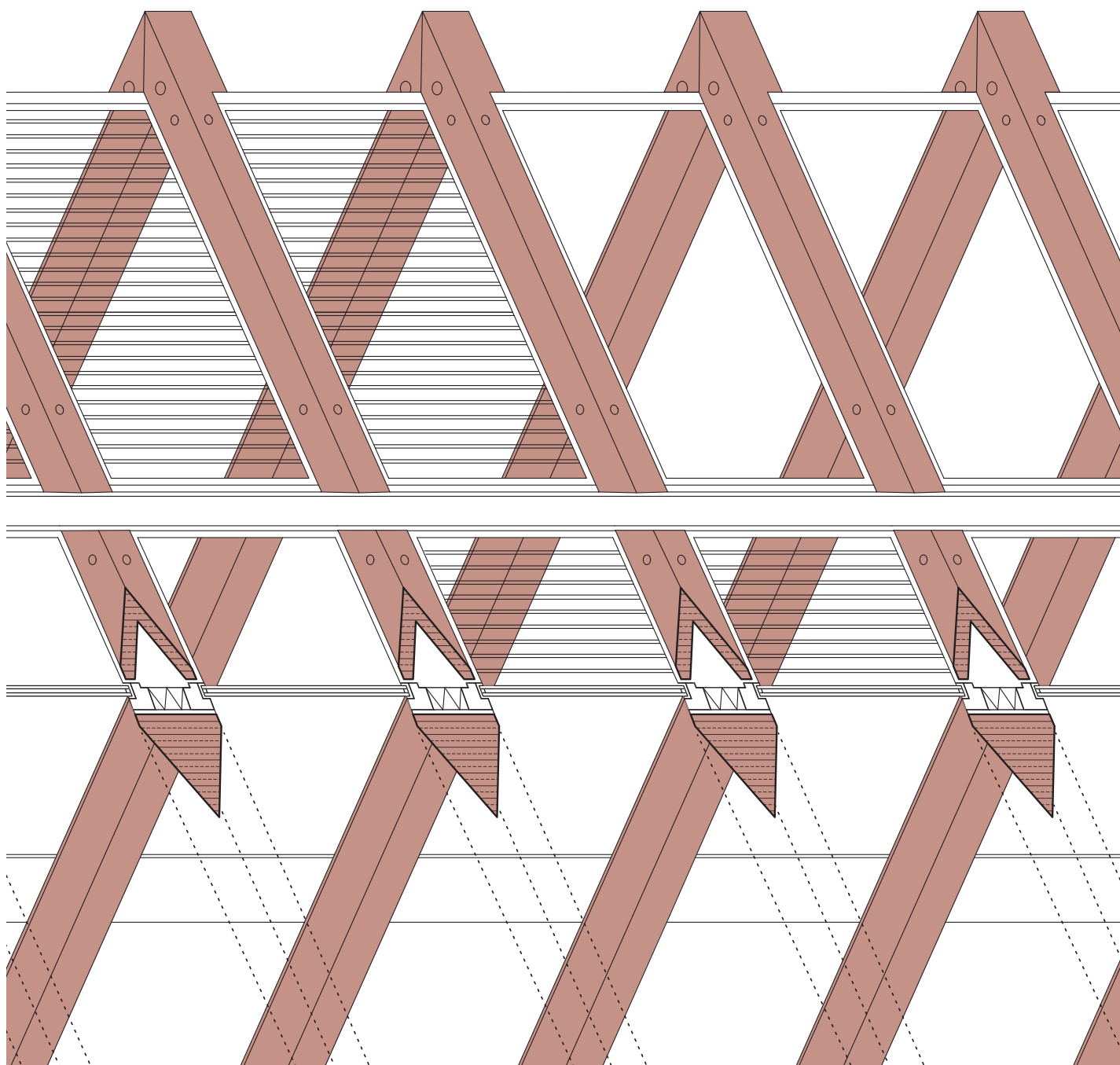


- Pavillon von Kengo Kuma
- Strenges Raster – Feltrinelli in Mailand
- Strategien für Notunterkünfte

# DETAIL

Zeitschrift für Architektur + Baudetail · Review of Architecture + Construction Details  
Serielles Bauen · Serial Construction · Ausgabe · Issue · **7/8** · 2017



## Modularer Wohnungsbau in Toulouse

Modular Apartments in Toulouse

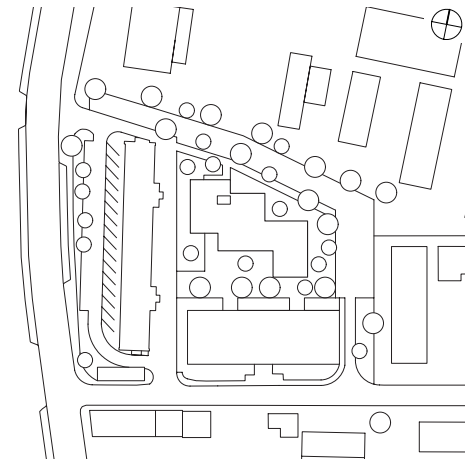
Architektur: PPA architectures  
Tragwerk: Pyrénées Charpentes

Fotos:  
S. 34, 35, 37–39: Philippe Ruault;  
S. 36: PPA architectures

Ein Wohnhaus in Holzmodulbauweise ergänzt seit 2015 die Place des Papyrus im Norden von Toulouse. Die 50 einfachen Apartments schaffen preisgünstigen Wohnraum in der Stadt und sollen zur Integration sozial benachteiligter Bevölkerungsgruppen beitragen.

Das trapezförmige Grundstück wird im Süden und Westen von zwei dicht angrenzenden Wohnriegeln flankiert. Um für die Apartments den bestmöglichen Kompromiss aus Privatheit und Besonnung zu erreichen, sind die Wohneinheiten in Gruppen gegeneinander verschoben und in unterschiedliche Richtungen gedreht – dabei entsteht ein kompakter, gestaffelter Baukörper. Er wird

über einen mehrfach geknickten Gang erschlossen, der teils an der Außenwand verläuft und dort Tageslicht erhält. Die Aussparung von vier Modulen im Erdgeschoss schafft einen überdachten Eingangsbereich. Die Modulfassaden sind stirnseitig zweigeteilt: eine Hälfte ist verglast, die andere, geschlossene bietet Platz für einen Schiebeladen. Ein umlaufender Rahmen aus Lärche macht die Einheiten ablesbar und verleiht der Fassade eine fast japanische Strenge. Mit Ausnahme des Treppenturms aus Stahlbeton bestehen alle konstruktiven Bauteile aus verschraubtem Brettsperholz. Stahlplatten mit angeschweißten Verbindungsstiften fixieren die gestapelten Kuben in ihrer



Position. Aufgedoppelte Wandscheiben und auskragende Bodenplatten tragen die nachträglich eingelegten Böden des Gangs. Über dem dritten Obergeschoss liegen die Deckenplatten der Module im Gefälle, um einen aufwändigen Zuschnitt der Dachdämmung auf der Baustelle zu vermeiden. Der hohe Grad an Vorfertigung ermöglichte eine kurze Bauzeit von ca. zwei Monaten von der Anlieferung der ersten Module bis zur Fertigstellung der Außenhülle. Vor dem Hintergrund der erheblichen städtebaulichen Verdichtung aber liegt die besondere Leistung der Architekten in der Schaffung gut proportionierter städtischer Räume mit den Mitteln eines repetitiven Bausystems. *BF*





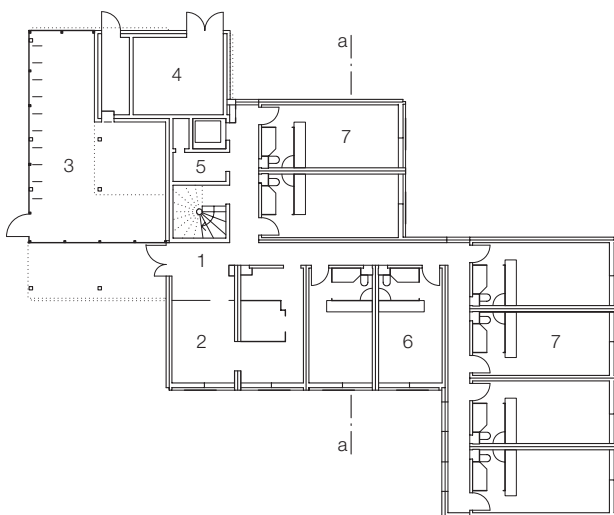
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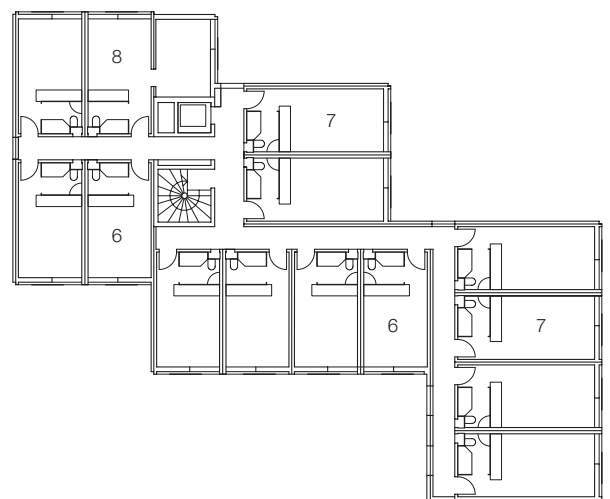
Since 2015 an apartment house erected using a modular timber construction system has augmented the buildings on the Place des Papyrus in the north of Toulouse. The 50 simple apartments provide economical living space in the city and are intended to facilitate the integration of disadvantaged population groups. The trapezoidal site is flanked to the south and west by housing blocks. To achieve the best possible compromise between the demands of privacy and orientation the dwelling units are organised in groups that are shifted in relation to each other with the units facing in different directions, which creates a compact, staggered volume. The access corridor makes a number of bends; at places it

runs along an outside wall which allows the entry of daylight. By omitting four modules on the ground floor a covered entrance area could be created. The modules have a uniform width of 3.50 m and come in two different lengths. With a storey height of 2.75 m a clear ceiling height of 2.48 m could be achieved by minimising the floor thickness. The external end walls to the modules are divided into two: one half is glazed, the other is closed and provides space for a sliding shutter. The larch frame that surrounds the end walls makes the units clearly legible and lends the facade an almost Japanese severity. Apart from the reinforced concrete staircase tower all the structural parts are of bolted

cross-laminated timber. Steel plates with welded connecting pins fix the stacked cubes in position. Double thickness wall panels and projecting floor slabs carry the corridor floors that were inserted later. Above the third storey the roof slabs of the modules have a built-in fall to avoid the difficulty of cutting the roof insulation on site. The high degree of prefabrication allowed a short building time of c. two months from the delivery of the first modules to completion of the external envelope. In the context of the considerable urban density here perhaps the architects' most significant achievement lies in using a repetitive building system to create well-proportioned urban spaces.



Erdgeschoss / Ground floor



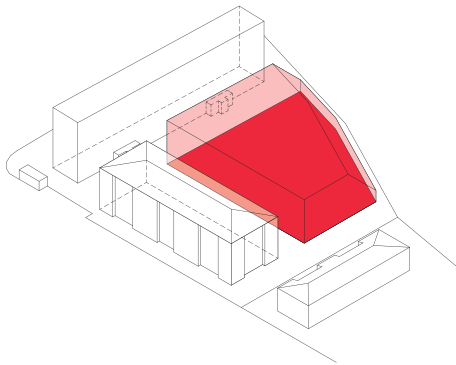
Regelgeschoss / Standard floor

Lageplan  
Maßstab 1:2000  
Schnitt • Grundrisse  
Maßstab 1:400

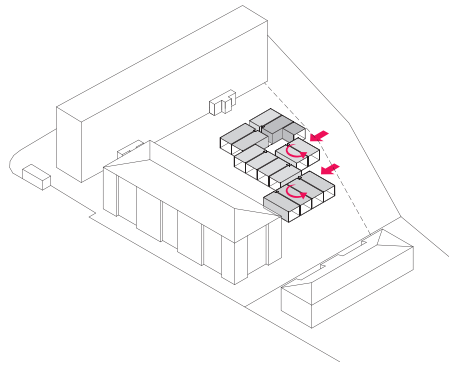
- 1 Eingang
- 2 Verwaltung
- 3 Fahrradraum
- 4 Heizungsraum
- 5 Technikraum
- 6 Apartment 20 m<sup>2</sup>
- 7 Apartment 24 m<sup>2</sup>
- 8 Apartment 32 m<sup>2</sup>

Site plan  
scale 1:2000  
Section • Floor plans  
scale 1:400

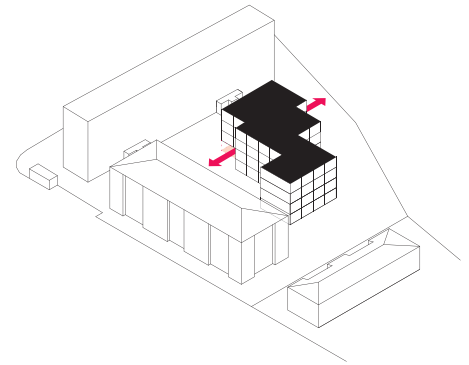
- 1 Entrance
- 2 Administration
- 3 Bike room
- 4 Boiler room
- 5 Services room
- 6 Apartment 20 m<sup>2</sup>
- 7 Apartment 24 m<sup>2</sup>
- 8 Apartment 32 m<sup>2</sup>



A



B



C



Axonometrien modulares Konzept:

- A bebaubarer Raum  
 B Verschieben und Drehen der Module  
 C Stapeln Module und Ausparen Eingangsbereich

Grundrisse Module

Maßstab 1:200

Horizontalschnitt

Maßstab 1:20

- 1 Rahmen aus Kantholz profiliert 120/320 mm
- 2 Schiebeladen Aluminiumblech 1,5 mm grau beschichtet geschraubt auf Unterkonstruktion aus Stahlrohr  $\square$  20/20 mm
- 3 Fenstertür Isolierverglasung in Aluminiumrahmen
- 4 Aluminiumprofil L40/50/5
- 5 Verkleidung Aluminiumblech 1,5 mm grau beschichtet geschraubt auf Lattung vertikal 25/38 mm  
 Windpapier diffusionsoffen, OSB-Platte 19 mm  
 Wärmedämmung Mineralwolle 140 mm  
 Lattung horizontal 38/38 mm, dazwischen Mineralwolle, Dampfsperre  
 Gipskartonplatte 12,5 mm gestrichen
- 6 Gipskartonplatte 12,5 mm gestrichen  
 Brettsperrholz dreilagig 80 mm  
 Wärmedämmung Mineralwolle 50 mm  
 Trennlage, Brettsperrholz dreilagig 80 mm  
 Gipskartonplatte 12,5 mm gestrichen
- 7 Wellblech Aluminium 0,8 mm  
 Lattung horizontal 25/38 mm  
 Windpapier diffusionsoffen  
 Wärmedämmung Mineralwolle 140 mm  
 Dampfsperre, Brettsperrholz dreilagig 80 mm  
 Gipskartonplatte 12,5 mm gestrichen
- 8 Aluminiumverbundplatte 5 mm

Axonometrics of modular concept:

- A Space that can be built on  
 B Shifting and swivelling the modules  
 C Stacking modules, omitting modules for entrance

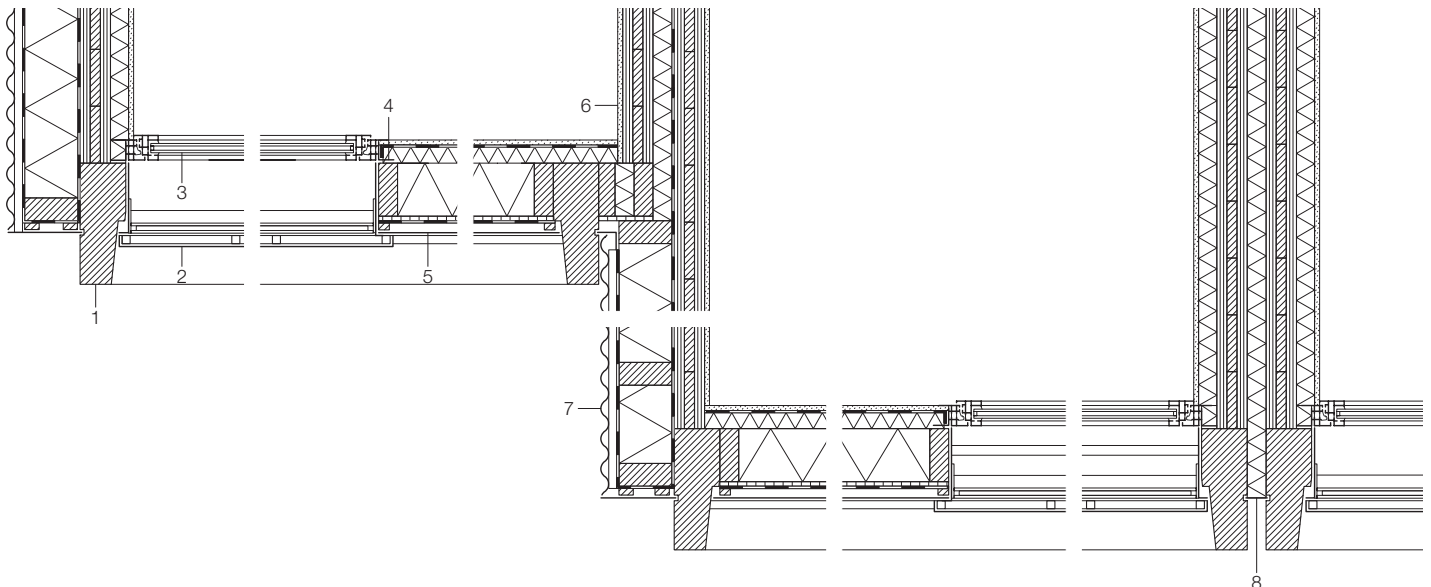
Floor plans of modules

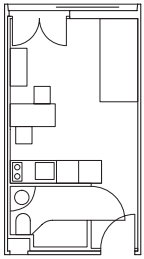
scale 1:200

Horizontal section

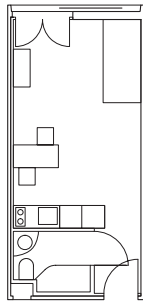
scale 1:20

- 1 120/320 mm timber sections as frame
- 2 sliding shutter 1.5 mm grey-coated sheet aluminium screwed to 20/20 mm hollow steel tube substructure
- 3 French window thermal glazing in aluminium frame
- 4 aluminium angle 40/50/5
- 5 1.5 mm sheet aluminium cladding screwed to 25/38 vertical battens  
 breather membrane, 19 mm OSB panel  
 140 mm mineral wool thermal insulation  
 38/38 mm horizontal battens with mineral wool between them  
 vapour barrier, 12.5 mm plasterboard panel, painted
- 6 12.5 mm plasterboard panel, painted  
 80 mm three ply cross laminated timber  
 50 mm mineral wool thermal insulation  
 separating layer, 80 mm three ply cross-laminated timber
- 7 12.5 mm plasterboard panel, painted  
 0.8 mm corrugated aluminium sheet  
 25/38 mm horizontal battens, Breather membrane  
 140 mm mineral wool thermal insulation  
 vapour barrier, 80 mm three-ply cross laminated timber, 12.5 mm plasterboard panel, painted
- 8 5 mm composite aluminium panel

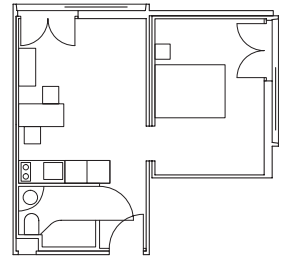




Wohnmodul 20 m<sup>2</sup>  
residential module 20 m<sup>2</sup>



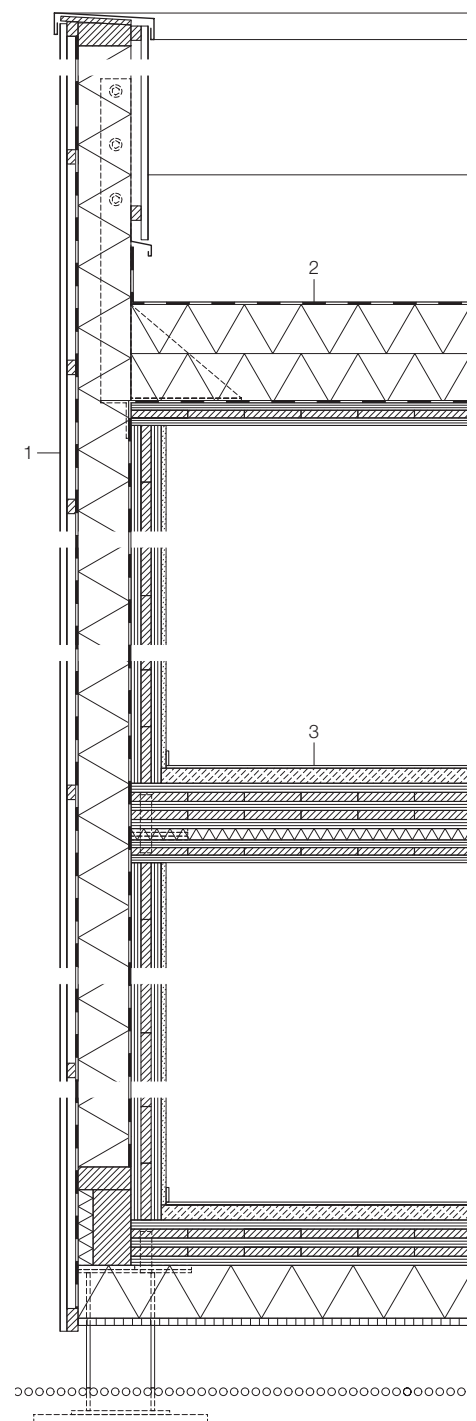
Wohnmodul 24 m<sup>2</sup>  
residential module 24 m<sup>2</sup>



Wohnmodul 32 m<sup>2</sup> (Sonderlösung am Aufzug)  
residential module 32 m<sup>2</sup> (one-off, at lift)



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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Wellblech Aluminium 0,8 mm<br/>Lattung horizontal 25/38 mm<br/>Windpapier diffusionsoffen<br/>Wärmedämmung Mineralwolle 140 mm<br/>Dampfsperre, Brettsperrholz dreilagig 80 mm<br/>Gipskartonplatte 12,5 mm gestrichen</p> <p>2 Dichtungsbahn Bitumen zweilagig<br/>Wärmedämmung Mineralwolle 260 mm<br/>Dampfsperre, Brettsperrholz dreilagig teilweise im Gefälle 60 mm lasiert</p> <p>3 PVC-Fliesen geklebt 6 mm, Betonestrich 40 mm<br/>Brettsperrholz fünflagig 120 mm<br/>Wärmedämmung Mineralwolle 30 mm<br/>Brettsperrholz dreilagig 60 mm lasiert</p> <p>4 Verbindungselement Flachstahl 10 mm mit Passstiften Stahl Ø 30 mm geschweißt</p> <p>5 Auflager Stahlprofil HEA 180</p> <p>6 PVC-Fliesen geklebt 6 mm<br/>Brettsperrholz dreilagig 80 mm</p> <p>7 abgehängte Decke Aluminiumelemente perforiert akustisch bedämpft</p> | <p>8 Stahlrohr □ 80/60 mm mit Aussteifungsschwert<br/>Flachstahl 8 mm geschweißt</p> <p>9 Wellblech Aluminium 0,8 mm</p> <p>10 Fenstertüre Isolierverglasung in Aluminiumrahmen</p> <p>11 Schiebeladen Aluminiumblech 1,5 mm grau beschichtet geschraubt auf Unterkonstruktion aus Stahlrohr □ 20/20 mm</p> <p>12 Brüstung PMMA gefärbt 8 mm in Stahlrahmen</p> <p>13 Rahmen aus Kantholz profiliert 120/320 mm</p> <p>14 Aluminiumverbundplatte 5 mm</p> | <p>3 6 mm PVC tiling, glued, 40 mm concrete screed<br/>120 mm five-ply cross laminated timber<br/>30 mm mineral wool thermal insulation<br/>60 mm three-ply cross laminated timber varnished</p> <p>4 connecting element 10 mm flat steel with welded Ø 30 mm steel pins</p> <p>5 HEA 180 steel section support</p> <p>6 6 mm PVC tiling, glued<br/>80 mm three-ply cross laminated timber</p> <p>7 suspended ceiling, acoustically insulated perforated aluminium elements,</p> <p>8 80/60 mm RHS steel tube with welded 8 mm flat steel fin</p> <p>9 0.8 mm corrugated aluminium sheet</p> <p>10 French window thermal glazing in aluminium frame</p> <p>11 sliding shutter 1.5 mm grey coated aluminium sheet screwed to substructure of 20/20 mm SHS steel tube</p> <p>12 8 mm coloured PMMA parapet in steel frame</p> <p>13 120/320 mm timber section as frame</p> <p>14 5 mm composite aluminium panel</p> |
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Vertikalschnitt  
Maßstab 1:20

Vertical section  
scale 1:20

