LIFESPAN

COMPOSITE ARCHITECTURAL BEAMS

TECHNICAL DATA SHEET

VERSION D1.1 | 06/06/2023

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Contents

Lifespan architectural beams

Lifespan architectural beams offer design versatility and increased span thanks to their specialised aluminium core that makes for easier installation at height. The outer coating of low-maintenance bamboo composite resists biodegradation, corrosion, and harsh weather, and offers built-in UV protection for beautiful durability. Enjoy the look of timber beams without the upkeep.

Product name:	Lifespan composite architectural beams
Product use:	Primarily used as an architectural beam in pergola structures and similar applications
Material:	Aluminium structure with composite cap
Material description:	An aluminium profile with Eva-tech cellulose-polymer cap

Document guide

Eva-Last strives to evaluate their products in depth and present the technical and safety information available in a manner that assists with the application thereof. If additional data or information is required, please do not hesitate to contact us at **rad@eva-last.com**.

In an attempt to simplify the information, similar data is loosely grouped into the categories summarised below. This document is ordered according to these categories and the applicable page number for the start of each section captured in the Table of Contents on page above.

- Material composition
- Physical properties
- Mechanical properties
- Thermal properties
- Fire reaction properties
- Weathering properties
- Surface properties

The material compositions section captures a summary of the product make-up from the Material Safety Data Sheet (MSDS). A link to the MSDS is provided for additional detail. Summaries of chemical compliance data available are also collected in this section.

The physical properties section provides a summary of available profiles and general material properties such as density, water absorption, etc. Additional profile information can be obtained from drawings in the appropriate Appendix. Where possible, material properties that can be assigned to more specific categories are moved to the relevant section.

The mechanical properties section captures data related to the products reaction to various load conditions. The section is broadly assembled into the below categories. Additional profile and sectional information are captured by the drawings in the appropriate Appendix.

- Material specific mechanical properties
- Profile specific mechanical properties
- Sectional properties

Product properties such as the expansion coefficient, thermal resistance, etc. are captured, where applicable, in the thermal properties section.

Information regarding the products reaction to fire is captured in the fire reaction properties section.

Test data relating to the acoustic performance of the product is summarised in the acoustic properties section.

Information on the products resistance to mold, termites, etc. is collected in the biodegradation properties section.

The surface properties section summarises information regarding the finish or texture of the product. Test data on aspects such as slip resistance (where applicable) is captured in this section.

Where the products form part of a system and, as a result, utilise other components, an additional section to capture useful data regarding these components has been added to this document.

Where information is not yet available, the section has been omitted. In the cases where information can be substituted or supplemented with alternative data (based on similar compositions, etc.) an attempt to do so is made. Where this is the case, it is highlighted. Please make use of the data accordingly. For any additional information regarding this, please feel free to contact **rad@eva-last.com**.

Ensure the product and application thereof is suitable, rational, and compliant with any applicable regulations or standards. Wherever necessary, consult a suitably qualified professional. For information about the installation and use of the product, please see the applicable Installation Guide (IG). For additional material safety and handling information, please refer to the applicable MSDS. For any further information, please contact **rad@eva-last.com**.

Material composition

The following table is a simplified material composition for the Lifespan material technology. For more information regarding the composition, safety, and handling of the material, please see the Lifespan MSDS. To confirm which substances are compatible, or incompatible, with the product, please refer to Appendix B.

Component	Substance	Mass
Core	Aluminium alloy. 6063-T5	62%
Cap	High density polyethylene (HDPE)	20%
	Cellulose fibers (Bamboo or wood fibers)	11%
	Calcium carbonate	3%
Additional additives	Other	4%

*Note material mass distribution may vary per profile.

Physical properties

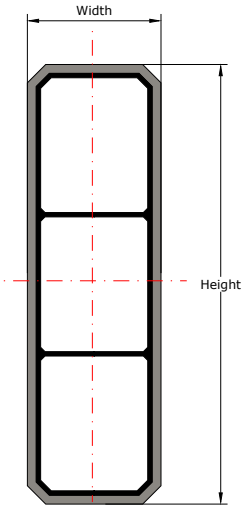
General material properties

Typical properties of the Lifespan material technology are captured below as an indication of the expected behaviour of the aluminium and composite materials separately.

Properties	Results		Test method	Information
Core Density	2 700 kg/m^3		ASTM D2395	Results are based on typical aluminium 6063-T5 materials.
Cap Density	1 250 kg/m^3			Results are based on Eva-tech material.
Water absorption 180 h	Mass	1.85%	Gb/T17657-2013-4.6	Change in mass.
	Length	-0.74%	GB/T17657-2013,GB/ T24508-2009	Change in dimensions.
	Width	0.47%		
	Height	1.29%		

Profile properties

The following table is a summary of the currently available profiles, please see **Appendix A** for profile drawings.



Profile ID	Profile width (mm)	Profile height (mm)	Mass per meter (kg/m)
STLS01X	30.5	100.5	1.3
STLS02	50.0	150.0	3.3
STLS09	30.0	50.0	0.8
STLS06	97.0	97.0	4.6
STLS07	150.0	150.0	8.1
STLS08	205.0	205.0	13.3
STR02T	102.5	102.5	**

The mass provided are estimates and based on the density and area of the profile.

Mechanical properties

Material specific mechanical properties

Lifespan

All information within this table is currently based on internal laboratory results of Lifespan.

Property	Result	Test method standard	Information
Shore hardness	72	GB/T17657-2013,GB/T24508-2009	
Scratch resistance	8 N		
Abrasion resistance	0.049 g/100r		
Impact resistance	Pass		No cracking was visible.
Surface bonding strength	2.2 MPa		

Aluminium 6063 – T5

It is generally assumed that the aluminium skeleton of the Lifespan profiles provides the majority of resistance to any loads, and it is recommended that any design utilising these members adopts a similar approach. Below are typical material properties of aluminium 6063 – T5 (extracted from an online resource).

Property	Result	Information
Modulus of elasticity (MOE)	68.9 GPa	Extracted from an online resource.
Poisson ratio	0.33	
Flexural strength	145 MPa	
Shear modulus	25.8 GPa	
Shear strength	117 MPa	

Profile flexural properties

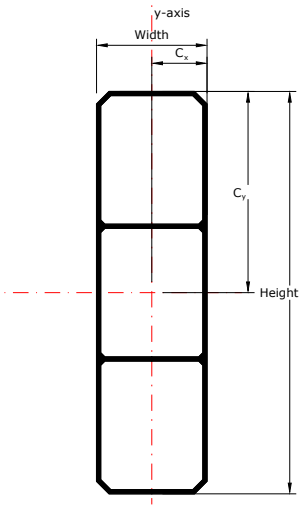
Flexural properties of Lifespan can be influenced by the profile geometry and span. Typical properties of the Lifespan material technology are captured below based on internal and external test results as an indication of the expected behavior of specific Lifespan profiles.

Profile	Span (mm)	Ultimate Load (kN)	Test method	Information
STLS01X	500 mm Horizontal 	3.8	GN/T 17657-2013-4.7	The listed profiles were tested internally.
STLS02		20.4		
STLS09		3.4		
STLS01X	500 mm Vertical 	5.6		
STLS02		N/A		
STLS09		3.9		

Profile	Span (mm)	Yield strength (kN)	Ultimate failure load (kN)	Test method	Information
STLS01	500 mm Horizontal 	6.1	8.2	ASTM 790 (modified)	The listed profiles were tested externally. This profile is not the same as STLS01X. And is provided for information only.
	500 mm Vertical 	6.5	9.4		
STLS02	500 mm Horizontal 	16.8	22.9		The listed profiles were tested externally.
	500 mm Vertical 	9.4	17.5		

Sectional properties

The following table provides a sectional property summary of the currently available Lifespan profiles in their typical board orientation. The sectional properties do not include the cap as it is generally assumed that the aluminium skeleton of the Lifespan profiles provides the majority of resistance to any loads. Please see Appendix A for profile drawings and further information.



Profile details					Moments of inertia		Centroid		Elastic sectional modulus	
Profile ID	**Application**	**Width (mm)**	**Thickness (mm)**	**Area (mm^2)**	**I_x (mm^4)**	**I_y (mm^4)**	**C_x (mm)**	**C_y (mm)**	**S_x (mm^3)**	**S_y (mm^3)**
STLS01X	Beam	26.5	96.5	288.7	259 885	35 682	13.3	48.3	5 386	2 693
STLS02	Beam	45.0	145.0	761.6	1 578 215	252 817	22.5	72.5	21 768	11 236
STLS09	Beam	26.0	46.0	1 446.4	1 513 294	1 513 294	47.0	47.0	32 232	32 232
STLS07	Post	93.9	93.9	2 304.0	6 530 505	6 530 505	73.0	73.0	89 459	89 459
STLS08	Post	146.0	146.0	5 563.8	32 796 272	32 796 272	102.4	102.4	320 433	320 433
STLS06	Post	199.7	199.7	166.0	40 492	18 090	12.9	23.0	1 761	1 397
STR02T*	Sleeve	102.5	102.5	3514.7	5 072 045	5 072 045	51.3	51.3	96 582	96 582

* This acts only as a decorative sleeve that fits over a 76 x 76 mm square steel tube.

Thermal properties

Typical properties of the Lifespan material technology and the aluminium core are captured below as an indication of the expected behaviour of the Lifespan material.

Properties	Results	Test method	Information
Aluminium Coefficient of Thermal Expansion (CTE)	23.4 x 10^{-6} mm/mm.°C	ASTM D696-16	Results are based on internal testing of Lifespan beams with aluminium 6063-T5 materials.
Thermal conductivity of aluminium at 25 °C	209 W/m.K		Extracted from online sources.

Fire reaction properties

Results currently unavailable.

Weathering

The environment to which materials are exposed influences how quickly the material will weather (or deteriorate). This includes degradation factors like UV exposure, oxidation or contact with organisms within the environment such as termites or mold.

Colour fade

Materials are susceptible to colour change over time due to weathering. **ΔE** denotes the colour difference between an original sample and a tested sample after exposure to UV light. **ΔE** is measured on a scale of 1 to 100 and provides a metric to understand how the human eye perceives colour change.

As Lifespan caps are made from Eva-tech materials, the following external laboratory of Eva-tech boards, have been provided.

Standard	Hours	Colour	ΔE	Test method	Information
ASTM	1 300	Rusteak , Brown (C04)	8.24	ASTM G154	Changes perceptible at a glance.
		Xavia, Grey (C11)	4.30		Changes perceptible through close observation.

Lifespan connectors

The following section provides a brief overview of the Lifespan connectors with which the Lifespan beams interact with. Please see **Appendix C** for drawings.

Material specific properties

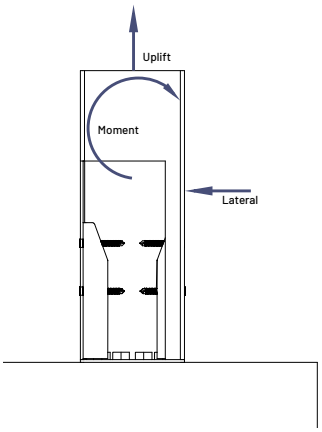
Typical mechanical properties for ISQ 230 (AMSA) from online sources.

Properties	Value	Notes
Typical yield strength	230 MPa	Typical for ISQ 230 (SANS 4998 Gr220, ASTM A653 Gr230 CS type A, EN 10346 DX 51D, JIS G3302 SGCC).
Ultimate tensile strength	270 to 500 MPa	
Modulus of elasticity	200 GPa	
Bulk modulus	160 GPa	
Poisson ratio	0.29	
Shear modulus	80 GPa	

Connector specific strength properties

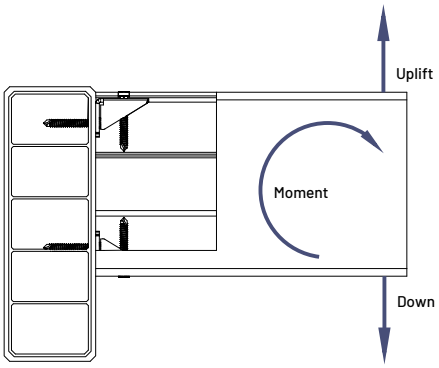
Results captured below are the average failure loads of installed brackets during internal testing. The provided design loads are based on an assumed factor of safety of 2.5. The limiting constraint is typically the withdrawal resistance of the screws when fixed to another Lifespan beam. Failure loads of the screw utilised in these applications are generally 900 N.

Concealed post mount



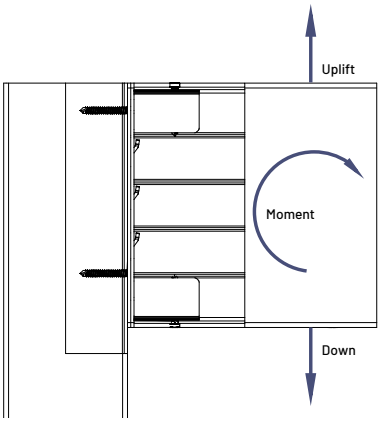
Load direction	Ultimate load	Design load	Test method	Information
Uplift load	13 230 N	5 290 N	Internal testing	
Lateral load	15 150 N	6 060 N		
Moment	690 N•m	275 N•m		This connector has relatively low moment-resistance, hence the top of the post should always be appropriately secured.

Concealed clip-in U-bracket



Load direction	Ultimate load	Design load	Test method	Information
Uplift load	2 060 N	825 N	Internal testing	
Lateral load	4 900 N	1 960 N		
Moment	N/A	N/A		This connector is not recommended for cantilever applications to serviceability limit constraints.

Concealed clip-in U bracket



Load direction	Ultimate load	Design load	Test method	Information
Uplift load	4 415 N	1 765 N	Internal testing	
Lateral load	4 415 N	1 765 N		
Moment	46 N•m	18 N•m		Moment resistance is determined by the substrate that the connector is fixed in to. Values captured here utilise a Lifespan beam as the substrate.

Weathering (Coating details)

Part	Specification	Thickness	Notes
Steel substrate	ISQ 230	2.0 mm	All connectors are 2.0 mm thick.
Powder coating	Ferro VEDOC VP Polyester (matt black)	60 to 80 µm	Supplier information.

Z-point MDS screw

The Z-point MDS screw is recommended to use when attaching the Lifespan connectors to Lifespan beams and vice versa. The screw has the following features.

Feature	Value
Screw dimensions	M4.2 x 32 mm
Screw material	Carbon Steel – C1022
Screw coating	Magni 599 dark brown epoxy. (~ 20 µm thick)
Head type	Pan head
Drill point type	Pre-drilling point
Effective thread length	30 to 31 mm
Pre-drilling hole size (if applicable)	3.3 mm

The Z-point MDS screw withdrawal resistance was tested by CCT. The ultimate torque was estimated using internal test results.

Specification		Results	Units	Notes
Screw breaking torque forces		4.8	N•m	Based on internal test results.
Pull out resistance	1.6 mm Galvanised steel	4.3	kN	Based on internal test results.
	1.6 mm Aluminium	1.8	kN	Based on internal test results.
	Southern yellow pine	1.7	kN	Density of pine 670 kg/m^3. Tests conducted by CCT.
	Apex ™ composite joist	1.4	kN	Density of Apex 750 kg/m^3. Tests conducted on profile STPVB104 by CCT.
	Eva-tech™ composite joist	0.8	kN	Density of Eva-tech 1 300 kg/m^3. Tests conducted on profile ST08X profile by CCT.
	Lifespan beam	0.7	kN	Tests conducted on STLS09 profile by CCT.

Quick reference guide for typical fasteners

The following table provides a quick reference list of typical fasteners that may be used for various substrates. This information has been collected from several manufacturers for convenience and is presented herein to provide indicative performance. Please refer to applicable manufacturers for further information and/or confirmation of the suitability of the application. Appropriate fasteners must be utilised. Particular attention should be paid to substructure/substrate and environmental conditions (particularly with respect to corrosion) of the site. All applications should adhere to applicable standards. All timber and metal profiles should be treated and/or coated appropriately. Regular proactive maintenance is advised where possible.

	Fastener type	Material	Size (mm)	Tensile (kN)	Ultimate shear (kN)	Withdrawal resistance (kN)	Edge distance		Minimum substructure material specification
Steel	Wafer head	C1022 case hardened	M5.5 x 22	15.3	8.8	2.2	Ø x 2 = 12 mm	Ø x 2 = 12 mm	Steel - 1.2 mm thick
						4.0			Steel - 1.5 mm thick
	Tek screw		M5.5 x 25			5.4			Steel - 1.9 mm thick
						7.4			Steel - 2.4 mm thick
Masonry	Hilti HPS-1 6 PE sleeved anchor*	Carbon steel, galvanised	M6.0 x 40	0.25	0.35	Not available	30 mm	30 mm	Devoid of cracks and similar. Typical embedment depth of 30 to 40 mm. Confirm adequate strength. Refer to Hilti TDS.
	Hilti HUS3-P concrete screw*	Carbon steel, galvanised	M5.0 x 40	2.8	3.9	Not available	35 mm	35 mm	Devoid of cracks and similar. Typical embedment depth of 40 mm. Confirm adequate strength. Refer to Hilti TDS.

*Refer to actual suppliers TDS for specific information, including coating and material thicknesses.

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While most data have been compiled from research, case histories, experience and testing, small changes in the environment can produce marked differences in performance. The decision to use a material, and in what manner, is made at your own risk. The use of a material and method may therefore need to be modified to its intended end use and environment.

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Appendix A

Profiles details

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	166	304
APPROXIMATE MASS (kg/m)	0.8	

SECTION PROPERTIES	
I_x (mm⁴)	40 492
I_y (mm⁴)	18 090
r_x (mm)	15.6
r_y (mm)	10.4
C_x (mm)	12.9
C_y (mm)	23.0
S_x (mm³)	1 761
S_y (mm³)	1 397

DRAWING TITLE
Lifespan - Architectural beams - For TDS - STLS01x

FILE NAME
Lifespan - Architectural beams - For TDS

DRAWING NUMBER	REV
220620CLS09BPD	C2.4

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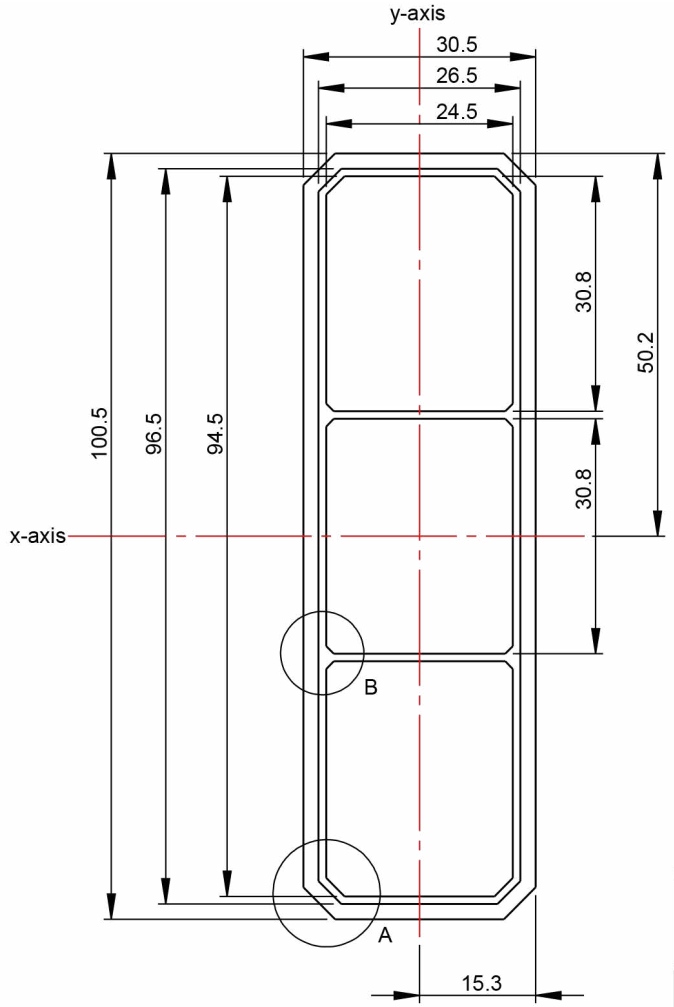
LIFESPAN
COMPOSITE ARCHITECTURAL BEAMS



Lifespan profile - STLS01x
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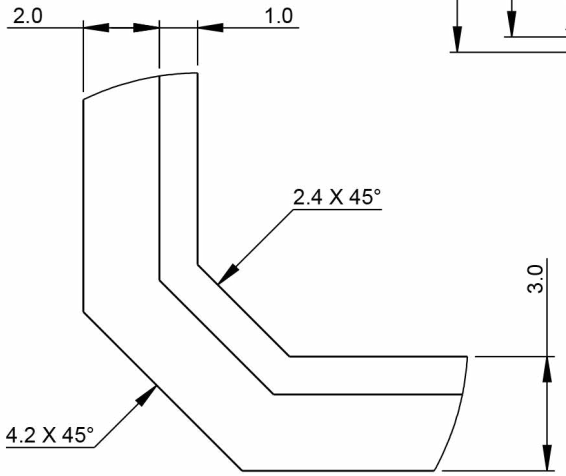

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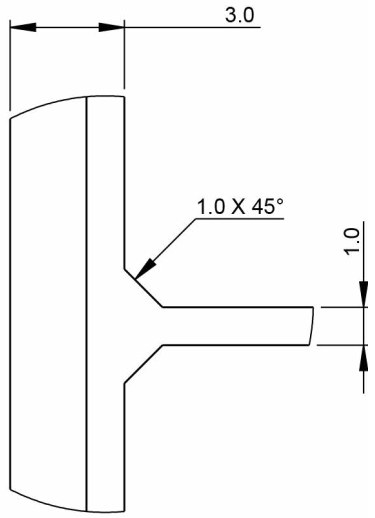

DETAIL B
SCALE 5 : 1

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	762	975
APPROXIMATE MASS (kg/m)	3.30	

SECTION PROPERTIES	
I_x (mm⁴)	1 578 215
I_y (mm⁴)	252 817
r_x (mm)	45.5
r_y (mm)	18.2
C_x (mm)	22.5
C_y (mm)	72.5
S_x (mm³)	21 768
S_y (mm³)	11 236

DRAWING TITLE
Lifespan - Architectural beams - For TDS - STLS02

FILE NAME
Lifespan - Architectural beams - For TDS

DRAWING NUMBER	REV
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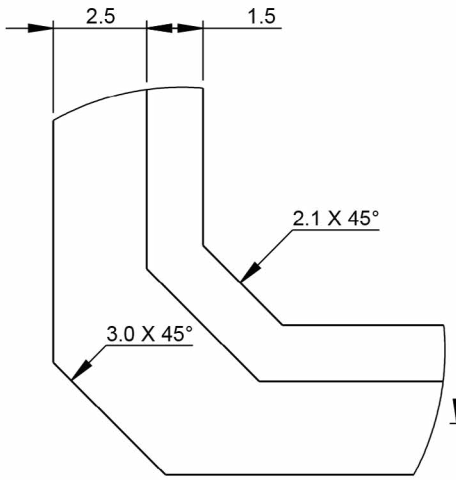

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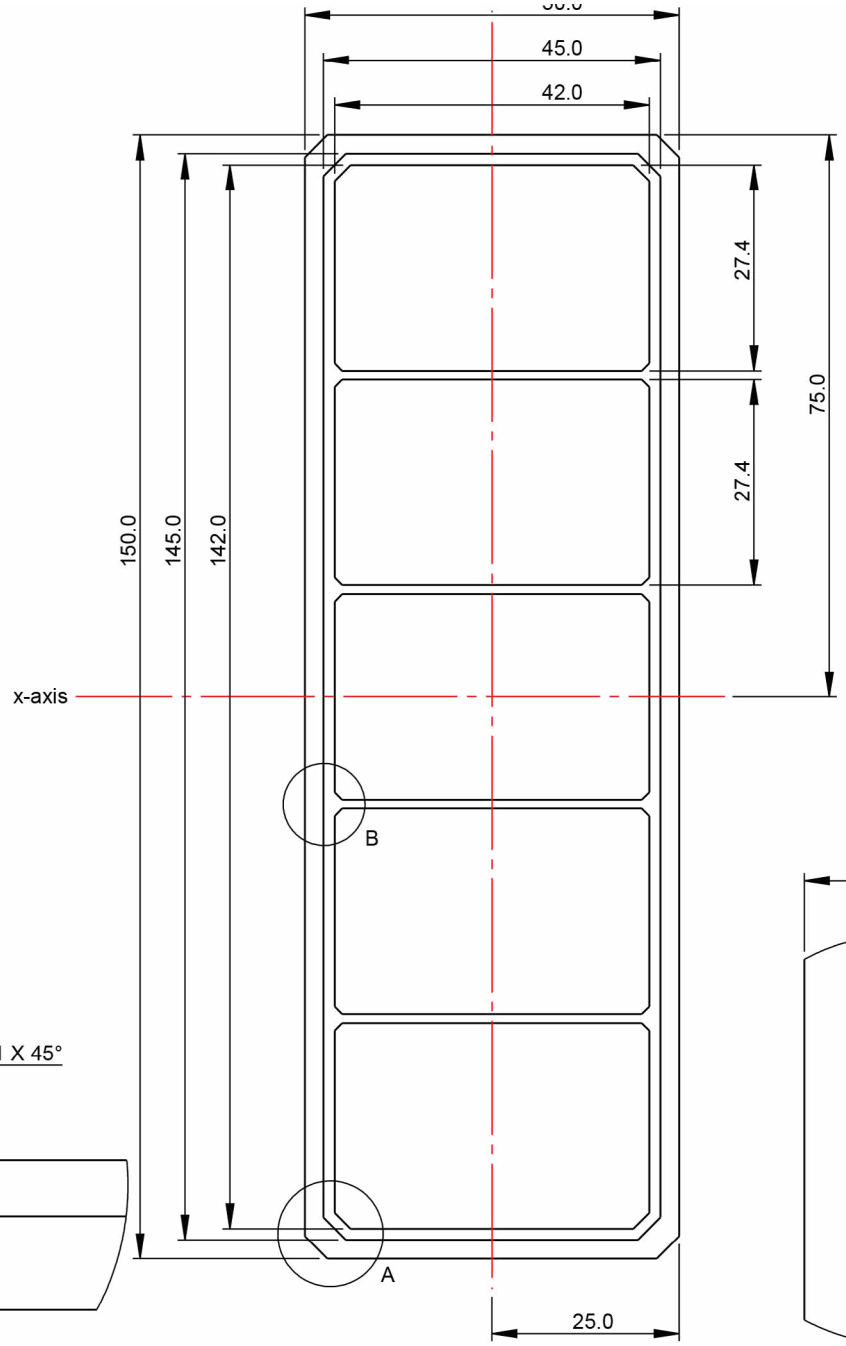

Lifespan profile - STLS02
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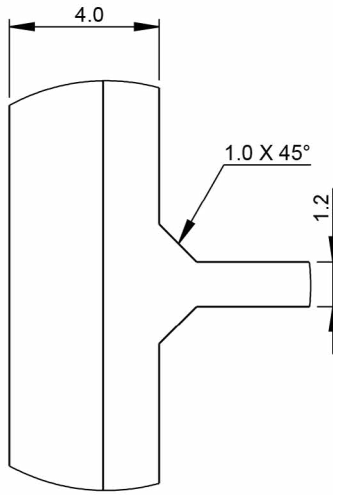

DETAIL B
SCALE 5 : 1

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	1 471	561
APPROXIMATE MASS (kg/m)	4.6	

SECTION PROPERTIES	
I_x (mm⁴)	1 513 294
I_y (mm⁴)	1 513 294
r_x (mm)	32.4
r_y (mm)	32.4
C_x (mm)	47.0
C_y (mm)	47.0
S_x (mm³)	32 232
S_y (mm³)	32 232

DRAWING TITLE
Lifespan - Architectural beams - For TDS - STLS06

FILE NAME
Lifespan - Architectural beams - For TDS

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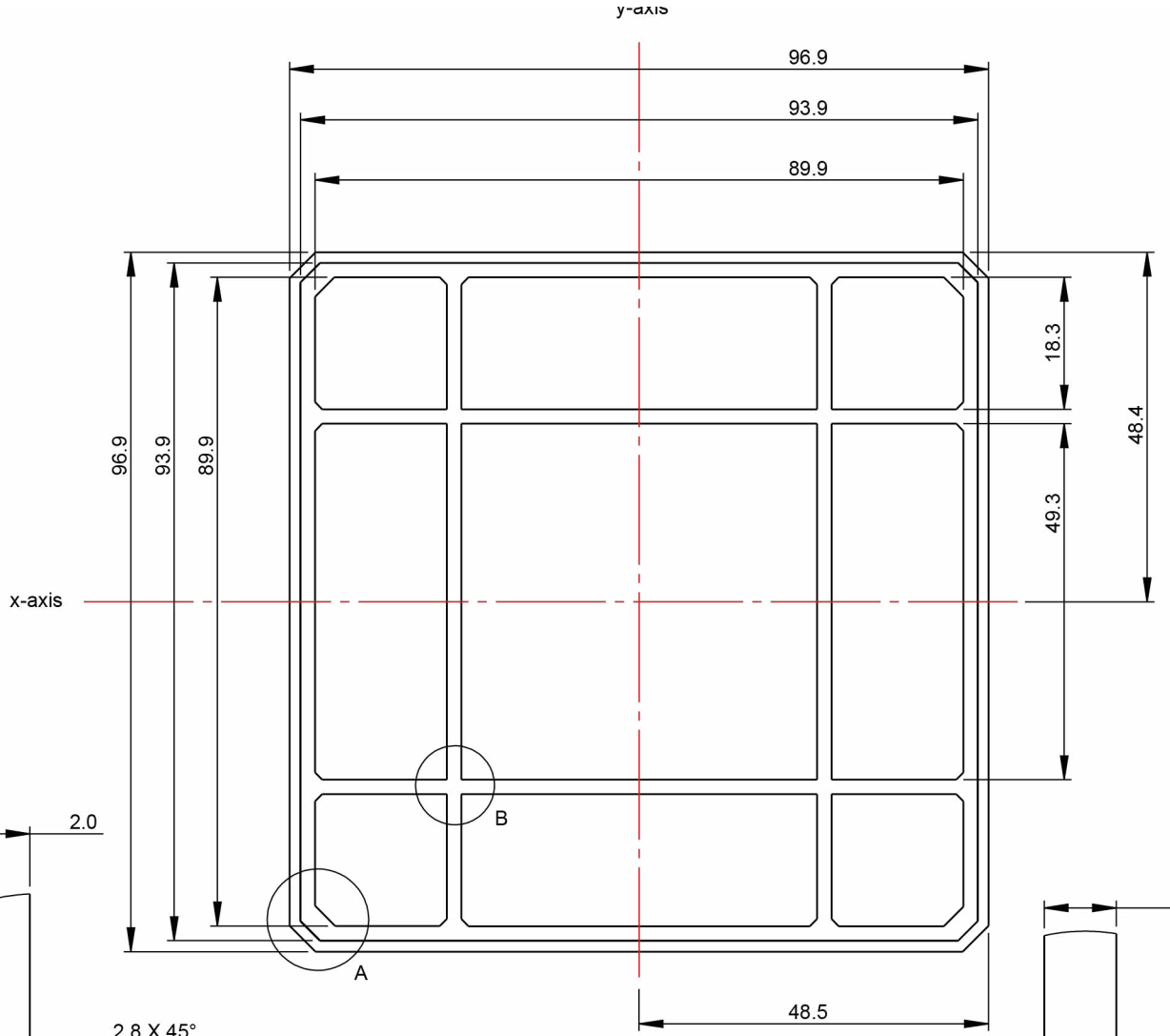

Lifespan profile - STLS06
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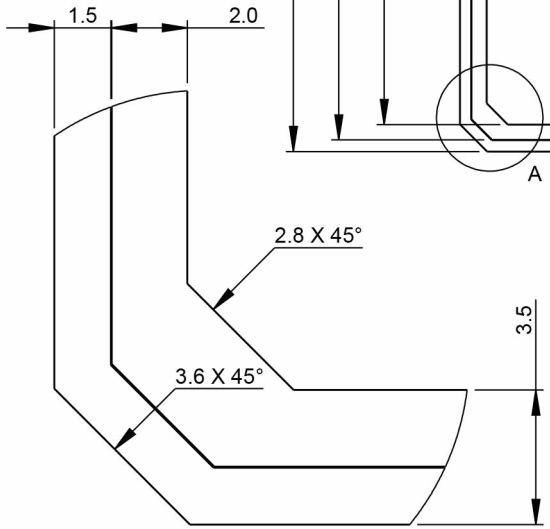

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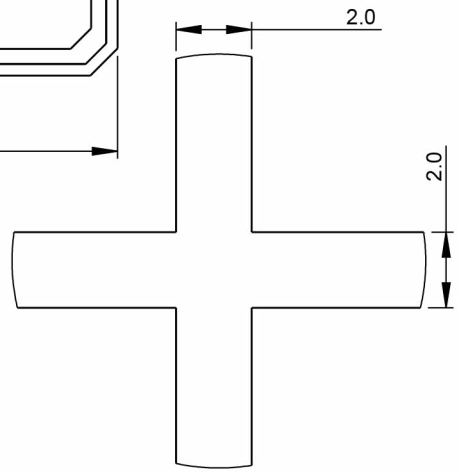

DETAIL B
SCALE 5 : 1

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	2 304	1 184
APPROXIMATE MASS (kg/m)	8.1	

SECTION PROPERTIES	
I_x (mm⁴)	6 530 505
I_y (mm⁴)	6 530 505
r_x (mm)	53.2
r_y (mm)	53.2
C_x (mm)	75.0
C_y (mm)	75.0
S_x (mm³)	89 459
S_y (mm³)	89 459

DRAWING TITLE
Lifespan - Architectural beams - For TDS - STLS07

FILE NAME
Lifespan - Architectural beams - For TDS

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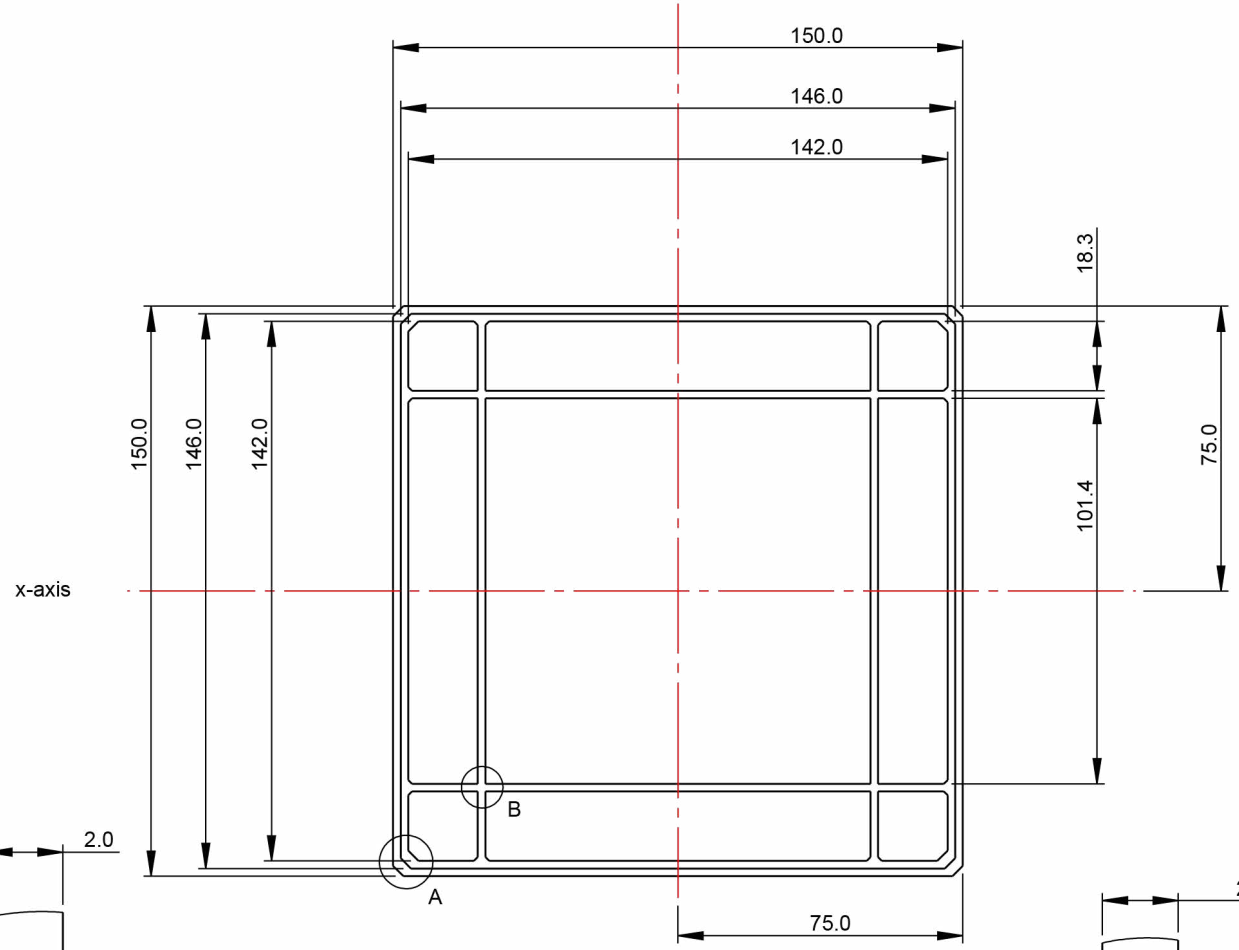
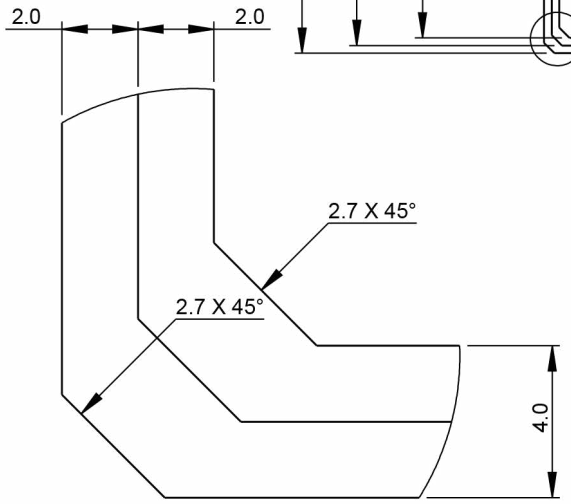
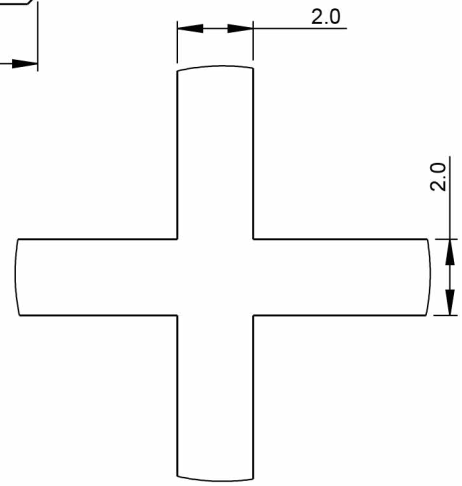
LIFESPAN
COMPOSITE ARCHITECTURAL BEAMS



Lifespan profile - STLS07
SCALE 1:2



DETAIL A
SCALE 5 : 1



DETAIL B
SCALE 5 : 1

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	4 223	1 747
APPROXIMATE MASS (kg/m)	13.3	

SECTION PROPERTIES	
I_x (mm⁴)	35 640 529
I_y (mm⁴)	35 640 529
r_x (mm)	91.9
r_y (mm)	91.9
C_x (mm)	102.4
C_y (mm)	102.4
S_x (mm³)	355 162
S_y (mm³)	355 162

DRAWING TITLE
Lifespan - Architectural beams - For TDS - STLS08

FILE NAME
Lifespan - Architectural beams - For TDS

DRAWING NUMBER	REV
220620CLS09BPD	C2.4

DATE	SCALE	PAGE
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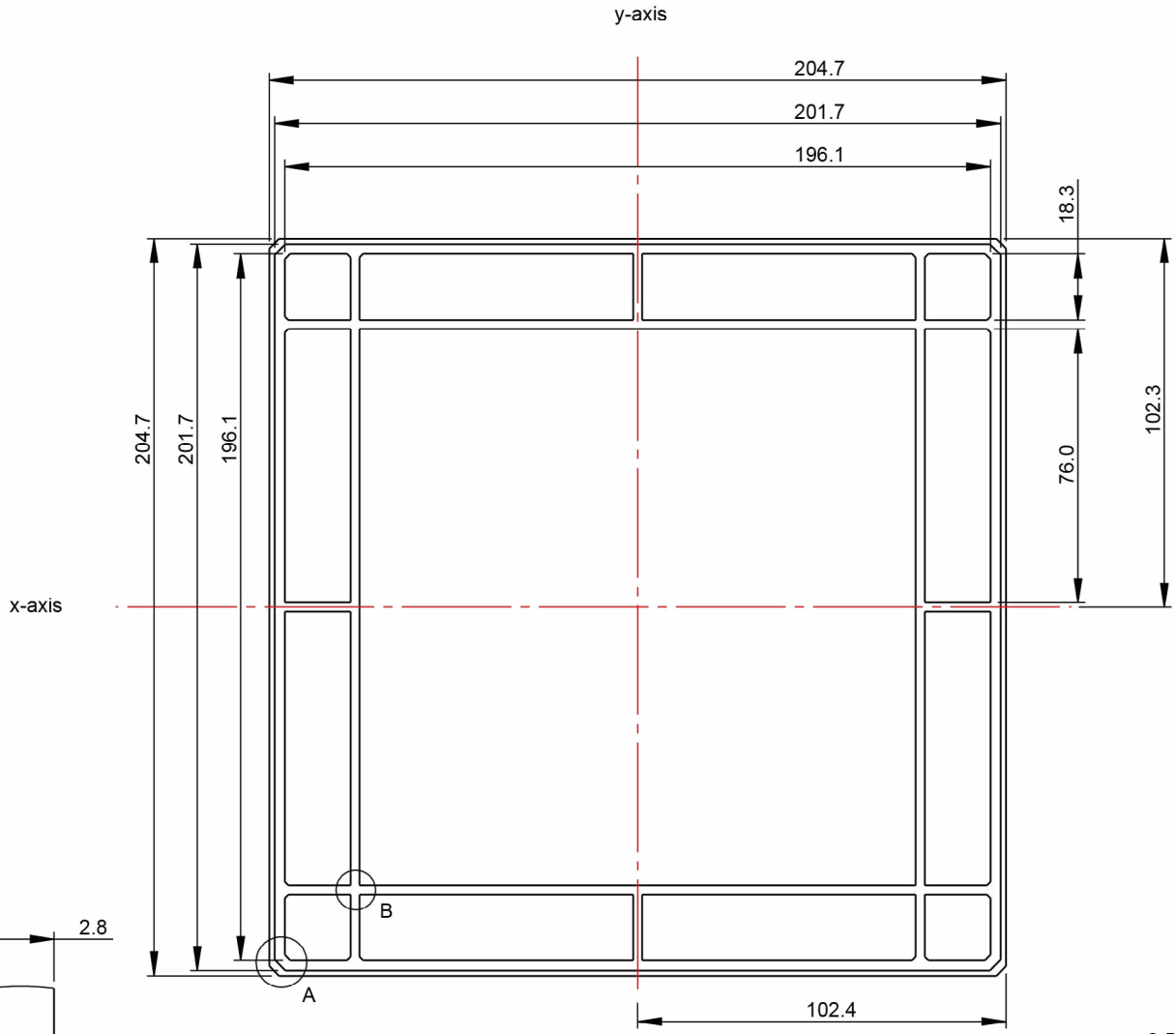
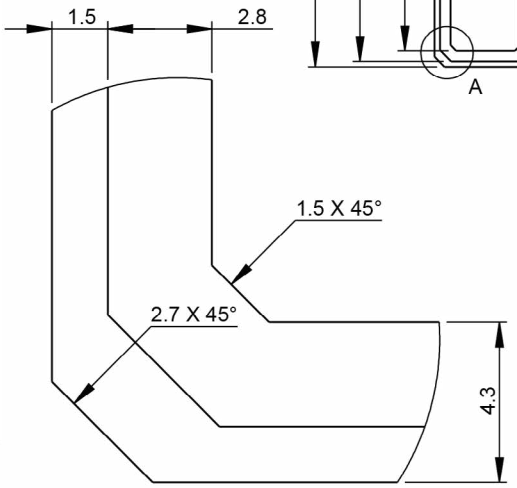
LIFESPAN
COMPOSITE ARCHITECTURAL BEAMS



Lifespan profile - STLS08
SCALE 1:2



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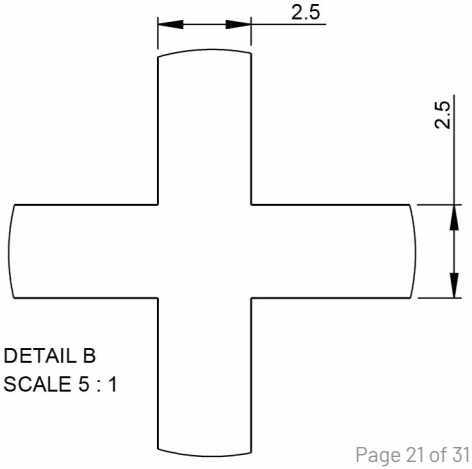
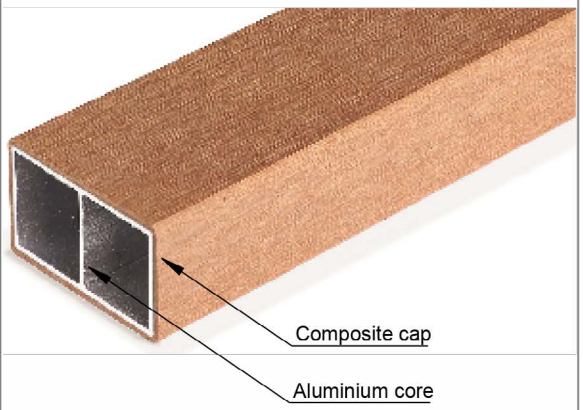


DETAIL B
SCALE 5 : 1

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	166	304
APPROXIMATE MASS (kg/m)	0.8	



SECTION PROPERTIES	
I_x (mm⁴)	40 492
I_y (mm⁴)	18 090
r_x (mm)	15.6
r_y (mm)	10.4
C_x (mm)	12.9
C_y (mm)	23.0
S_x (mm³)	1 761
S_y (mm³)	1 397

DRAWING TITLE
Lifespan - Architectural beam - STLS09

FILE NAME
Lifespan - Architectural beams - For TDS

DRAWING NUMBER	REV
220620CLS09BPD	C2.4

DATE	SCALE	PAGE
2022-06-20	1:1	A4

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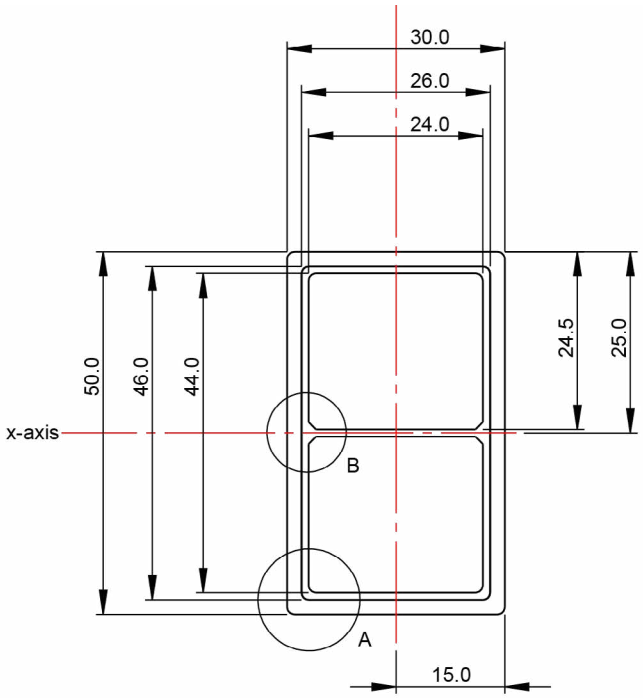
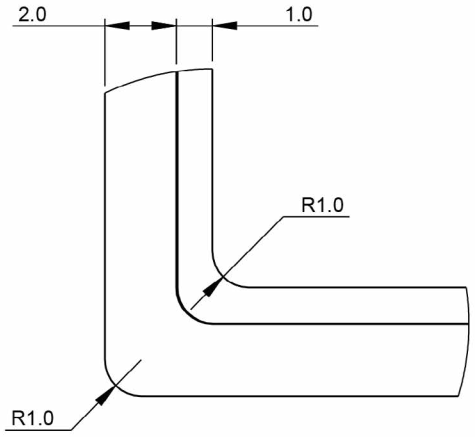
ISSUED FOR INFORMATION

LIFESPAN
COMPOSITE ARCHITECTURAL BEAMS



Lifespan profile - STLS09
SCALE 1:1



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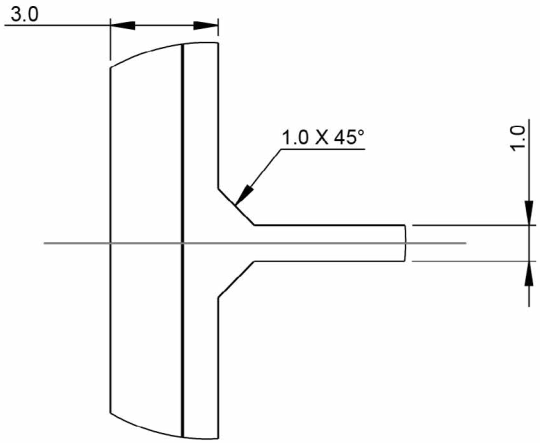
SCALE 5 : 1



DETAIL B
SCALE 5 : 1

Appendix B

Material compatibility

The following information provides an extensive list of substances that may negatively impact the Polyethylene material within the cap of lifespan. This does not account or the cellulose material within the composition of the cap. Please contact **rad@eva-last.com** for further information.

The table provided is referenced from the online sources BASF and is provided for ease of information.

It is important to check material compatibility when choosing chemicals that the product may encounter, as they may prematurely degrade the product, these may include ingredients in cleaning products, pool additives and even oils and saps from local vegetation.

CODES

+ = Resistant no indication that serviceability would be impaired.

o = Variable resistance, depending on conditions of use.

- = Unresistant, not recommended for service applications under any conditions.

"REAGENT" + # Plasticizer.

Certain types of chemicals are absorbed to varying degrees by poly- ethylene causing swelling, weight-gain, softening and some loss of yield strength. These plasticizing materials cause no actual chemical degradation of the resin. Several of these chemicals have a strong plasticizing effect (e.g. aromatic hydrocarbons benzene), whereas others have weaker effects (e.g. gasoline). Certain plasticizers are sufficiently volatile that if they are removed from contact with the polyethylene, the part will "dry" out and return to its original condition with no loss of properties.

"REAGENT"+ = Oxidizers.

Oxidizers are the only group of materials capable of chemically degrading polyethylene. The effects on the poly-ethylene may be gradual even for strong oxidizers and short-term effects may not be measurable. However, if continuous long-term exposure is intended, the chemical effects should be checked regularly.

REAGENT	CONC.	HDPE	
		70°	140°
Acetone		o	-
Acetaldehyde*	100%	o	-
Acetic Acid*	10%	+	+
Acetic Acid*	60%	+	o
Acetic Anhydride*		-	-
Air		+	+
Aluminium Chloride	all conc	+	+
Aluminium Fluoride	all conc	+	+
Aluminium Sulphate	all conc	+	+
Alums	all types	+	+
Ammonia	100% dry gas	+	+
Ammonium Carbonate		+	+
Ammonium Chloride	sat'd	+	+
Ammonium Fluoride	sat'd	+	+
Ammonium Hydroxide	10%	+	+
Ammonium Hydroxide	28%	+	+
Ammonium Nitrate	sat'd	+	+
Ammonium Persulphate	sat'd	+	+
Ammonium Sulphate	sat'd	+	+
Ammonium Metaphosphate	sat'd	+	+
Ammonium Sulphide	sat'd	+	+
Amyl Acetate#*	100%	-	-
Amyl Alcohol#*	100%	+	+
Amyl Chloride#	100%	-	-
Aniline#*	100%	-	o
Aqua Regia+		-	-
Arsenic Acid	all conc	+	+
Aromatic Hydrocarbons#*		-	-
Ascorbic Acid	10%	+	+
Barium Carbonate	sat'd	+	+
Barium Chloride	sat'd	+	+
Barium Hydroxide		+	+
Barium Sulphate	sat'd	+	+
Barium Sulphide	sat'd	+	+
Beer		+	+
Benzene#*		-	-
Benzoic Acid	all conc	+	+
Bismuth Carbonate	sat'd	+	+
Bleach Lye	10%	+	+
Borax	sat'd	+	+
Boric Acid	all conc	+	+
Boron Trifluoride		+	+
Brine		+	+
Bromine+	liquid	-	-
Bromine Water#	sat'd	-	-
Butanediol*	10%	+	+
Butanediol*	60%	+	+
Butanediol*	100%	+	+
Butter*		+	+

n-Butyl Acetate#*	100%	+	o
n-Butyl Alcohol*	100%	+	+
Butyric Acid#	conc	-	-
Calcium Bisulphite		+	+
Calcium Carbonate	sat'd	+	+
Calcium Chlorate	sat'd	+	+
Calcium Chloride	sat'd	+	+
Calcium Hydroxide	conc	+	+
Calcium Hypochlorite	bleach sol	+	+
Calcium Nitrate	50%	+	+
Calcium Oxide	sat'd	+	+
Calcium Sulphate		+	+
Camphor Oil#*		o	-
Carbon Dioxide	all conc	+	+
Carbon Disulphide		-	-
Carbon Monoxide		+	+
Carbon Tetrachloride#		o	-
Carbonic Acid		+	+
Castor Oil*	conc	+	+
Chlorine+	100% dry gas	-	-
Chlorine Liquid+		-	-
Chlorine Water+	2% sat'd sol	+	+
Chlorobenzene#*		-	-
Chloroform*#		o	-
Chlorosulphonic Acid	100%	-	-
Chrome Alum	sat'd	+	+
Chromic Acid	80%	-	-
Chromic Acid	50%	+	o
Chromic Acid	10%	+	+
Cider*		+	+
Citric Acid*	sat'd	+	+
Coconut Oil Alcohols*		+	+
Coffee		+	+
Cola Concentrate*		+	+
Copper Chloride	sat'd	+	+
Copper Cyanide	sat'd	+	+
Copper Fluoride	2%	+	+
Copper Nitrate	sat'd	+	+
Copper Sulphate	sat'd	+	+
Corn Oil*		+	+
Cottonseed Oil*		+	+
Cuprous Chloride	sat'd	+	+
Detergents Synthetic*		+	+
Developers Photographic		+	+
Dextrin	sat'd	+	+
Dextrose	sat'd	+	+
Diazo Salts		+	+
Dibutylphthalate*		o	o

Dichlorobenzene#*		-	-
Diethyl Ketone#*		o	o
Diethylene Glycol*		+	+
Diglycolic Acid*		+	+
Dimethylamine		-	-
Disodium Phosphate		o	+
Emulsions, Photographic*		+	+
Ethyl Acetate#* 100%	100%	o	-
Ethyl Alcohol* 100%	100%	+	+
Ethyl Alcohol* 35%	35%	+	+
Ethyl Benzene#*		-	-
Ethyl Chloride#		-	-
Ethyl Ether#		-	-
Ethylene Chloride#*		-	-
Ethylene Glycol*		+	+
Fatty Acids*		+	+
Ferric Chloride sat'd	sat'd	+	+
Ferric Nitrate sat'd	sat'd	+	+
Ferrous Chloride sat'd	sat'd	+	+
Ferrous Sulphate		+	+
Fish Solubles*		+	+
Fluoboric Acid		+	+
Fluosillcic Acid conc	conc	+	o
Fluosillcic Acid 32%	32%	+	+
Formic Acid all conc	all conc	+	+
Fructose sat'd	d	+	+
Fruit Pulp*		+	+
Furtural# 100%	100%	o	-
Furturyl Alcohol#*		o	-
Gallic Acid* sat'd		+	+
Gasoline#*		o	o
Glucose		+	+
Glycerine*		+	+
Glycol*		+	+
Glycolic Acid* 30%	30%	+	+
Grape Sugar		+	+
n-Heptane#*		o	o
Hexachlorobenzene		+	-
Hexanol Tertiary*		+	+
Hydrobromic Acid 50%	50%	+	+
Hydrochloric Acid all conc	all conc	+	+
Hydrocyanic Acid sat'd	sat'd	+	+
Hydrofluoric Acid* 60%	60%	+	+
Hydrogen 100%		+	+
Hydrogen Chloride dry gas	dry gas	+	+
Hydrogen Peroxide 30%	30%	+	+
Hydrogen Peroxide 10%	10%	+	+
Hydrogen Sulphide		+	+

Hydroquinone		+	+
Hypochlorous Acid conc.	conc.	+	+
Inks*		+	+
Iodine+ in KI sol'n	in KIsol'd	o	-
Isopropyl Alcohol 100%	100%	-	-
Lead Acetate sat'd	sat'd	+	+
Lead Nitrate		+	+
Lactic Acid* 20%	20%	+	+
Linseed Oil* 100%	100%	o	-
Magnesium Carbonate	sat'd	+	+
Magnesium Chloride	sat'd	+	+
Magnesium Hydroxide	sat'd	+	+
Magnesium Nitrate	sat'd	+	+
Magnesium Sulphate	sat'd	+	+
Mercuric Chloride	40%	+	+
Mercuric Cyanide	sat'd	+	+
Mercury		+	+
Methyl Alcohol*	100%	+	+
Methylethyl Ketone#*	100%	o	-
Methylene Chloride#*	100%	o	o
Milk		+	+
Mineral Oils#		o	-
Molasses		+	+
Naphtha#*		o	-
Naphthalene#*		o	-
Nickel Chloride	conc	+	+
Nickel Nitrate	sat'd	+	+
Nickel Sulphate	conc	+	+
Nicotine*	dilute	+	+
Nitric Acid	0-30%	+	+
Nitric Acid+	30-50%	+	o
Nitric Acid+	70%	+	o
Nitric Acid+	95-98%	-	-
Nitrobenzene#*	100%	-	-
n-Octane		+	+
Oleic Acid		o	-
Oxalic Acid*	sat'd	+	+
Perchloroethylene#		-	-
Phosphoric Acid	95%	+	+
Photographic Solutions		+	+
Plating Solutions*			
Brass		+	+
Cadmium		+	+
Chromium		+	+
Copper		+	+
Gold		+	+
Indium		+	+
Lead		+	+

Nickel		+	+
Rhodium		+	+
Sliver		+	+
Tin		+	+
Zinc		+	+
Potassium Bicarbonate	sat'd	+	+
Potassium Bromide	sat'd	+	+
Potassium Bromate	10%	+	+
Potassium Carbonate		+	+
Potassium Chlorate	sat'd	+	+
Potassium Chloride	sat'd	+	+
Potassium Chromate	40%	+	+
Potassium Cyanide	sat'd	+	+
Potassium Dichromate	40%	+	+
Potassium Ferri/Ferro	Ferro		
Cyanide	sat'd	+	+
Potassium Fluoride		+	+
Potassium Hydroxide	conc	+	+
Potassium Nitrate	sat'd	+	+
Potassium Perborate	sat'd	+	+
Potassium Perchlorate	10%	+	+
Potassium Permanganate	20%	+	+
Potassium Persulphate	sat'd	+	+
Potassium Sulphate	conc	+	+
Potassium Sulphide	conc	+	+
Potassium Sulphite 100%	conc	+	+
Propargyl Alcohol*		+	+
n-Propyl Alcohol*		+	+
Propylene Dichloride#*		-	-
Propylene GlyCol*	sat'd	+	+
Pyridine*		+	-
Resorcinol		+	+
Salicylic Acid	sat'd	+	+
Sea Water		+	+
Selenic Acid Shortening*	any conc	+	+
Sliver Nitrate Sol'n		+	+
Soap Solutions*	any conc	+	+
Sodium Acetate	sat'd	+	+
Sodium Benzoate	35%	+	+
Sodium Biscarbonate	sat'd	+	+
Sodium Bisulphate	sat'd	+	+
Sodium Bisulphite	sat'd	+	+
Sodium Borate	dilute	+	+
Sodium Bromide	dilute	+	+
Sodium Carbonate	conc	+	+
Sodium Chlorate	sat'd	+	+
Sodium Chloride	sat'd	+	+
Sodium Cyanide	sat'd	+	+

Sodium Dichromate	sat'd	+	+
Sodium Ferri/Ferro	sat'd	+	+
Cyanide	sat'd	+	+
Sodium Fluoride	sat'd	+	+
Sodium Hydroxide	conc	+	+
Sodium Hypochlorite	sat'd	+	+
Sodium Nitrate		+	+
Sodium Sulphate		+	+
Sodium Sulphide		+	+
Sodium Sulphite		+	+
Stannic Chloride		+	+
Stannous Chloride		+	+
Starch Solution*		+	+
Stearic Acid*		+	+
Sulphuric Acid		+	+
Sulphuric Acid+		+	o
Sulphuric Acid+		+	-
Sulphuric Acid+		o	-
Sulphuric Acid+		o	-
Sulphuric Acid+		-	-
Sulphurous Acid Tallow#		+	+
Tannic Acid*		+	o
Tartaric Acid Tetrolydrofuran#*		+	+
Titanium Tetrochloride Toluene#*		+	+
Trichloroethylene#*		-	-
Triethylene Glycol*		-	-
Trisodium Phosphate		+	+
Turpentine# Urea		- +	- +
Urine		+	+
Vanilla Extract*		+	+
Vinegar		+	+
Water		+	+
Wetting Agents*		+	+
Whiskey*		+	+
Wines*		+	+
Xylene#		-	-
Yeast		+	+
Zinc Bromide		+	+
Zinc Carbonate		+	+
Zinc Chloride		+	+
Zinc Oxide		+	+

Appendix C

Lifespan connector drawings

PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	N/A	N/A
APPROXIMATE MASS (g)	284 g	

SECTION PROPERTIES	
I_x (mm⁴)	N/A
I_y (mm⁴)	N/A
r_x (mm)	N/A
r_y (mm)	N/A
C_x (mm)	N/A
C_y (mm)	N/A
S_x (mm³)	N/A
S_y (mm³)	N/A

DRAWING TITLE
Concealed clip-in U bracket

FILE NAME
Lifespan Connectors

DRAWING NUMBER		REV
DATE	SCALE	PAGE
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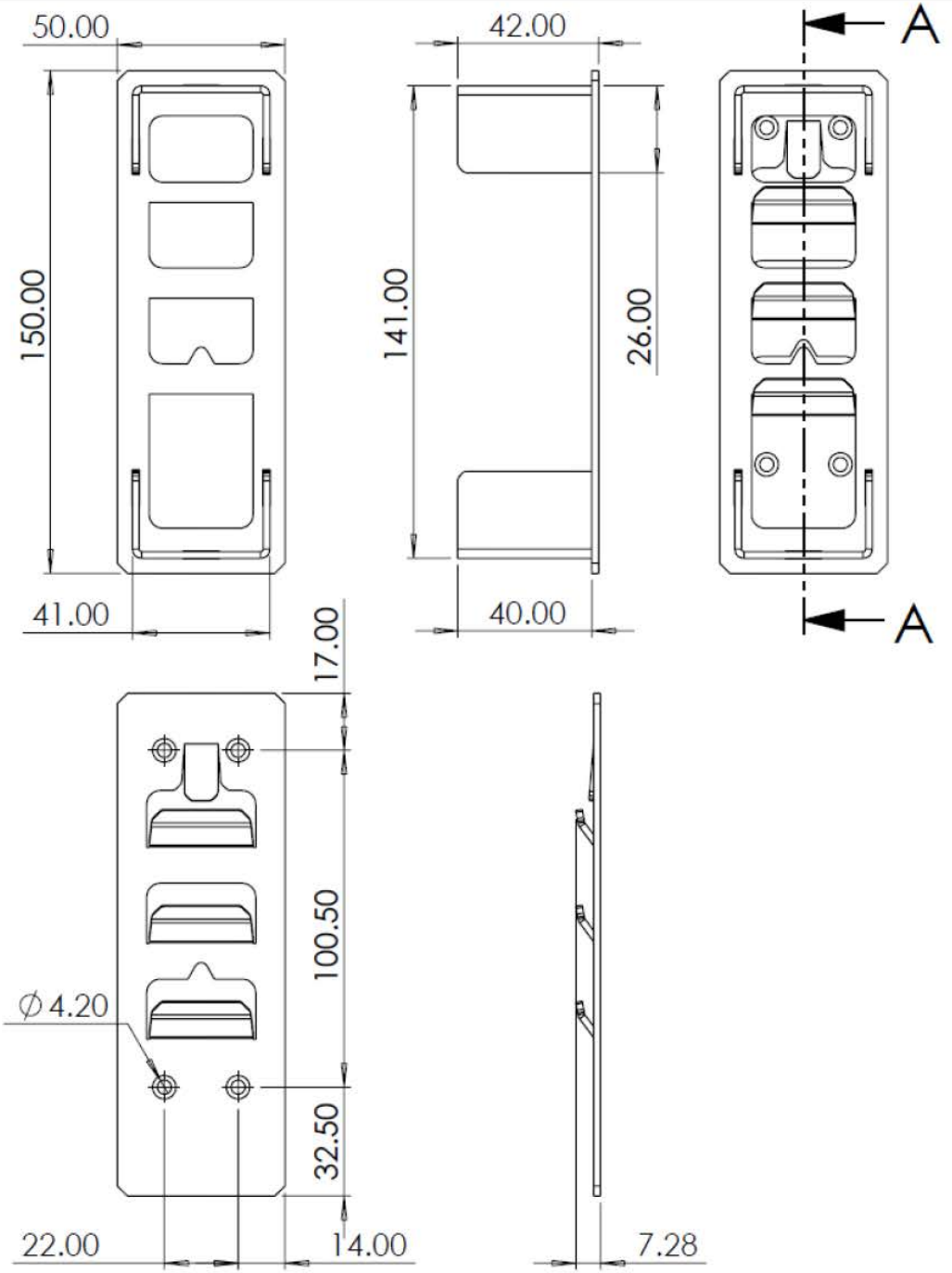
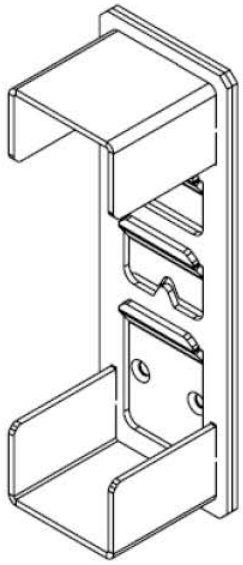
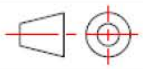
COMPOSITE ARCHITECTURAL BEAMS





PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	N/A	N/A
APPROXIMATE MASS (g)	26 g	

SECTION PROPERTIES	
I_x (mm⁴)	N/A
I_y (mm⁴)	N/A
r_x (mm)	N/A
r_y (mm)	N/A
C_x (mm)	N/A
C_y (mm)	N/A
S_x (mm³)	N/A
S_y (mm³)	N/A



DRAWING TITLE
Concealed rafter clip

FILE NAME
Lifespan Connectors

DRAWING NUMBER		REV
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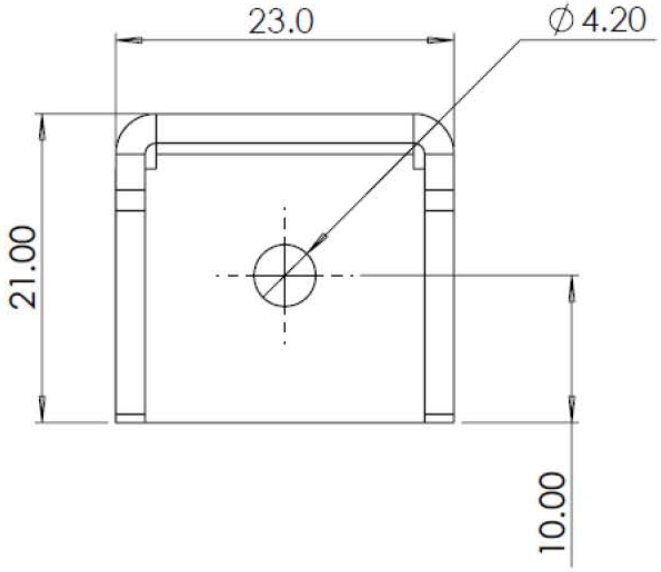
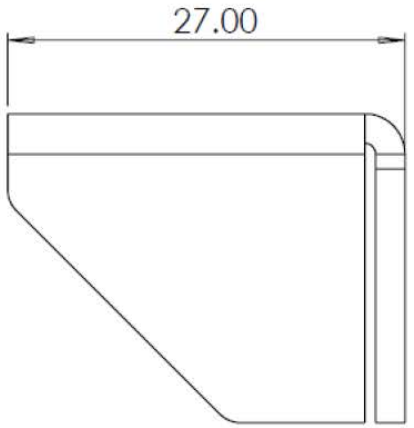
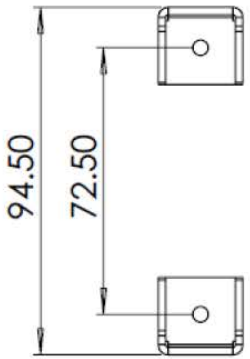
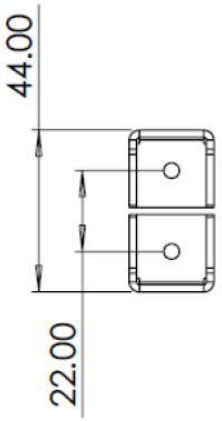
LIFESPAN
COMPOSITE ARCHITECTURAL BEAMS



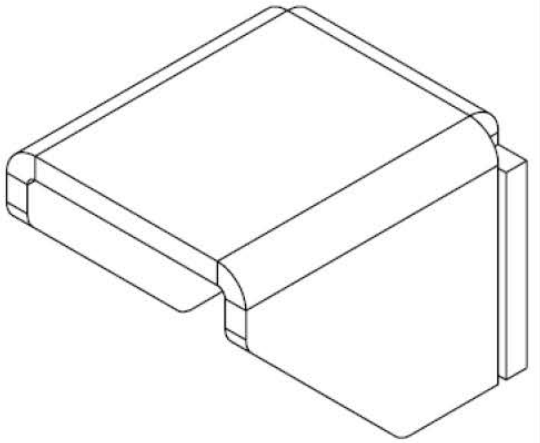




100 x 30 mm
beam

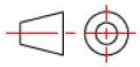


50 x 30 mm
beam



PROFILE PROPERTIES	ALUMINIUM CORE	COMPOSITE CAP
AREA (mm²)	N/A	N/A
APPROXIMATE MASS (g)	319 g	

SECTION PROPERTIES	
I_x (mm⁴)	N/A
I_y (mm⁴)	N/A
r_x (mm)	N/A
r_y (mm)	N/A
C_x (mm)	N/A
C_y (mm)	N/A
S_x (mm³)	N/A
S_y (mm³)	N/A



DRAWING TITLE
Concealed post mount (76x76x2)

FILE NAME
Lifespan Connectors

DRAWING NUMBER		REV
DATE	SCALE	PAGE
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