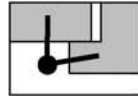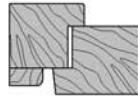# ZENIT Model

Description

Adjustable hinge made of galvanised steel, 16 and 20 mm in diameter, featuring threaded pins with 1.8 mm pitch, maximum stripping strength, easily screwed down into wood. These characteristics make it suitable for fire-stop doors.

Adjustments: can be adjusted horizontally using a 5 mm Allen wrench and vertically with a 4 mm Allen wrench.

❶ Horizontal adjustment: made by adjusting the threaded pins when screwing them down

❷ Depth adjustment: made by adjusting the threaded pin on the lower body (to apply the proper pressure to the gasket)

❸ Vertical adjustment: 4 mm, through the thrust applied by a tapered screw onto the revolving ball set in the mobile pivot.
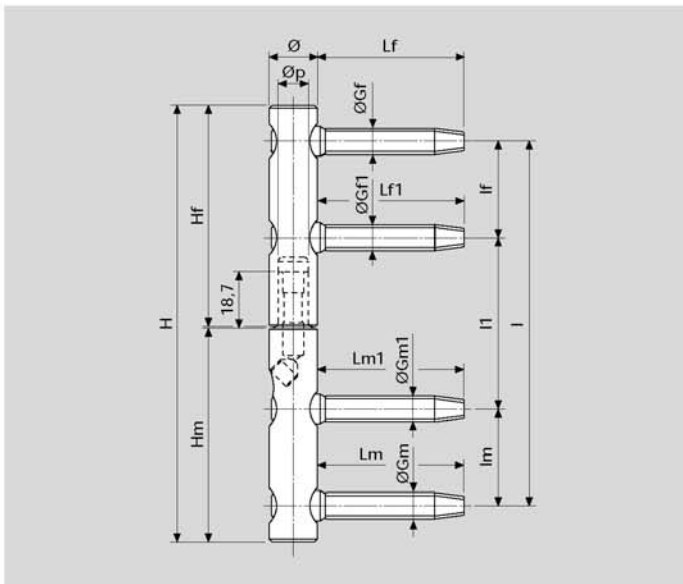
Hinge measurements

Dimension	Diameter (Ø)	
	16	**20**
H	145	145
I	121	121
Hm	71	71
Hf	73,5	73,5
Øp	10	13
ØG m	8,8	9,3
Lm	48,5	53,5
ØG f	8,8	9,3
Lf	48,5	53,5
Im/If	32	32
I1	57	57
ØGm1/Gf1	8,8	9,3
Lm1/Lf1	48,5	53,5

Steel – order specifications

Finish	Article Code	Finish initials
Bichromated	E02150.16.04	ZTR
	E02150.20.04	ZTR

Available covers

ABS: Art. E02151

Finish:
Nickel plated, Brass plated, White, Black, Brown, Satin nickel

NB. For complete dimensions and codes, see the "Covers" chapter.
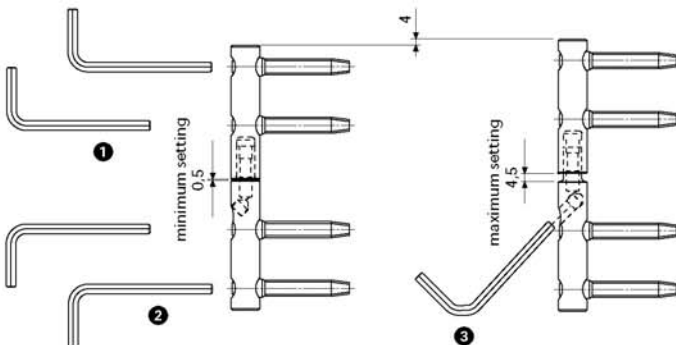
❶ minimum setting 0,5

❸ maximum setting 4,5

Pins must be screwed down flush with the hinge

Hinge edge

INSTALLATION TOOLS ("Jigs" chapter)

- Guide tool box article code E00112.XX.05
- Guide tool kit article code E00165.XX.05
- Single jig for frame drilling article code E00139.XX.05
- Jig rod for door windows article code E00136.00.21 (dx)
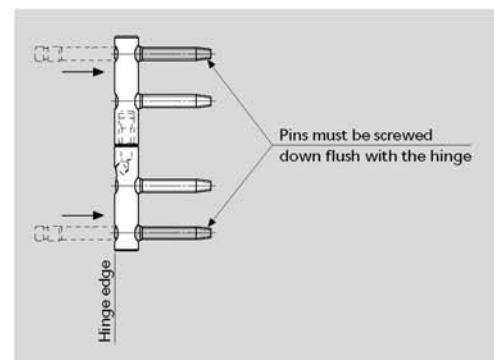
ZENIT anti-burglar model
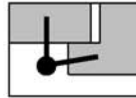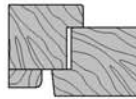
Description

Adjustable hinge made of galvanised steel, 20 mm in diameter, featuring threaded pins with 1.8 mm pitch, maximum stripping strength, easily screwed down into wood. These characteristics make it suitable for fire-stop doors. The anti-burglar sprig hinders the pin of the mounted hinge to be pulled out, especially when hinges are mounted outside.

Adjustments: can be adjusted horizontally using a 5-mm Allen wrench and vertically a 4-mm Allen wrench.

❶ Horizontal adjustment: made by adjusting the threaded pins when screwing them down

❷ Depth adjustment: made by adjusting the threaded pin on the lower body (to apply the proper pressure to the gasket)

❸ Vertical adjustment: 4 mm, through the thrust applied by a tapered screw onto the revolving ball set in the mobile pivot.

Hinge measurements

Dimension	Diameter (Ø)	
	16	**20**
H	145	145
I	121	121
Hm	71	71
Hf	73,5	73,5
Øp	10	13
ØGm	8,8	9,3
Lm	48,5	53,5
ØGf	8,8	9,3
Lf	48,5	53,5
lm/lf	32	32
l1	57	57
ØGm1/Gf1	8,8	9,3
Lm1/Lf1	48,5	53,5

Steel – order specifications

| Finish	Article Code	Finish initials
Bichromated	E02153.20.04	ZTR
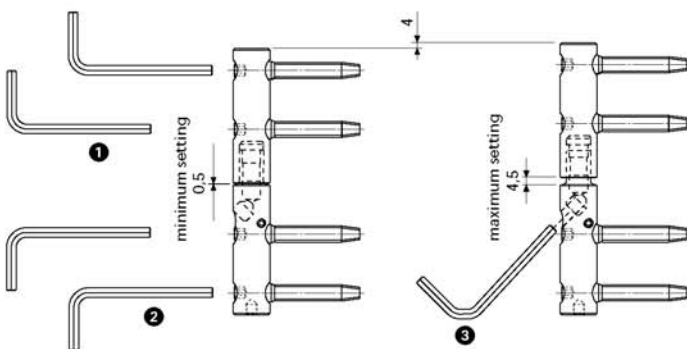
Available covers

ABS: Art. E02151

Finish:
Nickel plated, Brass plated, White, Black, Brown, Satin nickel

NB. For complete dimensions and codes, see "Covers" chapter

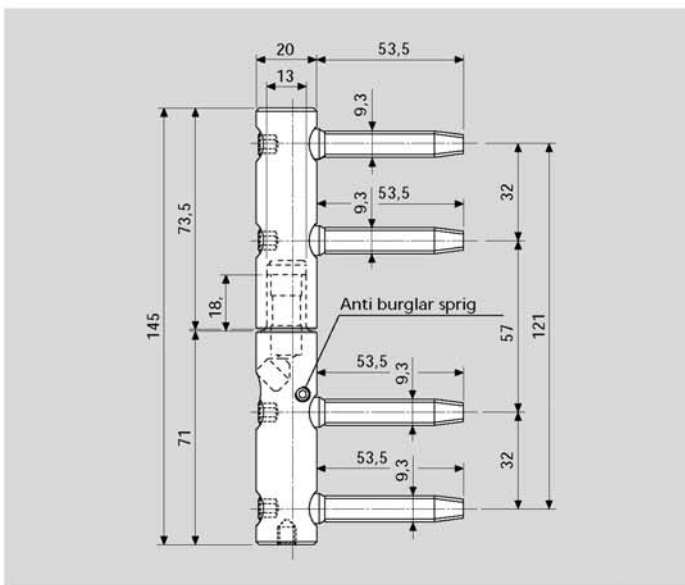Pins must be screwed down flush with the hinge

INSTALLATION TOOLS ("Jigs" chapter)

- Guide tool box article code E00112.XX.05
- Guide tool kit article code E00165.XX.05
- Single jig for frame drilling article code E00139.XX.05
- Jig rod for door windows article code E00136.00.21 (r-h)

Covers

Ø 18/22
77
Øi 16/20
Ø 18,5/22,5
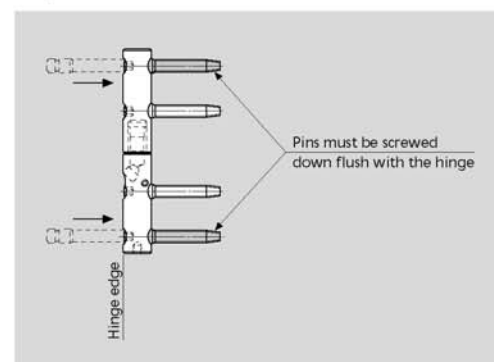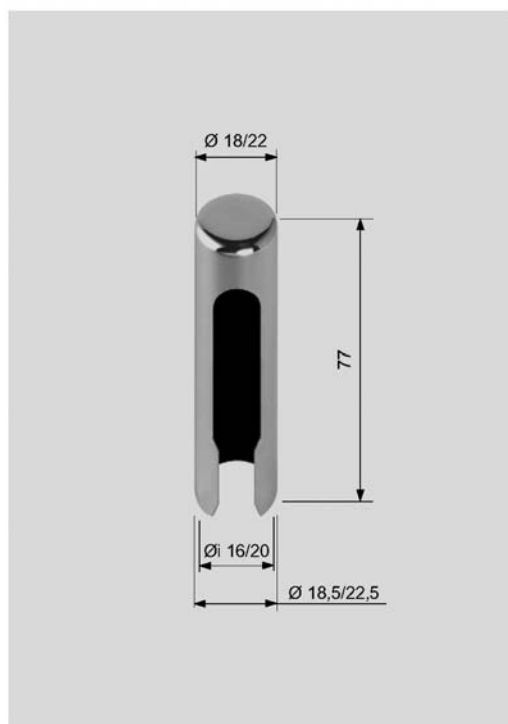
ABS – For ZENIT model adjustable hinges

Finish	Article Code	Finish initials	Ø
Nickel plated	E02151.16.06	ABK	16
	E02151.20.06	ABK	20
Brass plated	E02151.16.50	AOT	16
	E02151.20.50	AOT	20
White	E02151.16.91	ABB	16
	E02151.20.91	ABB	20
Black	E02151.16.93	ABN	16
	E02151.20.93	ABN	20
Brown	E02151.16.94	ABM	16
	E02151.20.94	ABM	20
Matt nickel plated	E02151.16.16	AON	16
	E02151.20.16	AON	20

BRASS - For ZENIT model adjustable hinges

Finish	Article Code	Finish initials	Ø
Bronze plated	E02152.16.02	OBR	16
	E02152.20.02	OBR	20
Nickel plated	E02152.16.06	ONK	16
	E02152.20.06	ONK	20
Varnished polished	E02152.16.10	OLV	16
	E02152.20.10	OLV	20
Matt chromium plated	E02152.16.34	OCS	16
	E02152.20.34	OCS	20

For ZENIT model adjustable hinges
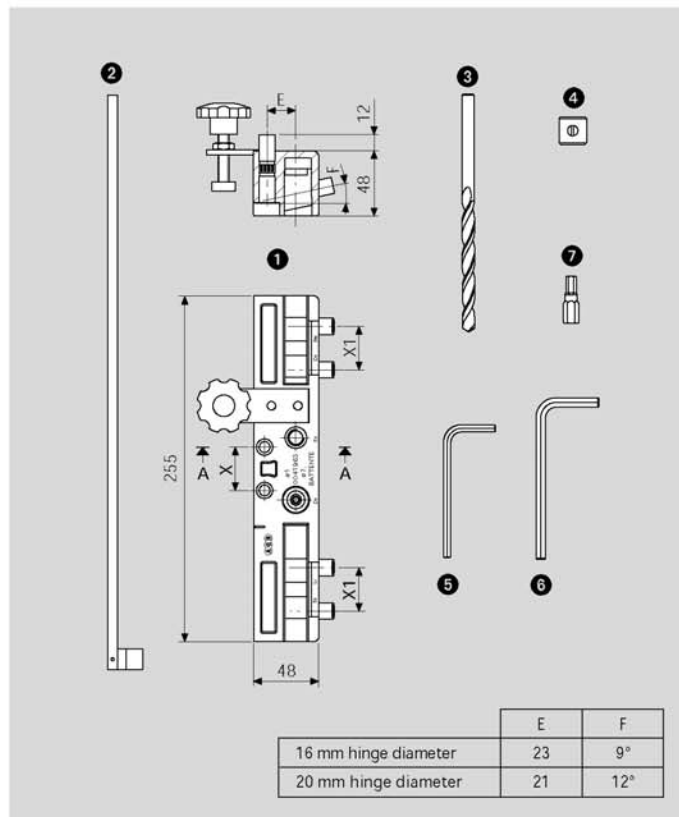
References:

❶ Jig
❷ Rod for door window
❸ Bit
❹ Bit holder
❺ 4-mm diameter hex key
❻ 5-mm diameter hex key
❼ Insert for screwer

Guide tool box

Contents for ZENIT model hinges ø 16: 2 jigs, 1 bit ø 7.7 mm, 1 bit holder, 3 hex keys (ø3+ø4+ø5 mm), 1 insert for screwer.

Contents for ZENIT model hinges ø 20: 2 jigs, 1 bit ø 8.2 mm, 1 bit holder, 2 hex keys (ø3 and ø5 mm), 1 insert for screwer.

Guide tool kit

Contents for ZENIT model hinges ø 16: 6 jigs, 2 rods for door window, 2 bits ø 7.7 mm, 2 bit holders, 2 hex keys ø3 mm, 2 hex keys ø4 mm, 2 hex keys ø5 mm, 2 inserts for screwer, 6 jig fastening knobs.

Contents for ZENIT model hinges ø 20: 6 jigs, 2 rods for door window, 2 bits ø 8.2 mm, 2 bit holders, 2 hex keys ø3 mm, 2 hex keys ø5 mm, 2 inserts for screwer, 6 jig fastening knobs.

	E	F
16 mm hinge diameter	23	9°
20 mm hinge diameter	21	12ª

Article Code	Diameter mm
Guide tool box	
E00112.16.05	16
E00112.20.05	20
Guide tool kit	
E00165.16.05	16
E00165.20.05	20
Single jig	
E00139.16.05	16
E00139.20.05	20
Jig rod for door window	
E00136.00.21	20

Hinge measurements

Ø hinge	X mm	X1 mm	BIT		Ø bit holder
			Ø	L	
16	32	32	7,7	160	8,8
20	32	32	8,2	165	8,8

Drilling diagram

SASH
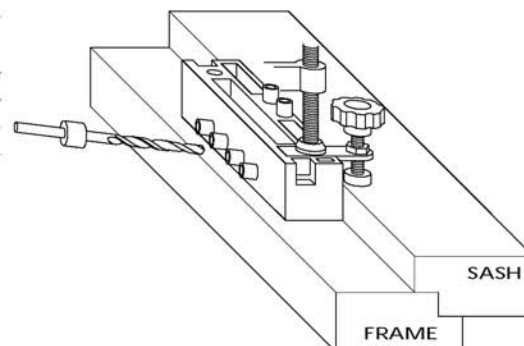
FRAME

TECHNICAL DETAILS OF THE HINGES LOADING CAPACITY

The capacity load of the hinges is one of the most important details that you need to consider when you build a window or a door frame, but its determination is not so simple. The capacity load of the hinge could very high (for some models it is more than 10.000 Kg/m^2), but, giving an exact capacity load of the hinge without considering some variables, it is not correct. The most important variables are as follows:

- **The dimensions of the windows and of the door frames (SRW, SRH, thickness) the specific weight of wood or of others materials used.**
  If we think of a narrow and high window and another one wide and small, which have the same surface, we have to consider that they do not react in the same way. The bending moments, on the two windows, are totally different. To calculate the bending moment it is important to know the barycenter and the mass of the window, and this is not so simple.
- **The position of the hinges.**
  The placing of the hinge defines the resisting moment that the sash and frame need to bear.
- **The kind and the satate of materials.**
  The coupling of the hinge into the sash and the frame, defines the resistance against the bending moment. This resistance changes in relation to the different materials and also changes on the same material (knotty wood) that are used to build a window or a door frame (PVCu, wood, Hemlock, Bay Oak).
- **The experience of installer and an accurate assembly.**
  The accuracy of the assembly, is extremely important. For example if we consider an hinge without the thread totally fixed on the door, we could write a lot of formulas, but the bearing of the hinges will never be the ones we have calculated if there's no accurancy in the assembling. For these reasons we want to stress that the experience of the installer and an accurate assembly are very important.

Here below there are some formulas (semplified) that permit the calculation of the weight of the window and door frame. They could be useful to know the resistance that the hinges need to do against the window load. On the next pages it is possible to consult the schedules that show the number of the hinges that you need to install on the window and door frame in relation to their size.

These schedules are not made with the inelasticity rules; you always need to consider all the information with your experience.

FORMULAS TO CALCULATE THE WEIGHT

WOODEN WINDOWS

TOTAL WEIGHT = WS + WG

WS = weight of the sash
WG = weight of the glass

WEIGHT OF THE SASH

S x P x PS
S = section of the sash = 0,7 dm x 0,8 dm = 0,56 d m^2
P = perimeter = (SRH + SRW) x 2
PS = specific weight of wood

600 Kg/ m^3	Soft wood
800 Kg/ m^3	Medium wood
1000 Kg/ m^3	Hard wood

WEIGHT OF THE GLASS

SRW x SRH x PSglass x S
PSglass = weight of m^2 of glass with 1 mm thickness
= 2,5 Kg/ m^2 x mm
GT = thickness of the glass

Example : - Hard wooden windows -

SRH = 1500 mm   SRW = 2800 mm
The thickness of the glass is 12 mm
Weight of sash=0,56x[(1500+2800)x2] /
/ 100 = 48,61 Kg
Weight wind.=[(1500x2800)/1000]x(2,5x0,012)=
=126 Kg.
Total weight = 174,16 Kg.

PVCu WINDOWS

TOTAL WEIGHT = WS + WS

P x WML
P = perimeter = (SRH + SRW) x 2
WML = Weight for meter = 3,1 Kg/m

WEIGHT OF THE GLASS

SRW x SRH x PSglass x S
PSglass = weight of m^2 of glass with 1 mm thickness
= 2,5 Kg/ m^2 x mm
GT = thickness of the glass

Example : - PVCu windows –

SRH = 1500 mm   SRW = 2800 mm
The thickness of the glass is 12 mm
Weight of sash = [(1500+2800)x2]/1000x3,1
=26,6 Kg.
Weight of glass = (1500x2800)/1000x2,5x12
=126 Kg.
Total weight = 152,66 Kg.

WOODEN DOORS

WEIGHT OF THE DOOR = PSwood x V

PSwood = specific weight of wood

600 Kg/ m^3	Soft wood
800 Kg/ m^3	Medium wood
1000 Kg/ m^3	Hard wood

V = volume of the door = Area x thickness

Example : - Hard wooden door -

SRH = 2100 mm   SRW = 800 mm
Thickness 40 mm
Total weight =
= 1000/1000 x(800x2100x40)/1000000 = 67,2 Kg.

NB. *The results that the schedules are showing in the following pages, are made thanks the tests that we did in our laboratory*

HINGES POSITION

The placing of the hinges define the resisting moment that the sash and the frame need to bear. Here below you can see two drawings that describe the different positions of the hinges on the window or door frame.
The theory suggests to chose the first solution, in fact, the first alternative permits to have more capacity load for the hinges. The experience suggests the second alternative because it prevents the bending of the sash.
Our diagrams are studied with the security loads, for this reason you can decide between the two solutions.

1) MORE RESISTANT AGAINST THE LOAD OF THE WINDOW
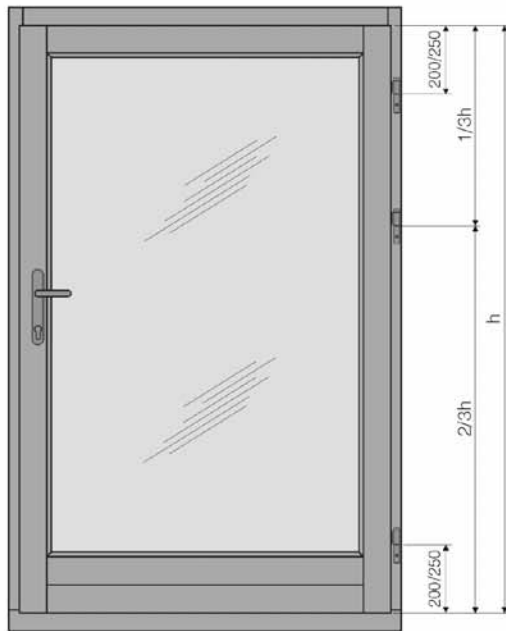
2) MORE RESISTANT AGAINST THE BENDING MOMENT
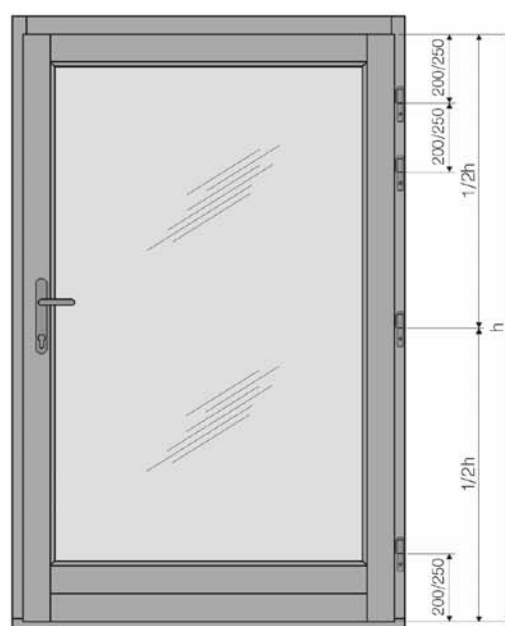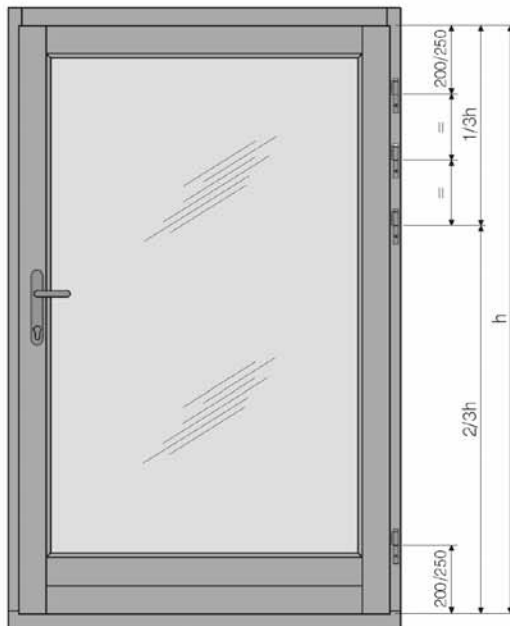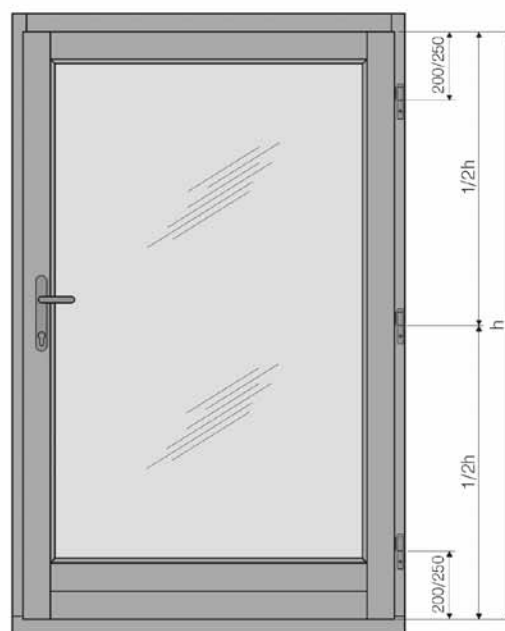
Application fields of the adjustable hinges mod. ZENIT Ø 16mm

Weight of the glass : 30   Kg/m²

THICKNESS OF THE GLASS = 12 mm

SRH (h.) (mm)	DIMENSIONS SRW (width)															
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
0																
100																
200																
300																
400																
500																
600		2	2	2	2	2	2	2	2	2						
700		2	2	2	2	2	2	2	2	2	2					
800		2	2	2	2	2	2	2	2	2	2	2				
900		2	2	2	2	2	2	2	2	2	2	2	2			
1000		2	2	2	2	2	2	2	2	2	2	2	2	2		
1100		2	2	2	2	2	2	2	2	2	2	2	2	2	2	
1200		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1300		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1400		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1500		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1600		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1700		2	2	2	2	2	2	2	2	2	2	2	3	3	3	4
1800		3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
1900		3	3	3	3	3	3	3	3	3	3	3	3	3	4	4
2000		3	3	3	3	3	3	3	3	3	3	3	3	3	4	4
2100		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
2200		3	3	3	3	3	3	3	3	3	3	3	3	4	4	
2300		3	3	3	3	3	3	3	3	3	3	3	3	4	4	
2400		4	4	4	4	4	4	4	4	4	4	4	4	4		
2500		4	4	4	4	4	4	4	4	4	4	4	4	4		
2600		4	4	4	4	4	4	4	4	4	4	4	4	4		
2700		4	4	4	4	4	4	4	4	4	4	4	4			
2800		4	4	4	4	4	4	4	4	4	4	4	4			

NB.The application fields are valid even with medium/low consistency wood (for example pine)
When the SRW >1800 mm we recommend the use of a third hinge to prevent the bending of the sash also where the application fields provide for two hinges

Application fields of the adjustable hinges mod. ZENIT Ø 16mm

Weight of the glass : 40   Kg/m²

THICKNESS OF THE GLASS = 16 mm

SRH (h.) (mm)	DIMENSIONS SRW (width)															
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
0																
100																
200																
300																
400																
500																
600		2	2	2	2	2	2	2	2	2						
700		2	2	2	2	2	2	2	2	2	2					
800		2	2	2	2	2	2	2	2	2	2	2				
900		2	2	2	2	2	2	2	2	2	2	2	2			
1000		2	2	2	2	2	2	2	2	2	2	2	2	2		
1100		2	2	2	2	2	2	2	2	2	2	2	2	2	3	
1200		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1300		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1400		2	2	2	2	2	2	2	2	2	2	2	3	3	3	4
1500		2	2	2	2	2	2	2	2	2	2	2	3	3	3	4
1600		2	2	2	2	2	2	2	2	2	2	3	3	3	4	4
1700		2	2	2	2	2	2	2	2	2	2	3	3	3	4	
1800		3	3	3	3	3	3	3	3	3	3	3	3	3	4	4
1900		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
2000		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
2100		3	3	3	3	3	3	3	3	3	3	3	3	4	4	
2200		3	3	3	3	3	3	3	3	3	3	3	4			
2300		3	3	3	3	3	3	3	3	3	3	3	4			
2400		4	4	4	4	4	4	4	4	4	4	4	4			
2500		4	4	4	4	4	4	4	4	4	4	4	4			
2600		4	4	4	4	4	4	4	4	4	4	4				
2700		4	4	4	4	4	4	4	4	4	4	4				
2800		4	4	4	4	4	4	4	4	4	4	4				

NB.The application fields are valid even with medium/low consistency wood (for example pine)
When the SRW >1800 mm we recommend the use of a third hinge to prevent the bending of the sash also where the application fields provide for two hinges

FUNCTIONAL FENESTRATION INC.

Application fields of the adjustable hinges mod. ZENIT Ø 16mm

Weight of the glass : 50   Kg/m²

THICKNESS OF THE GLASS   = 20 mm

SRH (h.)							SRW	(width)								
(mm)	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
0																
100																
200																
300																
400																
500																
600		2	2	2	2	2	2	2	2	2						
700		2	2	2	2	2	2	2	2	2	2					
800		2	2	2	2	2	2	2	2	2	2	2				
900		2	2	2	2	2	2	2	2	2	2	2	2			
1000		2	2	2	2	2	2	2	2	2	2	2	2	2		
1100		2	2	2	2	2	2	2	2	2	2	2	2	3	3	
1200		2	2	2	2	2	2	2	2	2	2	2	3	3	3	4
1300		2	2	2	2	2	2	2	2	2	2	2	3	3	4	4
1400		2	2	2	2	2	2	2	2	2	2	3	3	3	4	
1500		2	2	2	2	2	2	2	2	2	2	3	3	4	4	
1600		2	2	2	2	2	2	2	2	2	3	3	3	4		
1700		2	2	2	2	2	2	2	2	2	3	3	3	4		
1800		3	3	3	3	3	3	3	3	3	3	3	4	4		
1900		3	3	3	3	3	3	3	3	3	3	3	4			
2000		3	3	3	3	3	3	3	3	3	3	3	4			
2100		3	3	3	3	3	3	3	3	3	3	4	4			
2200		3	3	3	3	3	3	3	3	3	3	4				
2300		3	3	3	3	3	3	3	3	3	3	4				
2400		4	4	4	4	4	4	4	4	4	4	4				
2500		4	4	4	4	4	4	4	4	4	4	4				
2600		4	4	4	4	4	4	4	4	4	4					
2700		4	4	4	4	4	4	4	4	4	4					
2800		4	4	4	4	4	4	4	4	4	4					

NB.The application fields are valid even with medium/low consistency wood (for example pine)
When the SRW >1800 mm we recommend the use of a third hinge to prevent the bending of the sash also where the application fields provide for two hinges

Application fields of the adjustable hinges mod. ZENIT Ø 20mm

Weight of the glass : 30   Kg/m²

THICKNESS OF THE GLASS   = 12 mm

SRH (h.)							SRW	(width)								
(mm)	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
0																
100																
200																
300																
400																
500																
600		2	2	2	2	2	2	2	2	2						
700		2	2	2	2	2	2	2	2	2	2					
800		2	2	2	2	2	2	2	2	2	2	2				
900		2	2	2	2	2	2	2	2	2	2	2	2			
1000		2	2	2	2	2	2	2	2	2	2	2	2	2		
1100		2	2	2	2	2	2	2	2	2	2	2	2	2	2	
1200		2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
1300		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1400		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1500		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1600		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1700		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1800		3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
1900		3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
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2100		3	3	3	3	3	3	3	3	3	3	3	3	3	4	4
2200		3	3	3	3	3	3	3	3	3	3	3	3	3	4	4
2300		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
2400		4	4	4	4	4	4	4	4	4	4	4	4	4	4	
2500		4	4	4	4	4	4	4	4	4	4	4	4	4	4	
2600		4	4	4	4	4	4	4	4	4	4	4	4	4		
2700		4	4	4	4	4	4	4	4	4	4	4	4	4		
2800		4	4	4	4	4	4	4	4	4	4	4	4	4		

NB.The application fields are valid even with medium/low consistency wood (for example pine)
When the SRW >1800 mm we recommend the use of a third hinge to prevent the bending of the sash also where the application fields provide for two hinges

FUNCTIONAL FENESTRATION INC.

Application fields of the adjustable hinges mod. ZENIT Ø 20mm

Weight of the glass : 40 Kg/m²

THICKNESS OF THE GLASS = 16 mm

SRH (h.) (mm)	DIMENSIONS SRW (width)															
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
0																
100																
200																
300																
400																
500																
600		2	2	2	2	2	2	2	2	2						
700		2	2	2	2	2	2	2	2	2	2					
800		2	2	2	2	2	2	2	2	2	2	2				
900		2	2	2	2	2	2	2	2	2	2	2	2			
1000		2	2	2	2	2	2	2	2	2	2	2	2	2		
1100		2	2	2	2	2	2	2	2	2	2	2	2	2	3	
1200		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1300		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1400		2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
1500		2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
1600		2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
1700		2	2	2	2	2	2	2	2	2	2	2	2	3	4	4
1800		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
1900		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
2000		3	3	3	3	3	3	3	3	3	3	3	3	4	4	
2100		3	3	3	3	3	3	3	3	3	3	3	3	4		
2200		3	3	3	3	3	3	3	3	3	3	3	3	4		
2300		3	3	3	3	3	3	3	3	3	3	3	4	4		
2400		4	4	4	4	4	4	4	4	4	4	4	4			
2500		4	4	4	4	4	4	4	4	4	4	4	4			
2600		4	4	4	4	4	4	4	4	4	4	4	4			
2700		4	4	4	4	4	4	4	4	4	4	4				
2800		4	4	4	4	4	4	4	4	4	4	4				

NB.The application fields are valid even with medium/low consistency wood (for example pine)
When the SRW >1800 mm we recommend the use of a third hinge to prevent the bending of the sash also where the application fields provide for two hinges

Application fields of the adjustable hinges mod. ZENIT Ø 20mm

Weight of the glass : 50 Kg/m²

THICKNESS OF THE GLASS = 20 mm

SRH (h.) (mm)	DIMENSIONS SRW (width)															
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
0																
100																
200																
300																
400																
500																
600		2	2	2	2	2	2	2	2	2						
700		2	2	2	2	2	2	2	2	2	2					
800		2	2	2	2	2	2	2	2	2	2	2				
900		2	2	2	2	2	2	2	2	2	2	2	2			
1000		2	2	2	2	2	2	2	2	2	2	2	2	2		
1100		2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
1200		2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
1300		2	2	2	2	2	2	2	2	2	2	2	3	3	3	4
1400		2	2	2	2	2	2	2	2	2	2	2	3	3	4	4
1500		2	2	2	2	2	2	2	2	2	2	3	3	3	4	
1600		2	2	2	2	2	2	2	2	2	2	3	3	4	4	
1700		2	2	2	2	2	2	2	2	2	3	3	3	4	4	
1800		3	3	3	3	3	3	3	3	3	3	3	3	3	4	
1900		3	3	3	3	3	3	3	3	3	3	3	3	4	4	
2000		3	3	3	3	3	3	3	3	3	3	3	3	4	4	
2100		3	3	3	3	3	3	3	3	3	3	3	3	4		
2200		3	3	3	3	3	3	3	3	3	3	3	4	4		
2300		3	3	3	3	3	3	3	3	3	3	3	4	4		
2400		4	4	4	4	4	4	4	4	4	4	4	4			
2500		4	4	4	4	4	4	4	4	4	4	4				
2600		4	4	4	4	4	4	4	4	4	4	4				
2700		4	4	4	4	4	4	4	4	4	4	4				
2800		4	4	4	4	4	4	4	4	4	4	4				

NB.The application fields are valid even with medium/low consistency wood (for example pine)
When the SRW >1800 mm we recommend the use of a third hinge to prevent the bending of the sash also where the application fields provide for two hinges