Contents

1. Introduction

During the research period, contact was made with several experts:

- Anders Johnsson, organ consultant to the Svalöv parish,
- Outi Ben Ammar, organist of the Svalöv parish,
- Mats Hultkvist, organ expert and organist in Johannis church in Malmö,
- Ingrid Hultkvist, organ researcher,
- Niclas Fredriksson,
- Johannes Edvardsson and Hans Linderson (dendrochronologists),
- David Burmeister and Martin W. Jürgensen, experts from the Danish National Museum
- Maria Nielson, organist in Helsingborg, Maria church

A considerable number of sources was mentioned to us during and after our investigations. Since the actual sources were mainly in Scandinavian languages, we accepted the oral information as facts, and only later made translations of the actual sources. The advantage of this way of working was that we were able to achieve a data collection in a non-biased direction, focusing purely on the material technical evidence. The historical interpretation was done after most of the data was collected and when writing this report. This is reflected in the rather free literature references in this report. Shortly before the research period, Mads Kjersgaard sent an early version of an article about the Torrlösa organ to Mats Hultkvist, who kindly forwarded this article to us. This article was a great introduction to the organ. Most of this report is confirmed by our investigations. We however tried to keep an open mind instead of sticking to confirm what others already had seen.

It appears to us that quite a lot of the articles copy historical information from other articles, often without mentioning their sources. The actual archival basis seems to be rather narrow. We chose to accept the general historical overview as a fact and link the information from the instrument to this accepted history. A list of literature is available at the end of the report.

The data collection began with dismantling the organ. All accessible features of the case were observed and documented, as well as the balustrade elements and other artefacts of possible interest present in the church. Almost all pipes were disassembled, and each pipe was observed and documented. Measurements were also performed in St. Maria's church in Helsingborg, on the location where the organ was previously placed. This data collection is also supported by photographic evidence.

2. History of the organ

2.1 Origin around 1580, Hans Brebos

There is no clear information about the original organ, built for the St. Maria's Church in Helsingborg other than a record of a donation by Sten Bille for the construction of an organ, which might have taken place around 1580. Nevertheless, its construction is attributed to Hans Brebos: not an illogical conclusion, given the similarities to the organ casework in Morlanda, that is contributed to Brebos. Hans Brebos (also sometimes written as Brebus, Breboss or Brebosch) (mid-16th century – early 17th century) stems from a family of organ builders originally from Lier near Antwerp. Hans' brother Gillis was arguably more famous and built organs in several important churches in Antwerp and Mechelen before being commissioned by the Spanish King Philip II to build no less than four organs for the Royal Escorial in Spain.

Hans' career took quite a different course as he emigrated to Denmark in 1568 and subsequently converted to Protestantism. The output from his workshop in Copenhagen include new organs for the St. Olai Cathedral in Helsingør (1569), St. Peter's Church in Naestved (1585), rebuild or restorations in Malmö, St. Peter's (1597) and commissions for the Royal Danish court, of which very little now survives, except for some small sections of preserved casework. Helsingborg Mary's church 1570-1588 and Morlanda are also contributed to Brebos.

2.2 The reconstruction in 1628-1641, Johann Lorentz

In 1628 and 1641 Johan Lorentz carried out major changes, including a rückpositiv and two pedal towers. In that process, probably the wall of the balcony was changed in order to open space for the rückpositiv. The expert group suggests that in 1641 Johan Buxtehude performed repairs and decorated the organ case.

Johann Lorentz was born in 1580 in east Germany and moved to north Germany to work as an apprentice with Nicolaus Maas. Johann Lorentz lived from 1580-1654, and left a considerable number of instruments, being the privileges organ builder from King Christian IV. Unfortunately, only casework, façade pipes and some very small artefacts have survived (for more info see Hendrik Fibiger Nørfelt, Johan Lorentz).

2.3 Renewal in 1662, Hans Christoph Fritzsche

In 1662 the organ was renewed again by Hans Christoph Fritzsche (or Frietzsch). Fritzsche was born before 1629 and died 1674 in Hamburg. He was the son of Gottfried Fritzsche, who moved to Hamburg and left a considerable oeuvre. Hans went to Copenhagen. His sister Theodora married Friedrich Stellwagen, who founded his organ workshop in Lübeck. The pipes we have seen from of Gottfried Fritzsche (Hamburg 1631-1635) Stellwagen (Lübeck 1637, Mölln 1642, Stralsund 1659) and Hans Christoph Fritzsche (Altenbruch 1649, Malmö Petri / Museum 1658) are very similar.

These instruments were known to us before this research trip and are used as a reference.

2.4 The theft of 1693, new pipes by Georg Amdor

In 1693 Georg Metius, the organist at that time, stole a large portion of the pipework from the organ. It is unknown when new pipes were provided, but seems to be clear that Georg Amdor was the organ builder who did make these new pipes. After writing the main part of this report, Ingrid Hültkvist told us she found archival evidence that indeed Amdor worked on the organ in the early 18th century.

2.5 Various interventions 1735 - 1829

Among various interventions, Jonas Hielm and then Carl Grönvall performed repairs to the organ in 1735 and 1829 respectively.

2.6 The renovation in 1850

In 1849, the organ and its balcony were sold and moved from St. Mary's church in Helsingborg to the (at the time) new church in Torrlösa, its present location. During this process, the organ was reassembled without a rückpositiv, and the pedal sections were 'reduced'. The organ works were executed by organ builder C.J. Fogelberg.

2.7 The renovation in 1962

In the 1950 plans were made to reconstruct the organ to a more suiting 17th-century style. Flentrop was involved in this process. Both in the church archive, as in Flentrop's archive, visits, correspondence and an offer of Dirk Andries Flentrop is documented. In 1962 the organ builder Frobenius performed a restoration adding the current rückpositiv with a case in modern style. The situation before and after these works is documented by drawings of the architect, Leon-Nilson.

3. Case documentation

3.1 Documentation process

The rückpositiv case dates in its entirety from 1962 so was therefore left out of this documentation. In the organ's main case, many of the internal components had to be dismantled to allow the historical parts of the organ case to be measured and photographed. To begin with, the pipes were removed from the organ, followed by the wind trunks and the concussion bellows attached to the underside of the manual and pedal soundboards. The stop action was partly dismantled; however, the key action was left almost completely intact with the exception of the tracker ends underneath the soundboards. These tracker ends were unhooked from the pulldown wires so that the soundboards could be lifted up to reveal the hidden parts of the historical case.

After detailed examination and documentation of all historical case parts, the organ was reassembled, pipework returned to the soundboards, and the entire organ was regulated and tuned.

The organ case as it stands today in Torrlösa is a reflection of four key moments in the instrument's past. For simplicity's sake, these will be referred to as follows:

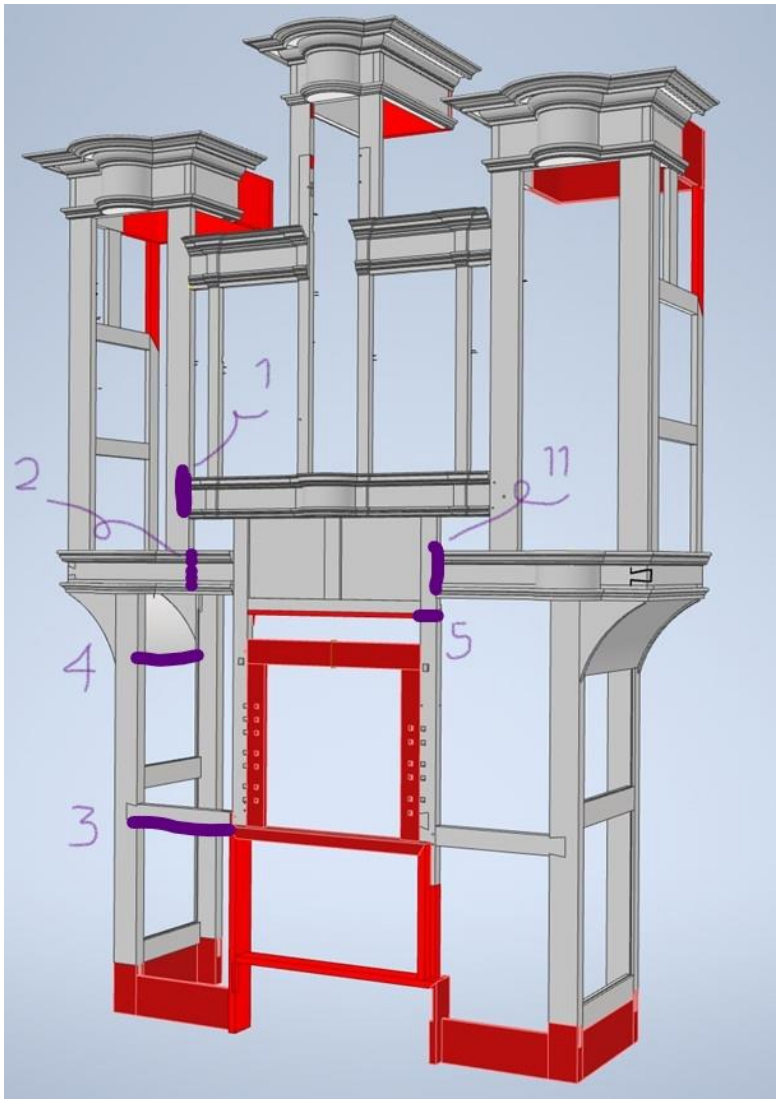
- The Brebos organ (late 16th century)
- The Lorentz extension(s) (1620s and 1641)
- The Fogelberg rebuild (c. 1850)
- The Frobenius rebuild (1962)

3.2 Dendrochronological research

A dendrochronological survey has dated parts of the organ case to the early 17th century, with some parts perhaps even from the late 16th century. Unfortunately, the lack of sapwood on any of the samples makes it impossible to determine precise felling dates. Some success in matching samples to statistical records does, however, give reasonable approximations, in some cases accurate to within a period of only 15 years. The report is attached in Annex B.

As will be elaborated upon in the following pages, there always remains an element of uncertainty in associating the various parts of the organ case to the earliest two builders named above. There is, however, also good reason to conclude that we are in fact dealing with the work of these specific organ builders, and the reasons for this will be discussed.

The most recent overhaul by Frobenius in 1962 removed almost all traces of the earlier 1850 rebuild and has left us with only sections of casework from the 16th/17th century plus the new material introduced by Frobenius. The work of these three remaining builders can, in fact, be distinguished from each other with just the naked eye. The 1962 oakwood is easily identifiable due to its relatively new appearance. The Brebos and Lorentz casework, also exclusively oakwood, is visibly much older, and this is also confirmed through the dendrochronological dating. The Brebos casework has been left largely as it was tooled (rough) on the inner surface, whereas the Lorentz components are planed smooth on all surfaces.



1. Case “Brebos” 45^0 joint impost	not dated
2. rear side moulding “Lorentz” Pedal tower	After 1592
3. Panel “Lorentz” disassembled	1619-1633
4. Panel “Lorentz” fixed in the case	1630-1647
5. cut out in post lower case “Brebos”	After 1592
6. Balustrade, bottom side of the most left post	(After 1600)
7. Flugeltur	not dated
8. Panel” Buxtehude 1641”	1580-1620
9. Panel “Laudate”	not dated
10. Balustrade “Matthaus”	not dated
11. impost “Lorentz”	not dated

3.3 The Frobenius rebuild

Figure 1 shows a 3D visualisation of the current situation, with 1962 Frobenius material coloured red. Omitted from this visualisation are the panels which fill the openings on the front and sides of the case which are mostly historical material. The entire rear wall of the organ and the pedal extension behind the case are not modelled since they are entirely from 1962.

Figure 2 shows a straight-on front and side view of the organ case as it currently stands, excluding front and side panelling and excluding the 1962 pedal extension behind the historical case. As can be seen from the sections coloured red, the entire console area has been renewed during the Frobenius work. In particular, the alterations to the lower portion of the front posts to accommodate a pedal keyboard of modern standards, may have already been an intervention as part of the 1850 work which Frobenius simply replaced with new material to fit the new console layout.

It should be noted that the square penetrations for the stop knob trace rods (14 on the left side, 11 on the right side) appear to have been made exclusively as part of the 1962 work. The existing holes are drilled half-depth from the rear side, with the remaining material chiselled out by hand in a square shape.

There are also two slightly larger square penetrations higher up in the original posts which have been pieced in and stained to match the colour of the casework. These penetrations were likely made in 1850 when the stop knobs were positioned horizontally in a single row in the rail above the music desk.

The horizontal stop knob configuration is confirmed in the documentation sketches by the architect Leon-Nilsen in 1958 (as shown in *Figure* 3), made before Frobenius rebuilt the organ.

The next photos show the same layout, as well as the pre-1960 situation regarding the balustrade and ornaments.

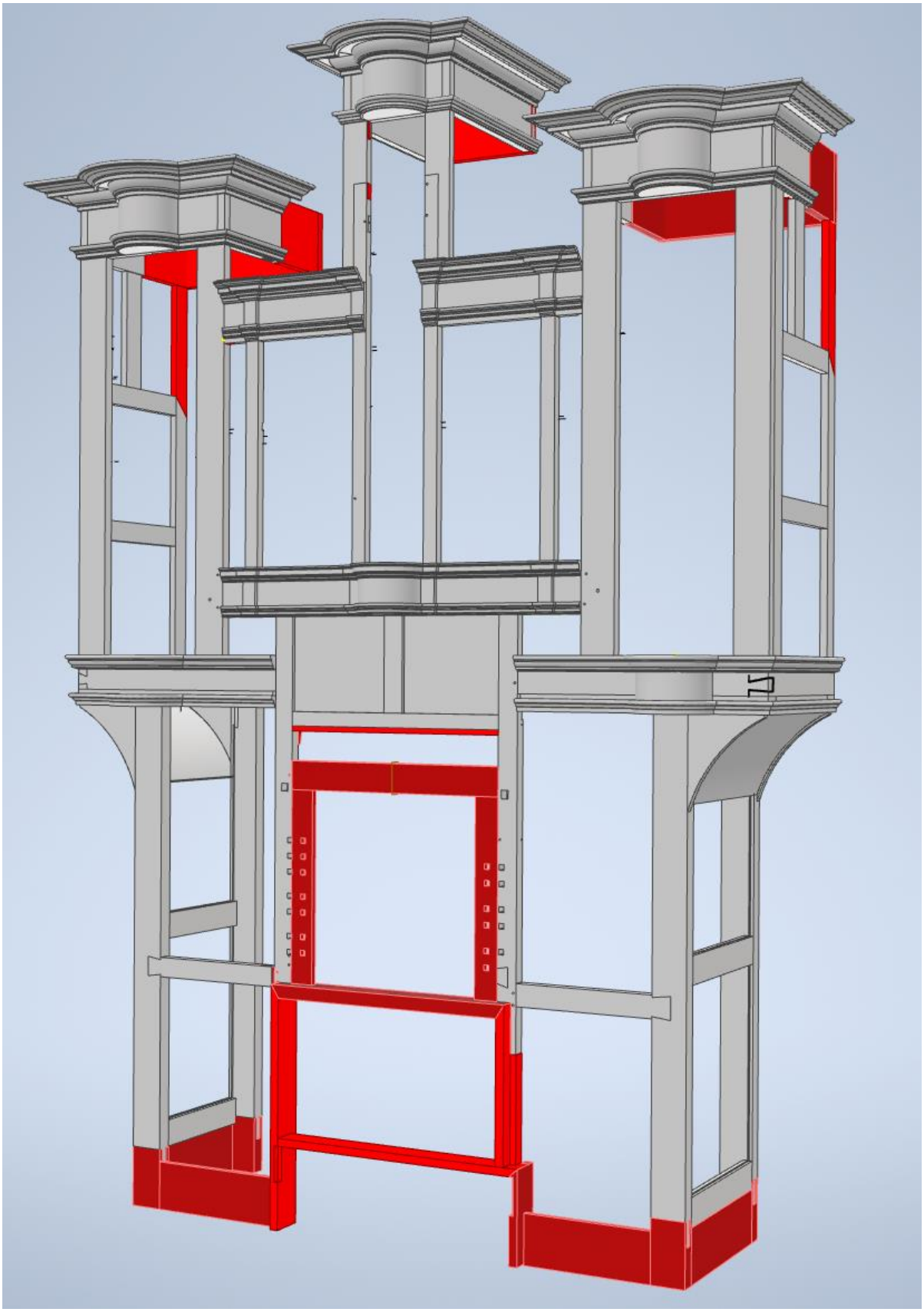


Figure 1

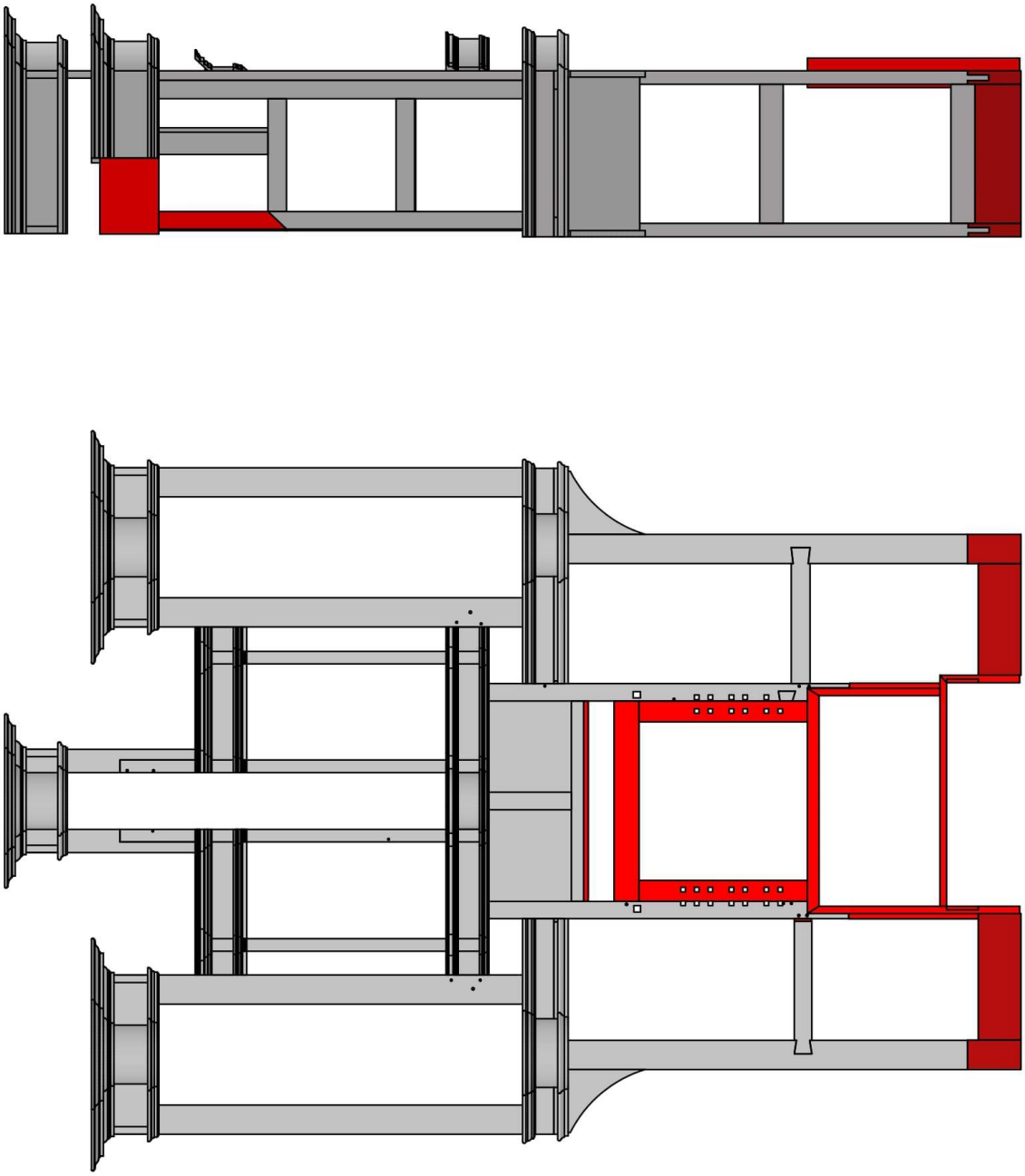


Figure 2

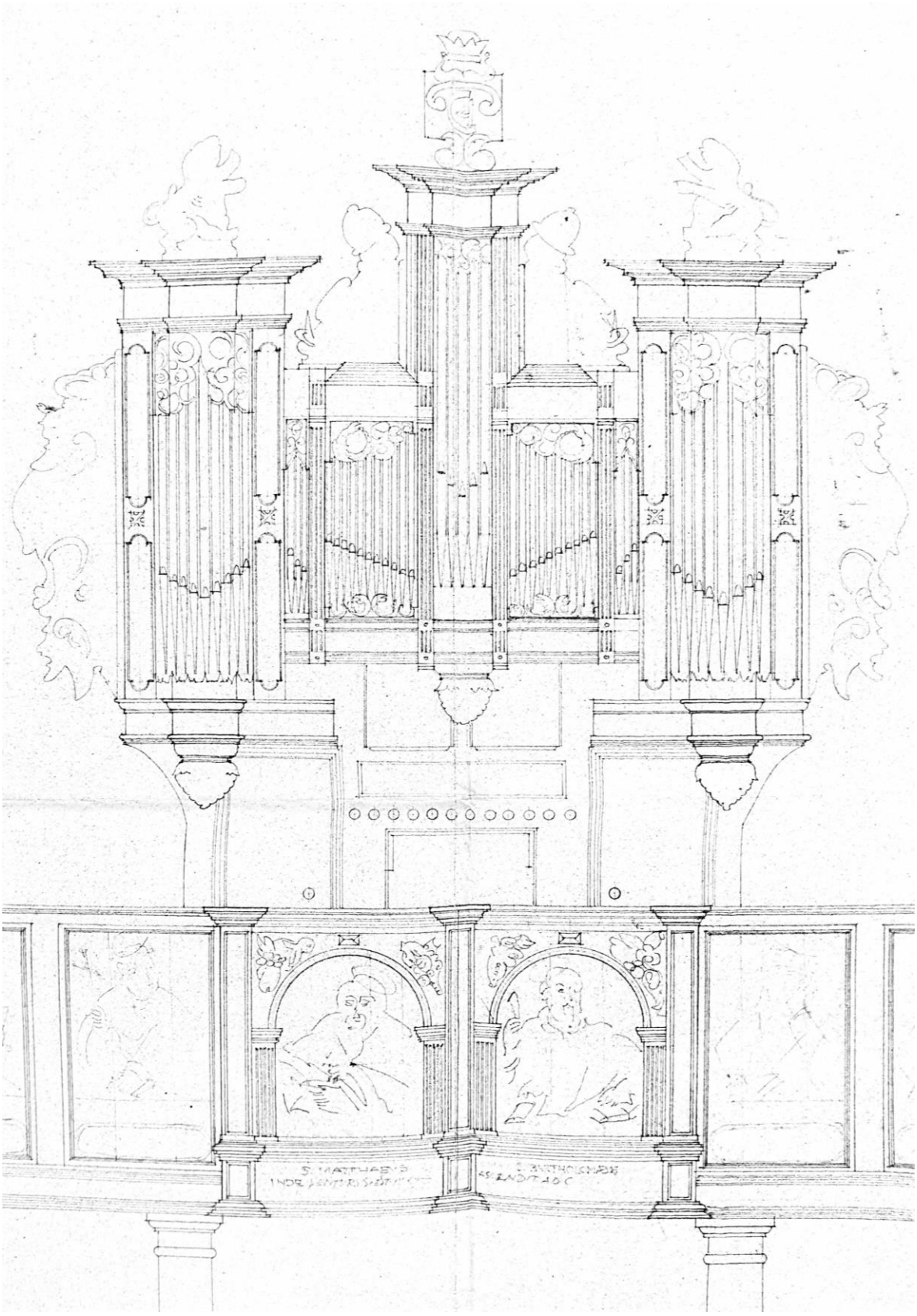


Figure 3

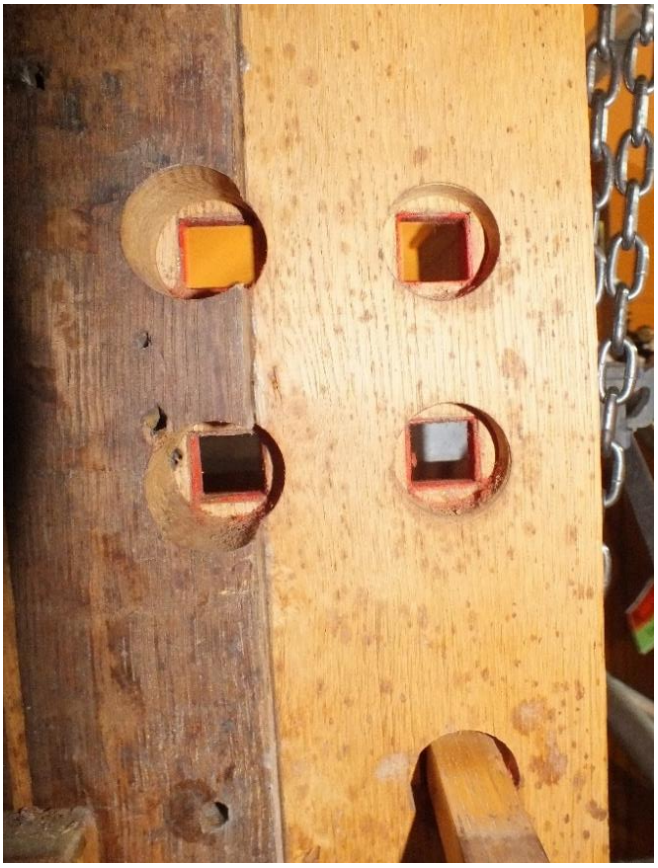


Photo 1: 1962 penetrations for stop knobs.

Photo 2: 1850 penetration for stop knob now pieced in.

Photo 3: photo from before the rebuild by Frobenius.

3.4 The Brebos case

Lower case height

The entire organ currently stands on a base of 1962 material. Tenons have been sawn out of the end of each of the four historical corner posts to join them with new post ends of 1962 material. This makes it impossible to determine the original length of these posts and therefore the original height of the lower case.

There is, however, one clue which suggests that the lower case is currently taller than in a previous situation: the remains of the mounting rail for the keyboard are still present in the original posts either side of the keyboards. When this rail was superseded, a piece of the old dovetail joint was left in the side post, and the holes for the pegs are still visible on the adjacent post. Based on the surviving dovetail, the height of the old mounting rail is 138 millimetres higher than the current mounting rail. This could potentially indicate that the organ is currently raised up compared to a previous situation.

Side tower case depth

The side view of *Figure 2* illustrates that the top/rear part of the side towers is 1962 material. The outer tower cornice frames appear to have been docked at around half the depth of the main case. One suggestion is that the organ may once have been positioned close to the ceiling underneath an archway which required the case to be built in this way. This theory is discussed in more depth in the section '**The Organ in Helsingborg**' below.

Distinction of the Brebos parts

The annotated diagram in *Figure 4* shows the surviving elements of the historical case with the Frobenius material removed. The central section of the case (highlighted in blue) appears to be from a different moment than the rest of the case. As mentioned earlier, this can be partly identified by the difference in the finish of the inside surfaces, but one can also dissect the two sections of casework from each other based on differences between the finish to the decorative façade.

The longstanding theory is that the middle part of the organ case (excluding the upper part of the central tower) may be preserved casework from the earliest situation (Brebos – late 16th century) and that the organ was extended (by Lorentz in the early 17th century) with the outer towers on either side of the older case. The similarities between the central part of the case in Torrlösa and Brebos' organ in Morlanda are undeniable, and the fact that Brebos was organ builder to the Royal Danish court also provides strong circumstantial evidence in favour of this theory.

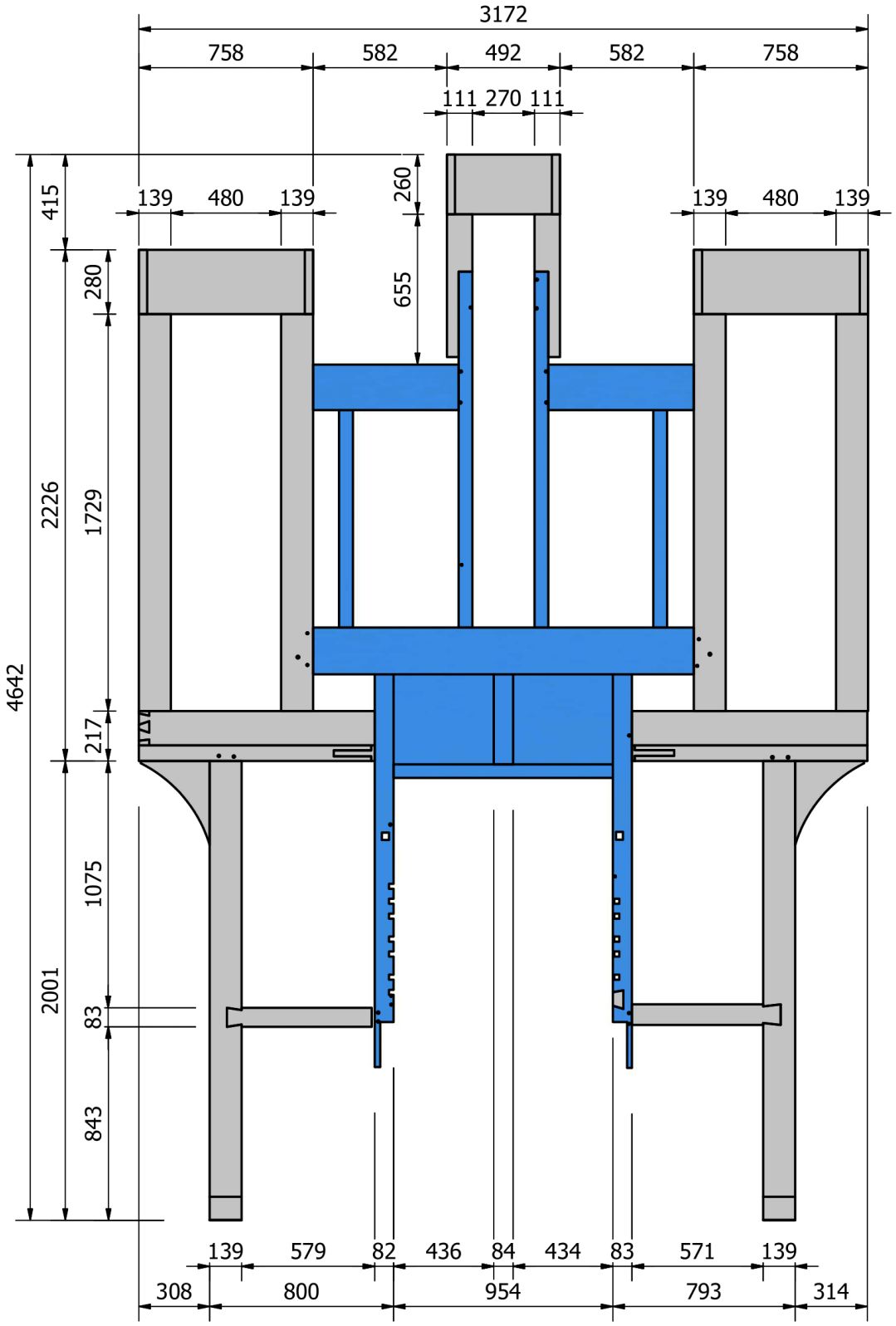


Figure 4: Brebos parts in blue

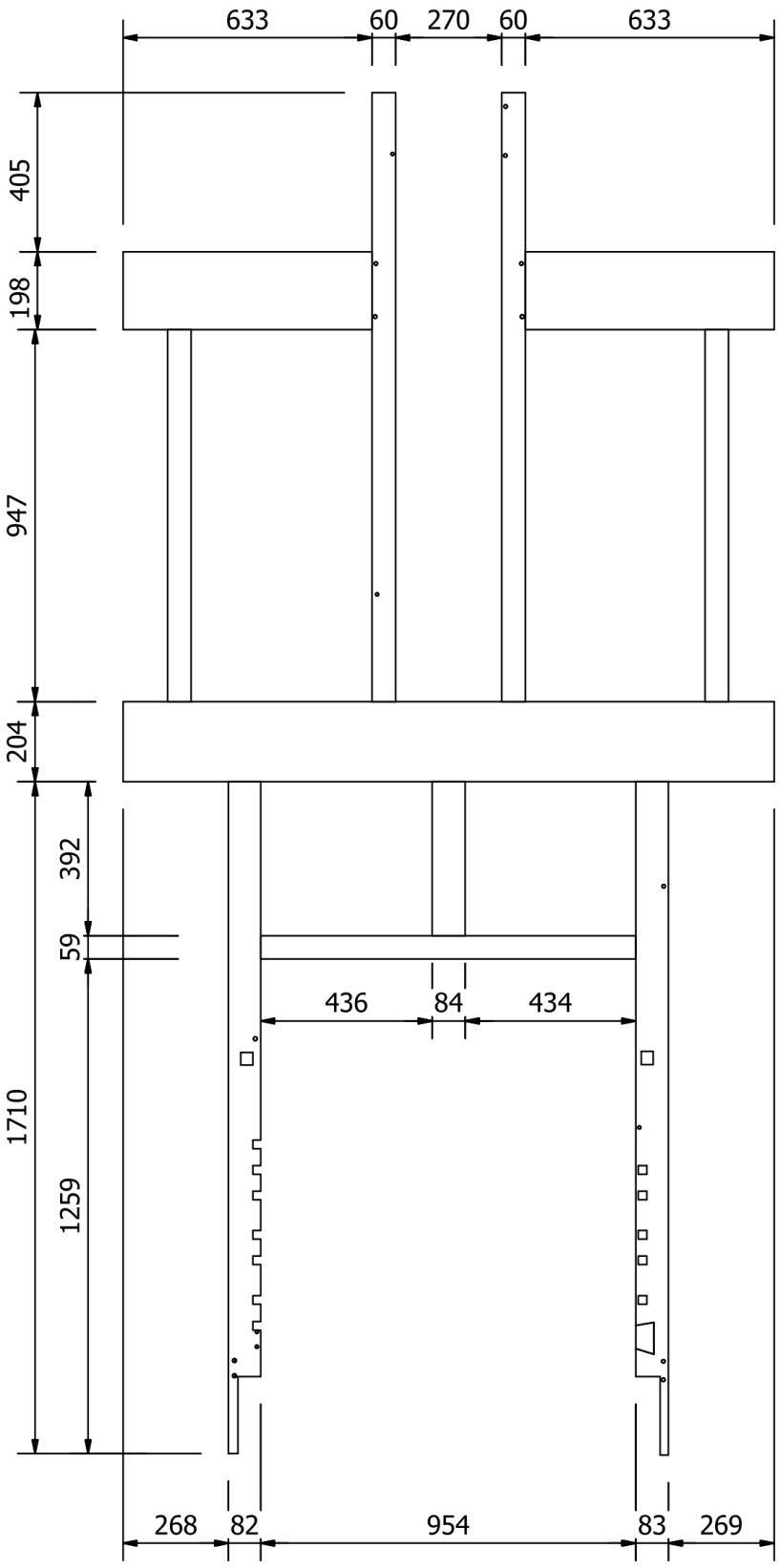


Figure 5: Brebos case only, front view

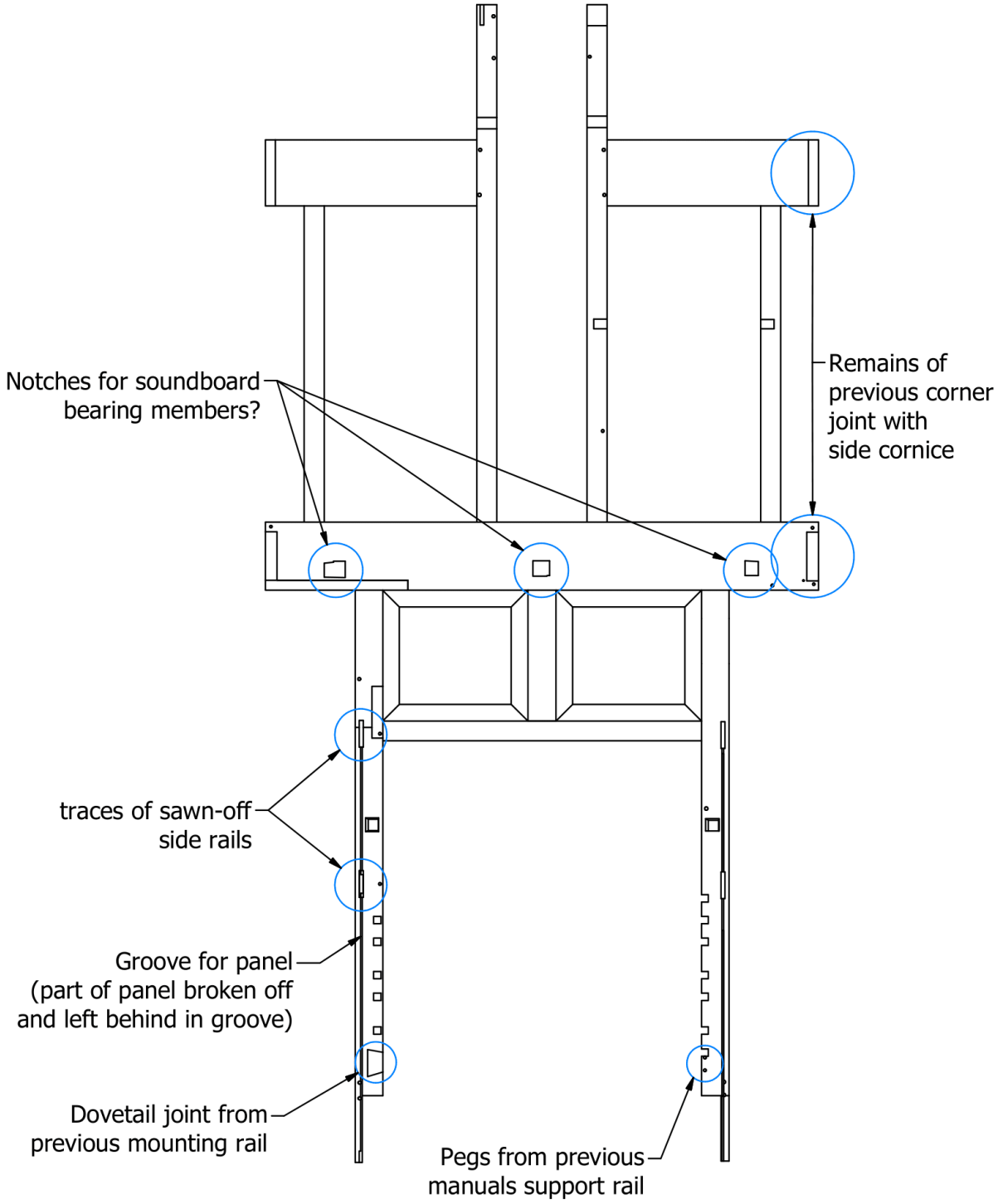


Figure 6: Brebos case only, view on inner surface, façade casework

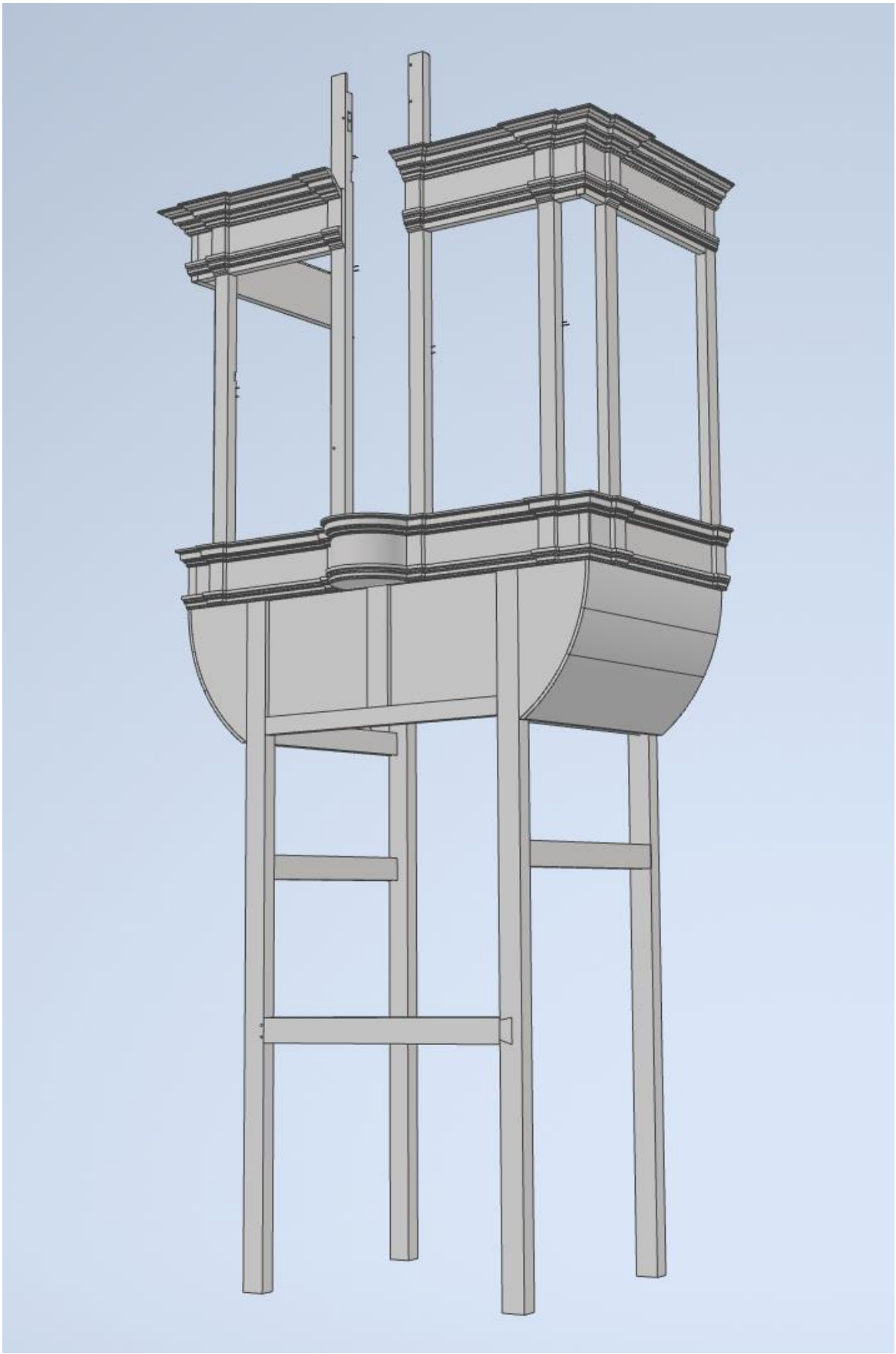


Figure 7: Visual reconstruction of how (parts of) the Brebos case may have looked

Middle tower

There are several clues which make it possible to carve the line between the Brebos part of the organ case and the later additions. To begin with, it is clear to see that the central tower has been extended upwards (perhaps to fit longer pipes) by the same builder who also built the outer towers. The cornice and mouldings around the central tower are near identical to those on the side towers. The upper façade posts which extend up to the central cornice appear rather odd since they are substantially broader than their counterparts one level lower.

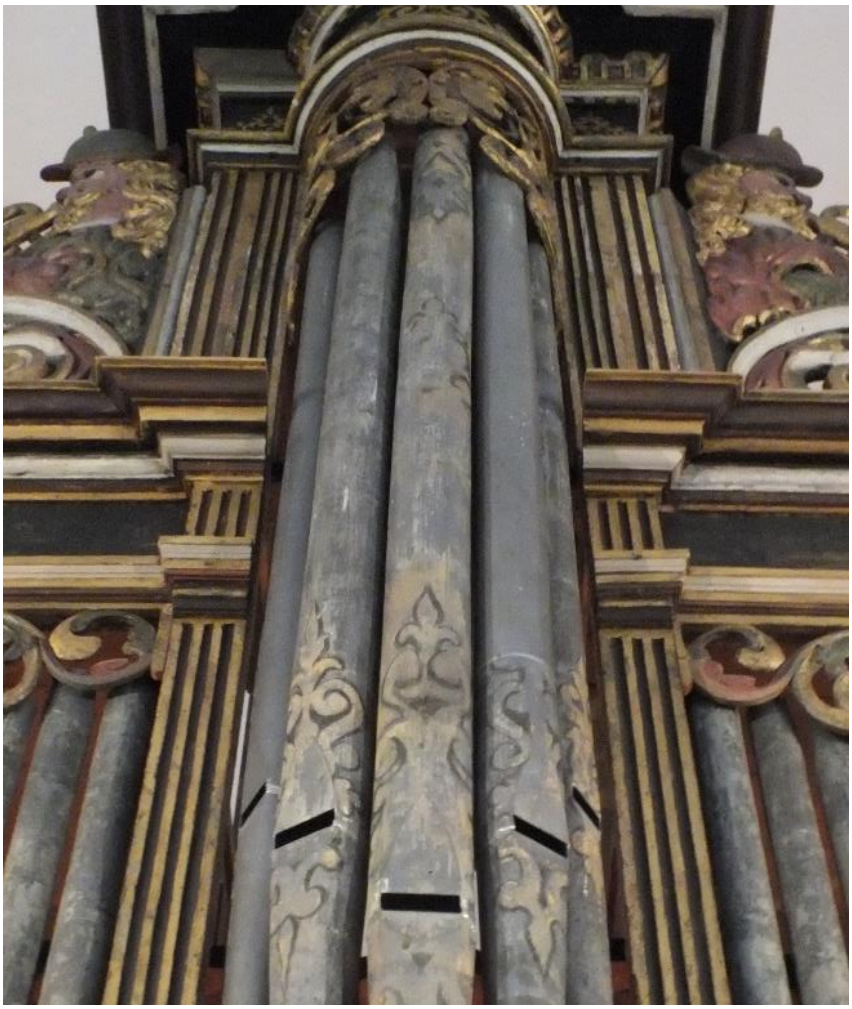


Photo 4: the original width of the lower Brebos front posts with their broadened counterpart standing above.

The triple fluting that is painted black corresponds to and is in line with the fluting that is found in the lower parts of the posts. This fluting also is visually identical to the fluting in Morlanda.

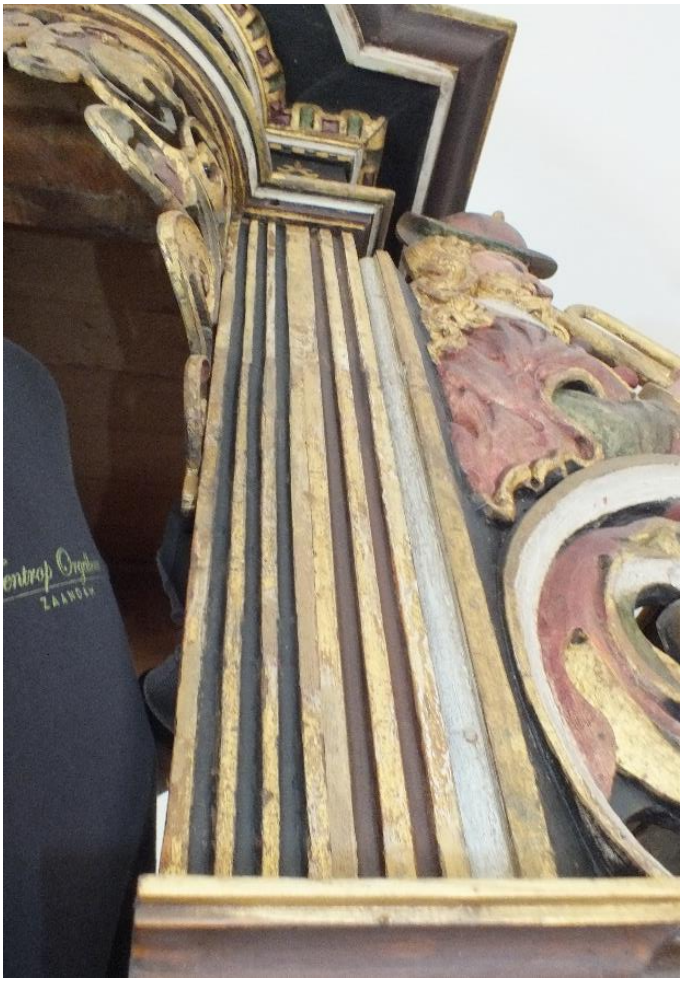


Photo 5: view of one modified front post, demonstrating the irregular fluting

Closer inspection reveals that these posts are partly original Brebos material, but they have been broadened and extended upwards. In this way, the central cornice (presumably larger than the original Brebos cornice it replaced) now has a better aesthetic correspondence with the larger cornices of the outer towers. The joins between the Brebos case and the later material are more evident from the inside, where the bare timber is exposed.

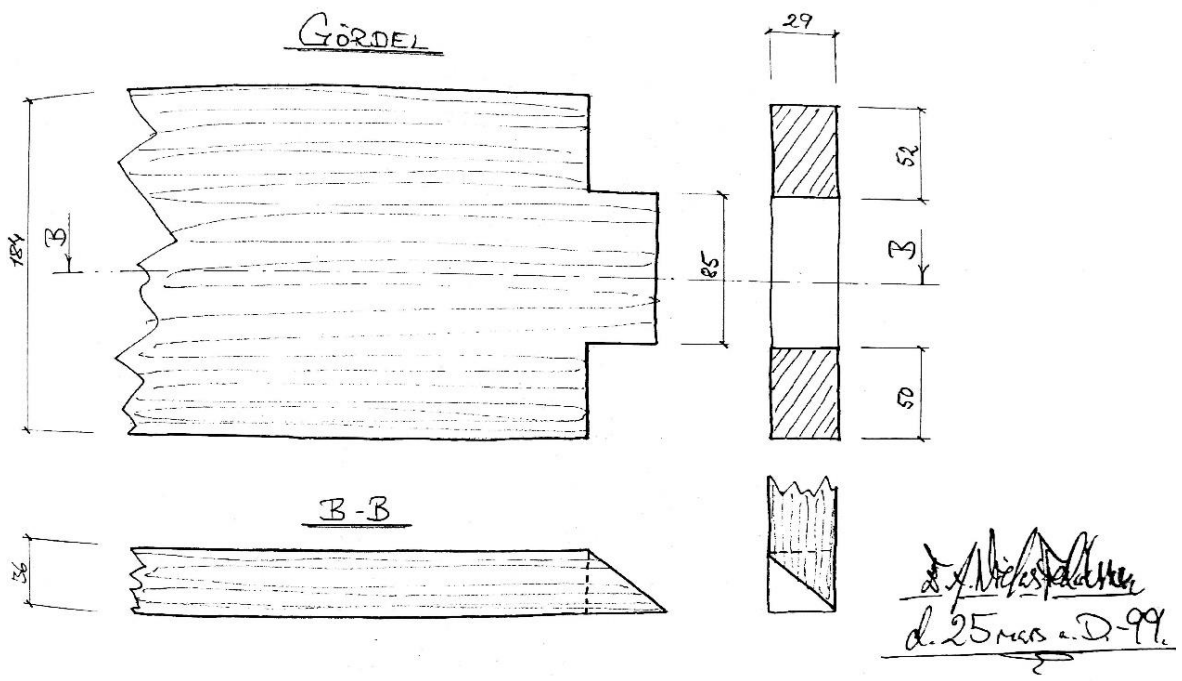
Photo 6: view from inside the middle tower

Width of the case

Figure 6 indicates the location of a number of other clues as to the original form of the Brebos case which are visible on the inner side of the casework. The remains of the corner joints to the cornice and impost frames are still visible. During the preparation of the dendrochronological survey of the organ, the filled-in modern material in one of these corner joints was chiselled out. The resulting exposed mitred joint bears a striking resemblance to the corner joints of the cornice frame in Morlanda, as shown in the below excerpt from that organ's documentation.

Another striking similarity with Morlanda is that the corner of the impost does not coincide with a front post, but with an open pipe field. In Morlanda, on both sides a statue is placed here. In

Torrlösa, we find three pipes on both sides to fill the front side of the opening. How the opening around the corner was filled, cannot be established anymore.



Excerpt GoArt Organ Documentation reports, No. 1
drawings section p. 11 (Niclas Fredrikson 25 March 1999)

Photo 7: remains of a cornet joint in the rear side of the Brebos impost frame. On the left side an old notch, possibly for a soundboard member, is visible.

Photo 8: Frobenius material partly chiselled out, revealing the mitred joint

Photo 9: a similar situation at the other end of the impost frame

The little doxology “(GLORIA) PATRI ET FILII ET SPIRITVI (SANCTO)” is incomplete. This text was hidden before 1960, and apparently revealed during the restoration in 1960, (cf. photo 3).

Photo 10: incomplete doxology

At the right, we even still can see a slight shape of an “S” under the present black paint.

If we would add the words GLORIA to the left and SANCTO to the left, the current surfaces of the corner fields (113 mm) are clearly not sufficient. Therefore, combined with the confirmed case width in the previous paragraph, we can be sure that the side façade fields must have run around the corner. A test based on the surviving characters lead to the conclusion that “GLOR” (240 mm) was on the left side, “IA” (113mm) on the front, mirroring “SA” (113mm) and “NCTO” (240 mm). The depth of the corner façade field apparently was not equal to the width, but approximately twice as deep.

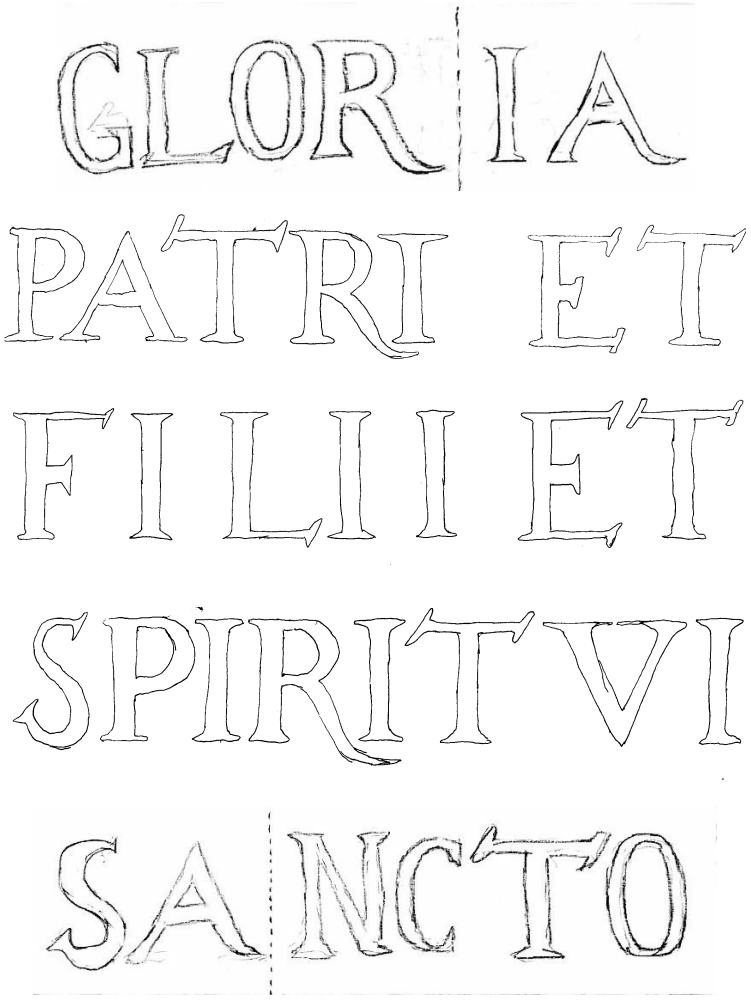


Figure 8: scaled and completed compilation of the 1:1 copy of the text

Soundboard supports

Also indicated in *Figure 6* and visible in the photos above are three notches in the rear side of the front impost frame. These are most likely notches where soundboard support members would have been positioned. The members would also have probably been supported in a parallel rail on the rear side of the case, however, only the front of the Brebos case remains today. A construction similar to the surviving impost frame in Morlanda is likely.

Keyboard rail

As discussed above, the position of the keyboard mounting rail could be indicative of the original length of the lower front posts of which only the upper portions remain. Comparison with the documentation drawings of the Morlanda casework does reveal some differences in the dimensions of the two cases, so it is clear that the organs were not identical.

Side walls

Located in the rear side of the lower front posts are several mortises into which rails would originally have been tenoned. There are also the remnants of a sawn-off rail still in one mortise, and the remains of sawn-off panels in a long groove in the same posts, indicating that there was originally a side wall to the lower case at this place. Part of the openings are filled with oak wood from Frobenius, perhaps to stabilize the post.

Photo 11: sawn-off tenon from a side rail in the lower case

Figure 7 is a visual reconstruction (partial) which merges together all of the clues discovered on the casework in Torrlösa with the documentation of the existing case in Morlanda. The cornice and impost frame have been completed with sidepieces and the moulding extended around this. The curved shoulder constructions under the impost frame on either side are based on the documented examples in Morlanda. The discovery of mortises in the underside of the impost frame at this place confirm they also once existed in Torrlösa.

Photo 12: mortises in the underside of the side parts of the impost

The length of the lower-case posts has been reconstructed based on the distance from floor to mounting rail measured in Morlanda, and then translating this to the organ in Torrlösa where the mounting rail still exists, but the front posts are sawn at their lower end.

David and Organist Panels

Above the keyboards, right under the impost, a post divides the front case in two panels, on which David and an organist are painted. Both the middle post and the panels seem to be authentic, when seen from the inside.

Photo 13: David and the organist

Seen from the inside, the middle post, the beam and the two panels do not bear signs of a younger age. Unfortunately, it was not possible to take dendrochronological samples from these parts.

Photo 14: inside view from impost and the top side of the two panels

Mouldings

Two mouldings of the Brebos case have been preserved: the profile at the impost, and the profile at the cornices at both sides. Both mouldings consist of some original parts and some Frobenius parts. In photo 3 we can see the parts that Frobenius made were already missing before 1960. Because the new parts are copied quite precisely from the old ones, and the authentic parts cannot be measured as easy as the new parts, the new parts were the model for our 1:1 contact-drawing. The middle tower has not survived, but it is likely that the moulding of the side field has the same profile as the lost middle tower, since this is the case in Morlanda. The middle tower of the organ case in Torrlösa has sawn-off tenons that suggest at least that the height of the cornice was the same for middle tower and side fields of the Brebos case.

Both Brebos profiles are not identical to the profiles in Morlanda, but have a very similar size and shape. This fact does not prove nor disprove that the cases were made by the same person, but it tells us that the periods in which both cases were built were not far apart.

It is clear that the mouldings of the pedal towers, and the middle tower are from a different style or period (Lorentz).

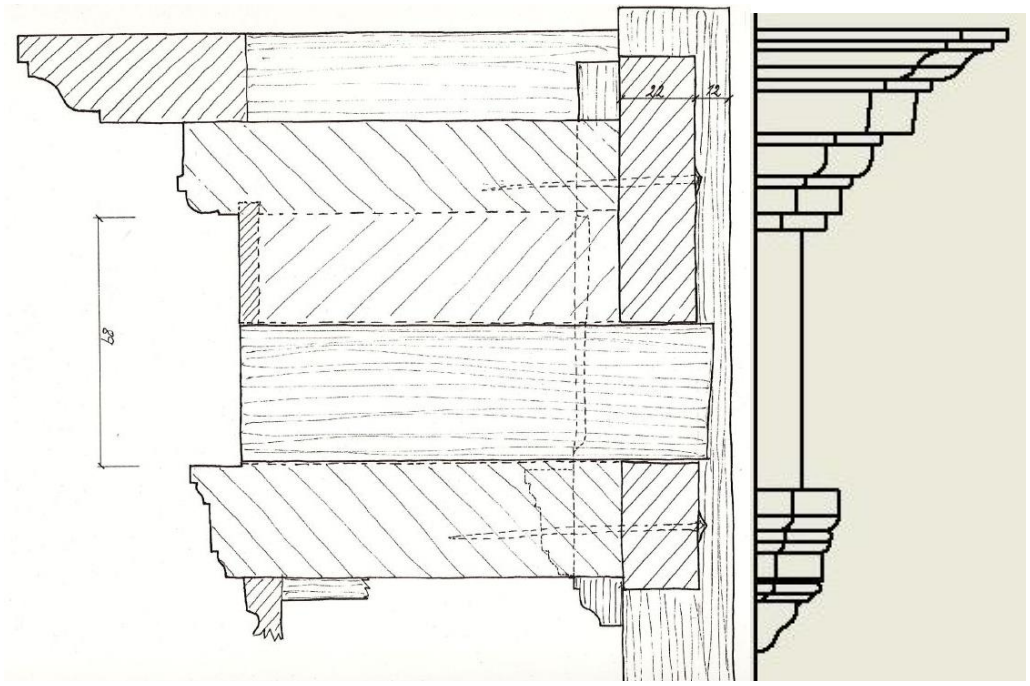


Figure 9: excerpt from pg. 12 GoArt research Document Morlanda (24 March 1999 Niclas Fredrikson); excerpt from 3D-model Torrlösa (Flentrop 2021), upper moulding Brebos 225 mm high

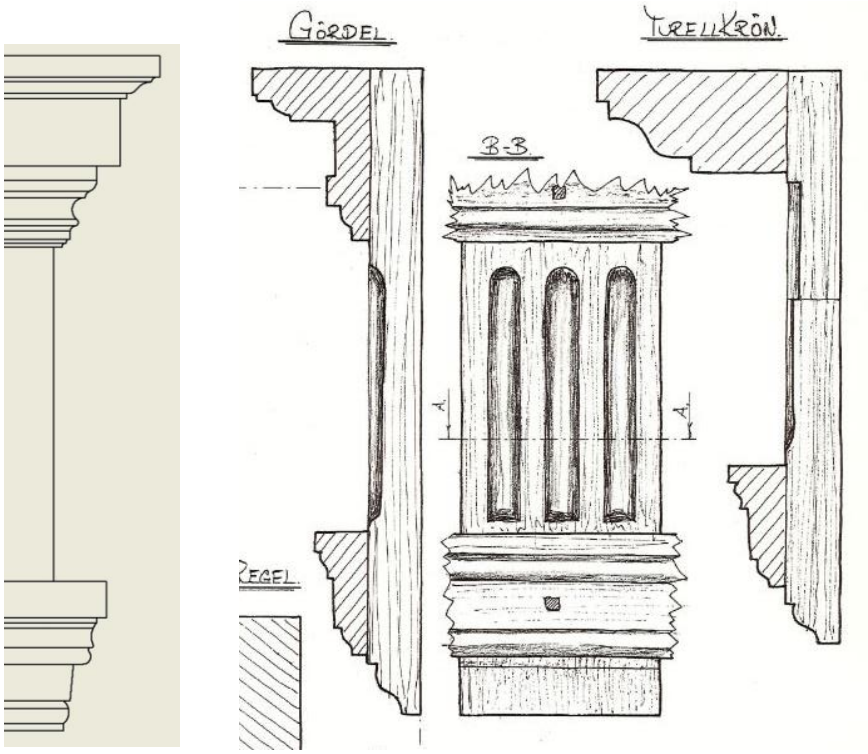


Figure 10: excerpt from pg. 13 GoArt research Document Morlanda (24 March 1999 Niclas Fredrikson);
excerpt from 3D-model Torrlösa (Flentrop 2021), lower moulding Brebos 204 mm high

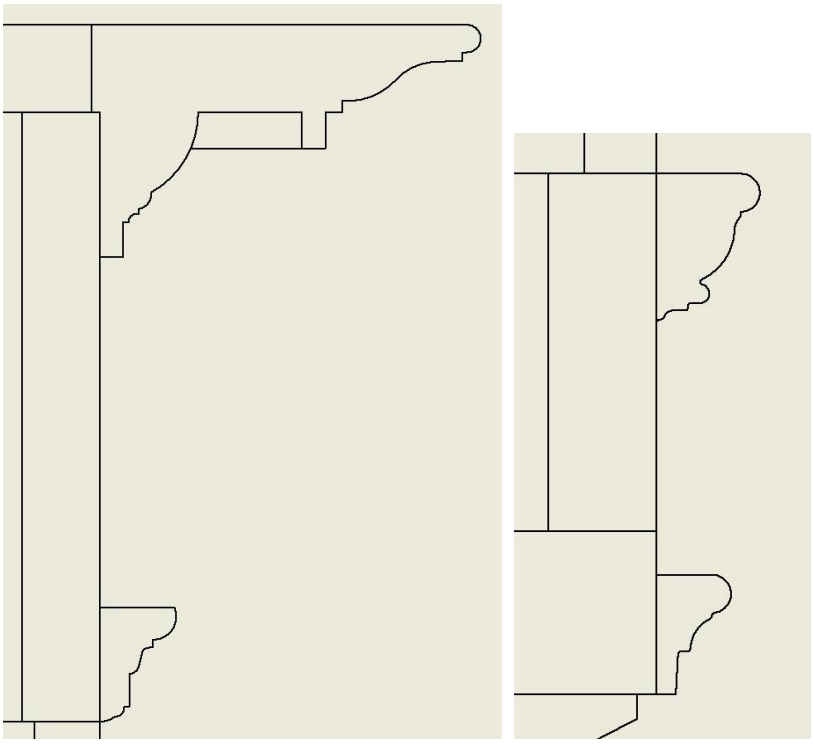


Figure 11: excerpt from 3D-model Torrlösa (Flentrop 2021), upper moulding Lorentz 320 mm high, lower moulding Lorentz 217 mm high

Wood carving

The wood carving in the Brebos case differs from the carving in the side towers from Lorentz. The thickness of the parts is given in this table:

Middle tower top	7-12 mm
Middle tower bottom (composed)	10 mm
Flat fields top	11,5 mm
Flat fields bottom	9,8 mm
Open fields side	9,5 mm
C IV top	34 mm
Lions	34-41 mm
Posaune players	30 mm
Pipe shades pedal tower top	11,7-14,6 mm
Pipe shades pedal bottom	12 mm

It is clear that the Brebos pipe shades are about 10 mm thick, and the other parts are thicker. The pipe shades of the pedal towers are only slightly thicker that the Brebos shades, but they have a different feel. For instance, the frame of the Brebos shades is as wide as the thickness of the wood. At the pedal, the width is considerably more.

The loosely placed toe board of the middle tower consists of a heavy oak semicircle from 1962, with a free composition of Brebos-carving attached to it. This part has nothing to do with the Brebos case as it came to us but could tell us about now missing Brebos parts. All parts seem to have been forced around the semicircle but were originally made as flat parts.

Below, a photo collage of the five major pieces of the semicircle is shown, with a scaled copy of the 1:1 contact drawing.
The three right pieces each show a more or less complete part, of about 110 mm wide. The utmost right part suggests having been placed in a corner, as the corner field of Morlanda shows. Overall, there are more Brebos-parts than available positions in the present organ.

Photos 15-16: Brebos carving around toe board middle tower

Although this composition of Brebos ornament is mounted on a 1962 oak semi-circle, the composition has not been created in 1962, since both the drawing *(Figure 3)* and the photo *(photo 3)* before 1962 show a very similar layout of Brebos ornaments.

It is likely that the ornament parts belonged to the Brebos organ, and since at present the wood carving is more or less complete, these parts were mounted elsewhere after they were redundant.

A possible source might have been the side façade fields of the case, that we estimate to have been 240 mm deep. Another source is a former Ruckpositive. Since literature states that the Ruckpositive was added by Lorentz, we think the first option is most likely.

David Burmester suggests in an email that middle tower was made round by Lorentz but was flat before. If we would place five pipes, FGABH in this flat field, the pipes would barely fit. A lower compass is not possible, and fewer pipes do not lead to a reasonable layout. Besides, the Morlanda case has a round central tower. We therefore think that the middle tower always was round.

3.5 The Lorentz case

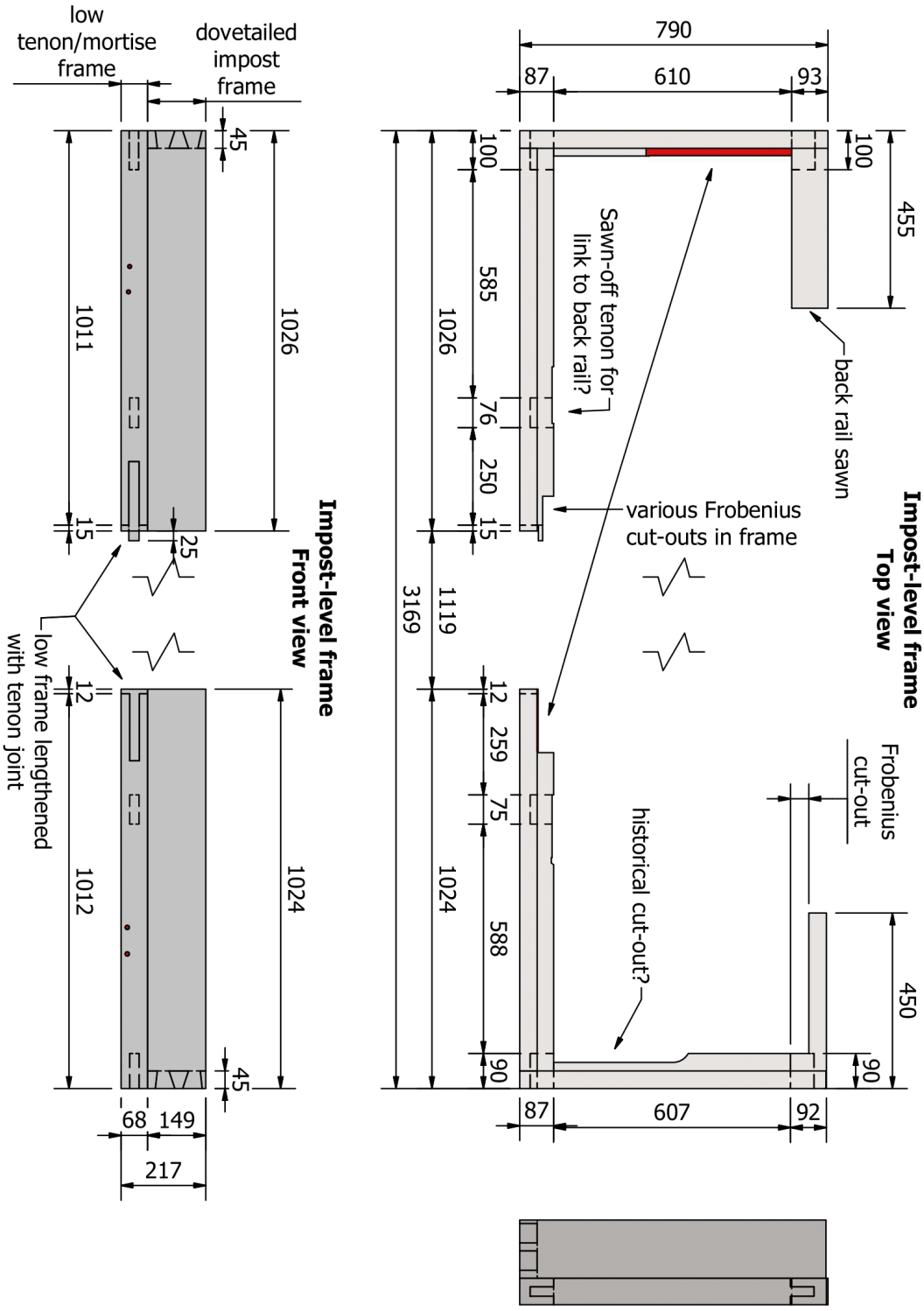


Figure 12 – Impost-level frame (Lorentz)

There is sufficient evidence to suggest that Johan Lorentz was the builder who took the Brebos organ case and extended it with the two outer towers and the higher central tower. The dendrochronological survey reveals that the outer sections of the case are built from trees with an approximate felling period of 1619-1633. Although this does not directly link Lorentz to the organ in Torrlösa, he was intensely active in the region around this period, including rebuilds of other Brebos organs. In addition, Lorentz was privileged organ builder to the court of Christian IV, King of Denmark (1596-1648), so he is perhaps the most likely candidate to have been awarded such a commission. The carved emblem 'C 4' standing atop the central tower is a clear link to the reign of Christian IV during a major phase in the organ history.

The chapter on the historical façade pipes details other links between Lorentz and the organ in Torrlösa.

Depth of the case

Notable features of the Lorentz casework include the docking of the two cornice frames which crown the outer towers. As previously discussed, and as can be seen in *Figure 2* (side view) the cornice frames are original material for approximately half the depth of the main case. The rest is completed with Frobenius material from 1962. It has been suggested that the case may once have been positioned close to a ceiling, tight underneath an archway, and that this might have been the reason for needing to doctor the cornice frames in this way. Unfortunately, there is no clear evidence how deep the cornice frames may have been originally. It is reasonable to assume that the depth without the Frobenius material is close to the original depth, since this depth corresponds to the depth of the impost, and there is no information on any rebuilds or moving of the organ which would have required such alteration of the case other than the 1850 replacement to Torrlösa. The link between the case and the church in Helsingborg is discussed in more detail below.

Impost frame

The main impost frame shown in *Figure 12* has some notable construction features. To begin with, this central frame would typically be a single rectangular box made up of four rails (front, back and two sides) joined at the corners with dovetail joints. The Lorentz construction is somewhat different, being comprised of a low but broad base frame joined at the corners with tenon and mortise, and on top of this the typical high impost frame with dovetailed corner joints. These two constructions are flush with each other on the outside, with a continuous moulding wrapping round the frame, but the low tenon/mortise frame creates a ledge all the way around on the inside, on which perhaps the soundboards could have been mounted. The location of the tenon for the inner beam of the base frame matches with the inner façade post. This corresponds precisely to the maximum size of the soundboard for the pedal.

Photo 17: tenon for inner beam of the base frame

This frame has been repeatedly doctored to suit the given situation. Frobenius squeezed an excessive amount of organ (including regulating wind boxes for each of the three soundboards) into the lower case, and this is shown by the numerous cuts made in the low frame. Other cuts, however, appear old enough to be from the time of Lorentz, and could perhaps indicate the location of pulldown wires from the soundboard(s).

Photo 18: the low frame as seen from below, showing the side rail tenoned into the front rail. There is a very old cutout (perhaps for the last pallet pulldowns at the edge of the soundboard) in the side rail.

Photo 19: the same frame but showing the side rail tenoned into the rear rail.
The rear rail was recently cut out here for the pulldowns of the Frobenius soundboard.

The fact that the Lorentz impost frame was added after the Brebos impost frame means that, when normally the front rail would be one long continuous piece, in Torrlösa it is interrupted by the two front posts of the Brebos case which intersect it. Seemingly it was not possible to extend the Brebos impost into one long continuous rail, which would have been more aesthetically pleasing. Perhaps this was due to height restrictions meaning the side towers had to be positioned lower than the central tower.

Connection of the Lorentz case with the Brebos case

Figure 12 shows only the Lorentz impost-level frame (both the low tenon/mortise frame and the dovetailed frame on top). The dovetailed frame continues until the intersection with the Brebos post, however, the low tenon/mortise frame has a rather odd join in it to lengthen the rail by a little over one centimetre, just before the intersection with the Brebos post. Normally it could be assumed that the organ builder simply made a mistake, and that the two frame sections were made too short by accident. The length of the tenon let into the front rail on either side, however, suggests a lengthening to this front rail which was much longer than is currently the case. A logical explanation for these joints is not available without challenging the width of this part of the case.

Additionally, there appear to have been two more sections of low frame linking the front rail to the back rail. All that remains now are the two sawn off tenons left in the mortises on the front rail. Since the back rail no longer exists in this position, it is unclear whether they would also have been tenoned in here, although it is likely they were.

Photo 20: joint Lorentz impost and Brebos case, right of the keyboards

The long tenoned joint in the front rail (with a modern cut out) was extended 12 mm to reach the Brebos post on the right of the photo. On the left, we see the sawn-off tenon still in a mortise, which would have connected front and rear rail.

Photo 21: joint Lorentz impost and Brebos case, left of the keyboards

On the opposite side we see the same extended front rail. This place is more difficult to inspect due to Frobenius material glued to the historical case. Here the frame extension continues on beyond the back side of the Brebos front post.
A clear explanation for this lengthening is severely restricted due to the modern cut outs, made in 1962 to allow large wind components to fit inside the lower case.

Photo 22: the right joint, seen from outside

Although it would have been easy and logical to make a constructive connection on this point, the joint between the Brebos posts and the Lorentz impost is empty. It could not be inspected due to the glued-on blocks by Frobenius, if there ever was a wood joint that was meant for the Lorentz impost, (or the vertical part of the armpit of the Brebos case).

If a Lorentz joint on this point is not in place, there is serious doubt if it was Lorentz' intention to connect the pedal towers in the way the organ case came to us.

Photo 23: joint upper case Lorentz – Brebos

Photo 24: detail of the wood joints on the opposite side

This is supported by the joints between the upper case of both pedal towers. At the location of the connection of the upper moulding of the Brebos case, we find traces of an historic joint, that however is filled with Frobenius-oak wood, and conflicts with a mortise that would serve for a beam to connect front post with rear wall. This all leads to the conclusion that the present connection between Lorentz and Brebos case is not original, but an invention of probably 1850.

Side wall and armpit arches

The concave ‘armpit’ arches between the lower case and the Lorentz impost frame, although old, appear to have been added at a later moment during the construction. As is shown in the photograph, it is clear that the side wall of the lower case previously continued all the way up to the impost frame. The side panel has been sawn through (the vertical groove for the panel is still extant) and there are sawn-off tenons from missing rails still remaining in the front and rear corner posts.

Photo 25: 'armpit' from inside

Position of the monogram and lions

The lions and the monogram seem to belong together. The lions would like to hold the monogram, but unfortunately, they are located on distant pedal towers, only allowing them to reach for the monogram. It is clear that this tense layout does not match the intentional position of monogram and lions. Below, one of the lions is shown from behind. It can be seen that the lower paw is cut diagonal, and that there is a recess for a profile in the corner. This is similar to the opposite side.

The monogram, also seen from behind, shows two major reconstructed parts at the sides. This was probably done in 1962; at photo 3 these parts are missing, and the monogram is flat at the sides. It cannot be established if these two sides ever were there, because the reconstructed parts block the visual inspection at this point. A somewhat flatter shape would, however, suit the paws of the lions better.

The fixation of all three ornaments on the case shows all signs of a relatively modern operation. The fine woodwork points to an organ builder like Frobenius, who must have reconstructed all missing parts in the ornaments. Below we tried to visualize how we might bring the lions and the monograph together. For this, we used 1:1 paper drawings of the ornaments, that were then transferred to our AUTOCAD drawings, and replaced by photos of the same size.

Photo 26: Lion seen from behind

The horizontal distance of both lions next to the (narrow, Brebos) middle tower could work. As we can see below, the paws would touch the monograph were we know it is old.

The vertical position is less satisfying. The lions are floating above the roof of the flat fields, and still are too low to get hold of the monograph. The recess for the lowest profile of the moulding that must have been at the top of the Brebos middle tower, however, does correspond precise with the position where it must have been. On the inside of the front post, we can still see the Brebos tenons for the two beams being the basic construction tor the round tower. All in all, we can conclude that the lions never held the ornament on top of the Brebos case.

Photo 27: monograph from behind

After 1628 or 1641, the flat fields were occupied by two trumpeters, who clearly like to sit where they are. The trumpeters do match the style of the other “Lorentz”- ornaments. If Kjersgaards theory on the enlargement of the middle tower in 1628 would be correct, the lions would fly even higher over the flat fields and would not be able to touch the monograph. And to have them all on top of the middle tower does not fit. Besides, the recess would not serve any purpose.

Therefore, we conclude that the three belong together, but not on the main organ, but on the ruckpositiv. Discarding the ruckpositiv in 1850 made the ornaments redundant.

Photo 28: attempt to reconnect lions and monograph

Panels

The panels were numbered during the documentation process. Please compare the table below with Figure 1 to identify the panels.

There are panels from pine and oak, and they have a rough and smooth, flat inner surface. This is shown in the table below.

In paragraph 3.2 Dendrochronology, panel 4 (sample 3) and panel 3 (sample 4) have been tested.

Nr.	position	position	position	material	inner surface
1	Left	Front	under Brebos armpit	Oak	Rough
2	Right	Front	under Brebos armpit	Oak	Rough
3	Left	Side	Upper	Oak	Flat
4	Left	Side	Lower	Oak	Flat
5	Right	Side	Upper	Oak	Flat
6	Right	Side	Lower	Oak	Flat
7	Left	Front	Upper	Oak	Rough
8	Left	Front	Lower	Pine	Flat
9	Right	Front	Upper	Oak	Rough
10	Right	Front	Lower	Pine	Flat
11	Middle	Front	Above console	Pine	Rough
12	Left	Front	David	Oak	Flat
13	Right	Front	Organist	Oak	Flat

Figure 13: table of properties of the panels

3.6 The Fogelberg organ

At the occasion of the displacement of the organ from Helsingborg to Torrlösa, the entire case had to be disassembled and transported. The Fogelberg rebuild included all historic parts that are still present in the organ, as well as a huge enlargement behind the organ. This can be seen on the drawings of architect Leon-Nilson in 1958.

Below, one of the side walls is shown. On the same drawing, also the layout of the (pedal) pipes in the large case can be found. This shows that the layout of the 1850 instrument was completely different than any 16th-, 17th- or 18th-century organ would be.

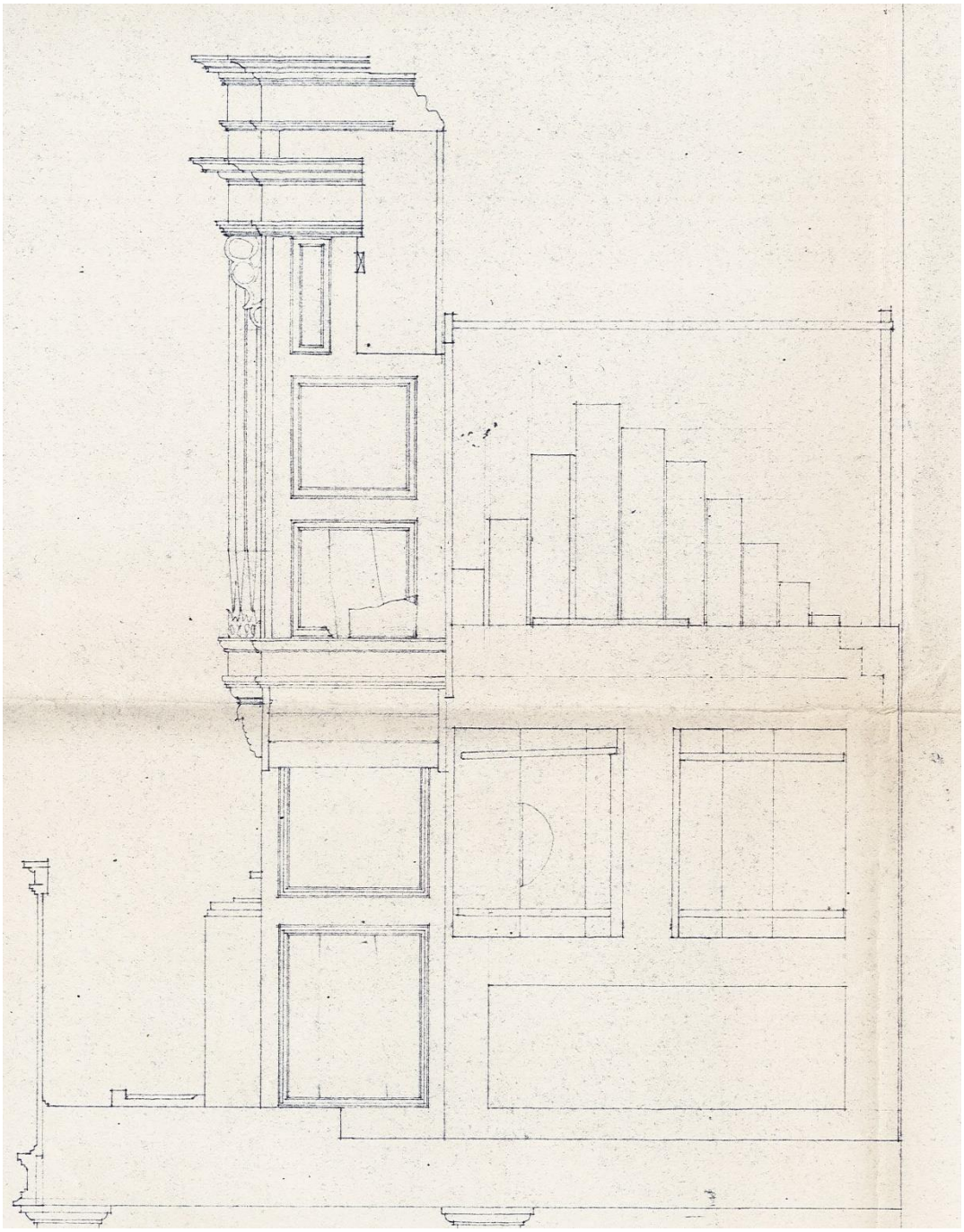


Photo 29: excerpt from drawing 1958, showing situation 1850-1960

The side wall on the opposite side contained some panels, that at present are on display separately in the church in Torrlösa. It is unclear to what extent the case extension was part of an historic ensemble, for instance for the bellows. Fogelberg used this space to install the pipes for his instrument. If we trust the judgement of the people involved in the 1960 rebuild, only material that was clearly from Fogelberg was discarded and all parts that came from Helsingborg were kept. The general front view of the instrument before and after the Frobenius rebuild in 1962 was more or less the same, of course with the exception of the added Ruckpositiv. Therefore, the earliest time frame in which the present layout was established is 1850, the latest 1641.

From here, evidence in the organ is hard to find.

A logical explanation for the not used joints between Lorentz and Brebos case would be that the pedal towers were disassembled from the central part and the three large parts were transported and reassembled in Torrlösa in the same position, but without reinstalling the joints. Another explanation would be that the three parts were reassembled in a different way, causing the old joints to not match their counterparts. It cannot be established from the case parts which of the two explanations is more likely.

It is mentioned that in 1850 the pedal sections of the organ were reduced. This would suggest that the connection between Brebos case and pedal towers is indeed an 1850 invention, and the towers were larger.

Below is a representation of how an alternative merge of pedal towers and Brebos case might have been depicted. In this case, the enlargement of the middle tower would reach exactly the same height as the pedal towers, which does not make a nice balanced picture, making this suggestion not very plausible.

Worth mentioning is that the mouldings of the Brebos case are missing on both sides of impost and upper case where they meet the pedal towers. These parts are replaced in 1962.

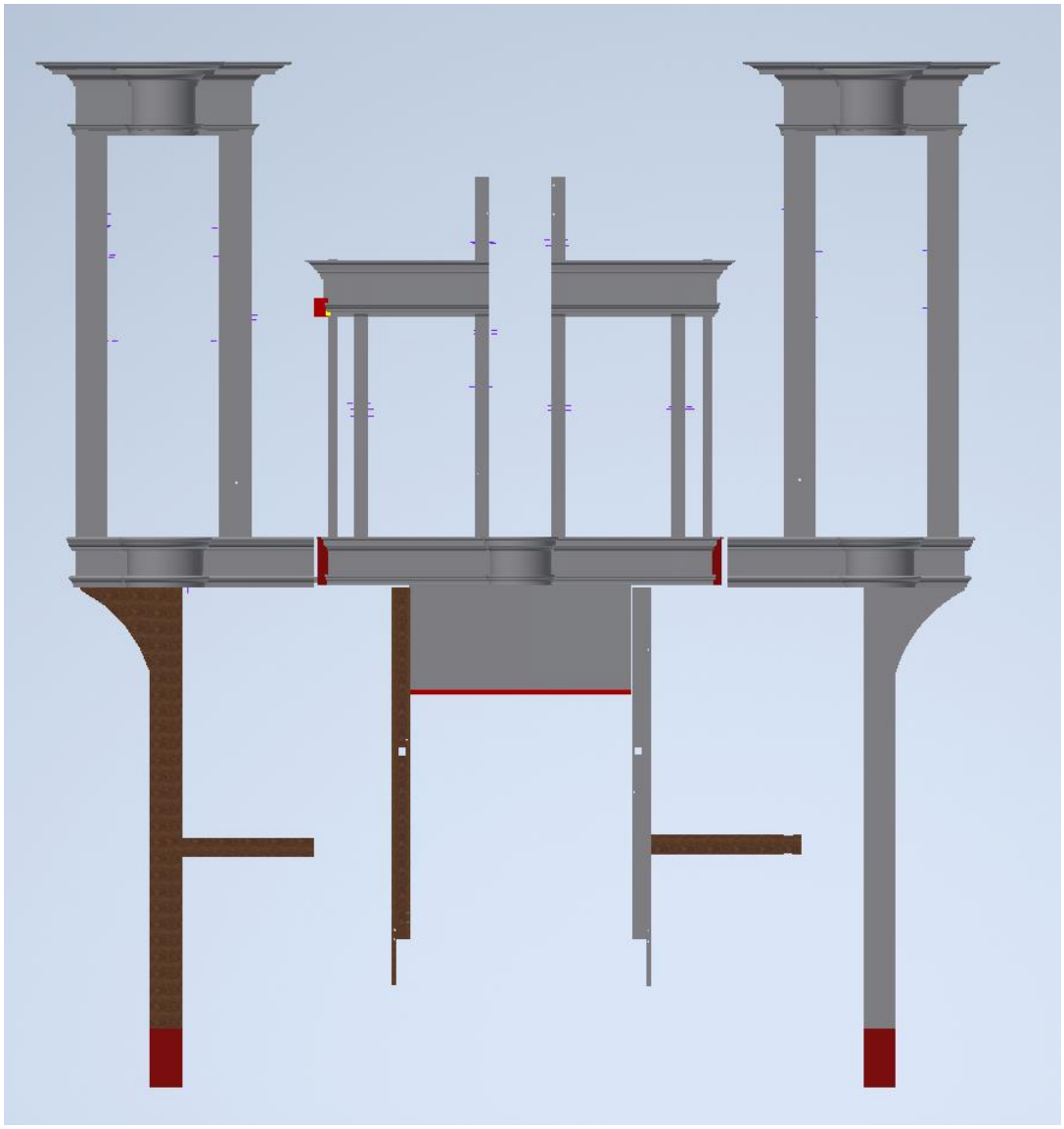


Figure 14: alternative position pedal towers

4. The organ in Helsingborg

The present instrument by Frobenius seems to have superseded all 1850 case parts and based the new case depth on the older material. The depth of the Lorentz lower case can be considered as the original depth since the impost frame is original. The three towers of the upper case show a pattern of partly renewed posts and rails. It seems that these parts are renewed because they were either missing or were parts from 1850. The overall picture is that the 1960 parts suggest an arch or vault that met the top of the case.

To investigate this theory, the Helsingborg church was surveyed and a 3D-model of the arch under which the organ is said to have been positioned was developed. This is shown in *Figure 15*.

The experiment confirms that this arch does indeed fit the shape of the case quite well when the 1960 additions (shown in red) are removed – see *Figure 10*. The pedal towers could have been slightly wider, but not much. This indicates that the assembly of the two side towers and the central part was not done in 1850, but more or less reflects the situation which existed at least before 1850. The much wider layout of the pedal towers as shown on the previous pages, does affect the possible height of the central part of the case, and would not lead to a conflict between middle tower and arch. However, the middle tower has the same new Frobenius parts as the pedal towers, suggesting all three towers must have conflicted with the Helsingborg arch.

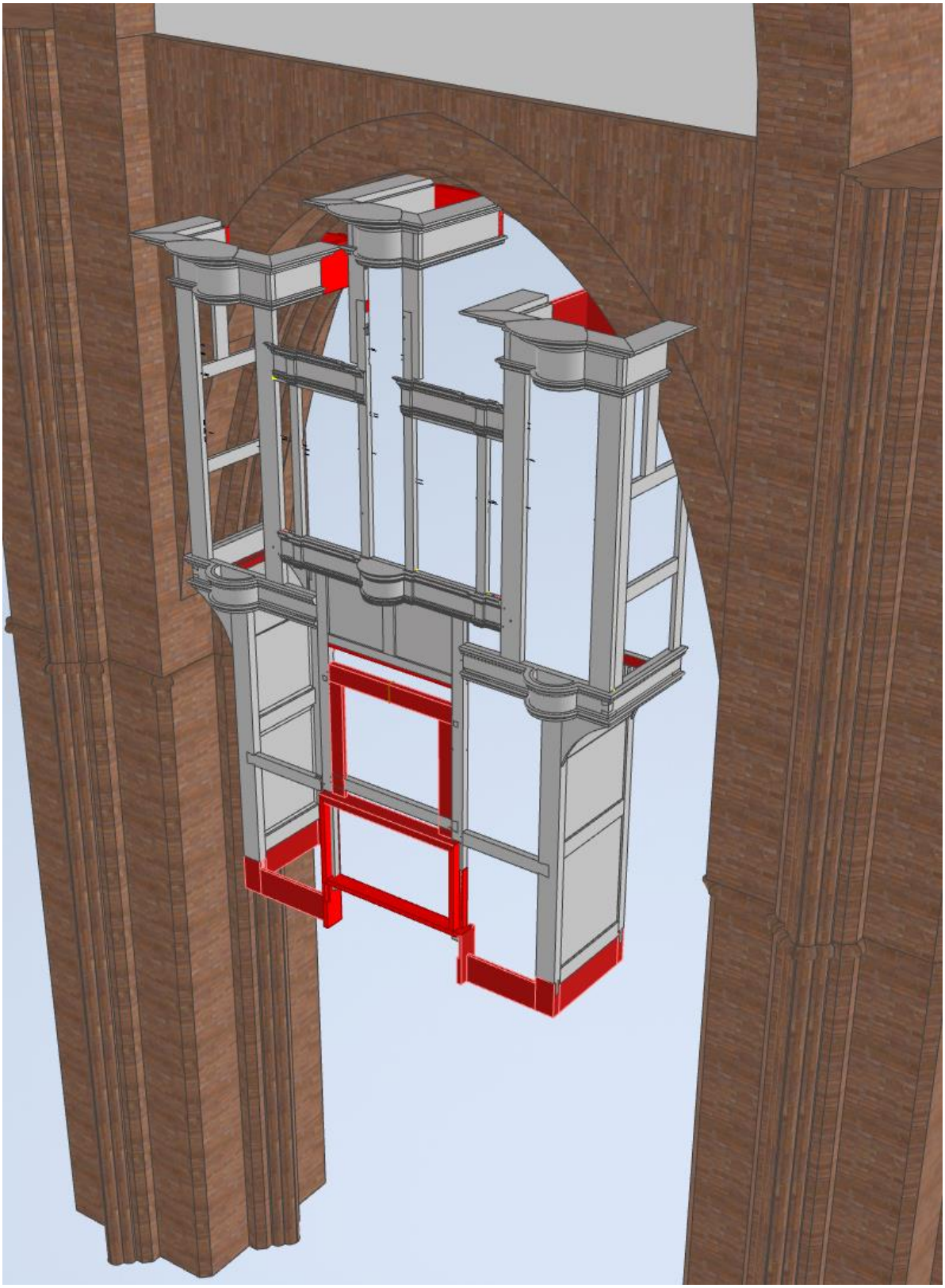


Figure 15: visual impression of how the existing organ case in Torrlösa would look when placed in the St. Maria's church in Helsingborg

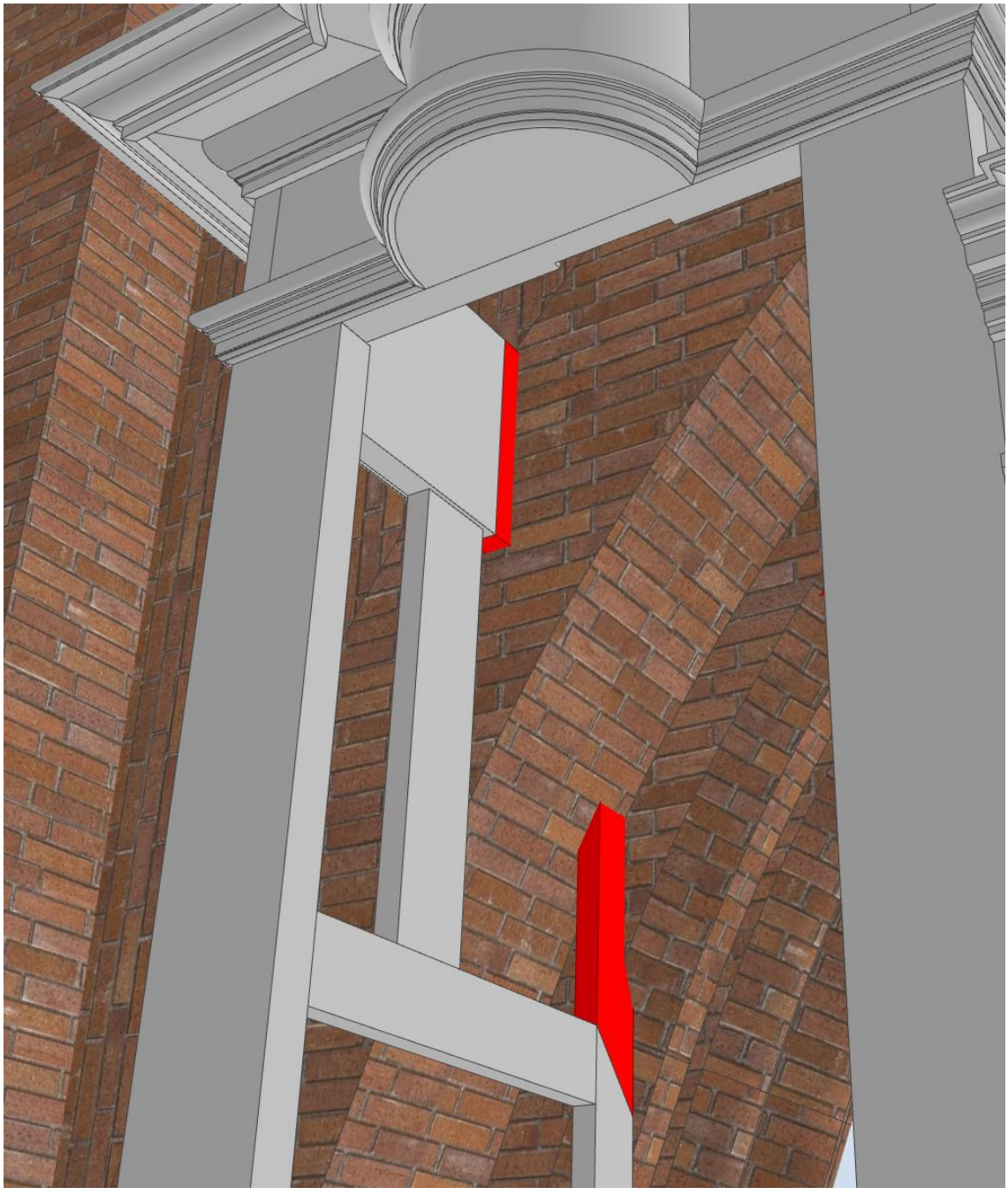


Figure 16 – the cutouts in the side towers (probably originally built like this) appear to suggest that the organ case in Torrlösa may have been positioned close underneath an archway, such as that measured in St. Mary's church in Helsingborg.

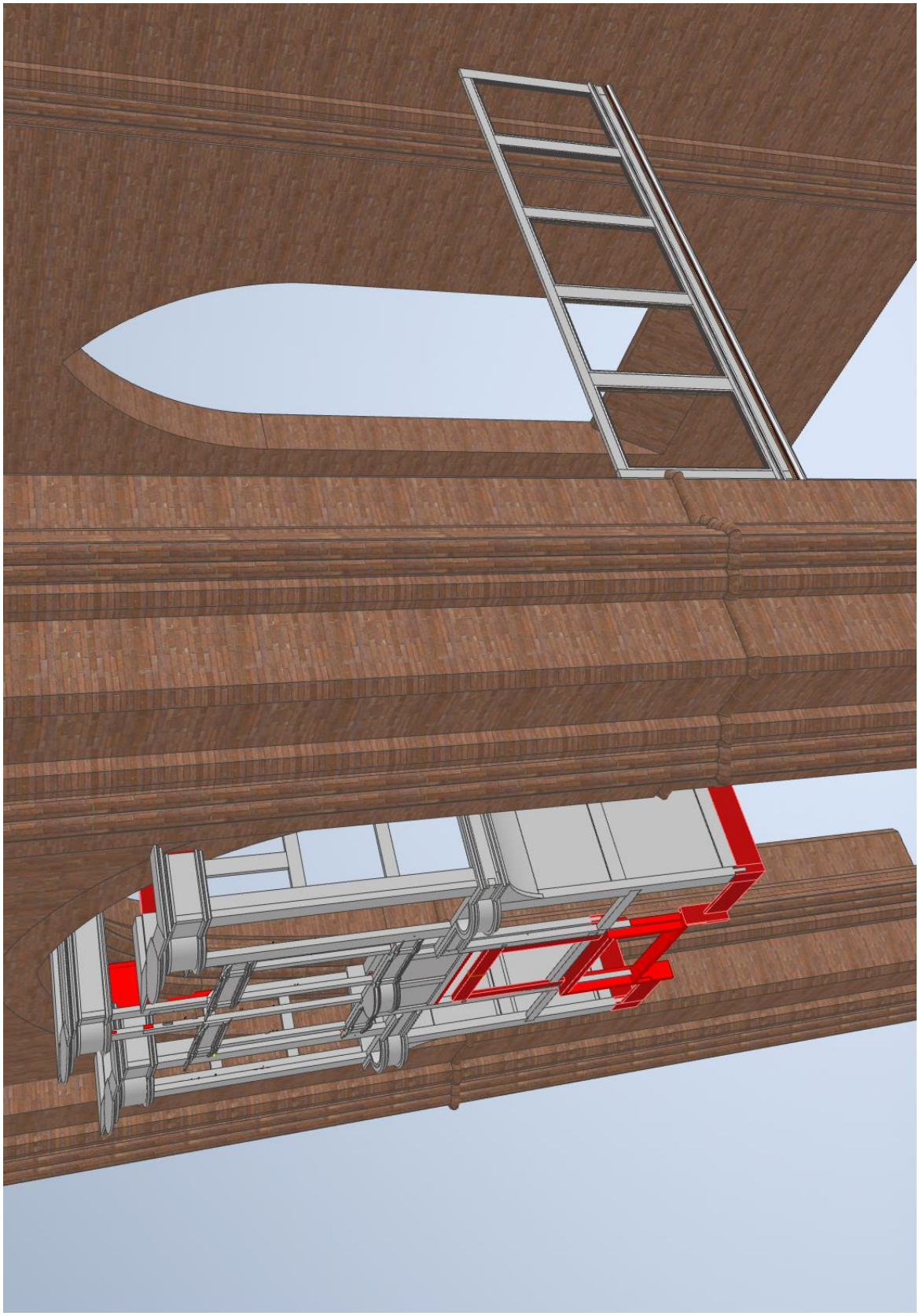


Figure 17 – a visual representation of how the panelled balustrade would fit in the side nave in Helsingborg. The balustrade may have been mounted inside rather than outside the pillar.

The balustrade to the organ gallery in Torrlösa is suggested to be part of the collection of other fixtures and furnishings which were also purchased from St. Maria's church in Helsingborg and moved to Torrlösa around 1850.

The balustrade can be divided into four main parts with 12 panels in total. On either side of the Frobenius Rückpositiv are two long sections of balustrade which hold painted panels depicting various saints. In addition, there are two separate sections (each with a single painted panel) which are hung on the side walls of the church either side of the organ gallery. Referring back to *Figure 3* (the architect's documentation of the organ before the Frobenius rebuild in 1960) it can be seen that these separate sections used to be mounted on the main gallery balustrade and were removed by Frobenius in order to put the Rückpositiv here. Indeed, it is also evident that panels 1 and 2 were part of a single structure with three vertical posts, and that the central post has been sawn down the middle. *Photo 3* confirms this clearly.

It has been suggested that the long balustrade sections currently on either side of the Rückpositiv (shown in the photo on the next page) may have been part of the gallery on which the organ stood in Helsingborg. The length of the balustrade sections does appear to closely match the available space between the church pillars which would have supported the organ gallery, and the side wall of the church. This is demonstrated in *Figure 17.*

The two separate smaller sections of balustrade, which were once a single structure, do not directly match the long sections. The mouldings are quite different on the small sections than on the long sections. A possible theory is that this central section was built in 1850 to fill the gap which was left when the two long pieces of balustrade were reused from Helsingborg.

Photo 30: one long balustrade section in Torrlösa, next to the Frobenius Rückpositiv and the spiral staircase.

The spiral staircase leading to the organ gallery in Torrlösa is said to have also originated from Helsingborg. The staircase is made of pine wood and has 16 steps in total, of which 3 are relatively new. The current distance in Torrlösa from church floor to gallery floor is around 3 metres, whereas the distance in Helsingborg (based on the theory that the organ was tucked underneath the archway) would have been more than 4 metres.

This shows that either the stairs were made considerably shorter when transferred from Helsingborg to Torrlösa, or that they were not part of the organ gallery in Helsingborg.

5. Historic artefacts in the church

The following items seem to have no connection with the church in Helsingborg, and therefore with the organ in Torrlösa:

The pulpit was taken from the old church in Torrlösa.

The altar resembles the style of around 1850 and apparently was built for the new church 1850.

An epitaph in stone, a painting from Bernadino Barbatelli, and a crucifix also are not linked in any way to Helsingborg.

The following items are of interest.

5.1 Balustrades next to the Ruckpositive

The balustrade can be divided in four main parts with 12 panels.

The mouldings of these balustrade parts do not match with any of the mouldings in the organ case. Therefore, the balustrade cannot be linked to any of the organ builders directly.

Photo 31, 32

All panels 3-12 are 759 – 764 mm wide, including the small moulding to keep them in their frame, and 112 cm high. The posts between the panels are 12-13 cm wide, except for the four middle posts

at the right. These are 106-108 mm wide. These different measures do not reflect a different style or age but may have been caused by the ultimate needed length of the whole balustrade (now 4563 mm left, 4530 mm right).

The total width between the aisle wall and the pillar in Helsingborg is 4475 mm at its widest. That means that the balustrade parts must have been a few cm in front of the pillars, which is plausible, as is shown in the previous chapter.

5.2 Single parts of the balustrade

The two balustrade parts with just one single panel, hanging at the church walls, are different from the larger parts next to the Ruckpositive. The moulding of the lower part, the frieze, is different in height and profile. The height of the painted surface of the panels is different (95 cm with a round top for panel 1 and 2, cf. 112 cm square for panels 3-12). This makes it clear that the larger parts at least were initially not in the direct vicinity or in line with the two separate parts.

The two balustrade parts have a total width of 110 cm each. Several theories about the provenance of these parts have reached us. The panels could have been on both sides of the Ruckpositive. The total opening under the arch in which the organ was placed is 432cm wide. This leaves a width of 213 cm for a Ruckpositive, which seems fairly wide. The Positive also would be placed protruding the church, so a position in the balustrade side wall came into the question as well.

All these ideas seemed to be pointless after we received photo 3, which shows the organ before 1960. Here the two balustrade parts look like one piece in the back of the organist. They seem to have been separated in 1962, and then hung on the church walls.

A closer look at this photo by David Burmester however taught us that even in 1962, there is a seam between the panels, suggesting they were separate before 1962. This is confirmed by the different wood species found at the connecting sides of the panels, and different direction of the grain of these woods. All these wooden parts seem to be much older than 1962, and therefor suggest that a separation, reunion, and repair of the cut section was done way before 1962.

5.3 The Balustrade panels

1. Separate part of the Balustrade, S. Bartholomaevs
Height 1418 mm, width 1108 (excl protruding part of the moulding)
Thickness panel 38 mm (bottom) to 34 mm (middle and top). Thickness posts 27 ½ mm.

Photo 33

2. Ibid. S. Matthaevs

Height 1422 mm, width 1113 (excl protruding part of the moulding)

Photo 34

Balustrade left to Ruckpositive with:

3. S. Petrvs

Photo 35

4. S. Andreas

Photo 36

5. S. Iacobvs Maior (1064)

Photo 37

6. S. Iohannes (1065)

Photo 38

7. S. Philippvs

Photo 39

Balustrade right to Ruckpositive with:

8. S. Thomas

Photo 40

9. S. Iacobvs Minor

Photo 41

10. Text

Photo 42

11. S. Simon

Photo 43

12. S. Ivdas S. Matthias

Photo 44

5.4 Stairs

13.Spiral stairs

The spiral staircase is made of pine wood. It has 16 steps in total, of which 3 are relatively new. The total height of all steps is about 295 cm.

The floor level of the organ in Helsingborg must have been around 444 cm. This shows that either the stairs were made considerably (150 cm) shorter, or they were not part of the organ gallery in Helsingborg. In the space on the former Helsingborg organ balcony, there must have been a ruckpositiv, a main case, a bellows room and a stair. Since the balcony itself is lost, we have no information about the layout of the room, other than common sense. There is plenty space to install all organ parts on this gallery including the stairs.

Photo 45

5.5 Separate panels

On a drawing by Leon-Nilson of 1658 the situation before the rebuild of 1962 is shown. On the right side of the case behind the Brebos-Lorentz case, we see two panels that resemble size and rear side construction of panel 14. Of the left side we seen two panels that look like panel 15 and 16. Panel 17 cannot be identified.

14. Panel Buxtehude 1641

Photo 46, 47, 48

15. Panel ….4: Ver. Lavdat…

The rear side is unpainted.

Photo 49, 50

16. Panel…. Lavdate Evm…

The rear side is unpainted.

Photo 51, 52

17. Panel Maria

This panel in painted on both sides.

Photo 53

Photo 54

6. Pipework documentation

Old pipework was discovered in the façade and in 7 of the 24 stops of the organ in its present state. There are 3 old pipes having a decorative role in the front of the 1962 rückpositiv. There are also old pipes stored in the church but not used in the organ. For practical reasons, the full comprehensive documentation of the historical pipework is presented separately in digital form.

6.1 Documentation process

The organ case as it stands today in Torrlösa is a reflection of six key moments in the instrument's past. For simplicity's sake, these will be referred to as follows:

- The Brebos organ (1585)
- The Lorentz extension(s) (1628 and 1641)
- The work of Hans Christoph Fritzsche (1662)
- The work of Georg Amdor (around 1700)
- The Fogelberg rebuild (1850)
- The Frobenius rebuild (1962)

Pipe identification

All pipes were carefully removed from the organ and each pipe was assigned a pipe identification number (pipe ID). The pipe ID corresponds to the pipe's current function, and it corresponds to the dark ink inscription on the corpus front, upper lip, lower lip, or back of the foot below the horizontal seam (dating 1962). Only the Pedal Rauschquint pipes have no ink inscription. The façade pipes were numbered temporarily from 1 to 59 from left to right, as seen when looking up at the organ from down in the main body of the church.

Documentation method

We measured the pipes in a standardised way. Frobenius pipes were not measured, as well as clearly modern or non-original elements, such as ears. In some cases, the measurement of certain elements was not possible. For example, the glued caps of the Gedact 4' and the very low cut-ups of the top octave of HW Octava 2' could not be measured. Taking off the caps was out of the question in order to avoid damaging the pipes. Some parameters were only measured when considered relevant.

The following instruments were used in the documentation of the pipework:

Digital callipers - Mahr Marcal 16 EWRi
Thickness gauge – Kroeplin POCO 2R
Digital Camera - Fujifilm FinePix HS 25 EXR
Digital Inspection Videoscope – AUTEL MaxiVideo MV400
Languid angle plates
Tape measure

All measurements are in millimetres, but the precision depends on the tools used.
For the pipe-wall thickness a precision of 0,05 mm was applied.

The digital callipers automatically measured to an accuracy of 0,01 mm, which was rounded to 0,1 mm, because the significance of the measurements was not that precise.
The circumference of pipe bodies and chimneys was measured with strips of thin paper, with a precision of 0,5 mm, from which the diameter was then calculated.

Pipe material analysis

A sample selection of historical pipes was chosen for material chemical analysis. Efforts were made to select pipes of differing visual appearance to ensure identification of all the different alloys found within the organ. The analysis was done using a portable X-ray Fluorescence Spectrometry tool, (XRF) provided by the Rijksdienst voor Cultureel Erfgoed (Cultural Heritage Agency), Amersfoort, Netherlands, for whose cooperation we are very grateful. This method is non-destructive, which made it possible to measure multiple pipes.

The result table below shows the measurements of lead and tin, the main components of these organ pipes. The exception is gold, present in the paint of one measured pipe. Other residual components such as copper, silver, antimony, bismuth and zinc below 0,1% were omitted, but can be found in the full results in Annex A.

The pipes attributed to Johann Lorentz are composed mostly from lead, with only 3,5% tin.

The pipes attributed to Georg Amdor have generally 13 to 18% tin.

The pipes attributed to Hans Christoph Frietzsche have between 12 and 15% tin.

The pipes attributed to Hans Brebos have around 5% tin, or a very high percentage (façade pipes) Unfortunately we were not able to transport and measure these very fragile Brebos façade pipes, but the corrosion pattern and other properties are known from pure tin pipes.

Analysis of the results:

Pipe ID	Sample Location	Pb %	Sn %	Pipemaker		A	B	C	D	E	F
PED Rq k1 Gs	body	80,09	19,72	E						19,7	
HW Oct 2 C	body	96,05	3,67	A		3,6					
HW Oct 2 C	foot	96,50	3,27			3,3					
HW Spfl 2 D	body	86,40	13,32	B			13,3				
HW Spfl 2 D	foot	88,08	11,70				11,7				
RP2	foot back side	96,64	3,12	A		3,1					
RP2	body back side	96,45	3,19			3,2					
RP2	body tinfoil	73,85	24,10							24,1	
RP2	gold paint on the lip	68,24	21,26							21,3	
HW G8 c2	body	85,65	13,85	B			13,9				
HW G8 c2	foot	86,34	13,06				13,1				
HW G8 c2	cap	90,22	9,44				9,4				
HW G8 cs2	body	93,22	6,52	B/D					6,5		
HW G8 cs2	foot	96,33	3,52						3,5		
HW G8 cs2	foot extension	89,23	10,44				10,4				
HW G8 cs2	cap	90,09	9,48				9,5				
HW G8 d2	body	94,43	5,21	B/D					5,2		
HW G8 d2	foot	94,49	5,32						5,3		
HW G8 d2	foot extension	89,32	10,30				10,3				
HW G8 d2	cap	89,46	10,12				10,1				
HW G8 d2	ears	68,73	30,69							30,7	
HW G8 f2	foot extension	97,48	2,02	D		2					
HW G8 g2	body	93,91	5,74	D					5,7		
HW G8 g2	foot	94,21	5,53						5,5		
HW Q 2 2/3 e1	body	86,65	12,83	C				12,8			
HW Q 2 2/3 e1	foot	87,71	11,94					11,9			
HW Q 2 2/3 f1	body	81,93	17,74	B			17,7				
HW Q 2 2/3 f1	foot	81,67	17,96				18				
HW Q 2 2/3 fis1	body	87,88	11,83	C				11,8			
HW Q 2 2/3 fis1	foot	87,17	12,56					12,6			
HW Q 2 2/3 g1	body	82,14	17,49	B			17,5				
HW Q 2 2/3 g1	foot	82,01	17,63				17,6				
HW Q 2 2/3 gis1	body	86,56	13,07	C				13,1			
HW Q 2 2/3 gis1	foot	87,26	12,44					12,4			
HW Q 2 2/3 a1	body	91,15	8,55	B			8,6				
HW Q 2 2/3 a1	foot	89,38	9,94				9,9				
HW Q 2 2/3 b1	body	86,96	12,73	C				12,7			
HW Q 2 2/3 b1	foot	87,21	12,49					12,5			
HW Q 2 2/3 h1	body	82,50	17,01	B			17				
HW Q 2 2/3 h1	foot	89,89	9,79				9,8				
HW Q 2 2/3 c2	body	83,56	15,90	B			15,9				
HW Q 2 2/3 c2	foot	85,66	14,02				14				
HW Q 2 2/3 cs2	body	86,05	13,59	C				13,6			
HW Q 2 2/3 cs2	foot	87,39	12,34					12,3			
HW Q 2 2/3 d2	body	84,76	14,76	C				14,8			
HW Q 2 2/3 d2	foot	84,08	15,64					15,6			
HW Q 2 2/3 ds2	body	82,02	17,52	B			17,5				
HW Q 2 2/3 ds2	foot	81,91	17,64				17,6				
HW Q 2 2/3 e2	body	81,15	17,96	B			18				
HW Q 2 2/3 e2	foot	83,59	16,06				16,1				
HW Q 2 2/3 f2	body	85,77	13,61	B			13,6				
HW Q 2 2/3 f2	foot	84,22	15,31				15,3				
HW Q 2 2/3 fs2	body	81,90	17,72	B			17,7				
HW Q 2 2/3 fs2	foot	81,99	17,67				17,7				
25	body	88,72	10,92	B			10,9				
25	foot	84,62	14,92				14,9				
29	body	84,12	15,33	B			15,3				
29	foot	83,93	15,73				15,7				
31	body	86,09	13,50	C				13,5			
31	foot	87,66	11,79					11,8			
32	body	84,61	15,09	B			15,1				
32	foot	84,46	15,28				15,3				
43	body	87,50	12,07	B			12,1				
43	foot	84,29	15,39				15,4				
49	body	84,79	14,78	B			14,8				
49	foot	84,38	15,36				15,4				

A = Lorentz
B = Amdor
C = Frietzsche
D = Brebos gedact
E = Fogelberg
F = Frobenius

Figure 18

Inscriptions

All the inscriptions found on the pipes were typed into the documentation tables for easier reference and analysis. In order to be able to check the handwriting and other features that cannot be documented by description, photos of the inscriptions were made. The documentation of inscriptions includes tone-letter as well as tone-names, façade numbering and other sporadic inscriptions.

A range of inscriptions of varying age are written on different parts on each pipe. Of most interest to us is the pipe-maker's inscription (PMI), that is to say; the very first inscription which was made at the time the pipe was originally manufactured. These can easily be identified because they are often a matching pair of inscriptions; one to be found on the foot section, the other on the body section of the pipe. This is because the pipe-maker made these inscriptions when the foot and body were not yet attached to each other. Later inscriptions (for example, made during a later restoration) typically only appear once on each pipe. The inscription of the pipe-maker is of most importance since the lettering shows the intended function of the pipe at the time of manufacture.
When referencing inscriptions on the rear of a pipe close to where the round seam and the long seam meet, the cross formed by these seams divides the back of the pipe into four quadrants. Sometimes the compass positions (North, South, East, and West) have been used when referencing in which quadrant the inscription has been written, for example, SW (South-West) means the inscription in the lower left quadrant when looking directly at the crossing of seams on the back side of the pipe. In these cases, North always means 'up', as is common in most printed maps.

6.2 Organ builders

Hans Brebos 1585

Since the organ from 1585 is attributed to Hans Brebos, we do expect to find some pipes of his hand. The article of Mads Kjersgaard in Dansk Orgel Kultur (p. 259) shows a Brebos pipe from Naestved and identifies some Brebos pipes in the façade. In our section about the façade pipes below, we distinguish the typical Brebos façade pipes from the façade pipes with a high lead content. GoArt's documentation of Morlanda show some inner pipes of Brebos. In the Gedact 8 we identify a number of pipes that we attribute to Brebos as well. These pipes have a high lead content (about 5% tin). No pipe makers' inscriptions were found on any Brebos pipes.

Johan Lorentz 1628-1641

In the article from Cor Edskes in Norfelt, 'Die Orgel in der St. Marienkirche zu Helsingør, we find scales and inscriptions of Johan Lorentz, 1639. We visited the Lorentz organ in the Trinity church in Kristianstad and got an overview of scales and inscriptions of Lorentz façade pipes here as well.

This leads to the attribution of most of the façade pipes in Torrlösa to Lorentz, 1628 / 1641, which confirms literature by many others. Also, C of the Octave 2 (former A) is by Lorentz. Mads Kjersgaard hypothesis is confirmed by the XRF-measures.

Georg Amdor around 1700

Mads Kjersgaard has attributed some of the inside pipes to Georg Amdor in his latest article. To confirm this, we visited the church of Östra Ljyngby, where a positive of Johan Georg Amdor, built in 1707, exists.

The following chapter describes this organ and especially the features of pipes and inscriptions on the pipes.

The organ of Östra Ljyngby

Photo 55: Östra Ljyngby positive

The instrument is signed on the back wall.

”M. JOHAN GEORG AMDOR, Orgel- und Instrument macher, gebürtig in Frankenland, fecit, A0 1707”

Photo 56

The lips of the larger pipes have a typical bay leaf shape; the smaller pipes are pressed in in a very straight forward, very old-fashioned way (like for instance the pipes of Jan van Covelens).

In Torrlösa, we find that the bay leaf upper lips are also used in smaller pipes.

Photo 57, 58: two Amdor pipes in Ostra Ljyngby

The alloy was not measured, but the haptic experience of the pipes is similar to the corresponding pipes in Torrlösa. The feet are all scraped in a horizontal direction, like the corresponding pipes in Torrlösa. Most of the pipes not only have tone inscriptions on foot and body, but also mention the pitch of the largest pipe in feet (8, 4, 3 or 2). The inscriptions of foot and body are not always in the same hand, suggesting that Amdor had at least two people making pipes. A lot of ‘8’ inscriptions have a specific feature: the left top part was written after letting the tool loose from the pipe. The fact that the pipe-maker had to let his tool loose is not uncommon, since lead is very sticky to write on, but the similar position of the separation is striking. Below the inscriptions taken in Östra Ljyngby are shown.

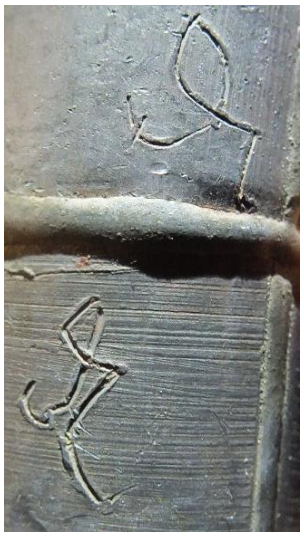























These inscriptions show a very similar hand as the pipes in Torrlösa. All in all, this makes that we fully endorse Kjersgaard's attribution of the inner pipes with these features to Amdor.

Hans Christoph Fritzsche, 1662

In the stops with mainly Amdor pipes, there are some pipes with slightly different features. These pipes are clearly from the Fritzsche school. The pipemaking features are almost the same as the pipes of Gottfried Fritzsche, in Hamburg (1630) or his son in law, Friedrich Stellwagen, in Lübeck, Jacobi Kirche (1637). Similar pipes from Hans Christoph Fritzsche can be found in the organ of Malmö Petri church (1658, now in the Malmö museum) and the Coci-Mahn-Fritzsche-Dropa-Klappmeyer-organ in Altenbruch (1649).

Whereas the bare glimpse of a pipe is sufficient for an experienced organ builder to recognise a known pipe-maker, some more proof is needed to confirm this attibution. Striking is the use of the old fashioned tone inscription g or gs. This character is only known in this school.

Photo 59: g Altenbruch, H.C. Fritzsche 1649

Photo 60, 61: g and gs Hamburg, St Katharinen (Gotttfried Fritzsche 1631)

Photo 62: gs (e' Quint 2 2/3) Torrlösa, Fritsche 1666

The haptic experience, the fact that the feet of these pipes are scraped vertically (and not horizontally, like the Amdor pipes) and the fact that the inscriptions suit other organs of Hans Christoph Fritzsche and his father Gottfried, and the fact that Hans Christoph Fritzsche is one of the organ builders mentioned in Helsingborg (in 1662), make that we can safely attribute these pipes to him.

Fogelberg 1850

It was Fogelberg who brought the organ to Torrlösa and executed a major rebuild. A large number of his pipes are still to be found in the instrument. These pipes, as well as the Frobenius pipes were identified, but were not the focus of our investigations.

6.3 Inner pipes

The following comments on the pipework are organised by their current stop function or location.

Gedact 8' HW

General

The pipes C – f^0 are made new by Frobenius.

The following pipes fs^0 – c''' are old and have glued caps. This fact made it impossible to measure the current body length as well as to detect the existence of construction circles that might give a clue about their original sheet lengths.

The caps' material is scraped mostly horizontally and has a different texture, when noticeable, which indicates that the caps were made as separate, moveable caps, and the material was not reused material, cut from the soldered top of the bodies of the same stop, as sometimes can be found.

This relevant, knowing that Fritzsche often used soldered caps.

All pipes have non-original ears.

The pipes have dark ink inscriptions from Frobenius above the mouth. Several pipes have a blue ink thin inscription which is certainly not a pipe-maker's but a more modern inscription.

The pipes between fs^0 and c'' are made by Amdor.

The feet of the pipes cs'' – c''' are all lengthened. The material of the extensions on the feet of cs'' – ds'' seem to match Amdor, although the rest of the pipe is older. This is confirmed by the composition of the alloy, which clearly shows a much lower tin percentage for the smallest pipes.

The XRF-analysis of the pipes c'', cs'' and d'' also suggest that all caps come from a sheet with a different alloy composition.

tin %	foot	body	cap	foot extension
c2	13,1	13,9	9,4	
cs2	3,5	6,5	9,5	10,4
d2	5,3	5,2	10,1	10,3
g2	5,5	5,7		

Figure 19: Results of XRF-analysis

Photo 63, 64: C'' (Amdor) and d'' (Brebos)

All the pipes except ds'' and h'' have a soft '8' inscribed in the foot front. These exceptions are potentially due to the foot repairs. This '8' is not original and might have been added upon reuse of the pipes, to distinguish between the Gedact 8' and Gedact 4' pipes. The use of the '8', and the typical shape of the 8 is seen in the pipes from Amdor, which gives the clue that this reuse might have been done by Amdor.

With the exception of ds' and gs', the pipes fs^0 – c'' have consistent inscriptions on South West with the tone name and '8' suggesting indeed that their original stop was an 8-foot stop. The other features of these pipes however are clearly from the same pipe maker.

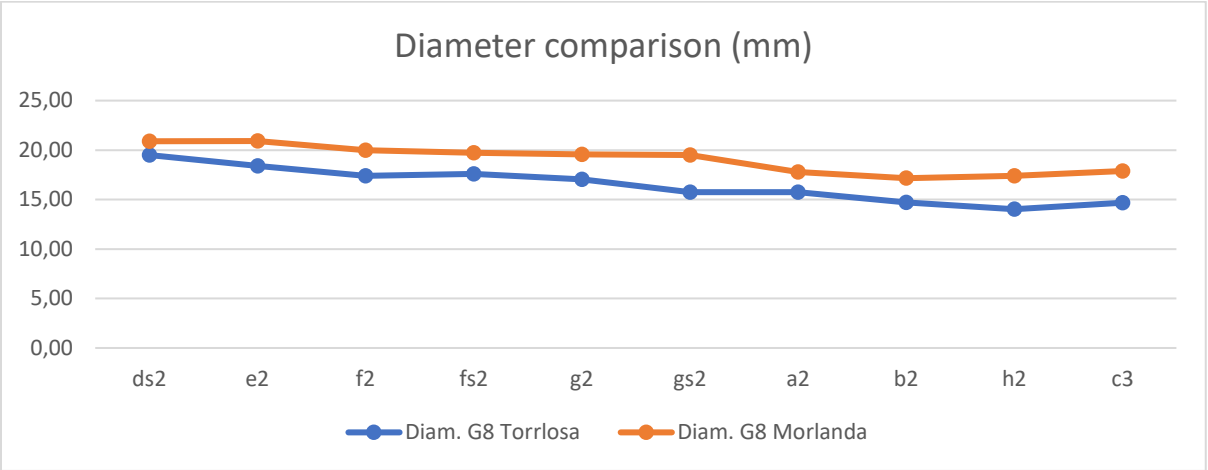
Photo 65: smallest pipes in the Gedact 8'

Photo 66: the feet of the smallest pipes

Due to the particularly old texture and shorter feet length of this group of pipes, further research into the pipes from cs'' -c''' was done. It was not possible to look for the construction circle evidence of their original body sheet length due to the fact that all the caps were glued to the body, as mentioned before.

Based on the low lead percentage a first thought might be that they might be made by Lorentz, but based on the lack of pipe-makers' inscriptions just like in the Brebos façade pipes, and the general feel of the pipes, we think that these pipes were the first inside pipes following the smallest façade pipes from Brebos, and therefore built by Brebos too. Also, the XRF-analysis of these pipes shows a slightly higher tin content than the pipes of Lorentz.

An attempt was made to compare the pipes with the Gedact 8' – possibly built by Hans Brebos – of the organ in Morlanda. Both groups have a high lead content, cast on sand and freely pressed upper and lower lip lines. The pipes were accepted on the current pitch, due to the lack of inscriptions.



The Torrlösa pipes are rather narrow and obviously cannot have been any shorter than they are. If they were cut in the past, they would have been even narrower. This confirms the idea they are originally principal pipes, now reused as Gedact pipes. The diameters would more or less fit to the smallest Brebos façade pipes, which measure 20,0 mm. This is further investigated in the paragraph about the façade pipes.

Gedact 4' HW

General

All pipes are made by Amdor.

The pipes C – c' have caps with modern felt and cs' – c''' the cap is glued to the body.

All pipes have non-original ears.

Inscriptions

The occurrence of Amdor inscriptions in this stop is irregular.

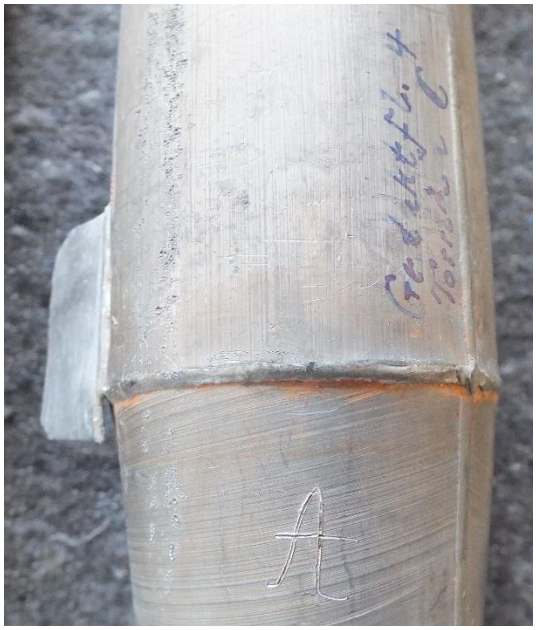


Photo 67: C marked A

The largest pipe, C, has a pipe makers inscription A, followed by B, H, c, etc. meaning that these come from an 8-foot Gedackt.

The pipes with pipe makers inscriptions for the semitones cs, ds and fs in the first octave point to the same conclusion, since the compass had short active, and Cs, Ds Fs and Gs were not there. Doubled inscriptions on different pipes like ‘cs’ and ‘cs 8’ mean that more than one stop is mixed in this group of pipes.

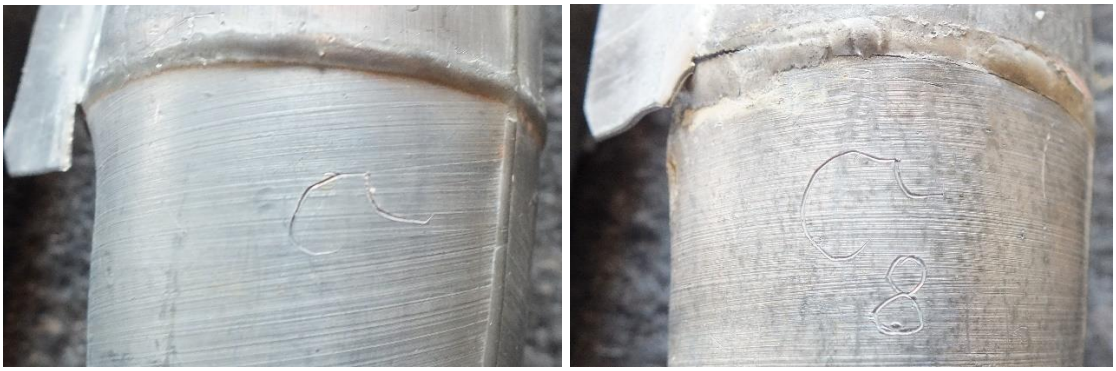


Photo 68: cs and cs 8

Although from b^0 not all feet have a the same horizontally scrapped texture, they have inscriptions matching Amdor’s. The texture does not change suddenly, but changes to a non-scraped surface. This all leads to the conclusion that the present stop is made entirely from Amdor pipes.

It is evident that multiple pipes were treated in an extremely inadequate and amateur way.

Photo 69, 70: non-professional treatment of the pipes

Quint 2 2/3‘ HW

General

The pipes between g’’ and c’’’ are made new by Frobenius.

The pipes D and Ds have a soft texture matching Fogelberg and are not as old as the other pipes.

The rest of the pipework is made by Amdor except for b^0, h^0, e’, fs’, gs’, b’, cs’’ and d’’, which are made by Fritzsche.

Inscriptions

This inscription ‘gs’ is undoubtedly a match to the inscriptions from Frietzsche’s school.

The pipe E has the Amdor inscription ‘C3’, which suggests that it might have been the pipe C of a Quint 2 2/3’.

Oktava 2‘ HW

General

The pipes ds’’, e’’, and fs’’ – c’’’ are made new by Frobenius.

There are non-original ears from C to gs^0.

Photo 71: HW Oct 2 C, Lorentz 'A'.

The C pipe is the only known inside pipe by Johann Lorentz. The XRF-analysis revealed a composition of 3,7% tin on the body and 3,2% on the foot, which matches that of the façade pipes, which are clearly by Lorentz.

In his latest article 'New Studies in the Torrlösa Organ 2021', Mads Kjersgaard refers to the rebuilt central tower by Lorentz stating it had the pipes CDEFG and the supplementary pipe A inside the tower. The XRF-analysis confirms this attribution.

Further, the scales of the façade pipes do match the scale of this A-pipe

Pipe ID	Organ builder	Pipe body Ø bottom	Pipemaker inscription
55 Ds	A	68.9	C'
56 X	A	62.1	D
54 F	A	58.1	E-
57 G	A	56.0	F'
53 A	A	52.0	G
HW Oct 2 C	A	47.1	A

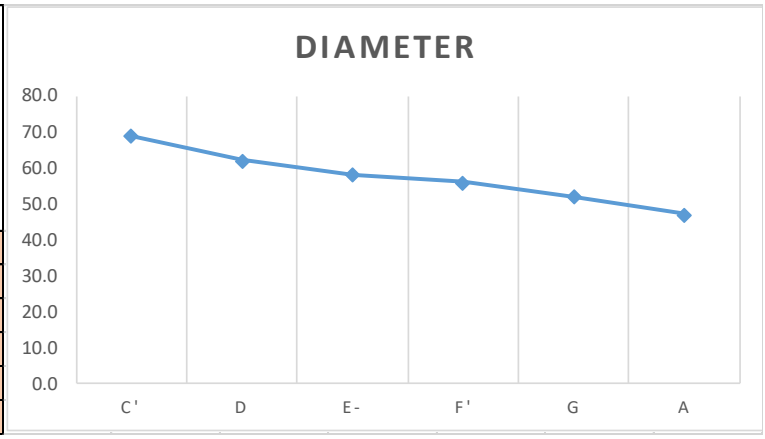


Figure 20: Scale Lorentz Principal 4 C-A

A plausible explanation for this pipe being probably the only surviving Lorentz inside pipe is the fact that it survived the theft in 1693, because it was placed in the middle tower.

Cs, marked b, is made by Amdor, however with traces of red paint and an unscraped sheet texture; D-gs^{0} are Amdor with the usual properties.

Between a^0 and d'' the pipes could be attributed to three pipe-makers:

- a^0 – cs', f', fs' and h' are by Fritzsche;
- d' – e', g' – a' and c'' – d'' and f'' are by Amdor;
- b' has a contrasting bay leaf upper lip and softer texture and is made by Fogelberg.

Inscriptions

It is clear that there are different groups of pipes put together in this stop with functions different to their original function:

- the pipes Ds, Fs and A have the inscriptions C2, D2 and G2;
- the pipes d^0, b^0, c', fs^1 have a, f, gs, a and d inscribed on both body and foot.

All the pipes have their current key name inscriptions on the upper lip in dark ink, by Frobenius.

Spetsflöjt 2' HW

General

All pipes are open, conical.

The pipes C and from gs'' to c''' are made new by Frobenius.

The pipes Cs, Ds, E, Gs and B belong to a group made by Fogelberg.

The rest of the pipework D, F, Fs, G, A, and from H to g'' have vertically scraped bodies and horizontally scraped feet and are made by Amdor. They also share a triangular upper lip and semi-circular lower lip lines.

The pipes between C and c' have non-original ears.

Some pipes have construction circles at the base of the body at the languid rather than at the top.

From c' onwards there are some feet with brown stains, possibly from the casting oil.

Inscriptions

The current pipe function is written on the back of the foot (position SE) in dark ink, by Frobenius.

The pipes Cs, Ds, E, Gs and B have the inscription "flut" also positioned SE of the solder cross.

The pipes D, F, Fs, G, A, and from H to g'' have the Amdor inscriptions C, D, E, F, G, A … f'', and are generally moved one tone higher by Frobenius.

All pipes have two horizontal dashes inscribed above the mouth, which suggests these markings were added when these pipes were already positioned together.

Principal 8' PED

General

The pipes from C - B are by Frobenius.

The pipe H's material texture is made by Amdor, marked 'A' on South West.

The following pipes c^0 – d' are all Fogelberg.

All of the pipes are lengthened at the top with material of the same (horizontally scraped) texture as the pipes themselves. The solder seams however are newer, which means the bodies were not lengthened by the original pipe-maker, but probably by Frobenius, with material of a redundant pipe.

Inscriptions

The pipes have dark ink inscriptions from Frobenius on the foot's back.

Three or even four different tone inscriptions are found on the body front of all the pipes. Some are crossed out which means these pipes have had at least two or three different functions. This is curious because pipes that are as recent as 1850, usually do not have such a lively history. Even Frobenius apparently was confused, since H-d^0 are marked half a note higher. Both d^0 and ds^0 are marked ds.

Rauschquint II PED

2' Rank:

General

Most pipes are made by Fogelberg.

The exceptions are ds^0, g^0, that have feet extended with old material, probably from Amdor.

The pipes f^0 and cs' are made by Amdor.

Inscriptions

In all pipes except ds^0, f^0, g^0 and cs' have a 'v' on South West and an 'S' on the foot's front.

Photo 72: Ped Principal 8 gs.

1 1/3 ’ Rank:

General

The pipes between C and A are made by Fogelberg.

B is modern pipe, of unique appearance in this organ and a stamped ‘3’ on the foot’s’ front, attributed to the anonymous “pipe-maker M2”.

Pipes H, c^0, f^0 – gs^0, b^0, h^0, cs’ and d’ are by Amdor.

Pipes cs^0 – e^0, a^0 and c’ are made by Fritzsche.

Separate pipes

General

These are the six surviving pipes of a larger group that disappeared sometime after the reconstruction by Frobenius in 1962. They are numbered with blue and black markers, which is the number used to identify them in this context.

Their material appearance suggests that pipes 25, 28, 32, 43 and 49 can belong to Amdor, whereas pipe 31 looks older, matching Fritzsche.

The repair in pipe 29 looks like Fogelberg’s soldering style, indicating that it would have been in use as late as 1850.

6.4 Façade pipes

The front pipes were numbered temporarily from 1 to 59, starting on the C side tower (left when standing in front of the organ looking up at the pipes) and ending on the C# side tower, which are divided into flats and towers as follows:

C tower	C small flat	C big flat	Middle tower	C# big flat	C# small flat	C# tower
1 – 9	10 – 12	13 – 26	27 – 33	34 – 47	48 – 50	51 – 59

Figure 21: front numbering from the church's point of view.

General

The pipes 28 and 59 were made new by Frobenius, 42 by Fogelberg. The rest of the pipes can be divided in tin pipes from Brebos and lead pipes from Lorentz.

The C small flat (10-12) and C# small flat (48-50) contain embossed pipes from Brebos. The C and C# big flat is composed of Lorentz pipes except pipes 13, 14, 16, 18 and 20, and 40, 44, 46 and 47 which are from Brebos.

The pipes in the middle tower and C and C# tower are made by Lorentz.

Lorentz pipes 53-57, the middle pipes of the C#-tower, are darker than the other pipes, suggesting a different cast, or different moment.

Inscriptions

The front pipes have multiple sets of inscriptions with different meanings. Brebos pipes do not have pipe makers inscriptions. The tone inscriptions on the Lorentz pipes do match inscriptions of other Lorentz facades, like Helsingør and Kristianstad.

There are at least 3 numbering sequences. Most of these sequences are dated quite a while after the pipes have been built. The deeper inscribed numbers to represent a situation that we can link to Lorentz.

The newest is written in dark ink, by Frobenius, on the back top of the body. There is an older numbering in faded ink/pencil marking, usually in the same area of the pipe.

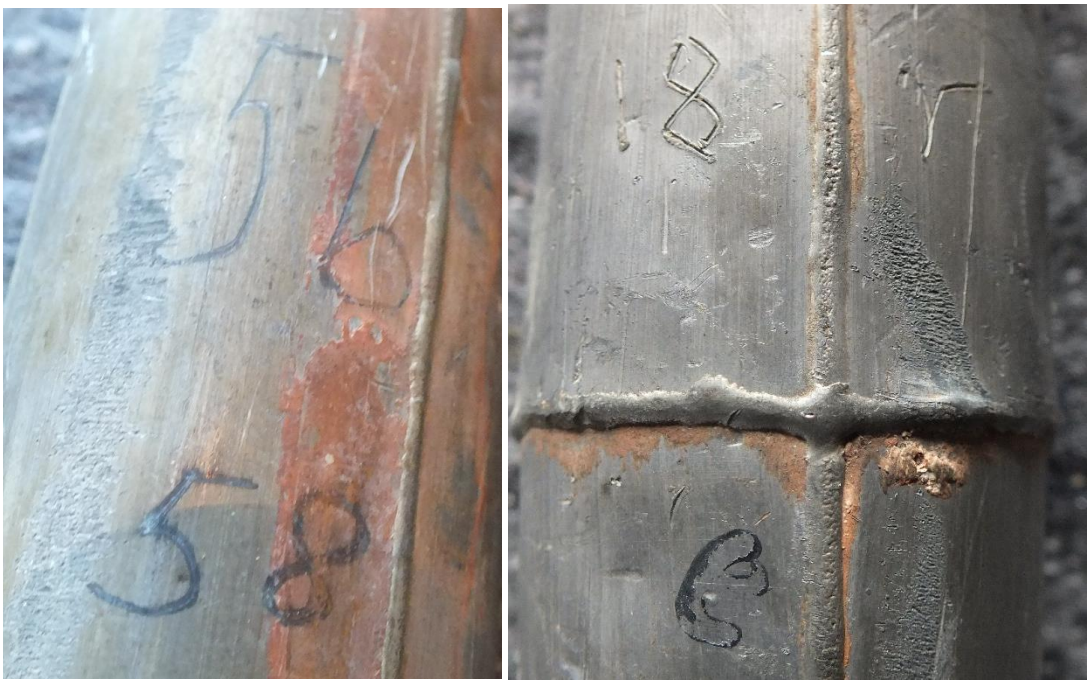


Photo 73, 74: example of numbering sequences (56 and 58) Lorentz sequence (18 r) and Frobenius ("c")

The oldest inscribed numbers are typically written around the seam cross on the rear of the pipe. It is possible to establish an order of precedence from the different handwritings, but it is more interesting to differentiate them when comparing the pipe-makers tone inscriptions and the sequence.

In the picture above, we can see the numbering and on the other side of the seam a letter 'R', of "Rückpositiv". A sub-group of pipes have this letter inscribed, meaning they belonged together, in this case in the facade of Lorentz's rückpositiv which was later scrapped. Mads Kjersgaard has pointed out the possible layout of the former Ruckpositive, based on the pipes with an "r" and a number. These numbers do indeed lead to a coherent façade, as described in Kjersgaard's latest article.

Frobenius' tone inscriptions are written in the southwest corner of the solder cross. The inscriptions considered to be made by the pipe-maker are usually placed in pairs in North West and South West. A number of pipes has a small dot in the vicinity of the inscription, other pipes an x.

Brebos pipes

The embossments on the pipes do not have the same pattern and direction. In the C small flat field, the embossment on the first pipe (nr 10) points to the right, nr 11 points upwards, and nr 12 points right again. In the opposite field, pipe 48 point left, 49 up, and 50 right again.

It would make sense when pipes 12 and 48 would swap, to have the side pipes point towards the middle pipe, that in turn points up. In the Brebos situation, the small flat fields were part of a hooked field, which must have had more pipes on both sides, that in the front (see the paragraph on the Brebos case). This makes it less relevant to discuss the positioning of the embossed pipes, since they must have been part of a more comprehensive ensemble.

The tin Brebos pipes have hooks by Frobenius, but also traces of flaps, which were nailed to the pipe rack.

Photo 75: rear of a Brebos façade pipe

Photo 76: Brebos façade pipe

The Brebos façade pipes in general are not in a very good condition. This pipe is corroded so heavily, that one can look through the pipe. This is unfortunately not uncommon for pipes that are made of almost 100% tin.

Model

To be able to combine the pipes, and all their features in an easy way, we created a model. The four basic groups of pipes are:

-Brebos (blue),

-Lorentz (green),

-Lorentz “r”” (red) and

-Lorentz dark (brown).

The position of previous hooks or flaps is shown in yellow.

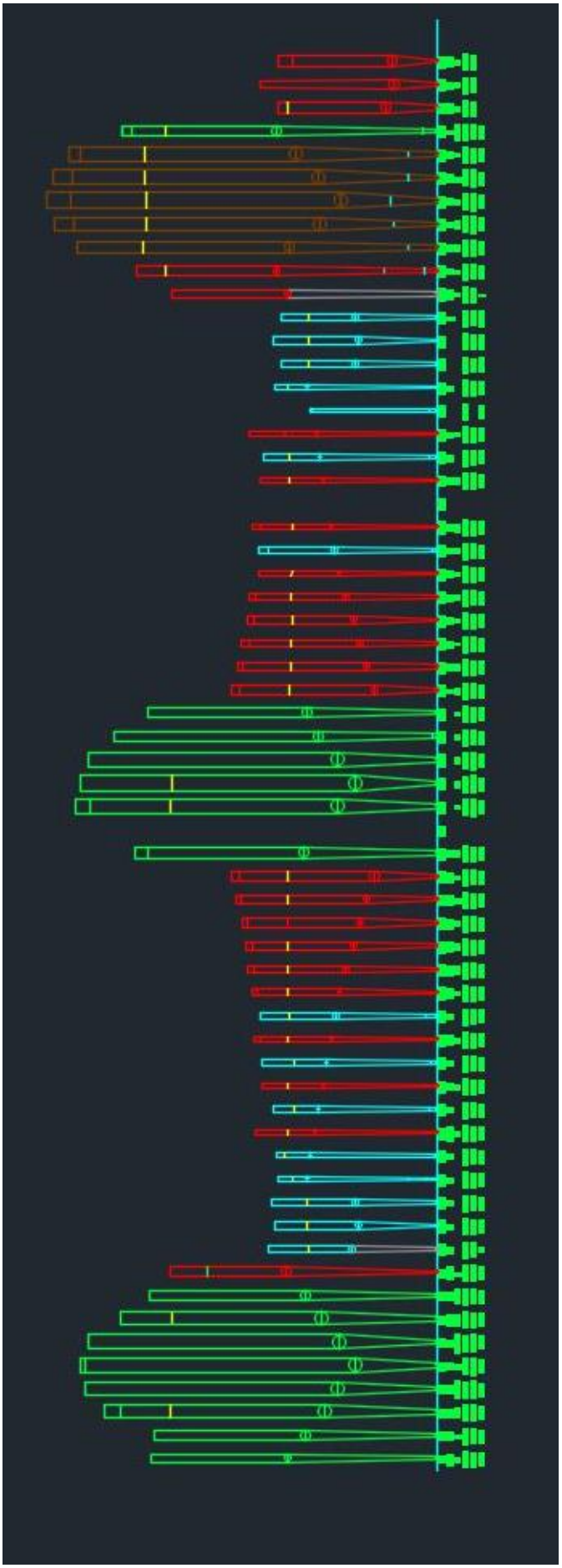
Non-original parts are added separately, as well as eventual lengthening based on construction circles.

The three pipes that now are placed a decoration in front of the Ruckpositive, are also part of the model.

The pipes are placed in the present order, but 100 mm apart.

Under each pipe, the most important properties are listed.

The numbering and the position of the hooks proved important information in order to reconstruct the façade. This is discussed in the pages below.

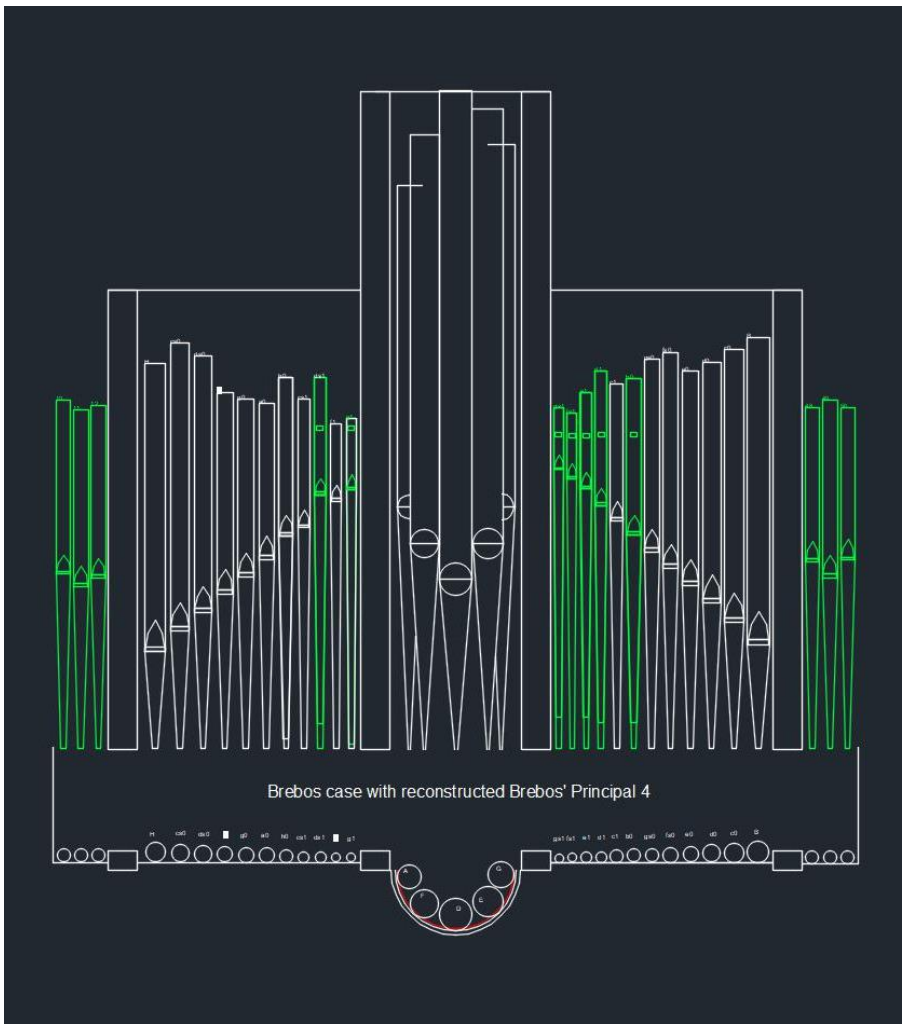


The Brebos façade from 1585

The central part of the case is original and belongs to Hans Brebos, thus it was necessary to try and reconstruct the original front pipe sequence. There are 13 surviving front pipes from Brebos, from which 6 are embossed pipes. It is a small fraction of what the façade must have originally been, but the fact that the original sizes of the case tower and fields can be used, and we have seven facade pipes in the flat fields with original feet, provides enough info for a reliable reconstruction.

In order to check whether the façade pipes and the highest octave of the HV Gedact 8’ would fit together, a scaling was reconstructed based on their diameters, then a scaling comparison with the Oktava 2’ (attributed to Brebos) from the Morlanda church was performed. The diameters of the smallest façade pipes and largest inside pipes are remarkably close. The current lengths of the Torrlösa pipes are slightly less, which raises the possibility that they were at some point cut shorter and had their caps glued.

Following the reconstructed scaling, it was possible to recreate a façade, starting from D. Based on the foot lengths of the existing Lorentz pipes, the top of the pipe body would be exactly fit under the moulding on top of the middle tower. This is a bit too cosy, so probably the feet of Brebos would have been about 10 cm shorter. This allows some overlength, and some space for D to speak freely. For C, we would need almost 70 mm more, so we can be pretty sure that Brebos never had more than just D in his façade.



Reconstruction of the Brebos Principal 4' façade

In this situation, the façade would have D-A in the middle tower and B-gs' in the flat fields, when we would place the Brebos pipes approximately ate the present location. For the sake of comparison with Morlanda, we placed the largest pipes in the flat fields outside. Please note that in Torrlösa, this is mirrored.

However, the pipes in the flat fields now have more than sufficient space, especially on the H-side, which has smaller pipes, und one pipe less. It would be possible to place five more pipes without problems. These pipes then would be blind. The inner pipes – which now are used in the Gedact 8' – would have had the function g' – g'' inside the organ.

Brebos façade with Lorentz pipes

The surviving Brebos pipes are not in a very good condition. It is known from more 16th Century builders that their tin facades had to be replaced in the 17th or 18th Century already (cf. Alkmaar, Van Covelens 1511 was replaced in 1645). However, apart from the side towers and the middle tower, all pipes from Lorentz bear the "r" mark and came from the Ruckpositiv. This makes it likely that these pipes were placed in the Brebos case when the Ruckpositive was discarded. That must have been in 1850. The Lorentz pipes in the middle tower, however, did not belong to the Ruckpositive, and the pedal towers have one pipe that originates from Lorentz Ruckpositive (pipe 9).

This means that Lorentz not only added a Ruckpositive and two pedal towers, but also changed the Brebos facade. The darker pipes 53-57 make a complete C-tower from C-G. Including the inside pipe A, and the enlarged middle tower by Lorentz, this makes a very comprehensible story, already described in Kjersgaard's latest report. At least when the numbering 28-32 was inscribed, these pipes belonged to the middle tower.

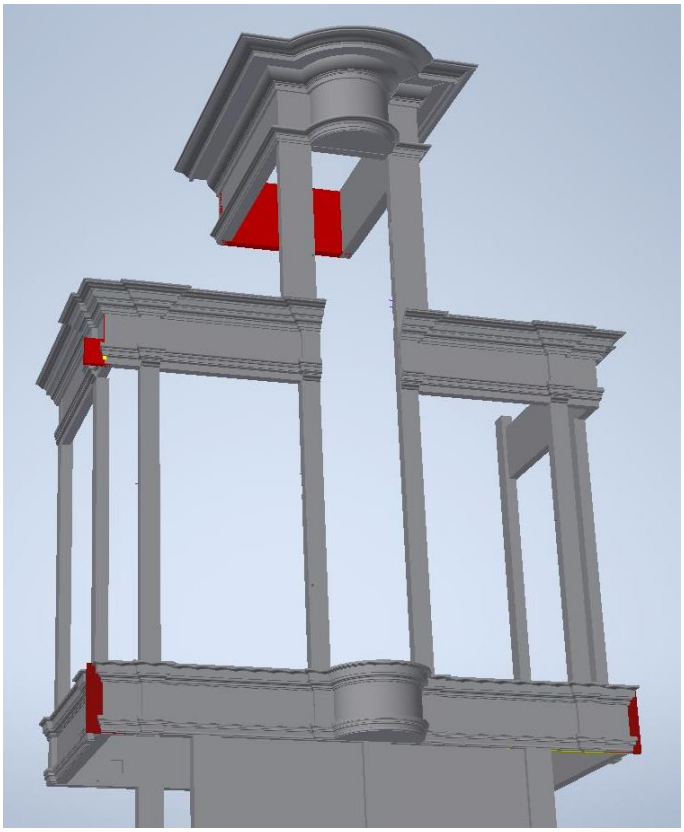


Figure 22: Brebos façade with enlarged middle tower

The Brebos façade with just the higher and wider middle tower, with a different moulding on top, looks a bit odd… The different colour of the pipes is an indication of a different cast or different age. But there are also numerous instruments that have these colour difference between towers or divisions, that are clearly built on the same moment. We suggest that the changes on middle tower, the addition of the Pedal towers and Ruckpositive could have been part of one single rebuild, rather than two separate measures. However, Kjersgaard's idea of two sessions cannot be falsified.

Kjersgaard states that the dark Lorentz pipes are pure lead, and the other Lorentz façade pipes 60-70% tin. This is not correct. The middle pipe of the Ruckpositive has been analysed with the XRF-tool and had the same alloy as the C from the Octave 2 (Lorentz inside pipe A): 3,5% tin, 96,5% lead. All other pipes have the same look and feel and must be the same high-lead alloy. Unfortunately for practical reasons it was not possible to analyse the dark Lorentz pipes, but we do not expect to find a very substantial difference with the other Lorentz pipes.

Lorentz' pitch

Several pipes have traces of the construction circle at the top of their bodies. When theoretically lengthening these pipes, we can find the length that Lorentz intended the pipes to be. We can assume that during voicing and tuning, the pipes were cut at the rear side to get to the intended pitch. At the rear side of these pipes, we still can find traces of this curved cut-outs. They are lowered on later occasions to get to the present pitch (that was about 442 Hz at 18^0C in August 2021), but could be reconstructed.

At pipe 55, marked c / c by Lorentz, the marks were clear, and this is a larger pipe, making the results more precise. We used thick paper strips, taped firmly to the pipes, and cut according to the assumed original tuning curve.

Photo 77: pipe 55 (Lorentz nr 30, note C)

When closing the modern tuning slot and cutting the paper according to the curve in the middle of the photo, we come to a pitch of 142,3 Hz. Assuming a meantone temperament, this would mean a=476 Hz. The two small edges at the top of the pipe are supposed to be edges to smoothen the top of the pipe. If these curves are taken as the tuning curve, the pitch is 137,4 Hz, leading to a=459 Hz. This curve would however be too flat to consider normal. Therefore, we think the Lorentz pitch was about 476 Hz. In North Germany, this was the normal high Choir pitch.

Lorentz scales

Since the dark Lorentz pipes that were built for the middle tower of the Manual form one group, together with the Octave 2 C pipe, that was the former Lorentz A, we took this group to find a scaling for the sheet width of the for the principal 4'. This sheet width was then calculated to find the diameters.

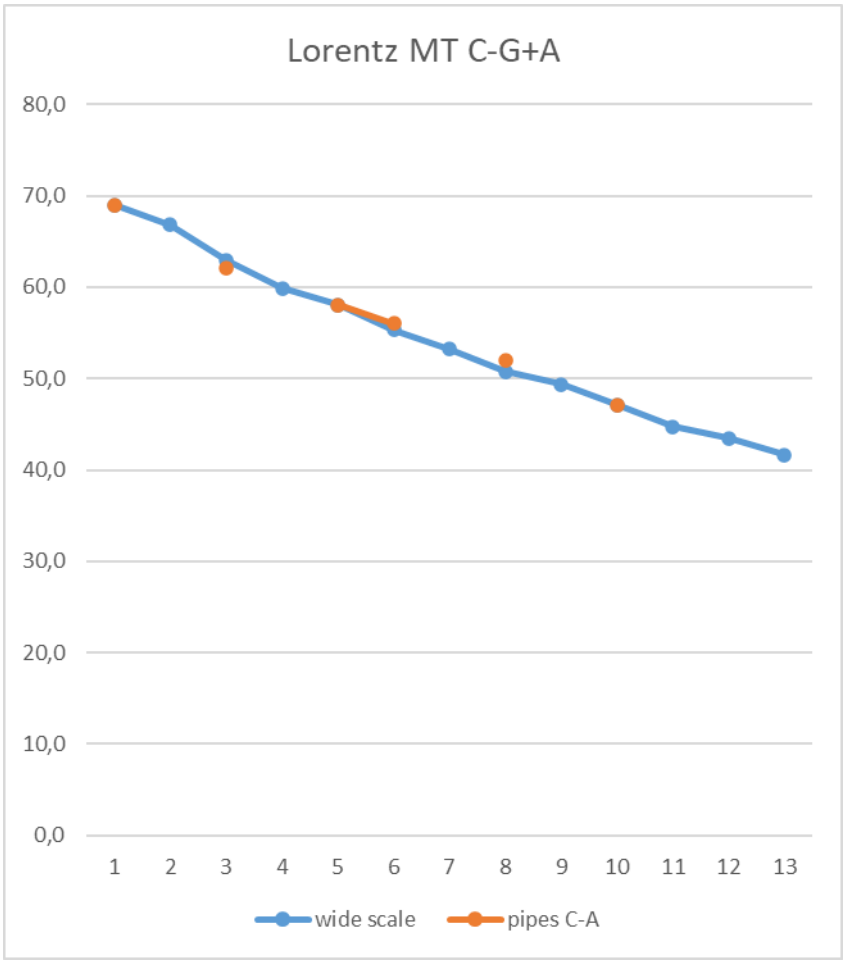


Figure 23: scale of the Lorentz Principal 4'

Shown is the result of a C of 69 mm, with an octave ratio of 5/3.

The pipes of the Ruckpositive form a second group that belongs together. Shown is the comparison with the same, wide, scale and these pipes. Please note that the first pipe is the middle pipe of the present Ruckpositive, and severely changed. The other two pipes should have their original diameter.

We can see that, with a bump of a half tone from c' to e', the wide scale suits these pipes also.

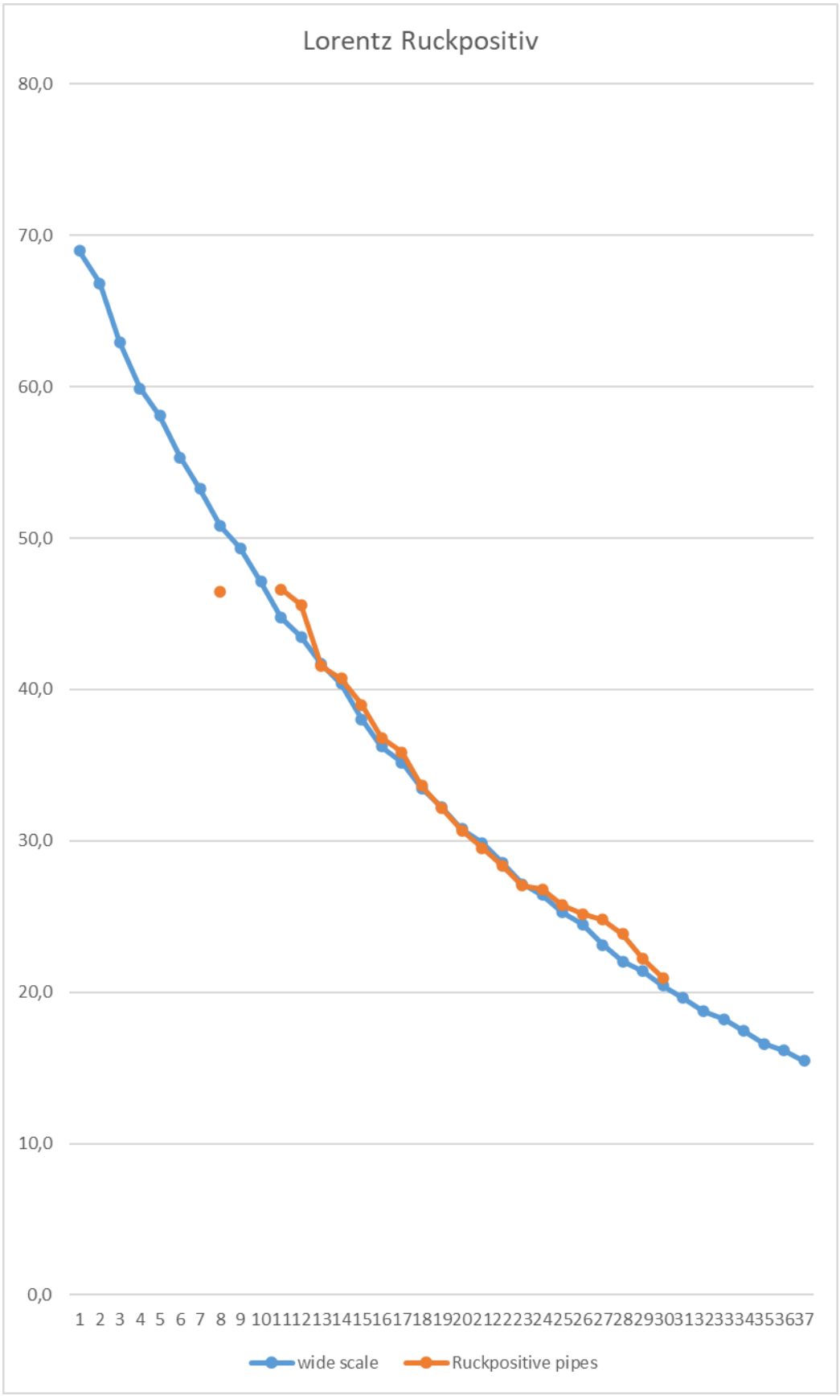


Figure 24: scale of Lorentz ruckpositive pipes

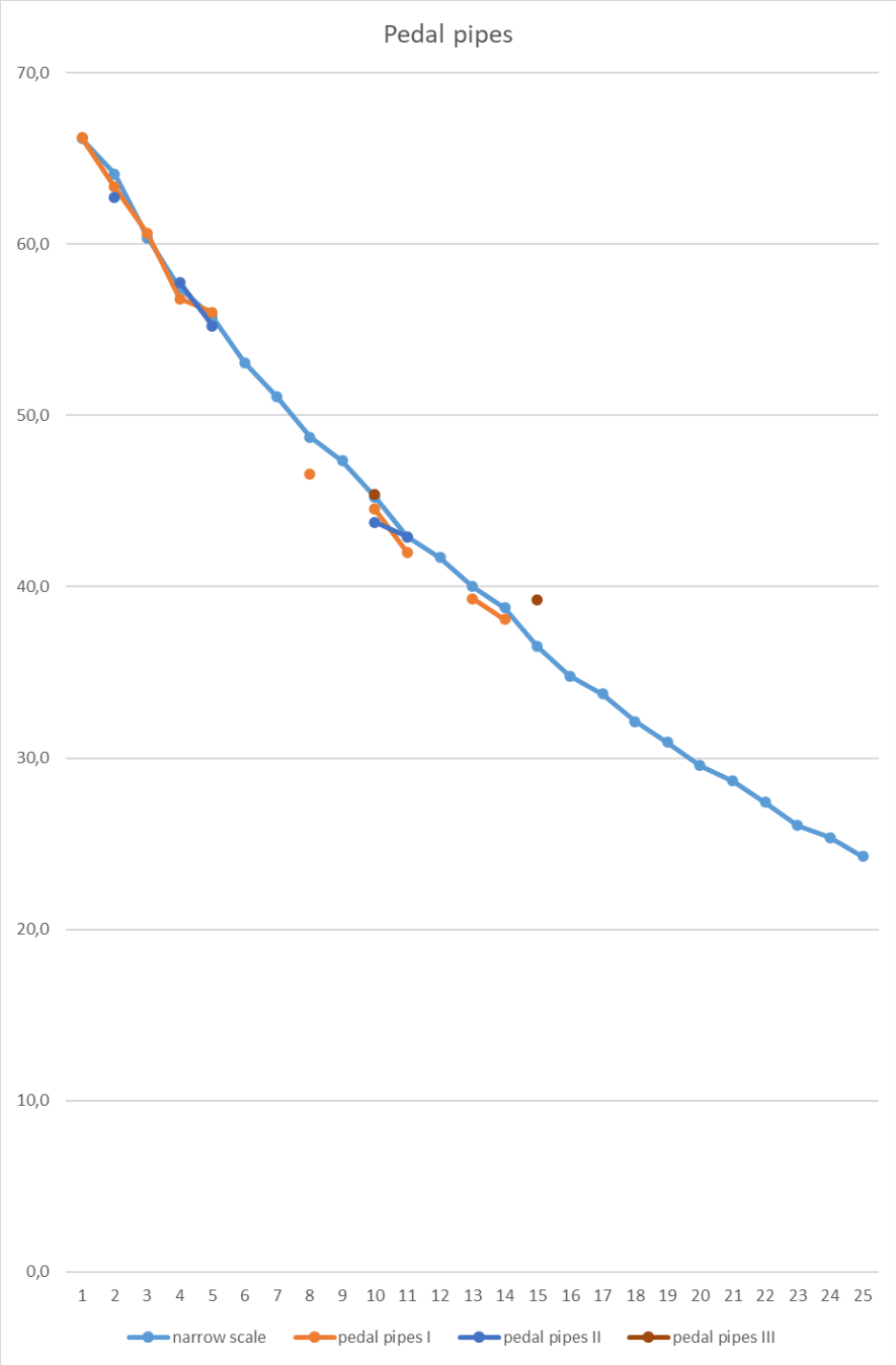


Figure 25: narrow scale for the pedal pipes

For the pedal pipes we took scale that was a bit more than ½ note narrower (C 66,2 mm, octave ratio 5/3).

Since there are more pipes for a single note, like three pipes for a, we had to divide the pipes over three groups. The pipes can be distinguished by diameter, or by the fact that they have an x. It turns out that, even though there are some differences, the pipes marked x are both wider and narrower than the regular pipes. The last pipe of group III (d) is even as wide as the wide scale, and apparently is not part of the pedal division. The pipe would suit nice at nr 10 of the RP. Since the foot is missing,

and a “0” is legible under a damaged section of the pipe, we will shift this pipe to the Ruckpositiv. We discuss the layout of the pedal pipes further under “Lorentz pedal section”.

Lorentz Rückpositiv

The front of the Lorentz rückpositiv was considerably narrower than the current central (Brebos) section of the case. If we would try to fit the 25 Lorentz Ruckpositive pipes in the Brebos case, this would leave large open spaces. Combined with the existence of a lower case, the theory of the Brebos case being a former Ruckpositive, can be considered unlikely.

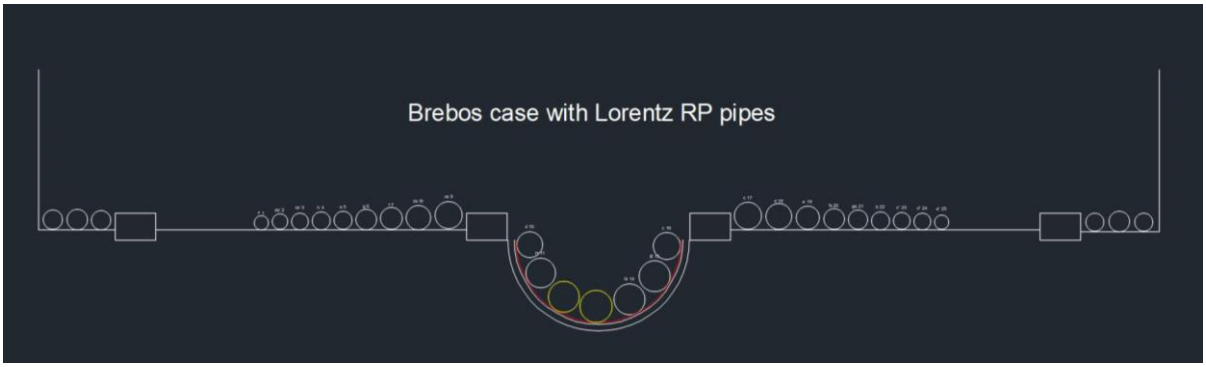


Figure 26: Brebos case with Lorentz Ruckpositiv pipes

The pipes 1-9 and 17-25 in this façade have traces of hooks on the same height (640 mm) from the toe board. The top of the pipe rack might have been at 62 or 63 cm. Pipe 16, nr 9 in this documentation, has an original foot, and a hook at 987 mm. Two of the three pipes that decorate the present ruckpositiv, have traces of hooks as well. If we put these hooks at 987 as well, we can reconstruct the length of the feet of these pipes (nr 11, pipe RP3, 568 mm nr 15, pipe RP 1, 564 mm).

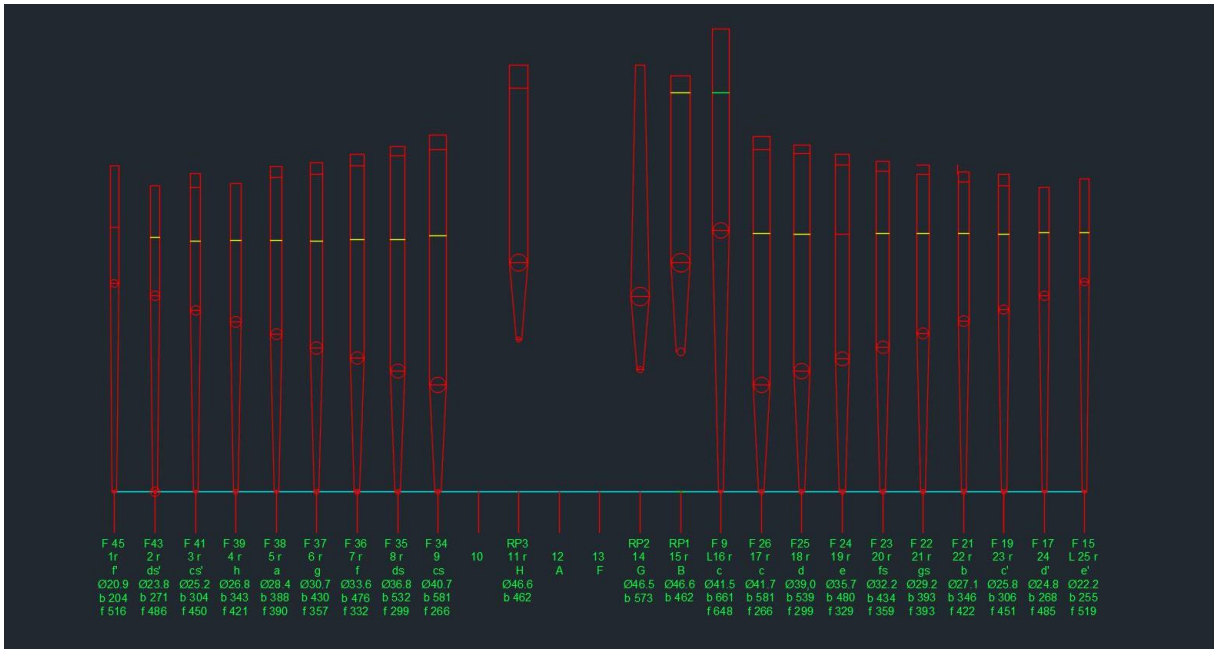


Figure 27: Lorentz pipes in order of their position in the Ruckpositive

How such a Ruckpositive could look, is shown in Kjersgaard’s article “New studies” section IV.

Lorentz pedal section

Abraham Abrahamsson Hülphers describes the Helsingborg Marien organ in is Historisk Afhandling om Musik och Instrumenter (1773). It is interesting to see the words “alla ½ ver.” In relation to the pedal division. To divide a stop in bass and treble is not uncommon for manual stops in relatively small organs. The 24-stop instrument in Helsingborg would normally not need such a division of stops. And as far as I know, this arrangement was never built in any pedal division. Normally, the bass and treble divide around c’. Since the compass of a pedal has its limits around c’, there is not much to divide. A logical explanation was given by Niclas Fredriksson, who suggested that the pedal towers might have been separate from the central case and had stop knobs on both towers. The division then might have been CDEFGABH and c^0-d’, or a similar division. This makes sense, as we find the current arrangement of the three case parts rather clumsy. Even though the case seems to have been arranged like this before 1850, we tried to find evidence for this theory.

A division in Bass and Treble of the pedal towers implies that the Bass Tower would contain façade pipes for the short octave of a Principal 4’, and the Treble Tower pipes for the tenor octave of the Principal 8’.

We discarded the pipes 53-57, since they belong to the central tower and contain pipes C, D, E, F, G of the Principal 4’ of the Great, and discarded the pipes that were appointed to the Ruckpositiv. We also discarded the old Brebos pipes, since they were never part of the pedal section.

We started the analysis with the feet. The towers have a V-shaped curve of the labia. This means that the central pipe has the shortest foot, and as the pipes get smaller, the feet get longer. To establish the original foot length, we measured the original part, and when necessary lengthened the foot until it would have a toe diameter that suits the original toes.

Indeed, the two largest pipes, c and cs, have the shortest foot, 350 mm.

The next four pipes have all feet of approximately 425 mm, and pipe makers’ inscriptions csx, d, dsx and ds.

The next three pipes have feet of approximately 500 mm. A fourth pipe with this foot lenght is missing. The three pipes have pipe makers’ inscriptions e/ex, ex/e and g.

The next four pipes have all feet of approximately 560 mm, and pipe makers’ inscriptions ax, a, a and b.

The next three pipes have all feet of approximately 640 mm. A fourth pipe with this foot length is missing. The three pips have pipe makers’ inscriptions bx, c, cs.

c	c		
cs	cs	csx/csx	
d	d		
ds	ds	dsx/dsx	
e	ex/e	e/ex	
f			
fs			
g	g		
gs			
a	a0	a	ax/ax
ais	b	bx	
h			
c1			
cs1	cs		
d1			

Figure 28: pedal pipes, the colours matching the length of the feet

A logical layout would be:

Principal 4' c^0 B G E C D F A H

and

Principal 8' a^0 g^0 f^0 ds^0 cs^0 d^0 e^0 fs^0 gs^0

Both towers would be almost equally wide and fit in the present pedal towers.

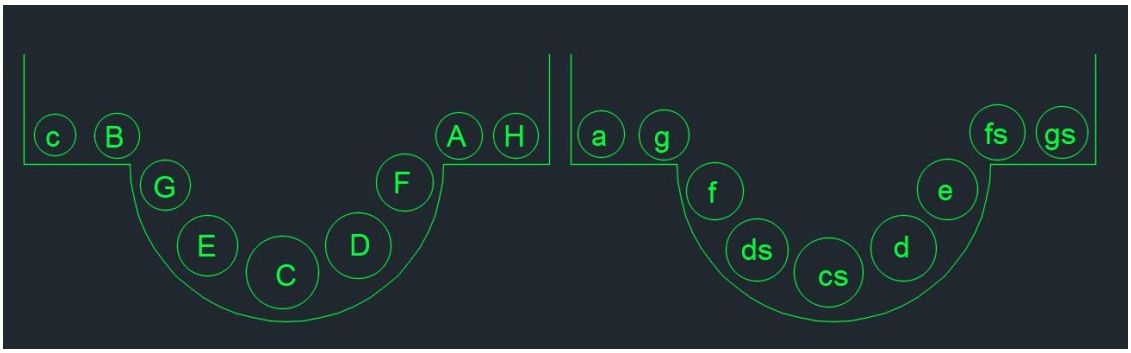


Figure 29: the above arrangement, based on the scaling of the existing Lorentz pipes.

This logical layout looks plausible, even though the right tower would be a bit crowded.

But it can easily be concluded that the existing pipes do not allow for such a layout. There are pipes missing, and there are pipes double. From an economic perspective this fact is unlikely. No organ builder would build so many blind pipes when he can also build sounding pipes of almost the same size.

The explanation from Kjersgaard in section II of the new studies, does not convince us.

In fact, in the ruckpositive, pipes 16 and 17 are both c-pipes, and 10 and 18 both d-pipes, of which only 17 and 18 were meant to speak. The pipes 11 and 16 were at the outside of the round tower, and for acoustical reasons, this is a disadvantage, so they were blind. But in the pedal towers, there are no blind pipes in such a disadvantaged position, and so there is no reason to build exactly these pipes blind.

It is indeed common practice to place blind pipes in the façade when there is more space than pipes. But in the pedal section, Lorentz could have easily built a d that he would need, instead of building a double cs. And why would he not build f, fs, fs, h, and c', but have double ds, e, a, a, and b?

If we have a look at the 1958 drawings of Leon-Nilson again, we can see that the pipes from 1850 are placed behind the historic façade and seem to have no connection with the façade itself. It is likely that the façade pipes would not even speak.

This fact might provide an explanation for the unsatisfactory layout of the pedal towers and the pedal sections: When the pedal cases were put to the present position, but were more distant to the organ before 1850, there would be more pedal pipes. Since in 1850 the façade contained just blind pipes, Fogelberg might have taken a selection of the pipes in best condition and suiting feet and placed them in the facade. If he would have done so, we would now miss D, E, F, from the Principal 4, and f, fs, g, and gs from the Principal 8.

Existing pipes with note names csx, dsx, ex, an unknown pipe with the same foot as e, a, ax, bx and cs' would be the blind extra pipes. The pipe for d' is omitted from this list, since there would be one tall foot too many (the foot is from 1960), and the scale does not belong to pedal, but Ruckpositive, as mentioned above. In the fields next to the RP middle tower the range around this pipe (10) is missing. It would have had a relatively short foot, reason why this foot is renewed.

The pipes for the pedal section could then have been as follows:

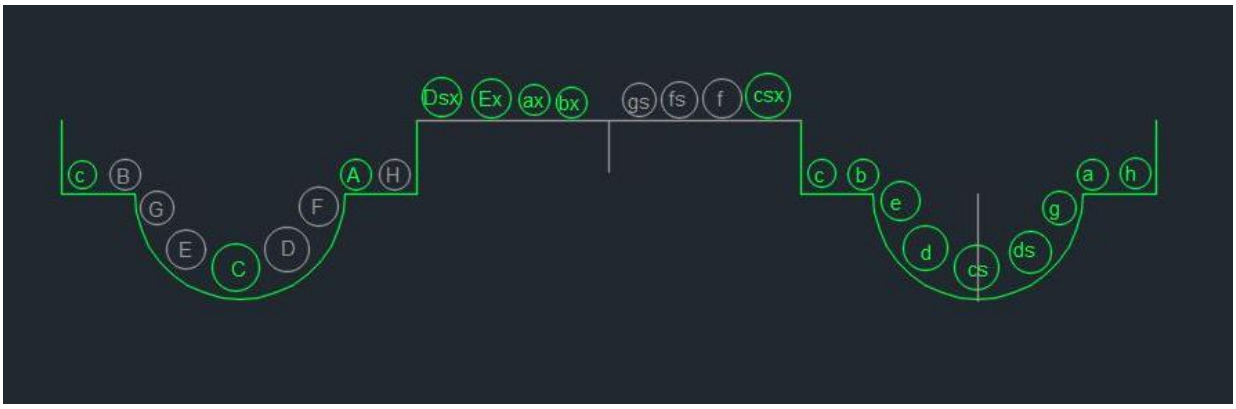
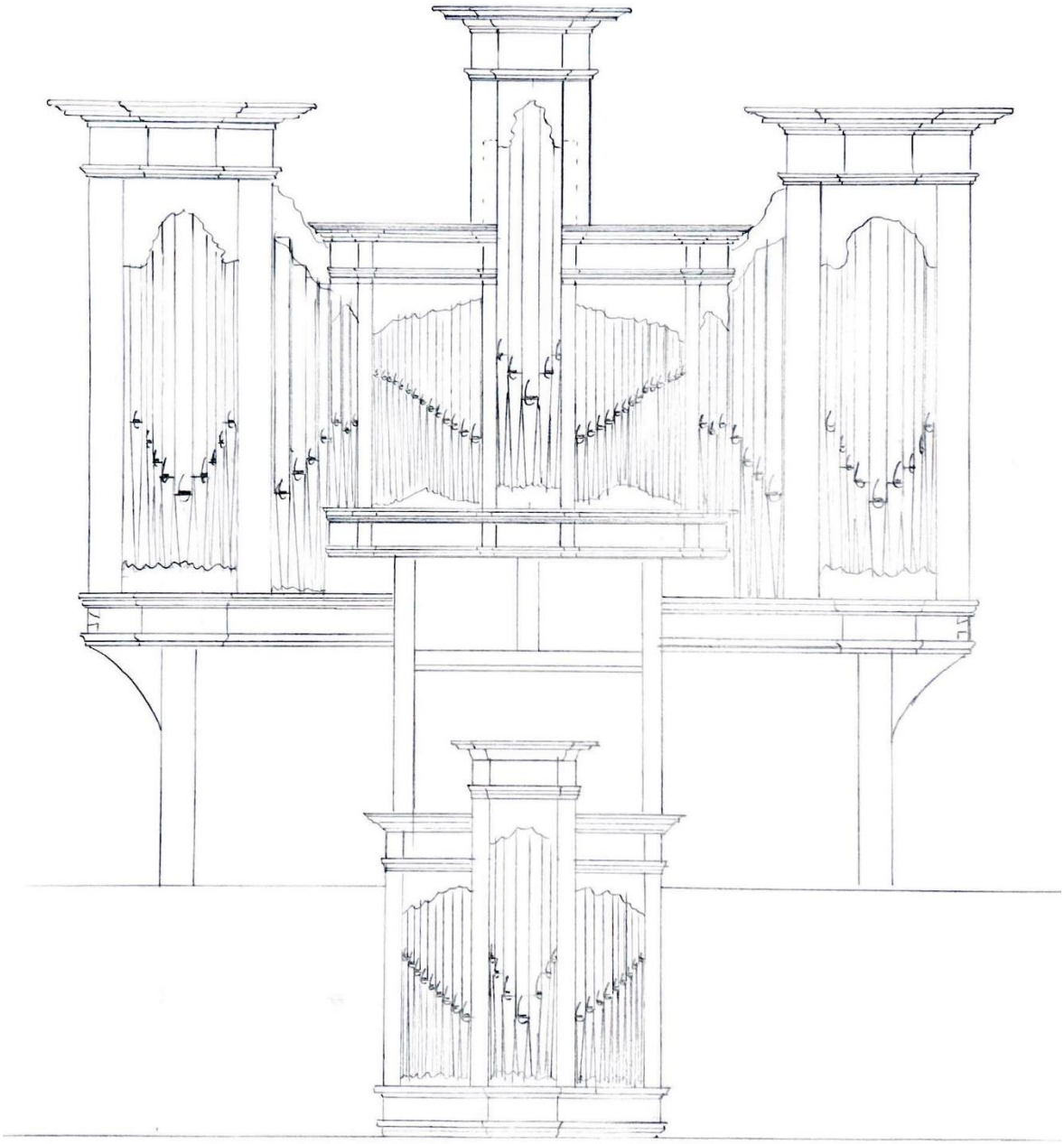


Figure 30: the alternative arrangement, based on the scaling of the existing Lorentz pipes.

Green pipes are Lorentz pipes with the original feet and body on a correct location. Grey pipes are pipes that are missing. The three Lorentz-pipes in the C-tower have numbers 1, 5, 8, matching their location. The four Lorentz-pipes next to this tower do have numbers 4, 7, 2, 9, matching their location in the round tower. The pipes in the Cs-tower do have numbers 50 – 52 - - - 56 – 51 – suggesting a and b were once swapped. On the other pipes, no (old) numbers have been found.



In this layout, the pedal towers will be 240 mm behind the Brebos façade, so the Brebos towers at the corner can run around the corner, making the text of the doxology complete. It also allows the cornices and mouldings to be completed. The Ruckpositiv (as designed by Kjersgaard already and accepted here) has almost the same width as the lower case of the Brebos organ. This is very logical from a constructive point of view, since the beams on which the positive rests, can be counterweighed by the main organ. Should this concept once be realized, the Ruckpositive will be made a few cm wider, so the beams will run inside the case.

7. Conclusions

The central part of the case is built by Hans Brebos, around 1585, and was built as a Manual division. It was not part of a Ruckpositive. Apart from the Lorentz pipes in the façade, more than ten Brebos façade pipes have survived, and are used as blind pipes. A small group of inside pipes are attributed to Brebos Principal 4.

The present Lorentz façade pipes in the great are mostly from the Ruckpositive. Almost all pipes survived and were used to replace the corroding Brebos pipes. A good reconstruction drawing of this Ruckpositive has been made by Mads Kjersgaard. The size of the case seems very good, the mouldings might be slightly adapted to match the C IV emblem and lions on top of it.

The Pedal towers and the middle tower of the Manual and made by Lorentz, in 1628 or 1641. It cannot be proven that the middle tower was rebuilt before the pedal sections were added. The enlargement of the middle tower visually makes more sense when the pedal sections are in place. The fact that the pipes in the middle tower are darker, can be caused by other reasons than an older age.

The pedal sections are not only connected in an unmotivated way to the Brebos case; the joints are also illogical and out of use, suggesting the layout has been changed. However, the present layout does fit nicely under the arch of its original location in Helsingborg. An alternative layout, with the imposts on the same level, does not look nice, and would not correspond to the traces in the case. An alternative layout with the pedal towers shifted out by 240 mm would however fit under the arches.

The façade contains Lorentz pipes of the former Ruckpositive, some pipes of the Manual, and some pipes from the pedal. The function of the pedal pipes does not correspond to a logical layout, suggesting that the layout has been changed. It is certain that the pipes for CDEFG belong to the middle tower and that the pipe for A is the only known inside pipe by Lorentz. A logical layout of the historic pipes can be achieved by suggesting that the towers once were shifted outwards, having blind pipes in extra fields.

A reconstruction of the entire case work as shown at the end of chapter 6 is plausible.

The late 17th-century / early 18th-century inside pipes are made by Amdor, probably to replace the pipes stolen by the organist in 1693. A few dozen of Fritzsche pipes from 1662 are mixed with these pipes. The rest of the pipes are either by Fogelberg or Frobenius.

Measurements

HW Gedact 8’ fs^{0} - c’’’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
HW G8 fs0	B	42,0	419	178	ds 8				8		fs	e / fs		
HW G8 g0	B	40,8	391	182	e 8				8		g	g		
HW G8 gs0	B	38,9	377	181	f 8				8		gs	gs / d/e		
HW G8 a0	B	37,2	351	183	fs 8				8		a	a		
HW G8 b0	B	35,6	327,5	183,5	g 8				8		b	b / ?		
HW G8 h0	B	34,6	307	183	gs 8				8		h	h		
HW G8 c1	B	33,3	290	184	a 8				8		c	cs? / fs?		
HW G8 cs1	B	31,7	276	182	b 8				8		cs'	cs		
HW G8 d1	B	33,4	251	184	h				8		d'	d		
HW G8 ds1	B	29,3	244,5	182					8		ds'			
HW G8 e1	B	29,3	227	181	cs' 8				8		e'	e		
HW G8 f1	B	27,6	218	181,5	d' 8				8		f'	f		
HW G8 fs1	B	27,0	204	182	ds' 8				8		fs'	fs / ?		
HW G8 g1	B	25,7	192	181	e' 8				8		g'	g		
HW G8 gs1	B?	25,4	178	182					8		gs'			
HW G8 a1	B	24,0	169,5	181	fs' 8				8		a'			
HW G8 b1	B	22,8	161,5	181	g' 8				8		b'	b		
HW G8 h1	B	22,3	149	182	gs' 8				8		h'			
HW G8 c2	B	21,4	142	182	a' 8				8		c''			
HW G8 cs2	B/D	20,8	134,5	182	b' 8				8		cs''	?		
HW G8 d2	B/D	20,3	124,5	182	h' 8				8		d''	d		
HW G8 ds2	B/D	19,5	115,5	184							ds''	ds		
HW G8 e2	D	18,4	111	184					8		e''	e'		
HW G8 f2	D	17,4	107	184					8		f''	a		
HW G8 fs2	D	17,6	99	178					8		fs''	f		
HW G8 g2	D	17,0	94	177					8		g''	fs'		
HW G8 gs2	D	15,8	90	181					8		gs''	g		
HW G8 a2	D	15,8	85	183					8		a''	gs		
HW G8 b2	D	14,7	80	179					8		b''	b		
HW G8 h2	D	14,0	74	161,5							h''	h		
HW G8 c3	D	14,7	68	184					8		c'''	c		
	B/D = foot B / body D											ink inscriptions		

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
HW G8 fs0	Y					178			13,07	8,34		1,1	
HW G8 g0	Y					182			14,12	8,19		0,95	
HW G8 gs0	Y					181			12,8	9,3		0,95	
HW G8 a0	Y					183			13,3	7,9		0,9	
HW G8 b0	Y					183,5			13,19	7,92		1,15	
HW G8 h0	Y					183			12,33	7,83		1,2	
HW G8 c1	Y					184			12,67	8,78		0,9	
HW G8 cs1	Y				repaired on the side	182			11,3	7,55		0,85	
HW G8 d1	Y					184			11,28	7,4		0,65	
HW G8 ds1	Y					182			11,02	7,32		0,8	
HW G8 e1	Y					181			11,54	7,34		0,8	
HW G8 f1	Y					181,5			11,84	7,53		0,8	
HW G8 fs1	Y					182			11,87	7,52		0,8	
HW G8 g1	Y					181			11,83	6,78		0,9	
HW G8 gs1	Y					182			11,06	6,64		0,75	
HW G8 a1	Y				repaired on the side	181			11,37	6,81		0,65	
HW G8 b1	Y					181			10,07	5,73		0,6	
HW G8 h1	Y					182			11,12	6,63		0,6	
HW G8 c2	Y			13,1		182			10,56	7,07		0,6	
HW G8 cs2		Y		3,5	ext. (10,4%) with new round seam, old long seam	182	88,12		10,68	6,38			N.O.
HW G8 d2		Y		5,3	ext. (10,3%) with new round seam, old long seam	182	89,76		10,75	5,53			N.O.
HW G8 ds2		Y			ext. with new round seam, old long seam	184	124,09		9,15	6,2			N.O.
HW G8 e2		Y			ext. with new round seam, old long seam	184	64,88		9,03	5,93			N.O.
HW G8 f2		Y		2,0	ext. with old round seam, old long seam	184	56,15		9,03	6,87			N.O.
HW G8 fs2		Y			ext. with old round seam, old long seam	178	57,74		8,82	6,76			N.O.
HW G8 g2		Y		5,5	ext. with new round seam, new long seam	177	64,17		8,52	5,47			N.O.
HW G8 gs2		Y			ext. with old round seam, old long seam	181	54,35		8,41	5,41			N.O.
HW G8 a2		Y			ext. with old round seam, old long seam	183	54,66		7,81	6,05			N.O.
HW G8 b2		Y			ext. with new round seam, old long seam	179	43,15		7,77	5,18			N.O.
HW G8 h2		Y			ext. with new round seam, old long seam	161,5	64,22		8,6	6,26			N.O.
HW G8 c3		Y			ext. with old round seam, old long seam	184	51,38		8,03	6,02			N.O.

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
HW G8 fs0	Y				419					measured from top of the head	129,5	132,1	42,03
HW G8 g0	Y				391					measured from top of the head	125,0	128,2	40,80
HW G8 gs0	Y				377					measured from top of the head	119,2	122,4	38,95
HW G8 a0	Y				351					measured from top of the head	114,1	116,9	37,22
HW G8 b0	Y				327,5					measured from top of the head	109,3	111,9	35,62
HW G8 h0	Y				307					measured from top of the head	106,2	108,8	34,64
HW G8 c1	Y				290					measured from top of the head	101,7	104,5	33,26
HW G8 cs1	Y				276					measured from top of the head	96,8	99,6	31,71
HW G8 d1	Y				251					measured from top of the head	102,8	105,0	33,43
HW G8 ds1	Y				244,5					measured from top of the head	89,8	92,2	29,34
HW G8 e1	Y				227					measured from top of the head	89,6	92,2	29,34
HW G8 f1	Y				218					measured from top of the head	84,0	86,6	27,58
HW G8 fs1	Y				204					measured from top of the head	82,1	84,7	26,95
HW G8 g1	Y				192					measured from top of the head	78,3	80,7	25,69
HW G8 gs1	Y				178					measured from top of the head	77,4	79,8	25,39
HW G8 a1	Y				169,5					measured from top of the head	72,0	75,4	23,99
HW G8 b1	Y				161,5					measured from top of the head	69,1	71,7	22,82
HW G8 h1	Y				149					measured from top of the head	67,1	69,9	22,26
HW G8 c2	Y		13,9		142					measured from top of the head	64,8	67,2	21,38
HW G8 cs2	Y		6,5		134,5					measured from top of the head	62,4	65,2	20,75
HW G8 d2	Y		5,2		124,5					measured from top of the head	60,1	63,9	20,34
HW G8 ds2	Y				115,5					measured from top of the head	58,1	61,3	19,50
HW G8 e2	Y				111					measured from top of the head	54,4	57,8	18,40
HW G8 f2	N.O.S.			*1	107			31,7		non original from top of the head	51,7	54,7	17,41
HW G8 fs2	Y				99					measured from top of the head	52,1	55,3	17,59
HW G8 g2	Y		5,7		94					measured from top of the head	50,5	53,5	17,04
HW G8 gs2	Y				90					measured from top of the head	46,3	49,5	15,75
HW G8 a2	Y				85					measured from top of the head	46,3	49,5	15,75
HW G8 b2	Y				80					measured from top of the head	43,0	46,2	14,71
HW G8 h2	Y				74					measured from top of the head	41,7	44,1	14,02
HW G8 c3	Y				68					measured from top of the head	42,9	46,1	14,67

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
HW G8 fs0	3,82	0,65			cannot measure	47,52	44,53				33,88	2,169	15,62	not original, lowered
HW G8 g0	3,76	0,8			cannot measure	40,6	43,63				33,22	2,236	14,86	not original, lowered
HW G8 gs0	3,82	0,8			cannot measure	40,92	41,71				31,18	2,081	14,98	
HW G8 a0	3,74	0,7			cannot measure	43,02	39,69				30,48	2,058	14,81	
HW G8 b0	3,68	0,65			cannot measure	38,81	37,83				29,7	2,331	12,74	
HW G8 h0	3,77	0,65			cannot measure	36,79	36,65				28,19	2,324	12,13	not original, lowered
HW G8 c1	3,76	0,7			cannot measure	35,05	35,87				27,07	2,316	11,69	not original, lowered
HW G8 cs1	3,93	0,7			cannot measure	34,37	33,7				24,67	2,227	11,08	
HW G8 d1	3,90	0,55			cannot measure	22,5	35,52				26,39	2,307	11,44	
HW G8 ds1	3,70	0,6			cannot measure	31,62	31,34				24,27	2,099	11,56	
HW G8 e1	4,04	0,65			cannot measure	31,11	32,33				22,17	2,253	9,84	
HW G8 f1	3,86	0,65			cannot measure	32,1	28,83				21,76	2,144	10,15	
HW G8 fs1	3,74	0,65			cannot measure	29,13	28,93				21,94	2,236	9,81	
HW G8 g1	3,71	0,6			cannot measure	24,77	28,76				21,12	2,252	9,38	
HW G8 gs1	3,69	0,6			cannot measure	26,25	28,03				20,98	2,525	8,31	
HW G8 a1	3,81	0,85	glue inside?		cannot measure	26,76	27,47				18,87	2,338	8,07	not original, lowered
HW G8 b1	3,70	0,65			cannot measure	24,52	25,4				18,67	2,134	8,75	
HW G8 h1	3,88	0,7			cannot measure	25,01	26,17				17,29	2,330	7,42	
HW G8 c2	3,77	0,6			cannot measure	21,55	23,02		9,4		17,17	2,429	7,07	
HW G8 cs2	3,82	0,7			cannot measure	21,28	22,65		9,5		16,34	2,263	7,22	
HW G8 d2	3,92	0,95			cannot measure	21,84	22,73		10,1		15,31	2,209	6,93	
HW G8 ds2	3,94	0,8			cannot measure	14,26	21,73				14,75	2,422	6,09	not original, lowered
HW G8 e2	3,70	0,85			cannot measure	15,97	21,03				14,71	2,331	6,31	
HW G8 f2	3,79	0,75			cannot measure	16,06	19,34				13,64	2,148	6,35	
HW G8 fs2	3,84	0,8			cannot measure	15,7	20,41				13,57	2,084	6,51	
HW G8 g2	3,48	0,75			cannot measure	15,28	19,45				14,51	2,348	6,18	
HW G8 gs2	3,58	0,8			cannot measure	15,28	18,15				12,94	2,204	5,87	
HW G8 a2	3,81	0,8			cannot measure	14,01	17,67				12,14	2,108	5,76	
HW G8 b2	3,59	0,8			cannot measure	16,44	17,01				11,97	2,311	5,18	not original, lowered
HW G8 h2	3,64	0,6			cannot measure	12,91	17,08				11,45	2,351	4,87	not original, lowered
HW G8 c3	3,68	0,8			cannot measure	14,24	16,13				11,65	2,417	4,82	

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average height	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
HW G8 fs0	2,1		60		parallel + arches	62,65		half circle		cannot measure		Y					Y	
HW G8 g0	1,9		55		parallel + arches	58,71		half circle	16,91			Y					Y	
HW G8 gs0	1,9		50	angle N.O.	parallel + arches	58,52		half circle	16,12			Y					Y	
HW G8 a0	1,9		50		parallel + arches	54,66		half circle	15,56			Y					Y	
HW G8 b0	1,4		60		parallel + arches	50,91		half circle	14,67			Y					Y	
HW G8 h0	1,5		55		parallel + arches	51,63		half circle	14,46			Y					Y	
HW G8 c1	1,7		55		parallel + arches	50,94		half circle	14,46			Y					Y	
HW G8 cs1	1,3		55		parallel + arches	47,53		half circle	14,15			Y					Y	
HW G8 d1	1,6		60		parallel + arches	55,23		half circle	13,71			Y					Y	
HW G8 ds1	1,7		60		parallel + arches	44,78		half circle	0	cannot measure		Y						
HW G8 e1	1,4		55		parallel + arches	43,74		half circle	12,29			Y					Y	
HW G8 f1	1,3		55		parallel + arches	41,16		half circle	11,62			Y					Y	
HW G8 fs1	1,3			angle N.O.	parallel + arches	41,88		half circle	11,66			Y					Y	
HW G8 g1	1,2		55	angle N.O.	parallel + arches	38,82		half circle	11,48			Y					Y	
HW G8 gs1	1,4		55		parallel + arches		*1	half circle	11,03			Y						
HW G8 a1	1,2		55		parallel + arches	36,58		half circle	10,5			Y					Y	
HW G8 b1	1,2		55	angle N.O.	parallel + arches	36,32		half circle	10,5			Y					Y	
HW G8 h1	1,1		60	angle N.O.	parallel + arches	34,98		half circle	10,51			Y					Y	
HW G8 c2	1,1		55	angle N.O.	parallel + arches	33,35		half circle	10,08			Y					Y	
HW G8 cs2	1,0		75		parallel lines		*1	convergent lines	9,04			Y					Y	
HW G8 d2	1,7		80		parallel lines		*1	convergent lines	12,05			Y				*2	Y	
HW G8 ds2	1,3		80	angle N.O.	pressed			half circle	8,4			Y						
HW G8 e2	1,4		80		pressed			convergent lines	8,96			Y						
HW G8 f2	0,8		80	angle N.O.	pressed			convergent lines	8,71			Y						
HW G8 fs2	1,6			angle N.O.	pressed			pressed				Y						
HW G8 g2	1,0		75	angle N.O.	pressed			convergent lines	9,66			Y						
HW G8 gs2	0,9		85?		pressed			convergent lines	17,97			Y						
HW G8 a2	1,0		80		pressed			convergent lines	15,02			Y						
HW G8 b2	1,4		80		pressed			convergent lines		14?		Y						
HW G8 h2	1,1		80		pressed			convergent lines	6,69			Y						
HW G8 c3	1,1		80		pressed			convergent lines	9,46			Y						

*1 cannot measure

*2 30,7% tin

HW Gedact 4’ C - c’’’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
HW G4 C	B	56,7	576	201	A		Gedakt Fl	*1		C	c'''		C / Gedakt Fl / 4	foot front
HW G4 Cs	B	54,6	547	180	B					Cs				
HW G4 D	B	52,2	511	177	H			*2		D				
HW G4 Ds	B	50,0	479	179	C					Ds				
HW G4 E	B	48,6	457,5	178	cs					E				
HW G4 F	B	46,8	434	175	cs 8					F				
HW G4 Fs	B	48,1	394	182						Fs				
HW G4 G	B	44,2	377	180	ds					G				
HW G4 Gs	B	43,0	360	179						Gs				
HW G4 A	B	43,7	330	173						A				
HW G4 B	B	41,1	313	182						B				
HW G4 H	B	40,0	293,5	180	fs					H		ds? (Lorentz)		
HW G4 c0	B	39,7	274	181						c				
HW G4 cs0	B	37,0	259	169	gs					cs		d, gs?		
HW G4 d0	B	37,1	236	184						d				
HW G4 ds0	B	34,5	230,5	181	b					ds				
HW G4 e0	B	34,3	212,5	183						e				
HW G4 f0	B	33,2	190	182						f				
HW G4 fs0	B	32,5	187,5	182						fs				
HW G4 g0	B	31,5		182	cs'					g				
HW G4 gs0	B	31,3		182						gs				
HW G4 a0	B	29,9		183						a				
HW G4 b0	B	29,0	140,5	185						b				
HW G4 h0	B	28,2	131	182						h				
HW G4 c1	B	27,4	126,5	185						c'				
HW G4 cs1	B	25,7	123,34	185						cs'				
HW G4 d1	B	24,9	114,7	185						d'				
HW G4 ds1	B	24,7	106,1	185						ds'				
HW G4 e1	B	23,7	101,35	184						e'				
HW G4 f1	B	23,1	93,24	187						f'				
HW G4 fs1	B	21,7	89,36	185						fs'				
HW G4 g1	B	21,0	83,86	189						g'				
HW G4 gs1	B	19,4	80,47	186						gs'				
HW G4 a1	B	19,4	76,03	187	c3					a'				
HW G4 b1	B	18,9	70,54	186						b'				
HW G4 h1	B	17,9	65,55	185						h'				
HW G4 c2	B	17,1	63,3	185						c''				
HW G4 cs2	B	16,9	58,76	186						cs''				
HW G4 d2	B	16,0	56,41	184						d''				
HW G4 ds2	B	16,0	51,01	182						ds''				
HW G4 e2	B	15,4	49,09	186						e''				
HW G4 f2	B	14,5	45,91	183						f''				
HW G4 fs2	B	13,4	43,73	188	cs''					fs''				
HW G4 g2	B	12,9	41,14	187	d''					g''				
HW G4 gs2	B	12,5	38,85	189	ds''					gs''				
HW G4 a2	B	12,2	37,19	187	e''					a''				
HW G4 b2	B	11,5	33,16	186	fs''					b''				
HW G4 h2	B	11,5	31,98	188	f''					h''				
HW G4 c3	B	11,3	28,58	185	g''					c'''				

*1 Gedactfl. 4 / Torrlosa C

*2 Flajte / 4 / E

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
HW G4 C	Y					201			17,2	10,53		0,85	
HW G4 Cs	Y					180			20	10,64		0,8	
HW G4 D	Y					177			16,91	11,08		0,6	
HW G4 Ds	Y					179			14,82	8,47		0,75	
HW G4 E	Y					178			15,2	9,4		0,7	
HW G4 F	Y					175			14,05	9,22		0,9	
HW G4 Fs	Y					182			13,81	9,12		0,75	
HW G4 G		Y				180			14,77	9,23			
HW G4 Gs	Y					179			14,56	9,06		0,9	
HW G4 A	Y					173			14,6	9,95		0,7	
HW G4 B	Y					182			13,5	8,42		0,75	
HW G4 H	Y					180			12,92	8,47		0,7	
HW G4 c0	Y					181			12,96	8,39		0,85	
HW G4 cs0	Y					169			14,18	8,1		0,65	
HW G4 d0	Y					184			12,34	8,23		0,7	
HW G4 ds0	Y					181			12,35	7,49		0,7	
HW G4 e0	Y					183			12,51	7,41		0,7	
HW G4 f0	Y					182			12,94	8,2		0,7	
HW G4 fs0	Y					182			11,86	8,46		0,55	
HW G4 g0	Y					182			12,21	7,4		0,65	
HW G4 gs0	Y					182			12,11	7,58		0,65	
HW G4 a0	Y					183			11,88	7,03		0,8	
HW G4 b0	Y					185			11,54	7,52		0,7	
HW G4 h0	Y					182			11,93	7,76		0,7	
HW G4 c1	Y					185			11,37	7,61		0,75	
HW G4 cs1	Y					185			10,69	6,93		0,8	
HW G4 d1	Y					185			10,45	6,62		0,75	
HW G4 ds1	Y					185			10,92	7,26		0,6	
HW G4 e1	Y					184			10,98	7,41		0,6	
HW G4 f1	Y					187			10,93	6,29		0,7	
HW G4 fs1	Y					185			11,33	6,63		0,7	
HW G4 g1	Y					189			10,34	6,17		0,7	
HW G4 gs1	Y					186			10,85	6,34		0,45	
HW G4 a1		Y				187	25		10,21	8,59	repaired foot		
HW G4 b1	Y					186			10,85	6,82		0,4	
HW G4 h1	Y					185			9,88	6,78		0,45	
HW G4 c2	Y					185			10,13	6,51		0,4	
HW G4 cs2	Y					186			10,55	6,28		0,55	
HW G4 d2	Y					184			9,96	6,63		0,3	
HW G4 ds2	Y					182			10,31	6,64	repaired foot	0,35	
HW G4 e2	Y					186			10,36	6,47		0,55	
HW G4 f2	Y					183			9,47	6,31		0,5	
HW G4 fs2	Y					188			9,83	6,32		0,45	
HW G4 g2	Y					187			9,88	6,53		0,5	
HW G4 gs2	Y					189			9,4	6,36		0,35	
HW G4 a2	Y					187			9,85	6,48		0,5	
HW G4 b2	Y					186			10,26	6,12		0,3	
HW G4 h2	Y					188			8,63	6,81		0,45	
HW G4 c3	Y					185			9,53	6,33		0,45	

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
HW G4 C	Y				576	627	36,83				175,2	178,2	56,72
HW G4 Cs	Y				547	595	36,05				168,5	171,5	54,59
HW G4 D	Y				511	561	30,13				161,2	164,0	52,20
HW G4 Ds	Y				479	525	31,17				154,6	157,0	49,97
HW G4 E	N.O.S.			ext. on top	457,5			24			149,9	152,7	48,61
HW G4 F	Y				434	502	4,17				143,8	147,18	46,85
HW G4 Fs	Y				394						148,6	151,2	48,11
HW G4 G	Y				377	438	7,41				136,4	138,8	44,19
HW G4 Gs	Y				360	392	34,18				132,3	135,1	42,99
HW G4 A	Y				330						134,6	137,2	43,68
HW G4 B	Y			different texture	313						126,8	129,0	41,07
HW G4 H	Y				293,5						123,2	125,6	39,96
HW G4 c0	Y				274						121,9	124,9	39,74
HW G4 cs0	Y				259						113,7	116,1	36,96
HW G4 d0	Y				236						114,4	116,6	37,11
HW G4 ds0	Y				230,5						106,3	108,5	34,54
HW G4 e0	Y				212,5						105,4	107,8	34,33
HW G4 f0	Y				190						102,4	104,4	33,23
HW G4 fs0	Y				187,5						99,9	102,1	32,49
HW G4 g0	Y									cannot take head out	97,1	99,1	31,54
HW G4 gs0	Y									cannot take head out	96,3	98,3	31,30
HW G4 a0	Y									cannot take head out	91,6	93,8	29,86
HW G4 b0	Y				140,5						89,1	91,1	29,01
HW G4 h0	Y				131						86,5	88,5	28,17
HW G4 c1	Y				126,5						84,2	86,0	27,38
HW G4 cs1	Y				123,34					glued head	79,1	80,7	25,67
HW G4 d1	Y				114,7					glued head	76,2	78,2	24,89
HW G4 ds1	Y				106,1					glued head	75,7	77,7	24,73
HW G4 e1	Y				101,35					glued head	72,7	74,3	23,66
HW G4 f1	N.O.				93,24					glued head	70,1	72,5	23,09
HW G4 fs1	Y				89,36					glued head	66,4	68,2	21,70
HW G4 g1	Y				83,86					glued head	63,6	66,0	21,00
HW G4 gs1	Y				80,47					glued head	59,4	61,0	19,41
HW G4 a1	Y				76,03					glued head	58,9	61,1	19,44
HW G4 b1	Y				70,54					glued head	57,4	59,2	18,85
HW G4 h1	Y				65,55					glued head	54,5	56,1	17,85
HW G4 c2	Y				63,3					glued head	52,0	53,6	17,07
HW G4 cs2	Y				58,76					glued head	51,0	53,0	16,85
HW G4 d2	Y				56,41					glued head	48,4	50,2	15,98
HW G4 ds2	Y				51,01					glued head	48,6	50,2	15,98
HW G4 e2	Y				49,09					glued head	46,4	48,2	15,36
HW G4 f2	Y				45,91					glued head	44,1	45,7	14,54
HW G4 fs2	Y				43,73					glued head	40,4	42,0	13,38
HW G4 g2	Y				41,14					glued head	38,8	40,4	12,85
HW G4 gs2	Y				38,85					glued head	37,5	39,3	12,51
HW G4 a2	Y				37,19					glued head	36,8	38,2	12,17
HW G4 b2	Y				33,16					glued head	33,9	36,1	11,49
HW G4 h2	Y				31,98					glued head	34,3	36,1	11,49
HW G4 c3	Y				28,58					glued head	33,9	35,5	11,31

N.O. = complete non-original
N.O.S. = non-original sections

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
HW G4 C	3,85	0,75		0,7		33,46	60,38	1		A	45,5	2,522	18,04	not original, lowered
HW G4 Cs	3,88	0,75		0,55		33,1	56,65	0,75		B	43,44	2,573	16,88	
HW G4 D	3,95	0,7		0,55		29,24	55,18	0,65		H	40,86	2,323	17,59	
HW G4 Ds	4,01	0,6		0,55		30,02	51,8	1			38,55	2,492	15,47	
HW G4 E	3,95	0,7		0,5		27,98	53,79	0,9			37,94	2,440	15,55	
HW G4 F	3,63	0,85		0,8		45,92	49,75	1,05			39,66			not original, lowered
HW G4 Fs	3,89	0,65		0,5		31,08	50,77	0,8			38,16	2,379	16,04	
HW G4 G	4,00	0,6		0,5		25,5	46,25	0,85			34,13	2,198	15,53	
HW G4 Gs	3,80	0,7		0,65		28,18	45,32	0,85			34,84			not original, lowered
HW G4 A	3,86	0,65		0,5		36,42	46,27	1,1			34,88			not original, lowered
HW G4 B	3,80	0,55		0,55		40,42	43,96	0,85			33,41			not original, lowered
HW G4 H	3,90	0,6		0,5		44,87	41,5	0,9			31,57	2,534	12,46	
HW G4 c0	3,92	0,75		0,7		23,26	41,8	0,7			31,12	2,379	13,08	
HW G4 cs0	3,98	0,6		0,45		27,1	39,01	0,7			28,55	2,407	11,86	
HW G4 d0	3,92	0,55		0,55		22,07	39,07	0,65			29,16	2,514	11,6	
HW G4 ds0	3,96	0,55		0,45		24,2	36,65	0,7			26,81			
HW G4 e0	4,06	0,6		0,45		22,44	36,57	0,75			25,98			not original, lowered
HW G4 f0	4,03	0,5		0,5		22,6	35,62	0,6			25,41			not original, lowered
HW G4 fs0	3,99	0,55		0,5		22,55	35,05	0,75			25,03			not original, lowered
HW G4 g0	3,94	0,5			cannot take head out						24,64	2,644	9,32	
HW G4 gs0	3,99	0,5			cannot take head out						24,17	2,659	9,09	
HW G4 a0	3,79	0,55			cannot take head out						24,15			not original, lowered
HW G4 b0	3,90	0,5		0,45		20,73	31,4	0,65			22,83	2,683	8,51	
HW G4 h0	3,87	0,5		0,45		20,95	30,92	0,6			22,35			not original, lowered
HW G4 c1	3,89	0,45		0,45		20,74	29,8	0,65			21,67	2,689	8,06	
HW G4 cs1	4,04	0,4			glued head						19,59	2,787	7,03	
HW G4 d1	3,95	0,5			glued head						19,27			not original, lowered
HW G4 ds1	3,73	0,5			glued head						20,28	2,786	7,28	
HW G4 e1	3,77	0,4			glued head						19,29			not original, lowered
HW G4 f1	4,10	0,6			glued head						17,09	2,892	5,91	
HW G4 fs1	3,84	0,45			glued head						17,3			not original, lowered
HW G4 g1	3,94	0,6			glued head						16,14			not original, lowered
HW G4 gs1	3,75	0,4			glued head						15,85			not original, lowered
HW G4 a1	3,76	0,55			glued head						15,67			not original, lowered
HW G4 b1	4,07	0,45			glued head						14,11			not original, lowered
HW G4 h1	3,39	0,4			glued head						16,06			not original, lowered
HW G4 c2	3,81	0,4			glued head						13,65			not original, lowered
HW G4 cs2	3,95	0,5			glued head						12,91			not original, lowered
HW G4 d2	3,78	0,45			glued head						12,79			not original, lowered
HW G4 ds2	3,75	0,4			glued head						12,96			not original, lowered
HW G4 e2	3,77	0,45			glued head						12,33			not original, lowered
HW G4 f2	3,75	0,4			glued head						11,74			not original, lowered
HW G4 fs2	3,67	0,4			glued head						11,02			not original, lowered
HW G4 g2	3,65	0,4			glued head						10,62	2,950	3,6	
HW G4 gs2	3,75	0,45			glued head						10,01			not original, lowered
HW G4 a2	3,69	0,35			glued head						9,99			not original, lowered
HW G4 b2	3,90	0,55			glued head						8,7	2,652	3,28	
HW G4 h2	3,63	0,45			glued head						9,45	2,813	3,36	
HW G4 c3	3,62	0,4			glued head						9,37			not original, lowered

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
HW G4 C	2,5		65	N.O.	bay leaf	97,06		half circle	22,59			Y					Y	
HW G4 Cs	2,7		60		bay leaf	93,15		half circle	22,4			Y					Y	
HW G4 D	2,4		60		bay leaf	91,28		half circle	21,98			Y					Y	
HW G4 Ds	2,4		60		bay leaf	83,32		half circle	20,17			Y					Y	
HW G4 E	2,4		60		bay leaf	83,04		half circle	20,12			Y					Y	
HW G4 F	2,4		70		bay leaf	71,67		half circle	17,91			Y					Y	
HW G4 Fs	0,9		80	1,9 *1	bay leaf	83,35		half circle	20,07			Y						
HW G4 G	1,6		60		bay leaf	73,26		half circle	17,14			Y					Y	
HW G4 Gs	1,3		70	2,53 *1	bay leaf	63,9		half circle	17,73			Y						
HW G4 A	1,6		65		bay leaf	75		half circle	17,73			Y						
HW G4 B	1,6		55		bay leaf	62,65		converging lines	20,01			Y						
HW G4 H	2,1		55	N.O.?	bay leaf	68,63		half circle	16,06			Y					Y	
HW G4 c0	2,2		70		bay leaf	59,2		half circle	16,07			Y						
HW G4 cs0	1,8		60		bay leaf	62,38		half circle	15,12			Y					Y	
HW G4 d0	1,5		55	N.O.	bay leaf	64,33		half circle	14,82			Y						
HW G4 ds0	1,9		60	N.O.	bay leaf	58,67		half circle	14,36			Y					Y	
HW G4 e0	1,6		55		bay leaf	59,51		half circle	13,86			Y						
HW G4 f0	1,5		55		bay leaf	56,63		half circle	13,3			Y						
HW G4 fs0	1,3		55		bay leaf	55,84		half circle	13,26			Y						
HW G4 g0	1,2		60	N.O.	bay leaf	54,56		half circle	13,27			Y					Y	
HW G4 gs0	1,4		60	N.O.	bay leaf	52,99		half circle	12,9			Y						
HW G4 a0	1,1		55	N.O.	bay leaf	52,05		half circle	12,59			Y						
HW G4 b0	1,1		55	N.O.	bay leaf	49,15		half circle	11,85			Y						
HW G4 h0	1,2		55		bay leaf	48,17		half circle	11,84			Y						
HW G4 c1	1,3		55		bay leaf	46,31		half circle	10,99			Y						
HW G4 cs1	1,2		55	N.O.	bay leaf	43,21		half circle	10,56			Y						
HW G4 d1	1,3		50	N.O.	bay leaf	42,05		half circle	10,13			Y						
HW G4 ds1	1,2		80	N.O.?	bay leaf	42,62		half circle	10,15			Y						
HW G4 e1	1,1		50	N.O.	bay leaf	40,26		half circle	9,68			Y						
HW G4 f1	1,1		50		pressed			half circle	9,96			Y						
HW G4 fs1	0,9			50?	bay leaf	37,63		half circle	9,44			Y						
HW G4 g1	1,3		60	N.O.	bay leaf	30,44		half circle	8,94			Y						
HW G4 gs1	1,3		55	N.O.	bay leaf	33		half circle	8,07			Y						
HW G4 a1	1,1		50	N.O.	bay leaf	29,78		half circle	9,13			Y					Y	
HW G4 b1	1,0		50	N.O.	parallel lines		*2	pressed				Y						
HW G4 h1	1,0		50		bay leaf	32,12	repaired	half circle	7,79			Y						
HW G4 c2	0,9		50	N.O.	parallel lines		*2	pressed				Y						
HW G4 cs2	0,9		50		parallel lines		*2	pressed				Y						
HW G4 d2	1,0		60		bay leaf	19,73		pressed				Y						
HW G4 ds2	1,0		75	N.O.	parallel lines		*2	pressed				Y						
HW G4 e2	0,7			N.O.	parallel lines		*2	pressed				Y						
HW G4 f2	0,7		75		parallel lines		*2	pressed				Y						
HW G4 fs2	0,8				parallel lines		*2	pressed				Y					Y	
HW G4 g2	0,6			N.O.	pressed			pressed				Y					Y	
HW G4 gs2	0,8				pressed			pressed				Y					Y	
HW G4 a2	0,8			N.O.	pressed			pressed				Y					Y	
HW G4 b2	1,0			N.O.	pressed			pressed				Y					Y	
HW G4 h2	0,6				pressed			pressed				Y					Y	
HW G4 c3	0,6		60?		pressed			pressed				Y					Y	

*1 total thickness; two faces, N.O.
*2 line or older ear

HW Quint 2 2/3’ C - c’’’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
HW Q 2 2/3 C	B	64,1	769	190	d						*1	C	*2	corpus front
HW Q 2 2/3 Cs	B	60,6	734	207	ds							Cs	Cs?	corpus front
HW Q 2 2/3 D	F	55,9	686	185					S			D	A, Albot Ballan	corpus front
HW Q 2 2/3 Ds	F	54,1	650	185	4							Ds	Ds	corpus front
HW Q 2 2/3 E	B	48,5	619	160	C 3							E	E	corpus front
HW Q 2 2/3 F	B	45,5	590	168								F	F	corpus front
HW Q 2 2/3 Fs	B	45,0	553	183								Fs	Fs	corpus front
HW Q 2 2/3 G	B	41,2	523	173								G	e / G	corpus front
HW Q 2 2/3 Gs	B	39,9	495	183								Gs	Gs	corpus front
HW Q 2 2/3 A	B	36,3	464	186								A	A	corpus front
HW Q 2 2/3 B	B	34,5	443	185								B	B	corpus front
HW Q 2 2/3 H	B	33,7	414	183	E2							H	H	corpus front
HW Q 2 2/3 c0	B	32,6	388	183	F							c 2 2/3	c	corpus front
HW Q 2 2/3 cs0	B	30,7	371	183								cs	cs	corpus front
HW Q 2 2/3 d0	B	29,4	349	184								d	d	corpus front
HW Q 2 2/3 ds0	B	28,8	320	179								ds	ds	corpus front
HW Q 2 2/3 e0	B	27,1	304	183	A		A					e	e	corpus front
HW Q 2 2/3 f0	B	26,5	284	185	B							f	f	corpus front
HW Q 2 2/3 fs0	B	25,7	269	186	e 3							fs	fs	corpus front
HW Q 2 2/3 g0	B	26,0	249	166	B, A2							g	cs	corpus front
HW Q 2 2/3 gs0	B	25,1	238	178								gs	gs	corpus front
HW Q 2 2/3 a0	B	24,4	222	183	c							a	g	corpus front
HW Q 2 2/3 b0	C	22,6	206	178	d		d					b	a	corpus front
HW Q 2 2/3 h0	C	21,6	193	179	e		e					h	b	corpus front
HW Q 2 2/3 c1	B	20,6	186	174	e							c' 2 2/3	h	corpus front
HW Q 2 2/3 cs1	B	21,2	171	172	fs							cs'	c	corpus front
HW Q 2 2/3 d1	B	18,2	167	176	fs		fs					d'	cs	corpus front
HW Q 2 2/3 ds1	B	19,3	153	183	fs		fs					ds'	ds	corpus front
HW Q 2 2/3 e1	C	18,5	147	178	gs		gs					e'	ds	corpus front
HW Q 2 2/3 f1	B	16,7	141	176	a'							f'	e	corpus front
HW Q 2 2/3 fs1	C	16,2	130	182	b		b					fs'	f	corpus front
HW Q 2 2/3 g1	B	16,2	121	184	ds' 3							g'	fs	corpus front
HW Q 2 2/3 gs1	C	15,6	116	180	h		h					gs'	g	corpus front
HW Q 2 2/3 a1	B	14,5	109	178	d'		cs ''					a'	gs	corpus front
HW Q 2 2/3 b1	C	14,5	102	181	cs		d?					b'	a	corpus front
HW Q 2 2/3 h1	B	14,5	95	187	ds' 2							h'	b	corpus front
HW Q 2 2/3 c2	B	13,8	90	178	ds''		ds''					c'' 2 2/3	h	corpus front
HW Q 2 2/3 cs2	C	12,6	88	181	f		f					cs''	c	corpus front
HW Q 2 2/3 d2	C	13,2	79	185								d''	cs	corpus front
HW Q 2 2/3 ds2	B	12,6	72	185	c'' 3							ds''	d	corpus front
HW Q 2 2/3 e2	B	12,0	70	184	cs'' 3							e''	ds	corpus front
HW Q 2 2/3 f2	B	11,3	66	183	gs							f''	e	corpus front
HW Q 2 2/3 fs2	B	10,6	60	179	ds'' 3							fs2	f	corpus front
HW Q 2 2/3 g2	M													
HW Q 2 2/3 gs2	M													
HW Q 2 2/3 a2	M													
HW Q 2 2/3 b2	M													
HW Q 2 2/3 h2	M													
HW Q 2 2/3 c3	M													

*1 Kwint 2 2/3

*2 Kwint 2 2/3 / H V / C

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
HW Q 2 2/3 C	Y					190			17,88	11,08		1,1	
HW Q 2 2/3 Cs	Y					207			19,44	9,27		1,1	
HW Q 2 2/3 D	Y					185			16,54	8,56		0,9	
HW Q 2 2/3 Ds	Y					185			14,16	8,17		0,8	
HW Q 2 2/3 E	Y		H			160			15,22	10,53		0,9	
HW Q 2 2/3 F	Y		H			168			13,67	9,71		0,8	
HW Q 2 2/3 Fs	Y		H			183			12,78	8,77		0,8	
HW Q 2 2/3 G	Y		H			173			13,93	8,02		0,8	
HW Q 2 2/3 Gs	Y		H			183			12,15	6,93		0,8	
HW Q 2 2/3 A	Y		V			186			11,19	7,27		0,65	
HW Q 2 2/3 B	Y		V			185			11,27	7,02		0,7	
HW Q 2 2/3 H	Y		H			183			11,08	8,14		0,6	
HW Q 2 2/3 c0	Y		H			183			10,86	6,5		0,65	
HW Q 2 2/3 cs0	Y		H			183			10,61	6,58		0,55	
HW Q 2 2/3 d0	Y		H			184			10,34	5,59		0,6	
HW Q 2 2/3 ds0	Y		H			179			10,34	6,39		0,5	
HW Q 2 2/3 e0	Y		H			183			10,42	6,42		0,65	
HW Q 2 2/3 f0	Y		H			185			11,03	6,68		0,55	
HW Q 2 2/3 fs0	Y		H			186			9,31	6,2		0,7	
HW Q 2 2/3 g0	Y		H			166			10,93	5,96		0,6	
HW Q 2 2/3 gs0	Y		H			178			10,96	5,93		0,65	
HW Q 2 2/3 a0	Y		H			183			9,76	5,84		0,7	
HW Q 2 2/3 b0	Y		V			178			10	6,24		0,5	
HW Q 2 2/3 h0	Y		V			179			9,04	6,19		0,55	
HW Q 2 2/3 c1	Y				repaired in the middle	174			10,2	5,5		0,65	
HW Q 2 2/3 cs1	Y		H			172			9,29	5,69		0,5	
HW Q 2 2/3 d1	Y		H			176			10,15	5,79		0,9	
HW Q 2 2/3 ds1	Y		H			183			9,34	5,67		0,55	
HW Q 2 2/3 e1	Y		V	11,9		178			8,44	5,2		0,5	
HW Q 2 2/3 f1		Y	H	18,0	repaired toe	176	17,14				replaced toe		
HW Q 2 2/3 fs1	Y		V	12,6		182			8,85	4,97		0,5	
HW Q 2 2/3 g1	Y		H	17,6		184			8,99	5,11		0,55	
HW Q 2 2/3 gs1	Y		V	12,4		180			9,17	5,5		0,5	
HW Q 2 2/3 a1	Y		V	9,9		178			9,8	5,78		0,55	
HW Q 2 2/3 b1	Y		V	12,5		181			9,06	5,69		0,7	
HW Q 2 2/3 h1	Y		H	9,8		187			9,61	5,9		0,6	
HW Q 2 2/3 c2		Y	H	14,0	repaired toe	178	12,13				replaced toe		
HW Q 2 2/3 cs2	Y		V	12,3		181			8,44	5,58		0,4	
HW Q 2 2/3 d2	Y		V	15,6		185			8,06	5,33		0,45	
HW Q 2 2/3 ds2	Y		H	17,6		185			8,79	5,67		0,5	
HW Q 2 2/3 e2	Y		H	16,1		184			8,78	5,81		0,4	
HW Q 2 2/3 f2	Y		H	15,3		183			7,59	4,95		0,45	
HW Q 2 2/3 fs2	Y		H	17,7		179			8,62	5,11		0,4	
HW Q 2 2/3 g2													
HW Q 2 2/3 gs2													
HW Q 2 2/3 a2													
HW Q 2 2/3 b2													
HW Q 2 2/3 h2													
HW Q 2 2/3 c3													

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	ıeral body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
HW Q 2 2/3 C	N.O.S.			small window at top	769				735		198,1	201,5	64,14
HW Q 2 2/3 Cs	N.O.S.			small window at top	734				690		187,3	190,5	60,64
HW Q 2 2/3 D	N.O.S.			extended at the top	686			46,82	663		171,5	175,5	55,86
HW Q 2 2/3 Ds	N.O.S.			small window at top	650				614		165,6	170,0	54,11
HW Q 2 2/3 E	N.O.S.	V		small window at top	619				592		150,1	152,5	48,54
HW Q 2 2/3 F	N.O.S.	V		small window at top	590				559		140,2	142,81	45,46
HW Q 2 2/3 Fs	N.O.S.	V		extended at the top	553			21	520		139,4	141,4	45,02
HW Q 2 2/3 G	N.O.S.	V		small window at top	523	584	2,64		498		127,4	129,6	41,24
HW Q 2 2/3 Gs	N.O.S.	V		small window at top	495	550	7,18		467		123,5	125,5	39,94
HW Q 2 2/3 A	N.O.S.	V		small window at top	464				444		111,6	114,0	36,27
HW Q 2 2/3 B	N.O.S.	V		small window at top	443				414		105,6	108,4	34,50
HW Q 2 2/3 H	N.O.S.	V		small window at top	414	439	27,26		400		104,0	106,0	33,72
HW Q 2 2/3 c0	N.O.S.	V		small window at top	388	415	23,75		359		100,5	102,5	32,64
HW Q 2 2/3 cs0	N.O.S.	V		window at top	371				350		94,8	96,4	30,67
HW Q 2 2/3 d0	N.O.S.	V		small window at top	349	366	28,2		333		90,4	92,4	29,41
HW Q 2 2/3 ds0	N.O.S.	V		small window at top	320						88,0	90,4	28,78
HW Q 2 2/3 e0	N.O.S.	V		small window at top	304						83,2	85,0	27,06
HW Q 2 2/3 f0	N.O.S.	V		small window at top	284	305	19,11				81,2	83,4	26,53
HW Q 2 2/3 fs0	N.O.S.	V		small window at top	269	291	17,4				79,0	80,6	25,67
HW Q 2 2/3 g0					249						79,3	81,7	26,01
HW Q 2 2/3 gs0	N.O.S.			small window at top	238						76,6	78,8	25,07
HW Q 2 2/3 a0		V			222						74,6	76,6	24,38
HW Q 2 2/3 b0		V			206						68,4	71,0	22,60
HW Q 2 2/3 h0		V			193						65,2	68,0	21,64
HW Q 2 2/3 c1					186						62,5	64,7	20,59
HW Q 2 2/3 cs1		V			171	175	28,52				64,8	66,6	21,21
HW Q 2 2/3 d1		V			167						55,0	57,0	18,15
HW Q 2 2/3 ds1		V			153						59,4	60,8	19,34
HW Q 2 2/3 e1		V	12,8		147						55,7	58,1	18,48
HW Q 2 2/3 f1		V	17,7		141						50,9	52,5	16,70
HW Q 2 2/3 fs1		V	11,8		130						48,8	50,8	16,17
HW Q 2 2/3 g1	N.O.S.	V	17,5	small window at top	121						49,6	51,0	16,23
HW Q 2 2/3 gs1		V	13,1		116						47,1	49,1	15,64
HW Q 2 2/3 a1		V	8,6		109						44,0	45,6	14,52
HW Q 2 2/3 b1		V	12,7		102						42,6	45,6	14,52
HW Q 2 2/3 h1		V	17,0		95						44,0	45,6	14,52
HW Q 2 2/3 c2		V	15,9		90						42,1	43,3	13,77
HW Q 2 2/3 cs2		V	13,6		88						37,6	39,4	12,55
HW Q 2 2/3 d2		V	14,8		79						39,7	41,5	13,22
HW Q 2 2/3 ds2	Y	V	17,5	small repair on top	72						37,9	39,5	12,58
HW Q 2 2/3 e2		V	18,0		70						36,0	37,6	11,98
HW Q 2 2/3 f2	Y	V	13,6	small repair on top	66						34,2	35,6	11,34
HW Q 2 2/3 fs2		V	17,7		60						32,0	33,2	10,57
HW Q 2 2/3 g2													
HW Q 2 2/3 gs2													
HW Q 2 2/3 a2													
HW Q 2 2/3 b2													
HW Q 2 2/3 h2													
HW Q 2 2/3 c3													

N.O. = complete non-original
N.O.S. = non-original sections

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
HW Q 2 2/3 C	3,90	0,85		0,75							50,82	3,924	12,95	N.O.
HW Q 2 2/3 Cs	4,01	0,8		0,55							46,67	3,829	12,19	
HW Q 2 2/3 D	3,94	1									43,48	3,781	11,5	
HW Q 2 2/3 Ds	3,99	1,1		9							41,5	3,735	11,11	
HW Q 2 2/3 E	3,80	0,6		0,45							39,52	3,551	11,13	
HW Q 2 2/3 F	3,84	0,65		0,5							36,47	3,662	9,96	N.O.
HW Q 2 2/3 Fs	3,96	0,5		0,5							35,17	3,734	9,42	N.O.
HW Q 2 2/3 G	3,77	0,55		0,5							33,82	3,826	8,84	N.O.
HW Q 2 2/3 Gs	3,73	0,5		0,45							33,12	3,660	9,05	
HW Q 2 2/3 A	3,99	0,6		0,6							27,97	3,595	7,78	N.O.
HW Q 2 2/3 B	3,92	0,7		0,6							26,97	3,467	7,78	N.O.
HW Q 2 2/3 H	4,02	0,5		0,45							25,86	2,976	8,69	N.O.
HW Q 2 2/3 c0	4,00	0,5		0,4							25,11	3,174	7,91	
HW Q 2 2/3 cs0	3,78	0,4		0,35							25,09	3,019	8,31	
HW Q 2 2/3 d0	3,69	0,5		0,35	mouth not soldered on left side						24,52	3,226	7,6	
HW Q 2 2/3 ds0	3,86	0,6		0,4							22,81	2,802	8,14	
HW Q 2 2/3 e0	3,98	0,45		0,35							20,92	2,713	7,71	
HW Q 2 2/3 f0	3,94	0,55		0,45							20,61	3,018	6,83	
HW Q 2 2/3 fs0	3,97	0,4		0,35							19,93	3,109	6,41	N.O.
HW Q 2 2/3 g0	4,07	0,6		0,55							19,47	3,311	5,88	N.O.
HW Q 2 2/3 gs0	4,14	0,55		0,5							18,48	2,892	6,39	
HW Q 2 2/3 a0	4,04	0,5	repaired on the sides	0,4							18,48	2,792	6,62	
HW Q 2 2/3 b0	4,10	0,65		0,65							16,7	2,647	6,31	
HW Q 2 2/3 h0	3,90	0,7		0,7							16,7	2,845	5,87	
HW Q 2 2/3 c1	3,98	0,55		0,4							15,7	3,198	4,91	
HW Q 2 2/3 cs1	3,94	0,45		0,4							16,44	2,704	6,08	
HW Q 2 2/3 d1	4,01	0,5		0,5							13,73	2,779	4,94	
HW Q 2 2/3 ds1	3,99	0,35		0,4							14,89	3,175	4,69	
HW Q 2 2/3 e1	3,87	0,6		0,5							14,37	3,165	4,54	
HW Q 2 2/3 f1	4,17	0,4		0,35							12,18	2,781	4,38	
HW Q 2 2/3 fs1	3,68	0,5		0,45							13,26	3,480	3,81	
HW Q 2 2/3 g1	3,96	0,35		0,4							12,53	2,955	4,24	
HW Q 2 2/3 gs1	3,59	0,5	repaired on the sides	0,6							13,11	3,336	3,93	
HW Q 2 2/3 a1	3,91	0,4		0,4							11,26	3,312	3,4	N.O.
HW Q 2 2/3 b1	3,58	0,75	repaired on the sides	0,35							11,89	3,417	3,48	
HW Q 2 2/3 h1	3,71	0,4		0,4							11,88	2,763	4,3	
HW Q 2 2/3 c2	3,73	0,3		0,3							11,29	3,019	3,74	
HW Q 2 2/3 cs2	3,71	0,45		0,45							10,14	2,905	3,49	
HW Q 2 2/3 d2	3,76	0,45		0,4							10,57	3,020	3,5	
HW Q 2 2/3 ds2	4,15	0,4		0,3							9,13	3,609	2,53	N.O.
HW Q 2 2/3 e2	4,19	0,4		0,25							8,59	2,736	3,14	
HW Q 2 2/3 f2	3,77	0,35		0,4							9,09	3,010	3,02	
HW Q 2 2/3 fs2	3,93	0,3		0,3							8,14	2,651	3,07	
HW Q 2 2/3 g2														
HW Q 2 2/3 gs2														
HW Q 2 2/3 a2														
HW Q 2 2/3 b2														
HW Q 2 2/3 h2														
HW Q 2 2/3 c3														

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot
HW Q 2 2/3 C	2,9	Y	60		bay leaf	99,16		half circle	25,36			Y					Y
HW Q 2 2/3 Cs	2,9	Y	60		bay leaf	95,01		half circle	23,92			Y					Y
HW Q 2 2/3 D	1,2	Y		two faces	bay leaf	85,15				short lines?		Y					
HW Q 2 2/3 Ds	0,5	Y		*1	bay leaf	82,53		half circle	20,68			Y					
HW Q 2 2/3 E	2,7	Y	60		parallel lines	42,09		converging lines	35,3		Y		42	14	0,6		Y
HW Q 2 2/3 F	2,0	Y	50		parallel lines	51,02		converging lines	23,11			Y					
HW Q 2 2/3 Fs	2,1	Y	70		parallel lines	55,31		pressed				Y					
HW Q 2 2/3 G	2,4	Y	50		parallel lines	52,29		converging lines	18,95			Y					
HW Q 2 2/3 Gs	2,3	Y	50		parallel lines	45,97		converging lines	19,78			Y					
HW Q 2 2/3 A	2,2	Y	75		parallel lines	42,28		converging lines	7,69			Y					
HW Q 2 2/3 B	2,0	Y	75		parallel lines	43,36		converging lines	7			Y					
HW Q 2 2/3 H	2,0	N	55		parallel lines	49,79		converging lines	12,92			Y					Y
HW Q 2 2/3 c0	2,1	Y		N.O.	parallel lines	38,09		converging lines	7,25			Y					Y
HW Q 2 2/3 cs0	1,8	Y	55		parallel lines	42,16		converging lines	13,69			Y					
HW Q 2 2/3 d0	1,8	Y		N.O.	parallel lines	36,83		converging lines	15,74			Y					
HW Q 2 2/3 ds0	1,8	Y	50		parallel lines	35,09		converging lines	15,55			Y					
HW Q 2 2/3 e0	1,5	Y		N.O.	parallel lines	41,12		converging lines	11,35			Y					Y
HW Q 2 2/3 f0	1,2	Y		N.O.	parallel lines	31,57		converging lines	12,8			Y					Y
HW Q 2 2/3 fs0	1,0	Y		N.O.	parallel lines	27,94		converging lines	14,16								Y
HW Q 2 2/3 g0	1,2	Y	55		parallel lines	33,76		pressed									Y
HW Q 2 2/3 gs0	1,5	Y	65		parallel lines	28,91		converging lines	10,53								
HW Q 2 2/3 a0	1,4	Y	80		parallel lines	32,27		converging lines	10,42								Y
HW Q 2 2/3 b0	1,6	Y	85		parallel lines	28,66		converging lines	10,38								Y
HW Q 2 2/3 h0	1,3	Y		N.O.	parallel lines	27,84		converging lines	11,67								Y
HW Q 2 2/3 c1	1,0	Y		N.O.	parallel lines	25,11		pressed									Y
HW Q 2 2/3 cs1	1,5	Y		N.O.	pressed			pressed									Y
HW Q 2 2/3 d1	1,3	Y		N.O.	pressed?			pressed									Y
HW Q 2 2/3 ds1	1,3	Y	85		parallel lines	28,15		converging lines	7,75								Y
HW Q 2 2/3 e1	1,2	Y	85		pressed			converging lines	8,86								Y
HW Q 2 2/3 f1	0,9	Y	60		pressed			pressed									Y
HW Q 2 2/3 fs1	1,2	Y		N.O.	pressed			converging lines	9,29								Y
HW Q 2 2/3 g1	1,2	Y		N.O.	parallel lines	23,11		pressed									Y
HW Q 2 2/3 gs1	1,1	Y		N.O.	parallel lines	20,7		converging lines	10,61								Y
HW Q 2 2/3 a1	1,3	Y		N.O.	pressed			converging lines	3,86								Y
HW Q 2 2/3 b1	1,1	Y		N.O.	parallel lines	19,31		converging lines	8,59								Y
HW Q 2 2/3 h1	1,2	Y		N.O.	parallel lines	19,23		pressed									Y
HW Q 2 2/3 c2	0,9	Y	60		pressed			pressed									Y
HW Q 2 2/3 cs2	1,0	Y		N.O.	pressed			converging lines	9,62								Y
HW Q 2 2/3 d2	1,0	Y		N.O.	parallel lines	16,02		pressed									
HW Q 2 2/3 ds2	1,0	Y		N.O.	converging lines	13,41		pressed									Y
HW Q 2 2/3 e2	1,0	Y	60		converging lines	13,41		pressed									Y
HW Q 2 2/3 f2	0,8	Y		N.O.	parallel lines	14,34		pressed									Y
HW Q 2 2/3 fs2	1,1	Y	60		pressed			pressed									Y
HW Q 2 2/3 g2																	
HW Q 2 2/3 gs2																	
HW Q 2 2/3 a2																	
HW Q 2 2/3 b2																	
HW Q 2 2/3 h2																	
HW Q 2 2/3 c3																	

*1 total thickness; two faces, N.O.

HW Octava 2’ C - c’’’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
HW Oct 2 C	A	47,1	580	216	A							C	Oktav 2 / H.V / C	corpus front
HW Oct 2 Cs	B	44,8	549	175	b							Cs		
HW Oct 2 D	B	41,8	518	170								D		
HW Oct 2 Ds	B	39,7	497	177	C2							Ds		
HW Oct 2 E	M or F?	40,6	455	188								E		
HW Oct 2 F	B	38,4	437	194								F		
HW Oct 2 Fs	B	36,6	410	180	D2							Fs		
HW Oct 2 G	B	34,1	386	165	E (e)							G		
HW Oct 2 Gs	B	31,7	366	184								Gs		
HW Oct 2 A	B	30,2	345	165	G2							A		
HW Oct 2 B	B	29,6	323	180			G					B		
HW Oct 2 H	B	29,6	303	184	G							H		
HW Oct 2 c0	B	29,6	272	175	g							H		
HW Oct 2 cs0	B	28,3	262	179	G2							c		
HW Oct 2 d0	B	26,8	248	180	a		a					cs		
HW Oct 2 ds0	B	26,5	232	180	b							D		
HW Oct 2 e0	B	25,9	216	179								ds		
HW Oct 2 f0	B	25,3	205	180			C		H			e		
HW Oct 2 fs0	B	25,3	192	180	h							f		
HW Oct 2 g0	B	23,9	183	173								fs	c	PMI corpus front
HW Oct 2 gs0	B	23,6	169	181	H							g		
HW Oct 2 a0	C	21,6	159	181	?		f					gs		
HW Oct 2 b0	C	20,7	150	178	f		f					a		
HW Oct 2 h0	C	19,5	143	181	gs		gs					b		
HW Oct 2 c1	C	19,0	131	184								h		
HW Oct 2 cs1	C	17,3	131	184	a		a					c	b	*1
HW Oct 2 d1	B	17,3	122	181	A							cs		
HW Oct 2 ds1	B	15,0	117	185	cs							d		
HW Oct 2 e1	B	14,4	109	185	d							ds		
HW Oct 2 f1	C	14,4	101	179	d							e		
HW Oct 2 fs1	C	14,4	95	180	d		d					fs / f / fs		
HW Oct 2 g1	B	13,9	90	183	ds							fs		
HW Oct 2 gs1	B	14,3	83	181	d							g		
HW Oct 2 a1	B	13,0	79	181	f							gs		
HW Oct 2 b1	F	12,9	72	190	fs							a		
HW Oct 2 h1	C	12,1	71	179	g		fs					b		
HW Oct 2 c2	B	11,4	65	180	gs							h		
HW Oct 2 cs2	B	10,9	62	176	a							c		
HW Oct 2 d2	B	10,7	59	180	b							cs		
HW Oct 2 ds2	M													
HW Oct 2 e2	M													
HW Oct 2 f2	B	9,5	48	173					h					
HW Oct 2 fs2	M													
HW Oct 2 g2	M													
HW Oct 2 gs2	M													
HW Oct 2 a2	M													
HW Oct 2 b2	M													
HW Oct 2 h2	M													
HW Oct 2 c3	M													

*1 corpus side next to PMI

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
HW Oct 2 C	Y			3,3		216			17,88	9,6		0,95	
HW Oct 2 Cs	Y					175			13,86	8,51		0,8	
HW Oct 2 D	Y		H			170			13,47	8,07		0,75	
HW Oct 2 Ds	Y		H			177			12,06	7,19		0,65	
HW Oct 2 E			H		possibly non-original foot	188			15,25	8,38		0,8	
HW Oct 2 F	Y		H			194			13,49	8,65		0,9	
HW Oct 2 Fs	Y		H			180			11,54	7,82		0,8	
HW Oct 2 G	Y		H			165			13,03	7,82	repaired	0,75	
HW Oct 2 Gs	Y		H			184			11,43	7,44		0,7	
HW Oct 2 A	Y		H			165			11,91	7,58		0,65	
HW Oct 2 B	Y		H			180			11,12	6,44		0,65	
HW Oct 2 H		Y	H		repaired with old material, new round seam	184	95		12,29	7,04		0,65	
HW Oct 2 c0	Y		H			175			11,2	7,03		0,7	
HW Oct 2 cs0	Y		H			179			10,95	7,5		0,65	
HW Oct 2 d0		Y	V		repaired with old material, new round seam	180	147		11,26	5,95		0,7	
HW Oct 2 ds0	Y		H			180			9,62	6,14		0,75	
HW Oct 2 e0	Y		H			179			10,43	6,58		0,7	
HW Oct 2 f0		Y	H		repaired with new material, new seams	180	79						
HW Oct 2 fs0		Y	H		repaired with new and old material, new seams	180	19	150		0			
HW Oct 2 g0	Y		H			173			10,82	5,9		0,6	
HW Oct 2 gs0		Y	H		repaired with N.O. material, new round seam	181	31			0			
HW Oct 2 a0	Y		V			181			9,3	5,78		0,75	
HW Oct 2 b0	Y		V			178			9,59	5,86		0,5	
HW Oct 2 h0		Y	V		repaired with new material, new seams	181	148			0			
HW Oct 2 c1		Y	V		repaired with new material, new seams	184	31			0			
HW Oct 2 cs1		Y	V		repaired with new material, new seams	184	22			0			
HW Oct 2 d1	Y		H			181			9,02	5,38		0,55	
HW Oct 2 ds1	Y		H			185			8,25	5,35		0,55	
HW Oct 2 e1	Y		H			185			8,35	5,67		0,55	
HW Oct 2 f1	Y		V			179			8,34	5,01		0,45	
HW Oct 2 fs1		Y	V		repaired with new material, new seams	180	149			0			
HW Oct 2 g1	Y		H			183			8,2	5,28		0,5	
HW Oct 2 gs1	Y		H			181			8,97	5,58		0,6	
HW Oct 2 a1	Y		H			181			8,23	5,02	sunk toe	0,5	
HW Oct 2 b1	Y		H			190			7,81	4,92	sunk toe	0,4	
HW Oct 2 h1		Y	V		repaired with new material, new seams	179	65			0			
HW Oct 2 c2	Y		H			180			7,87	4,95		0,5	
HW Oct 2 cs2	Y		H			176			8,12	5,38		0,5	
HW Oct 2 d2	Y		H			180			7,86	5,11		0,45	
HW Oct 2 ds2													
HW Oct 2 e2													
HW Oct 2 f2		Y	V		repaired	173	48						
HW Oct 2 fs2													
HW Oct 2 g2													
HW Oct 2 gs2													
HW Oct 2 a2													
HW Oct 2 b2													
HW Oct 2 h2													
HW Oct 2 c3													

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
HW Oct 2 C	N.O.S.		3,7	*1	580				548		144,6	148,0	47,11
HW Oct 2 Cs					549				525		138,3	140,9	44,84
HW Oct 2 D	N.O.S.	V		*2	518			30	510		129,1	131,3	41,79
HW Oct 2 Ds	N.O.S.			*2	497			71	474		122,0	124,8	39,71
HW Oct 2 E	N.O.S.	V		*2	455			60	429		125,1	127,5	40,59
HW Oct 2 F		V			437				419		118,3	120,5	38,36
HW Oct 2 Fs	N.O.S.			*1	410				394		112,1	114,9	36,59
HW Oct 2 G	N.O.S.	V		*1	386				377		104,7	107,1	34,09
HW Oct 2 Gs		V			366				354		97,1	99,7	31,74
HW Oct 2 A		V			345	389	2,7		328		92,5	94,7	30,16
HW Oct 2 B		V			323	364	4,5		309		90,7	92,9	29,56
HW Oct 2 H					303				295		90,1	92,9	29,56
HW Oct 2 c0	N.O.S.	V/H		*4	272			196		*3	90,5	92,9	29,56
HW Oct 2 cs0		V			262						87,0	89,0	28,34
HW Oct 2 d0		V			248						80,6	84,2	26,79
HW Oct 2 ds0		V			232						81,2	83,2	26,47
HW Oct 2 e0		V			216						79,3	81,3	25,87
HW Oct 2 f0		V			205						77,6	79,6	25,35
HW Oct 2 fs0		V			192						77,6	79,6	25,35
HW Oct 2 g0					183						71,6	75,2	23,95
HW Oct 2 gs0					169						71,6	74,2	23,62
HW Oct 2 a0		V			159						65,3	67,9	21,60
HW Oct 2 b0		V			150						62,5	64,9	20,66
HW Oct 2 h0		V			143						59,2	61,2	19,47
HW Oct 2 c1		V			131						57,8	59,8	19,03
HW Oct 2 cs1		V			131						52,2	54,2	17,26
HW Oct 2 d1		V			122						52,0	54,2	17,26
HW Oct 2 ds1		V			117	131	8,5				45,8	47,0	14,97
HW Oct 2 e1		V			109	121	10				43,6	45,2	14,39
HW Oct 2 f1		V			101						43,6	45,2	14,38
HW Oct 2 fs1		V			95						42,5	45,1	14,36
HW Oct 2 g1		V			90						42,0	43,8	13,95
HW Oct 2 gs1		V			83						43,3	44,9	14,29
HW Oct 2 a1		V			79						39,0	40,8	12,98
HW Oct 2 b1		V			72						38,7	40,7	12,95
HW Oct 2 h1		V			71						36,5	38,1	12,13
HW Oct 2 c2		V			65						34,3	35,9	11,43
HW Oct 2 cs2	N.O.S.	V		ext. on top, new seam	62			3			32,6	34,4	10,95
HW Oct 2 d2		V			59						31,7	33,7	10,74
HW Oct 2 ds2											0,0		0,00
HW Oct 2 e2											0,0		0,00
HW Oct 2 f2		V			48						28,0	30,0	9,54
HW Oct 2 fs2											0,0		0,00
HW Oct 2 g2											0,0		0,00
HW Oct 2 gs2											0,0		0,00
HW Oct 2 a2											0,0		0,00
HW Oct 2 b2											0,0		0,00
HW Oct 2 h2											0,0		0,00
HW Oct 2 c3											0,0		0,00

*1 small window at top, new seam
*2 ext. with tuning roll, new seam
*3 corpus from two sections old material
*4 old material section at top, old seam

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
HW Oct 2 C	3,98	0,85		0,7							36,34	3,331	10,91	N.O.
HW Oct 2 Cs	4,05	0,65		0,6							34,16	3,310	10,32	
HW Oct 2 D	4,00	0,55		0,5							32,25	3,395	9,5	N.O.
HW Oct 2 Ds	3,78	0,7									32,3	3,400	9,5	N.O.
HW Oct 2 E	3,90	0,6	repaired on one side								32,08	3,311	9,69	
HW Oct 2 F	3,88	0,55		0,45							30,47	3,177	9,59	
HW Oct 2 Fs	3,96	0,7		0,6							28,29	3,072	9,21	
HW Oct 2 G	3,81	0,6		0,5							27,45	3,280	8,37	
HW Oct 2 Gs	3,92	0,65		0,3							24,78	3,344	7,41	
HW Oct 2 A	3,93	0,55		0,4							23,56	3,532	6,67	N.O.
HW Oct 2 B	3,92	0,55		0,4							23,12	3,601	6,42	N.O.
HW Oct 2 H	4,03	0,7		0,6							22,37	3,178	7,04	
HW Oct 2 c0	4,17	0,6		0,45							21,7	4,331	5,01	N.O.
HW Oct 2 cs0	3,72	0,5		0,4							23,37	3,806	6,14	N.O.
HW Oct 2 d0	4,04	0,9		0,5							19,96	3,006	6,64	
HW Oct 2 ds0	3,76	0,5		0,4							21,58	3,874	5,57	N.O.
HW Oct 2 e0	3,99	0,5		0,3							19,84	3,921	5,06	N.O.
HW Oct 2 f0	3,80	0,5		0,5							20,44	3,710	5,51	N.O.
HW Oct 2 fs0	3,86	0,5		0,4							20,11	3,867	5,2	N.O.
HW Oct 2 g0	3,88	0,9		0,55							18,46	3,752	4,92	N.O.
HW Oct 2 gs0	3,86	0,65		0,55							18,53	4,073	4,55	N.O.
HW Oct 2 a0	4,01	0,65		0,55							16,28	3,923	4,15	N.O.
HW Oct 2 b0	4,28	0,6	repaired on one side	0,4							14,6	3,715	3,93	N.O.
HW Oct 2 h0	3,96	0,5		0,45							14,95	3,775	3,96	N.O.
HW Oct 2 c1	4,23	0,5		0,3							13,66	3,441	3,97	N.O.
HW Oct 2 cs1	3,69	0,5		0,4							14,15	3,260	4,34	
HW Oct 2 d1	3,92	0,55		0,45							13,26	3,211	4,13	
HW Oct 2 ds1	4,00	0,3	repaired on one side	0,3							11,47	3,108	3,69	
HW Oct 2 e1	3,95	0,4		0,4							11,03	3,116	3,54	
HW Oct 2 f1	3,87	0,4	repaired on both sides	0,4							11,26	2,801	4,02	
HW Oct 2 fs1	3,72	0,65		0,5							11,41	3,307	3,45	
HW Oct 2 g1	4,01	0,45		0,4							10,48	3,038	3,45	
HW Oct 2 gs1	4,02	0,4	repaired on one side	0,35							10,78	2,898	3,72	
HW Oct 2 a1	3,50	0,45	repaired on one side	0,4							11,15	2,911	3,83	
HW Oct 2 b1	3,88	0,5	repaired on one side	0,4							9,97	3,346	2,98	
HW Oct 2 h1	3,60	0,4		0,45							10,14	3,347	3,03	N.O.
HW Oct 2 c2	4,02	0,4	*1	0,4							8,54	2,818	3,03	
HW Oct 2 cs2	3,82	0,45		0,4							8,54	3,389	2,52	
HW Oct 2 d2	3,69	0,5		0,4							8,59	2,736	3,14	
HW Oct 2 ds2														
HW Oct 2 e2														
HW Oct 2 f2	4,41	0,5		0,5							6,35	3,608	1,76	N.O.
HW Oct 2 fs2														
HW Oct 2 g2														
HW Oct 2 gs2														
HW Oct 2 a2														
HW Oct 2 b2														
HW Oct 2 h2														
HW Oct 2 c3														

*1 repaired on both sides

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
HW Oct 2 C	3,2	N	55		parallel lines	72,16		converging lines	16,89			Y					Y	
HW Oct 2 Cs	2,3	Y	60		bay leaf	69,42		half circle	17,77			Y					Y	
HW Oct 2 D	2,2	Y	55		parallel lines	50,64		converging lines	14,39			Y						
HW Oct 2 Ds	2,0	Y	60		parallel lines	53,23		converging lines	14,39			Y					Y	
HW Oct 2 E	1,0	Y			bay leaf	56,77		half circle	16,65			Y						
HW Oct 2 F	2,1	Y	55		parallel lines	42,8		half circle	15,16			Y						
HW Oct 2 Fs	2,1	Y	80		parallel lines	38,58		converging lines	14,66			Y					Y	
HW Oct 2 G	2,0	Y	70		parallel lines	42,39		converging lines	10,18			Y					Y	
HW Oct 2 Gs	2,2	Y	75		parallel lines	46,08		converging lines	14,35			Y						
HW Oct 2 A	1,8	N		N.O. angle	parallel lines	44,14		converging lines	13,98			Y					Y	
HW Oct 2 B	1,6	Y		N.O. angle	parallel lines	41,53	repaired	converging lines	10,75			Y						
HW Oct 2 H	1,9	Y	75		parallel lines	35,58		converging lines	20,42	only left side		Y					Y	
HW Oct 2 c0	1,7	Y		N.O. angle	parallel lines	36,65		converging lines	11,64			Y					Y	
HW Oct 2 cs0	1,7	Y	55		parallel lines	39,62	only left si	pressed				Y					Y	
HW Oct 2 d0	1,9	Y	80		parallel lines	34,54		converging lines	11,52			Y					Y	Y
HW Oct 2 ds0	1,3	Y	80	N.O. angle?	parallel lines	39,27		converging lines	11,26			Y					Y	
HW Oct 2 e0	1,8	Y	55		parallel lines	31,07		converging lines	17,39			Y						
HW Oct 2 f0	1,4	Y		N.O. angle	parallel lines	24,22		converging lines	17,39			Y						
HW Oct 2 fs0	1,2	Y	55		parallel lines	39,09		small lines, pressed	11,27			Y					Y	
HW Oct 2 g0	1,2	Y	75		parallel lines, round top	35,7		converging lines	9,99			Y						
HW Oct 2 gs0	1,2	Y		N.O. angle	parallel lines	26,17		converging lines	14,22	only left side		Y					Y	
HW Oct 2 a0	1,1	Y	75		parallel lines	20,26		converging lines	11,55								Y	Y
HW Oct 2 b0	1,7	Y	80		parallel lines	25,21		converging lines	11,55								Y	Y
HW Oct 2 h0	1,3	Y	75		parallel lines	22,17		converging lines	9,72								Y	Y
HW Oct 2 c1	1,3	Y	>80		parallel lines	17,48		small lines, pressed	3,97									
HW Oct 2 cs1	1,0	Y	>=80	too small	parallel lines	22,25		converging lines	6,43								Y	Y
HW Oct 2 d1	1,0	Y	>=80	too small	parallel lines, round top	27,52		small lines, pressed	4,49								Y	
HW Oct 2 ds1	0,9	Y	>=80	too small	parallel lines	19,12		pressed									Y	
HW Oct 2 e1	0,9	Y	>=80	too small	parallel lines, round top	22,41		converging lines	5,38								Y	
HW Oct 2 f1	1,2	Y	>=80	too small	parallel lines	20,01		converging lines	7,46								Y	
HW Oct 2 fs1	1,3	Y	>=80	too small	parallel lines	15,81		converging lines	7,45								Y	
HW Oct 2 g1	0,9	Y	>=80	too small	parallel lines, round top	22,14		pressed									Y	
HW Oct 2 gs1	1,0	Y	>=80	too small	parallel lines	17,84		small lines, pressed	3,63								Y	
HW Oct 2 a1	0,9	Y	>=80	too small	parallel lines, round top	19,63		converging lines	3,47								Y	
HW Oct 2 b1	0,9	Y	>=80	too small	bay leaf	21,18		pressed									Y	
HW Oct 2 h1	0,9	Y	>=80	too small	pressed			converging lines	5,69								Y	
HW Oct 2 c2	0,9	Y	>=80	too small	parallel lines	15,22		converging lines	4,93								Y	
HW Oct 2 cs2	0,9	Y	>=80	too small	parallel lines	13,79		converging lines	3,99								Y	
HW Oct 2 d2	0,7	Y	>=80	too small	parallel lines	13,58		converging lines	4,47								Y	
HW Oct 2 ds2																		
HW Oct 2 e2																		
HW Oct 2 f2	0,9	Y		too small	no lines, pressed			pressed										
HW Oct 2 fs2																		
HW Oct 2 g2																		
HW Oct 2 gs2																		
HW Oct 2 a2																		
HW Oct 2 b2																		
HW Oct 2 h2																		
HW Oct 2 c3																		

HW Spitzflöte 2’ C - c’’’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
HW Spfl 2 C	M					C								
HW Spfl 2 Cs	F	58,0	511	189		flut / Cs						*1	*2	upper lip
HW Spfl 2 D	B	50,6	487	179	C	D						D	*2	upper lip
HW Spfl 2 Ds	F	53,7	451	194		flut / Ds						Ds	*2	upper lip
HW Spfl 2 E	F	49,6	429	191		flut / E						E	*2	upper lip
HW Spfl 2 F	B	47,3	409	189	D	F						F	*2	upper lip
HW Spfl 2 Fs	B	43,6	378	192	E	Fs						Fs	*2	upper lip
HW Spfl 2 G	B	42,6	356	190	F	G						G	*2	upper lip
HW Spfl 2 Gs	F	45,5	325	187		Gs						Gs	*2	upper lip
HW Spfl 2 A	B	38,9	315	188	G	A						A	*2	upper lip
HW Spfl 2 B	F	39,9	289	185		B						B	*2	upper lip
HW Spfl 2 H	B	36,7	275	186	A	H						H	*2	upper lip
HW Spfl 2 c0	B	35,9	264	181	B	c0						c	*2	upper lip
HW Spfl 2 cs0	B	34,7	249	180	H	cs0						cs	*2	upper lip
HW Spfl 2 d0	B	34,0	229	184	c	d0						d	*2	upper lip
HW Spfl 2 ds0	B	33,6	207	180	cs	ds0						ds	*2	upper lip
HW Spfl 2 e0	B	32,0	204	172	d	e0						e	*2	upper lip
HW Spfl 2 f0	B	30,6	188	191	ds	f0						f	*2	upper lip
HW Spfl 2 fs0	B	29,3	175	182	e	fs0						fs	*2	upper lip
HW Spfl 2 g0	B	28,6	165	179	f	g0						g	*2	upper lip
HW Spfl 2 gs0	B	29,1	155	186	fs	gs0						gs	*2	upper lip
HW Spfl 2 a0	B	27,5	145	181	g	a0						a	*2	upper lip
HW Spfl 2 b0	B	26,9	133	182	gs	b0						b	*2	upper lip
HW Spfl 2 h0	B	25,9	125	179	a	h0						h	*2	upper lip
HW Spfl 2 c1	B	25,3	117	183	b	c1						c	*2	upper lip
HW Spfl 2 cs1	B	25,0	114	185	h	cs1						cs	*2	upper lip
HW Spfl 2 d1	B	24,4	100	180	c'	d1						d	*2	upper lip
HW Spfl 2 ds1	B	22,5	100	180	cs'	ds1						ds	*2	upper lip
HW Spfl 2 e1	B	22,9	86	185	d'	e1						e	*2	upper lip
HW Spfl 2 f1	B	21,8	84	182	ds'	f1						f	*2	upper lip
HW Spfl 2 fs1	B	21,6	78	186	e'	fs1						fs	*2	upper lip
HW Spfl 2 g1	B	20,7	75	175	f'	g1						g	*2	upper lip
HW Spfl 2 gs1	B	20,9	66	183	fs'	gs1						gs	*2	upper lip
HW Spfl 2 a1	B	20,0	64	184	g'	a1						a	*2	upper lip
HW Spfl 2 b1	B	19,7	59	182	gs'	b1						b	*2	upper lip
HW Spfl 2 h1	B	18,8	59	183	a'	h1							*2	upper lip
HW Spfl 2 c2	B	17,9	53	184	b'	c2						c	*2	upper lip
HW Spfl 2 cs2	B	17,4	47	183	h'	cs2						d	*2	upper lip
HW Spfl 2 d2	B	16,5	45	182	c''	d2						cs	*2	upper lip
HW Spfl 2 ds2	B	16,0	42	184	cs''	ds2						ds	*2	upper lip
HW Spfl 2 e2	B	15,5	39	182	d''	e2						e	*2	upper lip
HW Spfl 2 f2	B	15,2	32	185	ds''	f2						f	*2	upper lip
HW Spfl 2 fs2	B	14,5	35	186	e''	fs2						fs	*2	upper lip
HW Spfl 2 g2	B	14,2	31	185	f''	g2						g	*2	upper lip
HW Spfl 2 gs2	M													
HW Spfl 2 a2	M													
HW Spfl 2 b2	M													
HW Spfl 2 h2	M													
HW Spfl 2 c3	M													

*1	spetsfl 2 / H.V. / Cs
*2	score marks: ''

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
HW Spfl 2 C	Y												
HW Spfl 2 Cs	Y		V			189			12,86	8,16		0,45	
HW Spfl 2 D	Y			11,7		179			17,34	8,76		0,8	
HW Spfl 2 Ds	Y		V			194			10,42	7,8		0,5	
HW Spfl 2 E	Y				foot possibly not original?	191			11,7	7,88		0,85	
HW Spfl 2 F	Y					189			16,72	9,37		0,8	
HW Spfl 2 Fs	Y					192			14,58	8,38		0,95	
HW Spfl 2 G		Y			new tip with round seam from maybe 1962?	190	9				new tip	0,9	
HW Spfl 2 Gs	Y		V			187			10,79	6,89		0,65	
HW Spfl 2 A	Y					188			13,74	6,87		0,85	
HW Spfl 2 B	Y		V			185			11,11	6,63		0,6	
HW Spfl 2 H	Y		V			186			13,46	7,94		0,75	
HW Spfl 2 c0	Y		H			181			12,51	7,02		0,6	
HW Spfl 2 cs0	Y		H			180			12,49	7,5		0,65	
HW Spfl 2 d0	Y		H			184			12,98	7,68		0,55	
HW Spfl 2 ds0	Y		H			180			12,35	6,9		0,7	
HW Spfl 2 e0	Y		H			172			0,04		repaired tip	0,5	
HW Spfl 2 f0		Y	H		small repair in the middle, new tip with round seam	191			0,04		new tip	0,6	
HW Spfl 2 fs0	Y		H			182			12,17	7,1		0,45	
HW Spfl 2 g0	Y		H			179			11,71	7,35		0,45	
HW Spfl 2 gs0	Y		H			186			11,29	7,89		0,7	
HW Spfl 2 a0	Y		H			181			11,33	6,44		0,5	
HW Spfl 2 b0	Y		H			182			10,5	5,99		0,55	
HW Spfl 2 h0	Y		H			179			11,54	6,57		0,65	
HW Spfl 2 c1	Y		H			183			11,03	6,33		0,55	
HW Spfl 2 cs1	Y		H			185			9,59	6,41		0,55	
HW Spfl 2 d1	Y		H			180			9,95	6,71		0,5	
HW Spfl 2 ds1	Y		V			180			9,56	5,97		0,5	
HW Spfl 2 e1	Y		H			185			8,73	5,35		0,5	
HW Spfl 2 f1	Y		H			182	24,1		8,99	5,56	new tip, old mat	0,5	
HW Spfl 2 fs1	Y		H			186			8,95	5,94		0,55	
HW Spfl 2 g1	Y		H			175			9,21	6,09		0,5	
HW Spfl 2 gs1	Y		H			183			9,22	5,66		0,6	
HW Spfl 2 a1	Y		H			184			9,1	6,47		0,55	
HW Spfl 2 b1	Y		H			182			9,12	5,83		0,5	
HW Spfl 2 h1	Y		H		small repair in the middle	183			8,81	5,84		0,5	
HW Spfl 2 c2	Y		H			184			8,27	6,05		0,5	
HW Spfl 2 cs2	Y		H			183			8,58	5,87		0,5	
HW Spfl 2 d2	Y		H			182			8,25	5,59		0,5	
HW Spfl 2 ds2	Y		H			184			8,39	5,24		0,5	
HW Spfl 2 e2	Y		H			182			8,03	5,06		0,35	
HW Spfl 2 f2	Y		H			185			8,03	5,7		0,5	
HW Spfl 2 fs2	Y		H			186			8	5,85		0,5	
HW Spfl 2 g2	Y		H			185			7,81	5,44		0,45	
HW Spfl 2 gs2													
HW Spfl 2 a2													
HW Spfl 2 b2													
HW Spfl 2 h2													
HW Spfl 2 c3													

*1 new tip, old material

Pipe ID	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body ø bottom	Pipe body ø Top (Z)	Pipe body Height where ø measured from top (Z)	Pipe body Circumference (calc.)	Pipe body Diameter (calc.)
HW Spfl 2 C										0,0				0,0	0,00
HW Spfl 2 Cs	V			511						179,1	58,0	13,4	3,0	182,3	58,03
HW Spfl 2 D	V	13,32		487						156,3	50,6	16,5	7,3	159,1	50,63
HW Spfl 2 Ds	V			451						165,9	53,7	14,2	4,7	168,7	53,71
HW Spfl 2 E	V			429						153,7	49,6	11,7	3,36	155,7	49,55
HW Spfl 2 F	V			409						145,9	47,3	14,7	3,8	148,5	47,28
HW Spfl 2 Fs	V			378						134,1	43,6	12,7	6,0	136,9	43,58
HW Spfl 2 G				356						131,2	42,6	12,0	2,4	133,8	42,59
HW Spfl 2 Gs	V			325						140,9	45,5	13,1	5,5	143,1	45,54
HW Spfl 2 A	V		*1	315			8,7			120,1	38,9	12,6	9,3	122,3	38,93
HW Spfl 2 B	V			289						122,9	39,9	12,8	3,9	125,3	39,88
HW Spfl 2 H	V			275						113,1	36,7	11,5	4,1	115,3	36,71
HW Spfl 2 c0	V			264						110,1	35,9	11,1	3,7	112,7	35,86
HW Spfl 2 cs0	V			249						106,9	34,7	11,4	3,1	108,9	34,65
HW Spfl 2 d0	V			229						104,7	34,0	12,1	2,9	106,7	33,96
HW Spfl 2 ds0	V			207						103,4	33,6	13,0	6,0	105,6	33,61
HW Spfl 2 e0	V			204						98,5	32,0	11,3	4,2	100,5	31,99
HW Spfl 2 f0	V		*1	188			2,67			94,3	30,6	11,8	3,1	96,3	30,64
HW Spfl 2 fs0	V			175						90,1	29,3	11,5	5,6	92,1	29,33
HW Spfl 2 g0	V			165						87,8	28,6	11,0	2,4	89,8	28,60
HW Spfl 2 gs0	V			155						89,6	29,1	10,9	2,7	91,4	29,10
HW Spfl 2 a0	V			145						84,3	27,5	11,2	6,4	86,3	27,47
HW Spfl 2 b0	V			133						82,6	26,9	11,1	3,8	84,6	26,93
HW Spfl 2 h0	V			125						79,4	25,9	11,0	4,4	81,4	25,92
HW Spfl 2 c1	V			117						77,6	25,3	10,2	5,7	79,4	25,26
HW Spfl 2 cs1	V			114						76,8	25,0	10,2	5,9	78,6	25,01
HW Spfl 2 d1	V			100						75,2	24,4	10,1	2,7	76,8	24,44
HW Spfl 2 ds1	H			100						68,8	22,5	10,5	5,0	70,8	22,53
HW Spfl 2 e1	V			86						70,4	22,9	10,4	7,7	72,0	22,92
HW Spfl 2 f1	V			84						67,0	21,8	9,1	2,7	68,6	21,84
HW Spfl 2 fs1	V			78						66,1	21,6	9,5	4,4	67,7	21,55
HW Spfl 2 g1	V			75						63,1	20,7	9,0	4,4	65,1	20,71
HW Spfl 2 gs1	V			66						63,9	20,9	9,8	5,0	65,7	20,92
HW Spfl 2 a1	V			64						61,3	20,0	9,3	4,8	62,9	20,02
HW Spfl 2 b1	V			59						60,3	19,7	9,3	5,6	61,9	19,71
HW Spfl 2 h1	V		*2	59						55,9	18,8	9,6	3,6	59,1	18,80
HW Spfl 2 c2	V			53						54,5	17,9	7,6	0,7	56,3	17,93
HW Spfl 2 cs2	V			47						52,7	17,4	8,3	2,0	54,7	17,42
HW Spfl 2 d2	V			45						50,0	16,5	8,2	5,2	51,8	16,50
HW Spfl 2 ds2	V		*1	42			6,4			48,5	16,0	9,7	7,2	50,3	16,00
HW Spfl 2 e2	V		*1	39			8,68			46,9	15,5	9,5	9,8	48,7	15,49
HW Spfl 2 f2	V			32						46,2	15,2	8,5	6,6	47,8	15,21
HW Spfl 2 fs2	V			35						43,8	14,5	8,2	7,6	45,4	14,46
HW Spfl 2 g2	V			31						42,5	14,2	7,8	4,9	44,5	14,15
HW Spfl 2 gs2										0,0					0,00
HW Spfl 2 a2										0,0					0,00
HW Spfl 2 b2										0,0					0,00
HW Spfl 2 h2										0,0					0,00
HW Spfl 2 c3										0,0					0,00

*1 extended on top, new round seam

*2 made from repurposed old material

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth height notes
HW Spfl 2 C													
HW Spfl 2 Cs	4,16	0,8		0,75							43,04	3,906	
HW Spfl 2 D	4,07	0,7		0,55							38,44	3,543	
HW Spfl 2 Ds	4,20	0,7		0,45							39,5	3,854	
HW Spfl 2 E	4,07	0,5		0,5							37,75	3,860	
HW Spfl 2 F	4,00	0,65		0,5							36,47	3,986	
HW Spfl 2 Fs	3,96	0,7		0,5							33,88	3,559	
HW Spfl 2 G	4,06	0,65		0,5							32,32	3,961	
HW Spfl 2 Gs	4,23	0,55		0,6							33,29	4,080	
HW Spfl 2 A	4,05	0,55		0,5							29,63	3,919	
HW Spfl 2 B	3,86	0,6		0,6							31,85	4,131	
HW Spfl 2 H	3,97	0,55		0,5							28,49	3,834	
HW Spfl 2 c0	3,86	0,65		0,5							28,54	4,203	
HW Spfl 2 cs0	3,90	0,5		0,5							27,4	3,738	
HW Spfl 2 d0	4,02	0,5		0,5							26,03	3,974	
HW Spfl 2 ds0	3,76	0,55		0,4							27,52	4,564	lowered 1,56
HW Spfl 2 e0	4,02	0,5		0,5							24,5	3,684	probably not a height scoring
HW Spfl 2 f0	3,94	0,5		0,4							23,91	4,094	lowered 0,8
HW Spfl 2 fs0	4,06	0,5		0,4							22,23	3,774	
HW Spfl 2 g0	4,05	0,5		0,45							21,71	4,127	
HW Spfl 2 gs0	3,86	0,45		0,45							23,22	4,161	
HW Spfl 2 a0	4,09	0,5		0,5							20,63	4,006	
HW Spfl 2 b0	4,09	0,5		0,45							20,21	3,681	
HW Spfl 2 h0	4,07	0,5		0,45							19,52	4,050	
HW Spfl 2 c1	4,03	0,45		0,45							19,25	4,240	
HW Spfl 2 cs1	4,08	0,45		0,45							18,8	3,983	
HW Spfl 2 d1	3,90	0,4		0,4							19,29	4,486	lowered 0,75
HW Spfl 2 ds1	4,04	0,5		0,5							17,02	3,958	
HW Spfl 2 e1	3,89	0,4		0,4							18,09	4,662	
HW Spfl 2 f1	3,78	0,4		0,4							17,74	5,157	lowered 0,8
HW Spfl 2 fs1	3,85	0,4		0,35							17,17	4,518	
HW Spfl 2 g1	4,02	0,5	*1	0,45							15,67	4,212	
HW Spfl 2 gs1	3,87	0,45		0,4							16,53	4,492	lowered 0,5
HW Spfl 2 a1	3,91	0,4		0,4							15,69	4,522	
HW Spfl 2 b1	4,12	0,4		0,45							14,63	4,488	
HW Spfl 2 h1	3,84	0,8		0,7	not original?						14,55	4,254	
HW Spfl 2 c2	3,79	0,45		0,45							14,4	4,431	
HW Spfl 2 cs2	3,95	0,5		0,4							13,35	5,095	lowered 0,55
HW Spfl 2 d2	3,92	0,45		0,4							12,76	5,024	
HW Spfl 2 ds2	4,22	0,45		0,4							11,48	5,171	
HW Spfl 2 e2	4,05	0,45		0,4							11,57	5,283	lowered 1,0
HW Spfl 2 f2	3,80	0,4		0,4							12,15	7,189	lowered 0,35
HW Spfl 2 fs2	4,19	0,4		0,4							10,47	4,716	lowered 0,45
HW Spfl 2 g2	4,11	0,5		0,4							10,34	4,947	
HW Spfl 2 gs2													
HW Spfl 2 a2													
HW Spfl 2 b2													
HW Spfl 2 h2													
HW Spfl 2 c3													

*1 reinforced on right side

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
HW Spfl 2 C												Y						
HW Spfl 2 Cs	1,5	5	30	2 face thickened	bay leaf	84,11		half circle	20,87			Y	15	50	0,7			
HW Spfl 2 D	1,9	4	>80		triangular	93,48		half circle	20,87			Y	17	46	0,7		Y	
HW Spfl 2 Ds	1,5	6		2 face thickened	bay leaf	77,25		half circle	20,33			Y	15	46	0,6			
HW Spfl 2 E	2,2	5	40	thickened	bay leaf	70,92		half circle	18,88			Y	12	48	0,6			
HW Spfl 2 F	1,6		75		triangular	86,83		half circle	18,99			Y	14	44	0,7		Y	
HW Spfl 2 Fs	1,6		75		triangular	84,32		half circle	18,35			Y	12	41	0,7		Y	
HW Spfl 2 G	1,7	3	75		triangular	78,02		half circle	16,78			Y	11	44	0,7		Y	
HW Spfl 2 Gs	2,2	6		2 face thickened	bay leaf	68,61		half circle	15,67			Y	11	41	0,7			
HW Spfl 2 A	1,5	5	75		triangular	73,95		half circle	15,56			Y	11	39	0,7		Y	
HW Spfl 2 B	2,1		45	2 face thickened	bay leaf	63,66		half circle	15,96			Y	8,8	39	0,5			
HW Spfl 2 H	1,6	4	75		triangular	68,16		half circle	15,12			Y	13	36	0,7		Y	
HW Spfl 2 c0	1,4	7	75		triangular	67,5		half circle	14,96			Y	11	37	0,6		Y	
HW Spfl 2 cs0	1,4	4	75		triangular	64,67		half circle	14,49			Y	11	33	0,7		Y	
HW Spfl 2 d0	1,4	7	75		triangular	60,66		half circle	13,57			Y	9,9	32	0,7		Y	
HW Spfl 2 ds0	1,5	5	>80		triangular	62,61		half circle	14,48			Y	10	32	0,7		Y	
HW Spfl 2 e0	1,2	5	75		triangular	58,12		half circle	12,92			Y	9,5	31	0,7		Y	
HW Spfl 2 f0	1,5	1	75		triangular	56,35		half circle	12,04			Y	9,1	30	0,6		Y	
HW Spfl 2 fs0	1,5	6	75		triangular	52,51		half circle	11,76			Y	10	30	0,7		Y	
HW Spfl 2 g0	1,3	7	75		triangular	51,77		half circle	10,85			Y	11	29	0,7		Y	
HW Spfl 2 gs0	1,1	5	80		triangular	53,96		half circle	12,1			Y	10	28	0,7		Y	
HW Spfl 2 a0	1,4	4	80		triangular	49,47		half circle	10,59			Y	9,3	26	0,7		Y	
HW Spfl 2 b0	1,5	9	80	deep cuts	triangular	48,09		half circle	10,32			Y	9,5	27	0,6		Y	
HW Spfl 2 h0	1,3	6	80		triangular	47,86		half circle	10,18			Y	7,5	25	0,7		Y	
HW Spfl 2 c1	1,3		80		triangular	47,51		half circle	10,35			Y	7,1	24	0,5		Y	
HW Spfl 2 cs1	1,3	3	75		triangular	45,46		half circle	9,87								Y	
HW Spfl 2 d1	1,5	5	>80		triangular	47,21		half circle	9,68								Y	
HW Spfl 2 ds1	1,4	4	75		triangular	41,53		half circle	8,99								Y	
HW Spfl 2 e1	1,0	3		*1	triangular	41,54		half circle	9,86								Y	
HW Spfl 2 f1	0,8	4		*1	triangular	41,54		half circle	9,81								Y	
HW Spfl 2 fs1	0,7	4		*1	triangular	40,92		half circle	9,25								Y	
HW Spfl 2 g1	1,2	4	55?	mouth too low	triangular	38,42		pressed									Y	
HW Spfl 2 gs1	1,1			angle not original	triangular	38,42		half circle	9,25								Y	
HW Spfl 2 a1	1,1		>80		triangular	37		half circle	8,6								Y	
HW Spfl 2 b1	1,1	4	>80		triangular	34,25		half circle	8,38								Y	
HW Spfl 2 h1	1,1			*2	pressed bay leaf	15,68		half circle	7,35								Y	
HW Spfl 2 c2	1,2		>80		triangular	32,85		half circle	8,06								Y	
HW Spfl 2 cs2	1,2	1		mouth too low	triangular	31,42		half circle	7,48								Y	
HW Spfl 2 d2	1,2			mouth too low	triangular	29,66		half circle	7,49								Y	
HW Spfl 2 ds2	1,2	2		mouth too low	triangular	29,23		half circle	7,13								Y	
HW Spfl 2 e2	1,2			mouth too low	triangular	29,23		pressed									Y	
HW Spfl 2 f2	0,9			mouth too low	triangular	27,26		pressed									Y	
HW Spfl 2 fs2	1,1			mouth too low	triangular	27,57		pressed									Y	
HW Spfl 2 g2	0,9			mouth too low	triangular	25,68		pressed				Y					Y	
HW Spfl 2 gs2																		
HW Spfl 2 a2																		
HW Spfl 2 b2																		
HW Spfl 2 h2																		
HW Spfl 2 c3																		

*1	cannot measure, too small
*2	horizontal cut, cannot measure

Pedal Principal 8’ H - d’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
PED Pr8 H	B	80,2	1269,5	197	A 8 C	P					8' / WF	*1		
PED Pr8 c0	F	76,2	1188	181	8 cs	P						D / c0 / c	*2	corpus front
PED Pr8 cs0	F	73,2	1120	180	8 d	P						Ds / ds / ds		
PED Pr8 d0	F	70,0	1056	181	8 ds	P						E / d / d		
PED Pr8 ds0	F	68,6	992	180	8 ds	P						F / ds / ds		
PED Pr8 e0	F	65,3	929	186	8 e	P						Fis / e / e		
PED Pr8 f0	F	61,9	880	179	8 f	P						G / f / f		
PED Pr8 fs0	F	60,2	826	185	8 fs	P						Gis / fs / fs		
PED Pr8 g0	F	55,4	787	189	8 g	P						B / g /g		
PED Pr8 gs0	F	53,6	747	188	fs, v, 8 gs	P						H / gs / gs		
PED Pr8 a0	F	52,2	696	184	8 aa	P						C / a / P / a		
PED Pr8 b0	F	49,7	657	191	8 b	P						c / cs / b / b		
PED Pr8 h0	F	47,9	620	192	8 h	P						d / h / h		
PED Pr8 c1	F	46,0	589	184	8 c'	P					e0	ds / c / c		
PED Pr8 cs1	F	44,5	556	191	8 cs'	P						e / Gs / ds		
PED Pr8 d1	F	42,5	522	189	d'		8P					f / d / d		

*1	Pr 8 - Pedal / C / 0 / H
*2	Svinum? 1886 / 1934

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
PED Pr8 H		Y			toe not original	197	26,14				*1	1,05	
PED Pr8 c0	Y					181			20,67	13,78	deformed	1	
PED Pr8 cs0	Y					180			19,21	12,08		0,9	
PED Pr8 d0	Y					181			18	10,08		0,75	
PED Pr8 ds0	Y				new round seam with corpus, new languid?	180			14,94	10,97	deformed	0,8	
PED Pr8 e0	Y					186			13,34	8,81		0,9	
PED Pr8 f0	Y					179			18,35	9,94		0,7	
PED Pr8 fs0	Y					185			14,26	9,51		1,1	
PED Pr8 g0	Y					189			13,23	8,35		1,1	
PED Pr8 gs0	Y					188			11,94	8,91		0,7	
PED Pr8 a0	Y					184			12,8	8,81		0,7	
PED Pr8 b0	Y					191			14,46	8,89		0,65	
PED Pr8 h0	Y					192			11,81	8,2		0,7	
PED Pr8 c1	Y					184			11,59	6,94		0,6	
PED Pr8 cs1	Y					191			11,68	8,72		0,8	
PED Pr8 d1	Y					189			11,1	8,15		0,7	

*1	N.O. new material

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
PED Pr8 H	N.O.S.			two ext.s on top	1269,5				1229		248,6	252,0	80,21
PED Pr8 c0	N.O.S.			ext. on top	1188				1149		236,7	239,5	76,24
PED Pr8 cs0	N.O.S.			ext. on top	1120				1090		226,8	230,0	73,21
PED Pr8 d0	N.O.S.			ext. on top	1056				1020		217,0	220,0	70,03
PED Pr8 ds0	N.O.S.			ext. on top	992				955		212,1	215,5	68,60
PED Pr8 e0	N.O.S.			ext. on top	929				892		202,0	205,0	65,25
PED Pr8 f0	N.O.S.			ext. on top	880				842		192,1	194,5	61,91
PED Pr8 fs0	N.O.S.			ext. on top	826				785		185,8	189,0	60,16
PED Pr8 g0	N.O.S.			ext. on top	787				752		171,6	174	55,39
PED Pr8 gs0	N.O.S.			ext. on top	747				702		164,9	168,5	53,64
PED Pr8 a0	N.O.S.			ext. on top	696				657		160,0	164,0	52,20
PED Pr8 b0	N.O.S.			ext. on top	657				629		154,0	156,0	49,66
PED Pr8 h0	N.O.S.			ext. on top	620				586		147,6	150,6	47,94
PED Pr8 c1	N.O.S.			ext. on top	589				553		142,0	144,4	45,96
PED Pr8 cs1	N.O.S.			ext. on top	556				520		137,1	139,7	44,46
PED Pr8 d1	N.O.S.			ext. on top	522				493		130,5	133,7	42,54

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
PED Pr8 H	4,02	0,85			extended top						61,83	3,497	17,68	
PED Pr8 c0	3,96	0,7			extended top						59,71	3,677	16,24	
PED Pr8 cs0	3,98	0,8			extended top						57,05	3,657	15,6	
PED Pr8 d0	4,02	0,75			extended top						53,99	3,445	15,67	
PED Pr8 ds0	4,06	0,85			extended top						52,22	3,589	14,55	
PED Pr8 e0	4,06	0,75			extended top						49,74	3,723	13,36	
PED Pr8 f0	4,03	0,6			extended top						47,65	3,517	13,55	
PED Pr8 fs0	3,97	0,8			extended top						46,81	3,615	12,95	
PED Pr8 g0	3,99	0,6			extended top						42,99	3,616	11,89	
PED Pr8 gs0	4,00	0,9			extended top						41,26	3,610	11,43	
PED Pr8 a0	3,98	1			extended top						40,24	3,533	11,39	
PED Pr8 b0	4,06	0,5			extended top						37,93	3,606	10,52	
PED Pr8 h0	4,07	0,75			extended top						36,26	3,652	9,93	
PED Pr8 c1	4,18	0,6			extended top						33,99	3,601	9,44	
PED Pr8 cs1	3,97	0,65			extended top						34,49	3,405	10,13	
PED Pr8 d1	4,06	0,8			extended top						32,17	3,559	9,04	

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
PED Pr8 H	3,1		65		bay leaf	122,41		half circle	30,68			Y						
PED Pr8 c0	2,0			2 face thickened	bay leaf	114,97		half circle	28,95			Y						
PED Pr8 cs0	2,3			2 face thickened	bay leaf	113,92		half circle	27,15			Y						
PED Pr8 d0	2,1			2 face thickened	bay leaf	108,42		half circle	25,55			Y						
PED Pr8 ds0	2,0		50	2 face dr., N.O.	bay leaf	100,67		half circle	23,79			Y						
PED Pr8 e0	2,0		35	2 face thickened	bay leaf	100,6		half circle	23,8			Y						
PED Pr8 f0	2,2		80	2 face thickened	bay leaf	95,16		half circle	23,37			Y						
PED Pr8 fs0	2,6			2 face thickened	bay leaf	90,96		half circle	22,84			Y						
PED Pr8 g0	2,0			2 face thickened	bay leaf	84,08		half circle	22,2			Y						
PED Pr8 gs0	1,8			2 face thickened	bay leaf	81,8		half circle	21,68			Y						
PED Pr8 a0	2,5			2 face thickened	bay leaf	84,68		half circle	19,91			Y						
PED Pr8 b0	2,5		90?	2 face thickened	bay leaf	78,3		half circle	18,39			Y						
PED Pr8 h0	2,6			2 face thickened	bay leaf	74,72		half circle	18,22			Y						
PED Pr8 c1	2,5			2 face thickened	bay leaf	69,47		half circle	17,55			Y						
PED Pr8 cs1	2,1			2 face thickened	bay leaf	67,88		half circle	18,32			Y						
PED Pr8 d1	1,8			2 face thickened	bay leaf	64,5		half circle	16,63			Y						

Pedal Rauschquinte kor I C - d’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
PED Rq k1 C	F	42,9	581	185	h v	1	*1		S			c		
PED Rq k1 Cs	F		550		c v	1			S			cs		
PED Rq k1 D	F		513		cs v	1			S			d		
PED Rq k1 Ds	F		486		d v				S			ds		
PED Rq k1 E	F		456		ds v	1			S			e		
PED Rq k1 F	F	34,8	430,5		e v	1			S			f		
PED Rq k1 Fs	F		400		f v	1			S			fs		
PED Rq k1 G	F		386		Fs v	1			S			g		
PED Rq k1 Gs	F		366		g v	1			S			gs		
PED Rq k1 A	F		343		gs v	1			S			a		
PED Rq k1 B	F		324		a v	1			S			b		
PED Rq k1 H	F		306		b v	1			S			h		
PED Rq k1 c0	F	25,8	286	185	h v	1			S			c		
PED Rq k1 cs0	F		269		c v	1			S			cs		
PED Rq k1 d0	F		257		cs v	1			S			d		
PED Rq k1 ds0	B / F		237,5	186		1						ds		
PED Rq k1 e0	F		226		ds v	1			S			e		
PED Rq k1 f0	B	21,2	225		ds	1						f		
PED Rq k1 fs0	F		202		f v	1			S			fs		
PED Rq k1 g0	B / F		191	194		1						g		
PED Rq k1 gs0	F		179,5		g v	1			S			gs		
PED Rq k1 a0	F		167		gs v	1			S			a		
PED Rq k1 b0	F		158		a v	1			S			b		
PED Rq k1 h0	B / F	16,8	150	181	b 2	1 b			S			h		
PED Rq k1 c1	F	15,6	141	183	h v	1			S			c		
PED Rq k1 cs1	B	16,0	134	184	H	1						cs		
PED Rq k1 d1	F	14,6	125	186	cs v	1			S			d		

*1 Torrlosa / Rausquint Ped kor 1

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
PED Rq k1 C	Y					185			12,48	7,42		0,8	
PED Rq k1 Cs	Y												
PED Rq k1 D	Y												
PED Rq k1 Ds	Y												
PED Rq k1 E	Y												
PED Rq k1 F	Y								11,42	7,64		0,9	
PED Rq k1 Fs	Y												
PED Rq k1 G	Y												
PED Rq k1 Gs	Y												
PED Rq k1 A	Y												
PED Rq k1 B	Y												
PED Rq k1 H	Y								9,68	6,54		0,6	
PED Rq k1 c0	Y					185					bad shape, can't measure		
PED Rq k1 cs0	Y								9,79	6,83		0,55	
PED Rq k1 d0	Y												
PED Rq k1 ds0		Y			extended, new round and vertical seams, with Frietzsche m	186	173						
PED Rq k1 e0	Y												
PED Rq k1 f0	Y				repaired on the side				9,95	6,17		0,6	
PED Rq k1 fs0	Y				repaired in the middle								
PED Rq k1 g0		Y			extended, new round and vertical seams, with Frietzsche m	194	181						
PED Rq k1 gs0	Y												
PED Rq k1 a0	Y												
PED Rq k1 b0	Y												
PED Rq k1 h0	Y					181			8,96	6,22		0,6	
PED Rq k1 c1	Y					183			8,39	5,08		0,5	
PED Rq k1 cs1	Y					184			9,27	5,88		0,55	
PED Rq k1 d1	Y				crooked	186			7,84	4,89		0,5	

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
PED Rq k1 C	N.O.S.			extended on top	581			15,75			131,6	134,8	42,91
PED Rq k1 Cs	N.O.S.			extended on top	550			24,1			0,0		
PED Rq k1 D	N.O.S.			extended on top	513			16,72			0,0		
PED Rq k1 Ds	N.O.S.			small window on top	486						0,0		
PED Rq k1 E	N.O.S.			small window on top	456						0,0		
PED Rq k1 F	Y				430,5						106,6	109,4	34,81
PED Rq k1 Fs	N.O.S.			small window on top	400						0,0		
PED Rq k1 G	Y				386						0,0		
PED Rq k1 Gs	Y				366						0,0		
PED Rq k1 A				small window on top	343						0,0		
PED Rq k1 B	N.O.S.			extended on top	324			5,64			0,0		
PED Rq k1 H	N.O.S.			extended on top	306			14,02			0,0		
PED Rq k1 c0	Y				286						78,6	81,0	25,80
PED Rq k1 cs0	N.O.S.			small window on top	269						0,0		
PED Rq k1 d0	Y				257						0,0		
PED Rq k1 ds0	Y				237,5						0,0		
PED Rq k1 e0	N.O.S.			small window on top	226						0,0		
PED Rq k1 f0	N.O.S.			small window on top	225						64,9	66,7	21,24
PED Rq k1 fs0	N.O.S.			small window on top	202						0,0		
PED Rq k1 g0	N.O.S.			small window on top	191						0,0		
PED Rq k1 gs0	Y				179,5						0,0		
PED Rq k1 a0	Y				167						0,0		
PED Rq k1 b0	N.O.S.			extended on top	158			14,74			0,0		
PED Rq k1 h0	N.O.S.			small window on top	150						51,1	52,9	16,82
PED Rq k1 c1	N.O.S.			small window on top	141						47,4	49,0	15,59
PED Rq k1 cs1	Y				134						48,6	50,4	16,05
PED Rq k1 d1	N.O.S.			small window on top	125						44,4	46,0	14,63

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
PED Rq k1 C	4,18	0,8		0,8	extended top						31,46	3,305	9,52	
PED Rq k1 Cs											31,55	3,643	8,66	
PED Rq k1 D											28,79	3,507	8,21	
PED Rq k1 Ds											28,36	3,722	7,62	N.O.
PED Rq k1 E											27,31	3,641	7,5	N.O.
PED Rq k1 F	4,08	0,7		0,65							26,1	3,398	7,68	
PED Rq k1 Fs											24,77	3,379	7,33	
PED Rq k1 G											23,8	3,420	6,96	
PED Rq k1 Gs											22,48	3,287	6,84	
PED Rq k1 A											22,62	3,579	6,32	N.O.
PED Rq k1 B											21,36	3,385	6,31	
PED Rq k1 H											19,95	3,458	5,77	
PED Rq k1 c0	4,25	0,6		0,7							18,51	3,353	5,52	
PED Rq k1 cs0											18,89	3,498	5,4	
PED Rq k1 d0											17,34	3,053	5,68	
PED Rq k1 ds0											15,2	3,115	4,88	
PED Rq k1 e0											17,02	3,305	5,15	
PED Rq k1 f0	4,18	0,45		0,5							15,55	2,792	5,57	
PED Rq k1 fs0											15,16	3,246	4,67	
PED Rq k1 g0											17,21	3,741	4,6	
PED Rq k1 gs0											14,53	3,172	4,58	
PED Rq k1 a0											13,51	2,996	4,51	
PED Rq k1 b0											13,51	3,303	4,09	
PED Rq k1 h0	4,04	0,45		0,4							12,63	3,181	3,97	
PED Rq k1 c1	3,86	0,4		0,35							12,26	3,523	3,48	
PED Rq k1 cs1	3,93	0,45		0,4							12,36	3,145	3,93	
PED Rq k1 d1	4,16	0,4		0,35							10,67	3,243	3,29	

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
PED Rq k1 C	2,2			2 face thickened	bay leaf	63,85		half circle	16,55			Y						
PED Rq k1 Cs				thickened	bay leaf			half circle				Y						
PED Rq k1 D				thickened	bay leaf			half circle				Y						
PED Rq k1 Ds				thickened	bay leaf			half circle				Y						
PED Rq k1 E				thickened	bay leaf			half circle				Y						
PED Rq k1 F	2,2			round thickened	bay leaf	51,29		half circle	14,35			Y						
PED Rq k1 Fs				thickened	bay leaf			half circle				Y						
PED Rq k1 G				thickened	bay leaf			half circle										
PED Rq k1 Gs				thickened	bay leaf			half circle										
PED Rq k1 A				thickened	bay leaf			half circle										
PED Rq k1 B				thickened	bay leaf			half circle										
PED Rq k1 H				thickened	bay leaf			half circle										
PED Rq k1 c0	1,9			2 face thickened	bay leaf	40,82		half circle	10,69									
PED Rq k1 cs0				thickened	bay leaf			half circle										
PED Rq k1 d0				thickened	bay leaf			half circle										
PED Rq k1 ds0					bay leaf			half circle										
PED Rq k1 e0					bay leaf			half circle										
PED Rq k1 f0	1,2		80		parallel lines	24,52		pressed										
PED Rq k1 fs0					bay leaf			half circle										
PED Rq k1 g0					bay leaf			half circle										
PED Rq k1 gs0					bay leaf			half circle										
PED Rq k1 a0					bay leaf			half circle										
PED Rq k1 b0					bay leaf			half circle										
PED Rq k1 h0	1,3			60 ~ 75	bay leaf	26,37		pressed										
PED Rq k1 c1	1,4		80		bay leaf	25,38		half circle	6,94									
PED Rq k1 cs1	1,2			85?	parallel lines	17,77		pressed										
PED Rq k1 d1	0,8			80?	bay leaf	23,55		half circle	5,94									

Pedal Rauschquinte kor II C - d’

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
PED Rq k2 C	F	39,7	379	188		2						*1		
PED Rq k2 Cs	F	39,2	349	191		2						gis / Cs		
PED Rq k2 D	F	36,6	330	187		2						a / D		
PED Rq k2 Ds	F	34,9	309	187		2						b / Ds		
PED Rq k2 E	F	33,3	294	192		2						E		
PED Rq k2 F	F	31,7	277	187		2						c / F		
PED Rq k2 Fs	F	29,8	259	190		2						cs / Fs		
PED Rq k2 G	F	28,7	242	191		2						d / G		
PED Rq k2 Gs	F	27,2	230	190		2						ds / Gs		
PED Rq k2 A	F	26,0	216	180		2						e / e / A		
PED Rq k2 B	M2	24,3	207	187		2						E / B		
PED Rq k2 H	B	22,9	196	179	Cs	2	Cs					e / H / s / R		
PED Rq k2 c0	B	22,1	186	172	d	2	d					f / c / H		
PED Rq k2 cs0	C	21,8	171	177	ds	2	ds					fs / cs / gs		
PED Rq k2 d0	C	21,8	163	178	e	2	e					g / d / c		
PED Rq k2 ds0	C	19,8	157	180	fs	2	fs					a / ds / d?		
PED Rq k2 e0	C	18,7	144	178	g	2	g					b / e		
PED Rq k2 f0	B	17,4	140	183	gs	2						h / f		
PED Rq k2 fs0	B	17,2	128	184	A	2						c / e / fs		
PED Rq k2 g0	B	17,7	121	183	b2	2						d g		
PED Rq k2 gs0	B	16,5	115	182	B	2			Pr C			gs		
PED Rq k2 a0	C	15,1	110	180	c	2	c					a / ds		
PED Rq k2 b0	B	15,1	102	182	c	2						e / b		
PED Rq k2 h0	B	15,4	95	182	cs2	2						e / h / b		
PED Rq k2 c1	C	15,4	89	177	cs	2	cs					f / c'		
PED Rq k2 cs1	B	14,2	83	178	d	2						fs / e / cs		
PED Rq k2 d1	B	13,9	77	181	ds	2						gs / d		

*1 Rauschquint Pedal C-kor II / g / Torrlosa Rauschquint Ped kor2 1 1/3

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
PED Rq k2 C	Y					188			10,94	7,48		0,7	
PED Rq k2 Cs	Y					191			10,8	7,65		0,5	
PED Rq k2 D	Y				scraped dark	187			10,49	7,55		0,85	
PED Rq k2 Ds	Y					187			10,36	7,49		0,7	
PED Rq k2 E	Y					192			10,09	6,48		0,9	
PED Rq k2 F	Y					187			10,58	6,95		0,9	
PED Rq k2 Fs	Y					190			8,92	5,68		0,5	
PED Rq k2 G	Y				scraped dark	191			8,97	6,86		0,8	
PED Rq k2 Gs	Y					190			8,59	6,12		0,6	
PED Rq k2 A		Y			new ext. from Sallstrom, 2000	180	58,33			0	N.O.		
PED Rq k2 B	Y					187			10,37	6,67		0,5	
PED Rq k2 H		Y	H		ext. with new material	179	146,25			0	N.O.		
PED Rq k2 c0	Y		H		crooked	172			8,89	5,3		0,8	
PED Rq k2 cs0	Y		V			177			9	5,89		0,5	
PED Rq k2 d0	Y		V			178			9,32	5,19		0,55	
PED Rq k2 ds0	Y		V			180			8,56	6,34		0,7	
PED Rq k2 e0	Y		V			178			8,81	5,68		0,6	*1
PED Rq k2 f0		Y	H		ext. with new seams	183	55,43			0	N.O.		
PED Rq k2 fs0	Y		H			184			8,96	6,03		0,55	
PED Rq k2 g0	Y		H			183			8,68	5,41		0,6	
PED Rq k2 gs0	Y		H			182			7,9	5,35		0,5	
PED Rq k2 a0	Y		V			180			8,3	5,94		0,55	
PED Rq k2 b0	Y		H			182			8,67	5,92		0,5	
PED Rq k2 h0	Y		H			182			9,69	6,55		0,5	
PED Rq k2 c1	Y		V			177			8,8	5,52		0,5	
PED Rq k2 cs1	Y		H			178			8,63	5,45		0,35	
PED Rq k2 d1	Y		H			181			8,57	5,24		0,45	

*1 irregular

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
PED Rq k2 C	Y			tuning roll in the front	379				363		121,7	124,7	39,70
PED Rq k2 Cs	Y			tuning roll in the front	349				333		119,8	123,03	39,16
PED Rq k2 D	Y				330						112,1	114,93	36,58
PED Rq k2 Ds	Y				309						106,6	109,62	34,89
PED Rq k2 E	Y				294						101,7	104,53	33,27
PED Rq k2 F	Y				277						96,6	99,44	31,65
PED Rq k2 Fs	Y				259						91,5	93,69	29,82
PED Rq k2 G	Y				242						87,4	90,02	28,65
PED Rq k2 Gs	Y				230						82,8	85,4	27,18
PED Rq k2 A	Y				216						79,0	81,55	25,96
PED Rq k2 B	Y				207						74,5	76,31	24,29
PED Rq k2 H	Y				196						69,8	72,01	22,92
PED Rq k2 c0	Y				186						67,5	69,51	22,13
PED Rq k2 cs0	Y				171						66,4	68,57	21,83
PED Rq k2 d0	Y				163						65,6	68,56	21,82
PED Rq k2 ds0	Y				157						60,7	62,31	19,83
PED Rq k2 e0	Y				144						57,4	58,83	18,73
PED Rq k2 f0	Y				140						53,2	54,77	17,43
PED Rq k2 fs0	Y				128						52,7	53,93	17,17
PED Rq k2 g0	N.O.S.			extended on top	121			9,89			54,2	55,59	17,69
PED Rq k2 gs0	Y				115						50,1	51,89	16,52
PED Rq k2 a0	Y				110						45,5	47,5	15,12
PED Rq k2 b0	Y				102						45,7	47,49	15,12
PED Rq k2 h0	Y				95						46,9	48,51	15,44
PED Rq k2 c1	Y				89						46,5	48,51	15,44
PED Rq k2 cs1	Y				83						43,0	44,6	14,20
PED Rq k2 d1	Y				77						42,0	43,62	13,88

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
PED Rq k2 C	4,17	0,75		0,5							29,21	3,445	8,48	
PED Rq k2 Cs	4,05	0,8		0,65							29,59	3,909	7,57	
PED Rq k2 D	4,00	0,7		0,6							28,03	3,840	7,3	
PED Rq k2 Ds	4,14	0,75		0,4	thin on top						25,77	4,065	6,34	
PED Rq k2 E	4,28	0,7		0,5							23,78	3,402	6,99	
PED Rq k2 F	4,16	0,7		0,5							23,23	3,267	7,11	
PED Rq k2 Fs	4,05	0,55		0,85							22,61	3,939	5,74	
PED Rq k2 G	3,98	0,65		0,6							21,96	3,553	6,18	
PED Rq k2 Gs	4,05	0,65		0,5							20,46	3,528	5,8	
PED Rq k2 A	4,16	0,65		0,5							18,96	3,618	5,24	
PED Rq k2 B	3,90	0,45		0,45							19,1	3,405	5,61	
PED Rq k2 H	4,13	0,55		0,4							16,89	3,242	5,21	N.O.
PED Rq k2 c0	3,95	0,5		0,5							17,08	3,746	4,56	N.O.
PED Rq k2 cs0	4,15	0,55		0,4							16,01	3,443	4,65	N.O.
PED Rq k2 d0	3,98	0,75		0,65							16,49	3,305	4,99	
PED Rq k2 ds0	4,07	0,4		0,4							14,91	2,667	5,59	
PED Rq k2 e0	3,83	0,35		0,3							14,98	2,955	5,07	
PED Rq k2 f0	4,10	0,4		0,35							12,97	2,691	4,82	
PED Rq k2 fs0	3,60	0,3		0,35							14,65	3,496	4,19	N.O.
PED Rq k2 g0	3,80	0,35		0,35							14,25	3,019	4,72	
PED Rq k2 gs0	3,95	0,45		0,35							12,69	3,036	4,18	
PED Rq k2 a0	3,79	0,5		0,45							11,99	3,090	3,88	
PED Rq k2 b0	3,93	0,45		0,45							11,62	3,141	3,7	
PED Rq k2 h0	3,74	0,4		0,3							12,53	3,079	4,07	
PED Rq k2 c1	3,88	0,5		0,6							11,98	3,443	3,48	N.O.
PED Rq k2 cs1	3,88	0,4		0,7							11,07	3,050	3,63	
PED Rq k2 d1	3,82	0,4		0,4							11	3,691	2,98	

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
PED Rq k2 C	2,4		>80	2 face thickened	bay leaf	63,85		half circle	16,55									Y
PED Rq k2 Cs				2 face thickened	bay leaf			half circle										
PED Rq k2 D				2 face thickened	bay leaf			half circle										
PED Rq k2 Ds				thickened	bay leaf			half circle										
PED Rq k2 E				2 face thickened	bay leaf			half circle										
PED Rq k2 F	2,0		>80	thickened	bay leaf	48,73		half circle	12,08									
PED Rq k2 Fs				thickened	bay leaf			half circle										
PED Rq k2 G				thickened	bay leaf			pressed										
PED Rq k2 Gs				thickened	bay leaf			half circle										
PED Rq k2 A				thickened	bay leaf			half circle										
PED Rq k2 B					pressed			pressed										
PED Rq k2 H	1,1		55	N.O. angle	parallel lines	27,9		converging lines	6,86								Y	
PED Rq k2 c0	1,1		45		parallel lines	29,74		pressed									Y	Y
PED Rq k2 cs0	1,39		80		parallel lines	27,94		converging lines	11,39								Y	Y
PED Rq k2 d0	1,2		60		parallel lines	27,32		converging lines	8,32								Y	Y
PED Rq k2 ds0	1,3		60		parallel lines	25,05		converging lines	9,81								Y	Y
PED Rq k2 e0	1,2		60		parallel lines	24,34		converging lines	9,36			Y					Y	Y
PED Rq k2 f0	1,2		55		pressed	0		pressed									Y	
PED Rq k2 fs0	0,9		55		parallel lines	22,51		pressed									Y	
PED Rq k2 g0	1,2		60		parallel lines	22,99		converging lines	7,72								Y	
PED Rq k2 gs0	0,8		75		parallel lines	21,87		pressed									Y	
PED Rq k2 a0	0,8		75		pressed	0		pressed									Y	Y
PED Rq k2 b0	0,7		75		parallel lines	16,33		pressed?									Y	
PED Rq k2 h0	1,1		>80		parallel lines	15,75		pressed?									Y	
PED Rq k2 c1	0,8			languid too low	pressed			pressed?									Y	Y
PED Rq k2 cs1	0,8			mouth height too low	parallel lines	16,55		pressed?									Y	
PED Rq k2 d1	0,8			mouth height too low	parallel lines	15,07		pressed?									Y	

Separate pipes

Pipe ID	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Total foot length	Inscriptions SW	Inscriptions SE	Inscriptions NW	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions other text	Location other text
RP1	A	46,6	462	220	B		B / 15	r						
RP2	A	46,5	573	181	G		G / 14							
RP3	A	45,6	488	190	H		H / 11	r						
25	B	23,4	230	154	Cs?							a	25	body back
29	B	19,7	171	187	f		f					gs	29	body back
31	C	20,8	155	196	fs?		fs?					a	31	body back
32	B	22,9	156	187	d		d						32	body back
43	B	12,1	69,18	187	fs / 43							b	43	foot back
49	B	11,2	63,2	189,5	a							c	49	body back

Pipe ID	Foot complete original	Foot sections non-original	Foot scraping direction	Foot tin %	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Toe notes	Original footwall-thickness average	Original footwall-thickness notes
RP1	Y		V		new vertical and round seams	220			15,96	9,21		0,9	
RP2	Y		V	3,1	new round seam	181			27,3	12,56		1,2	
RP3	Y		V		*1	190			11,95	9,04		0,6	*2
25	Y		H	14,9		154			9,96	6,51	has crack(s)	0,4	
29	Y		H	15,7	foot and body not in a straight line	187			9,31	5,63	has crack(s)	0,5	
31		Y	V	11,8	repaired with old material and new round seam	196	80				has crack(s)		
32	Y		H	15,3		187			9,25	5,63		0,5	
43	Y		H	15,4		187			7,87	5,27	has crack(s)	0,5	
49	Y		H	15,4		189,5			7,22	5,91	has crack(s)	0,5	

*1 conicity: 26.9 / 77mm; irregular repaired seam; original seam is partly present
*2 irregular

Pipe ID	Pipe body complete original	Pipe body scraping direction	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)
RP1	Y	V			462						142,6	146,4	46,60
RP2	Y	V	3,2	probably reshaped as conical	573						142,2	146,0	46,47
RP3	Y	V		*1	488						139,2	143,23	45,59
25	Y		10,9		230						70,9	73,5	23,40
29	Y	V	15,3		171						60,2	62,04	19,75
31	Y	V	13,5		155						63,2	65,2	20,75
32	Y	V	15,1		156						70,2	71,81	22,86
43	Y	V	12,1		69,18						36,7	38,13	12,14
49	Y	V	14,8		63,2						33,2	35,19	11,20

*1 24,1% tin on foil and 21,3% on gold paint

Pipe ID	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Head Height	Head Diameter	Head Thickness	Head % tin	Head Inscription	Mouth width	Mouth cut-up (ratio)	Mouth-height current	Mouth height notes
RP1	4,14	0,95		0,8							34,41	3,265	10,54	
RP2	3,44	0,95		0,8							41,33	6,408	6,45	
RP3	4,02	1		0,7							34,64	3,296	10,51	
25	4,02	0,65		0,7							17,65	3,080	5,73	
29	3,73	0,45		0,4							16,14	2,764	5,84	
31	4,04	0,5		0,5							15,64	2,880	5,43	
32	4,09	0,4		0,4							17,15	3,107	5,52	
43	3,72	0,35		0,45							9,88	3,771	2,62	
49	3,91	0,5		0,5							8,48	3,200	2,65	

Pipe ID	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Ears average length	Ears average leight	Ears average thickness	Ears notes	Pipemaker inscription on foot	Pipemaker inscription on body
RP1	2,6	Y	45	2 face thickened	bay leaf	76,09		half circle	19,3								Y	Y
RP2	2,91	Y	50		bay leaf	80,16		half circle									Y	Y
RP3	2,52	Y	55		bay leaf	70,28		half circle	18,67		N						Y	Y
25	1,54	Y	80		convergent lines	29,14		parallel lines	6,93								Y	
29	1,2	Y	80		pressed	28,82		parallel lines	0		N						Y	Y
31	1,7	Y	80		convergent lines	26,38		parallel lines	11,69								Y	Y
32	1,49	Y	80		convergent lines	34,92		parallel lines	15,9			Y					Y	Y
43	0,86	Y		mouth too low	convergent lines	15,52		parallel lines	7,89									Y
49	1,0	Y		mouth too low	convergent lines	13,31		parallel lines	5,16								Y	

Facade pipes

Pipe ID	Field	Organ builder	Pipe body Ø bottom	Pipe body length max (measured)	Inscriptions SW	Inscriptions SW dark ink (Frobenius)	Inscriptions SE	Inscriptions NW	Inscriptions NW dark ink (Frobenius)	Inscriptions NE	Inscriptions foot front	Inscriptions lower-lip	Inscriptions upper-lip	Inscriptions corpus front	Inscriptions body back	Inscriptions body back lighter ink / pencil	Inscriptions body back dark ink (Frobenius)	Inscriptions location *other text*
1 X	C tower	A	38,1	589	cs / 1			cs							50		59	*1
2 Ais	C tower	A	45,4	674	a	B		a / 8								56	58	*1
3 X	C tower	A	56,0	881	ex / F	Fs		e / 7							51		53	*1
4 Fis	C tower	A	57,8	1060	dsx			dsx / 4								54	56	*1
5 D	C tower	A	66,2	1156	c'	D		c' / 5								53	55	*1
6 E	C tower	A	62,7	1073	csx			csx										
7 Gis	C tower	A	55,2	863	e	Gs		ex							52	55	57	*1
8 X	C tower	A	44,5	672	ax			ax / 2								50	52	*1
9 c0	C tower	A	41,5	661				c / 16		r						2	2	*1
10 X	C small flat	E	29,5	359						1? / 8? / 4?					18		10	*1
11 X	C small flat	E	30,5	366				12									11	*1
12 X	C small flat	E	29,5	354				11								12		
13 X	C big flat	E	20,0	128,16				13		43?							43	
14 X	C big flat	E	20,2	146,69				4?							45			*1
15 fs1	C big flat	A	22,2	255	e	fs		e' / 25		r					43		45	*1
16 X	C big flat	E	23,0	198				43									?	
17 e1	C big flat	A	24,8	268	d'	e'		d' / 24									43	
18 X	C big flat	E	24,6	278											41 or 4?		8	
19 d1	C big flat	A	25,8	306	c'	d'		c' / 23		r							41	
20 X	C big flat	E	29,2	323		20		21										
21 c1	C big flat	A	27,0	346	b?	c'		b / 22		r						2?	21	
22 ais0	C big flat	A	29,5	393	gs	b		gs / 21		r						21	22	
23 gs0	C big flat	A	32,2	434	fs	gs		fs / 20		r						22	23	
24 fs0	C big flat	A	35,9	480	e'	fs		e / 19		r					23		24	
25 e0	C big flat	A	39,0	538,5	d'	e		d / 18		r						33	35	
26 d0	C big flat	A	41,7	581	c	d		c / 17		r						25	26	
27 H	Middle tower	A	43,8	671,5	a0	H		a0							51 / Ped X	26	27	*1
28 G	Middle tower	M			G			Cs										
29 E	Middle tower	A	60,6	1064	d	E		d							28	29		*1
30 D	Middle tower	A	63,3	1180	Cs	D		Cs								29	30	*1
31 Fs	Middle tower	A	56,8	1068	Ds	Fs?		Ds										
32 A	Middle tower	A	46,6	871	g	A		g								27	28	*1
33 cs0	Middle tower	A	42,0	685	b	Cs		b								31	33	*1
34 ds0	C# big flat	A	40,7	581	cs	ds		cs / 9								32	34	
35 f0	C# big flat	A	36,8	532	ds	f		ds / 8		r						24. / 25.		
36 g0	C# big flat	A	33,6	476	f	g		f / 7		r					34		36	
37 a0	C# big flat	A	30,7	430	g	a		b / g / 6		r					35		37	
38 h0	C# big flat	A	28,4	388	a	h		a / 5		r						36	38	
39 cs1	C# big flat	A	26,8	343	h	cs'		h / 4		r					37		39	
40 X	C# big flat	E	28,6	326			c'	4										
41 ds1	C# big flat	A	25,2	304	cs'	ds'		cs' / 3		r						18?	19?	
42 X	C# big flat	A or F or M	26,1	264														
43 f1	C# big flat	A	23,8	271	ds'	f'		ds' / 2		r							17	
44 X	C# big flat	E	23,5	242											18	42		
45 g1	C# big flat	A	20,9	204		g'		f' / 1 r										
46 X	C# big flat	E / A	20,2	142														
47 X	C# big flat	E / M	20,6	135				4							14		47	
48 X	C# small flat	E	28,0	317											49 / cx		48	*1
49 X	C# small flat	E	30,8	365											*2	47+	4?	*1
50 X	C# small flat	E	28,0	313				10 ? 19?								40?		
51 X	C# tower	A	39,2	499				d		0 / r						9	9	*1
52 cs0	C# tower	A	39,3	598	c	cs		c / 11								49	51	*1
53 A	C# tower	A	52,0	911	G	A		32 / G									7	*1
54 F	C# tower	A	58,1	1057	E	F		E- / 31								4	4	*1
55 Ds	C# tower	A	68,9	1158	Cs'	Ds		C' / 30								5	5	*1
56 X	C# tower	A	62,1	1058	D			D		29						6		*1
57 G	C# tower	A	56,0	922	F	G		F'		2					M		3	*1
58 H	C# tower	A	42,9	620	bx	H		bx / 9								8.	8	*1
59 X	C# tower	M																

*1 body back

*2 47 / 3x / 49 (modern)

Pipe ID	Field	Foot complete original	Foot complete non-original	Foot sections non-original	Foot scraping direction	General foot description	Total foot length	Foot length 1 from tip	Foot length 2 from tip	Ø foot-tip	Ø toe-hole	Foot Circumference Top (under the mouth)	Foot Circumference Bottom (the end of the original foot)	Toe notes	Original footwall-thickness average	Original footwall-thickness notes	Pipe body complete original	Pipe body sections non-original	Pipe body current height (from the ground to bottom of hook)
1 X	C tower	Y				small window at the top	639	8,98		13,87	9,03			*1	0,9			Y	1104
2 Ais	C tower	Y					565			15,91	8,12				1,2			Y	1104
3 X	C tower	Y					497			17,24	8,96				1,1			Y	1104
4 Fis	C tower	Y					425			18,33	8,18				1,2				1105
5 D	C tower	Y					349			20,65	10,2				1,1			Y	1103
6 E	C tower	Y					421			17,41	9,77				1,2			Y	1098
7 Gis	C tower	Y					493			17,77	9,29				1				1102
8 X	C tower	Y				new round seam with corpus	563			14,56	7,81				1				1105
9 c0	C tower		Y				648			10,48	6,85					N.O.		Y	1102
10 X	C small flat		Y			new material	360									N.O.	Y		521
11 X	C small flat						333								0,4		Y		520
12 X	C small flat						352								0,4		Y		520
13 X	C big flat				Y	*2	554,5	45,85	121,3					modern repairs	0,8		Y		597
14 X	C big flat					*3	534	10,32									Y		597
15 fs1	C big flat						519			11,44	6,3				1		Y		597
16 X	C big flat				Y	*3	505	35,45									Y		596
17 e1	C big flat					lower lip is new	485			11,08	6,18			modern repairs	0,9		Y		597
18 X	C big flat				Y	*3	473	27,28									Y		596
19 d1	C big flat						451			12,36	6,5				0,8		Y		596
20 X	C big flat				Y	*3	431	46,75									Y		596
21 c1	C big flat						422			12,1	6,49			modern repairs	0,9		Y		595
22 ais0	C big flat						393			12,22	7,22			modern repairs	0,9		Y		595
23 gs0	C big flat						359			13,49	7,92			modern repairs	0,8		Y		595
24 fs0	C big flat					repaired seam	329			14,54	7,48			modern repairs	0,8		Y		597
25 e0	C big flat					repaired seam	299			14,26	7,51			modern repairs	0,9		Y		594
26 d0	C big flat						266			13,53	7,54				0,8		Y		595
27 H	Middle tower	Y					567			15,04	7,91				1,1			Y	1105
28 G	Middle tower		Y																
29 E	Middle tower	Y				repaired foot, new vertical seam	426			19,31	9,45				1,15		Y		1102
30 D	Middle tower	Y					348			18	8,81				1		Y		1102
31 Fs	Middle tower	Y					425			17,72	10,05				1,2			Y	1112
32 A	Middle tower				Y	*4	510	19			0			N.O.				Y	1104
33 cs0	Middle tower	Y				bending slightly	557			14,29	8,83				0,85			Y	1100
34 ds0	C# big flat	Y					266			14,7	7,81				1,2		Y		594
35 f0	C# big flat	Y					299			14,58	7,34				1,1		Y		592
36 g0	C# big flat	Y					332			13,24	6,97				0,95		Y		594
37 a0	C# big flat	Y					357			12,04	7,07				0,8		Y		594
38 h0	C# big flat	Y					390			11,3	6,99				0,8		Y		595
39 cs1	C# big flat	Y					421			11,91	6,51				0,9		Y		594
40 X	C# big flat				Y	repaired toe	439	21,95						N.O.				Y	596
41 ds1	C# big flat	Y					450			11,31	6,24				0,85		Y		595
42 X	C# big flat	Y				new vertical and round seams	475			10,17	5,89				0,55				596
43 f1	C# big flat	Y					486			10,64	6,4				0,8		Y		595
44 X	C# big flat				Y		501	30,61		0				N.O.			Y		596
45 g1	C# big flat	Y					516			11,3	6,4				0,95				596
46 X	C# big flat				Y	new round seam	543	28,81		0	0			N.O.					596
47 X	C# big flat		Y			new foot	557										Y		598
48 X	C# small flat																		520
49 X	C# small flat																		520
50 X	C# small flat																		520,5
51 X	C# tower		Y			new foot with new seams								N.O.				Y	1120
52 cs0	C# tower				Y	*5	687	53	223			123,9	47,53	N.O.				Y	1104
53 A	C# tower				Y	repaired with new material	631	121				160,5	77,39	N.O.			Y		1121
54 F	C# tower				Y	repaired with new material	501	186				178	106,3	N.O.				Y	1103
55 Ds	C# tower				Y	*6	410	196				211	132,4	N.O.			Y		1109
56 X	C# tower				Y	repaired with new material	508	124				193,5	90,63	N.O.			Y		1115
57 G	C# tower				Y	repaired with new material	607	124				171	82,66	N.O.			Y		1111
58 H	C# tower				Y	repaired with new material	689	60				131,7	46,8	N.O.				Y	1104
59 X	C# tower													N.O.					

*1 window measured from the mouth
*2 upper seam new, others are old; also repaired vertical seam
*3 repaired toe with old material, old seams
*4 repaired foot with old material, old round seam, new vertical seam
*5 foot with reattached part and repaired with new material
*6 repaired with new material and diamond shaped window

Pipe ID	Field	Pipe body height of line under the original hook/flap	Pipe body previous height (from the ground to bottom of	Pipe body flap height (from ground to bottom of flap)	Pipe body tin %	General body description	Pipe body lengthmax (measured)	Pipe body length Original (calc.)	Pipe body Construction circle (deepest point from top)	Pipe body length Non-Original (measured)	Pipe body length Tuning (measured)	Notes on pipe body length
1 X	C tower					window at the top back	589				529	tuning roll on non-original material
2 Ais	C tower					small window at the top back	674		18		646	
3 X	C tower		1140			*1	881		19		809	tuning roll on non-original material
4 Fis	C tower						1060				856	
5 D	C tower					window at the top with tuning roll	1156		75		1019	tuning roll on non-original material
6 E	C tower					window on the whole back with tuning roll	1073				897	tuning roll on non-original material
7 Gis	C tower		1137				863				701	
8 X	C tower						672				603	
9 c0	C tower	981	987			extension at the top with tuning roll	661			163	565	tuning roll on non-original material
10 X	C small flat	547		551			359				664	
11 X	C small flat	554		557			366		13		564	
12 X	C small flat	554		554			354				568	
13 X	C big flat			621		*2	128,16				89,86	
14 X	C big flat			656		*2	146,69				97,63	
15 fs1	C big flat	639	642				255				187	
16 X	C big flat			611		High % tin	198				179	top very irregular
17 e1	C big flat		642				268				213	
18 X	C big flat			615		High % tin	278			21,76	221	top very irregular
19 d1	C big flat		638				306		8,46		240	
20 X	C big flat			633		High % tin	323			25,52	264	*5
21 c1	C big flat	634	640				346		18,27		274	CC with center line
22 ais0	C big flat		640				393		22,01		306	
23 gs0	C big flat		639				434		24,36		347	
24 fs0	C big flat	633	638				480		28,3		388	
25 e0	C big flat	635	638				538,5		38,83		439	
26 d0	C big flat		639				581		30,44		493	
27 H	Middle tower					new back window with tuning roll	671,5		13,9		592	
28 G	Middle tower											
29 E	Middle tower	1133	1140				1064		36,83		894	
30 D	Middle tower	1129	1139				1180				1025	
31 Fs	Middle tower					majority not original	1068			888	799	
32 A	Middle tower					new back window with tuning roll	871				668	
33 cs0	Middle tower					extended on top, old material with new seam	685			134	523	double tuning roll on original material
34 ds0	C# big flat						581		25,96		465	
35 f0	C# big flat		624				532		33,84		414	
36 g0	C# big flat	619	624				476		22,93		363	
37 a0	C# big flat	616	621				430		19,64		325	
38 h0	C# big flat	618	621				388		15,5		290	
39 cs1	C# big flat	617	622				343				255	
40 X	C# big flat					*3	326			40,95	250	
41 ds1	C# big flat	620	620				304		3,3		224	
42 X	C# big flat					red paint on new seam; foiled	264				263	
43 f1	C# big flat	622	631				271				198	
44 X	C# big flat			635			242				190	
45 g1	C# big flat	612	623			reattached top part?	204			25,65	181	
46 X	C# big flat					new vertical and round seams	142				142	
47 X	C# big flat			641			135				98	flap won't let measure the lowest point
48 X	C# small flat	546		548			317				259	
49 X	C# small flat			551			365				333	
50 X	C# small flat	558		556			313				234	
51 X	C# tower					small window on the top with new material	499				474	*6
52 cs0	C# tower	1164				*4	598				536	
53 A	C# tower	1253	1263			dark colour	911		20,42		667	
54 F	C# tower	1238	1246			*4, dark colour	1057		10,51		855	
55 Ds	C# tower	1237	1245		0,8%	dark colour	1158	0	0		985	
56 X	C# tower	1243	1250			dark colour	1058		17,88		944	
57 G	C# tower	1244	1254			dark colour	922		35,92		756	
58 H	C# tower	1160	1166			*4	620		23,97		622	
59 X	C# tower											

*1 window at the top back with tuning roll, old extension on top, voicer possibly reattached section which has CC
*2 High % tin; height of the original existing flap, but foot not completely original
*3 small window on top and extension with old material
*4 small window with tuning roll in the back with new material
*5 languid round seam is new; top very irregular
*6 length measured the highest side; top cut diagonally seen from the front; tuning length measured on the lowest side

Pipe ID	Field	Pipe body Sheet width (calc.)	Pipe body Circumference measured	Pipe body Diameter (calc.)	Pipe body mouth proportion (calc.)	Pipe wall thickness Mouth	Wall thickness mouth notes	Pipe wall thickness Top	Wall thickness top notes	Mouth width	Mouth cut-up (ratio)	Mouth-height current
1 X	C tower	119,7	119,7	38,1	4,09		N.O.	0,5		29,29	3,136	9,34
2 Ais	C tower	139,2	142,6	45,4	4,03	0,85		0,4		34,55	3,161	10,93
3 X	C tower	172,4	176,0	56,0	4,15	0,9		0,5		41,56	3,237	12,84
4 Fis	C tower	178,3	181,5	57,8	4,21	0,8		0,7		42,35	3,189	13,28
5 D	C tower	204,4	208	66,2	4,06	0,9		0,5		50,39	3,581	14,07
6 E	C tower	193,8	197,0	62,7	4,06	0,8		0,55		47,73	3,444	13,86
7 Gis	C tower	169,9	173,5	55,2	4,14	0,9		0,45		40,99	3,393	12,08
8 X	C tower	136,1	139,9	44,5	3,99	0,95		0,5		34,09	3,662	9,31
9 c0	C tower	126,9	130,5	41,5	3,93	0,9			*1	32,25	3,420	9,43
10 X	C small flat	89,4	92,6	29,5	4,06	0,8		0,65		22	3,729	5,9
11 X	C small flat	92,3	95,94	30,5	3,85	0,9		0,4		24	3,038	7,9
12 X	C small flat	89,4	92,56	29,5	3,89	0,8		0,7		23	4,259	5,4
13 X	C big flat	59,9	62,74	20,0	3,82	0,7		0,5		15,7	3,765	4,17
14 X	C big flat	59,7	63,53	20,2	3,51	0,95		0,65		17,01	3,574	4,76
15 fs1	C big flat	67,3	69,73	22,2	3,86	0,6		0,6		17,46	3,332	5,24
16 X	C big flat	70,1	72,14	23,0	3,86	0,5		0,5		18,18	2,932	6,2
17 e1	C big flat	74,7	77,92	24,8	4,00	0,8		0,5		18,66	3,443	5,42
18 X	C big flat	74,6	77,18	24,6	3,85	0,65		0,6		19,37	3,160	6,13
19 d1	C big flat	77,9	80,92	25,8	4,06	0,75		0,6		19,18	3,069	6,25
20 X	C big flat	88,8	91,61	29,2	3,88	0,7		0,75		22,86	2,865	7,98
21 c1	C big flat	82,4	84,97	27,0	4,01	0,65		0,4		20,55	3,123	6,58
22 ais0	C big flat	89,9	92,73	29,5	4,04	0,7		0,5		22,24	3,186	6,98
23 gs0	C big flat	98,0	101,01	32,2	4,07	0,75		0,55		24,07	3,320	7,25
24 fs0	C big flat	109,5	112,65	35,9	3,99	0,8		0,7		27,45	3,641	7,54
25 e0	C big flat	119,2	122,44	39,0	4,29	0,8		0,6		27,79	3,172	8,76
26 d0	C big flat	127,7	131,08	41,7	4,12	0,85		0,7		31	3,291	9,42
27 H	Middle tower	134,1	137,5	43,8	3,87	0,85		0,6		34,65	3,414	10,15
28 G	Middle tower											
29 E	Middle tower	187,3	190,5	60,6	4,14	0,8		0,6		45,29	3,299	13,73
30 D	Middle tower	196,0	199,0	63,3	4,17	0,75		0,6		47,02	3,359	14
31 Fs	Middle tower	175,3	178,5	56,8	4,17	0,8			*2	42,06	3,165	13,29
32 A	Middle tower	142,7	146,3	46,6	3,87	0,9		0,5		36,91	3,263	11,31
33 cs0	Middle tower	128,2	132,0	42,0	3,97	0,95			top not original	32,33	3,279	9,86
34 ds0	C# big flat	124,2	127,98	40,7	4,26	0,95		0,8		29,18	3,040	9,6
35 f0	C# big flat	112,6	115,63	36,8	3,99	0,75		0,7		28,23	3,477	8,12
36 g0	C# big flat	102,3	105,68	33,6	4,17	0,85		0,65		24,51	3,675	6,67
37 a0	C# big flat	93,3	96,34	30,7	4,10	0,75		0,55		22,78	3,058	7,45
38 h0	C# big flat	86,3	89,11	28,4	3,93	0,7		0,5		21,98	3,580	6,14
39 cs1	C# big flat	81,4	84,04	26,8	4,17	0,65		0,7		19,52	3,060	6,38
40 X	C# big flat	87,0	89,82	28,6	3,85	0,7		0,4	*3	22,61	3,320	6,81
41 ds1	C# big flat	76,5	79,09	25,2	4,06	0,65		0,6		18,84	3,489	5,4
42 X	C# big flat	79,6	82,0	26,1	4,17	0,6		0,55		19,09	3,736	5,11
43 f1	C# big flat	72,1	74,9	23,8	4,17	0,7		0,7		17,3	3,030	5,71
44 X	C# big flat	71,0	73,8	23,5	4,00	0,7		0,4	*3	17,76	2,578	6,89
45 g1	C# big flat	63,4	65,8	20,9	4,02	0,6		0,55	*3	15,78	3,315	4,76
46 X	C# big flat	61,2	63,6	20,2	4,01	0,6		0,45		15,26	4,528	3,37
47 X	C# big flat	61,9	64,7	20,6	4,09	0,7		0,4		15,11	3,676	4,11
48 X	C# small flat	88,0	88,0	28,0				0,5		22	3,729	5,9
49 X	C# small flat	96,8	96,8	30,8				0,4				
50 X	C# small flat	88,0	88,0	28,0				0,6				
51 X	C# tower	119,6	123,2	39,2	4,00	0,9		0,5		29,93		
52 cs0	C# tower	120,5	123,5	39,3	3,87	0,75		0,45		31,14	3,414	9,12
53 A	C# tower	160,1	163,5	52,0	4,00	0,85		0,7		40	3,135	12,76
54 F	C# tower	178,9	182,5	58,1	4,05	0,9		0,5		44,15	3,307	13,35
55 Ds	C# tower	212,7	216,5	68,9	4,09	0,95		0,5		52,04	3,818	13,63
56 X	C# tower	191,8	195,0	62,1	4,06	0,8		0,8		47,27	4,082	11,58
57 G	C# tower	172,8	176,0	56,0	4,13	0,8		0,55		41,8	3,110	13,44
58 H	C# tower	131,5	134,9	42,9	4,09	0,85		0,5		32,17	3,236	9,94
59 X	C# tower											

*1 non-original extension too long
*2 right side rather irregular, top not original
*3 could measure original wall

Pipe ID	Field	Mouth height notes	Languid thickness	Languid nicks	Languid angle	Languid notes	Upper-lip Shape	Upper-lip Height	Upper-lip Notes	Lower-lip Shape	Lower-lip Height	Lower-lip notes	Original Ears present	non-original Ears Present	Pipemaker inscription on foot	Pipemaker inscription on body
1 X	C tower	*1	2,3	N	55		bay leaf	63,7		half circle	15,85		N			
2 Ais	C tower		2,8	N	55		bay leaf	70,28		half circle	19,49		N			
3 X	C tower		3,6	N	55		bay leaf	89,87		half circle	22,15		N			
4 Fis	C tower		3,8	N	55		bay leaf	93,05		half circle	23,15		N			
5 D	C tower		4,5	N	55		bay leaf	103,81		half circle	31,81		N			
6 E	C tower		3,1			new languid	bay leaf	92,96		half circle	24,65		N			
7 Gis	C tower		3,82	N	55		bay leaf	88,08		half circle	23,11		N			
8 X	C tower		2,58	N	55		bay leaf	70,21		half circle	18,02		N			
9 c0	C tower	*2	2,45			new languid	bay leaf	62,29		half circle		new foot	N			
10 X	C small flat		1,4	N	> 80		bay leaf	38		half circle		new	N			
11 X	C small flat		1,5	N	> 80		bay leaf	44		half circle	12,3		N			
12 X	C small flat		1,4	N	> 80		bay leaf	40		half circle	13,5		N			
13 X	C big flat		0,8	N		cannot measure	bay leaf	30,65		half circle	9,92		N			
14 X	C big flat		0,8	N		cannot measure	bay leaf	29,95		half circle	10,02		N			
15 fs1	C big flat	not original, lowered	1,3	N	50		bay leaf	34,34		half circle	10,12		N		Y	Y
16 X	C big flat		1,2	N	>80		bay leaf	33,61		half circle	12,19	*3	N			
17 e1	C big flat	not original, lowered	1,5	N	70	<75	bay leaf	37,5		half circle	11,36		N			
18 X	C big flat	not original, lowered	2,2	N		angle not original	bay leaf	36,56		half circle	9,79		N			
19 d1	C big flat		2,2	N	55		bay leaf	39,72		half circle	10,77		N		Y	Y
20 X	C big flat		1,7	N	80		bay leaf	40,19		half circle	11,39		N			
21 c1	C big flat		1,9	N	55		bay leaf	40,66		half circle	12,09		N			
22 ais0	C big flat		2,1	N	60		bay leaf	45,48		half circle	14,86		N			
23 gs0	C big flat		2,1	N	55		bay leaf	50,25		half circle	14,79		N		Y	Y
24 fs0	C big flat		2,1	N	50		bay leaf	56,69		half circle	15,77		N		Y	Y
25 e0	C big flat		2,1	N	50		bay leaf	58,95		half circle	16,33		N		Y	Y
26 d0	C big flat		2,6	N	50		bay leaf	66,47		half circle	16,32		N		Y	Y
27 H	Middle tower		3,2	N	55		bay leaf	71,04		half circle	17,8		N		Y	Y
28 G	Middle tower															
29 E	Middle tower		4,2	N	60		bay leaf	96,54		half circle	24,86				Y	Y
30 D	Middle tower		4,6	N	60		bay leaf	92,12		half circle	25,32				Y	Y
31 Fs	Middle tower		4,0	N	55		bay leaf	91,78		half circle	24,35				Y	Y
32 A	Middle tower	*4	3,8	N	55		bay leaf	79,25		half circle		cannot find line			Y	Y
33 cs0	Middle tower		2,7	N	60		bay leaf	67,23		half circle	17,82			Y	Y	Y
34 ds0	C# big flat		2,6	N	45		bay leaf	66,01		half circle	15,87					
35 f0	C# big flat		2,0	N	45		bay leaf	59,99		half circle	15,87					
36 g0	C# big flat	not original, lowered	2,0	Y	50		bay leaf	55,67		half circle	14,04					
37 a0	C# big flat		2,6	Y	55		bay leaf	47		half circle	13,55					
38 h0	C# big flat		2,2	Y	55		bay leaf	45,28		half circle	11,18					
39 cs1	C# big flat		1,9	N	50		bay leaf	41,34		half circle	11,27					
40 X	C# big flat	not original, lowered	1,7	N	80		bay leaf	41,73		half circle	10,98					
41 ds1	C# big flat	not original, lowered	2,0	N	50		bay leaf	37,76		half circle	11,26					
42 X	C# big flat		1,4	N	60	*5	bay leaf	38,69		half circle	10,17					
43 f1	C# big flat		1,4	N	60		bay leaf	36,16		half circle	9,94					
44 X	C# big flat	5,5 average on the sides	2,1	N		>80	bay leaf	33,61	bad shape	half circle	8,69	bad shape				
45 g1	C# big flat		1,5	N	45		bay leaf	35,67		half circle	8,7					
46 X	C# big flat		0,9	N	80		bay leaf	31,57		half circle	8,64					
47 X	C# big flat		0,9	N	80		bay leaf	30,74		half circle	8,74					
48 X	C# small flat		1,4	N			bay leaf	38		half circle		new	N			
49 X	C# small flat						bay leaf						N			
50 X	C# small flat						bay leaf						N			
51 X	C# tower	foot not original				no languid	bay leaf	66,16		half circle					Y	
52 cs0	C# tower		2,8		55		bay leaf	60,36		half circle	16,18				Y	Y
53 A	C# tower		3,3		55		bay leaf	87,54		half circle	19,57				Y	Y
54 F	C# tower		3,5		55		bay leaf	94,4		half circle	25,78				Y	Y
55 Ds	C# tower	mouth lowered	4,26		60		bay leaf	108,67		half circle	28,27				Y	Y
56 X	C# tower	mouth lowered	4,0		60		bay leaf	107,04		half circle	24,74				Y	Y
57 G	C# tower		3,0		60		bay leaf	90,83		half circle	23,04				Y	Y
58 H	C# tower	mouth lowered	2,5		60		bay leaf	65,76		half circle		*6		Y	Y	Y
59 X	C# tower															

*1 probably non-original due to corpus repair
*2 non-original due to new foot
*3 maybe not original: soldered back and the scraping direction does not match foot's
*4 height not original, it was lowered with new material
*5 modern languid (pipe)
*6 cannot find the whole circle

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Annex A XRF-analysis pipe metal

			%	%	%	%	%	%	%	%
nr	stop	location	Pb	Sn	Cu	Zn	Sb	Ag	Au	Bi
1286	Fogelberg	body	80,09	19,72	0,14	<0,0	<0,0	<0,1	<0,1	<0,2
1287	Lorenz, oct2 C	body	96,05	3,67	0,07	<0,0	<0,0	<0,1	<0,0	<0,2
1288	Lorenz, oct2 C	foot	96,50	3,27	0,09	<0,0	<0,0	<0,1	<0,1	<0,2
1289	spitsfluit 2 D	body	86,40	13,32	0,11	<0,0	<0,0	<0,1	<0,1	<0,2
1290	spitsfluit 2 D	foot	88,08	11,70	0,11	<0,0	<0,0	<0,1	<0,1	<0,2
1291	RP2	foot back	96,64	3,12	0,11	<0,0	0,11	<0,1	<0,1	<0,2
1292	RP2	body back	96,45	3,19	0,08	<0,0	0,09	<0,1	<0,1	<0,2
1293	RP2	body tin leaf	73,85	24,10	0,78	<0,0	0,05	0,07	<0,1	0,17
1294	RP2	mouth gold leaf	68,24	21,26	0,88	<0,0	0,05	<0,1	3,87	0,16
1295	Gedact 8 c2	body	85,65	13,85	0,31	<0,0	<0,0	<0,1	<0,1	<0,2
1296	Gedact 8 c2	foot	86,34	13,06	0,16	0,03	<0,0	<0,1	<0,1	<0,2
1297	Gedact 8 c2	hoed	90,22	9,44	0,14	<0,0	<0,0	<0,1	<0,1	<0,2
1298	Gedact 8 cis2	body	93,22	6,52	0,09	<0,0	<0,0	<0,1	<0,1	<0,2
1299	Gedact 8 cis2	foot	96,33	3,52	0,06	<0,0	<0,0	<0,0	<0,1	<0,2
1300	Gedact 8 cis2	foot extension	89,23	10,44	0,14	<0,0	<0,0	<0,1	<0,1	<0,2
1301	Gedact 8 cis2	cap	90,09	9,48	0,11	<0,0	<0,0	<0,1	<0,0	<0,2
1302	Gedact 8 d2	body	94,43	5,21	0,08	0,02	0,05	<0,0	<0,1	<0,2
1303	Gedact 8 d2	foot	94,49	5,32	0,10	<0,0	0,04	<0,0	<0,0	<0,2
1304	Gedact 8 d2	foot extension	89,32	10,30	0,17	0,03	<0,0	<0,1	<0,1	<0,2
1305	Gedact 8 d2	hoed	89,46	10,12	0,14	<0,0	<0,0	<0,0	<0,1	<0,2
1306	Gedact 8 d2	ears	68,73	30,69	0,36	<0,0	0,13	<0,1	<0,1	<0,2
1307	Gedact 8 f2	foot extension	97,48	2,02	0,07	<0,0	0,03	<0,1	<0,1	<0,2
1308	Gedact 8 g2	body	93,91	5,74	0,08	<0,0	0,05	<0,1	<0,1	<0,2
1309	Gedact 8 g2	foot	94,21	5,53	0,07	<0,0	0,06	<0,0	<0,0	<0,2
1310	Quint e1	body	86,65	12,83	0,13	<0,0	0,05	<0,1	<0,0	<0,2
1311	Quint e1	foot	87,71	11,94	0,13	<0,0	0,05	<0,1	<0,1	<0,2
1312	Quint f1	body	81,93	17,74	0,20	<0,0	<0,0	<0,1	<0,0	<0,2
1313	Quint f1	foot	81,67	17,96	0,19	<0,0	<0,0	<0,1	<0,1	<0,2
1314	Quint fis1	body	87,88	11,83	0,15	<0,0	0,05	<0,1	<0,1	<0,2
1315	Quint fis1	foot	87,17	12,56	0,14	<0,0	0,04	<0,0	<0,0	<0,2
1316	Quint g1	body	82,14	17,49	0,19	<0,0	<0,0	<0,1	<0,1	<0,2
1317	Quint g1	foot	82,01	17,63	0,22	<0,0	<0,0	<0,1	<0,1	<0,2
1318	Quint gis1	body	86,56	13,07	0,15	<0,0	0,05	<0,1	<0,1	<0,2
1319	Quint gis1	foot	87,26	12,44	0,16	<0,0	0,06	<0,1	<0,0	<0,2
1320	Quint a1	body	91,15	8,55	0,12	<0,0	<0,0	<0,1	<0,0	<0,2
1321	Quint a1	foot	89,38	9,94	0,09	<0,0	0,41	<0,0	<0,1	<0,2
1322	Quint b1	body	86,96	12,73	0,15	<0,0	0,06	<0,1	<0,0	<0,2
1323	Quint b1	foot	87,21	12,49	0,14	<0,0	0,05	<0,1	<0,1	<0,2
1324	Quint h1	body	82,50	17,01	0,22	<0,0	<0,0	<0,1	<0,0	<0,2
1325	Quint h1	foot	89,89	9,79	0,08	<0,0	<0,0	<0,1	<0,1	<0,2
1326	Quint c2	body	83,56	15,90	0,18	<0,0	<0,0	<0,1	<0,1	<0,2
1327	Quint c2	foot	85,66	14,02	0,15	<0,0	<0,0	<0,1	<0,0	<0,2
1328	Quint cis2	body	86,05	13,59	0,18	<0,0	0,03	<0,1	<0,0	<0,2
1329	Quint cis2	foot	87,39	12,34	0,14	<0,0	0,06	<0,1	<0,1	<0,2
1330	Quint d2	body	84,76	14,76	0,16	<0,0	<0,0	<0,1	<0,1	<0,2
1331	Quint d2	foot	84,08	15,64	0,18	<0,0	<0,0	<0,1	<0,1	<0,2
1332	Quint dis2	body	82,02	17,52	0,21	<0,0	<0,0	<0,1	<0,1	<0,2
1333	Quint dis2	foot	81,91	17,64	0,20	<0,0	<0,0	<0,1	<0,1	<0,2
1334	Quint e2	body	81,15	17,96	0,20	0,03	<0,0	<0,1	<0,1	<0,2
1335	Quint e2	foot	83,59	16,06	0,14	<0,0	<0,0	<0,1	<0,1	<0,2
1336	Quint f2	body	85,77	13,61	0,17	0,03	<0,0	<0,1	<0,0	<0,2
1337	Quint f2	foot	84,22	15,31	0,18	<0,0	<0,0	<0,1	<0,0	<0,2
1338	Quint fis2	body	81,90	17,72	0,21	<0,0	<0,1	<0,1	<0,0	<0,2
1339	Quint fis2	foot	81,99	17,67	0,18	<0,0	<0,0	<0,1	<0,0	<0,2
1340	pipe 25	body	88,72	10,92	0,10	<0,0	<0,0	<0,1	<0,1	<0,2
1341	pipe 25	foot	84,62	14,92	0,14	<0,0	<0,0	<0,0	<0,0	<0,2
1342	pipe 29	body	84,12	15,33	0,17	<0,0	<0,0	<0,0	<0,1	<0,2
1343	pipe 29	foot	83,93	15,73	0,16	<0,0	<0,1	<0,1	<0,0	<0,2
1344	pipe 31	body	86,09	13,50	0,17	<0,0	0,05	<0,1	<0,1	<0,2
1345	pipe 31	foot	87,66	11,79	0,14	<0,0	<0,0	<0,1	<0,1	<0,2
1346	pipe 32	body	84,61	15,09	0,17	<0,0	<0,0	<0,1	<0,1	<0,2
1347	pipe 32	foot	84,46	15,28	0,16	<0,0	<0,0	<0,1	<0,1	<0,2
1348	pipe 43	body	87,50	12,07	0,13	<0,0	<0,0	<0,0	<0,1	<0,2
1349	pipe 43	foot	84,29	15,39	0,18	<0,0	<0,0	<0,1	<0,0	<0,2
1350	pipe 49	body	84,79	14,78	0,18	<0,0	<0,0	<0,1	<0,0	<0,2
1351	pipe 49	foot	84,38	15,36	0,17	<0,0	<0,0	<0,1	<0,1	<0,2

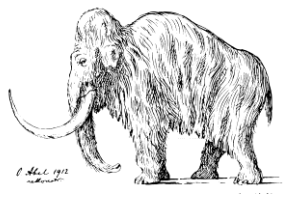
Annex B Dendrochronological analysis

Lund University

Department of Quaternary Geology

KVARTÄRGEOLOGISKA AVDELNINGEN

HANS LINDERSON



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DENDROCHRONOLOGICAL ANALYSIS OF CHURCH ORGAN IN TORRLÖSA, SKÅNE, SWEDEN

Uppdragsgivare: Svalövs pastorat
Område: Skåne **Prov nr:** 56040 - 56059
Analysed object: Church organ and items in Torrlösa kyrka, Skåne, Sweden

Resultat:

Dendro identity no:	Sample no	Tree Species	No Yrs; No radii measured	Sapwood (Sp) Bark (B) Waney edge (W)	Dating of the outermost (youngest) annual ring in the sample	Estimated felling year E(Efter/After) / V(Winter) Period	Approximated felling period for the trees in each of the groups
56040	1	Oak	111;3	-Sp, -W	Not dated	---	---
56041	2	Oak	105;2	-Sp, -W	1583	**E 1592**	E 1592
56042	3A	Oak	248:3	-Sp	1613	**E 1623**	1619–1633
56043	3B	Oak	204;2	-Sp, -W	1590	**E 1600**	1619–1633
56044	3C	Oak	105;2	Sp 4	1613	**1626±7**	1619–1633
56045	3D	Oak	204;2	-Sp, -W	1599	**E 1609**	1619–1633
56046	4A	Oak	102;2	-Sp, -W	1614	**E 1623**	1630–1647
56047	4B	Oak	97;2	-Sp, -W	1620	**E 1630**	1630–1647
56048	4C	Oak	167;3	-Sp, -W	1609	**E 1619**	1630–1647
56049	5	Oak	89;2	-Sp, -W	1544	**E 1551**	E 1592
56050	6A	Pine	158;2	-Sp, -W	(1562)	**(E 1600)**	(E 1600)
56051	7	Oak	184;2	-Sp, -W	Not dated	---	---
56052	8A	Pine	95;2	-Sp, -W	1504	**E 1554**	1580–1620
56053	8B	Pine	142;2	-Sp, -W	1530	**E 1580**	1580–1620
56054	8C	Pine	82;2	-Sp, -W	1482	**E 1532**	1580–1620

56055	9A	Oak	103;2	Sp: 7, -W	Not dated	---	---
56056	9B	Oak	128	-Sp, -W	Not dated	---	---
56057	6B	Pine	71(+10);2	-Sp, -W	(1497+10)	(E 1550)	(E 1600)
56058	10	Oak	77;2	-Sp, -W	Not dated	---	---
56059	11	Oak	60;2	-Sp, -W	Not dated	---	---

For the dates that are in parentheses, a sufficiently high statistical significance was not achieved. They are therefore considered insignificant.

Results

A total of 20 samples from the church organ and the church interior in Torrlösa church were dendrochronologically analysed. The samples came from 11 different parts of the organ or interior. Of these, a total of six parts (1, 2, 3, 4, 5 and 11) were related to the owl. These parts consisted of a total of 11 analysed oak samples. The remaining five parts (6, 7, 8, 9 and 10), which in total consists of 9 analysed wood samples, were linked to the church's balustrade and decoration. A total of 15 of the samples were oak (*Quercus* sp.) while the remaining 5 samples were pine (*Pinus* sp.). No coring of wooden samples or cookies (discs) were taken from any of the analysed objects. Instead, a photo documentation of all the samples was carried out and the later analysis and measurements of the annual rings was performed on calibrated images.

Dating of the church organ

Object 1, (56040), the 45° angle impost joint on the organ, neither show significant cross-date statistics to the other samples or the reference chronologies. The sample is therefore considered as undated at present.

Object 2, (56041), the back side moulding on the organ, is an oak sample without sapwood. The outermost ring is dated to 1583, which gives an earliest possible felling year for the tree to 1592. The tree-ring data correlates to chronologies developed from oak material exported from non-specified areas in the Baltic region. Object 5 (56049), also show weak correlation to reference chronologies from similar material, and when sample 56041 and 56049 are merged into a joint tree-ring record, the correlation increased.

Object 3 and 4 (56042-48), the panel disassembled from the church organ and the panel fixed on the church organ, consist of 8 oak planks, of which 7 have been analysed. The samples 56042, 043, 045, 047 and 048 cross-date, and a chronology has been developed from the samples. This chronology cross-date with oak-reference chronologies from Skåne, Halland, Denmark and Västergörland.

Object 11 (56059), the post inside the church organ, neither show significant cross-date statistics to the other samples or the reference chronologies. The sample is therefore considered as undated at present.

Dating of the church interior

Object 8, consist of three join pine planks (56052-54) with the text “Johannes Büxtehüde” and the year 1641. Since sapwood is missing on the three planks, only an after dating (*terminus post quem*) is possible. If the outermost ring in the youngest dated pine plank is close to the sapwood boundary, a likely felling year for tree 8B (56053), and thereby the other trees in the same construction, between 1580 and 1620. However, there might be missing heartwood rings as well, which can give a later interval for the tree felling. The pine trees correlate to reference chronologies from Norway.

Object 6, 7, 9 and 10, neither show significant cross-date statistics to the other samples or reference chronologies. These samples are therefore considered as undated at present.

With regard to the samples that have received an uncertain date or the samples that we have not been able to be date, a supplement consisting of more samples can be a possibility to date these samples with search.

Sample description

Church organ

Sample 1:	(56040), ”Brebos”, 45° angle impost joint on the organ.
Sample 2:	(56041), Loventz back side moulding on the organ.
Samples 3A-D:	(56042-45), Panel disassembled from the church organ.
Samples 4A-C:	(56046-48), Panel, fixed on the church organ.
Sample 5:	(56049), Post lower case on the organ. “Brebos”
Sample 11:	(56059): Impost “Loventz”. Post inside the church organ.

Church interior

Samples 6A-B:	(56050 and 56057), Posts balustrade (right and left).
Sample 7:	(56051), Top flügeltüve, Jungfrau Maria
Samples 8 A-C:	(56052-54), “Büxtehüde 1641
Samples 9A-B:	(56055-56), Panel, “Landate second”
Sample 10:	(56058), Separate balustrade “Matthaeus”

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"Dendro identity number", is a unique identity for each sample handled in the laboratory.
"Number of years", the number of annual rings that have been analysed in the sample. In some cases, it has not been possible to measure the annual ring width, then the annual rings have been counted, which has been marked with "+ n".
In the same column, the note "ew" or "lw" sometimes occurs, these terms are derived from the English early wood (spring wood) and late wood (summer wood) and describe the degree of development of the youngest / last annual ring. Early wood does, for example, indicates that the tree was harvested in the summer.
"Sapwood (Sp), Waney edge (W), bark (B)" are features that indicates if we have the last formed ring or might indicate how many annual rings we are missing in the sample. Provided that the sample can be dated and there is waney edge or bark on the sample, you get an exact year of dating (extreme exceptions exist). "Close to W" is stated when there are indications for this, for example in field notes or if a saw blade follows a natural curvature in the round timber. If the edge (the rounded end of the wood where the bark has disappeared) is missing and the sapwood is visible, the felling year can be calculated with the help of the sapwood statistics for different tree species and conditions. Usually, 17 ± 7 years are used on oak and a more varied image on pine with a maximum variation of ± 20 years. If the sapwood ("- Sp") is missing, a so-called "post-update" (*terminus post quem*) is specified. The wood then gets the oldest possible dating. Theoretically, the wood can be as young as you like, but more likely it is about up to a few decades later felling than the specified post-date. This is usually discussed in the report.
"Dating of the outermost annual ring in the sample", is always yearly exact when dated. If the sample cannot be cross dated with a dated dendrochronological series, "no dating" is indicated. This usually occurs with a small number of annual rings (young / fast-growing / heavily degraded trees), odd tree species (in Sweden, oak and pine are best), too few samples from the examined structure, disturbed growth, etc.
"Estimated precipitation year" here a calculation is made based on the dating of the outermost annual ring in the sample and how many annual rings that are calculated are missing in the sample. The margin of error indicated covers more than 95 percent of the samples. If the bark or waney edge remains on the sample, the date is given the following winter if no other notes have been made. The winter half refers to the tree's dormant period so that no annual ring formation takes place in the trunk, the rest period normally begins in August and lasts until May south of the Norrland border (approximately Dalälven). The dormant period of the trunk timber gradually becomes longer towards the tree line of the mountains.
In the column on the far right, an alternative dating has been noted as well as the trees' estimated seedlings.

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