

General Processing Advice for Forster Profile Systems

Cutting – Welding – Grinding



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Foreword

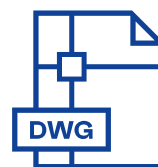
This booklet is intended to support the processing of Forster Profile Systems. The processing of stainless steel requires specific handling. To achieve an efficient and high quality production, please consider the following steps with simplified text and image.



Processing Information

CD-ROMs with all the latest documentation on Forster systems in PDF format are available for designers and manufacturers.

→ Website
→ YouTube



CAD Drawings

The latest version of the CD-ROM contains the individual system components as well as entire system drawings in DWG format.

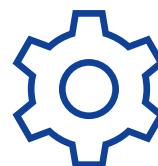
→ Website



forsterpro Construction Tool

At interesting conditions, we can offer a calculation program that has proven its worth in practical applications.

→ Contact



Service

For more information on our profile systems and about us, visit our website at forstersystems.com or contact one of our consultants directly in your vicinity.

→ Website



U-Value Calculator

The easy to understand program calculates the U-values (heat transfer coefficient) of complete components, such as doors, windows and façades, to EN ISO 10077-1:11.2000 using a database as a source.

↓ Download

Please note:

- This booklet does not replace Forster fabrication binders.
- It shows only a fraction of Forster fittings and profile systems.
- Full details are found in the fabrication binders.
- Forster reserves the right to make technical alterations.

Metal Company

General

Ambition

The goal of this chapter „Metal Company“ is to provide a basic set-up for a production plant for Forster customers. In the following set-up an extension with extensive series production of elements incl. cutting & milling machinery (↓ Automation Brochure) and powder coating plant is not considered in this document. It is to show how the initial processing of Forster systems is easier to handle. A basic stock of machinery, tools and equipment is listed.

Factual Scope

Forster wants to give it's customers a possible example of the premises, a minimum level of mobility, of machinery, hand tools and work aids. The layout of equipment and the facilities will optimize the outcome in the factory.

Responsibility

The responsibility for the proper setup of the metal workshop is ultimately in the hands of the fabricator and can be individually adapted to their needs.

Facilities

Driveway

Create optimal access routes for the delivery of the material and the collection of finished pieces for surface treatment or for assembly. A crane or alternatively a fork lift is absolutely necessary. The premises height should allow to drive in with a truck.

Layout and Ceiling Height

An ideal workshop size of 8 – 10 employees is about 800 – 1000 m² at the beginning. Further extension space should be considered. The height depends on the size of the work pieces and to the size of the crane. A working height of 6 m will be sufficient in general.

Metal Company

Buildings and Structures

To allow for expansion of the company, it is recommended to plan reserve space. If possible, provide an extension on the double size.

Individual Premises

- Conference
- Compressor
- Apartment
- Intermediate storage
- Showroom
- Fire protected garage
- Office
- Disposal storage
- Building equipment
- Carpark
- Central heating

Flooring

- Following characteristics should be considered:
- Anti slip
- Abrasion resistance
- None electric conductivity
- Bright colour
- Resistant varnishes

Suitable material: mastic / melted asphalt

Lightening

All rooms that serve the usual residence of people need to get as much daylight as possible. Transparent light incidence made by roof light dome, glass bricks, transparent roofing.

Rest- and Break Rooms

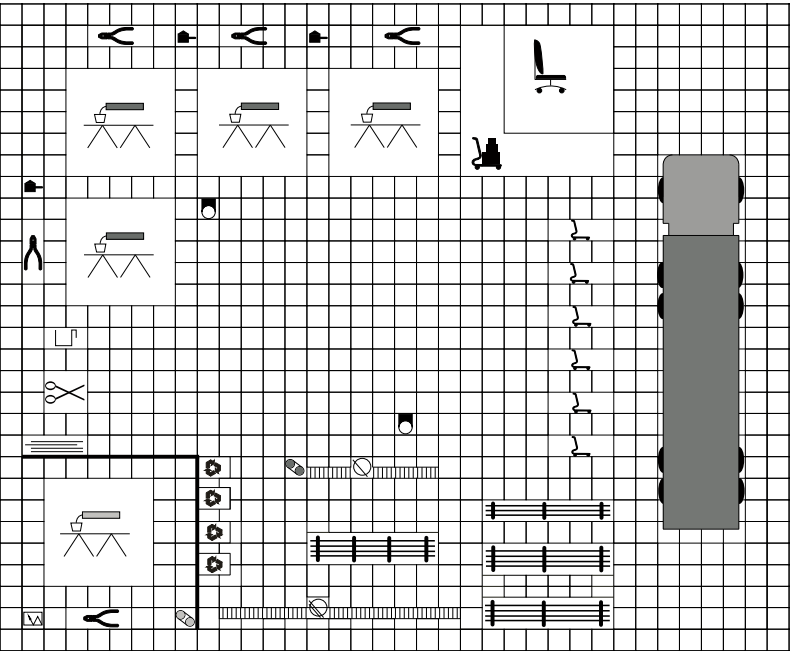
- Toilet
- Shower
- Changing
- Break

Consider separate men and women's areas if space permits and according to country specific rules for working / rest areas.

A reception combined with the office in the entrance area will lead the customers to the right place.

Ground Plan, Possible Arrangements

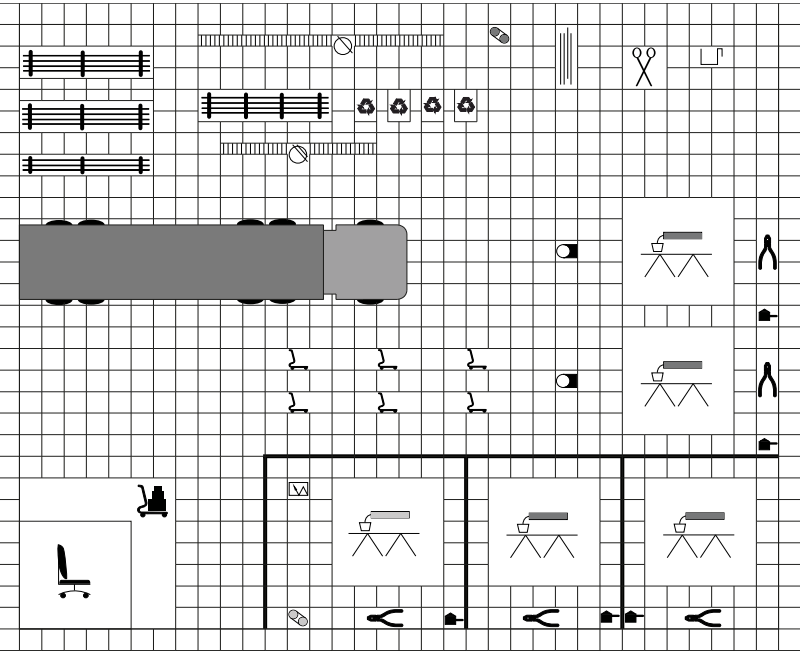
Proposal 1:



Legend

	welding machine TIG		plate shear		drilling machine		storage rack bars
	bits and pieces		wastage		grinding machine steel		storage rack steel
	office for the production manager (second floor)		circular saw semi-automatic		grinding machine CrNi		storage rack CrNi
	sheet metal stockyard		circular saw fully-automatic		workstation steel 1 person		warehouse (first floor)
	trimming press		workbench		workstation CrNi 1 person		trolleys / truck

Proposal 2:



Metal Company

Arrangement of Machine Location: Cutting Steel / Stainless Steel

Steel profiles and glazing beads are generally cut to size using a metal circular cold saw:

Cutting Speed	26 m / min (steel), 13 m / min (stainless steel)
Spacing of Saw Blade	6 – 8 mm
Thickness of Saw Blade	4 – 6 mm
Cooling	emulsion / spray cooling

A suitable brand and model is Emmegi Twin Ferro.
(↓ [Automation Brochure](#))

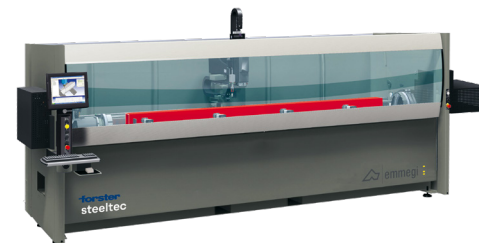
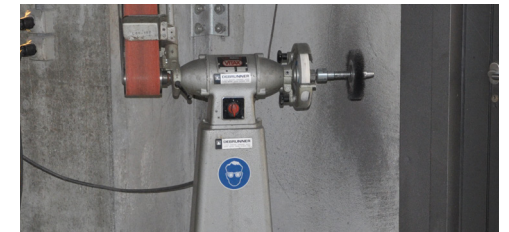
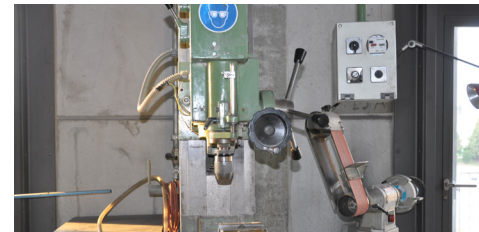


Drilling and Twist Drill

Steel profiles are drilled using twist drills made of high-speed steel:

Cutting Speed	25 m / min
Forward Feed Max	0.12 – 0.25 mm / rev
Cooling	emulsion / spray cooling

Conventional drilling and sanding belts are recommended.



Metal Company

Arrangement of Machines

The following is recommended for welding:

Shielded Arc Welding	MAG process
Wire Ø SG2	0.6 to 0.8 mm
Active Gas	82% Argon / 18% CO ² or 100% CO ²

The welding work place should be well ventilated or equipped with a smoke-collecting unit (e.g. shield or mobile smoke-collecting unit). This applies especially when welding pre-treated profiled steel sections and conform to country specific Health & Safety requirements.

Suitable type: VARIO STAR Fronius (www.fronius.com)



Using Hydrargon 2 (gas mixture: 98% argon 2% hydrogen) and the pulse system, allowing to weld on lower current (approx. 40A) because it leads to less distortion in the material. Concave merging is possible.

Suitable type: TransTig 1700 Puls Fronius (www.fronius.com)



Metal Company

Workshop Equipment



Mobile toolbox



Workbench*



Trestle



Crane



Storage racking



Welding table



Pallet truck



Fork lift truck



Trolley



Compressor*



Compressed air hose*



Compressed air pistol



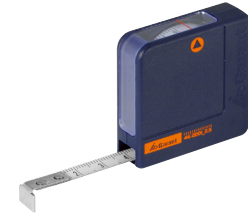
Scriber*



Marking gauge*



Vernier caliper*



Tape measure



Scale*



Dividers*



Try square* 90° and 45°



Square



Gauge*



Spirit level*



Tape measure*



Double meter stick



Laser*



Chalk line*



Plumb bob*

Metal Company

Hand Tools – Striking Tools



Punch*



Driftpunch*



Chisel*



Mortise chisel*



Steel hammer*



Plastic hammer*



Hand saw



Double-cut files*



Sheet deburrer*



Twist drill set*



Step drill set*



Thread tap M3-M10*



Countersink set*



Mill*



Tinsnip*



Stanley knife*



Combination plier*



Adjustable joint plier*



Adjustable wrench*



Bolt cutter*



Diagonal cutting plier*



End cutting plier*



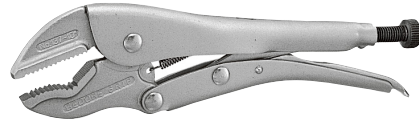
Long nose plier*



Wire brush*



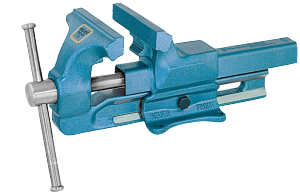
Longnose clamping plier*



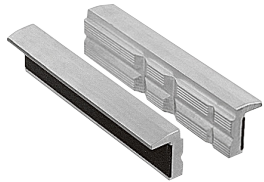
Clamping plier*



Bar clamp*



Bench vise*



Vise chuck jaws*



C-Clamp*



Slot and Philips screwdrivers*



Wooden trowel



Ratchet set*



Combining wrench set*
(6-32 mm)



Torque wrench*



Riveting pliers*



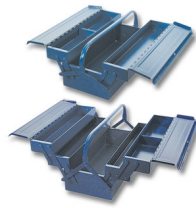
Glass vacuum cups*



Pinch bar*



Ladder



Toolbox*



Tie down and tow straps*



Ropes



Cable spool*



Extension reels*



Connectors*



Grinding machines



Hand drill*



Cordless drill machine*



Jig saw



Rotary hammer*



Reciprocating saw*



Wet-dry vacuum cleaner*



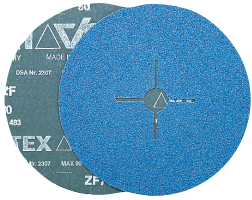
Excenter grinder*



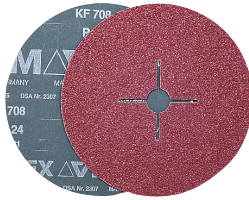
Angle grinder*

Metal Company

Grind and Cut Disks / Safety Equipment



Fiber disk (40 – 80) stainless steel*



Fiber disk (40 – 80) steel*



Rough grind and cut disks*



Safety glasses*



Ear plugs / Ear protection*



Hand gloves*



Dust mask*



Safety shoes



Work cloths*



Helmet / welding helmet*



Extinguisher



First aid kit*

Metal Company

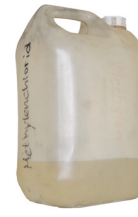
Gas / Liquids / Chemicals



Acetylen – oxygen



Welding gas



Thinner



Stainless cleaner*



Cartridge gun*



Scotch tape*



Cutting paste*



Zinc spray*



Screw lock*



Paint brush*



Lubricant WD 40



Cleaning paper*



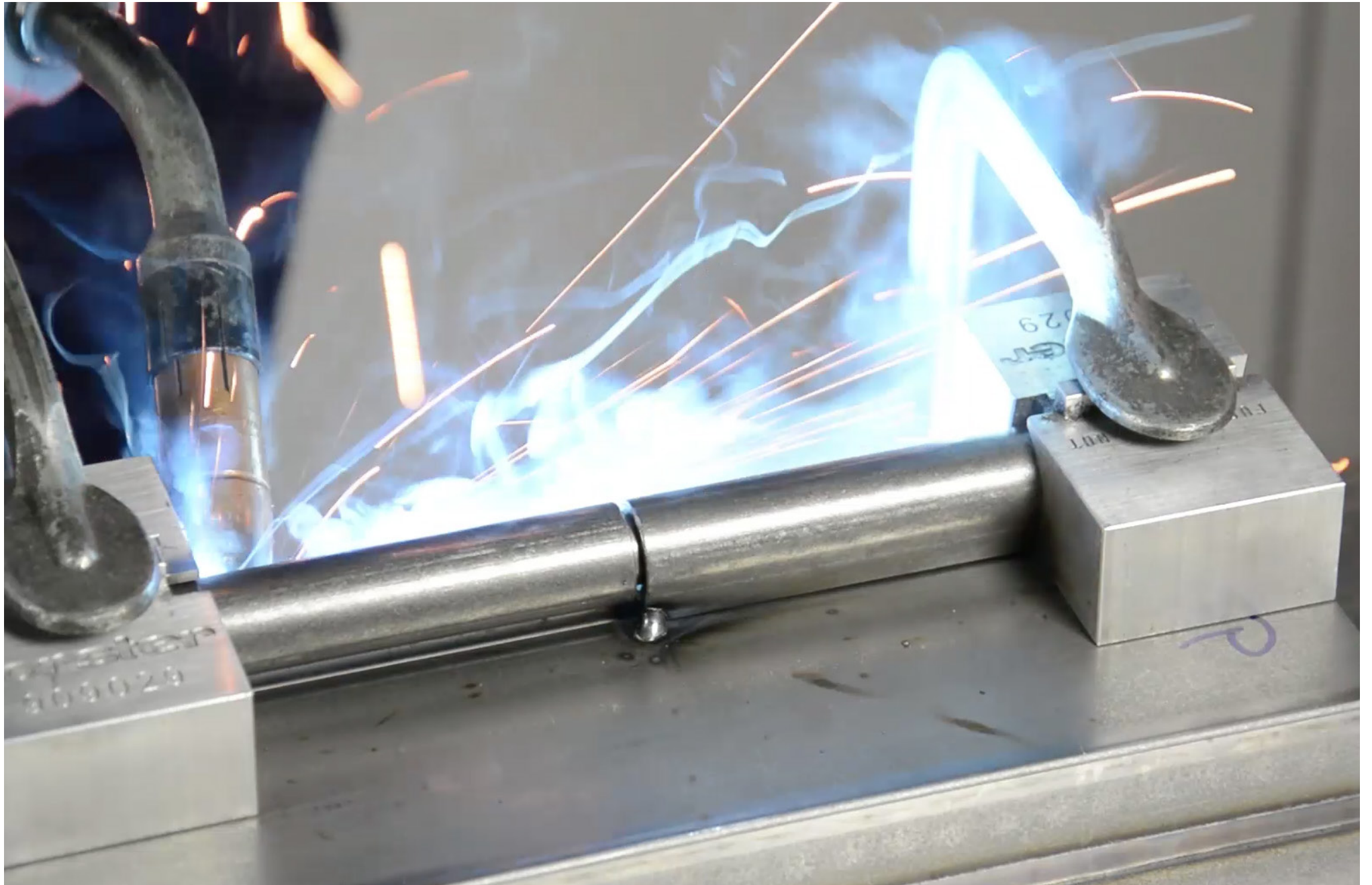
Container scrap metal



Rubbish container



Hand scrub-sope*



Drawing and Planning

Highest service for planning and implementation are offered by Forster. Comprehensive support concerning planning and drawing will be found on Forster website: www.forstersystems.com/downloads. The extensive documentation is available on Forster homepage free of charge. A demo version of the planning tool MAP can be requested. Please contact your Forster-Supplier for detailed information concerning a MAP licence.

The U-Value Calculator is downloadable as well. Follow installation instructions and apply login data as described. This is a free software tool from Forster which calculates the U-Values (Thermal Break) of complete assemblies such as doors, windows and facades in accordance with EN ISO 10077-1:11.2000 from a stored database. Even complex building units can be described selective and calculated separately – a simple and useful tool for planning.

In addition to extensive technical information, Forster offers a wide range of services. The team of experienced Forster technicians will give you advice on your projects, help during tendering, give advice in the implementation planning and provides engineering for object-specific solutions.

Drawing Aids

The complete range of profiles as sectional diagrams will be found on the internet, available for download. For further information, please contact Forster or a Forster trading-partner.

Forster can offer the best proven calculation program with some very distinct advantages. The varied use of this calculation program extends over the entire order process: From business bids to work preparation papers, to material samples and optimised cutting lists, delivery / invoicing.

Steel and stainless steel are materials predestined for visually minimal glass architecture, while simultaneously the ideal construction material for all security areas. With about 210 kN/mm² for steel and 170 kN/mm² for stainless steel these materials have the highest modulus of elasticity used in the construction industry. It is therefore particularly suited for use in buildings with highly crowded public. Commercial and industrial buildings, schools and hospitals, sports and leisure facilities, are advantageously backed up and made accessible by steel and stainless steel components. These materials clearly guarantee the longest service life and highest safety.

Stainless Steel

By adding (alloying) chromium (11 – 28%) a layer of chromium oxide, a few molecular layers thick, is formed on the surface. This means, chromium and oxygen combines, protecting the underlying material against corrosion. Increasing the chromium content or adding molybdenum, nickel or other metal alloys can strengthen the corrosion resistance of the stainless steel and enable it to withstand much more aggressive conditions, even acid. These properties are used for application in specialized areas such as chemicals, swimming pool water, sea water, aggressive environmental atmosphere etc.

Besides optical, there are also several physical differences between steel and stainless steel. A comparison of steel and stainless steel can be plus and minus points noted on both sides.

- Steel is easier to cut, to bend and to weld.
- Stainless steel is tougher, so steel can be processed more easily.
- Stainless steel is resistant to corrosion.
- Steel however, requires a surface treatment such as powder coating.
- Steel welds are grinded very quickly, whereas compared.
- Stainless steel welds are time consuming to grind.
- Stainless steel has a lower thermal conductivity and thus a better energy balance.
- Steel is less tough and thus less on distortion during welding.

Ultimately it's the customer who decides on the price and optical requirements. The processing of steel compared to stainless steel is associated with less time, less tool wear and lower purchasing prices of raw material. However, stainless steel has the advantages of its visual impact, excellent properties of corrosion resistance and the benefit of lower thermal conductivity than steel.

Delivery and Storage

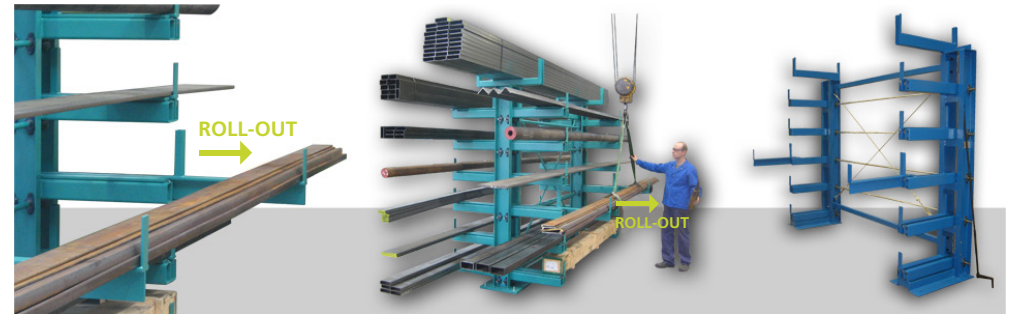
Delivery and Unloading

The control of the material is important as damage can occur immediately on or after delivery. It is important to check the material on delivery for missing or damaged elements which if left unchecked could affect production and cause delays. Careful unloading and transport using carry straps and the correct method around the workshops is essential.

- The most suitable means of transport is a crane with a cross-arm and two belts at least 800 mm wide. If unloading with a fork-lift truck, then only with broad fork-arms set wide apart.
- In order to avoid dents or deformations Forster recommends inserting wooden or plastic supports in between.
- Clean supports and covers prevent small profiled cross-sections from becoming deformed. When removing from storage racks, always lift the profiles, don't slide.

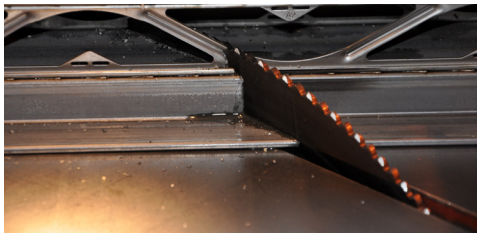
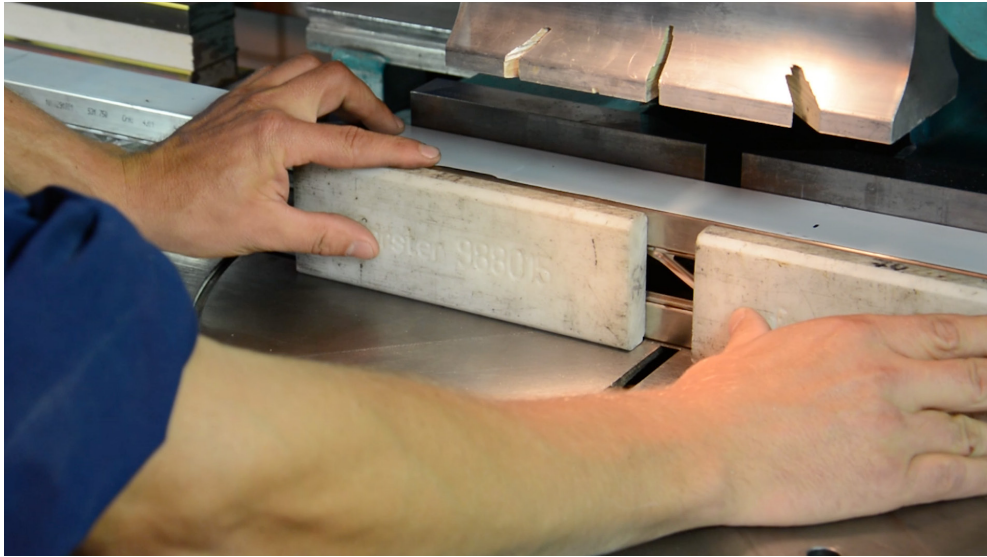
Storage

It is essential that steel and stainless steel is stored and processed separately. To save as much storage space as possible, high shelves should be used. The supports shall be protected with wood or plastic. To prevent damage to the high quality profiles and their surface the removal from the storage racks should be made only by lateral lifting out. Avoid pulling the long side. All components of the system must be stored in dry and suitable rooms to avoid corrosion. To keep a smooth and fast workflow, it is worth selecting the storage near by the location of the circular saw. The shorter transport distances in the workshop, the faster the processing. You'll find relevant examples for workshop setups and the machinery in this documentation.



Processing

Cutting



Cut 45°



Cut 90°

Steel profiles and glazing beads are generally cut to the right size using a metal circular cold saw:

www.kaltenbach.com

www.rohbitech.com

www.braendle-gmbh.ch

www.emmegi.de

Information

- Pay particular attention to the accuracy of the angle, both in cutting to size and during assembly.
- Cutting the outer frame to size.
- During the manufacture of the outer frame, the following location deviations (rebate play) are prescribed for the installation of leaf-frames. Nominal dimension +1 / -0 mm.
- Cutting leaf frames to size: During the manufacturing of leaf frames the location deviations (rebate play) must be determined during assembly including outer frames. Cutting tolerance: +0 / -1 mm.
- The Forster development workshop cuts all steel sections as well as angles or flat bars with the KKS – 450.
- It is of great importance to have precise length adjustment of the stop.
- As an alternative to circular saws, band saws can be used.

	Steel	Stainless Steel
Saw Blades	HSS (high-speed steel)	HSS (high-speed steel)
Cutting Speed	20 – 60 m / min	7 – 10 m / min
Spacing	6 – 8 mm	8 – 10 mm
Forward Feed	150 mm / min	50 mm / min
Thickness	4 – 6 mm	4 – 6 mm
Cooling	emulsion / spray cooling	emulsion / spray cooling

Processing Information Stainless Steel

For the cutting of stainless steel, use blades made of high-speed steel (HSS-E) with fine toothings. In order to prevent corrosion on stainless steel it is essential to use different blades as in during the processing of mild steel. The emulsion liquid must not contain any ferrite components (e.g. sawdust, etc).

Processing

Cutting – Hold-Down Device



Information

Pay particular attention when clamping profiled steel tubes and glazing beads. It must be possible to adjust the pressure manually exerted by hydraulic or pneumatic clamping devices to suit the material to be clamped.

When cutting the various kinds of profiled sections, Forster recommends using the suitable plastic supports made by Forster.

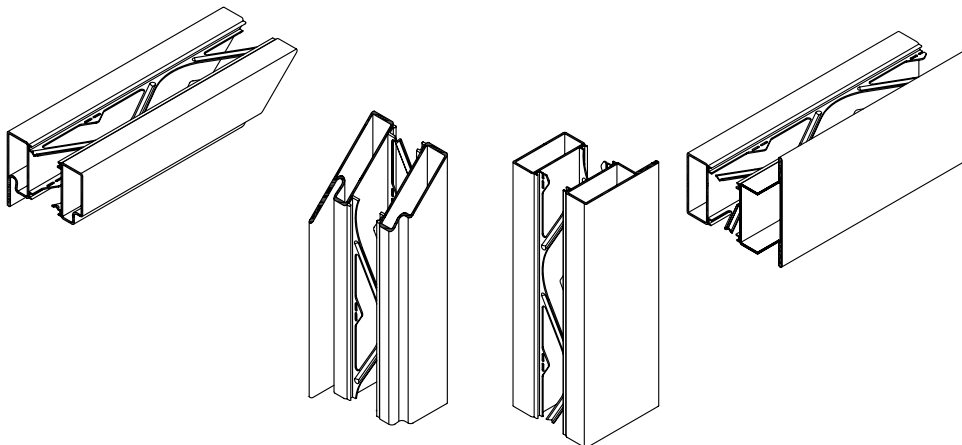
Processing Information Stainless Steel

The stainless steel profile must be protected additionally with a plastic base before clamping. This protects the surface from chips, which often remain hanging on the hold-down and may cause damage to the profile.

Cutting 45° / 90°

The upper sections of leaf frames are usually cut 45°. And again, most important is the precision of the saw blade / belt in vertical section relating to 90° vertically. The larger the gap at the mitre, the more difficult the assembly, and the worse the distortion during welding.

Cross-bar or the base sections are usually cut straight. Either made by the circular saw, cutting disc or handsaw (see notching out).



Leaf profile top (45°).

Leaf profile bottom (90°).

Processing

Notching Out



- Pre-cut with circular saw.
- Cut-out with cutting disc.
- Alternative marking 15.5 mm or 20.5 mm.
- Pre-cut with cutting disc.

Information

The bottom or cross-bar profile is cut to length on the circular saw, then centre the profile on the blade and pre-cut into the required depth. At the last step, cut out the part sideways with handsaw or cutting disc on the grinding machine. Be aware that the size of the notch out depends on the size of the profile flange, which can be 15 mm or 20 mm. Please consult the fabrication binder for the correct dimensions. Forster recommends to do the notch out 0.5 mm longer than the profile flange.

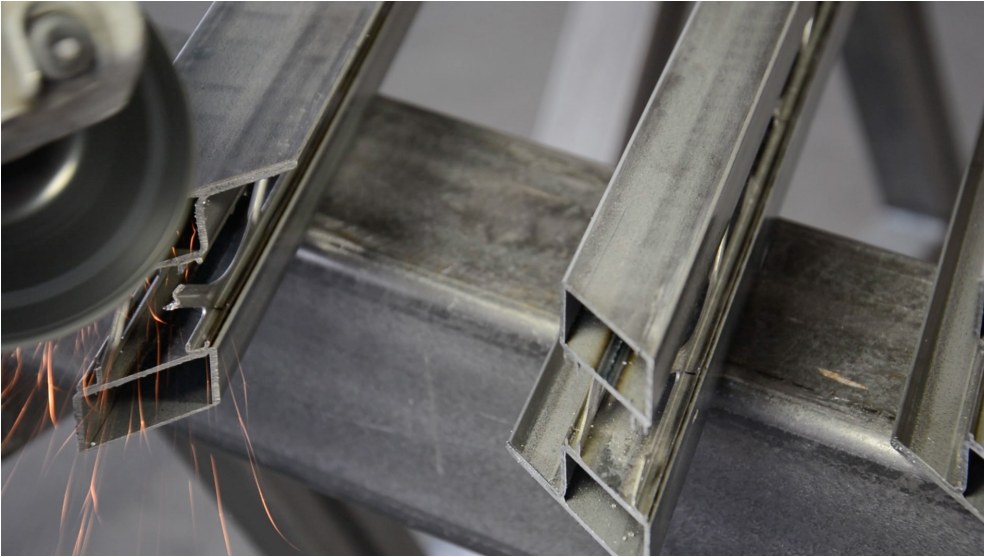
Exterior Cleaning

The profiles are covered with an oil film. This happens during the rolling of the sheets to profile tubes, and serves as rust protection. However, this protection lasts only for a few weeks. For further processing, degrease the profile surface with a convenient half-textile cloth and appropriate cleaner such as thinner methylene chloride (DCM / MEC) after cutting and notching.

Important: The cleaner must not contain any kind of grease or oil.

Processing

Deburr and Chamfer



- Chamfer by the use of a grinder.
- Chamfer the edges at a 45° angle.

Information

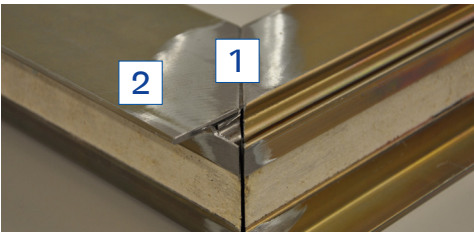
The sharp edges must be removed by a grinder (fibre disc, grain 40 / 60) or file, to prevent injuries, and for flush fitted clamping. The edges must be chamfered to a 45° angle prior to the welding and approximately to half of the profile thickness. The chamfer serves the connection, so the welding seam has enough sufficient space for the fusion joint.

Processing Information Stainless Steel

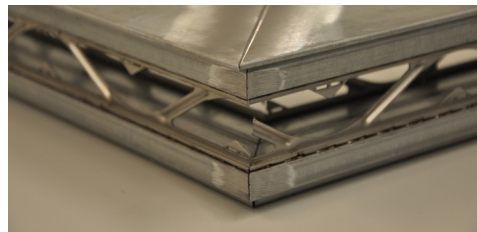
Stainless steel profiles are deburred only slightly and not beveled. The sharp raw edge will be melted during the welding process like additional material.

Processing

Preparation for Welding



Yellow passivated.



Sendzimier-galvanized.



Removing with cutter.



Removing with twist-drill.

Information

To avoid pore formation in the welding seam remove the zinc-layer in the area near to the welding prior to the welding. When first abrading the surface with the grinding wheel the layer seems to be removed. Mostly it is just ground up. The colour of the steel (1) is darker than the zinc layer (2). Ensure that the region of the weld seam is really free of zinc.

During the processing of the Forster fuego light system (EI60 and EI90 series) avoid pore formation by removing the zinc-layer in the area of the welding seam on the surface and underneath, by milling out the gypsum and plaster-like insulating material. Use a drill, cutter or an end mill.

Processing Information Stainless Steel

The ground stainless steel profiles are delivered with an adhesive film to protect the surface. Remove the protective foil 150 mm off the welding area. To be welded edges must be freed of residues containing oil, grease or emulsion from cutting. Any residues in welding area causes dark to black weld-edges or pores, followed by a complex processing and finishing.

Number and Mark

For incorporation into the project, it is worth to number the various sections with waterproof markers and mark them accordingly on the plan. Marking of the hinge side, lock cut-outs and fittings, supports the imagination, and simplifies production. But be aware, some markers may show up after powder coating even if you removed them with aggressive cleaning agents such as thinner or acetone.

Processing

Marking and Punching / Drilling



Marking by the means of a scribe and try square.



Punch setting by the means of a centre punch and hammer.

Information

Holes and cut-outs to be manufactured for locks, strike plates, terminal buttons, assembly fixtures, etc. must be marked. The marking is done by a scribe, a kind of pen with carbide mine. As measuring tools use roll and steel yards, marking gauge, measure tapes and the square.

The position of the holes to be drilled are done with the centre punch and a hammer.

Processing Information Stainless Steel

Since the centre punch is made of steel use a pencil to mark stainless steel to avoid extraneous rust. The centre punch should not be round but in edged-shape instead. Since stainless steel is usually very hardened it causes a higher wear of twist drills.

Drilling

To drill the holes for drainage, fixation for fittings and wall abutments as well as studs and screw on hinges use twist drills made of high speed steel.

	Steel	Stainless Steel
Cutting Speed	25 m / min	6 – 12 m / min
Forward Feed	0.12 – 0.25 mm / rev	0.05 – 0.15 mm / U
Cooling	emulsion / spray cooling	emulsion / spray cooling

Follow carefully the minimum distances and diameters of the holes according to processing folder.

Processing Information Stainless Steel

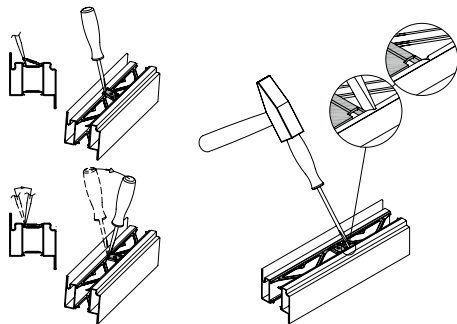
For drilling stainless steel profiles Forster recommends twist drills made from high-speed steel. TiN-coated tools are preferable.

Processing

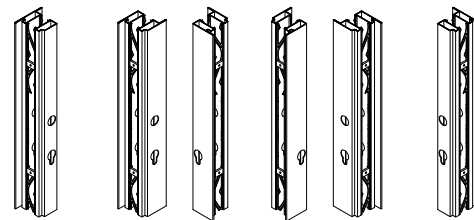
Cut-Outs and Fix Points for Fittings



- Manufacturing of a cut-out in Forster unico.
- Welding of weld-in-plates for locks and keeps.



Guide clip installation.



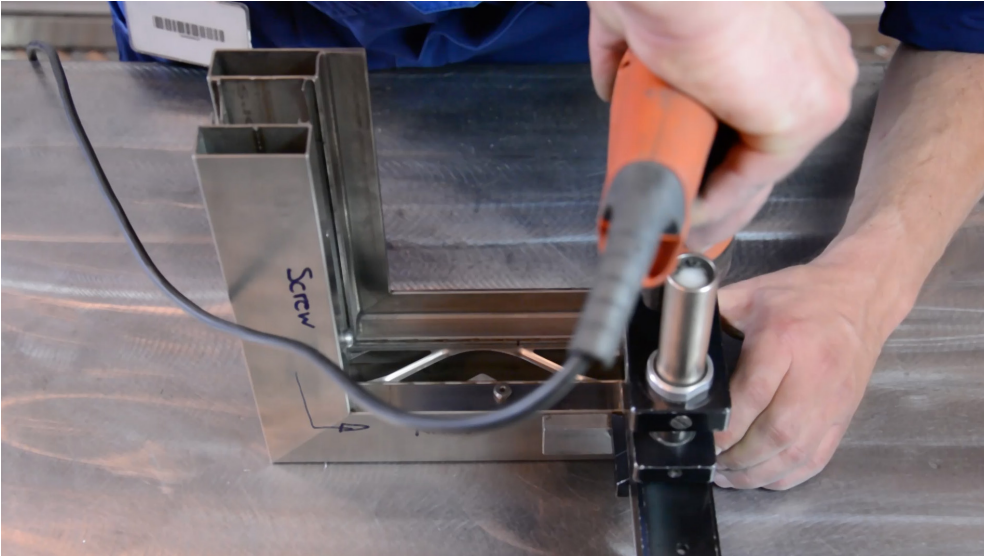
Easy processing with pre-fabricated Forster profiles.

Information

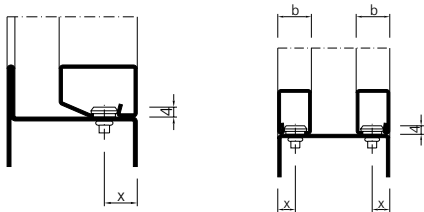
The manufacturing of cut-outs is done with jig saw, mill, cutting disc or drill. Due to the filigrane insulator construction the cut-outs in the system Forster unico are done easily. The cut-out in the lock section is done by a grinder with cutting disk.

Depending on which profile system is used, different kinds of weld-in-plates (Forster fuego light), clips (Forster unico) or cut-outs (Forster presto) are to use or to do.

Pre-fabricated profiles with cut-outs for Forster fittings (locks, handles and cylinders etc.) are available in the systems Forster fuego light and Forster unico. Additionally pre-fabricated profiles for integrated door closers for single and double leaf doors, as well as for locks are available in various profile systems as listed in our fabrication binders. The only operation needed is the cutting the pre-fabricated profile into the right length.



- Installation using the power driver for stud fasteners.
- Installed stud fastener.
- Drilling guide.
- Stainless steel stud screw.
- Stainless steel rivet.



Distance for drilling.

The stud fasteners serve as fixing points of the glazing bead. Forster recommends two methods of installation:

Method 1 – Power Driver for Stud Fasteners

This aid provides the opportunity to do the installation fast and economically. The position of the stud fastener can be adjusted on the edge guide and doesn't require any prior marking on the profiles. The stud fasteners are self-drilling and self-tapping. They are available in magazines containing 10 stud fasteners each. The collet on the power driver automatically reloads the magazine after the installation of a stud fastener.

Important: Distance x corresponds to a glazing bead assembly that fits flush with the frame. The distance for drilling x can be increased depending on the look required (see picture below on the right side).

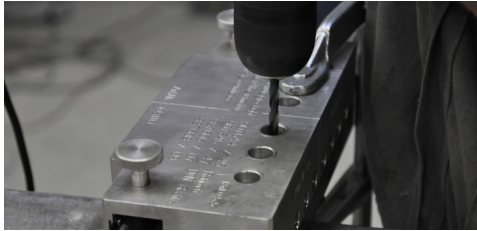
Method 2 – Drilling Template

The use of the drilling template is recommended when small numbers of door sets are to be produced. At first the holes are drilled through the drilling jig and afterwards the stud fasteners are screwed in manually. The drilling jig must also be used when stainless steel stud fasteners are used because they are not self drilling.

Remark: Due to optical reasons it is important that the glazing beads are positioned just 1 mm from the radius edge and not exactly on the profile edge. Forster recommends doing a couple of tests in order to evaluate the right setting position of the studs.

Processing

Installation of Screws on Hinges



Drilling with the drilling guide.



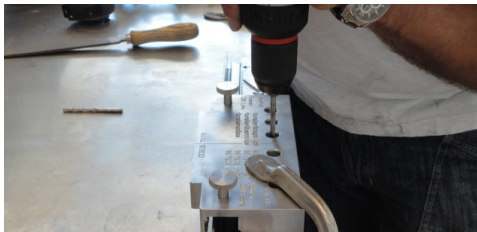
Thread forming (no tapping).



Fixing leave part.



Drilling leave part.



Frame part.



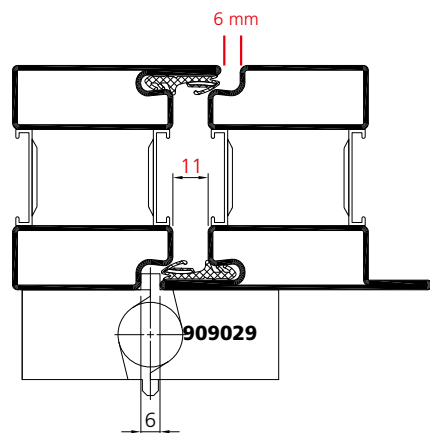
Thread forming.

Information

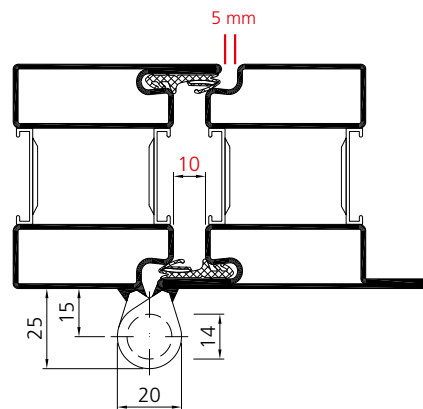
The installation dimensions vary depending on which profile system is used. Corresponding advice and details are shown in the fabrication binders according to each profile system.

All the screws on hinges are installed by the use of the associated drilling guide (art. no. 909110). The drills and the thread forming taps which are enclosed in the drilling guide set **must strictly be used (never use thread cutter).**

The usage of other tools will most likely lead to failure of the hinges and affect the longevity negatively. Drilling installation guides exist for all the screws on hinges. The marked drilling diameters and type of thread formers must strictly be adhered to.



Before the welding (6 mm).



After the welding (5 mm).

Information

Forsters entire range of weld on hinges must be installed by using the correspondent welding templates. The order and direction of the tacking and welding must strictly be followed in order to avoid unnecessary deformation due to the influence of the high temperatures which occur during the welding.

Important Advice about the Handling of the Welding Templates:

The welding template has spacers on both sides which are 1 mm thicker than the required distance between the leaf and the frame (clearance). The welding template is only used until the hinge is tacked onto the door set. Afterwards it must be removed. Due to the shrinkage caused by the heat of the welding the clearance will absorb the excessive distance of 1 mm. Do not put any spacer in between the profile rebate!

Processing

Tacking and Welding Order of Weld on Hinges



Information

The recommendation of the tacking order and the direction of how it should be welded is based on the long term experience of Forster. In order to avoid deformation due to the influence of the high welding temperatures it is recommended to follow the procedure as shown here and in our fabrication binders.

- The hinges are positioned in the welding templates and fixed with screw clamps.
- Tacking in direction inside to outside.
- Order which the welding has to be done starts from inside to outside.
- The opposite side must be welded from outside to the inside.
- The welding in the opposite direction provides a better partition of the heat in the material, and produces less deformation in the material.

The exact positioning of the hinges depends on the type of hinges used and is shown in our fabrication binders.

Processing

Frame Assembly from Fixing to Welding – Clamping and Welding



- Steel trestles.
- Welding table, art. no. 9990008.

Fixation

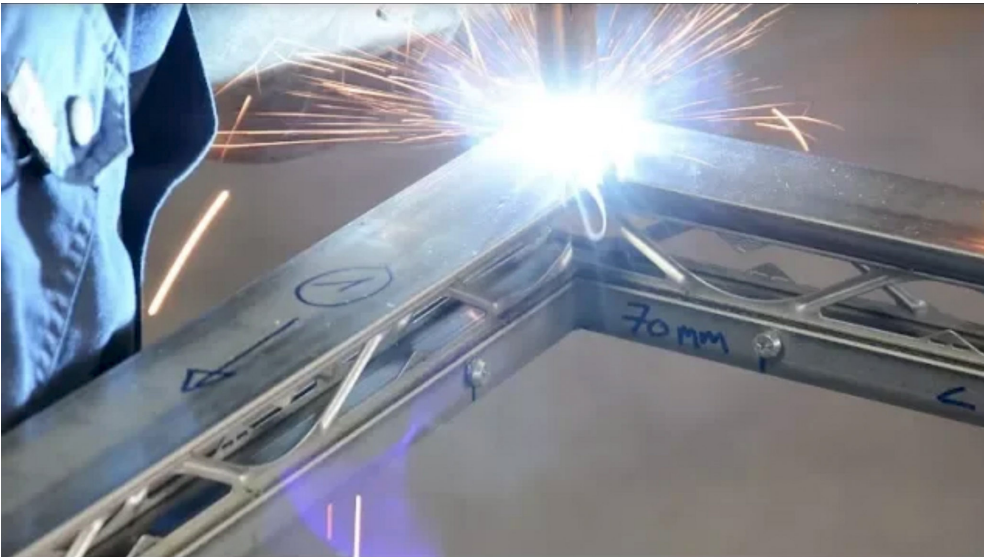
- Assembling profiles to a frame.
- The corners are fixed on a even level ...
- ... or fixed by the usage of steel plates onto an even level.
- Checking the height, width and diagonal measures.

Information

Forster recommends the use of steel trestles which are positioned parallel to the floor. It is important that all trestles used for the frame are exactly the same size and height. If a large quantity of frames are to be produced it pays off to purchase a welding table (f.e. the Creaswiss welding table, www.creametal.ch). The time taken for fabrication will be significantly shorter.

Processing

Frame Assembly from Fixing to Welding – Tacking and Welding



Tacking

- When the surface is flush even the profiles are tacked on the outer edge.
- The tacking must be done from inside to the outside.

Welding

- The outer edges are welded vertically in direction top to bottom.
- Afterwards surface welding is done in direction inside to outside.
- The smaller the welding seam is, the less risk exists in terms of deformation of the profiles and the need of time for the grinding is less.

Information

In order to reduce the negative influence of the high welding temperatures Forster recommends to do the tacking and welding in sequences on each frame corner.

- Do the outer tackings on the corner vertically on all four edges.
- Do the inner corner tacking in each frame corner.
- Do the rest of the tackings on the upper frame side in each corner.
- Turn frame upside down and repeat the tacking row mentioned above.
- Do the welding cornerwise in the same sequenced order as mentioned above.

Processing

Frame Assembly from Fixing to Welding – Grinding



In order to avoid pits and dents in the surface it is important to keep the grinding machine as flat as possible while grinding the surface.

- First-grinding with grain 36.
- Second grinding with a smoother grain (60 / 80).
- Last finish of the internal and external edges is easily done with rasp.
- The concinnity of the surface depends on the requirements of the type of coating. A test coating pays off in any case.

Information

Processing Information Stainless Steel

Using Hydrargon 2 (gas mixture: 98% argon 2% hydrogen) and the pulse system, allowing to weld on lower current (approx. 40A) because it leads to less distortion in the material. Concave merging is possible.

Suitable type: TransTig 1750 Puls Fronius (www.fronius.com)

It is essential that the points below are followed:

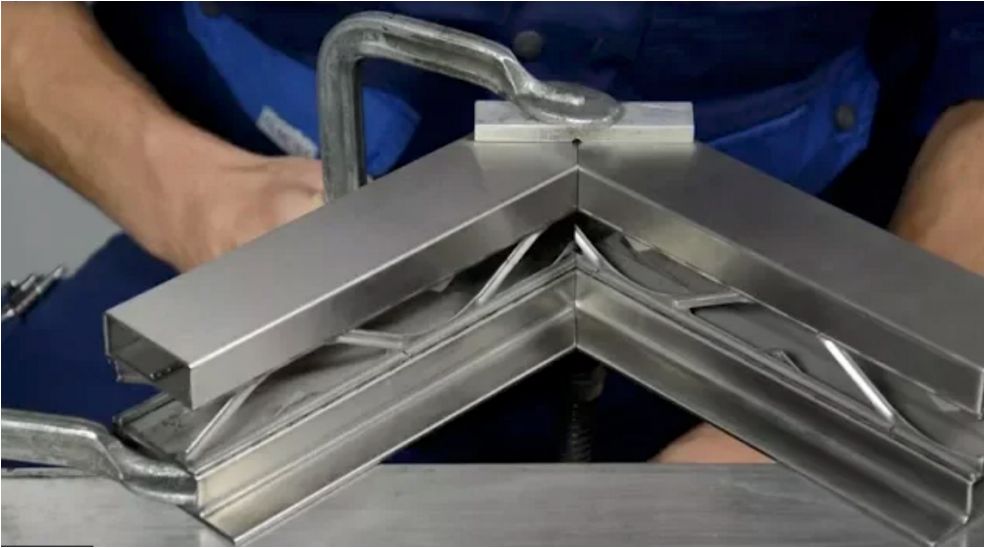
- To be welded areas, surface and inside the profile, must of course be totally free of dust, foil, oil and grease.
- Stainless steel profiles are deburred only slightly and not beveled.
The sharp raw edge will be melted during the welding process like additional material.
- Processing tools must not be used for mild steel otherwise contamination will occur.
- Workspace and surfaces must be completely clean to avoid scratches.
- Screw clamps should be covered by plastic clips.

The Following Video Shows: Mock-Up Partition of a Door

- Fitting and clamping joints.
- Order of tack welding.
- Order of welding.
- Steps and order of grinding process.

Processing – Stainless Steel

Fitting and Clamping Joints / Order of Tack Welding



- Flush fitting.
- Tacks in distance of app. 10 times thickness of to be welded material.
- Always weld from inside to outside.
- The bottom profile of the leaf is most often cut 90°. Always follow the order from in- to outside tacking and welding as well.
- The butt joint is to be welded with additional material because of the profiles radius.

Information

The guide will keep the Tungsten / Wolfram electrode to the required distance, guide the torch accurately and absorb heat. While using the pulse system the mitre cut can be melted without using additional material. Pulse-frequency-welding pulling up the melting material and forms a convex seam instead of a concave seam as usual.

Processing – Stainless Steel

Stainless Steel – Electrochemical Cleaning



Template 0,1 x 100 mm x 5 m.

Adhesive double-faced 0.05 x 50 m.



Angle grinder UWF 8-R10'000.

Straight grinder USF 6-R2'500.



MagicCleaner Stand Alone –

see www.fronius.com.

Information

Depending on the clients perceptions, for example in public buildings, a perfect mitre grind is required. Industrial use on the other hand may allow the melted and cleaned welding seam be left unpolished but preferable cleaned by electrochemically phosphor cleaner such as the MagicCleaner below. The conventional method is using commercial pickling paste.

Advances of phosphor acid cleaning are:

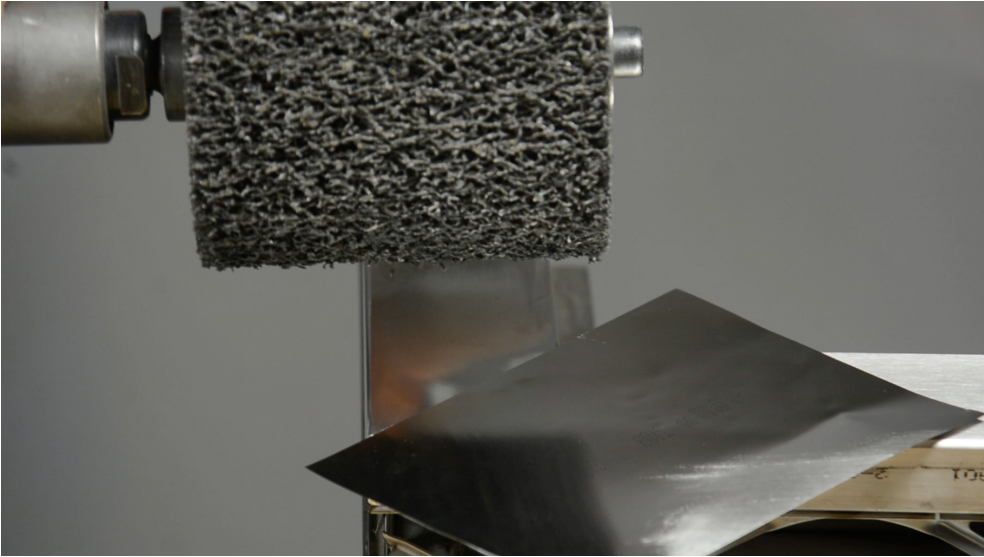
- timesaving.
- no neutralization required.
- waste can be let into sewage system.

Steps and Order of Grinding Process

The set below is available at Forster. Forster recommends to use this kind of grinding gear and follow the steps to take the least time for a proper result in polishing.

Processing – Stainless Steel

Stainless Steel – Grinding



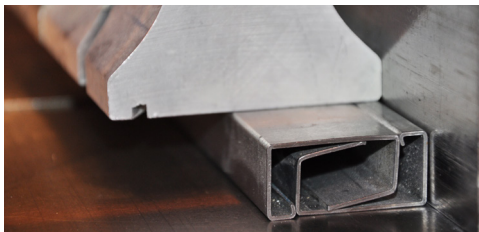
- Template 0.1 mm with double-face tape reusable many times.
- Before fixing the template make sure the material is not too hot.
- Straight grinder spindle Roller Fleece CRS 3M, hold straight-grinder slope first, grind along the edge of the template to get the mitre grind.
- Then guide it parallel to the profile to grind the surface length-side.
- The bottom profile is most often grinded in 90°.
- Mitre grind and butt joint grind.

Information

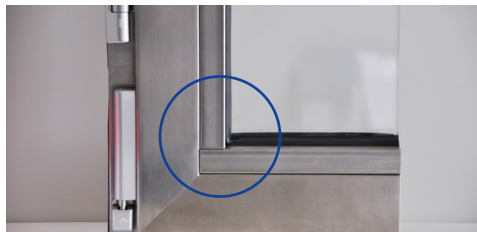
The pre-grinding is to be done with a fibre-disc grid 100, second step use an adjustable grinder on slow speed with the fleece disc Trizact grid 400. Make sure you remove all scratches from the first step. Always guide the disc as flat as possible. The procedure except of the grid is similar to grinding steel welding seams. Then follow the steps for the perfect polish.

Processing – Stainless Steel

Cutting of the Glazing Beads



Packet cut.



*Recommended joint of
glazing beads.*

Information

The glazing beads are cut in length in a packet cut. It is important to ensure that the rebate is measured on the uncoated element. The rebate will be reduced by the coating applied to the paint thickness. To cause no paint damage at the onset consider that the distance is reduced by four times the thickness of the paint, and thus cut shorter (typically 1 mm).

In general, the horizontal glazing beads are continuous, but varies depending on the country and the customer's request.

Surface Treatment

General

Before surface-treatment complete the element with all its fittings and make sure the function is guaranteed.

Relevant Standards for the Surface Treatment

Forster refers to the relevant country specific standards concerning coating of steel and aluminium materials.

Classification of surrounding environmental terms:	EN ISO 12944-2
Types of surfaces and preparation:	EN ISO 12944-4
Coating systems:	EN ISO 12944-5
Coating of facade parts made of aluminium or steel:	SZFF 41.07
Quality specification of aluminium coatings:	SZFF 52.01
Quality specification of steel coatings:	SZFF 52.02

Preparation of Steel Profiles for Coating

Steel and stainless steel profiles must be neatly and flush grinded. Depending on the environmental surrounding conditions it may be required to coat the object several times.

Prior to everything else, the base material must be given the precise surface rawness corresponding to the chosen type of coating. This could be achieved through sand or dust blasting. Depending on the type of top coating, the base coating might have to be degreased.

Proper surface treatments (sand blasting, degreasing, top coating etc.) on pre-fabricated door, window and facade elements should only be carried out by professionals.

Special Preparation of Hinges for Coating

Prior to the coating of the 3-Dimensional hinges (e.g. 907667), Forster recommends the usage of cover caps art. no. 907056. These cover caps are to be put on the top and bottom end of the hinge instead of the original metal caps. The cover caps art. no. 907056 can be used several times.

The original caps may not be installed on the hinge during the coating procedure, because they can not be removed afterwards. Nevertheless the original caps must be given to the coating company for separate coating. The cover cap art. no. 907056 is also designed for the use of covering the holes on the weld on hinges and screws on hinges prior to the coating.

Important Advice Concerning Coating

Information concerning the operational conditions and environmental influence on installed door, window and facade elements must be given to the coating company, in order to choose the best type of coating. EN ISO 12944 and all sub chapters describe the relevant types of treatments and coatings. Furthermore refer to the documentation in our fabrication binders.

Specialities for Forster fuego light Profiles

The unique heat absorbing characteristics of the special insulating fillings of the profile, must be taken into consideration, in order to choose the right type of coating. Forster recommends to do first time test samples of the coatings if wet paint coating systems are used, and to do corresponding quality tests. If the profiles are powder coated the duration of the coating procedure must be kept longer. Furthermore Forster refers to the corresponding information in the fabrication binders (e.g. Binder 1, Forster fuego light, surface treatment.)

Instructions for Installation

Installation from A-Z



Fix door frame at the top end.



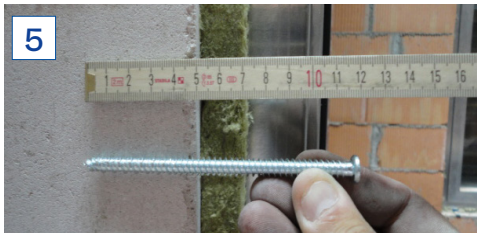
Fill (and close) joints.



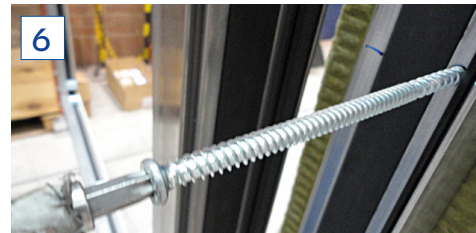
Mount door leaf, align for air gap.



Drill lateral anchor holes.



Fix door frame.



Fix door frame.

Forster doors and windows are generally supplied to the site as completely assembled elements. They have to be stored so that tilting and sliding is prevented, and they must be protected against soiling and damage. Check dimensions of door frame and wall opening. Align door frame perpendicularly and horizontally in the wall opening on the basis of the cutting check; drill top-end anchor holes.

Instructions for Installation

Installation from A-Z

If door leaves are delivered without glazing, fit glazing and put it on setting blocks made of hardwood or fire insulated material such as Promatect H.

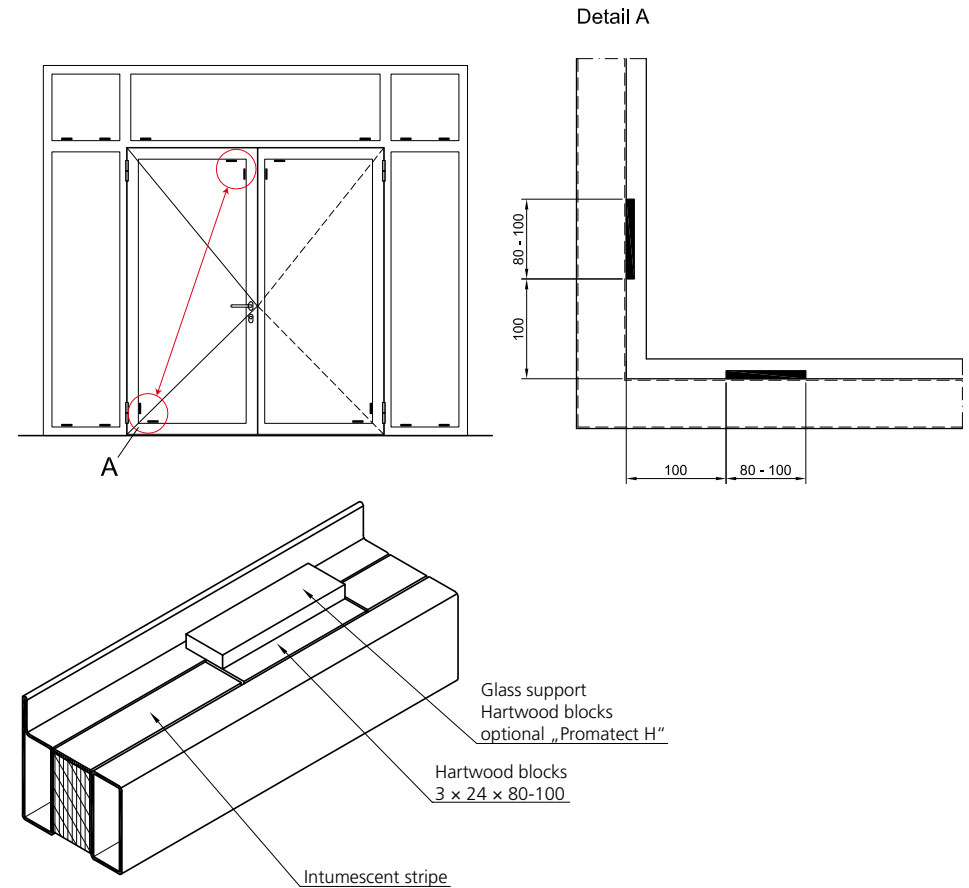


Setting blocks.



Diagonal installation.

The door leaf must be blocked in its diagonal to transfer the load and avoid lowering by daily using.



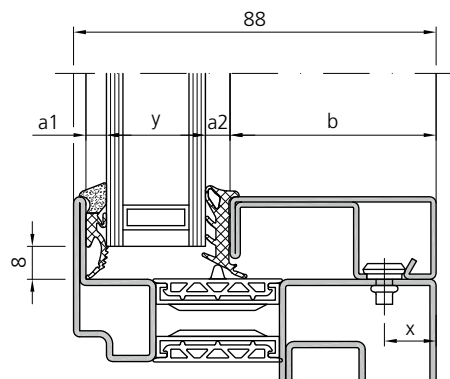
Instructions for Installation

Installation from A-Z

Steps in Dry Glazing

(With Rebate Relief on the Outside):

- Clean the glazing groove.
- Stick the glazing gasket art. no. 985302 onto the profile lip (immediately before inserting the glass).
- Remove the protective foil.
- Spraying the butyl strip with water makes it easier to position the glass element more precisely. Without rinsing additive. Do not use soapy water.
- Position the glazing supports on steel supports.
- Insert glass and cushion it without stress according to instructions.
- Clip glazing beads in place.
- When the water has dried up, the adhesive bond between glass and weather-stripping forms again.
- Press the inner glazing weather-stripping (mitred) art. no. 905385 – 387 into place (allow 1% extra length when cutting to size).

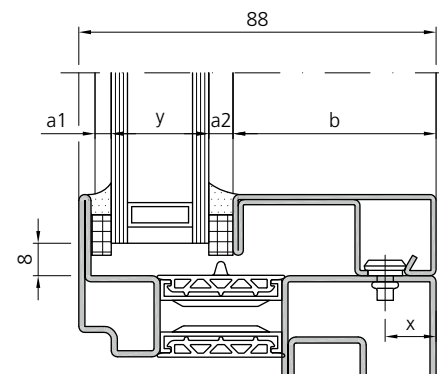


Dry glazing.

Steps in Wet Glazing

(Without Rebate Run-Off Towards Outside):

- Clean the glass rebate.
- Before inserting glass: clean the glass rebates incl. glazing beads.
- Stick packing strips in place (lips and glazing beads) art. no. 988002 – 006.
- Position the glazing supports on the alu supports art. no. 986701 – 702.
- Insert glass element and cushion it without stress according to instructions.
- Clip glazing beads in place.
- Apply sealing compound.
- Smooth sealing compound.



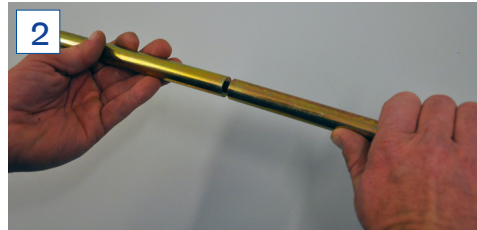
Wet glazing.

Instructions for Installation

Installation from A-Z



1
The weld on hinges can be adjusted in height and sideways directed by a straightening tool to adjust it flash fitting and the shadow gap.



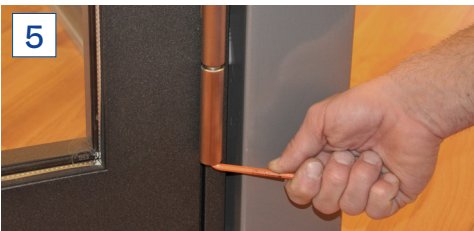
2
Make sure the lever-arm is fully tightened. Choose position of the head and tighten it up. Use carefully to avoid damage on the paint.



3
To adjust shadow gap shift tool over the lower hinge part.



4
To correct flush fitting treat the upper hinge part.



5
Adjusting in height loosen the lock nut with an Allen key nr. 6.



6
Drive Allen key no. 5 through the hollow lock nut and move door leaf up or down by turning the hinge bolt. After adjusting the height fix bolt with the lock nut. Allen keys are contained in the set.

The door leaf must be „blocked“ or „heel & toed“ in its diagonal to transfer the load and avoid dropping by daily using. The requirements set by the producer of the glass panes, and the regulations for design and supervision should be observed. The setting blocks and the hinges have to be adjusted so that the shadow gap between door leaf and door frame. Be aware that the cap distance varies according to the profile system. Please consult the fabrication binder for the correct dimensions.

Instructions for Installation

Installation from A-Z

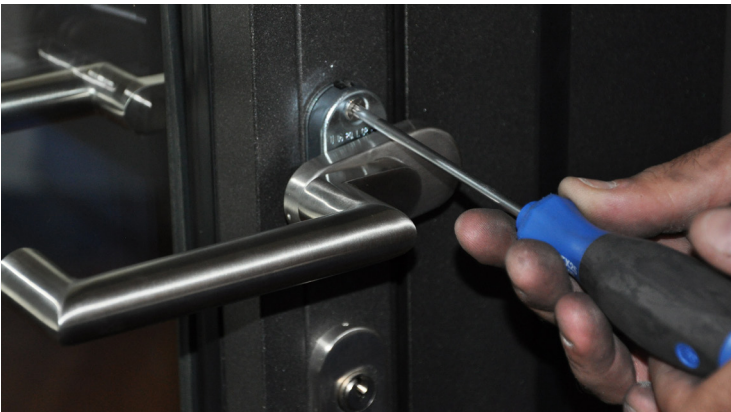
Depending of the installation criteria a door closer has to be mounted. Door closers are individual items, follow the description of the supplier. Forster recommends the brands Dorma and GEZE. Our detail plans include these two systems which are characterized by high quality. Handles must be fixed after glazing.

Final Inspection

- Check hinges for tight fit.
- Check that rebate seal has been correctly press fitted.
- Check that latch bolt has been greased.
- Check door for proper automatic closing function.
- Check antipanic function with double-leaf doors, check coordinated leaf closing and operation of the catch plate for hold-open devices.



Fixing door closer.



Fixing handle.

Instructions for Maintenance

The following points have to be checked annually or after a maximum of 50,000 opening cycles:

Responsibility

Door servicing is the responsibility of the operating firm. The operating firm can conclude a service agreement with the manufacturer of the door at his own discretion.

General Requirements

Inspections must be made by an expert or by a person who has the required skills and has been specially instructed (e.g. caretakers). Defective or faulty parts may only be replaced by an authorized specialist workshop after consultation with the manufacturer of the door. Inspections made and measures taken must be recorded (e.g. in a log book).

Seals

Seals must be checked for their contact pressure and pliability. Brittle and faulty seals must be replaced along their entire length. The bottom-end drop seal must be checked for proper tripping function and tight contact with the floor.

Door Hinges

Screwed-on and welded door hinges to be re-adjusted with a view to the shadow gap between door leaf and door frame. Be sure that welded hinges are not deformed. Hinge bolts must be greased. Forster recommends the use of the greasing set (art. no. 909240).



Greasing set, art. no. 909240.

- Locks, door handles.
- Check that the latch engages properly.
- Check door lock fixtures.
- Check anti-panic function (where provided).
- Slightly grease latch on both sides.

Door Closers

Door closers have to be adjusted so that the doors will close automatically from any opening angle (for setting, see installation instructions provided by the manufacturer of the device).

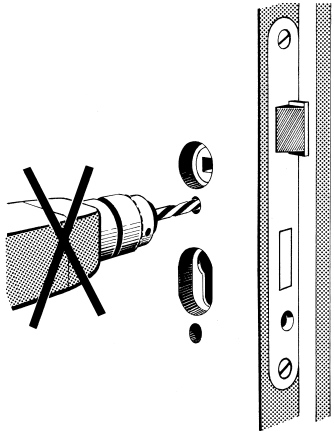
Hold-Open Devices

The legislator requires that a service agreement be concluded for hold-open devices.

Instructions for Maintenance

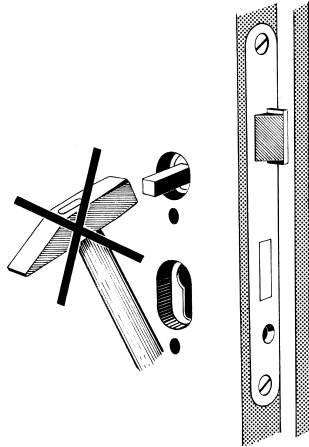
Instructions of Function Relevant Components of the Door Fittings

1



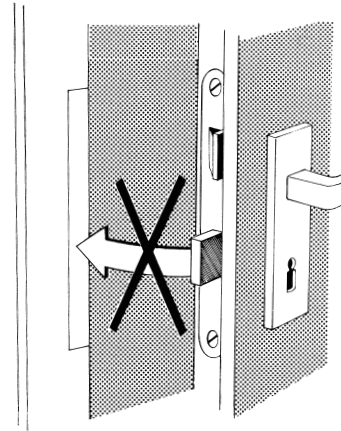
Not drilling through the lock once it is installed.

2



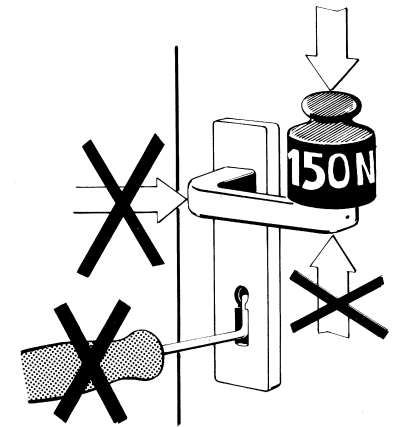
The spindle must not be forced through the locking nut.

5



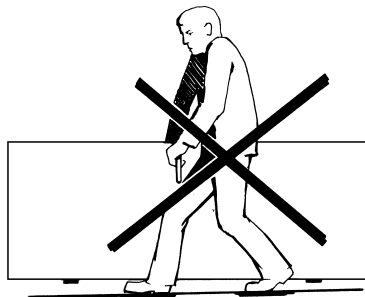
Lock dead bolt only when door is shut.

6



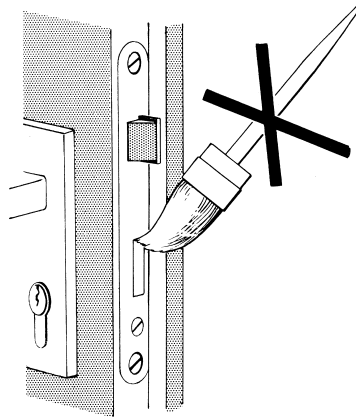
No pressure must be applied to handle against operating direction.

3



Don't use handle for carrying the door.

4

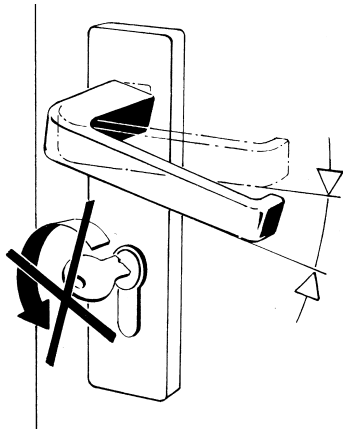


Dead bolt and latch bolt are not to be varnished.

Instructions for Maintenance

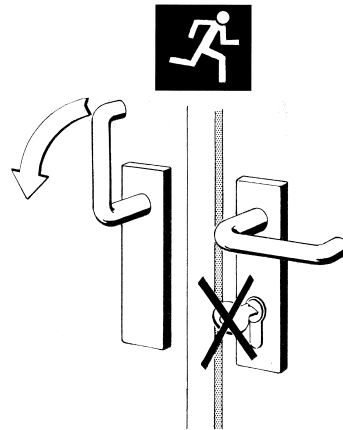
Instructions of Function Relevant Components of the Door Fittings

1



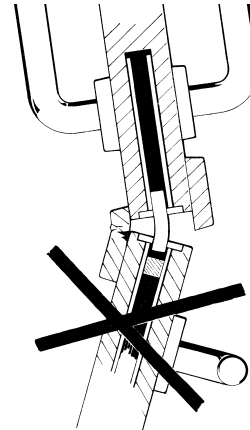
Handle and key must not be operated at the same time.

2



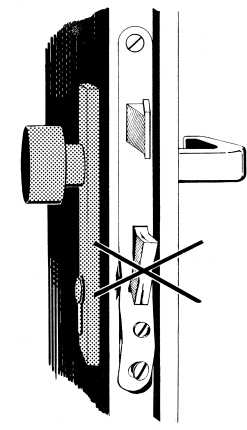
Keys must not be left in the locks of anti-panic doors.

5



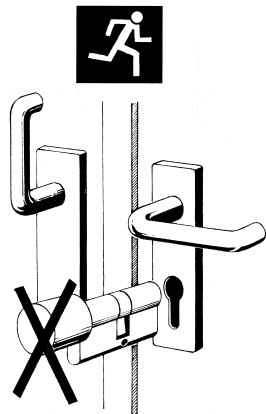
Double doors must not be forced open by using the inactive leaf.

6



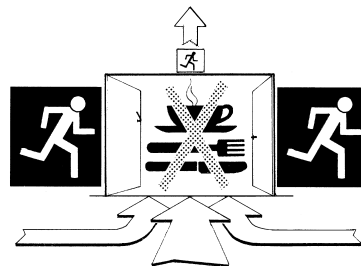
The lock has to be exchanged as soon as signs of force are visible.

3



Lockable or rotating knobs are not to be installed in antipanic doors.

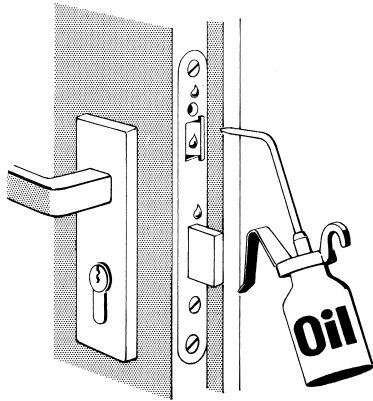
4



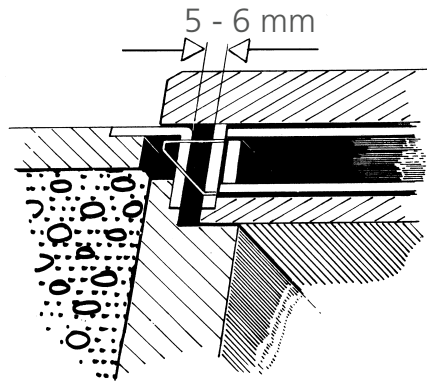
Use anti-panic handle in case of emergency only.

Instructions for Maintenance

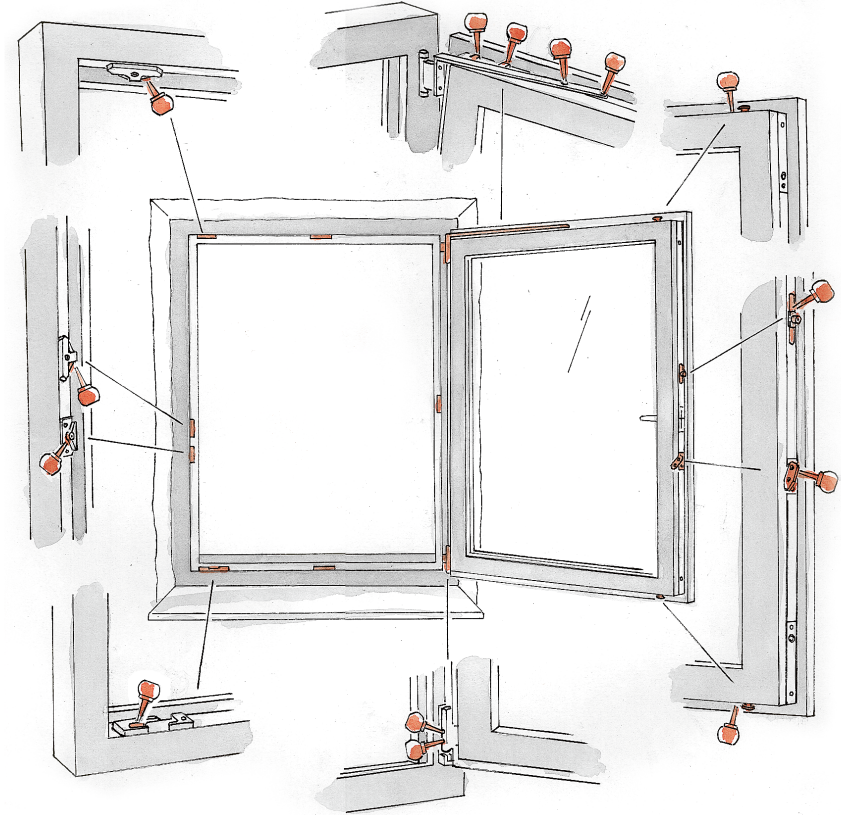
Instructions of Function Relevant Components of the Door Fittings



Locks have to be greased at least once per year (not resin oil).



The distance between forend and striking plate ought to be 5 – 6 mm.



Regular greasing and lubrication* (min. 1x annually) of all function relevant components in leaves and frames maintains the easy moving characteristics of your Forster-fittings and protect them against premature wear.

Safety strikers made of steel, require constant lubrication to prevent unnecessary abrasion. Moreover, the fit and seat of individual screws must be checked. Loose screws or torn off screw heads must be tightened or replaced immediately.

* Use acid and non-resinous commercial greases or lubricants.

Steel and Stainless Steel Profile Systems

Application Area	forster omnia	forster unico	forster unico xs	forster presto	forster presto xs	forster fuego light	forster thermfix vario	forster thermfix light
Safety								
Fire-resistant doors and fixed glazing EI	•	•				•		
Sliding fire doors EI								
Fire-resistant façades EI								
Overhead fire-resistant glazing EI								•
Fire-resistant windows EI		•						
Fire-resistant doors and walls E / EW		•		•	•			
Fire-resistant façades E / EW							•	
Smoke protection doors E30 / Sa / S ₂₀₀ (RS)	•	•		•	•	•		
Fire-resistant walls E30 (G30)		•		•	•			
Fire-resistant windows E / EW		•						
Burglar-resistant doors	•	•		•		•		
Burglar-resistant windows	•	•						
Burglar-resistant façades							•	
Bullet-resistant doors		•				•		
Bullet-resistant windows		•				•		
Bullet-resistant façades							•	
Thermal insulation								
Doors (also finger protection and lift-up sliding doors)	•	•	•					
Windows and fixed glazing	•	•	•					
Façades							•	•
Overhead glazing								•
Stainless steel systems								
Doors and fixed glazing	•	•		•		•		
Windows	•	•						
Façades						•	•	
Non-insulated systems								
Doors, windows and fixed glazing				•	•			
Sliding doors					•			
Refer to country-specific standards and approvals.								