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European Technical Assessment

ETA 22/0030
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General Part

Technical Assessment Body issuing the European Technical Assessment: Itecons - Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade	
Trade name of the construction product	Chatron Solar Light Tube
Product family to which the construction product belongs	Roof Coverings, Roof Lights, Roof Windows and Ancillary Products. Roof Kits. Product area code: 22
Manufacturer	Chatron, Lda. Travessa da Zona Industrial 1, 95 – Rossio 3730-601 Vale de Cambra Portugal
Manufacturing plant	Chatron, Lda. Travessa da Zona Industrial 1, 95 – Rossio 3730-601 Vale de Cambra Portugal
This European Technical Assessment contains	11 pages including 1 Annex which form an integral part of the assessment
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 220021-00-0402 – *Tubular daylight devices (TDD)*

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Specific parts

1. Technical description of the product

Chatron Solar Light Tube is a tubular device direct daylight from the roof via a reflecting light pipe, into a room. Chatron Solar Light Tube is comprised of the following main elements:

- A light collector composed of a polycarbonate dome, which is a roof module with a transparent cover;
- A rigid light pipe composed of an aluminium reflector tube, which can be supplied with bends and telescopic features for extension;
- A light diffuser kit made of polycarbonate.

The kit also includes various accessories, such as sealing tapes, fasteners, etc, as defined in Table 1.

Chatron Solar Light Tube kit is manufactured in a range of sizes of diameter of the reflector tube with the corresponding references as shown in Table 1.

Table 1: Range of sizes of diameter of the reflector tube and corresponding models of Chatron Solar Light Tube

Diameter (mm)	Models of Chatron Solar Light Tube
250	*TS 250*
	TS 250 TPM
350	*TS 350*
	TS 350 TPM
530	*TS 530*
	TS 530 TPM
750	*TS 750*
	TS 750 TPM
1000	*TS 1000*
	TS 1000 TPM

A thermal insulation layer from the outside of the reflector tube and a double polycarbonate dome may be applied to the system.

The components of Chatron Solar Light Tube are specified in Table 2.

Table 2: Definition of the kit components of Chatron Solar Light Tube

Element	Materials	Components
Solar collector	Polycarbonate	Dome
	Polypropylene	Collector sealing system
	High density polyethylene	Connection accessory (solar collector to reflector tube)
Reflector tube	Aluminum	Rigid tube
	Factory made flexible elastomeric foam (FEF)	Thermal insulation layer applied from the outside of the reflector tube
	Aluminum in the inner part of the reflector tube, ABS structure from de outside and thermal insulation in between.	TPM module (only used in models with "TPM" on the reference)
	ASA	Sealing accessory
Solar diffuser	Polycarbonate, ABS and ASA	Easy Clic diffusor

The detailed drawings of Chatron Solar Light Tube are presented in Annex A.

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1. Intended use

Chatron Solar Light Tube is intended to transmit natural daylight into rooms and may be intended to transverse through both warm and cold rooms.

Chatron Solar Light Tube is not intended to have a load bearing, load transferring or stiffening function and is not intended to transmit natural daylight into cold storage rooms and cold storage buildings.

The provisions made in this European Technical Assessment are based on an assumed working life of 25 years as minimum according to the EAD, provided that the conditions lay down for the installation, packaging, transport and storage as well as appropriate use, maintenance and repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a mean for choosing the right product in relation to the expected economically reasonable working life of the works.

3. Performance of the product and references to the methods used for its assessment

The assessment of Chatron Solar Light Tube according to the Basic Work Requirements (BWR) was carried out in compliance with EAD 220021-00-0402. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by Itecons.

A summary of the assessed characteristics and the performance of the kit can be found in Table 3 and in the following sections there is detailed information regarding the methods of assessment and test results.

Table 3: Assessed characteristics and performance of kit Chatron Solar Light Tube

Chatron Solar Light Tube performance											
Characteristic \ **Model**		**TS 250**	**TS 350**	**TS 530**	**TS 750**	**TS 1000**	**TS 250 TPM**	**TS 350 TPM**	**TS 530 TPM**	**TS 750 TPM**	**TS 1000 TPM**
Reaction to fire of the light collector, the light diffuser and the light pipe		According to Decision 96/603/EC the aluminium reflector tube is classified A1 without the need for further testing. No performance was assessed regarding reaction to fire of the other elements of the kit (light collector, light diffuser, other accessories).									
Resistance to fire of the light collector, the light diffuser and the light pipe		No performance assessed									
External fire performance of the light collector		No performance assessed									
Water tightness of the assembled kit	**Sloped roofs**	Class E1050					No performance assessed				
	Flat roofs	No performance assessed									
Content, emission and/or release of dangerous substances		No performance assessed									
Upward and downward load resistance of the light collector		Class C3									
Resistance to impact of the light collector		No performance assessed									
Direct airborne sound insulation of the assembled system		47.3 ± 1.3 dB	50.4 ± 1.4 dB	45.7 ± 1.3 dB	No performance assessed		51.3 ± 1.3 dB	51.6 ± 1.4 dB	51.7 ± 1.4 dB	No performance assessed	
Air permeability of the light diffuser		Class 3									
Solar energy transmittance of the assembled system		No performance assessed									
Light transmittance of the assembled system		No performance assessed									
Light properties of the light collector, light pipe and light diffuser		No performance assessed									
Thermal transmittance of the assembled system		See section 3.6.5 of this ETA									
Thermal transmittance of the light diffuser		See section 3.6.6 of this ETA									
Loss in light due to bending of the light pipe		No performance assessed									
Durability		No performance assessed									

3.1. Mechanical resistance and stability (BWR 1)

Not relevant.

3.2. Safety in case of fire (BWR 2)

3.2.1. Reaction to fire of the light collector, the light diffuser and the light pipe

According to Decision 96/603/EC the aluminium reflector tube is classified A1 without the need for further testing.

No performance was assessed regarding reaction to fire of the other components of the kit (light collector, light diffuser, other accessories).

3.2.2. Resistance to fire of the light collector, the light diffuser and the light pipe

No performance assessed.

3.2.3. External fire performance of the light collector

No performance assessed.

3.3. Hygiene, health and the environment (BWR 3)

3.3.1. Water tightness of the assembled kit

The water tightness of Chatron Solar Light Tube, references TS 250, TS 350, TS 530, TS 750 and TS 1000, was assessed according to section 4.5 of EN 14351-1 for sloped roofs.

The results are presented in Table 4.

Table 4: Water tightness classification according to EN 12208

Limit of water tightness	1050 Pa
Final classification	Class E1050

No performance was assessed regarding the other references of Chatron Solar Light Tube in relation to its water tightness for sloped roofs.

The water tightness of Chatron Solar Light Tube for flat roofs was not assessed.

3.3.2. Content, emission and/or release of dangerous substances

No performance assessed.

3.4. Safety in use (BWR 4)

3.4.1. Upward and downward load resistance of the light collector

The resistance of the light collector to wind loads for use on sloped roofs was determined according to clause 4.2 of EN 14351-1.

The test consists in the following tests:

- Deflection test: positive and negative pressures until P1;
- Repeated pressure test: positive and negative pressures until P2;
- Safety test: positive and negative pressures until P3.

The wind load test was performed for a wind load Class 3. Thus, the values of the test pressures are: P1 = 1200 Pa; P2 = 600 Pa; P3 = 1800 Pa. The results are presented in Table 5.

Table 5: Resistance to wind load according to the EN 12210

Deflection test + repeated pressure test + air permeability test + safety test	
Final classification	Class C3

The resistance of the light collector to wind loads of Chatron Solar Light Tube for flat roofs was not assessed.

3.4.2. Resistance to impact of the light collector

No performance assessed.

3.5. Protection against noise (BWR 5)

3.5.1. Direct airborne sound insulation of the assembled system

The airborne sound insulation performance of Chatron Solar Light Tube was verified by laboratory testing according to the relevant parts of EN ISO 10140-1. The rating of airborne sound insulation was undertaken according to EN ISO 717-1. The specimens consisting of a solar tube with nominal diameter of 250 mm (TS 250 and TS 250 TPM), 350 mm (TS 350 and TS 350 TPM) and 530 mm (TS 530 and TS 530 TPM) composed by a solar collector with a polycarbonate dome and a polycarbonate "Easy Clic" solar diffuser.

The results are presented in Table 6.

Table 6: Airborne sound insulation $D_{n,e,w}$

Product	$D_{n,e,w}$
TS 250	47.3 ± 1.3 dB
TS 250 TPM	51.3 ± 1.3 dB
TS 350	50.4 ± 1.4 dB
TS 350 TPM	51.6 ± 1.4 dB
TS 530	45.7 ± 1.3 dB
TS 530 TPM	51.7 ± 1.4 dB
TS 750	No performance assessed
TS + 750 TPM	No performance assessed
TS 1000	No performance assessed
TS + 1000 TPM	No performance assessed

3.6. Energy economy and heat retention (BWR 6)

3.6.1. Air permeability of the light diffuser

The air permeability of the light diffuser was determined according to clause 4.14 of EN 14351-1 for sloped roofs. According this standard two air permeability tests shall be carried out in accordance with EN 1026, one with positive test pressures and another with negative test pressures. The test result, defined as the numerical average of the two air permeability values (m^3/h) at each pressures step, shall be expressed in accordance with EN 12207. Therefore, the classification based on the air permeability to the overall area of the light diffuser is presented in Table 7.

Air permeability of the light diffuser for flat roofs: No performance assessed.

Table 7: Classification of the light diffuser according to EN 12207

Classification in relation with overall area (V_A)	Final classification
Class 3	Class 3

3.6.2. Solar energy transmittance of the assembled system

No performance assessed.

3.6.3. Light transmittance of the assembled system

No performance assessed.

3.6.4. Light properties of the light collector, light pipe and light diffuser

No performance assessed.

3.6.5. Thermal transmittance of the assembled system

The thermal transmittance of the assembled kit was determined according the French Régles Th-Bât, Fascicule 3/5, clause 2.2.7.

The calculations were carried out for three possible solutions:

- Solution 1 – base system;
- Solution 2 – system with reflector tube thermal isolated from the outside;
- Solution 3 – system with reflector tube isolated from the outside and with a double dome.

The thermal transmittance coefficient of the kit was determined for three possible installation setups:

1. solar tube crossing an unheated space (unheated attic);
2. solar tube installed in a heated space;
3. solar tube integrated in the external ceiling.

The results are presented in Table 8 to 12.

Table 8: Thermal transmittance coefficient, U_{ts}, of the Chatron Solar Light Tube from crossing an unheated space

Solution	U_{ts} (W/(m²K))									
	TS 250	TS 350	TS 530	TS 750	TS 1000	TS 250 TPM	TS 350 TPM	TS 530 TPM	TS 750 TPM	TS 1000 TPM
1	2.37	2.76	3.22	3.55	3.78	1.45	1.47	1.58	1.64	1.68
2	2.38	2.77	3.22	3.55	3.78	1.46	1.48	1.59	1.65	1.69
3	2.38	2.77	3.22	3.55	3.78	1.46	1.48	1.59	1.65	1.69

Table 9: Thermal transmittance coefficient, U_{ts}, values of the Chatron Solar Light Tube for situations where the installation crosses a heated space

Solution	U_{ts} (W/(m²K))									
	TS 250*	TS 350*	TS 530*	TS 750*	TS 1000*	TS 250 TPM*	TS 350 TPM*	TS 530 TPM*	TS 750 TPM*	TS 1000 TPM*
1	1.61	1.73	1.81	1.92	2.01	0.68	0.44	0.54	0.64	0.72
2	1.19	1.30	1.42	1.57	1.69	0.57	0.39	0.49	0.59	0.67
3	0.96	1.02	1.12	1.21	1.29	0.52	0.35	0.43	0.50	0.57

*Solar tubes with 0.625m length

Table 10: Thermal transmittance coefficient, U_{ts}, values of the Chatron Solar Light Tube integrated in an external ceiling

Solution	U_{ts} (W/(m²K))				
	TS 250	TS 350	TS 530	TS 750	TS 1000
1	1.84	2.09	2.30	2.44	2.52
2	1.85	2.09	2.30	2.43	2.52
3	1.66	1.82	1.96	2.00	2.04

Table 11: Thermal transmittance coefficient, U_{ts}, values of the Chatron Solar Light Tube integrated in ceilings with an internal thermal insulation layer

Solution	U_{ts} (W/(m²K))				
	TS 250 TPM	TS 350 TPM	TS 530 TPM	TS 750 TPM	TS 1000 TPM
1	1.23	1.25	1.32	1.35	1.37
2	1.24	1.26	1.33	1.36	1.38
3	1.15	1.16	1.21	1.21	1.22

Table 12: Thermal transmittance coefficient, U_{ts}, values of the Chatron Solar Light Tube integrated in ceilings with an external thermal insulation layer

Solution	U_{ts} (W/(m²K))				
	TS 250 TPM	TS 350 TPM	TS 530 TPM	TS 750 TPM	TS 1000 TPM
1	1.20	0.91	1.02	1.10	1.15
2	1.20	0.91	1.02	1.10	1.15
3	1.13	0.82	0.91	0.96	1.00

3.6.6. Thermal transmittance of the light diffuser

The thermal transmittance of the light diffuser, for the different models of the kit, was determined by calculation according EN ISO 10077-2.

The calculations were carried out for three possible solutions:

- Solution 1 – base system;
- Solution 2 – system with reflector tube thermal isolated from the outside;
- Solution 3 – system with reflector tube isolated from the outside and with a double dome.

The results are presented in Table 13.

Table 13: Thermal transmittance coefficient of the light diffuser, $U_{diffuser}$

Solution	$U_{diffuser}$ (W/(m²K))									
	TS 250	TS 350	TS 530	TS 750	TS 1000	TS 250 TPM	TS 350 TPM	TS 530 TPM	TS 750 TPM	TS 1000 TPM
1	2.37	2.76	3.22	3.55	3.78	1.45	1.47	1.58	1.64	1.68
2	2.38	2.77	3.22	3.55	3.78	1.46	1.48	1.59	1.65	1.69
3	2.38	2.77	3.22	3.55	3.78	1.46	1.48	1.59	1.65	1.69

3.6.7. Loss in light due to bending of the light pipe

No performance assessed.

3.6.8. Durability

No performance assessed.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the Decision 1998/436/EC as amended by decision 2001/596/EC of European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) applicable is 3.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Itecons.

The ETA is issued on the basis of agreed data/information, deposited at Itecons, which identifies the kit and its components that have been assessed and judged. It is the manufacturer's responsibility to make sure that all those who use the kit are appropriately informed of specific conditions laid down in this ETA.

Changes to the kit or the components or their production process should be notified to the Itecons before the changes are introduced. Itecons will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

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By

Technical Assessment Unit of

Itecons – Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade

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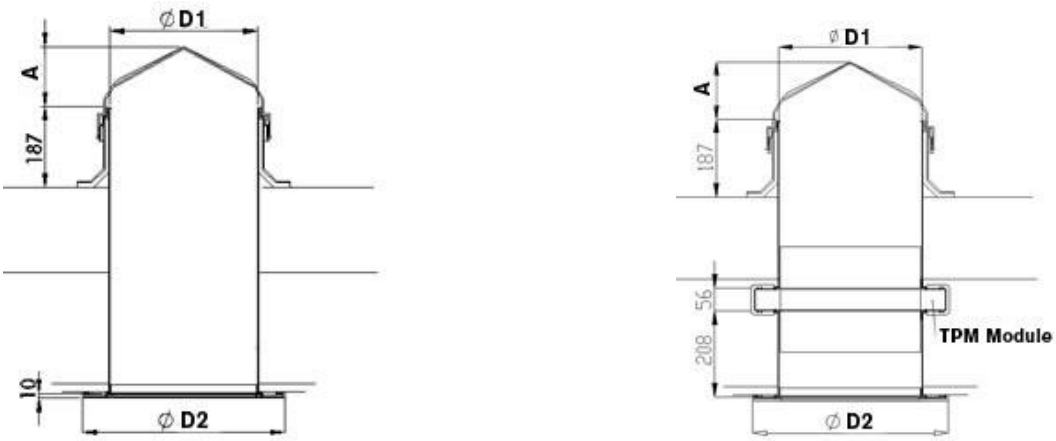
Validated document

(Administration)

Annex A – Detailed drawings

Model	D1	D2	A
TS 250	248	274	130
TS 350	348	474	140
TS 530	528	554	205
TS 750	748	774	250
TS 1000	998	1024	300

Model	D1	D2	A
TS 250 TPM	248	274	130
TS 350 TPM	348	474	140
TS 530 TPM	528	554	205
TS 750 TPM	748	774	250
TS 1000 TPM	998	1024	300



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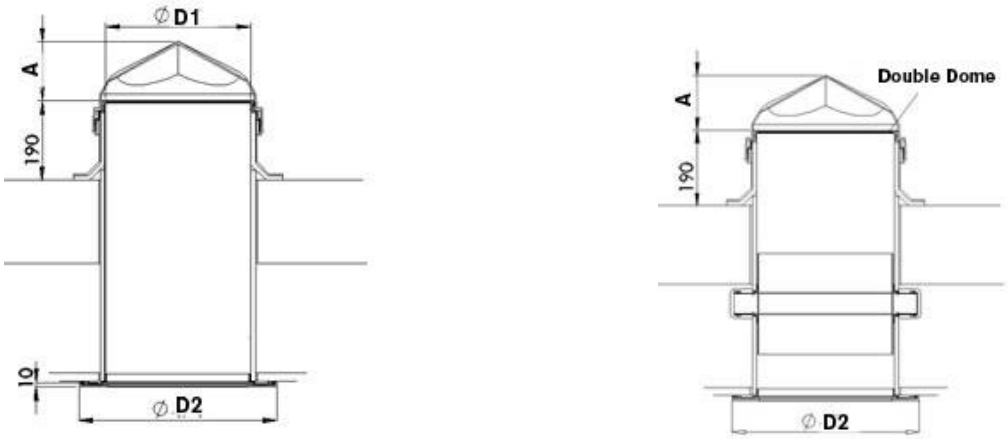

c)

Figure A1: Schematic representations of the different models of Chatron Solar Light Tube.
a) Solution 1 - base system; b) Solution 2 - system with reflector tube isolated from the outside; c) Solution 3 - system with reflector tube isolated from the outside and with a double dome.