

1. BI-Fitpoints

POINT SUPPORTING SYSTEMS

1.1 Description

As a manufacturer of tempered glass, laminated glass and insulating glass etc. over many years BGT Bischoff Glastechnik has wide-ranging experience and the necessary CNC precision machines, to be able to meet the high demands of point supported glass fixing techniques. Various different point supporting systems such as rigid or flexible supports as well as flush screwed connections require different and yet precise glass processing. The objective of using point supports is to provide the best possible transparency with the frame-free glazing principle or to achieve a filigree and aesthetic appearance. As a consequence of minimizing the construction, the load is transmitted via the point support directly into the sub-structure or via a secondary structure. Due to the wide range of point supporting systems - countersunk, rigid and flexible, large or small disks - point fixings can be dimensioned exactly according to the structural and optical requirements.

The systems described in the following are the standard range offered by BGT. These systems have already been installed in various building situations and have proved themselves well. It is sensible - even during the planning stage - to involve the appointed installer and/or structural engineer in order to ensure that the sub-structure and the selected point retainers match with one another. In contrast to the post and bolt designs, where the tolerances can be taken up in the glass rebate and in which the glass edges are covered, a much more elaborate and accurate design is essential in the case of a point supported structure.

Important: The supports are protected by patent and imitation is only permitted with approval.

It is essential to have the approval of the upper regional building authorities for point-supported glazing. (individual agreement). It may be necessary to carry out component testing for this.

Against payment BGT will prepare the necessary technical calculations and documents.

1.2 General information

1.2.1 Special tools

For every point support a special tool is necessary for correct assembly. These are used to make more difficult the unauthorized dismantling of the glass supports.

1.2.2 Joints

The joint width can be 10 - 15 mm depending on the application.

1.2.3 Design advice

- We recommend that when point supports are used a structural engineer is brought into the design process.
- In the case of all countersunk (flush mounted) supports it is not possible to take up any tolerances in the glass.
- The flush-mounted supports are first screwed to the glass and then to the structure, i. e. it is necessary to work on the fixing from the rear.

1.2.4 Mounting information

We recommend that when BI-Fitpoint B 50 and B 70 are used in connection with laminated safety glass the holes are filled out with suitable filler materials.

1.3 Requirements of the single panes

DIN 1249 serves as the basis for the specific glass features.

1.3.1 Drilled holes

The distance from the edge of the glass to the hole should be at least 50 mm.

1.3.2 Edge processing

The edge quality is ground to the exact dimension (KMG) to conform with DIN 1249 Part 11 "Glass edges". Requirements in excess of this must be separately specified.

1.3.3 Tolerances

External dimensions of rectangular panes

Pane dimension in m	Tolerances in mm with glass thicknesses			
	up to 8	up to 10	up to 12	up to 15
0 - 1,5	± 1,0	± 1,5	± 2,0	± 2,5
1,5 - 2,5	± 1,0	± 1,5	± 1,5	± 3,0
2,5 - 3,5	± 1,5	± 2,0	± 3,0	± 3,0
3,5 - 4,5	± 2,0	± 2,5	± 3,0	± 3,5

External dimensions of panes with straight edges

Pane dimension in m	Tolerances in mm with glass thicknesses			
	up to 8	up to 10	up to 12	up to 15
0 - 1,5	± 2,0	± 2,5	± 3,0	± 4,0
1,5 - 2,5	± 2,0	± 2,5	± 4,0	± 4,5
2,5 - 3,5	± 2,5	± 3,0	± 4,5	± 4,5
3,5 - 4,5	± 3,0	± 4,0	± 4,5	± 5,5

External dimensions of panes with radii (e. g. segmental arches etc.)

Requirements are defined according to need.

1.3.4 Angularity

Angularity is defined according to the test method in DIN 1249 Part 12 Fig. 1. The basic tolerances are the tolerances for the external dimensions (see previous tables)

2. APPLICATIONS

2.1. Canopies

Glass is becoming more and more popular as an eye-catching feature in the overhead area. Structures, which appear to be daring even impress laypersons. To virtually eliminate the risk of falling parts it is essential to follow the special regulations for both the glass and the supporting systems.

2.1.1 BI-Fitpoint B 70 Rodan

This point supporting system is a flexible construction, which is screwed to the glass without being countersunk. The flexibility reduces the load on the drilled holes, which reduces the risk of glass breakage and permits greater spans and a certain level of inclination of the structure.

The protruding disks of the point support simplify the assembly from hole to sub-structure, since it is possible to compensate for tolerances in the x/y/z directions. The relatively large disk with diameter of 70 mm is necessary in the canopy area to obtain greater pressure on the glass. This is precondition for greater loading capacity and thereby the safety of overhead glazing. For easier assembly the socket is welded to the sub-structure. This has a self-locking thread (Drawing 1).

2.1.2 Recommended type of glass

For overhead glazing a splinter-binding glass is normally specified. The BGT product BI-CombisetHestral is an optimum glass combination for this application. Very good splinter-binding and increased impact and fracture security are features of this glass. More detailed information on the properties as well as technical data can be obtained from the BGT product information sheet BI-HESTRAL.

Recommended standard values	
Glass	2 x 8 mm (laminated safety glass made from semi-tempered glass) BI-Combiset-Hestral with 1,52 mm film
Span*	≤ 1000 mm
Overhang*	≤ 300 mm
Type of mounting	inclined ≥ 3 °
Snow load	0,75 KN/m ²

It is essential to have the approval of the upper regional building authorities for point-supported glazing (individual agreement). It may be necessary to carry out component testing for this.

Against payment BGT will prepare the necessary technical calculations and documents.

2.2. Façades

A filigree façade is one of the most sophisticated applications of point supported systems. Great loads on the one hand, but with the smallest possible, delicate supports on the other hand, appear to conflict with one another. Under certain preconditions it is however possible to construct very impressive glass walls with heights of many metres.

2.2.1 Point supporting systems

2.2.1.1 BI-Fitpoint B 50 Rodan

Construction and design are identical to the B 70 Rodan support system (described under Point 2.1.1), with the exception of the smaller disk size. (Drawing 2).

2.2.1.2 BI-Fitpoint B 70 Rodan

See description under Point 2.1.1

2.2.1.3 BI-Fitpoint B 70 Rodan Iso

BI-Fitpoint B 70 Rodan Iso is the same as the support for monolithic glass but with a correspondingly longer distance piece (Drawing 3). In the case of insulating glazing an edge compound consisting of a butyl rubber mass and silicon is placed around every hole in the glass to seal the insulating glass unit. BI-Fitpoint B 70 Rodan Iso with its larger disk covers up this black edge filling compound and hence a visually sophisticated appearance is achieved for the insulating glass unit.

2.2.1.4 BI-Fitpoint VB 46 Sadev

This point support is countersunk and flexibility is provided by means of an articulant joint. Because of the countersunk design a flush surface is achieved with glass and support and allows the point support to be even more inconspicuous. This countersunk design however requires high dimensional accuracy and low tolerances between the point support and the sub-structure. Dimensions accurate to a few millimetres are therefore necessary for this. The flexible design of the support and its rigid assembly also permits the use of larger glass panels. This support system is basically designed for glass thicknesses above 10 mm. (Drawing 4)

2.2.1.5 BI-Fitpoint VB 48/65 Fe

See description under Point 2.2.1.4 (Drawing 5)

2.2.1.6 BI-Fitpoint VB 46 Sadev Iso

This point support for insulating glazing corresponds with the point support unit described in Point 2.2.1.4 (Drawing 6).

To cover the irregular colours in the edge composite of silicon, butyl and metal it is recommended that a ceramic colour coating is printed around each point support. This involves applying a circle of 60 mm diameter around the hole onto the outer pane side 2 in any RAL colour.

Further information on the properties as well as the multiplicity of colours can be obtained from the BGT brochure of **BI-Color**.

2.2.1.7 BI-Fitpoint VB 51/60 OKA

See description under Point 2.2.1.6 (Drawing 7)

2.2.1.8 BI-Fitpoint DB 60 OKA Iso

See description under Point 2.2.1.3 (Drawing 8)

2.2.1.9 BI-Fitpoint VS 46 BGT

BI-Fitpoint VS 46 BGT is countersunk and rigid. This requires high dimensional accuracy of the glass holes as well as the glass supports on the sub-structure. It is recommendable for glass from 10 mm and offers an inexpensive alternative (Drawing 9).

2.2.2 Recommended type of glass

According to the point supporting system being used, in the case of single glazing it is possible to use unprinted and printed safety glass from 8 mm thick and laminated safety glass made from two tempered glass panes.

In the case of insulating glazing both panes must be tempered. Thereby the internal pane can be as low as 6 mm thick according to the requirements.

In the case of insulating glazing with increased thermal protection it is possible to use thermal insulating glass. This permits K-values of up to 1,3 W/m²K to be achieved.

The glass dimensions depend on the number and spacing of the point supports per pane. The recommended standard for mounting is four point supports per square meter of glass surface each at a spacing of about 1 metre. However in the case of every building situation the special aspects of wind load, installation height and type of support must be taken into account. Against payment BGT will establish the structural values.

All point-supported façade glass (tempered glass) must always be heat-soak-tested (HST)

Recommended standard values for single glazing	
Glass	≥ 10 mm tempered glass
Span	≤ 1000 mm
Type of mounting	vertical
Installation height	≤ 20 m

Recommended standard values for insulating glazing	
Glass	Outside: ≥ 10 mm tempered glass with HST* Inside: ≥ 8 mm tempered glass or 2 x 6 mm laminated safety glass made of semi-tempered glass with 1,52 mm film
Span	≤ 1000 mm
Type of mounting	vertical
Installation height	≤ 20 m

*Heat-Soak Test

2.3 Railings/stair balustrades

Point supports have been used for many years for stair balustrades. Relatively low pane thicknesses and loads permit the design of delicate and simple systems. Modern architecture is increasingly using glass as an eye-catching design element. Greater glass dimensions and increased safety requirements have led to further developments in the point supporting systems for stair balustrades.

2.3.1 Point supporting systems

2.3.1.1. BI-Fitpoint VB 30/50 Rodan

The BI-Fitpoint VB 30/50 Rodan support is countersunk and flexible. The outer disk diameter is 30 mm, and the inner disk 50 mm. The possible load capacity is therefore also correspondingly lower. Its flexible design

however still permits more choice in the selection of the disk dimensions. (Drawing 10)

2.3.1.2 BI-Fitpoint S 30 BGT

BI-Fitpoint S 30 is a non-countersunk, rigid support. It is recommended for use if no countersinking is desired and cheaper alternatives have to be used. (Drawing 11).

2.3.1.3 BI-Fitpoint S 50 BGT

This support was used in the famous Hotel Kempinski at Munich Airport II. Its design is rigid and non-countersunk. The special feature of this support is its flat full-surface disk with no mounting points. Mounting is carried out with a special spanner at side points. (Drawing 12)

2.3.2 Recommended type of glass

Tempered glass from 8 mm. In public areas and at greater falling heights there is BI-CombisetHestral required. This semi-tempered laminated safety glass still retains a residual carrying capacity even after breakage of one or both of the panes. You can find more details in the BGT BI-Hestral brochure. According to the requirements the responsible building authority may demand a pendulum impact test (DIN 52 337).

Recommended standard values	
Glass	≥ 8 mm tempered glass or 2 x 6 mm laminated safety glass made of semi-tempered glass with 1,52 mm film for countersunk supports: 2 x 8 mm laminated safety glass made of semi-tempered glass with 1,52 mm film
Span	≤ 1000 mm
Type of mounting	vertical

2.4 Lifts

Special regulations apply to glass shafts and glass lift cabins. These can be required by the lift manufacturer. The following point supporting systems are suitable here:

2.4.1 Point supporting systems

2.4.1.1 BI-Fitpoint VB 45/50 Rodan

Described in more detail under Point 2.3.1.1. (Drawing 10)

2.4.1.2 BI-Fitpoint S 50 BGT

Described in more detail under Point 2.3.1.3. (Drawing 12)

2.4.2 Recommended type of glass

In non-traffic areas tempered glass from 8 mm can be used. In traffic areas however laminated safety glass made of semi-tempered glass from 2 x 6 mm is needed according to the support and dimensions.

Recommended standard values	
Glass	<u>Non-traffic areas:</u> ≥ 8 mm tempered glass <u>Traffic areas:</u> 2 x 6 mm laminated glass made of semi-tempered glass with 1,52 mm film
Span	≤ 1000 mm
Type of mounting	vertical

2.5 Walk-on surfaces

Point-supported walk-on glass surfaces are a special application for point supports. Glass steps and transitions can be fixed to the sub-structure in the most diverse ways. What is most important with all types of fixing is the separation of glass and metal.

Further information on walk-on glass surfaces and their fixing options can be found in the BGT brochure **BI-Step-Color**.

2.5.1 Point supporting systems

2.5.1.1 BI-Fitpoint Step VS 50 BGT

This point support does not fulfil the classical bearing function. It is intended for the safe fixing of glass steps onto the sub-structure. The glass is fitted linearly to the sub-structure and the support is flush with the step on the upper face. (Drawing 13).

2.5.1.2 BI-Fitpoint Step VS 30 Verro

Described in detail under Point 2.5.1.1 (Drawing 14).

2.6 Individual application - especially for façades

2.6.1 BI-Fitpoint Anker

BI-Fitpoint Anker is a type of fixing which is firmly anchored in the glass but for which the glass pane does not have to be drilled through completely. In this way the uniform surface of the pane is retained and hence design freedom is provided without the interfering effect of traditional types of retainer.

2.6.2 Recommended type of glass

For this point-supported system both unprinted and printed safety glass panes between 10 and 15 mm thick can be used. All glass combinations are possible - including laminated safety glass combinations - as long as they can be tempered. The glass dimensions depend on the number and spacing of the print supports in each pane. (Drawing 15)