



MVRDV

Winy, Jacob and Nathalie

(摄影: Allard van der Hoek)

GLASS FARM, SCHIJNDEL NL

玻璃农场，斯海恩德尔，荷兰

斯海恩德尔的市场广场曾在第二次世界大战中遭到破坏，并经历过多次扩建和翻新。1980年，Winy Maas写信建议在广场与教堂、市政厅和主要街道之间建造一个新的建筑物。2000年，市议会终于通过了这个提议，于是MVRDV提出了一系列解决方案，来填补这个巨大广场中的空白。玻璃农场是MVRDV的第七个方案，之前提出的几套方案中还包含了一个剧院和其他各种设施建筑。广场周围的居民们都参与了方案的选择中，期间还进行过好几次激烈的辩论，最终确定了现在的方案。这个完全由玻璃覆盖的1 600m²的建筑包含了一系列的公共设施，如餐厅、商店和健身中心等。

巧合的是，建筑具有的最大建筑外皮有着传统斯海恩德尔农场的形式，通过对这种类型的其余农场进行测量与分析，从而找出一个“理想的”平衡点。艺术家Frank van der Salm与MVRDV合作，拍摄了一组老建筑照片，这个“典型的农场”便是由这些老照片拼贴组成的。这些图像通过烧结的过程被打印到1 800m²的玻璃表面上，从而产生出一种类似于教堂中彩色玻璃的效果。根据对采光和视野的要求，打印在玻璃上的图片的透明度也会不断地变化。

夜晚，结构将会从内部被照亮，变成一座传统农场的纪念碑。玻璃农场被有意地放大尺寸进行设计，它是一个正常农场的1.6倍大，高度达14m，这也象征着从村庄到城镇的发展。打印的图案也遵循这一“扩张的历史”，比如外观附加了4m高的农场大门。当成年人看到这座建筑时，或许会回想起他们小时候在农场生活的场景，为了进一步增强这种怀旧感觉，建筑旁边还会有一个按照建筑同比例放大的钟摆。

Schijndel's market square suffered from damages during the Second World War and has been subject to numerous enlargements and refurbishments. Winy Maas wrote a letter in 1980 proposing the idea of a new structure in the square between the church, town hall and main street, and in 2000 the town council finally accepted. MVRDV has since proposed an iteration of options that could fill the gap in this unusually large village square. The Glass Farm is MVRDV's seventh proposal for the site, earlier designs have included a theatre and various other facilities.

The villagers engaged vividly with the process, resulting in heated debates, polls and polemics in the local press – both by supporters and adversaries of the plan. The 1600m² building, which is entirely covered by a glass facade consists primarily of a series of public amenities such as restaurants, shops and a wellness centre.

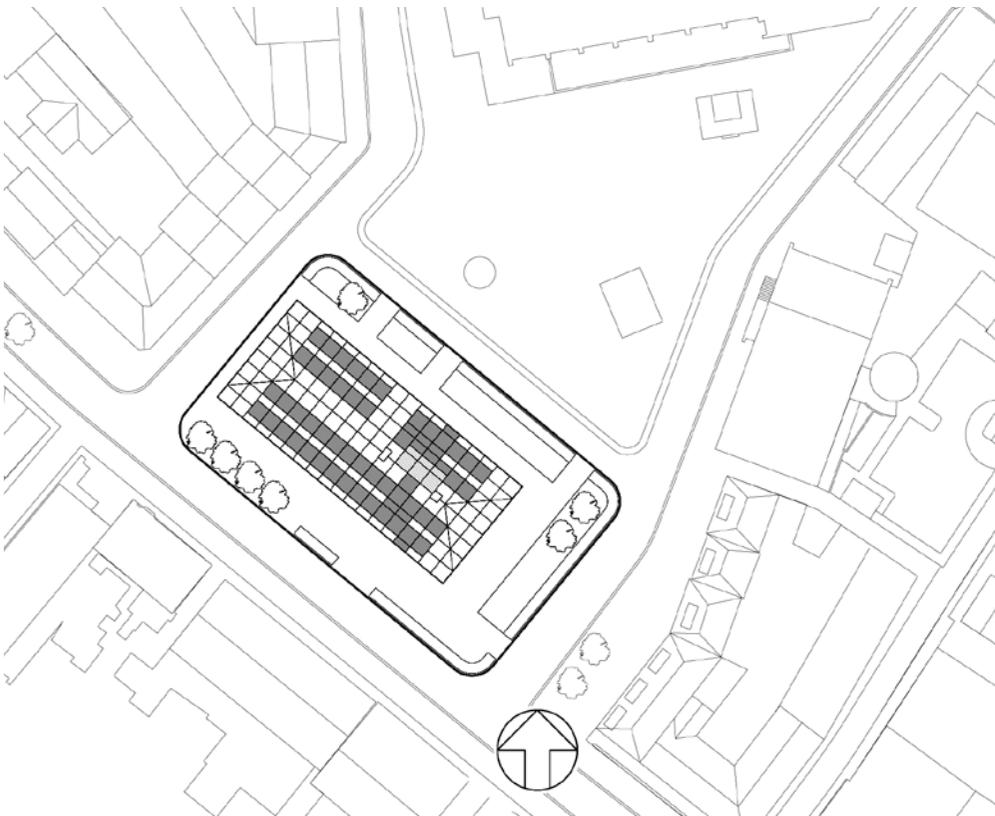
By coincidence, the maximum envelope that was defined by the town planners had the form of a traditional Schijndel farmhouse. All of the remaining farms of this type were measured, analyzed and an 'ideal' average was developed from the data. In collaboration with MVRDV, artist Frank van der Salm photographed the historic buildings, and from these an collage of the 'typical farm' was composed. This image was printed using fritted procedure onto the 1800m² glass facade, resulting in an effect similar to stained glass windows in a cathedral. The print varies in translucency depending requirements for light and views.

At night the structure will be illuminated from the inside, becoming a monument to the traditional farmhouse. At a height of 14 metres the Glass Farm is intentionally designed out of scale and is 1.6 times larger than a real farm, symbolizing the village's growth into a town. The printed image follows this 'augmented history', with the superimposed farm door appearing 4 metres tall for example. When adults interact with the building, they are once again the size of a small child in relation to the building, possibly adding an element of nostalgic remembrance to their experience. To enhance this sensation further, there will be a table and swing next to the building, scaled up to the same size.

Coinciding with the completion of the building, an exhibition opens in the local Museum Jan Heestershuis about Context and Authenticity. Later this year a book will be published by NAI Publishers exploring the development of the Glass Farm,

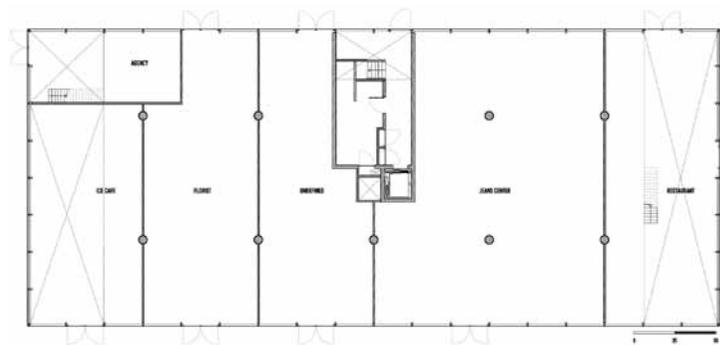
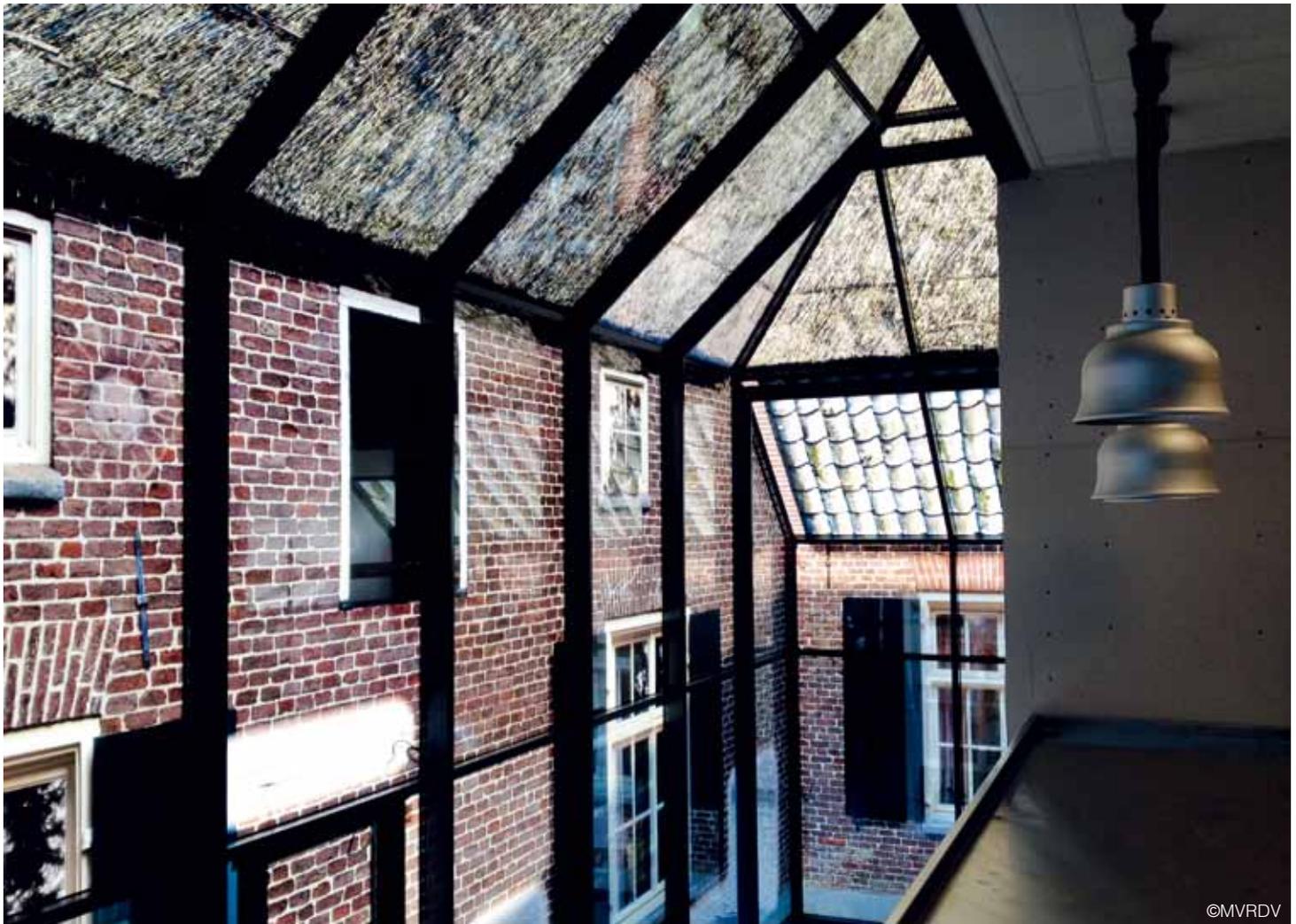


摄影：Persbureau van Eindhoven



总平面图

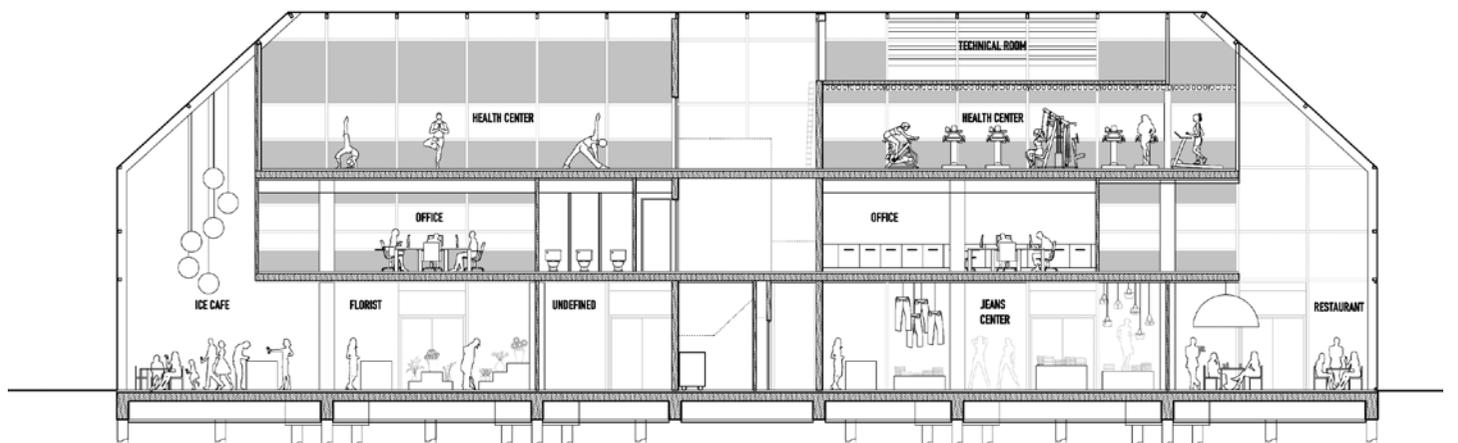
客户：RemBrand bv
 建筑面积：1 600m²
 初步设计：2000年
 深化设计：2008~2012年
 设计完成：2013.01.17
 建筑设计：MVRDV
 设计团队：Winy Maas, Jacob van Rijs,
 Nathalie de Vries, Frans de Witte,
 Gijs Rikken
 结构设计：Hooijen Konstruktiebureau
 安装单位：IOC Ridderkerk
 建筑外表皮：Brakel Atmos
 玻璃分包：AGC



一层平面图



二层平面图



剖面图



在大楼竣工之际，当地博物馆Jan Heestershuis开展了一个关于环境与真实性的展览。今年的早些时候，NAI Publisher将会出版一本探索玻璃农场发展过程的书，其中包括建筑由设计到实现的漫长过程。MVRDV事务所与Hooijen工程、IOC Ridderkerk安装公司、Brakel Atoms幕墙公司和AGC打印公司一起为开发商RemBrand实现了这座建筑的建造，RemBrand是Van Den Brand房地产公司和Remmers施工的联合体。

技术细节

建筑的主体为钢结构，无论是建筑外墙还是屋顶面板，钢管结构都依据玻璃尺寸划分的轴线安装起来。来自附近城镇Uden的Brakel Atmos幕墙公司将铝制玻璃丁字铁直接安装在铁管结构上，没有任何的调整，这样就对钢结构的偏差容许度有着相当高的要求。Brakel Atmos公司的项目负责人Bart van Landgen解释道：“建筑外墙和屋顶面板里的角度部分尤其需要非常精确。如果在外侧放置过远，建筑的体量就会增加，从而造成建筑超过外部玻璃面板的尺寸。这就是为什么我们最多只允许-5mm的偏差。钢管结构可以允许放置得偏里一些，但不能处于轴线之外。其他的钢梁允许有 $\pm 2\text{mm}$ 的偏差。在水平方向上，允许的偏差稍微大些，因为玻璃丁字铁可以调节。”安装要求低偏差的另一个原因是密封接头狭窄。玻璃窗格被密封在结构外部，接头被限制在20mm，构件必须在这些接头处被紧固。因此要求在玻璃窗格之间设置一个间隔板，这样内部的玻璃板才能被夹紧。

including a literary description of the lengthy processes which lead to its realisation. MVRDV realised the building for RemBrand developers, a combination of Van Den Brand Real Estate and Remmers Construction Group, together with Hooijen Engineers, IOC Ridderkerk for installations, Brakel Atmos for the facade and AGC for the print.

Technical Details

The principle structure of the building is made of steel. Both in the façade and roof panes, steel tubes have been mounted, based on the grid that follows the dimensions of the glass. Brakel Atmos from the nearby town Uden placed the aluminum glazing tees directly on the steel tubes, without any justification. This has put very high quality demands on the tolerances of the steel structure. Bart van Landgen, project leader at Brakel Atmos explains: “Especially the angle sections in the façade and roof panes had to be very precise. If placed too far outside, the volume of the building grows, thus exceeding the size of the glass panes for the façade. That’s why we have a tolerance of a maximum of -5 mm. The tubes are allowed to be a bit on the inside, but not on the outside of the grid. The other steel girders are allowed $\pm 2\text{ mm}$. In lateral direction, tolerances were slightly larger, because the glazing tees can be adjusted.”

Another reason for the low tolerances were the narrow sealing joints. The glass panes are sealed on the outside, with joints limited to 20 mm. Within those joints, fastening elements had to be realized. This required a spacer block in between the glass panes. Therefore, the inner glass pane can be clamped.

Brakel Atmos’ glazing tees are designed to be drained, in case any water might slip through the sealing joints, or condensation might occur. Therefore, the glazing tees of the roof panes are connected in a continuous line with the façade panes. Also the glazing bars are connected with the glazing profiles for water tightness. For the corner profiles and the various rafters on the roof, Brakel Atmos had to find a different solution. The joints connecting all the different profiles would turn out to be too large if the drainage was combined. “We have developed a new glazing tee that

为了防止水滴穿过密封接头或者出现冷凝情况，Brakel Atmos公司将玻璃丁字铁设计为可以排水，因此，屋顶窗格的玻璃丁字铁与建筑立面的玻璃连续起来。另外，为了保证良好的水密性，玻璃杆与玻璃型材也相连。对于边角轮廓和屋顶上的各种椽子，Brakel Atmos公司必须寻找到不同的解决方案。如果与排水相结合，所有不同部位的连接点尺寸将会过大。Brakel Atmos公司研制的玻璃丁字铁能直接安装在80mm×80mm的钢管结构上，并且可以生成不同的角度，对边角和屋椽部位都很有用。这样，连接点就显得非常纤薄，并且在内部的轮廓与玻璃窗格间增加了额外的密封条。在与外部的气密构件相组合后，确保了没有任何水滴能够进入玻璃结构。因此，没有必要在不同的轮廓间创造连续的连接点。

与其他连接点相反，建筑拐角处的密封连接点有30mm宽。因为要满足在一定角度上的玻璃窗格，这样较大的尺寸是有必要的。为了把密封连接点的尺寸限制在30mm，外玻璃窗格的尺寸被做得比内窗格要大一些。此外，建筑的屋脊部位配置了额外的橡胶和集成的丝网来驱逐鸟类并防止各种脏物。

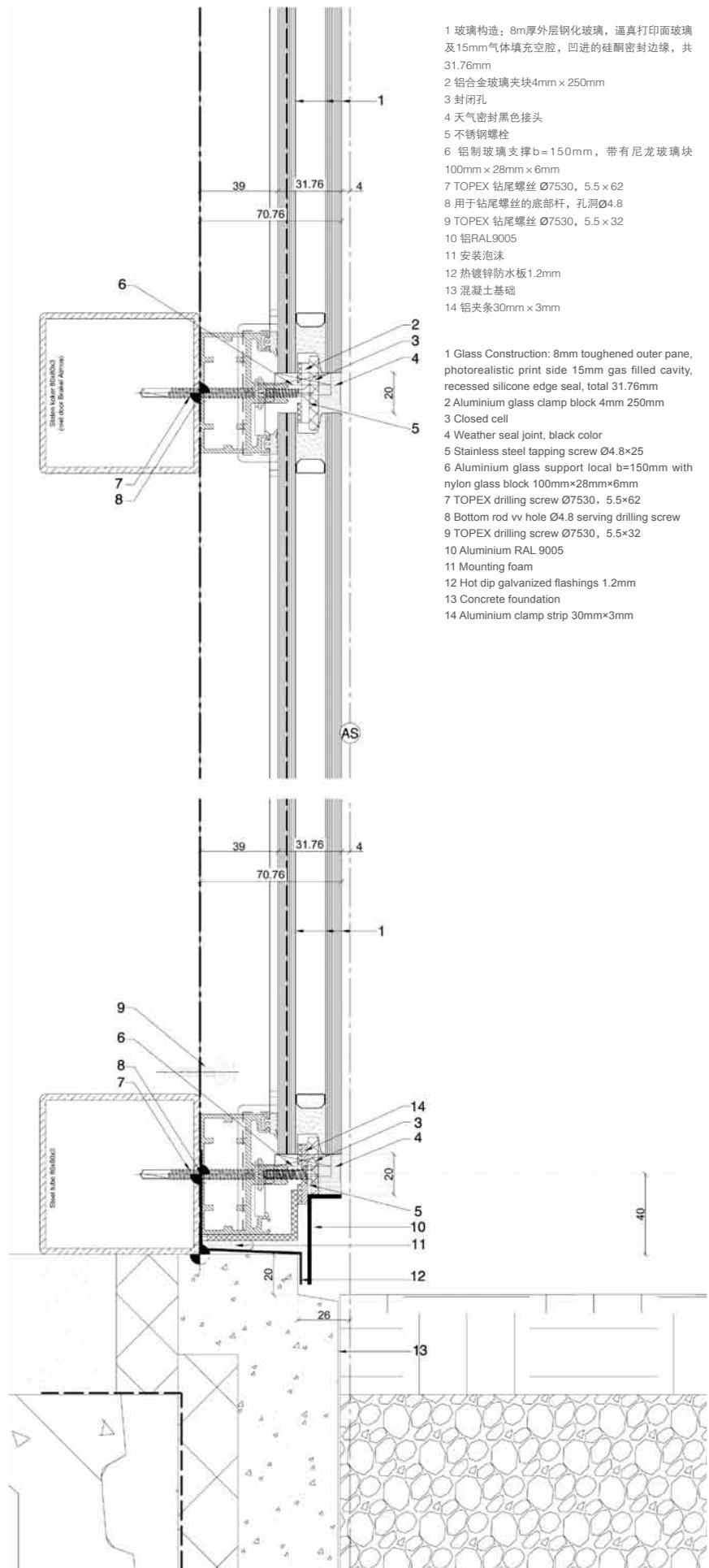
建筑的外壳完全由玻璃制成，外立面的钢结构也被覆盖了条状玻璃。为了确保建筑表面有足够的粘接力，在钢框架上安装了一种铝制的外壳。建筑的门以绝缘玻璃完全覆盖。内部的窗格被安装在钢框架内，面积较大的外部窗格被安装在了钢框架上。烟囱也被玻璃所覆盖，为了能将玻璃很好地安装在烟囱上，这些玻璃窗格在生产过程中就已配上扣环。

不过，不是所有建筑外壳的透明度都是相同的。某些并不需要透明部分的外部玻璃窗格就被安装在了隔离的面板上。这适用于设有桑拿房和一些办公室位置的屋顶面板，还有位于楼板边缘的玻璃板。用于楼板边缘的玻璃板防火等性能较好，火灾时可以避免火势的扩散。

can be mounted directly on the 80*80 mm steel tubes and that can be produced at various angles. Therefore it is useful for both the corner profiles as for the rafters. It has become a very slim profile with an additional seal between the profile and the glass pane on the inside. In combination with the wheaterseal on the outside, it is ensured that no water will slip through. Therefore, it was not necessary to create continuous joints between the profiles.”

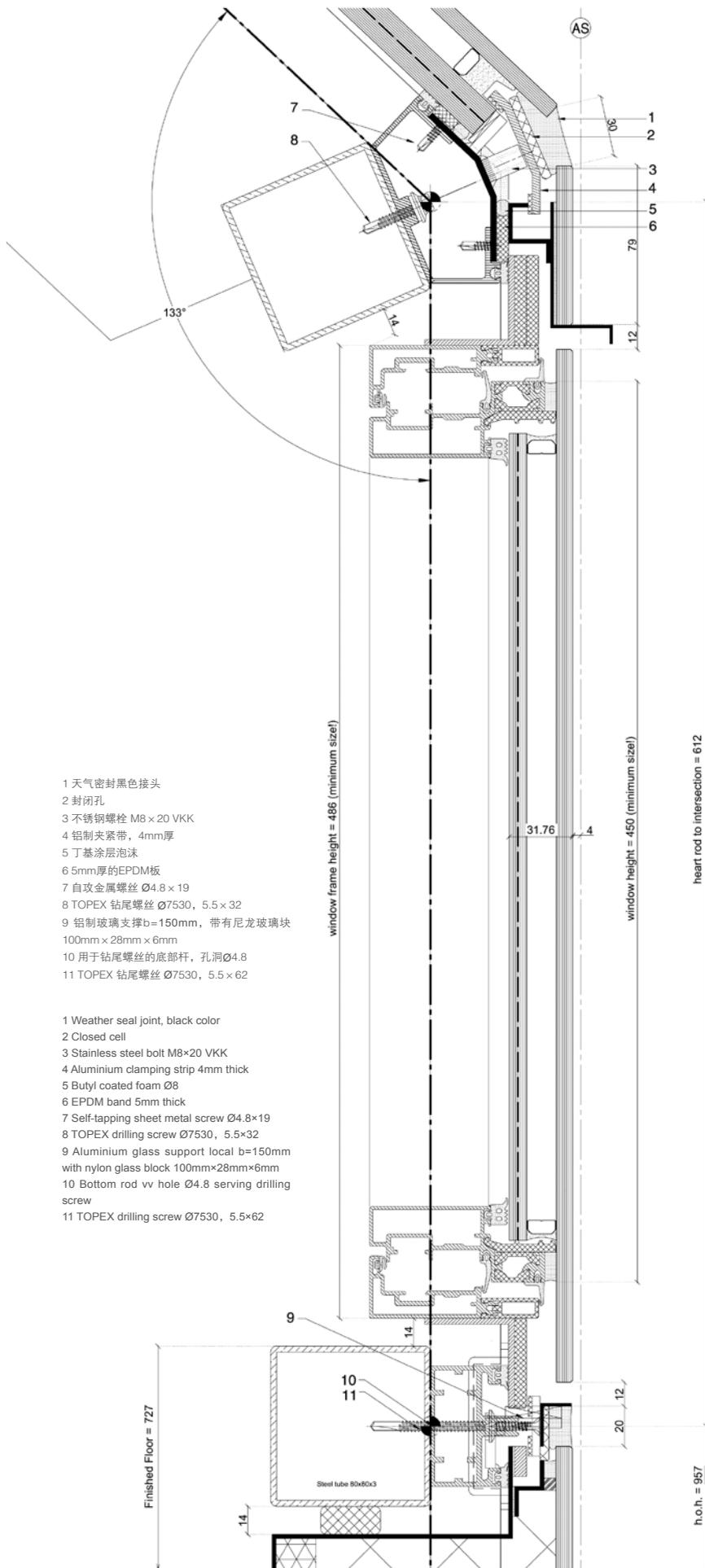
In contrast to the other joints, the sealing joints at the corners of the building have a width of 30 mm. This larger size was necessary due to the meeting of the window panes at an angle. In order to limit the sealing joint to 30 mm, the outer glass pane has been made larger than the inner pane. Apart from that, the ridge of the building has been equipped with an additional rubber and an integrated shock wire to repel birds and avoid any dirtiness.

The outer shell is made entirely of glass. The steel frames in the façade have been covered in strips of glass as well. To ensure sufficient bonding surface, an aluminum casing has been applied over the steel frames. The doors have been fully covered with (insulation) glass. This has been encased in steel frames, whereby the inner pane has been placed inside the steel frames while the larger outer pane has been placed onto the steel frames. The chimneys have been covered in glass as well. These glass panes have been equipped with fastenings during production, in order to mount it to the real chimney.



- 1 玻璃构造：8mm厚外层钢化玻璃，逼真打印面玻璃及15mm气体填充空腔，凹进的硅酮密封边缘，共31.76mm
- 2 铝合金玻璃夹块4mm×250mm
- 3 封闭孔
- 4 天气密封黑色接头
- 5 不锈钢螺栓
- 6 铝制玻璃支撑b=150mm，带有尼龙玻璃块100mm×28mm×6mm
- 7 TOPEX 钻尾螺丝 Ø7530，5.5×62
- 8 用于钻尾螺丝的底部杆，孔洞Ø4.8
- 9 TOPEX 钻尾螺丝 Ø7530，5.5×32
- 10 铝RAL9005
- 11 安装泡沫
- 12 热镀锌防水板1.2mm
- 13 混凝土基础
- 14 铝夹条30mm×3mm

节点详图



- 1 天气密封黑色接头
- 2 封闭孔
- 3 不锈钢螺栓 M8×20 VKK
- 4 铝制夹条带, 4mm厚
- 5 丁基涂层泡沫
- 6 5mm厚的EPDM板
- 7 自攻金属螺丝 Ø4.8×19
- 8 TOPEX 钻尾螺丝 Ø7530, 5.5×32
- 9 铝制玻璃支撑b=150mm, 带有尼龙玻璃块 100mm×28mm×6mm
- 10 用于钻尾螺丝的底部杆, 孔洞Ø4.8
- 11 TOPEX 钻尾螺丝 Ø7530, 5.5×62

- 1 Weather seal joint, black color
- 2 Closed cell
- 3 Stainless steel bolt M8×20 VKK
- 4 Aluminium clamping strip 4mm thick
- 5 Butyl coated foam Ø8
- 6 EPDM band 5mm thick
- 7 Self-tapping sheet metal screw Ø4.8×19
- 8 TOPEX drilling screw Ø7530, 5.5×32
- 9 Aluminium glass support local b=150mm with nylon glass block 100mm×28mm×6mm
- 10 Bottom rod vv hole Ø4.8 serving drilling screw
- 11 TOPEX drilling screw Ø7530, 5.5×62

节点详图





摄影：Persbureau van Eindhoven



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©MVRDV



摄影：Persbureau van Eindhoven

总之，有很多不同的玻璃结构被用在了这个建筑上，其他几个供应商也参与到其中。为了妥善监管这个过程，每块玻璃面板都对应着一个品牌。Brakel Atmos公司向MVRDV广泛咨询了关于这些品牌的玻璃形状和尺寸。为了防止搞混合作公司，将每个公司的商标都贴在了面板的右下角。

打印

在设计的前期阶段，我们就很明显地意识到玻璃农场的建造必须使用打印技术。因为每个窗格都是不同的，窗格的细节程度要求相当高，屏蔽玻璃和丝印玻璃有着很大的问题。当时，比利时的AGC Mirodan是唯一一家有合适打印机的公司。玻璃窗格的最大尺寸已经知道：3.1m×2.33m，这决定了网格轴线的大小。在此之前从来没有做过这样大的尺寸，并且最小的尺寸只有50cm×7cm，这使得问题变得很棘手。

打印在外部8mm厚的玻璃内侧进行。在打印期间，搪瓷被喷涂在玻璃板上。在搪瓷干后，玻璃板被放入炉子中。然后待搪瓷烧掉后，玻璃回火。

线的游戏

关于打印和切割线的问题，在摄影师、MVRDV事务所、AGC和Brakel Atmos公司之间进行过多次商讨。在MVRDV事务所和摄影师决定了玻璃构想后，Brakel Atmos公司绘制了所有的玻璃板，包括20mm的密封构件。“我们使用了三维图像投影技术来确定转换处的定位线。由于我们不得不处理不同厚度的玻璃，这些线不可能在所有地方都是连续的。但不管在内部还是外部，这些线都是非常准确的。”Bart van Langen说。

整个建筑的外壳（1800m²）是无缝的，连排水沟都没有。不过，设计已经在不同入口处设置了小的排水沟。沿着建筑外表面流下的水会被地面上的一个排水系统收集起来。（译/赵欣，校/吴春花）

However, not the entire shell is equally transparent. For some parts, transparency was not desired and these outer glass panes have been mounted to insulated panels. This applies for several panels in the roof, where a sauna and some offices are located, and for the glass panes near the edge of the floor. The latter have been produced with fire resistance to avoid any spreading of fire.

Altogether, a lot of different glass structures have been used, with several other suppliers involved. “To properly monitor the process, each glass pane has been equipped with a brand. We’ve had extensive consultation with MVRDV about the shape and size of those brands. To prevent any confusion with collaborating firms, we’ve put the marks in the lower right corner.

Print

During the early phases of the design, it became clear the Glass Farm could only be created by using printing techniques. Because each pane is different and the level of detail is very high, screened glass or silk-screened glass was out of the question. At the time, AGC Mirodan in Belgium was the only firm owning a suitable printer. The maximum dimensions of the glass panes were known: 3.10*2.33 metres. These dimensions determined the size of the grid. “That was the maximum size. It has never been done before and that made it quite tricky including even the smallest pieces of only 50 * 7 cm.”

The print has been applied on the inside of the outer glass of 8 mm thickness. During printing, enamel is sprayed on the glass. After drying, this enters the oven, where the enamel gets burned in and the glass is tempered.

Game of lines

A lot of consultation has been between the photographer, MVRDV, AGC and Brakel Atmos, about the print and the cutting lines. Brakel Atmos has drawn all the glass panes, including the 20 mm seal, where after MVRDV and the photographer have determined the projections. “We have used projected 3D images to determine the lining on the transitions. Because you have to deal with a package of a certain thickness, the lines can’t continue everywhere. It’s either correct on the outside, or on the inside,” Bart van Langen tells.

The entire outer shell (1800m²) has been detailed seamlessly. A gutter is absent, for instance. However, small gutters have been applied above various entrances. Water flowing from the façade is collected in a drainage system at ground level. **At**