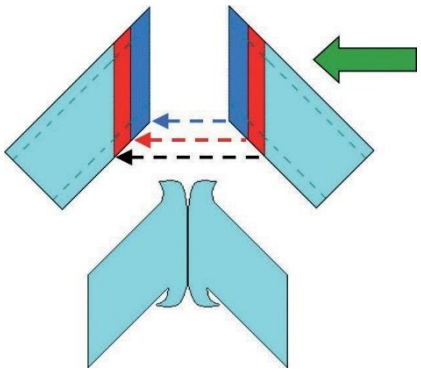

Figure 12: Parallel direction of movement,
i.e. at a 90° angle to the joining surfaces

5.3 Welding machine

You can achieve optimum welding with a machine that meets the following criteria:

- The clamping, matching, and joining pressure can be adjusted reproducibly.
- The path control system ensures that the specified dimensions of the window are achieved.
- The exhaust air from the pneumatic system is not directed directly at the welding mirrors (avoiding cooling).
- The clamping devices fix the profiles in place and transfer the force required for welding without damaging or deforming the profiles.
- The support surfaces for the profiles are stable and adjustable. Offset in the weld seam must be avoided.
- The welding mirrors must be easily accessible so that the film can be easily cleaned or replaced.
- The welding mirrors have an even temperature distribution over the entire surface, including the film.
- The gap width and the temperature of the weld bead limitation are adjustable.

5.4 Welding mirror

The welding mirror transfers the heat directly to the profile. To ensure that the process works properly, please observe the following specifications:

- Keep the welding mirror clean.
- Only use undamaged and suitable PTFE foil.
- Regularly measure the temperature directly on the mirror in the welding area with a contact sensor (see Figure 13). Infrared thermometers are not permitted because an air cushion forms between the PTFE film and the mirror, which distorts the temperature displayed.
- Clean the welding mirror with a linen cloth or paper towel (not with synthetic fibers).
- Avoid PTFE spray ("Teflon spray") because it can get into the weld seam and reduce corner strength.
- When replacing bonded PTFE films, make sure that no adhesive residue remains on the heating element.

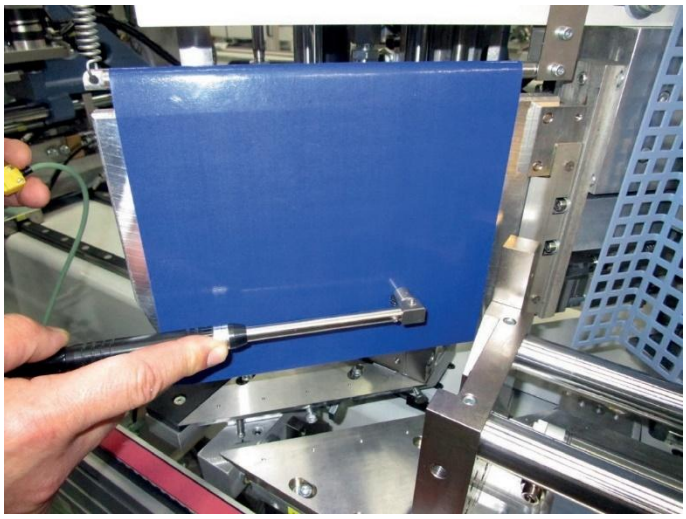

Figure 13: Temperature measurement on the welding mirror using a contact sensor

5.5 Welding fixtures

Aluminum blocks with the counter-contour of the profile to be welded are commonly used as welding fixtures. Such supports (shown in red in Fig. 14) are used to fix the profile in position and provide support. Their use depends on the profile and machine and must be checked for each individual case. On the one hand, these supports prevent the profile from deforming due to the clamping pressure during welding. On the other hand, the support can limit the weld bead.

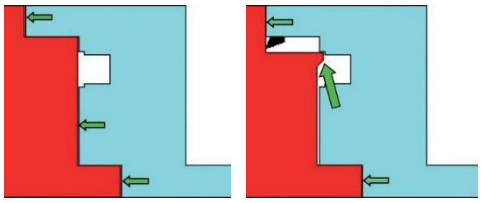

Figure 14: System without (left) and with seal (right) and support in the fitting groove

As usual, adjust the contact surfaces and dimensions of the fixtures to the respective profile geometry, its position in the machine, and any special combinations, considering the permissible tolerances.

Shapers and/or clamps can be used to improve the welding quality of the seal. In this case, it is essential to ensure that neither fixtures nor guide stops deform the seals in an impermissible manner.

5.6 Weld bead limitation

Weld bead limitations are used to ensure that the molten excess material can flow off in a controlled manner during welding. These are usually between 0.2 mm and 2 mm.

As a rule, the smaller the bead, the more important it is that all process parameters are adhered to. This includes everything from cutting to finishing, as all of these steps influence corner strength.

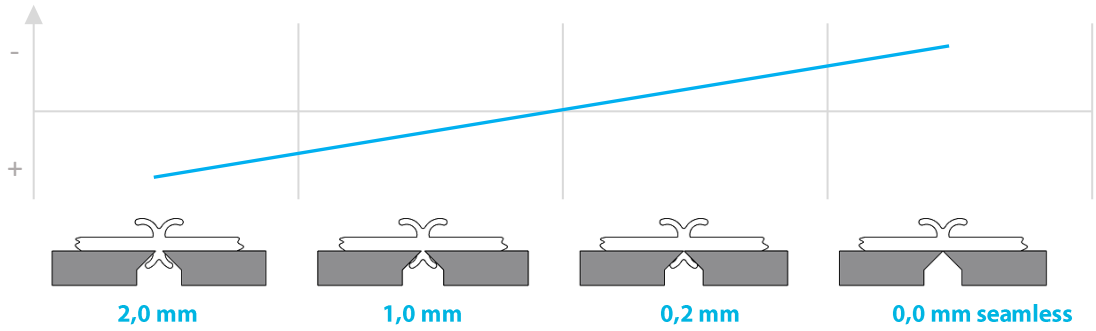

Figure 15: Variants of weld bead limits and their effect on the corner strength

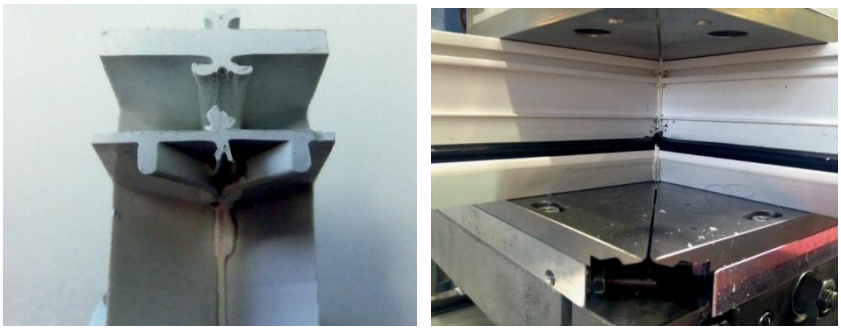

Figure 16: Weld bead limitation

5.7 Process parameters

The recommended welding temperatures are usually between 235 °C and 255 °C. However, temperatures of up to 285 °C are also possible for special processes, such as high-temperature welding.

To achieve optimum welding results and the specified corner strength, adjust the pressure (force) and time values to the following factors:

- Settings recommended by your machine supplier
- Specifications, recommended by the window profile supplier
- Processed profile
- Selected temperatures
- Weld bead limitation
- Length of welding allowance or melting-loss

5.8 Cooling

After welding, the profile must be allowed to cool freely – between one and fifteen minutes, depending on the profile. Accelerating cooling, for example with compressed air, is not permitted. Also, make sure not to place profiles on cold floors to prevent them from cooling too quickly (risk of stress).
Also important in this context: Avoid interrupting the process chain between welding and finishing, duly allowing for the necessary cooling time.

6 Finishing

Once the welded profile has cooled down, it is finished. This means removing weld beads in the visible and functional areas of the profile.

Make sure that no holes are created by milling too deeply; functionally relevant (e.g., water-carrying) inner chambers must remain closed. Take care that the seal remains intact and functional.

You can decide how to shape the groove (width/depth/angle of the flank) based on visual considerations.

Options include a U- or V-groove or smooth (flush) finishing.

It is important that the finished corner achieves its target corner strength, that the seal lies completely flush on the surface of the finished profile corner, and that no water can penetrate through the groove.

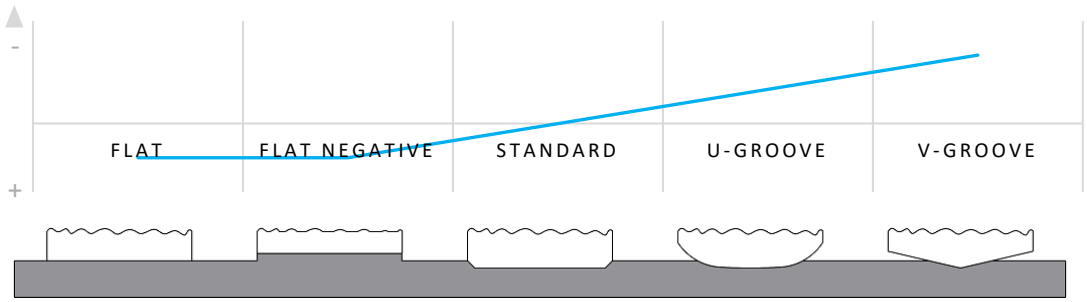

Figure 17: Finishing variants and their effect on the corner strength

6.1 Requirements for finishing

- Only remove the weld beads once the profile has cooled sufficiently (especially for profiles with decorative films).
- Avoid notches, especially on inside corners.
- Work very carefully, especially in functional areas (installation of fittings in the Euro groove and flatness of sealing surfaces, etc.), see "Plaster milling" and "Mitre groove" at
-
- Figure 18 .

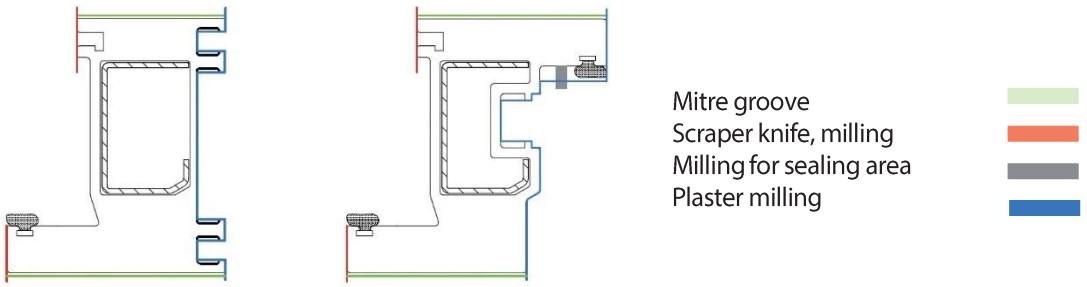

Figure 18: Finishing in the functional areas

6.2 Special features of profiles with decorative surfaces

With decorative surfaces, you should take particular care to ensure that the partially sensitive colored surfaces are not damaged during finishing.

When finishing laminated profiles, the machine parameters may need to be adjusted due to the adhesive and thickness of the film.

To match the color of the finished corners to the decorative surface, use a suitable touch-up pen. For colored base bodies, this ensures color fastness and covers any white breakage that may occur.

Figure 19: Grooved and color-matched corner

7 "Seamless" welding process

Welding processes that partially or completely eliminate the need for finishing are referred to here as "seamless" welding processes. Window manufacturers who opt for machines using this technology must consider that they are purchasing highly complex processing equipment that places different and higher demands on the user:

- Machines using this technology require qualified personnel for operation and maintenance.
- Intensive and regular training for all personnel involved is necessary.
- During operation, increased cleaning, service, and maintenance costs are to be expected (compared to conventional systems).
- An in-house maintenance department should be available.
- Please note that there is increased effort involved in switching to new profiles or modified ones, e.g., surfaces, seals, protective films.
- Pay particular attention to profile and cutting tolerances (see also section 4); the accuracy requirements for "seamless" welding are higher than for conventional welding.

Figure 20: "Seamless" welded corners (left), grooved corners (right)

8 Practical tips for quality control

In this section, we provide you with practical tips for quality control throughout the entire manufacturing process, with a particular focus on the welding process. We recommend that window manufacturers incorporate these tips into their in-house process control procedures, if they have not already done so.

To be noted for the German market: In addition to in-house quality specifications, the specifications from the processing guidelines of your system suppliers, other component suppliers (e.g. hardware and glass), the quality associations for multiple-pane insulating glass, locks & hardware as well as windows, facades and doors and the machine suppliers must also be considered.

Material intake no. **Result** (mark with x)

No.	Property requiring testing	Frame material	Recommendation according to	Test method	OK	Not OK
1 (R)	Melting time	PVC-U	System description	Time measurement	☐	☐
2 (R)	Melting pressure	PVC-U	System description	Pressure gauge	☐	☐
3 (R)	Joining time	PVC-U	System description	Time measurement	☐	☐
4 (R)	Joining pressure	PVC-U	System description	Pressure gauge	☐	☐
5 (R)	Welding sprue	PVC-U	Even and limited, without any discolouration	Visual inspection	☐	☐
6 (R)	Frame outside dimensions	All	Order documents ± 1 mm	Measurement	☐	☐
7 (R)	Finishing work	PVC-U	Uniform groove[1]	Visual inspection	☐	☐
			No feathering	Visual inspection	☐	☐
			No notches	Visual inspection	☐	☐
8 (R)	Adhesive application	Metal	System description, on the joining surfaces	Visual inspection	☐	☐
9 (R)	Misalignment of profiles	All	System description	Measurement	☐	☐
10 (R)	Tightness of butt joint	Metal	Tight	Visual inspection	☐	☐

Figure 21: Recommendation by the Quality Association for Windows, Facades and Front Doors (Gütegemeinschaft Fenster, Fassaden und Haustüren e.V.) and the Quality Association for Plastic Window Profile Systems (Gütegemeinschaft Kunststoff-Fensterprofilsysteme e.V.).

Quality control must cover all areas of production. We recommend setting up the following five control "stations" for the production process:

1. Storage and transport
- Integrity of the profile bars
- Cleanliness and dryness of the profiles

2. Cutting
- Checking the cutting dimensions, length, and angles
- Checking the cut surface and seals
- Check on sufficient distance between the reinforcement and the cut surface

3. Welding
- PTFE-film is clean and intact
- Temperature and dimension settings tailored to the respective profile, as well as correct, undamaged, and correctly adjusted fixtures
- Temperature at the welding mirror
- Flatness of the support on the welding machine
- Parameter settings on the welding machine
- Dimension control on the finished frame
- Uniform weld bead formation (symmetrical and even across the miter)
- Color of the weld bead
- Flexibility and integrity of the seal
- Integrity of the decorative film
- No residues of protective film in the weld seam
- Tightness of the water-carrying chambers
- Cooling time

4. Finishing
- Correct setting of the plastering machines (visible surfaces, functional areas, seals, dimensional allowance for foiled profiles, etc.)
- Check of internal corners (avoidance of notch effects; cleanliness of the glazing bead groove)

5. Finished parts inspection
- Check corner strength (random sampling), see 8.1

Inspection intervals

The frequency of inspections must be determined individually by you as the window manufacturer. If you are subject to a quality control system, the relevant specifications must be observed.

We generally recommend carrying out an inspection when starting up the systems and when changing parameters.

8.1 Checking corner strength

The required corner strength depends on the geometry of the profile. The corner strength of unfinished corners is determined by the system provider in accordance with EN 514 and EN 12608-1.

To check the quality of the entire welding process at the window manufacturer, a finished corner can be tested. The applicable target value for corner strength (F_{soll}) is specified by the system provider together with the cutting dimensions of the test samples (L_i or L_a).

Commercially available tensile/compression testing machines are suitable for checking corner strength. The following schematic diagram illustrates the principle of the compression bending test:

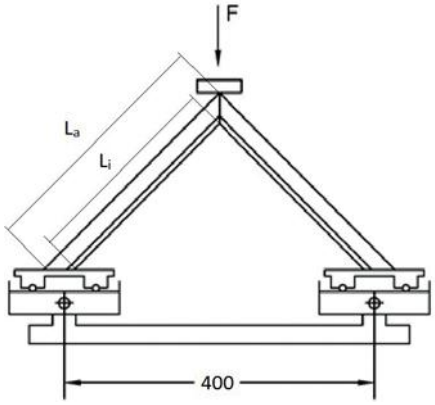

Figure 22: The compression bending test for determining corner strength

In addition to the above-mentioned test according to EN 514, a simple visual inspection of the weld quality can be carried out during the ongoing process, as shown in the following table.

Image	Visual inspection	Possible source of error
	Clean, evenly formed weld bead, no displacement, visually clean weld pattern	OK
	Uneven, slightly displaced weld bead	Angle adjustment of machine, machine parameters (pressures, forces, etc.), allowances and contact surface, cutting, profile tolerances
	Yellow discoloration within the weld bead	Times too long, temperature at heating element too high
	Foreign particles within the weld bead	Contamination in the cut surface

Figure 23: Visual inspection of the weld

8.2 How to avoid errors during welding

Errors during welding and during preparatory and follow-up work can impair the quality of the corner strength. The following table contains a summary of important information for avoiding errors.

Error description	Correction
The temperature on the display does not match the temperature at the welding mirror. The welding mirror cools down on one side (e.g., due to drafts).	Check the temperature with a temperature measuring device. Non-contact measuring devices are not suitable for temperature measurement. Check the location of the welding machine. (see 5.4 Welding mirror)
The cooling time was set too short (especially for foil-laminated profiles).	Check the parameters/times. (see 5 Welding)
The surfaces to be welded are dirty or damp.	Clean the cut surfaces before welding; cut profiles must be welded quickly. (see 4 Cutting profiles correctly)
The welding foil is dirty/damaged.	Clean the welding foil or replace damaged welding foil. (see 5.4 Welding mirror)
The surfaces to be welded are not parallel to the profile flange due to incorrect clamping or poor cutting.	Ensure that the profiles are parallel (45°) to the flange. (see 4 Cutting profiles correctly , 5.3 Welding machine and 5.5 Welding)
Deformation of the profile during clamping.	Correct the clamping pressure (see 5.1 Influencing factors , 5.3 Welding machine and 5.5 Welding)
The weld at the water-bearing levels is leaking.	Check the entire production batch; re-weld and ensure the correct parameters are used. See 4 Cutting profiles correctly)
Chatter marks when grooving (blunt grooving knife)	Avoid excessively long cooling times (see 5.8 Cooling) Insert a new/sharp groove knife. (see 6 Finishing)

9 Special welding process

The following processes correspond to a separate manufacturing process, to which chapters 1 to 7 of this guide apply only to a limited extent.

9.1 General information

Special welding is the responsibility of the window manufacturer and requires higher standards of accuracy and quality control. Not all profiles are suitable for special welding. The specifications provided by the system supplier must be followed.

9.2 Wood-optics welding

In addition to the conventional 45° welding of plastic windows described in the previous chapters, it is possible to process and weld the plastic profiles in such a way that the corner formation visually resembles that of a wood window ("HFL").

In this case, the entire processing process is technically more complex and more sensitive in terms of process technology.

Figure 24: "Wood optics"

Special features of single-sided/double "HFL":

- Special dimensioning of the heating element
- Use of different heating elements for different profile heights
- Possible thermal deformation due to solar radiation on the non-welded profile walls must be considered

9.3 T-connection / butt welding

- Frame profile and post profile are butt welded together
- The mullion profile must be prepared and milled accordingly
- A profile-specific butt welding element is required

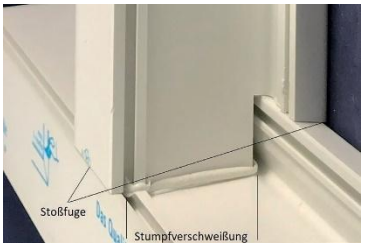

Figure 25: Butt-welded mullion, rebate seal (AD)

Figure 25 b: Butt-welded mullion center seal (MD)

9.4 T-connection / V-welding / clinch cut

- The frame profile and mullion profile are butt welded together
- The frame profile must be notched (clinch) and the mullion profile prepared accordingly (pointed)

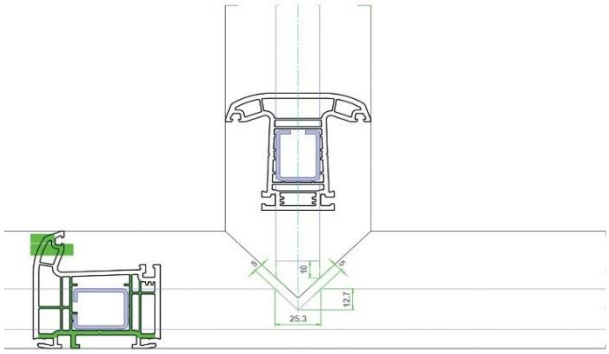

Figure 26: "V-weld"

9.5 T-connection / trapezoidal weld

- The frame profile and post profile are welded together using a trapezoidal weld
- The frame profile must be machined for this, depending on the post geometry
- A profile-specific trapezoidal heating element is required.

9.6 Parameters influenced by special welding processes

Milling and punching

Mullion milling (for butt welding) and double miter cuts (for V-welding) are particularly sensitive in terms of contour accuracy and dimensional compliance.

With center seal systems, the area of the center seal must be punched or milled. Specific milling contours apply to each profile system at HFL (wood optics).

Corner strength

The window manufacturer is responsible for planning, implementation, execution, and quality assurance. They coordinate with the machine manufacturer and system provider.

Connections produced using special welding processes may have different strengths than those produced using conventional 45° welding. This circumstance must be considered in the sash-size diagrams.

Quality assurance must be used to check and ensure compliance with the specified strength values (see Chapter 7 Quality Control).

Fitting fastening

The modified welded connection requires an updated TBDK verification. This may affect the size diagrams and sash weights. Please consult your hardware supplier.

Tightness of the welded joint

When using special welding processes, the window manufacturer must ensure that the promised performance characteristics (e.g., tightness against heavy rain) are maintained.

With HFL, the outer visible surface – and with double HFL also the inner visible surface – is not welded, but has a gap that can lead to leaks.

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10 Further information / Applicable documents

Further information on the notes, information, and specifications mentioned in this guide can be found in the following documents:

- System descriptions and processing guidelines from plastic window profile system suppliers
- RAL-GZ 716 Quality and testing specifications for plastic window profile systems
- RAL-GZ 520 Quality and testing specifications for multi-pane insulating glass
- RAL-GZ 607 Quality and testing specifications for locks and fittings
- RAL-GZ 695 Quality and testing specifications for the manufacture and installation of windows, facades, and front doors
- Protocol template "Workplace-related self-monitoring: 3.3.6 Sash and frame installation" from the Quality Association for Windows, Facades, and Front Doors
- DIN EN 514
- Operating instructions from machine suppliers

11 What influences corner strength?

The most important information at a glance – checklist for cutting out

Please note the following	OK	Not OK
In the hall / when preparing the weld • Hall temperature at least 17 °C • Cleanliness (no heavy dust formation, e.g., from woodworking) • No drafts near the machine • Do not contaminate cut surfaces (when inserting steel) • Observe dimensions during online operation • Perform factory production control at relevant work steps	☐	☐
On the profiles • Storage of profiles (do not move them directly from cold storage to the machine; store on a flat surface; ensure cleanliness) • Pay attention to profile tolerances • Cleanliness of the profiles, the inner chambers, the cut surfaces • Check the correct cutting angles (45° / 90°)	☐	☐
On the machine • Regular maintenance of the machines • Adjustment of temperatures / pressures / times • Weld bead limitation (do not select too narrow) • Undamaged PTFE film (observe minimum film thickness / PTFE content) • Cleanliness of the heating element • Smooth movement of moving parts	☐	☐
Before welding • Cutting of profiles (dimensions, angles, splinter-free inner webs, water-bearing chambers) • Setting miter angle 45° and corner angle 90° • Clean cut surface (no smearing of the seal or protective film) • Cleanliness (blowing out the profiles, oil-free compressed air)	☐	☐

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RAL Gütegemeinschaft Kunststoff-Fensterprofilsysteme e.V.
Am Hofgarten 1–2 | 53113 Bonn
Tel.: +49 (0)228 4798 00-10
info@gkfp.de
gkfp.de

KUNSTSTOFF FENSTERPROFILSYSTEME | RAL Simply Excellent