



Pre Engineered Railings

 **RINOX[®]**
Engineered in Germany

ABOUT RINOX

RINOX Engineering is a pioneer in Stainless Steel Modular Railing Systems. RINOX has gained respect amongst the most quality conscious buyers in 67 countries around the world.

Using German manufacturing technology, strict quality norms and multi-locational manufacturing in India & China, RINOX has become a leader in its field.

Premium Stainless Steel Railing systems by RINOX provide a complete and elegant solution for all railing and architectural requirements. The railing system manufactured by RINOX is completely modular and does not need any welding, grinding or polishing at the installation site.

The railing system is based on interchangeable components, allowing for a wide range of flexibility to design a professional and secure railing. These components are available to fit all standard pipe sizes easily available with local stockholders.

RINOX products (standard and OEM) are installed at various locations worldwide, including



Airports



Shopping
Malls



Office
Buildings



Residential
Projects



Hospitals



Metro
Stations

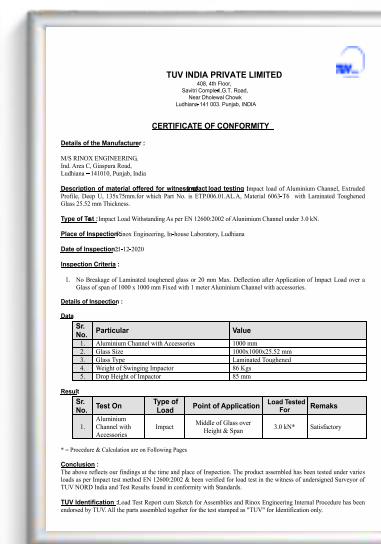
QUALITY CONTROL

RINOX products are developed in a state of the art research and development center that is involved in creating cost effective solutions for common and special requirements. Each product is carefully designed and monitored at each stage of production.

The Rinox Research and Development (R&D) center works in close association with the marketing team, understanding the specific requirement of the customers and churning out products that offer solutions to the customer's needs.

Our indepth knowledge about different stainless steel grades like AISI 304, 316, 316L and capability to effortlessly convert products between casting, pressing, welding and machining processes ensures that you get the finest products manufactured using the most suitable method.

Rinox is one of the biggest leader offering CE marked stainless steel handrail and glass fittings



The letters "CE" are the abbreviation of French phrase "conformité Européene" which literally means "European Conformity". CE Marking on a product certifies that the product complies with the essential requirements of the relevant European health, safety and environmental protection legislation. CE Marking on a product indicates to government officials that the product may be legally placed on the market within the entire European Union Countries.





1 WINSOME

2 FLATRON

3 BRAWNY

4 ROYALE

5 TWIN RAIL

6 FRAMELESS RAIL

7 WALL RAIL

RAILING SYSTEMS	INFILL CRITERIA				
 WINSOME	GLASS	HORIZONTAL BAR	VERTICAL PICKETS	CABLE	WIRE MESH
 FLATRON	GLASS	HORIZONTAL BAR	VERTICAL PICKETS	CABLE	WIRE MESH
 BRAUNY	GLASS	HORIZONTAL BAR	VERTICAL PICKETS	CABLE	WIRE MESH
 ROYALE	GLASS	HORIZONTAL BAR	VERTICAL PICKETS	CABLE	WIRE MESH
 TWIN RAIL	GLASS	HORIZONTAL BAR	VERTICAL PICKETS	CABLE	WIRE MESH

WINSOME

RAILING SYSTEM

Winsome Railing design system by Rinox Engineering is a stunning choice for anyone who wants to enhance the beauty of their glass railing with spiders. This system features a round post assembly that provides strength and durability, as well as a sleek and modern aesthetic look. You can choose from a variety of post, top rail and handrail and mounting options to create your own distinct design. Winsome Railing design system is a part of the RINOX brand, which is a global industry standard for premium stainless steel railing systems.

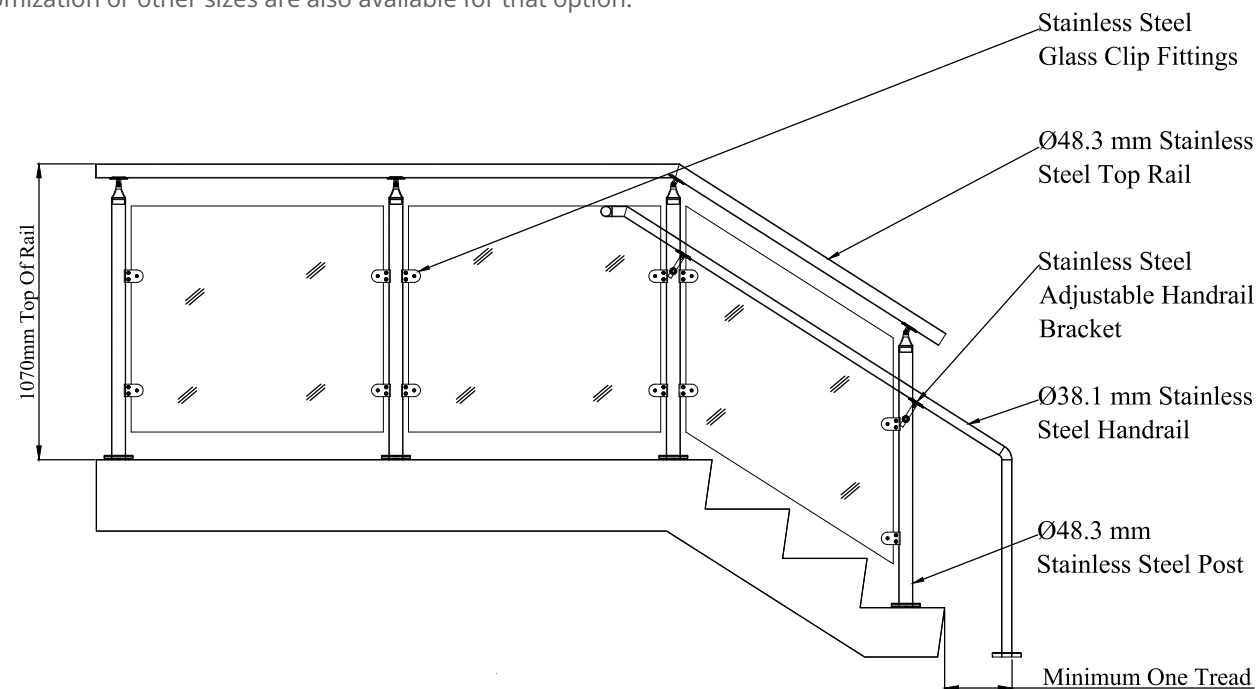


WINSOME RAILING SYSTEM

TECHNICAL DATA	TYPE/SHAPE	MATERIAL	FINISH	STANDARD SPACING / SIZE IN mm (Inch)
POST	Round	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	1220 mm (4') On Center - Standard
INFILL OPTIONS	Glass with clips	Glass	Clear	10.76 - 12.76 mm (3/8" - 9/16") laminated glass
	Glass with spider			
	Horizontal Bar	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 10 - 16 mm (13/32" - 5/8") hollow or solid
	Vertical Pickets		Natural	Dia. 4 - 6 mm (3/16" - 1/4")
	Cable			Dia. 5 mm (3/16") - Standard
	Wire Mesh			
TOP RAIL / HAND RAIL	Round or Square Tube,	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 48.3 / 38.1 mm (1 7/8" - 1 1/2") - Standard Sq. 40x40 mm (1 5/8" x 1 5/8") - Standard
	Round or Square U-Tube			Dia. 42.4 mm (1 7/8") - Standard Sq. 40x40 mm (1 5/8" x 1 5/8") - Standard

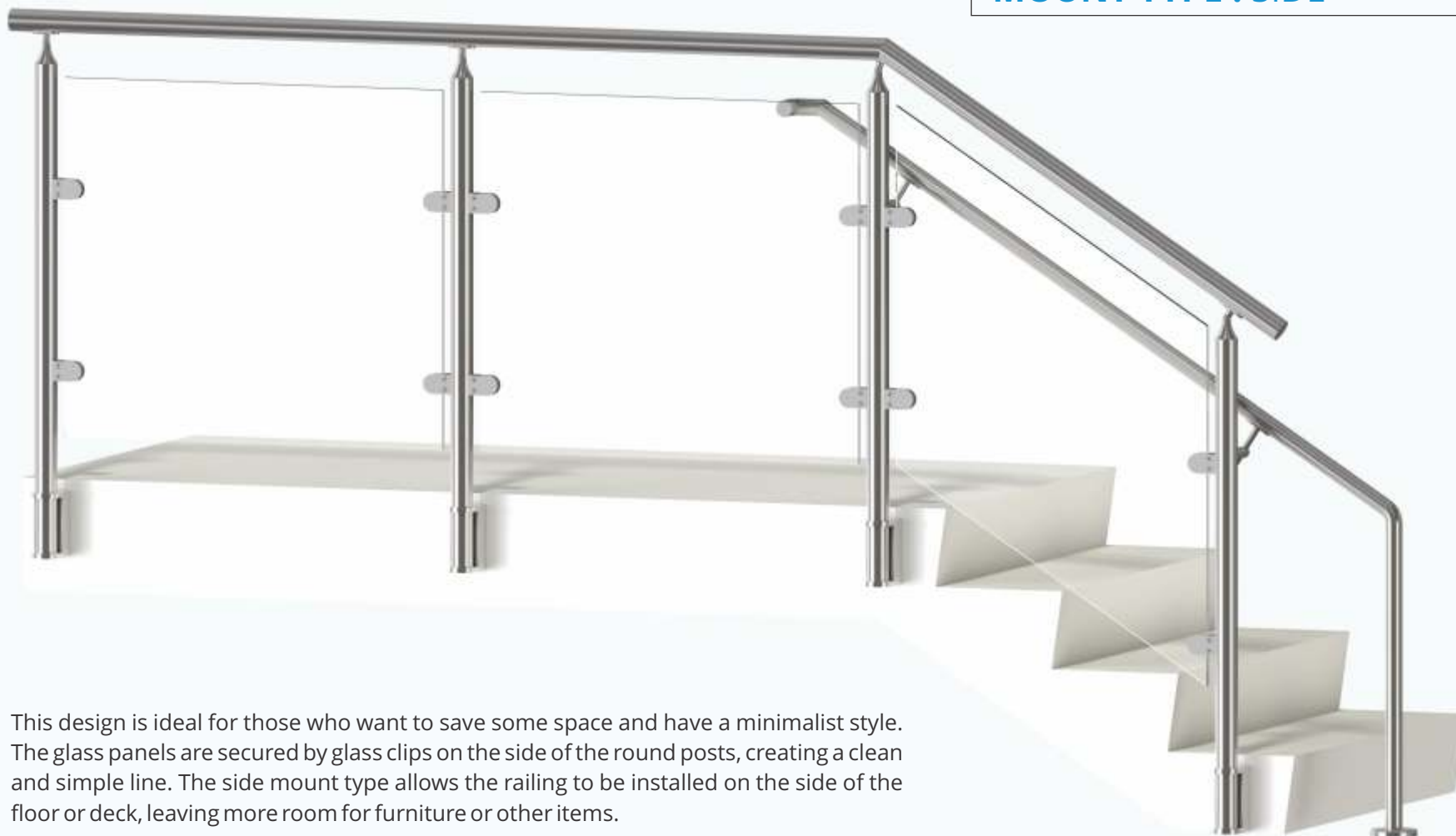
Note: Standards specifies customization or other sizes are also available for that option.

STANDARD LINE DIAGRAM



WINSOME RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : TOP**

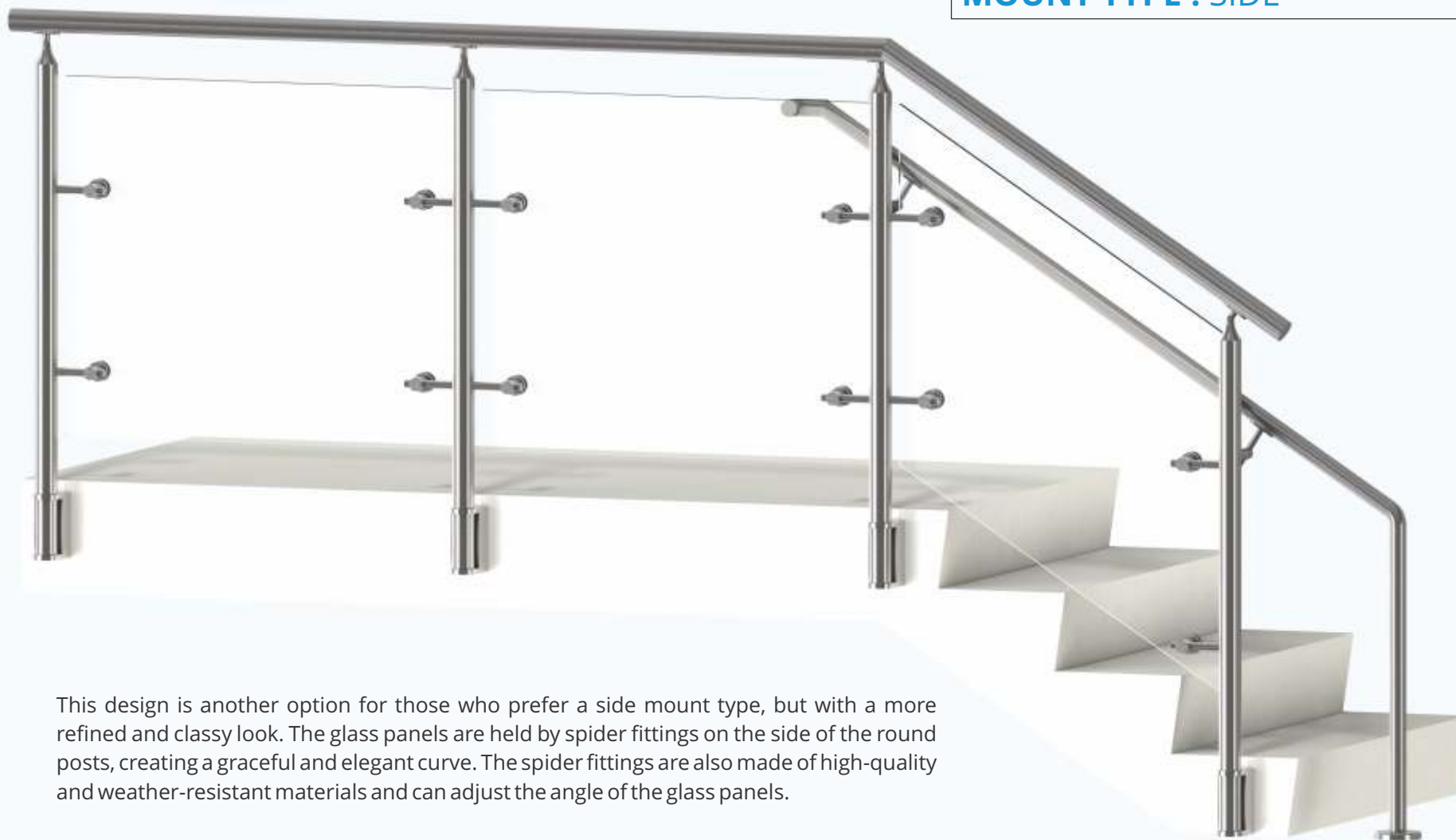
This design features a sleek and modern look with clear glass panels held by stainless steel clips on top of the round posts. The glass clips are adjustable and can accommodate different glass thicknesses. The top mount type allows the railing to be installed on the edge of the floor or deck, creating a seamless and spacious appearance.

WINSOME RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : SIDE**

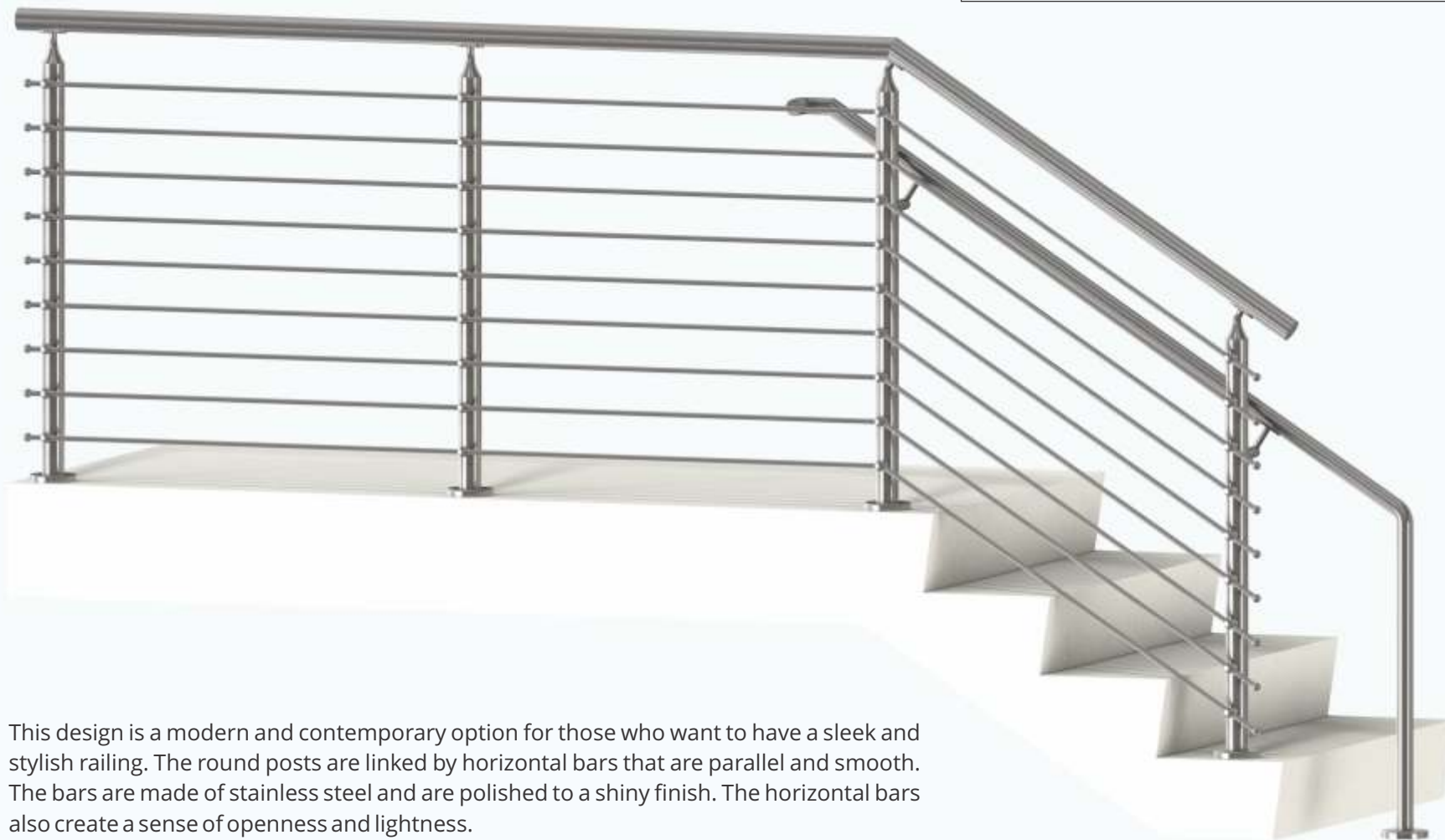
This design is ideal for those who want to save some space and have a minimalist style. The glass panels are secured by glass clips on the side of the round posts, creating a clean and simple line. The side mount type allows the railing to be installed on the side of the floor or deck, leaving more room for furniture or other items.

WINSOME RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : TOP**

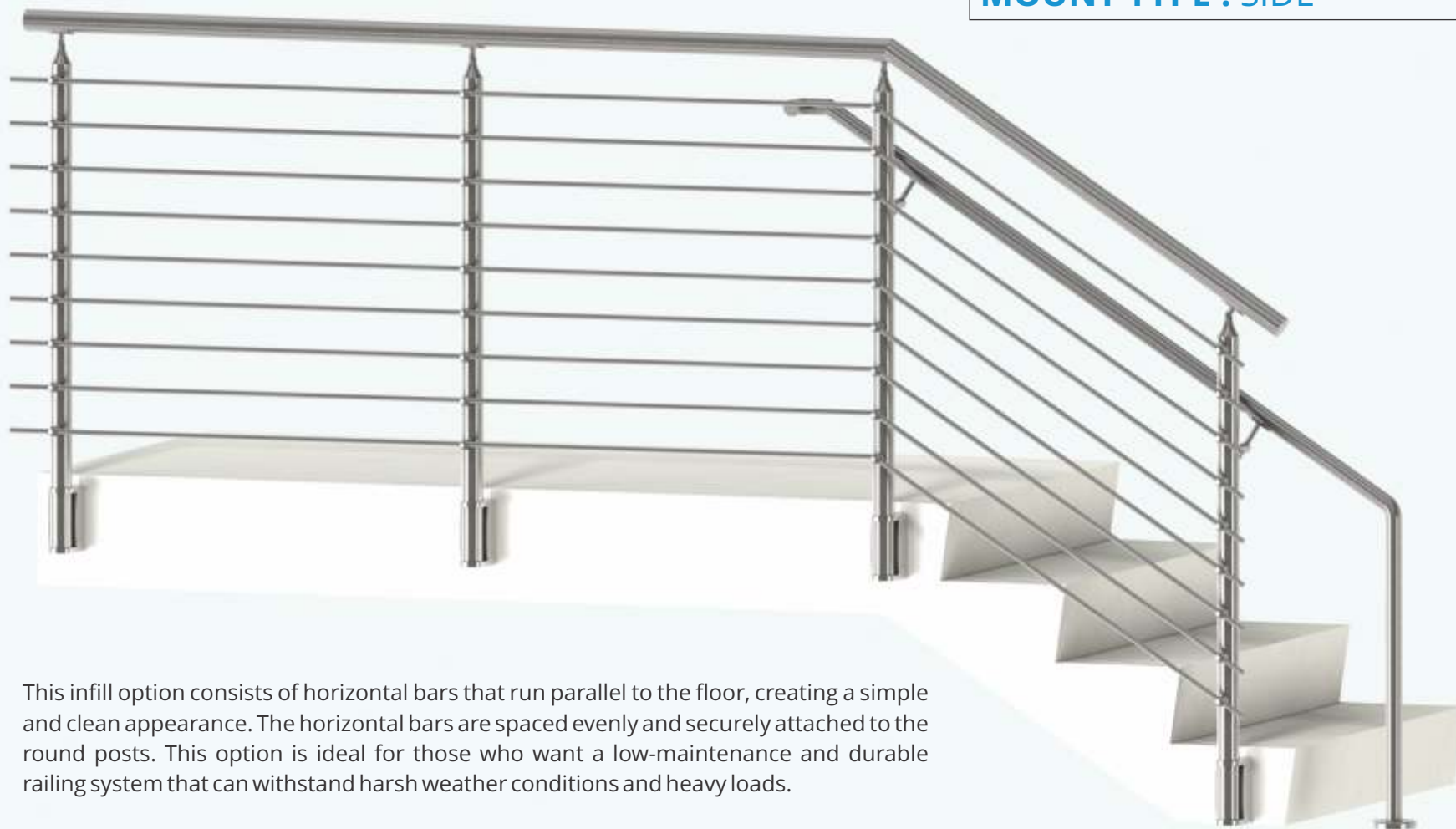
This design is similar to the previous one, but with a more sophisticated and elegant touch. The glass panels are supported by spider fittings that are attached to the round posts. The spider fittings are made of durable and corrosion-resistant materials and can hold the glass panels at various angles. The top mount type also creates a smooth and open look.

WINSOME RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : SIDE**

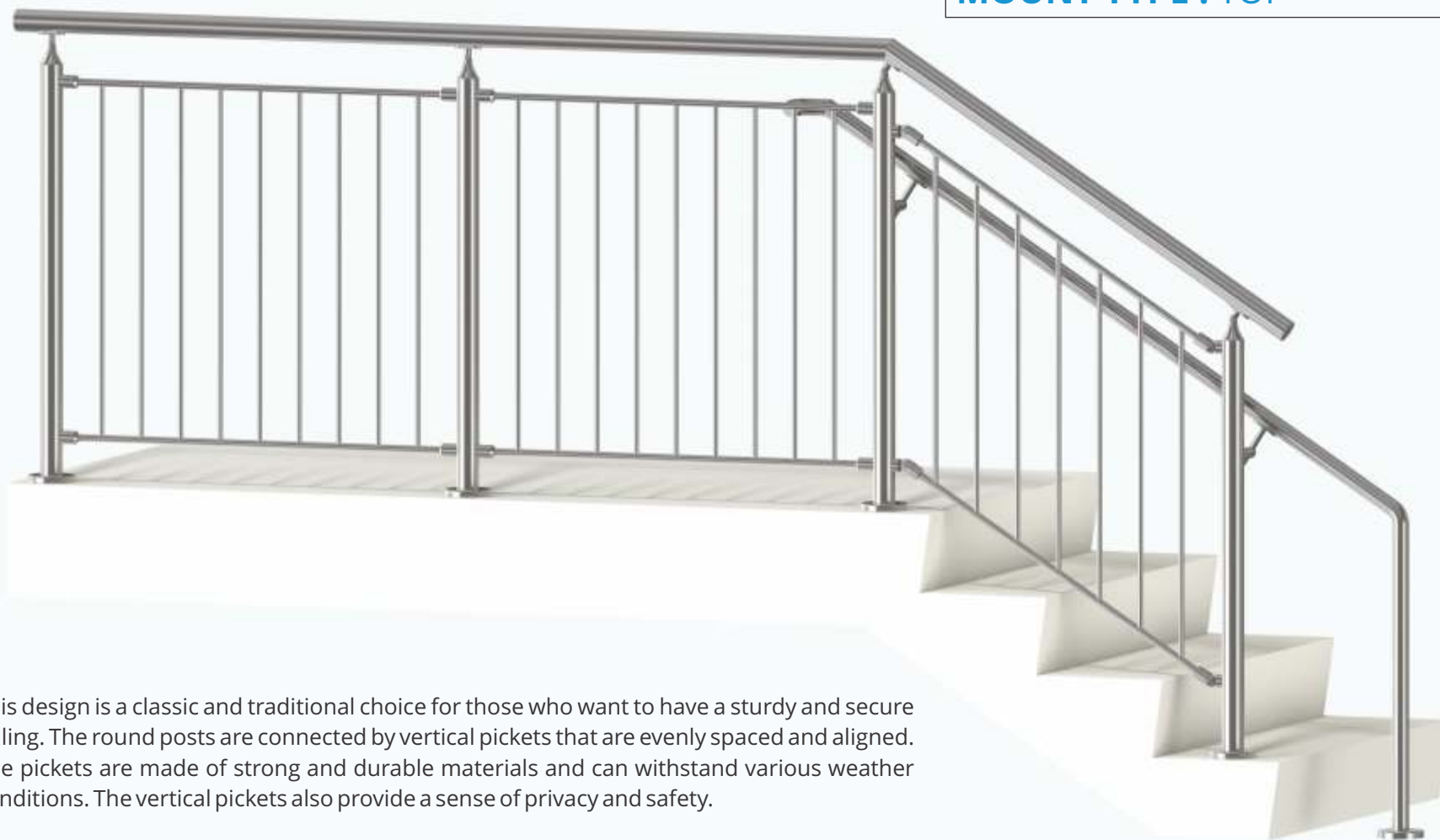
This design is another option for those who prefer a side mount type, but with a more refined and classy look. The glass panels are held by spider fittings on the side of the round posts, creating a graceful and elegant curve. The spider fittings are also made of high-quality and weather-resistant materials and can adjust the angle of the glass panels.

WINSOME RAILING SYSTEM**INFILL OPTION : HORIZONTAL BAR****MOUNT TYPE : TOP**

This design is a modern and contemporary option for those who want to have a sleek and stylish railing. The round posts are linked by horizontal bars that are parallel and smooth. The bars are made of stainless steel and are polished to a shiny finish. The horizontal bars also create a sense of openness and lightness.

WINSOME RAILING SYSTEM**INFILL OPTION : HORIZONTAL BAR****MOUNT TYPE : SIDE**

This infill option consists of horizontal bars that run parallel to the floor, creating a simple and clean appearance. The horizontal bars are spaced evenly and securely attached to the round posts. This option is ideal for those who want a low-maintenance and durable railing system that can withstand harsh weather conditions and heavy loads.

WINSOME RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : TOP**

This design is a classic and traditional choice for those who want to have a sturdy and secure railing. The round posts are connected by vertical pickets that are evenly spaced and aligned. The pickets are made of strong and durable materials and can withstand various weather conditions. The vertical pickets also provide a sense of privacy and safety.

WINSOME RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : SIDE**

This infill option consists of vertical pickets that run perpendicular to the floor, creating a classic and elegant appearance. The vertical pickets are spaced evenly and securely attached to the round posts. This option is ideal for those who want a traditional and refined railing system that can provide safety and privacy.

WINSOME RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : TOP**

This design is a unique and innovative solution for those who want to have a versatile and flexible railing. The round posts are fitted with a wire mesh system that can be customized to different shapes and patterns. The wire mesh system is made of galvanized steel and is coated with a protective layer. The wire mesh system also adds a touch of creativity and personality.

WINSOME RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : SIDE**

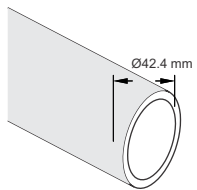
This infill option consists of wire mesh that covers the entire area between the round posts, creating a contemporary and industrial appearance. The wire mesh is made of high-quality stainless steel and securely attached to the round posts. This option is ideal for those who want a modern and versatile railing system that can offer visibility and ventilation.

WINSOME RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : INCLINED**

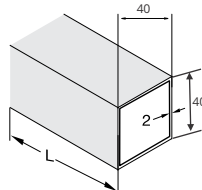
Elevate your surroundings with Winsome railing design, boasting round posts expertly mounted at an inclined angle for a striking aesthetic. Experience both beauty and functionality as Winsome seamlessly blends modern style with structural innovation, ensuring a sophisticated and secure ambiance for your space. Choose Winsome for a perfect harmony of design and safety in every detail

TOP RAIL ATTACHMENTS

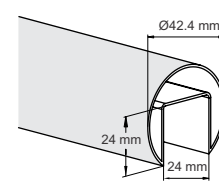
ROUND TUBE



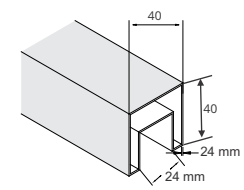
SQUARE TUBE



ROUND U TUBE

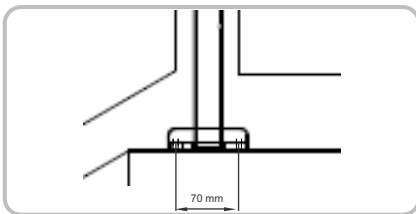


SQUARE U TUBE

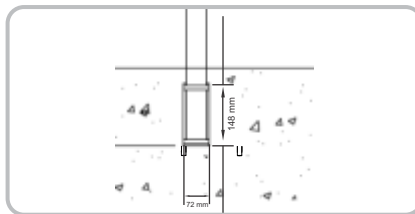


BASE ATTACHMENTS

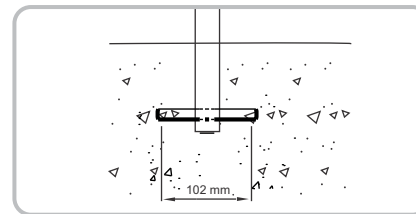
TOP MOUNT



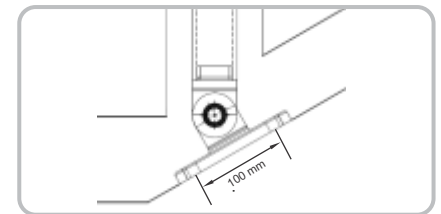
SIDE MOUNT



CORE MOUNT



INCLINED



FLATRON

RAILING SYSTEM

Flatron is a design that offers a sleek and modern look for your railing system. It features a flat post that can be mounted on the top or the side of the surface, and can accommodate various types of infill options. Whether you choose glass, pickets, bars, or wire mesh, Flatron will add a touch of elegance and sophistication to your space.

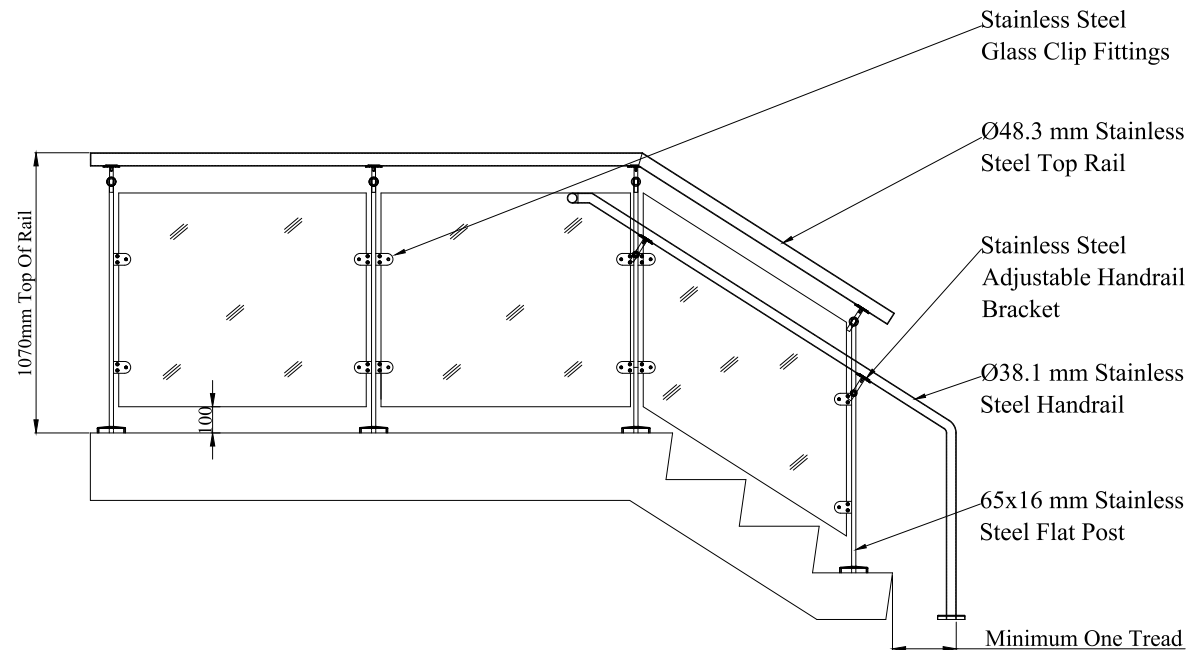


FLATRON RAILING SYSTEM

TECHNICAL DATA	TYPE/SHAPE	MATERIAL	FINISH	STANDARD SPACING / SIZE IN mm (Inch)
POST	Rectangular	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	1220 mm (4') On Center - Standard
INFILL OPTIONS	Glass with clips	Glass	Clear	10.76 - 12.76 mm (3/8" - 9/16") laminated glass
	Glass with spider			
	Horizontal Bar	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 10 - 16 mm (13/32" - 5/8") hollow or solid
	Vertical Pickets		Natural	Dia. 4 - 6 mm (3/16" - 1/4")
	Cable			Dia. 5 mm (3/16") - Standard
	Wire Mesh			
TOP RAIL / HAND RAIL	Round or Square Tube	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 48.3 / 38.1 mm (1 7/8" / 1 1/2") - Standard Sq. 40x40 mm (1 5/8" x 1 5/8") - Standard
	Round or Square U-Tube			Dia. 42.4 mm (1 7/8") - Standard Sq. 40x40 mm (1 5/8" x 1 5/8") - Standard

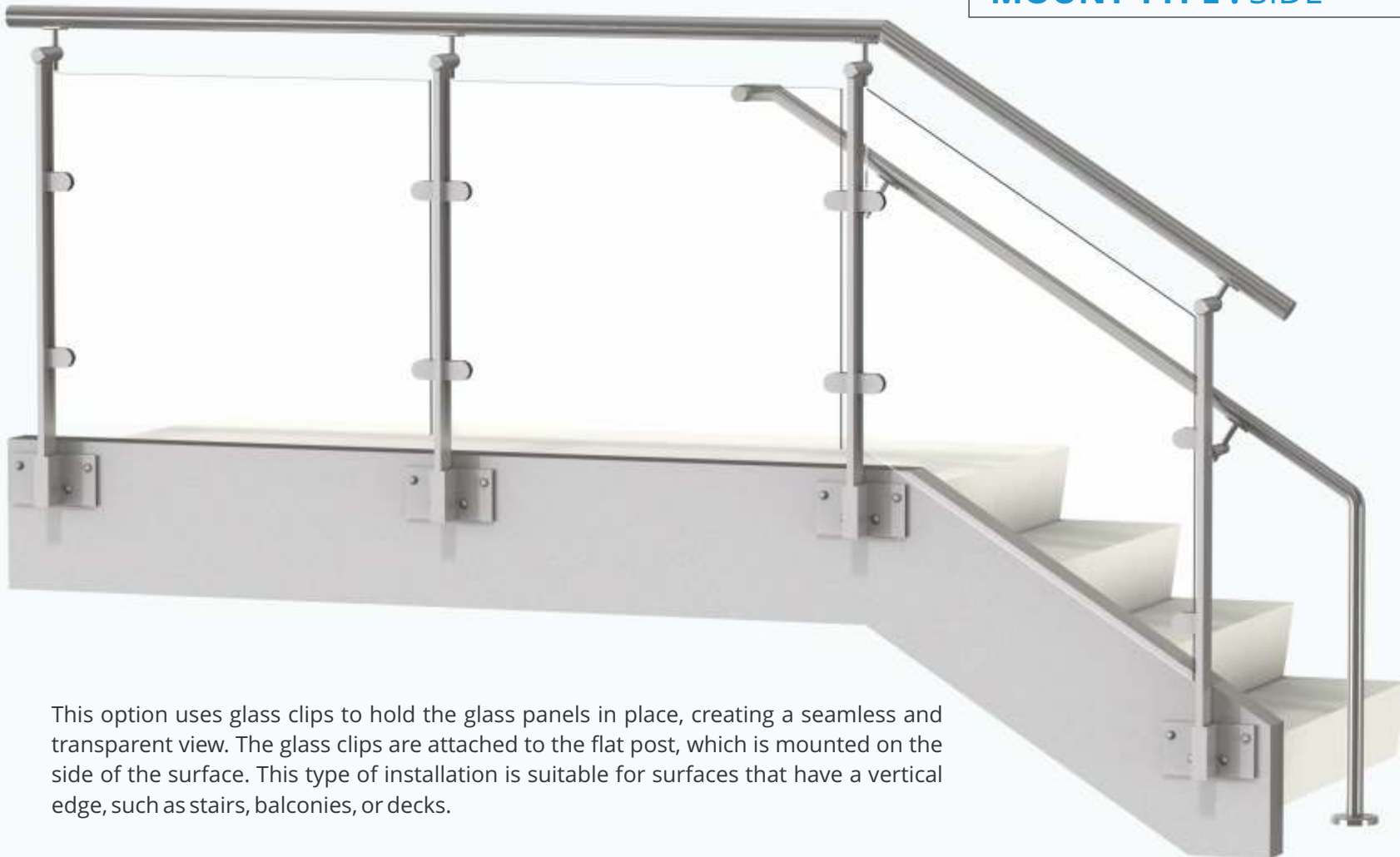
Note: Standards specifies customization or other sizes are also available for that option.

STANDARD LINE DIAGRAM



FLATRON RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : TOP**

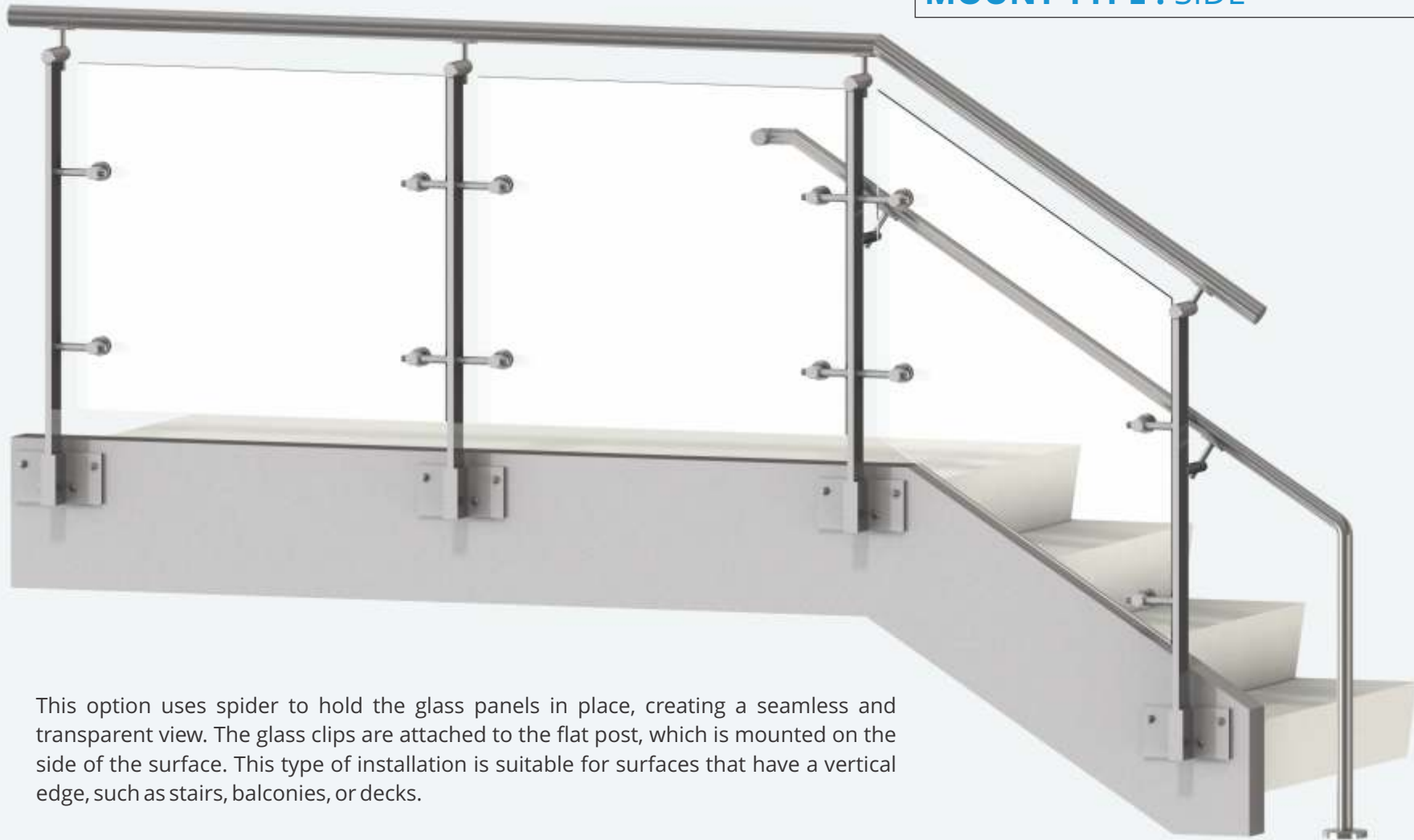
This option uses glass clips to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the flat post, which is mounted on the top of the surface. This type of installation is suitable for flat surfaces that can support the weight of the post and the glass.

FLATRON RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : SIDE**

This option uses glass clips to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the flat post, which is mounted on the side of the surface. This type of installation is suitable for surfaces that have a vertical edge, such as stairs, balconies, or decks.

FLATRON RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : TOP**

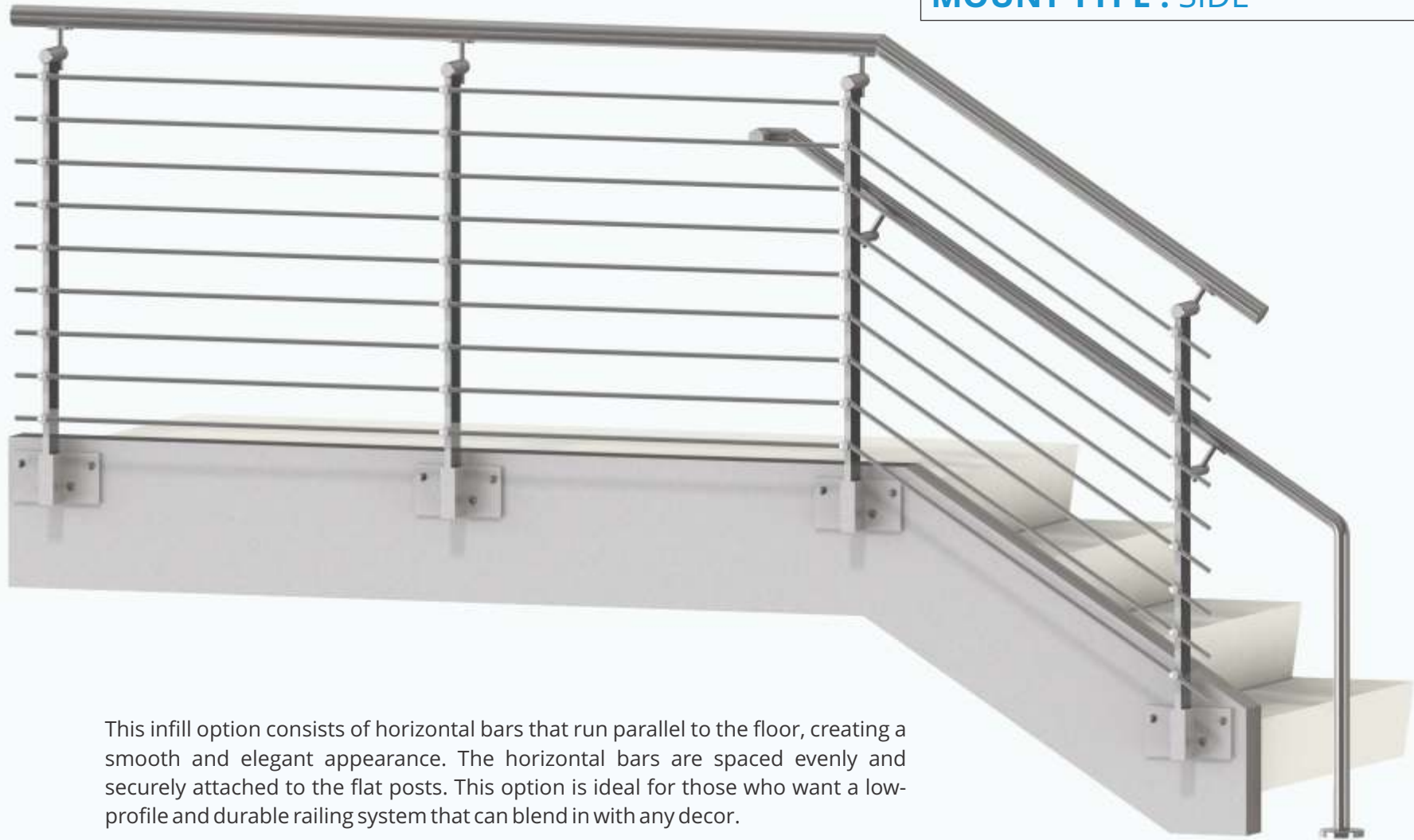
This option uses glass Spider fitting to connect the glass panels to the flat post, creating a stylish and elegant look. The glass Spider fitting are small metal devices that have four arms that extend from a central point, resembling a spider. The Spider fitting are mounted on the top of the surface, along with the flat post. This type of installation is suitable for flat surfaces that can support the weight of the post, the glass, and the Spider fitting.

FLATRON RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : SIDE**

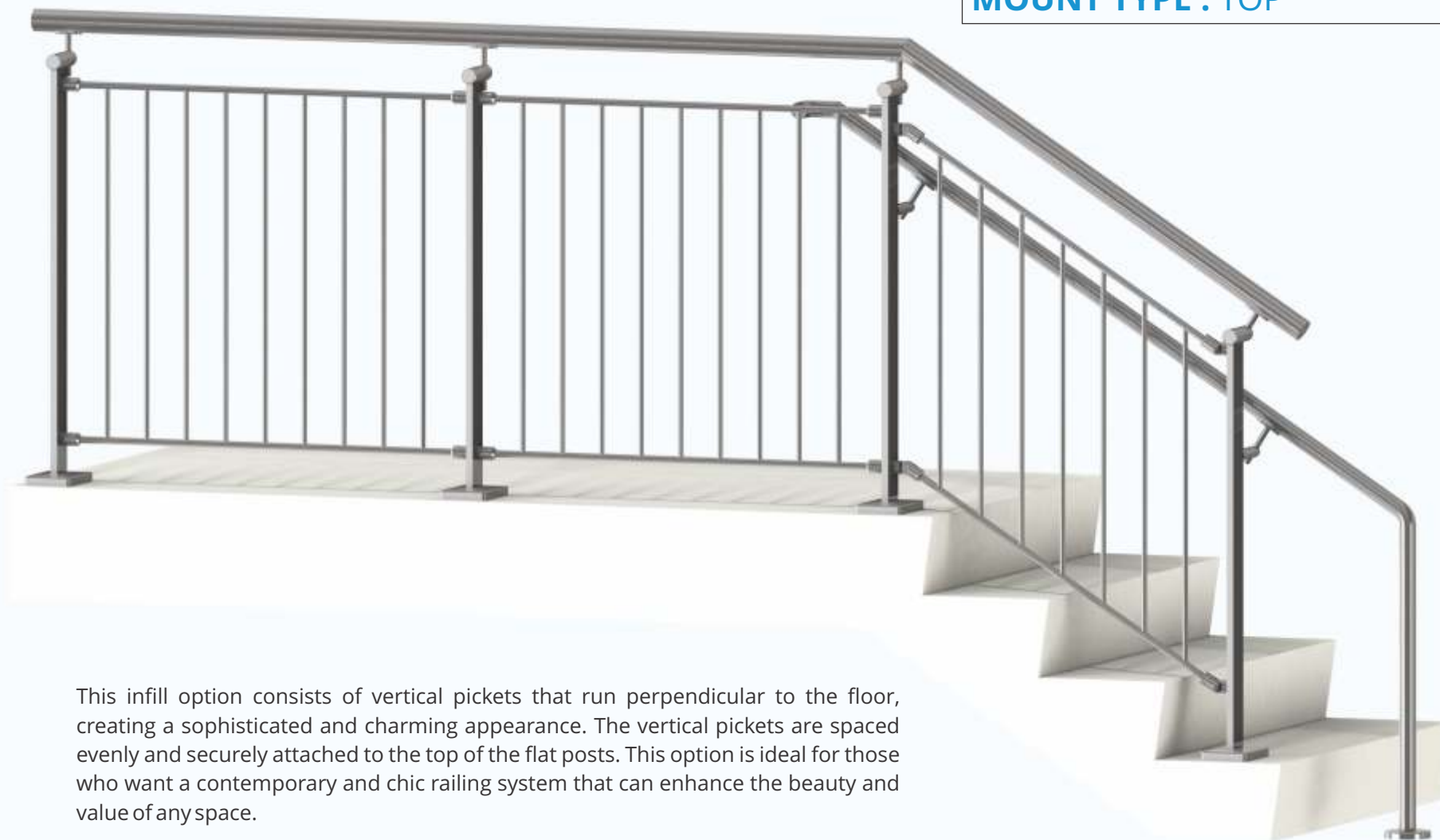
This option uses spider to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the flat post, which is mounted on the side of the surface. This type of installation is suitable for surfaces that have a vertical edge, such as stairs, balconies, or decks.

FLATRON RAILING SYSTEM**INFILL OPTION : HORIZONTAL BAR****MOUNT TYPE : TOP**

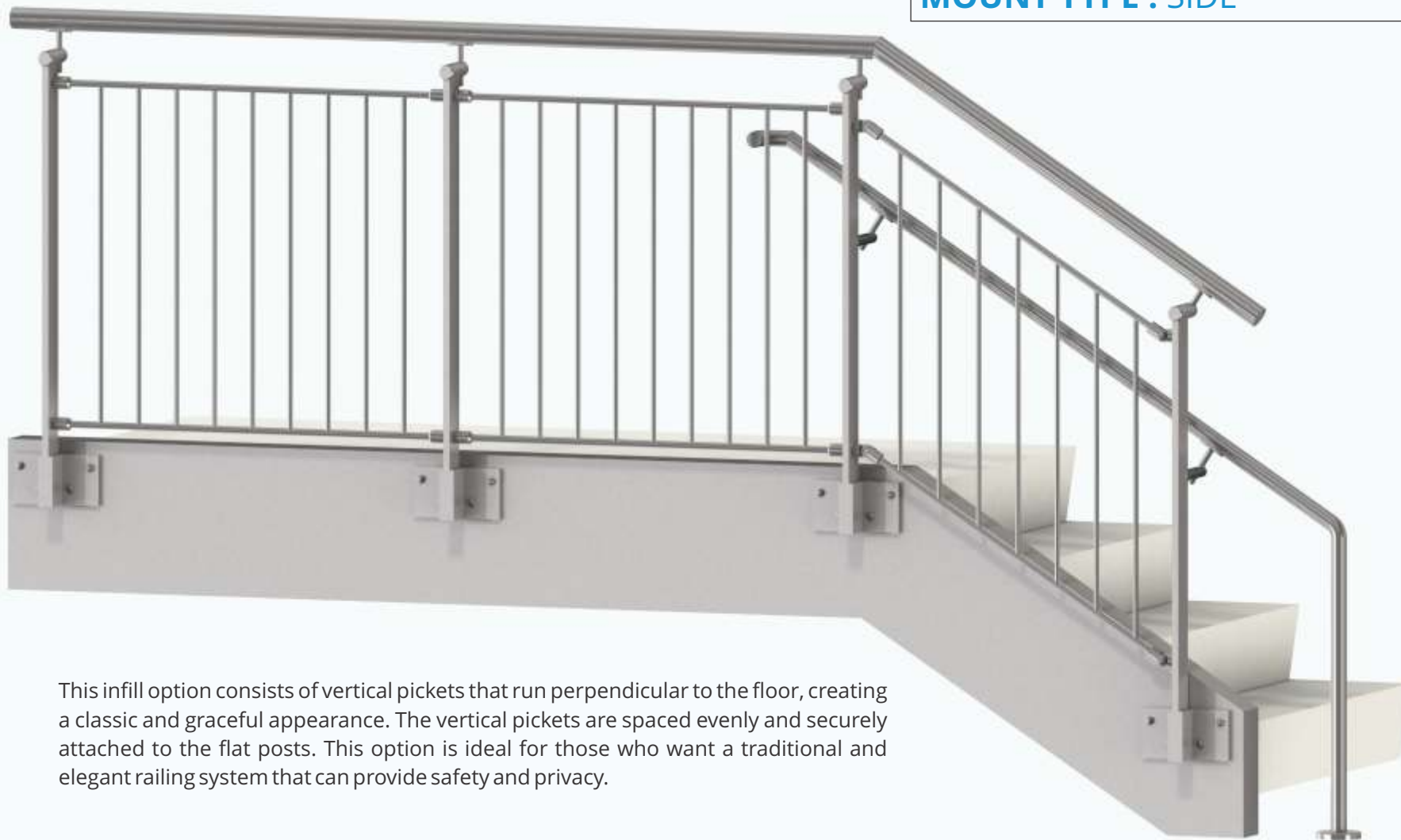
This infill option consists of horizontal bars that run parallel to the floor, creating a neat and refined appearance. The horizontal bars are spaced evenly and securely attached to the top of the flat posts. This option is ideal for those who want a high-end and sturdy railing system that can add a touch of class to any space.

FLATRON RAILING SYSTEM**INFILL OPTION : HORIZONTAL BAR****MOUNT TYPE : SIDE**

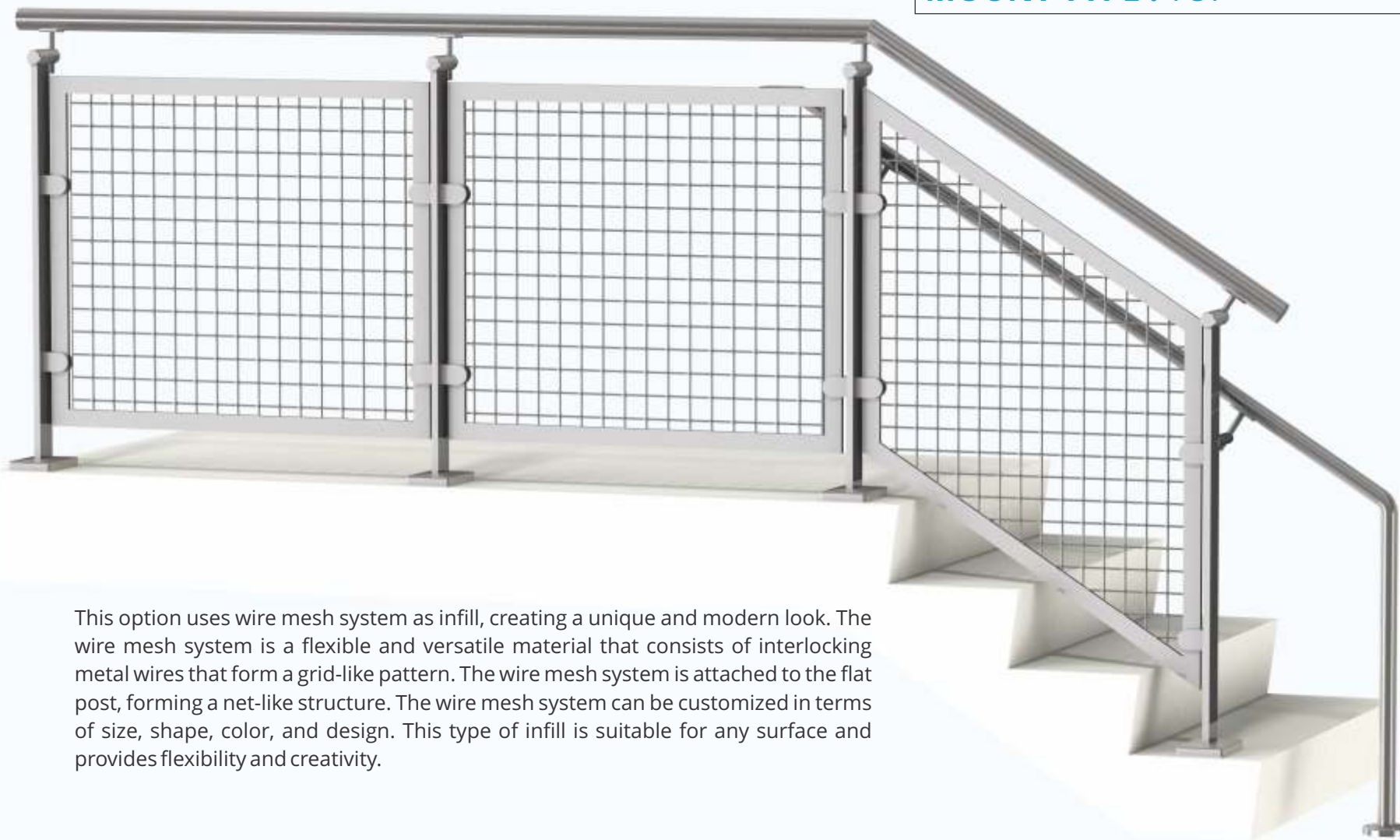
This infill option consists of horizontal bars that run parallel to the floor, creating a smooth and elegant appearance. The horizontal bars are spaced evenly and securely attached to the flat posts. This option is ideal for those who want a low-profile and durable railing system that can blend in with any decor.

FLATRON RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : TOP**

This infill option consists of vertical pickets that run perpendicular to the floor, creating a sophisticated and charming appearance. The vertical pickets are spaced evenly and securely attached to the top of the flat posts. This option is ideal for those who want a contemporary and chic railing system that can enhance the beauty and value of any space.

FLATRON RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : SIDE**

This infill option consists of vertical pickets that run perpendicular to the floor, creating a classic and graceful appearance. The vertical pickets are spaced evenly and securely attached to the flat posts. This option is ideal for those who want a traditional and elegant railing system that can provide safety and privacy.

FLATRON RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : TOP**

This option uses wire mesh system as infill, creating a unique and modern look. The wire mesh system is a flexible and versatile material that consists of interlocking metal wires that form a grid-like pattern. The wire mesh system is attached to the flat post, forming a net-like structure. The wire mesh system can be customized in terms of size, shape, color, and design. This type of infill is suitable for any surface and provides flexibility and creativity.

FLATRON RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : SIDE**

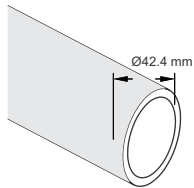
This infill option consists of wire mesh that covers the entire area between the flat posts, creating a modern and industrial appearance. The wire mesh is made of high-quality stainless steel and securely attached to the flat posts. This option is ideal for those who want a versatile and innovative railing system that can offer visibility and ventilation.

FLATRON RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : INCLINED**

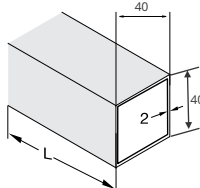
Experience modern elegance with the Flatron railing design featuring sleek Flat posts mounted at a subtle incline. This innovative design not only adds a contemporary touch to your space but also provides enhanced stability and a unique visual appeal. Elevate your surroundings with the perfect blend of style and functionality with Flatron.

TOP RAIL ATTACHMENTS

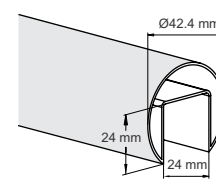
ROUND TUBE



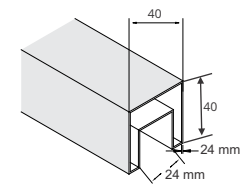
SQUARE TUBE



ROUND U TUBE

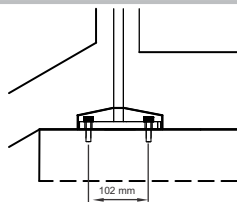


SQUARE U TUBE

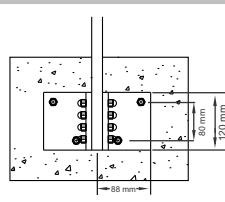


BASE ATTACHMENTS

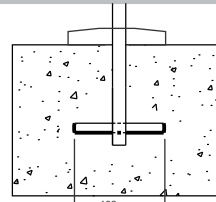
TOP MOUNT



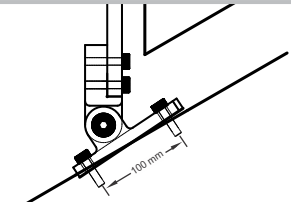
FASCIA MOUNT



CORE MOUNT



INCLINED



BRAWNY

RAILING SYSTEM

Brawny is a design that offers a sturdy and robust look for your railing system. It features a square post that can be mounted on the top or the side of the surface, and can accommodate various types of infill options. Whether you choose glass, pickets, bars, or wire mesh, Brawny will provide strength and durability to your space.

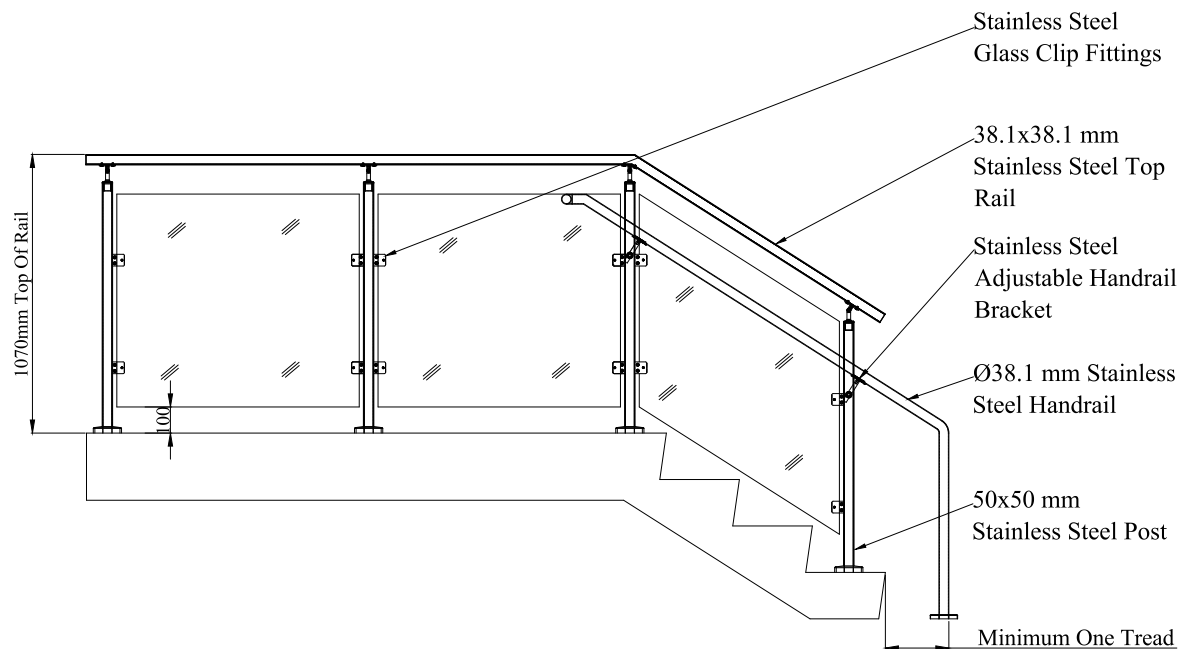


BRAWNY RAILING SYSTEM

TECHNICAL DATA	TYPE/SHAPE	MATERIAL	FINISH	STANDARD SPACING / SIZE IN mm (Inch)
POST	Square	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	1220 mm (4') On Center - Standard
INFILL OPTIONS	Glass with clips	Glass	Clear	10.76 - 12.76 mm (3/8" - 9/16") laminated glass
	Glass with spider			
	Horizontal Bar	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 10 - 16 mm (13/32" - 5/8") hollow or solid
	Vertical Pickets		Natural	Dia. 4 - 6 mm (3/16" - 1/4")
	Cable			Dia. 5 mm (3/16") - Standard
	Wire Mesh			
TOP RAIL / HAND RAIL	Round or Square Tube	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 48.3 / 38.1 mm (1 ⁷ / ₈ " - 1 ¹ / ₂ ") - Standard Sq. 40x40 mm (1 ⁵ / ₈ " x 1 ¹ / ₈ ") - Standard
	Round or Square U-Tube			Dia. 42.4 mm (1 ⁷ / ₈ " - 1 ¹ / ₂ ") - Standard Sq. 40x40 mm (1 ⁵ / ₈ " x 1 ¹ / ₈ ") - Standard

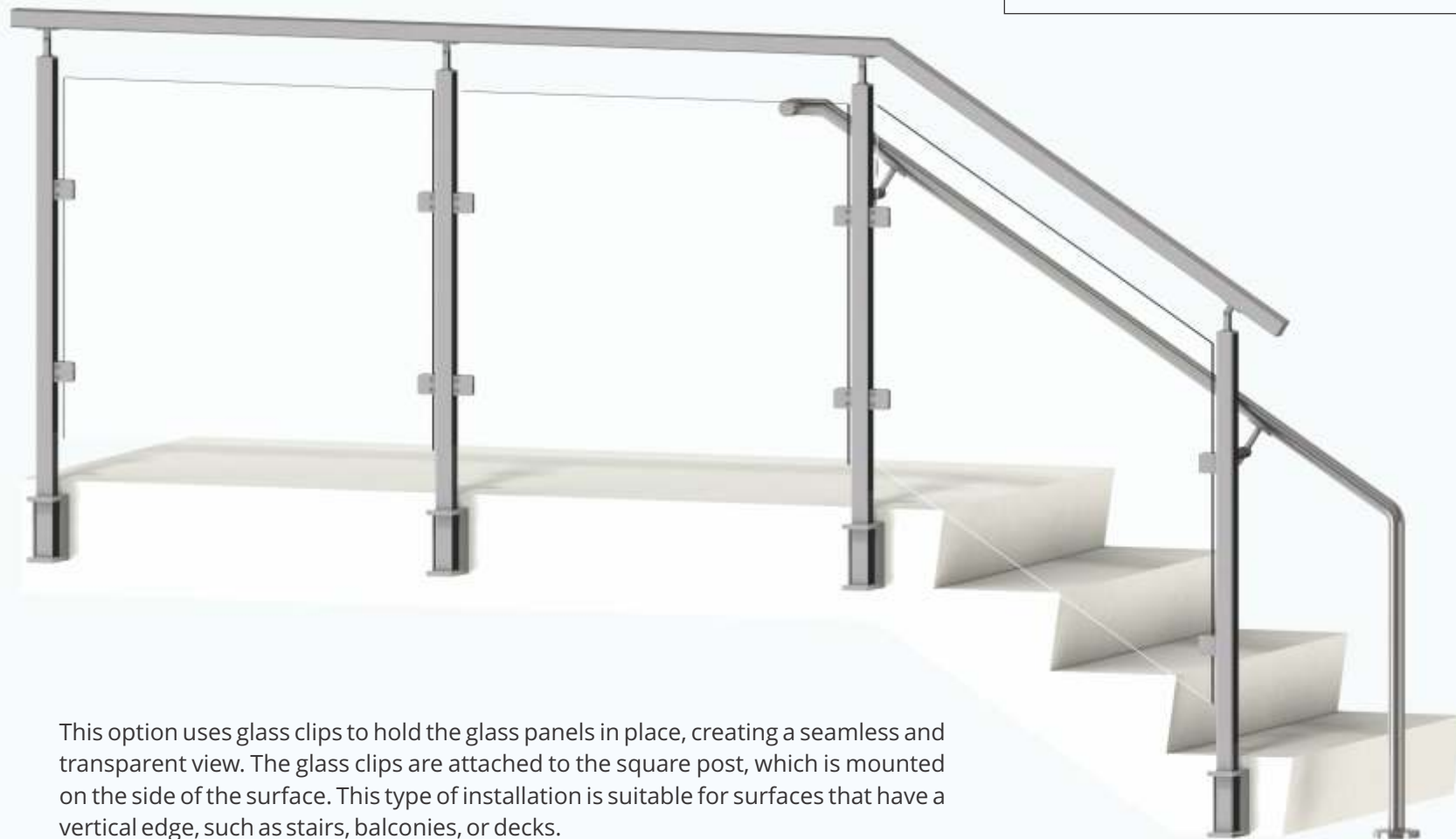
Note: Standards specifies customization or other sizes are also available for that option.

STANDARD LINE DIAGRAM

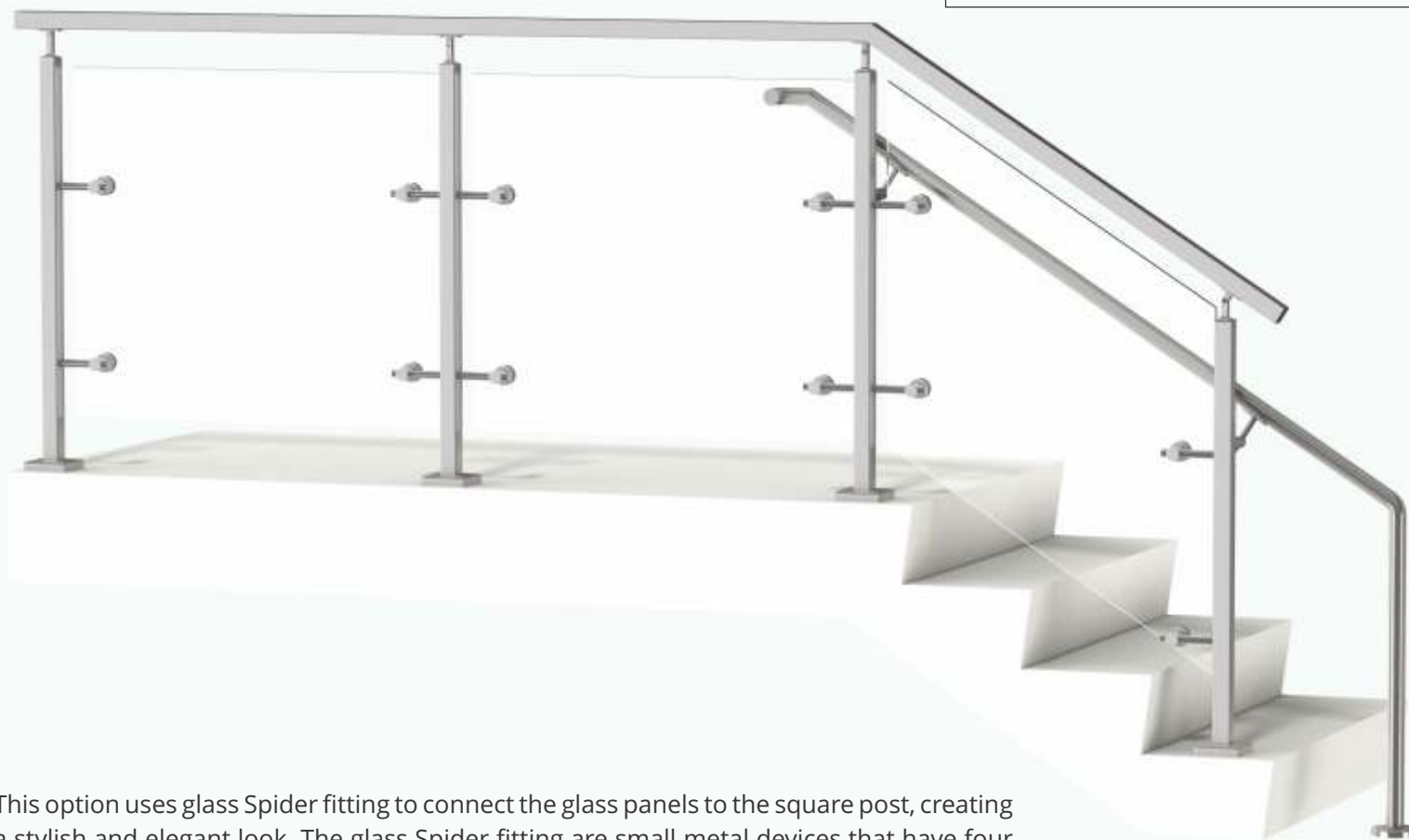


BRAWNY RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : TOP**

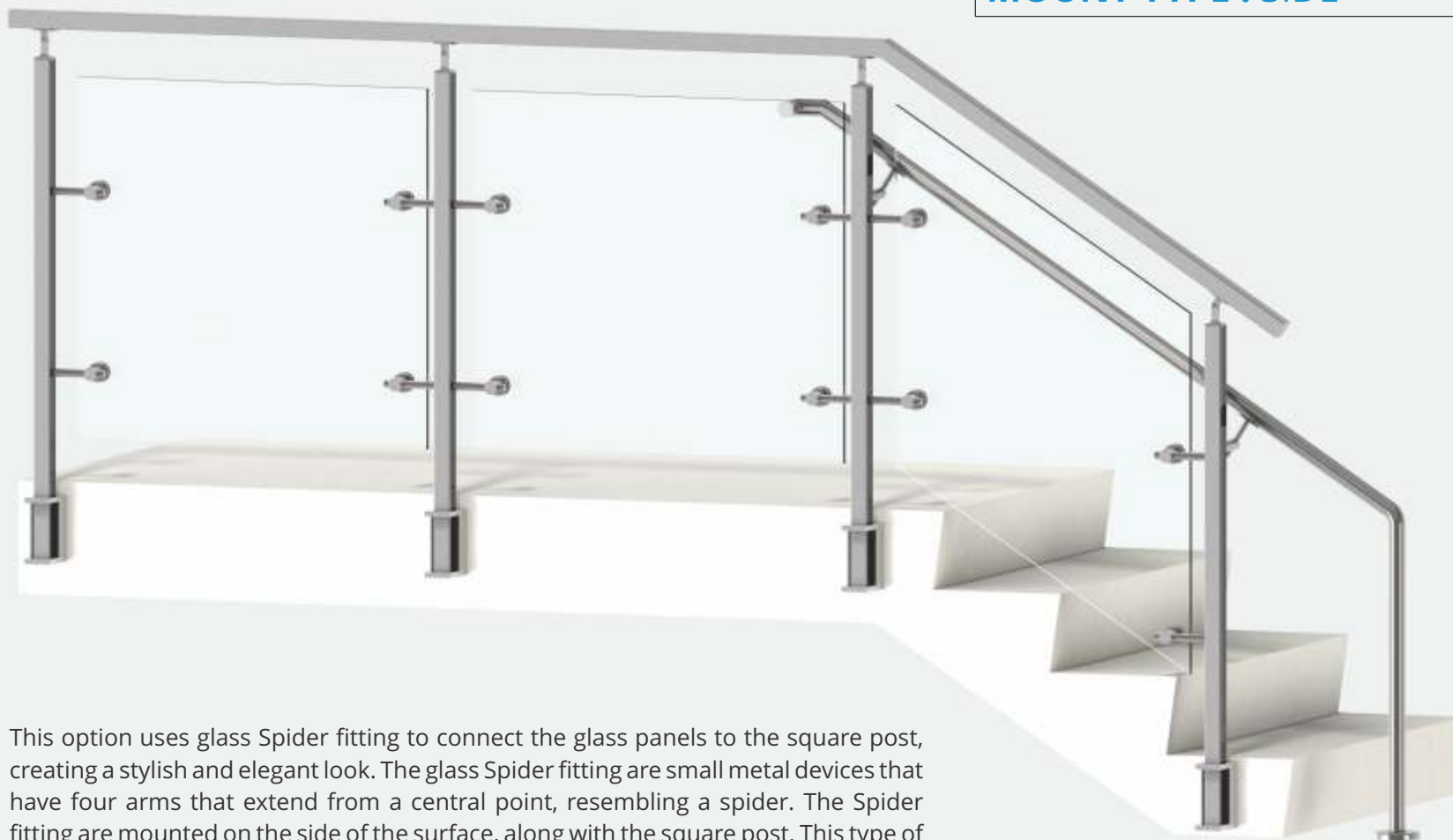
This option uses glass clips to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the square post, which is mounted on the top of the surface. This type of installation is suitable for flat surfaces that can support the weight of the post and the glass.

BRAWNY RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : SIDE**

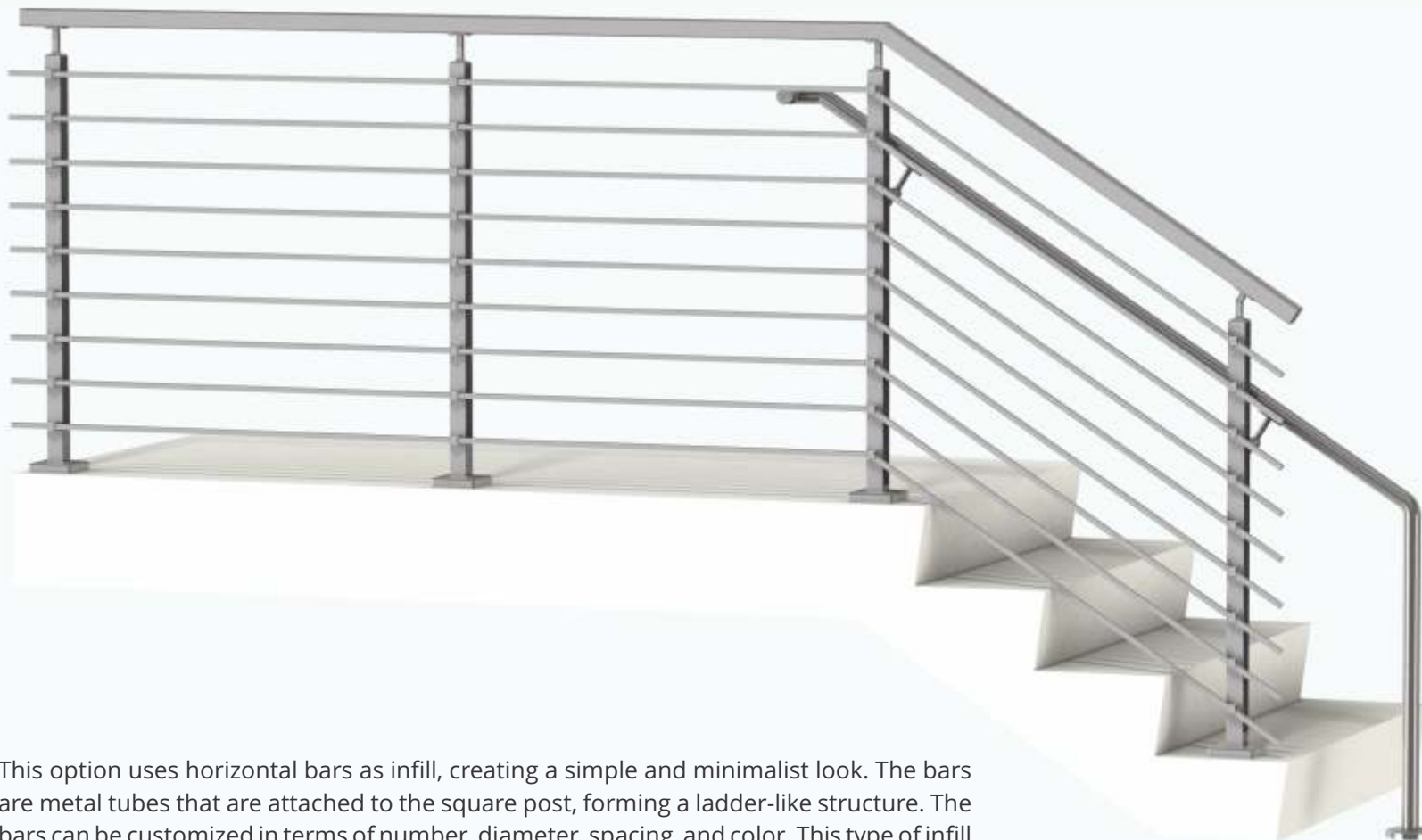
This option uses glass clips to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the square post, which is mounted on the side of the surface. This type of installation is suitable for surfaces that have a vertical edge, such as stairs, balconies, or decks.

BRAWNY RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : TOP**

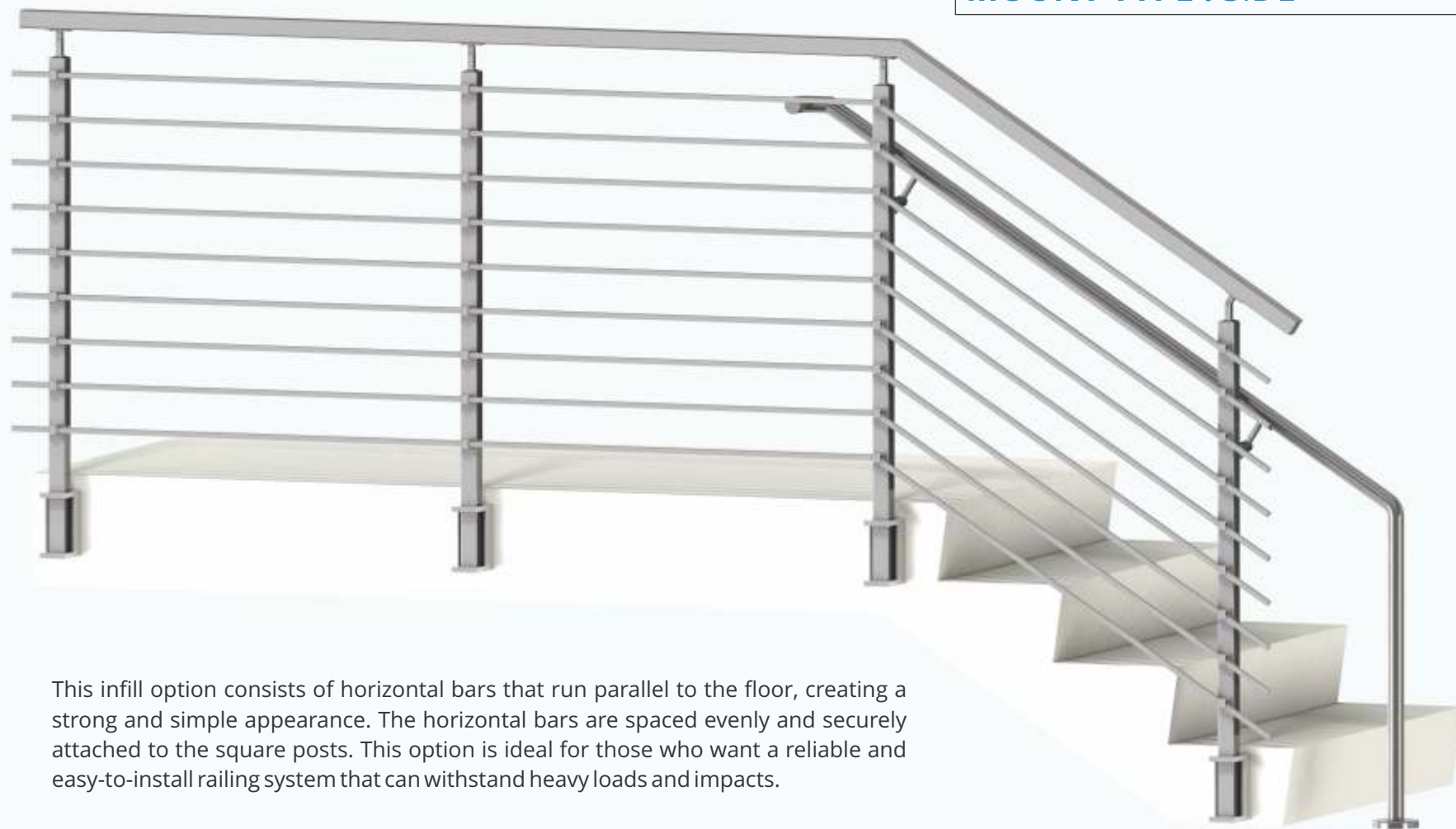
This option uses glass Spider fitting to connect the glass panels to the square post, creating a stylish and elegant look. The glass Spider fitting are small metal devices that have four arms that extend from a central point, resembling a spider. The Spider fitting are mounted on the top of the surface, along with the square post. This type of installation is suitable for flat surfaces that can support the weight of the post, the glass, and the Spider fitting.

BRAWNY RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : SIDE**

This option uses glass Spider fitting to connect the glass panels to the square post, creating a stylish and elegant look. The glass Spider fitting are small metal devices that have four arms that extend from a central point, resembling a spider. The Spider fitting are mounted on the side of the surface, along with the square post. This type of installation is suitable for surfaces that have a vertical edge, such as stairs, balconies, or decks.

BRAWNY RAILING SYSTEM**INFILL OPTION : HORIZONTAL BAR****MOUNT TYPE : TOP**

This option uses horizontal bars as infill, creating a simple and minimalist look. The bars are metal tubes that are attached to the square post, forming a ladder-like structure. The bars can be customized in terms of number, diameter, spacing, and color. This type of infill is suitable for any surface and provides stability and durability.

BRAWNY RAILING SYSTEM**INFILL OPTION : HORIZONTAL BAR****MOUNT TYPE : SIDE**

This infill option consists of horizontal bars that run parallel to the floor, creating a strong and simple appearance. The horizontal bars are spaced evenly and securely attached to the square posts. This option is ideal for those who want a reliable and easy-to-install railing system that can withstand heavy loads and impacts.

BRAWNY RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : TOP**

This option uses vertical pickets as infill, creating a classic and traditional look. The pickets are metal rods that are attached to the square post, forming a fence-like structure. The pickets can be customized in terms of height, width, spacing, and color. This type of infill is suitable for any surface and provides safety and security.

BRAWNY RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : SIDE**

This infill option consists of vertical pickets that run perpendicular to the floor, creating a classic and graceful appearance. The vertical pickets are spaced evenly and securely attached to the square posts. This option is ideal for those who want a traditional and refined railing system that can provide safety and privacy.

BRAWNY RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : TOP**

This option uses wire mesh system as infill, creating a unique and modern look. The wire mesh system is a flexible and versatile material that consists of interlocking metal wires that form a grid-like pattern. The wire mesh system is attached to the square post, forming a net-like structure. The wire mesh system can be customized in terms of size, shape, color, and design. This type of infill is suitable for any surface and provides flexibility and creativity.

BRAWNY RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : SIDE**

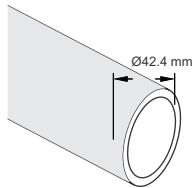
This infill option consists of wire mesh that covers the entire area between the square posts, creating a rustic and industrial appearance. The wire mesh is made of high-quality stainless steel and securely attached to the square posts. This option is ideal for those who want a versatile and functional railing system that can offer ventilation and durability.

BRAWNY RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : INCLINED**

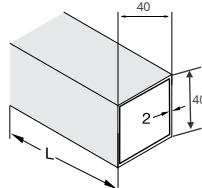
Discover the innovative Brawny railing design featuring square posts mounted at a subtle incline. This unique approach not only adds a touch of modern elegance but also enhances structural stability, providing a robust and stylish solution for your railing needs. Elevate your space with Brawny's blend of contemporary design and functional excellence.

TOP RAIL ATTACHMENTS

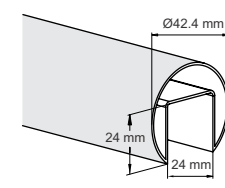
ROUND TUBE



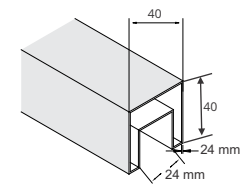
SQUARE TUBE



ROUND U TUBE

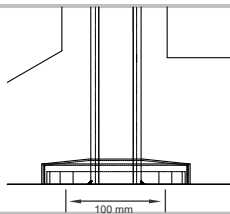


SQUARE U TUBE

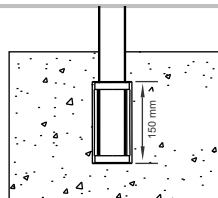


BASE ATTACHMENTS

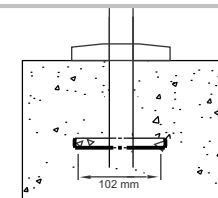
TOP MOUNT



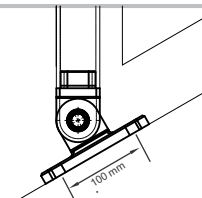
FASCIA MOUNT



CORE MOUNT



INCLINED



ROYALE

RAILING SYSTEM

The Royale design is a luxurious and elegant option for your railing needs. It features aluminium channel that is either side mounted or top mounted to the floor or the wall, creating a sleek and seamless look. The aluminium channel is made of high-quality aluminium alloy and powder coated to resist corrosion and rust. The aluminium channel can hold tempered glass panels or laminated glass panels as infill, creating a transparent and modern appearance.

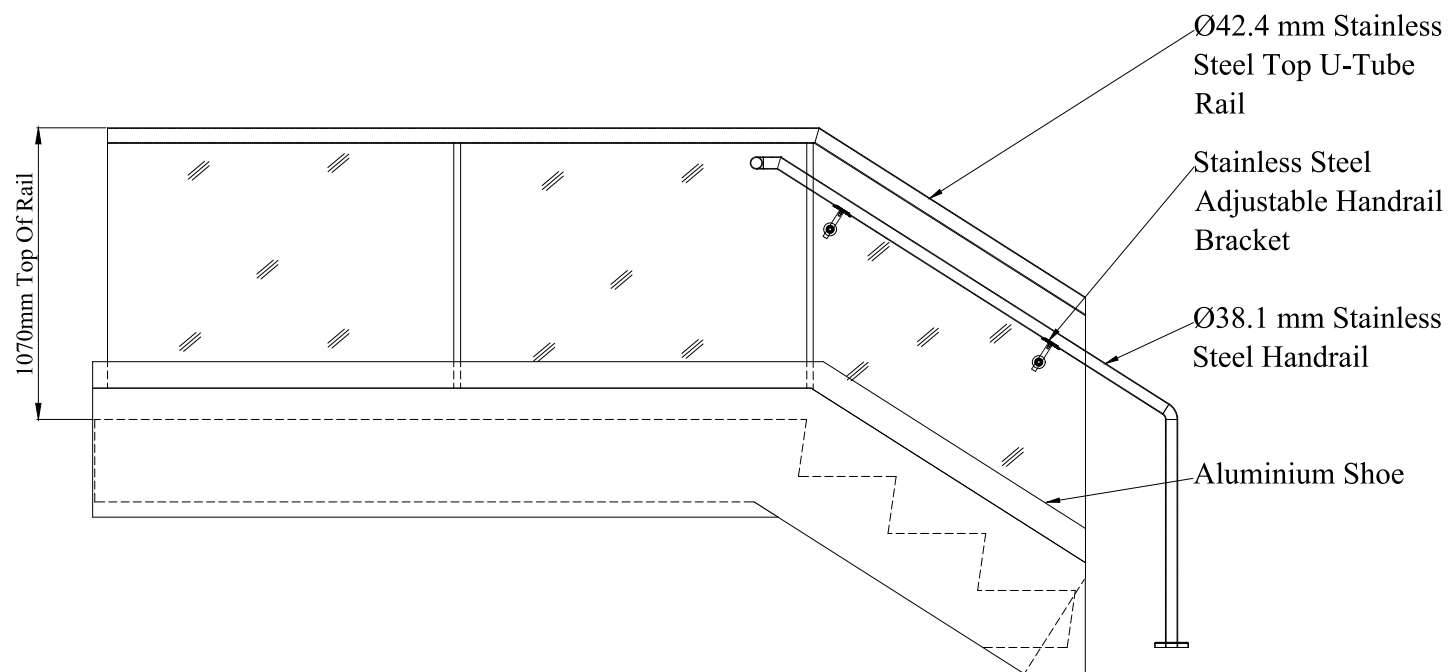


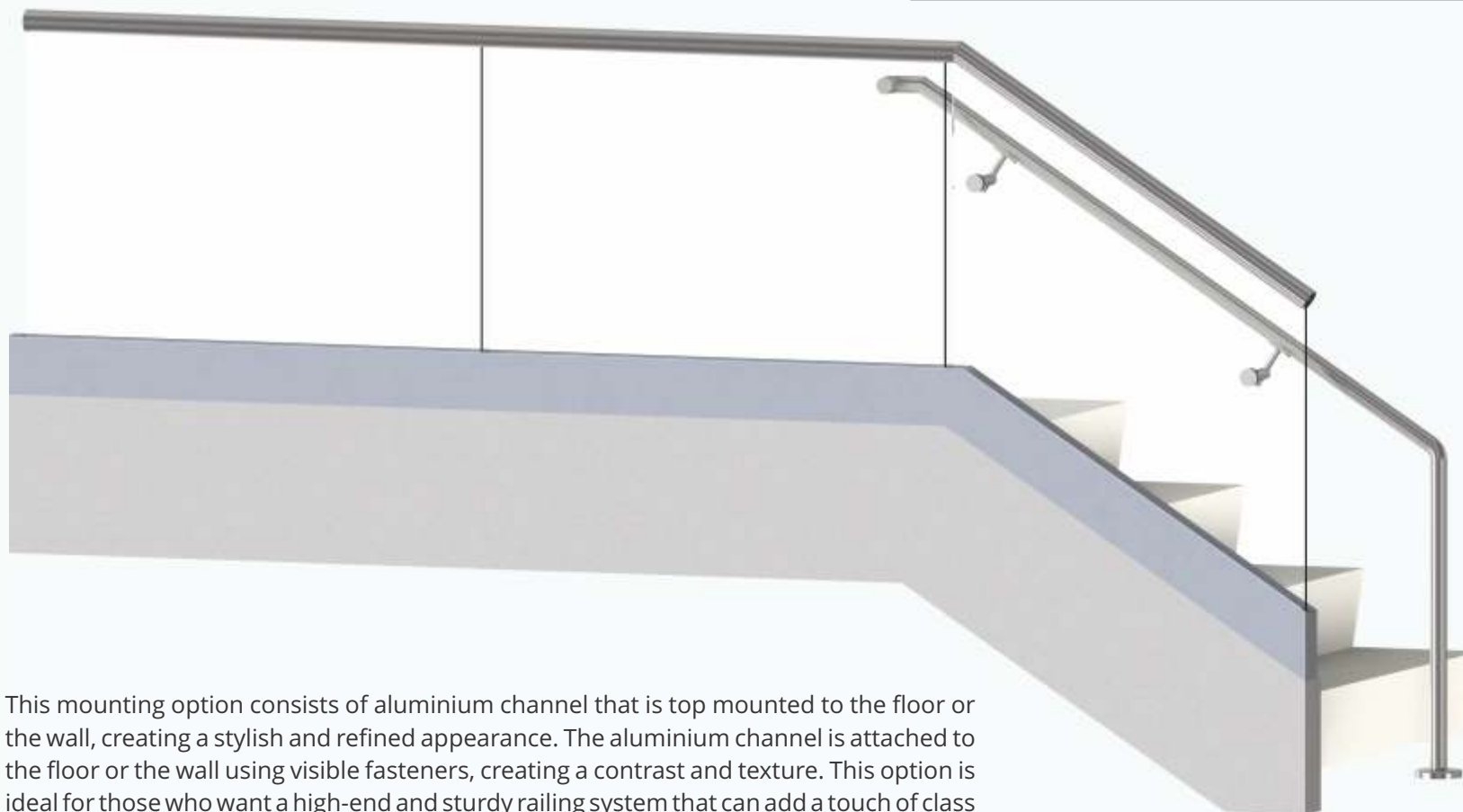
ROYALE RAILING SYSTEM

TECHNICAL DATA	TYPE/SHAPE	MATERIAL	FINISH	STANDARD SPACING / SIZE IN mm (Inch)
SHOE	Top/Fascia Mount	6063-T6 Aluminium	Natural/Anodized	Continuous
INFILL OPTIONS	Glass	Glass	Clear	12.76 - 27 mm (1/2" - 1 1/16") laminated glass
	Glass Bracket	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	1220 mm (4') On Center - Standard
TOP RAIL / HAND RAIL	Round or Square Tube	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 48.3 / 38.1 mm (1 7/8" - 1 1/2") - Standard Sq. 40x40 mm (1 5/8" x 1 5/8") - Standard
	Round or Square U-Tube			Dia. 42.4 mm (1 7/8") - Standard Sq. 40x40 mm (1 5/8" x 1 5/8") - Standard
	Top U-Cap		#4, #6 Satin	25 - 38 mm (1" - 1 1/2") High

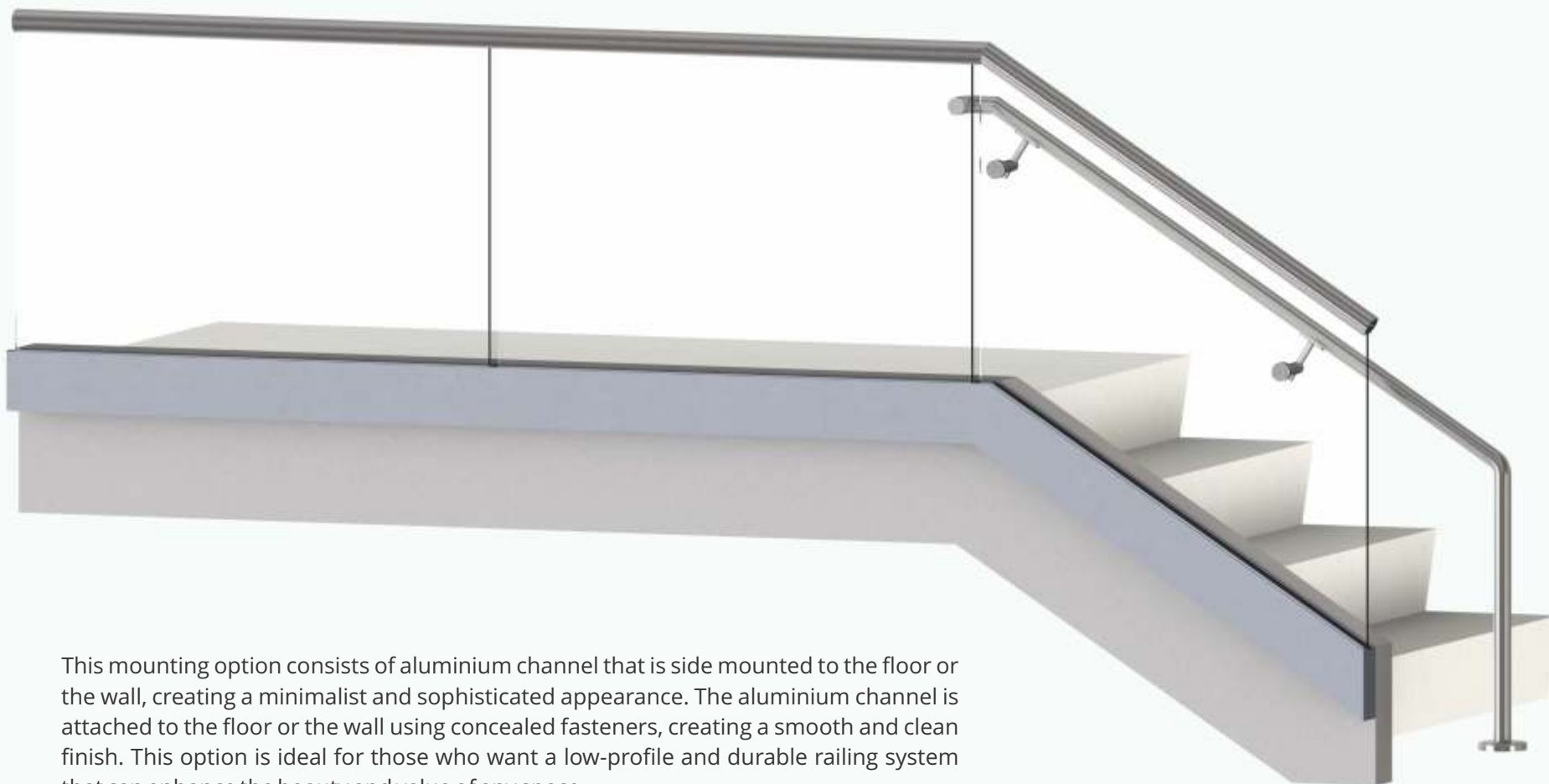
Note: Standards specifies customization or other sizes are also available for that option.

STANDARD LINE DIAGRAM



ROYALE RAILING SYSTEM**INFILL OPTION : GLASS WITH BRACKET****MOUNT TYPE : TOP**

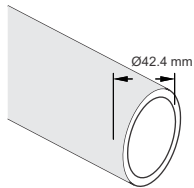
This mounting option consists of aluminium channel that is top mounted to the floor or the wall, creating a stylish and refined appearance. The aluminium channel is attached to the floor or the wall using visible fasteners, creating a contrast and texture. This option is ideal for those who want a high-end and sturdy railing system that can add a touch of class to any space.

ROYALE RAILING SYSTEM**INFILL OPTION : GLASS WITH BRACKET****MOUNT TYPE : SIDE**

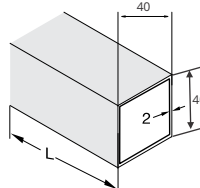
This mounting option consists of aluminium channel that is side mounted to the floor or the wall, creating a minimalist and sophisticated appearance. The aluminium channel is attached to the floor or the wall using concealed fasteners, creating a smooth and clean finish. This option is ideal for those who want a low-profile and durable railing system that can enhance the beauty and value of any space.

TOP RAIL ATTACHMENTS

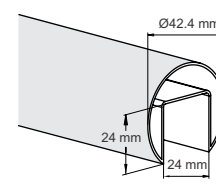
ROUND TUBE



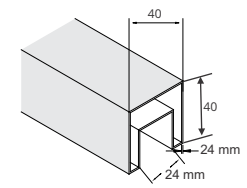
SQUARE TUBE



ROUND U TUBE

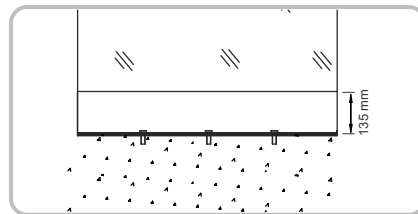


SQUARE U TUBE

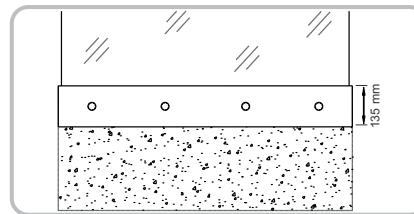


BASE ATTACHMENTS

TOP MOUNT



FASCIA MOUNT



TWIN RAIL

RAILING SYSTEM

Twin Rail is a design that offers a sleek and modern look for your railing system. It features a double flat bar post that can be mounted on the top or the side of the surface, and can accommodate various types of infill options. Whether you choose glass, pickets, bars, or wire mesh, Twin Rail will enhance the aesthetic and functionality of your space.

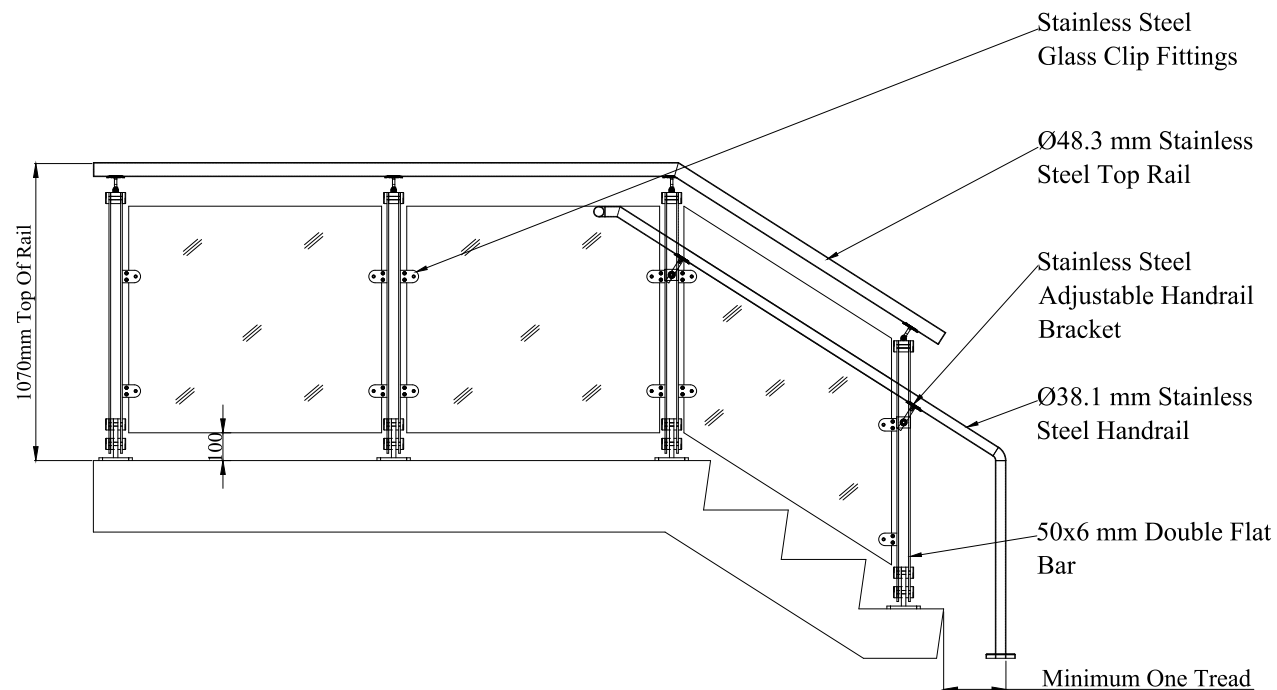


TWIN RAIL RAILING SYSTEM

TECHNICAL DATA	TYPE/SHAPE	MATERIAL	FINISH	STANDARD SPACING / SIZE IN mm (Inch)
POST	Double Flat	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	1220 mm (4') On Center - Standard
INFILL OPTIONS	Glass with clips	Glass	Clear	10.76 - 12.76 mm (3/8" - 9/16") laminated glass
	Glass with spider			
	Horizontal Bar	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 10 - 16 mm (13/32" - 5/8") hollow or solid
	Vertical Pickets		Natural	Dia. 5 mm (3/16") - Standard
	Wire Mesh			
TOP RAIL / HAND RAIL	Round or Square Tube,	304 or 316 stainless steel	#4, #6 Satin or #8 Mirror	Dia. 48.3 / 38.1 mm (1 ⁷ / ₈ " - 1 ¹ / ₂ ") - Standard Sq. 40x40 mm (1 ⁵ / ₈ " x 1 ¹ / ₈ ") - Standard
	Round or Square U-Tube			Dia. 42.4 mm (1 ⁷ / ₈ " - 1 ¹ / ₂ ") - Standard Sq. 40x40 mm (1 ⁵ / ₈ " x 1 ¹ / ₈ ") - Standard

Note: Standards specifies customization or other sizes are also available for that option.

STANDARD LINE DIAGRAM

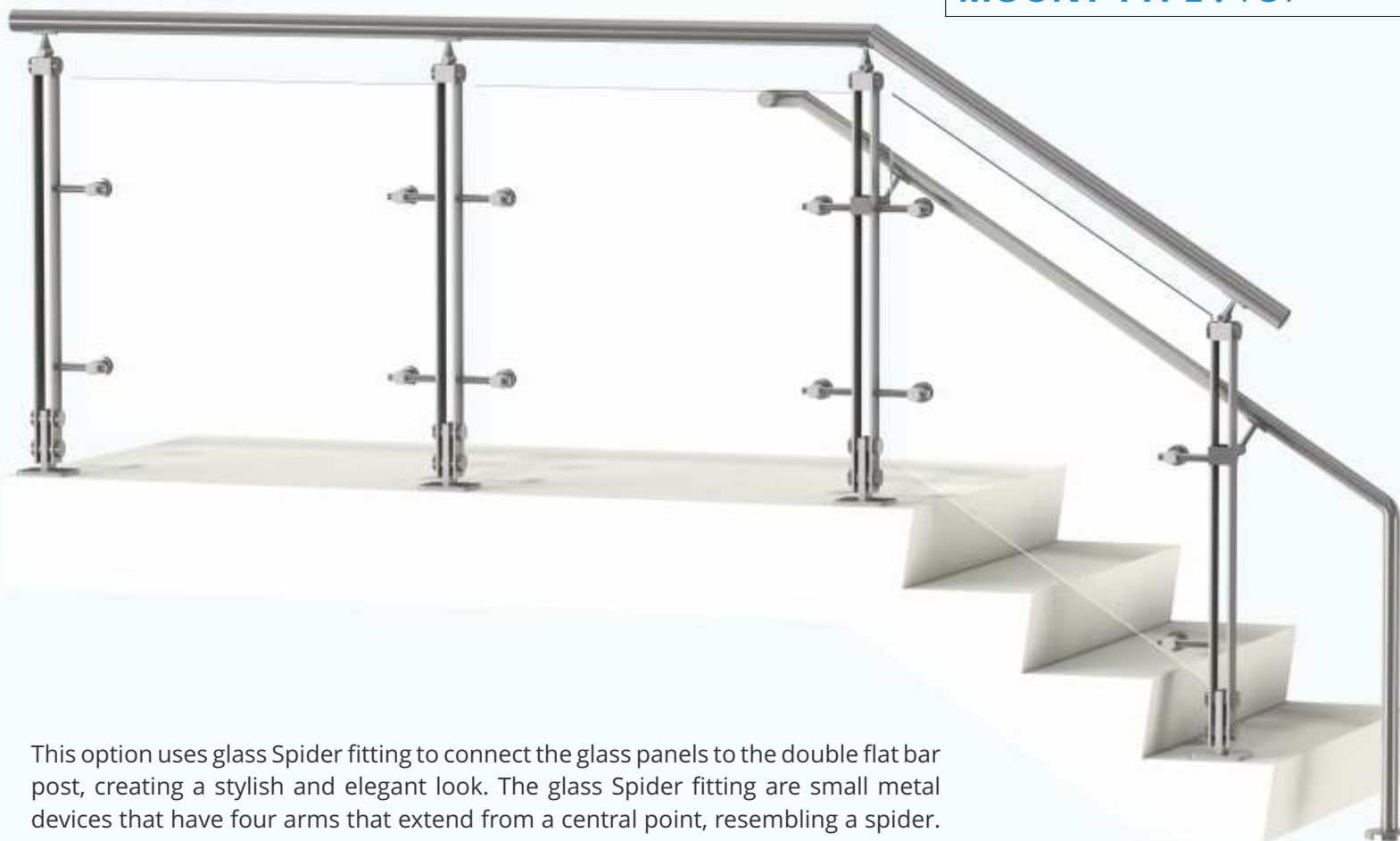


TWIN RAIL RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : TOP**

This option uses glass clips to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the double flat bar post, which is mounted on the top of the surface. This type of installation is suitable for flat surfaces that can support the weight of the post and the glass.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : GLASS WITH CLIPS****MOUNT TYPE : SIDE**

This option uses glass clips to hold the glass panels in place, creating a seamless and transparent view. The glass clips are attached to the double flat bar post, which is mounted on the side of the surface. This type of installation is suitable for surfaces that have a vertical edge, such as stairs, balconies, or decks.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : TOP**

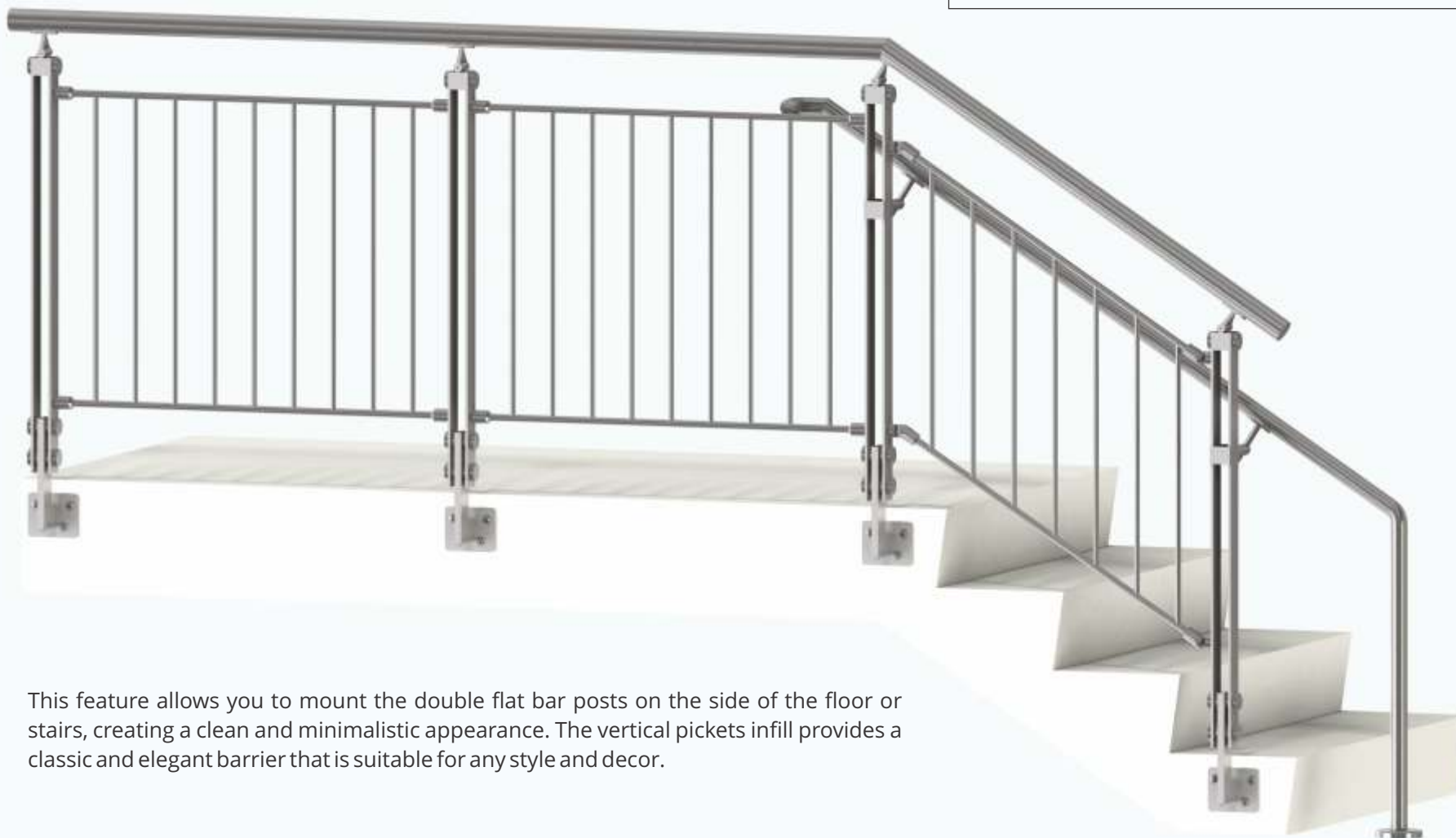
This option uses glass Spider fitting to connect the glass panels to the double flat bar post, creating a stylish and elegant look. The glass Spider fitting are small metal devices that have four arms that extend from a central point, resembling a spider. The Spider fitting are mounted on the top of the surface, along with the double flat bar post. This type of installation is suitable for flat surfaces that can support the weight of the post, the glass, and the Spider fitting.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : GLASS WITH SPIDER****MOUNT TYPE : SIDE**

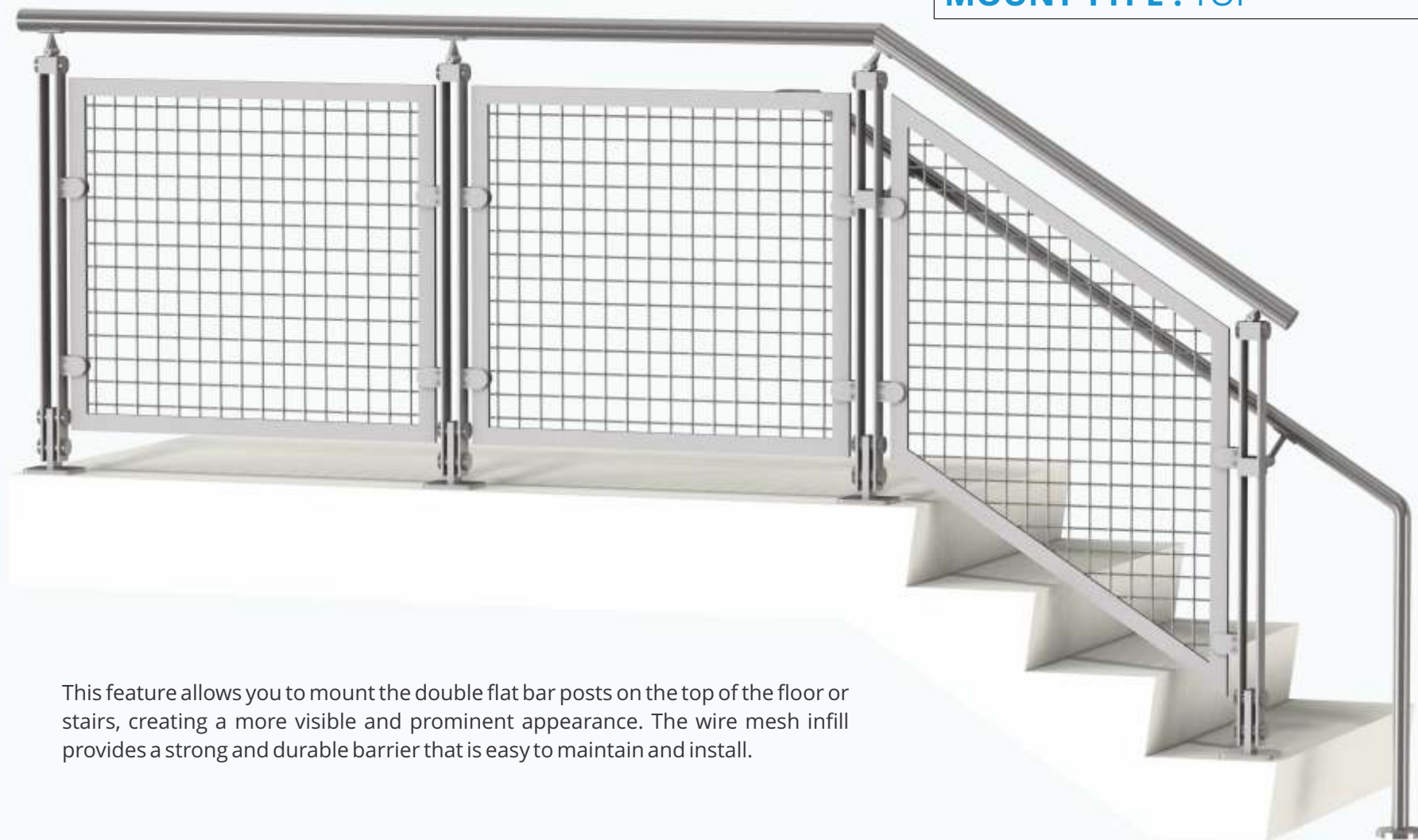
This feature allows you to mount the double flat bar posts on the side of the floor or stairs, creating a clean and minimalistic appearance. The spider fitting in glass infill provides a transparent and modern barrier that allows natural light and views to pass through.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : TOP**

This feature allows you to mount the double flat bar posts on the top of the floor or stairs, creating a more visible and prominent appearance. The vertical pickets infill provides a classic and elegant barrier that is suitable for any style and decor.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : VERTICAL PICKETS****MOUNT TYPE : SIDE**

This feature allows you to mount the double flat bar posts on the side of the floor or stairs, creating a clean and minimalistic appearance. The vertical pickets infill provides a classic and elegant barrier that is suitable for any style and decor.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : TOP**

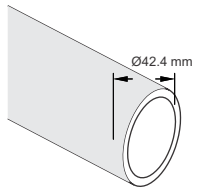
This feature allows you to mount the double flat bar posts on the top of the floor or stairs, creating a more visible and prominent appearance. The wire mesh infill provides a strong and durable barrier that is easy to maintain and install.

TWIN RAIL RAILING SYSTEM**INFILL OPTION : WIRE MESH****MOUNT TYPE : SIDE**

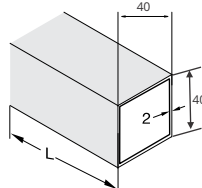
This feature allows you to mount the double flat bar posts on the side of the floor or stairs, creating a clean and minimalistic appearance. The wire mesh infill provides a strong and durable barrier that is easy to maintain and install.

TOP RAIL ATTACHMENTS

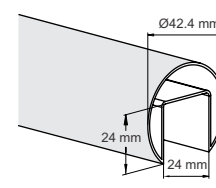
ROUND TUBE



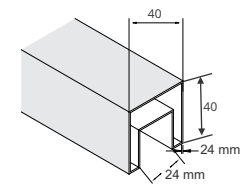
SQUARE TUBE



ROUND U TUBE

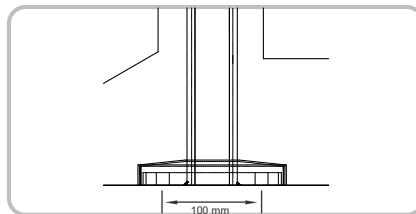


SQUARE U TUBE

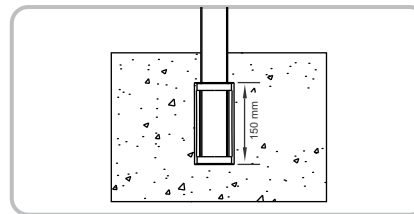


BASE ATTACHMENTS

TOP MOUNT



SIDE MOUNT



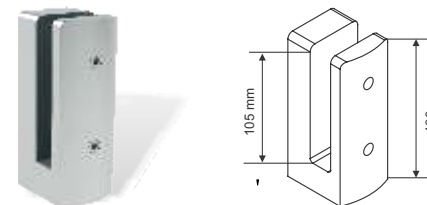
FRAMELESS

GLASS RAILING

Elevate your space with sophistication and transparency through our frameless glass railing. Crafted with precision, stainless steel spigots and glass holders ensure a seamless blend of modern design and structural integrity. Experience unobstructed views and contemporary elegance like never before.

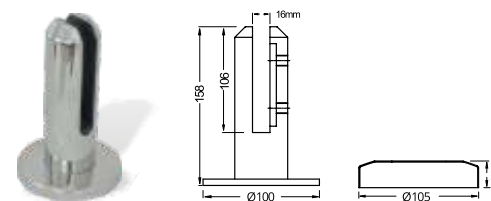


FASCIA MOUNT SPIGOT



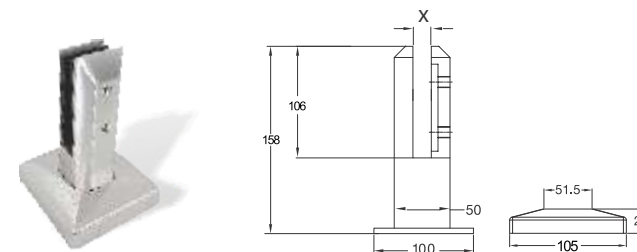
Part No.	Height	Glass Size
SGD.101.01.16.S	130 mm	12-17.52 mm

ROUND SPIGOT



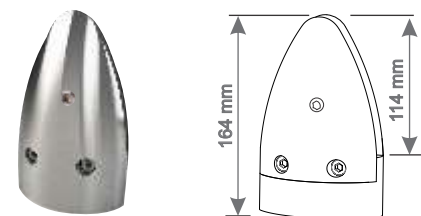
Part No.	Height	Glass Size
SGR.101.12.16.S	158 mm	10 - 12 mm

SQUARE SPIGOT



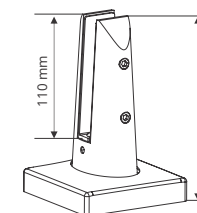
Part No.	Height	Glass Size
SGS.102.03.16.S	158 mm	13.52 - 17.52 mm

ALPINE SPIGOT



Part No.	Height	Glass Size
SGE.101.01.04.S	164 mm	10 to 12.76 mm

OVAL SPIGOT



Part No.	Height	Glass Size
SGO.101.01.16.S	163 mm	12-17.52 mm

Spigots are also available with PVD Technology



Rose Gold



Black



Yellow



Golden



Rainbow

GLASS HOLDER



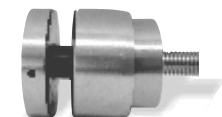
Adjustable Standoff (Round)



Adjustable Standoff (Square)



Adjustable Standoff (Round)



Adjustable Standoff (Round)

WALL RAIL

RAILING SYSTEM

Discover the epitome of elegance with our stainless steel railing brackets. Crafted for both style and durability, these brackets seamlessly blend sophistication with sturdy support, elevating your space to new heights. Elevate your surroundings with the timeless allure of stainless steel precision.



GLASS BRACKETS



Handrail Bracket for Glass



Handrail Bracket for Glass Mounting



Swivel Handrail Bracket for Glass



Handrail Bracket for Glass(Cavo)



Handrail Bracket for Glass Mounting in Casting



Classic Glass Bracket

WALL BRACKETS



Wall Bracket with Short Tube Saddle



Aluminium Alloy Wall Bracket with Hole



Wall Bracket with Long Tube Saddle



Fixed Wall Bracket with Plate without Hole



Wall Bracket with Swivel Saddle



Flexible Wall Bracket with Plate without Hole

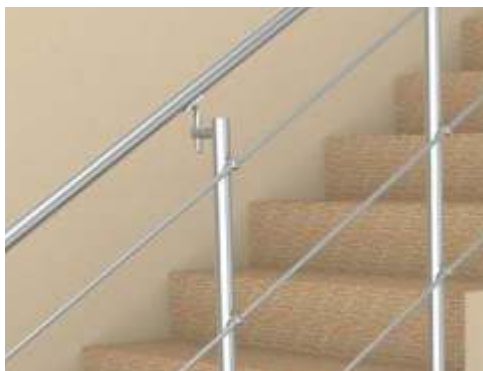
HANDRAIL BRACKETS



Swivel Handrail Bracket for Round Post



Swivel Handrail Bracket for Flat Post



Swivel Handrail Bracket for Round Post

LED RAILING BRACKETS



Tube Support



Wall Bracket



Wall Bracket

PROJECTS GALLERY

Rinox, a German lineage company, has been involved in several prestigious projects across the globe. Their railings have been used in projects in India, Germany, USA, Nigeria, and many more countries. Rinox is a trendsetter in the global stainless steel architectural space and is India's largest exporter of stainless steel architectural hardware to Europe. Over the years, the system has become popular and has been adopted all over the world. Rinox has stayed close to its German roots, and all its designs have a distinctive European feel to them.



OUR CLIENTS

WOXSEN
SCHOOL OF BUSINESS

VEGAS
It's happening!

Sagar
Raina

AMRITA
HOSPITAL
FARIDABAD
Embrace Good Health

HONDA

Jio
WORLD
CENTRE

TOYOTA

Mahindra

Nestlé

EGL ENTERPRISES LTD

MOTOR
HARLEY-DAVIDSON
CYCLES

PALLADIUM
— LUXURY RECEPTION —

EMBASSY
PRISTINE

PHOENIX | KESSAKU
THE MASTERPIECE

emami
CITY

Unity

NEXA

lemon tree
HOTELS

HOTEL
CHENTHUR PARK

CANDOR
TechSpace



Project - Arena Corinthians
Product Used - Rinox Railings

 **Brazil**



Project - Meerhof 2.0 Apartment
Product Used - Rinox Railings

 **Estonia**



Project - E & L Enterprise
Product Used - Rinox Railings

 **Malta**



Project - Cementers Head Office
Product Used - Rinox Railings



 **Uganda**



Project - Europa Centre
Product Used - Rinox Railings

 **Germany**



Project - Love of Christ Generation Church
Product Used - Rinox Railings

 **Nigeria**



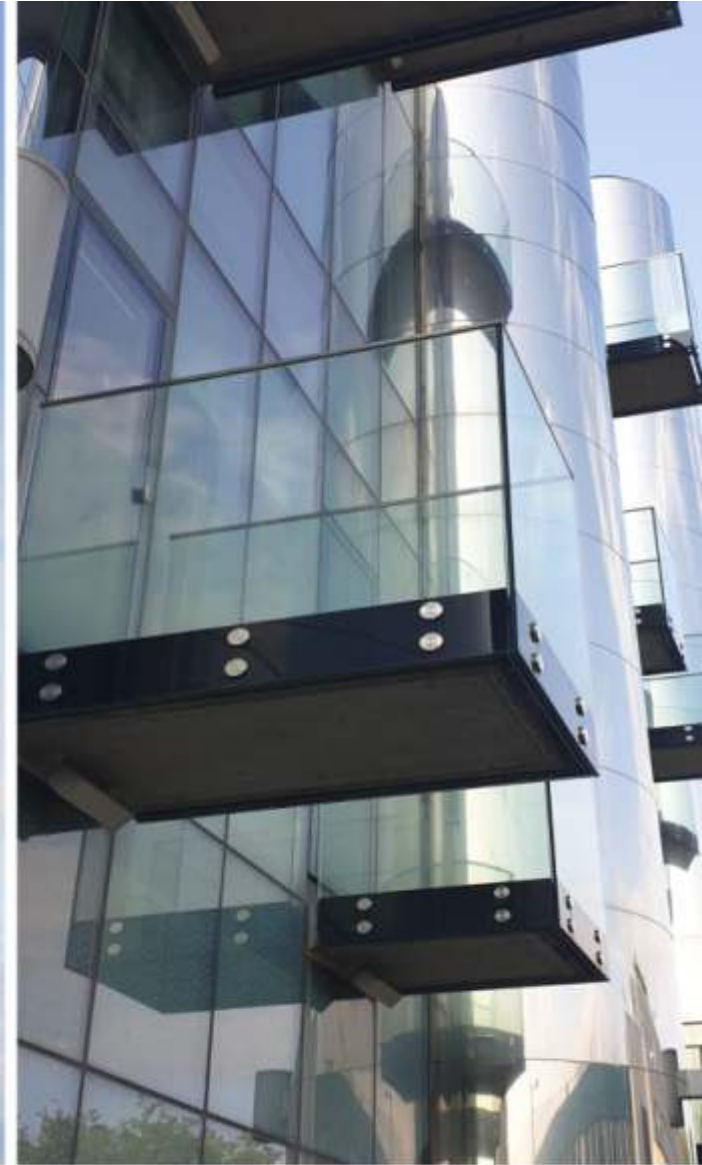
Project - Multi-Vac
Product Used - Rinox Railings

 **USA**



Project - Aria Hotel
Product Used - Glass Holders

 **Serbia**



Project - Tallink Hotel
Product Used - Glass Holders

 **Estonia**



Project - Nashville Soccer Club TTL
Product Used - Aluminium Channel

 **U.S.A**

ARCHITECTURAL EXCELLENCE

DESIGN - CALCULATE - TEST

Rinox has built significant experience and capabilities in calculating wind load pressures and designing railings accordingly. Their team provides technical assistance in selecting designs based on site requirements such as topography, wind-load, etc. Rinox handles all aspects of the project, including estimation, design, production, and final installation.



DESIGN CALCULATION

1. Ideal Model



Loading

Sr.No.	Load	Value	Remarks
1.	Uniform Load	50 lb/feet	
2.	Concentrated Load	200 lb	

3. Assumptions

Strength of Aluminium taken as 25000 psi for Grade 6063-T6

4. Design of Sections

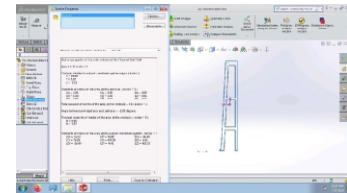
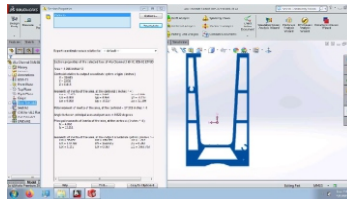
Section in Bending (Full Section)

Bending Moment Concentrated Load	=	$P(h) = 200(42) = 8400 \text{ lb-in}$	
Bending Moment Uniform Load	=	$(w/12)L(h) = (50/12)39(42) = 6825 \text{ lb-in}$	
Max Bending Moment (M)	=	8400 lb-in	(1)
Moment of Inertia I_x	=	4.962 in ⁴	From Software
Distance of Extreme Fibre	=	1.476 in	From Software
Moment of Inertia I_y	=	12.211 in ⁴	From Software
Distance of Extreme Fibre	=	3.292 in	From Software

5. Vertical leg under Bending

Wall Thickness of web near Base	=	0.118 in	
Outside Dimension near Base D	=	0.65 in	
Considering 1 feet section in length for bending B, b =	=	12 in	
Bending Moment Concentrated Load	=	$P(h) = 200(42) = 8400 \text{ lb-in}$	
Bending Moment Uniform Load	=	$(w/12)L(h) = (50/12)39(42) = 6825 \text{ lb-in}$	
Max Bending Moment (M)	=	8400 lb-in	
Moment over 1 Feet	=	$\frac{8400(12)}{39} = 2585 \text{ lb-in/ft}$	(1.1)
Plastic Section Modulus at Base of Vertical Leg Z =	=	$\frac{BD^2}{4} - \frac{bd^2}{4} = \frac{12(0.65)^2}{4} - \frac{12(0.414)^2}{4} = 0.753 \text{ in}^3$	
$d = (0.65) - 2(0.118) = 0.414 \text{ in}$			
(F _y)	=	25000 psi	Grade 6063-T6
Moment Capacity	=	$F_y Z = 25000 \times 0.753 = 18825 \text{ lb-in}$	
Factor of Safety	=	1.65	
Moment Capacity	=	11409 lb-in/ft	(3)

So Moment Capacity (3) is More than Applied Moment (1.1).



6. Reactions

Considering Free Body Diagram as shown in Fig. 1 Approx. Weight of Assembly = 136 lbs (From Software)

Applied Force (P) = 200 lb

Resolving all Forces in Vertical & Horizontal Plane as shown in Fig. 2

According to Conditions of Static Equilibrium for a plane force condition (2-D Force Condition)

1. Algebraic sum of All Vertical forces in a free body is zero. Mathematically $\Sigma V=0$, where V is Vertical forces
2. Algebraic sum of All Horizontal forces in a free body is zero. Mathematically $\Sigma H=0$, where H is Horizontal forces
3. Algebraic sum of Moment about any fixed Point in a free body is zero.

Mathematically $\Sigma M=0$, where M is Moment due to forces

Now Taking Upward force to be +ve
So $+R - W = 0$ or $R = 136 \text{ lbs}$

Taking Force towards Left to be +ve
So $-P - F = 0$ or $F = 200 \text{ lbs}$

Taking moment due to P

$$P \times L = F \times L1$$

$$\Rightarrow F = \frac{PL}{L1} = \frac{200(42)}{1.48} = 5676 \text{ lbs}$$

Upward reaction R is the reaction provided by the resting surface against the weight exerted by the assembly in downward direction.

Rightward reaction F will tend to shear the anchors as it is acting perpendicular to the axis of the anchor and should be resisted by considering a minimum of 2 bolts.

So net force in shear to be resisted by each bolt is

$$\frac{5676 + 200}{2} = 2938 \text{ lb} \quad \text{Say } (\mathbf{58\text{-}Max}) \quad (4)$$

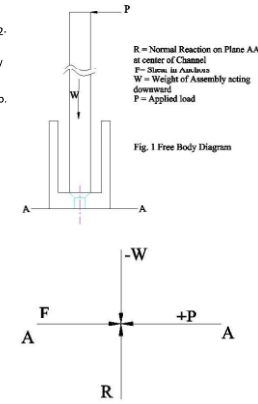


Fig. 2 Resolving all forces on Plane AA at center of Channel

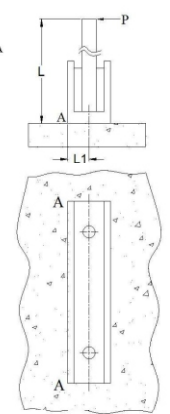


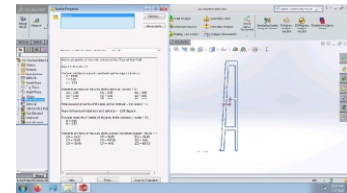
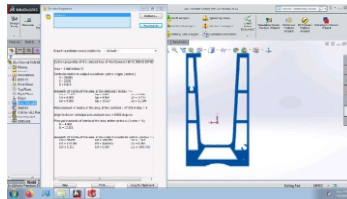
Fig. 3 Eccentric Load Perpendicular to axis of bolts.

RINOX ENGINEERING

DESIGN CALCULATIONS

S_x	=	$\frac{I_x}{y_y} = \frac{4.962}{1.476} = 3.362 \text{ in}^3$	
S_y	=	$\frac{I_y}{y_x} = \frac{12.211}{3.292} = 3.71 \text{ in}^3$	
Minimum Section Modulus (S)	=	3.362	
(F _y)	=	25000 psi	Grade 6063-T6
Moment Capacity	=	$F_y S = 25000 \times 3.362 = 84050 \text{ lb-in}$	
Factor of Safety	=	1.65	
Moment Capacity	=	50939.4 lb-in	(2)

So Moment Capacity (2) is More than Applied Moment (1).



RINOX ENGINEERING

DESIGN CALCULATIONS

Since Bending Moment is more for Concentrated Load, So this force will have more Tension component due to distance of application from fixing points. So Considering Bending Moment due to concentrated Load Only.

As Shown in Fig. 3 Concentrated Load Applied (P) & fixing due to anchors railing tend rotate about AA. It is known that the bolts will be subjected to Tensile stress due to Turning Moment.

Since all the bolt are in line & at same perpendicular distance from AA & As we have seen this type of loading is a case of eccentric load acting perpendicular to the axis of bolts. So they all will be equally loaded due to same distance & Max tensile Load on each bolt will be given by

$$T_{B-Max} = \frac{PLL}{n(L1)^2} = \frac{200(42)(1.48)}{4(1.48^2)} = 1418 \text{ lb} \quad \text{We also know when bolts are subjected to both Tension & Shear then its equivalent load in Tension is given by}$$

$$T_{B-Max} = \frac{1}{2} \left[T_{B-Max} + \sqrt{T_{B-Max}^2 + 4S_{B-Max}^2} \right]$$

$$= \frac{1}{2} \left[1418 + \sqrt{1418^2 + 4(2938^2)} \right] = 3731 \text{ lb}$$

7. Design of Shims/Wedges

The Horizontal Component for Resolved Forces as Earlier in Fig. 2 will also subject the wedges to compressive forces.

Compressive Force = 2938 lb

From Fig. 4 below Minimum area of Shim resisting Compression

WxH (of Contact Area) = 2.17x2.34=5.08 in²

Considering Only 40 % of Total Area due to Section being Hollow

So net Area resisting Compression is

$A_w = 0.4 \times 5.08 = 2 \text{ in}^2$

Number of Wedges in 3.28 feet is 4

So Stress = $\frac{\text{Load}}{\text{Area}}$

Compressive Strength of ABS Plastic is 9400 psi

So Load it can withstand is

Stress x Area

or $9400 \times (2^4) = 75200 \text{ lb}$

Factor of Safety 2

Applying Factor of Safety

$$\frac{75200}{2} = 37600 \text{ lb}$$

which is more than the compressive forces experienced by the Wedges (2938 lb)
So These are also Safe under Compression.

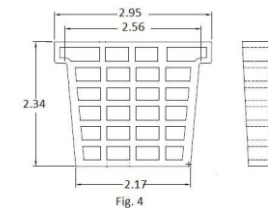


Fig. 4

DESIGN CALCULATION

Design of Brawny Post

1. Applicable Loads according to IBC

200-pound concentrated load acting on the top rail.
50-pound/feet uniform load acting on the top rail.
Post / Rail height of 42 inches.
Maximum post spacing of 48 inches.
Handrail Square 1.5x1.5x0.08 Inch
Post Section Square 2x2x0.12 Inch
Factor of Safety 1.67, Applied on Capacity Side

2. Load Proportion Factor from NAAM AS1621-01

$$CR = \frac{C_{rail}}{C_{post}} = \frac{[(E)(I)/L]}{[(E)(I)/h]} \quad (1)$$

Where CR = Stiffness Ratio
Crail = stiffness of rail
Cpost = stiffness of post
E = modulus of elasticity (psi x 10⁶)
I = moment of inertia (in⁴)
L = post spacing (inches)
h = post height (inches)

$$I_{rail} = 0.146 \text{ in}^4 \quad (\text{See Table})$$

$$I_{post} = 0.503 \text{ in}^4 \quad (\text{See Table})$$

$$CR = \frac{C_{rail}}{C_{post}} = \frac{[(E)(I)/L]}{[(E)(I)/h]} = \frac{[(28000000)(0.146)/48]}{[(28000000)(0.503)/42]} = 0.254 \quad (2)$$

From Stiffness Ratio estimated Load Proportion Factor (Pf) from Stiffness Ratio Chart are

End posts of 2-span rail – 0.93 (Refer Fig-1)

Intermediate posts of 2-span rail – 0.825 (Refer Fig-1)

Table 1-7A (continued) Square HSS (Roll Formed) Dimensions and Properties														
Shape	Wall Thickness t	Nominal Wt. Lb/ft	Area, A in. ²	Perimeter, P in.	I _x in. ⁴	I _y in. ⁴	S _x in. ³	S _y in. ³	Z _x in. ³	Z _y in. ³	Torsion		Surface Area ft ² /ft	
											J in. ⁴	C in.		
	in.	lb/ft	in. ²	in.	in. ⁴	in. ⁴	in. ³	in. ³	in. ³	in. ³	in. ⁴	in.	ft ² /ft	
HSS4 4 0.080	0.080	21.4	6.16	3.30	11.6	5.80	1.37	1.47	1.75	0.71	0.23	0.23	1.16	
	0.075	17.6	5.08	6.07	6.07	10.7	5.36	1.45	1.72	0.71	0.23	0.23	1.16	
	0.070	14.9	4.28	8.01	6.01	9.29	4.85	1.47	1.76	0.70	0.22	0.22	1.16	
	0.065	12.4	3.60	10.0	6.22	4.11	1.51	1.49	2.08	1.03	0.20	0.20	1.16	
	0.060	9.23	2.66	18.1	6.36	3.18	1.55	1.77	3.19	10.3	0.40	0.40	1.16	
	0.055	6.35	1.83	29.7	6.55	2.28	1.58	2.65	3.46	7.12	0.40	0.40	1.16	
HSS3.5 3.5 0.050	0.050	10.7	3.09	10.0	5.29	3.02	1.21	1.69	2.38	8.89	0.49	0.49	1.10	
	0.045	7.98	2.30	15.3	5.51	4.14	2.37	1.34	2.69	6.78	0.58	0.58	1.11	
	0.040	5.51	1.59	25.5	5.65	3.06	1.71	1.57	2.90	4.72	0.55	0.55	1.14	
	0.035	3.89	1.12	38.8	5.88	2.17	1.24	1.39	1.43	3.13	0.35	0.35	1.15	
	HSS3 3 0.035	0.035	12.4	3.58	4.00	3.58	2.58	1.04	1.36	1.31	7.06	4.00	0.893	
		0.030	8.98	2.59	8.00	4.00	3.16	2.11	1.10	1.88	5.40	3.20	0.928	
0.025		6.74	1.94	12.5	4.25	2.51	1.87	1.14	2.62	4.17	2.54	0.946		
0.020		4.68	1.36	21.4	4.44	1.84	1.22	1.17	1.45	2.46	2.69	1.84	0.969	
0.015		3.19	0.901	34.0	4.63	1.36	0.897	1.19	1.09	2.94	2.02	1.29	0.989	
HSS2.5 2.5 0.025		0.025	7.24	2.09	6.00	6.00	1.59	1.35	0.899	1.71	1.36	2.97	2.07	0.702
	0.020	5.49	1.56	9.72	1.28	1.10	0.995	1.38	1.69	2.33	1.68	0.780		
	0.015	3.85	1.11	17.2	1.02	0.824	0.962	0.980	1.96	1.66	1.24	0.802		
	0.010	2.64	0.761	27.7	0.736	0.589	0.682	0.686	2.14	1.15	0.878	0.813		
	0.008	2.00	0.574	37.5	0.568	0.453	0.591	0.524	2.22	0.885	0.881	0.815		
	HSS2 2 0.020	0.020	5.51	1.59	4.00	4.00	0.766	0.766	0.694	1.00	0.875	1.39	1.19	0.595
0.015		4.24	1.22	5.94	0.643	0.648	0.735	0.612	1.19	1.13	0.995	0.613		
0.010		3.02	0.870	10.0	0.529	0.530	0.796	0.625	1.44	0.801	0.754	0.625		
0.008		2.08	0.601	21.5	0.515	0.515	0.779	0.420	1.64	0.578	0.545	0.647		
0.006		1.56	0.456	29.2	0.383	0.383	0.788	0.320	1.73	0.448	0.425	0.649		
HSS1.75 1.75 0.018		0.018	3.61	1.04	5.56	0.556	0.408	0.608	0.594	0.940	0.725	0.720	0.530	
	0.015	2.69	0.760	10.9	0.525	0.371	0.658	0.451	1.21	0.637	0.567	0.552		
	0.010	1.87	0.539	17.7	0.347	0.282	0.677	0.394	1.36	0.583	0.420	0.563		
	0.008	1.42	0.412	24.0	0.319	0.221	0.684	0.298	1.47	0.507	0.332	0.565		
	HSS1.5 1.5 0.015	0.015	3.78	1.09	2.00	2.00	0.260	0.247	0.488	0.481	0.375	0.500	0.548	0.428
		0.010	2.99	0.802	4.17	0.236	0.215	0.502	0.410	0.500	0.430	0.490	0.446	

3. Section Modulus (S) of the Post Under Concentrated Load

P = Concentrated load of 200 pounds

Pf = 0.93 for end posts, 0.825 for intermediate posts [2 spans]

Base Flange height: 0.5 inches

h = 40.75 inches [rail height from the centerline of the top rail to the top of the base flange]

Post Section 2x2x0.12 Inches

$$F_y = 30000 \text{ psi}$$

$$Z = \frac{(P)(P_f)(h)}{F_y}$$

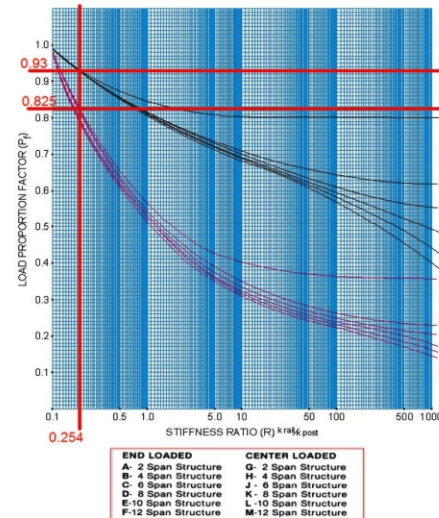


Fig-1 End Post & Intermediate Post (2 Span)

Section Modulus of End Post

$$Z = \frac{(200)(0.93)(40.75)}{30000} = 0.253 \text{ in}^3 \quad (1)$$

Section Modulus of Intermediate Post

$$Z = \frac{(200)(0.825)(40.75)}{30000} = 0.224 \text{ in}^3 \quad (2)$$

3.1 Plastic Section Modulus (Z) of the Post Under Concentrated Load for Single Span

$$Z = \frac{(P)(h)}{F_y}$$

For Single Span each post is considered to carry full concentrated load, so Load Proportion factor Pf becomes 1 or omitted in Equation

$$Z = \frac{(200)(40.75)}{30000} = 0.272 \text{ in}^3 \quad (3)$$

Actual Plastic Section Modulus of Post Section (2x2x0.12 Inches)

$$Z = 0.605 \text{ in}^3 \quad (\text{See Table 1.7A above})$$

Applying FoS = 1.67

$$Z = \frac{0.605}{1.67} = 0.362 \text{ in}^3 \quad (4)$$

4. Plastic Section Modulus (Z) of the Post Under Uniform Load

w = uniform load of 50 pounds per foot applied horizontally

L = post spacing = 48 inches

Base Flange height: 0.5 inches

h = 40.75 inches [rail height from the centerline of the top rail to the top of the base flange]

$$F_y = 30000 \text{ psi}$$

$$Z = \frac{(w/12)(L)(h)}{F_y} = \frac{(50/12)(48)(40.75)}{30000} = 0.272 \text{ in}^3 \quad (5)$$

Actual Plastic Section Modulus of Post Section (2x2x0.12 Inches)

$$Z = 0.605 \text{ in}^3 \quad (\text{See Table 1.7A above})$$

Applying FoS = 1.67

$$Z = \frac{0.605}{1.67} = 0.362 \text{ in}^3 \quad (6)$$

5.1 Plastic Section Modulus (S) of the Fascia Mount Post Under Concentrated Load (Single Span)

P = Concentrated load of 200 pounds

h = 43.75 inches [rail height from the centerline of the top rail to the top face of the fascia bracket]

Longer Length of Fascia Mount

Post Section 2x2x0.12 Inches

$$F_y = 30000 \text{ psi}$$

$$Z = \frac{(P)(h)}{F_y} = \frac{(200)(43.75)}{30000} = 0.292 \text{ in}^3 \quad (7)$$

Actual Plastic Section Modulus of Post Section (2x2x0.12 Inches)

$$Z = 0.605 \text{ in}^3 \quad (\text{See Table 1.7A above})$$

Applying FoS = 1.67

$$Z = \frac{0.605}{1.67} = 0.362 \text{ in}^3 \quad (8)$$

5.2 Plastic Section Modulus (Z) of the Fascia Mount Post Under Uniform Load

w = uniform load of 50 pounds per foot applied horizontally

L = post spacing = 48 inches

h = 43.75 inches [rail height from the centerline of the top rail to the top face of the fascia bracket]

$$F_y = 30000 \text{ psi}$$

$$Z = \frac{(w/12)(L)(h)}{F_y} = \frac{(50/12)(48)(43.75)}{30000} = 0.292 \text{ in}^3 \quad (9)$$

Actual Plastic Section Modulus of Post Section (2x2x0.12 Inches)

$$Z = 0.605 \text{ in}^3 \quad (\text{See Table 1.7A above})$$

Applying FoS = 1.67

$$Z = \frac{0.605}{1.67} = 0.362 \text{ in}^3 \quad (10)$$

DESIGN CALCULATION

Design of Winsome Design

1. Applicable Loads according to IBC

200-pound concentrated load acting on the top rail.
50-pound/feet uniform load acting on the top rail.
Post / Rail height of 42 inches.
Maximum post spacing of 48 inches.
Handrail Diameter 1.9 inch x 0.109 Inch (Schedule 10)
Post Section Diameter 1.9 inch x 0.148 Inch (HSS1.9x0.148)
Factor of Safety 1.67, Applied on Capacity Side

2. Load Proportion Factor from NAAM AMP 521-01

$$CR = \frac{C_{rail}}{C_{post}} = \frac{[(E)(I)/L]}{[(E)(I)/h]} \quad (1)$$

Where CR = Stiffness Ratio
C_{rail} = stiffness of rail
C_{post} = stiffness of post
E = modulus of elasticity (psi x 10⁶)
I = moment of inertia (in⁴)
L = post spacing (inches)
h = post height (inches)

$$I_{rail} = \frac{\pi(d_o^4 - d_i^4)}{64} = \frac{3.14(1.9^4 - 1.682^4)}{64} = 0.247 \text{ in}^4$$

$$I_{post} = \frac{\pi(d_o^4 - d_i^4)}{64} = \frac{3.14(1.9^4 - 1.604^4)}{64} = 0.315 \text{ in}^4$$

$$CR = \frac{C_{rail}}{C_{post}} = \frac{[(E)(I)/L]}{[(E)(I)/h]} = \frac{[(28000000)(0.247)/48]}{[(28000000)(0.315)/42]} = 0.686 \quad (2)$$

From Stiffness Ratio estimated Load Proportion Factor (Pf) from Stiffness Ratio Chart are

End posts of 2-span rail – 0.87 (Refer Fig-1)

Intermediate posts of 2-span rail – 0.63 (Refer Fig-1)

3. Section Modulus (S) of the Post Under Concentrated Load

P = Concentrated load of 200 pounds
Pf = 0.87 for end posts, 0.63 for intermediate posts [2 spans] Refer Fig. 1
Base Flange height: 0.5 inches
h = 40.55 inches [rail height from the centerline of the top rail to the top of the base flange]
Post Section Dia- 1.9x0.148 Inches
F_y = 30000 psi

$$Z = \frac{(P)(P_f)(h)}{F_y}$$

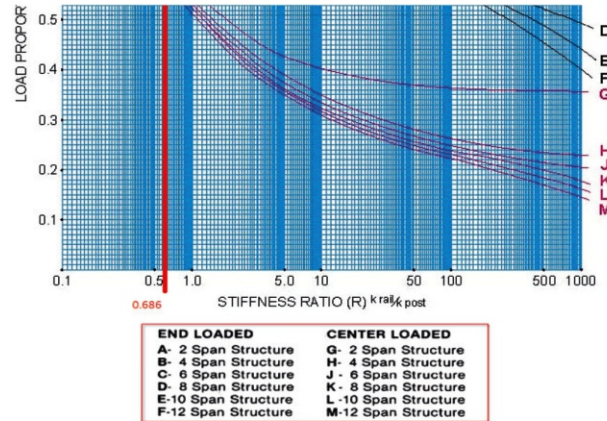
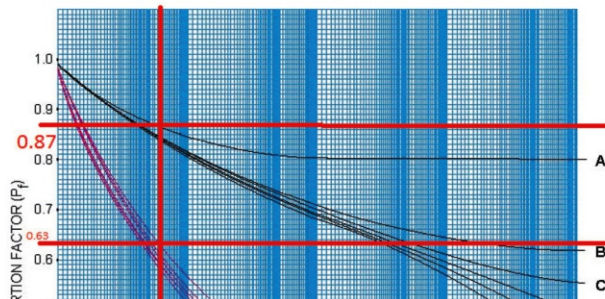


Fig-1 End Post & Intermediate Post (2 Span)

Section Modulus of End Post

$$Z = \frac{(200)(0.87)(40.55)}{30000} = 0.235 \text{ in}^3 \quad (1)$$

Section Modulus of Intermediate Post

$$Z = \frac{(200)(0.63)(40.55)}{30000} = 0.17 \text{ in}^3 \quad (2)$$

3.1 Section Modulus (S) of the Post Under Concentrated Load for Single Span

$$Z = \frac{(P)(h)}{F_y} \quad \text{For Single Span each post is considered to carry full concentrated load, so Load Proportion factor Pf becomes 1 or omitted in Equation}$$

$$Z = \frac{(200)(40.55)}{30000} = 0.27 \text{ in}^3 \quad (3)$$

Actual Plastic Section Modulus of Post Section (1.9x0.148 Inches)

$$Z = \frac{(d_o^3 - d_i^3)}{6} = \frac{(1.9^3 - 1.604^3)}{6} = 0.455 \text{ in}^3$$

Applying FoS = 1.67

$$Z = \frac{0.455}{1.67} = 0.272 \text{ in}^3 \quad (4)$$

4. Section Modulus (S) of the Post Under Uniform Load

w = uniform load of 50 pounds per foot applied horizontally
L = post spacing = 48 inches
Base Flange height: 0.5 inches
h = 40.55 inches [rail height from the centerline of the top rail to the top of the base flange]
F_y = 30000 psi

$$Z = \frac{(w/12)(L)(h)}{F_y} = \frac{(50/12)(48)(40.55)}{30000} = 0.27 \text{ in}^3 \quad (5)$$

Actual Plastic Section Modulus of Post Section (Dia- 1.9x0.148 Inches)

$$Z = \frac{(d_o^3 - d_i^3)}{6} = \frac{(1.9^3 - 1.604^3)}{6} = 0.455 \text{ in}^3$$

Applying FoS = 1.67

$$Z = \frac{0.455}{1.67} = 0.272 \text{ in}^3 \quad (6)$$

5.1 Section Modulus (S) of the Fascia Mount Post Under Concentrated Load (Single Span)

P = Concentrated load of 200 pounds

h = 43 inches [rail height from the centerline of the top rail to the top face of the fascia bracket]
Longer Length of Fascia Mount

Post Section Dia- 1.9x0.148 Inches

F_y = 30000 psi

$$Z = \frac{(P)(h)}{F_y} = \frac{(200)(43)}{30000} = 0.287 \text{ in}^3 \quad (7)$$

Actual Plastic Section Modulus of Post Section (Dia- 1.9x0.148 Inches)

$$Z = \frac{(d_o^3 - d_i^3)}{6} = \frac{(1.9^3 - 1.604^3)}{6} = 0.455 \text{ in}^3$$

Applying FoS = 1.67

$$Z = \frac{0.455}{1.67} = 0.272 \text{ in}^3 \quad (8)$$

5.2 Section Modulus (S) of the Fascia Mount Post Under Uniform Load

w = uniform load of 50 pounds per foot applied horizontally

L = post spacing = 48 inches

h = 43 inches [rail height from the centerline of the top rail to the top face of the fascia bracket]

F_y = 30000 psi

$$Z = \frac{(w/12)(L)(h)}{F_y} = \frac{(50/12)(48)(43)}{30000} = 0.287 \text{ in}^3 \quad (9)$$

Actual Plastic Section Modulus of Post Section (Dia- 1.9x0.148 Inches)

$$Z = \frac{(d_o^3 - d_i^3)}{6} = \frac{(1.9^3 - 1.604^3)}{6} = 0.455 \text{ in}^3$$

Applying FoS = 1.67

$$Z = \frac{0.455}{1.67} = 0.272 \text{ in}^3 \quad (10)$$

DESIGN CALCULATION

Design of Flatron Post

1. Applicable Loads according to IBC

200-pound concentrated load acting on the top rail.

50-pound/feet uniform load acting on the top rail.

Post / Rail height of 42 inches.

Maximum post spacing of 48 inches.

Post Section 2.56x0.63 Inches

Factor of Safety 1.67, Applied on Capacity Side

2. Load Proportion Factor from NAAM AMP 521-01

$$CR = \frac{C_{rail}}{C_{post}} = \frac{[(E)(I)/L]}{[(E)(I)/h]}$$

Where

CR = Stiffness Ratio

C_{rail} = stiffness of rail

C_{post} = stiffness of post

E = modulus of elasticity (psi x 10⁶)

I = moment of inertia (in⁴)

L = post spacing (inches)

h = post height (inches)

$$CR = \frac{C_{rail}}{C_{post}} = \frac{[(28000000)(0.175)/48]}{[(28000000)(0.88)/42]} = 0.174$$

From Stiffness Ratio estimated Load Proportion Factor (Pf) from Stiffness Ratio Chart are

End posts of 2-span rail – 0.97 (Refer Fig-1)

End posts of 3 or more spans – 0.96

Intermediate posts of 2-span rail – 0.91 (Refer Fig-2)

Intermediate posts of 3 or more spans – 0.9

3. Section Modulus (S) of the Post Under Concentrated Load

P = Concentrated load of 200 pounds

Pf = 0.97 for end posts, 0.91 for intermediate posts [2 spans] Refer Fig. 1 & 2

Base Flange height: 0.5 inches

h = 40.55 inches [rail height from the centerline of the top rail to the top of the base flange]

Post Section 2.56x0.63 Inches

F_y = 30000 psi

$$S = \frac{(P)(P_f)(h)}{F_y}$$

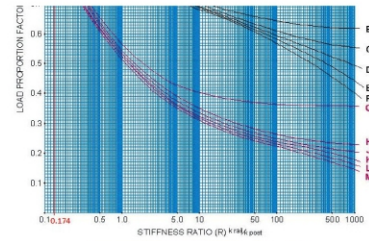
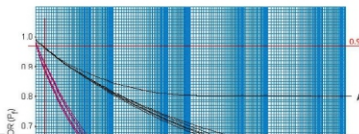


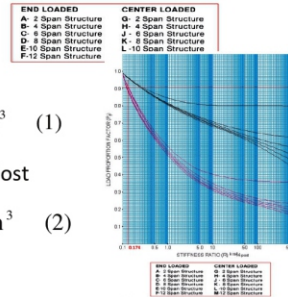
Fig-1 End Post 2 Span

Section Modulus of End Post

$$S = \frac{(200)(0.97)(40.55)}{30000} = 0.262 \text{ in}^3 \quad (1)$$

Section Modulus of Intermediate Post

$$S = \frac{(200)(0.91)(40.55)}{30000} = 0.246 \text{ in}^3 \quad (2)$$



3.1 Section Modulus (S) of the Post Under Concentrated Load for Single Span

$$S = \frac{(P)(h)}{F_y}$$

For Single Span each post is considered to carry full concentrated load, so Load Proportion factor Pf becomes 1 or

$$S = \frac{(200)(40.55)}{30000} = 0.27 \text{ in}^3 \quad (3)$$

Actual Section Modulus of Post Section (2.56x0.63 Inches)

$$S = \frac{I}{y} = \frac{0.88}{(2.56/2)} = 1.28 \text{ in}^3$$

Applying FoS = 1.67

$$S = \frac{1.28}{1.67} = 0.766 \text{ in}^3 \quad (4)$$

4. Section Modulus (S) of the Post Under Uniform Load

w = uniform load of 50 pounds per foot applied horizontally

L = post spacing = 48 inches

Base Flange height: 0.5 inches

h = 40.55 inches [rail height from the centerline of the top rail to the top of the base flange]

F_y = 30000 psi

Pipe diameter: 1-1/2" nominal, 1.90 inches actual

$$S = \frac{(w/12)(L)(h)}{F_y} = \frac{(50/12)(48)(40.55)}{30000} = 0.27 \text{ in}^3 \quad (5)$$

Actual Section Modulus of Post Section (2.56x0.63 Inches)

$$S = \frac{I}{y} = \frac{0.88}{(2.56/2)} = 1.28 \text{ in}^3$$

Applying FoS = 1.67

$$S = \frac{1.28}{1.67} = 0.766 \text{ in}^3 \quad (6)$$

5.1 Section Modulus (S) of the Fascia Mount Post Under Concentrated Load (Single Span)

P = Concentrated load of 200 pounds

h = 43.33 inches [rail height from the centerline of the top rail to the top face of the fascia bracket]

Post Section 2.56x0.63 Inches F_y = 30000 psi

$$S = \frac{(P)(h)}{F_y} = \frac{(200)(43.33)}{30000} = 0.289 \text{ in}^3 \quad (7)$$

Actual Section Modulus of Post Section (2.56x0.63 Inches)

$$S = \frac{I}{y} = \frac{0.88}{(2.56/2)} = 1.28 \text{ in}^3$$

Applying FoS = 1.67

$$S = \frac{1.28}{1.67} = 0.766 \text{ in}^3 \quad (8)$$

5.2 Section Modulus (S) of the Fascia Mount Post Under Uniform Load

w = uniform load of 50 pounds per foot applied horizontally

L = post spacing = 48 inches

h = 43.33 inches [rail height from the centerline of the top rail to the top face of the fascia bracket]

F_y = 30000 psi

$$S = \frac{(w/12)(L)(h)}{F_y} = \frac{(50/12)(48)(43.33)}{30000} = 0.289 \text{ in}^3 \quad (9)$$

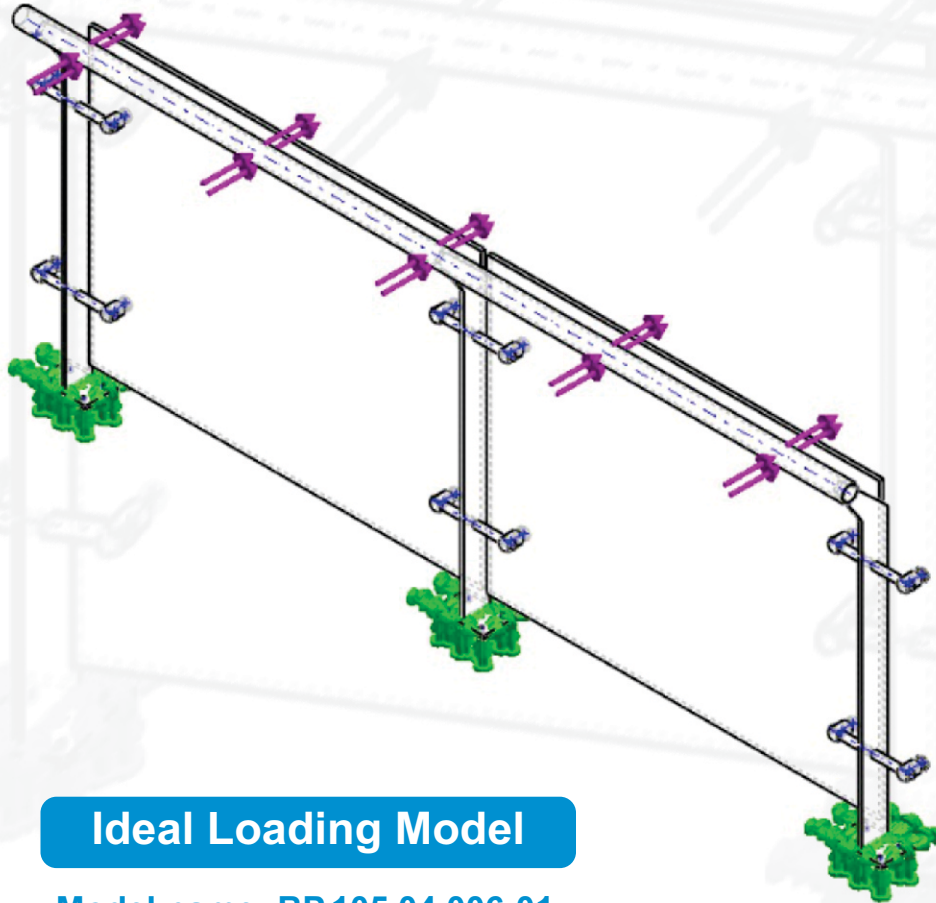
Actual Section Modulus of Post Section (2.56x0.63 Inches)

$$S = \frac{I}{y} = \frac{0.88}{(2.56/2)} = 1.28 \text{ in}^3$$

Applying FoS = 1.67

$$S = \frac{1.28}{1.67} = 0.766 \text{ in}^3 \quad (10)$$

SIMULATION TESTING



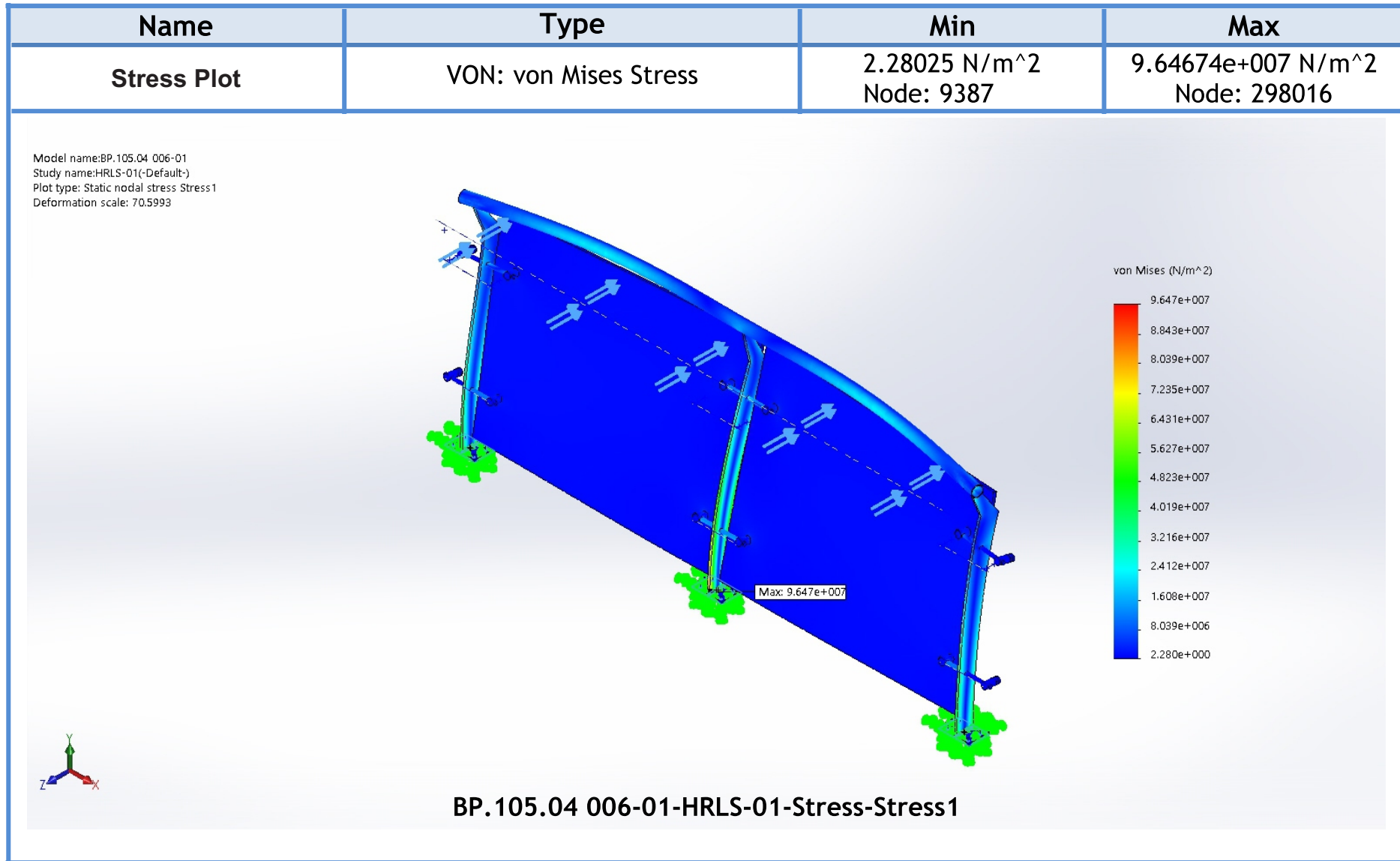
Ideal Loading Model

Model name: BP.105.04 006-01
Current Configuration: Default

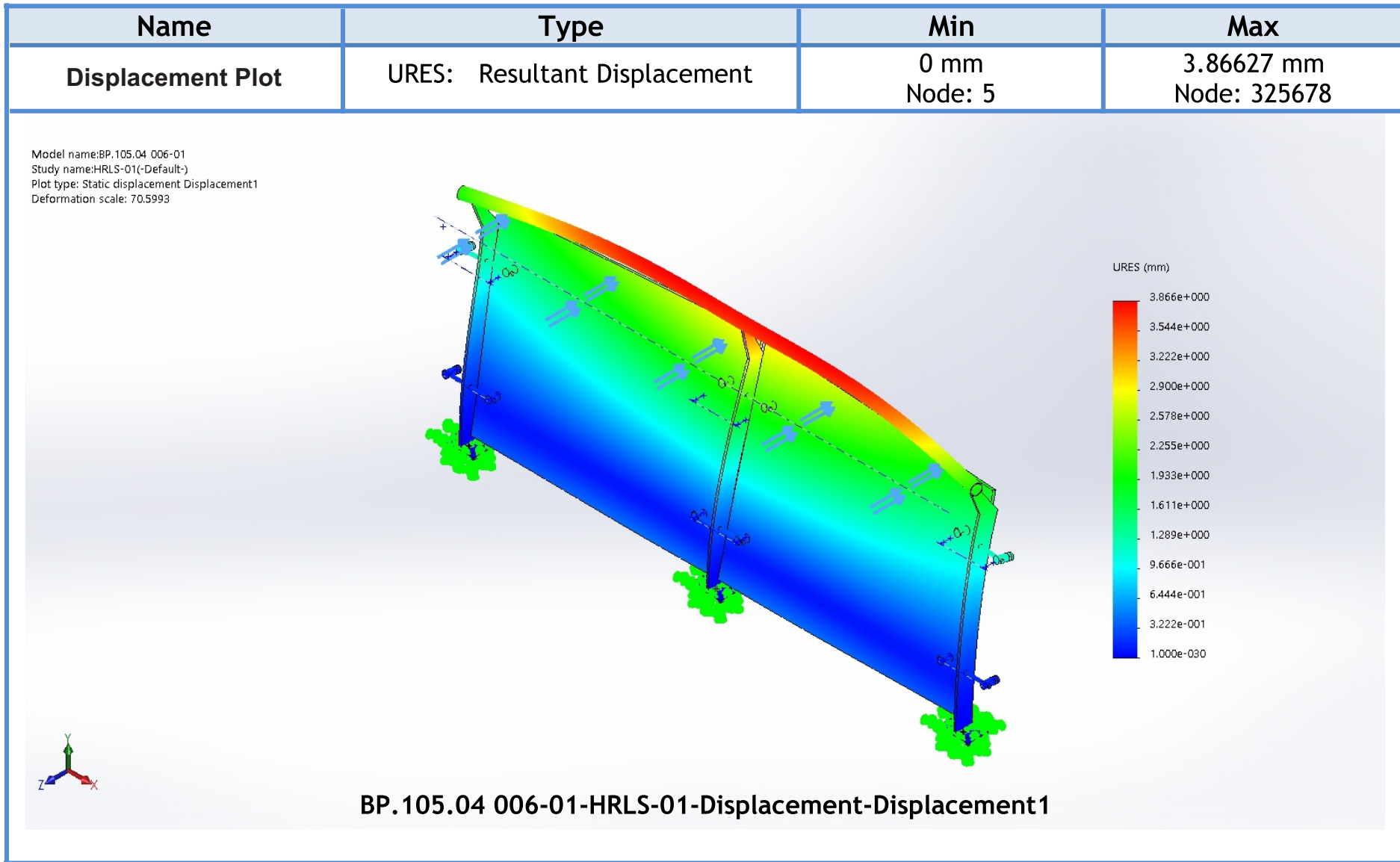
Model Particulars

Sno.	Particulars	Value
1	Post Section	80x12 mm
2	Handrail	48.3x2.0 mm
3	Glass Panels Thickness	12 mm Toughened Glass
4	Glass Size	1200x900 mm
5	Railing Height	1067 mm (42 Inch)
6	Post Spacing	1220 mm (48 Inch)
7	Uniform Load	730 N/m (50 lb/ft.)

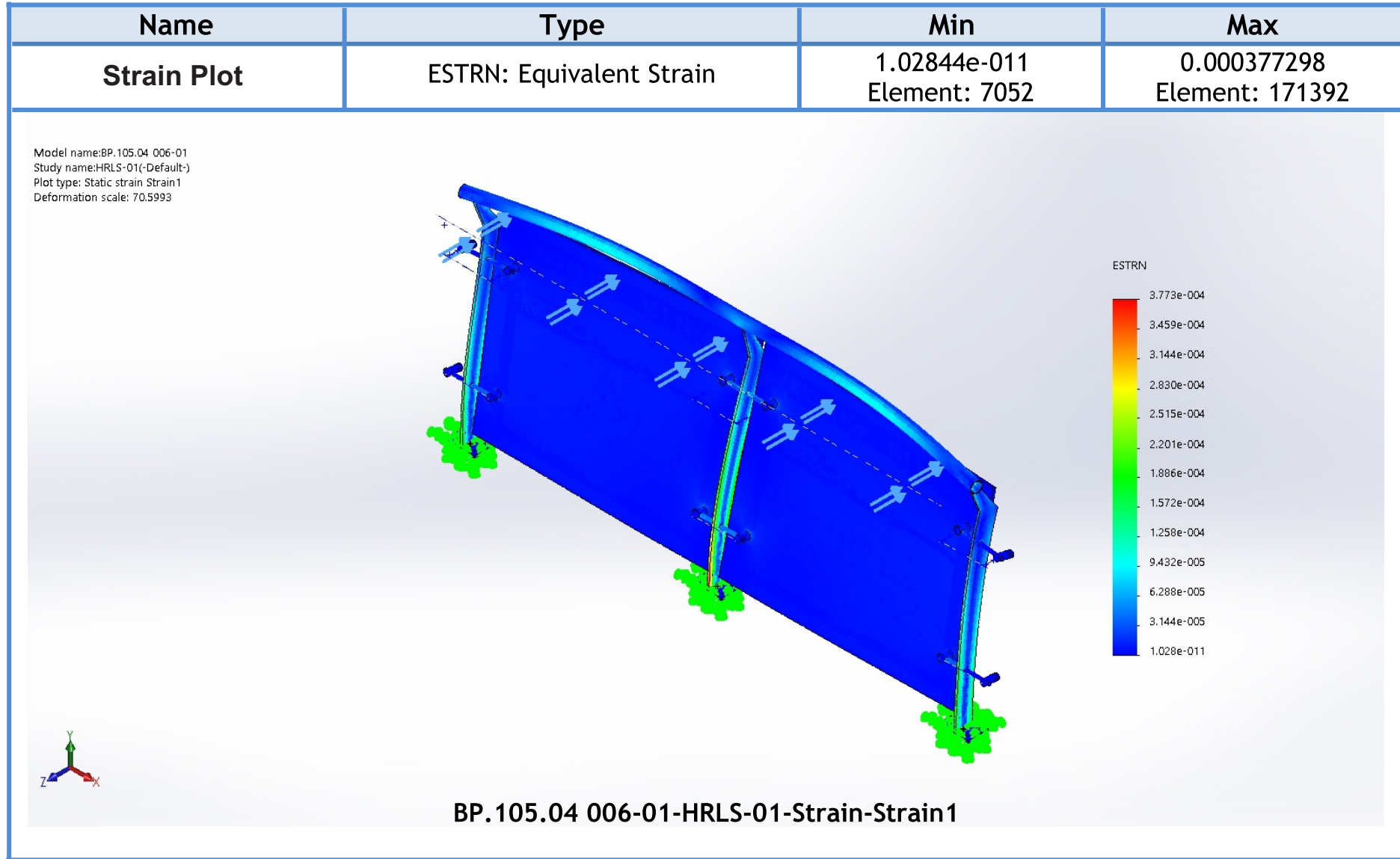
SIMULATION TESTING



SIMULATION TESTING



SIMULATION TESTING



RAILING STANDARDS COMPARISON CHART

Elements of Railings	Parameter	Parameter Range	Standards / Codes				
			ASTM	CSA	BS	AS	NZS
Railing as a System	Terminology	-	Guard/Handrail	Guard/Handrail	Barrier	Barrier	Barrier
	Horizontal Uniformly Distributed Line Load	Min	0.73 kN/m	0.75 kN/m	0.36 kN/m	0.35 kN/m	0.22 kN/m
		Max	0.88 kN/m	3.0 kN/m	3.0 kN/m	3.0 kN/m	3.0 kN/m
		Min	220 N over 0.1 m ² Area	-	0.5 kN/m ²	-	0.5 kN/m ²
		Max		-	1.5 kN/m ²	-	1.5 kN/m ²
	Concentrated Load	Min	0.89 kN	1.0 kN	0.25 kN	0.6 kN	0.6 kN
		Max	1.62 kN		1.5 kN		
	Height	Min	1067 mm	1070 mm	750 mm	900 mm	800 mm
		Max			1100 mm	1100 mm	1100 mm

RAILING DESIGNS

WINSOME	06-19
FLATRON	20-33
BRAWNY	34-47
ROYALE	48-52
TWIN RAIL	53-63
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ARCHITECTURAL EXCELLENCE

DESIGN CALCULATION	85-89
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