Tecfi S.p.A. - Fixing Systems
Head Office:
S.S. Appia km.193 - 81050 Pastorano (CE) - Italy
tel. (+39).0823.88.33.38 - fax (+39).0823.88.32.60
www.tecfi.it info@tecfi.it

Declaration of Performance No1109-CPD-0080

According to the Regulation EU No 305/2011

*Item code:***AJE01 and AJE31**

*Manufacturer:***Tecfi S.p.A. - S.S. Appia, km 193 - 81050 Pastorano (CE), Italy**

1. Intended use	
Product-type:	Metal anchor for use in concrete
Anchor type:	Torque controlled expansion anchor for use in concrete under static, quasi-static or seismic action (performance category C2)
Technical description of the product:	see Table 2.a
Specification of the intended use in accordance with the applicable EAD:	The anchors are intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.
Base material:	Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.
Installation:	Hole drilling by rotary plus hammer mode: M8, M10, M12, M16, M20 In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.After installation further turning of the anchor is not possible.
Loading:	- Static and quasi-static loads: sizes from M8 to M20. - Seismic loads performance category C2: sizes from M10 to M20
Durability:	The anchor may be used in structures subject to dry internal conditions only. The verifications and assessment methods on which the relevant European Technical Assessment isbased lead to the assumption of a working life of the anchor of at least 50 years. The indicationsgiven on the working life cannot be interpreted as a guarantee given by the producer, but are tobe regarded only as a means for choosing the right products in relation to the expectedeconomically reasonable working life of the works.
Service temperature:	The anchors may be used in the following temperature range: [-40°C ; +80°C]
Resistance to fire:	See tables from 4.f to 4.n
Reaction to fire:	The anchor is classified A1 according to EC Decision 96/603/EC.
European Assessment Document:	ETAG001, part 1, part 5 and Annex E, April 2013 edition used as EAD according to Article 66(3) of the Regulation (EU) No 305/2011.
European Technical Assessment:	ETA 11/0319
Technical Assessment Body:	DeutschesInstitutfürBautechnik, Kolonnenstr. 30 B, 10829 Berlin, GERMANY
Design methods:	- Static and quasi-static load: TAG001, Annex C, design method A, Edition August 2010 or CEN/TS 1992-4:2009. - Seismic load: EOTA Technical Report TR045(February 2013).
Assessment and Verification of Constancy of Performance:	EC Certificate No. 1109-CPD-0080
Notified Body:	*IFBT* GmbH, Hans-Weigel-Straße 2b, D - 04319 Leipzig, (Germany)
Under the system:	1

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2. Anchor's components

Table 2.a - AJE 01 and AJE 31 components

Part	Component	Description
1	**Cone Bolt**	Zinc plated min 5 µm (Cr VI Free) according to ISO 4042 carbon steel cone bolt, minimum tensile strength 800 N/mm^2
2	**Hexagonal nut**	Zinc plated min 5 µm (Cr VI Free) according to ISO 4042 carbon steel hexagonal nut DIN 934 (or ISO 4032).
3	**Washer**	Zinc plated min 5 µm (Cr VI Free) according to ISO 4042 carbon steel washer ISO 7089 (AJE01) or ISO 7093-1 (AJE31), hardness class HV 200.
4	**Sleeve expansion**	Zinc plated min 5 µm (Cr VI Free) according to ISO 4042 carbon steel HRB 80.

Table 2.b - SPS component

1	**Seismic Protector®, for seismic performance categories C1 and C2**		Zinc plated min 5 µm (Cr VI Free) according to ISO 4042 carbon steel spacer(s).

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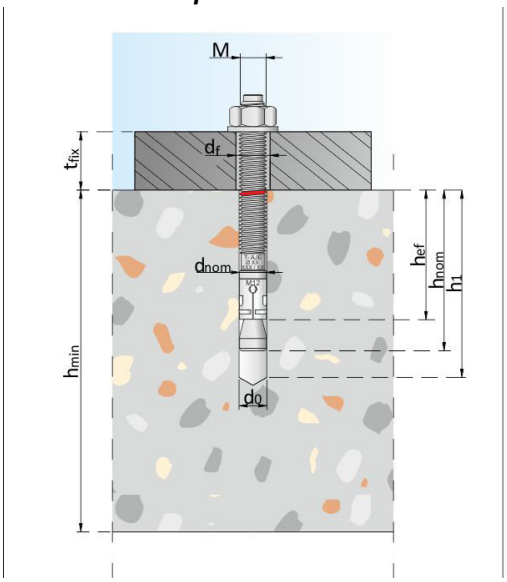
3. Installation

3.1 Installation information

Static and quasi-static loads



Seismic loads

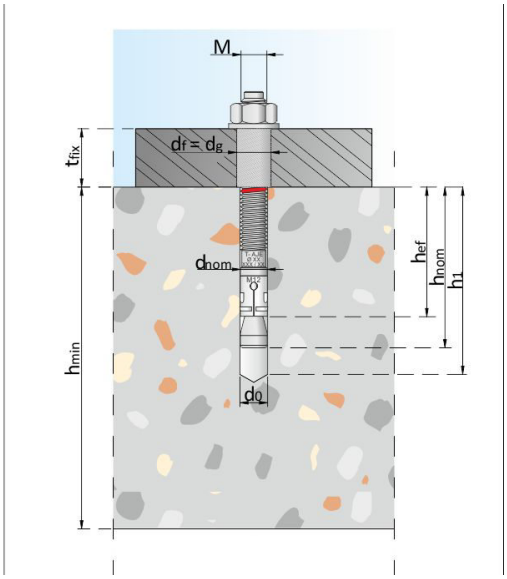


Table 3.a: Installation details

d_{nom}:	Outside diameter of the anchor
d_{cut}:	Maximum cutting diameter of the drill bit
t_{fix}:	Thickness of the fixtures
d_0:	Diameter of the drill hole
d_f:	Diameter of the clearance hole in the fixture
M:	Diameter of the metric thread
h_{min}:	Minimum thickness of the concrete member
h_{nom}:	Overall anchor embedment depth
h_{ef}:	Anchorage depth
d_g:	Diameter of the Seismic Protector® used to fill the gap between the anchor and the fixture
l_g:	Length of the spacer used to fill the gap between the anchor and the fixture
s_g:	Thickness of the spacer used to fill the gap between the anchor and the fixture

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3. Installation

Table 3.b: Installation data

Anchor size			M 8	M 10	M 12	M 16	M 20
Nominal drill hole diameter	d_0	[mm]	8	10	12	16	20
Maximum cutting diameter of drill bit	d_{cut}	[mm]	8,45	10,45	12,5	16,5	20,55
Installaztion torque moment	T_{inst}	[Nm]	20	45	60	110	200
Minimum allowable spacing (even in case of fire exposure)	s_{min}	[mm]	80	65	75	130	170
Minimum allowable edge distance	c_{min}	[mm]	80	80	90	130	200
Wrench size	SW	[mm]	13	17	19	24	30
Overall anchor embedment depth	h_{nom}	[mm]	55	70	85	100	115
Minimum thickness of concrete member	h_{min}	[mm]	100	110	140	170	200
Depth of the drilled hole to deepest point	h_1	[mm]	65	85	105	120	135
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22
Thickness of fixture	t_{fix}	[mm]	≤ 160	≤ 160	≤ 270	≤ 320	≤ 320
Nominal outside diameter of Seismic Protector® SPS for seismic performance categories C1 and C2	d_g	[mm]	NPD	12	14	18	22
Nominal length of Seismic Protector® SPS for seismic performance categories C1 and C2	l_g	[mm]	NPD	The total length of the spacer must be equal to the thickness of the fixture, with a tolerance of: - for t_{fix} ≤ 120 [mm]: + 0 - 3 [mm]; - for t_{fix}> 120 [mm]: + 0 - 5 [mm]. More steel spacers can be used to reach the total length of the Seismic Protector®.			
Minimum edge distance (fire exposure on one side)	c_{min}	[mm]	2 h_{ef}				
Minimum edge distance (fire exposure if fire attacks from more than one side)	c_{min}	[mm]	If fire attacks from more than one side, the minimum edge distance shall be ≥ 300 mm or ≥ 2 h_{ef}				

Table 3.c: Details of letter code on the head

Letter code on the head of cone bolt *	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S
Maximum thickness of fixture	5	10	15	20	25	30	35	40	45	50	55	60	65	70	80	90	100

*For 100 <t_{fix} ≤ 200 there is the number 1 before the letter code;
200 <t_{fix} ≤ 300 there is the number 2 before the letter code;
300 <t_{fix} ≤ 400 there is the number 3 before the letter code;

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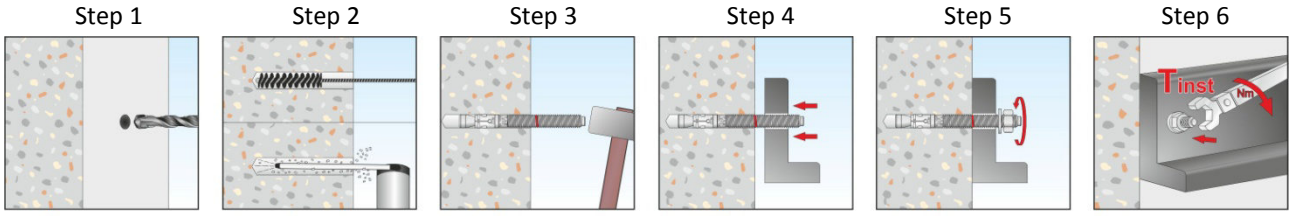
3. Installation

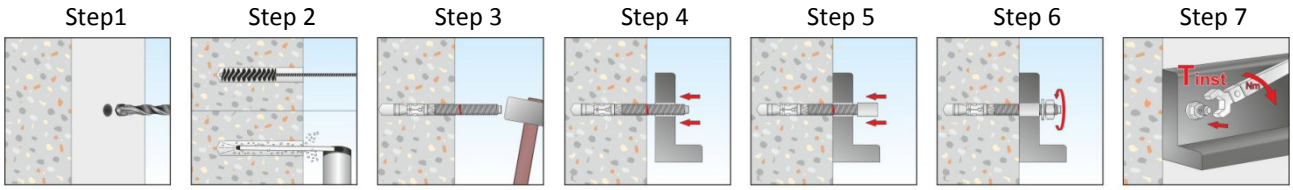
Table 3.d: Installation instructions AJE01 and AJE31 for static and quasi-static loads



Step1	Drill a hole into the concrete in rotary plus hammer mode
Step2	Remove the dust into the hole using a brush and a blowing pump
Step3[1)]	Hammer the anchor into the hole
Step4[1)]	Place the fixture
Step 5 & 6	Apply the required torque moment T_{inst}

[1)]Through fixing is allowed (place the fixture before placing the anchor)

Table 3.e: Installation instructions AJE01 and AJE31 for seismic performance categories C1 and C2



Step1	Drill a hole into the concrete in rotary plus hammer mode
Step2	Remove the dust into the hole using a brush and a blowing pump
Step 3 [2)]	Hammer the anchor in the hole
Step 4 [2)]	Place the fixture
Step 5 [3)]	Insert the Seismic Protector® to fill the annular gap between the anchor and the fixture
Step 6 & 7	Apply the required torque moment T_{inst}

[2)] Through fixing is allowed (place the fixture before placing the anchor)

[3)] Size and number of the steel spacers depends on the anchor's diameter and the thickness of fixture

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According to the Regulation EU No 305/2011

3. Installation

3.2: Tools for installation

Drill bit

	AJE anchor size	Drill bit item code
	Ø 8 (M 8)	EO 01 08 210
	Ø 10 (M 10)	EO 01 10 210
	Ø 12 (M 12)	EO 01 12 210
	Ø 16 (M 16)	EO 01 16 210
	Ø 20 (M 20)	EO 01 20 210

Blowing pump

Item code: DW 01 00 001

Seismic Protector®

Item code: SPS

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4. Declared performance according to ETAG001 part 1, part 2 and Annex E							
Anchor size			**Ø 8**	**Ø 10**	**Ø 12**	**Ø 16**	**Ø 20**
Table 4.a: Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	25	40	70	115
	$V_{Rk,s}$	[kN]	12	20	35	60	95
	$V_{Rk,seis,C1}$	[kN]	NPD	10	17	24	45
	$V_{Rk,seis,C2}$	[kN]	NPD	10	17	24	45
	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519
Partial safety factor	$\gamma_{Ms,N}$	[-]	1,5				
Table 4.b: Pull-out failure							
Characteristic resistance in **uncracked** concrete C20/25	$N_{Rk,p,ucr}$	[kN]	7,5	16	20	Not relevant	
Characteristic resistance in **cracked** concrete C20/25	$N_{Rk,p,cr}$	[kN]	6	9	16	25	30
Characteristic resistance under seismic performance category **C1**	$N_{Rk,seis,C1}$	[kN]	NPD	3,2	12,8	25	30
Characteristic resistance under seismic performance category **C2**	$N_{Rk,seis,C2}$	[kN]	NPD	2,1	3,2	15,1	16,1
Increasing factor for concrete C30/37	ψ_c	[-]	1,22				
Increasing factor for concrete C40/50			1,41				
Increasing factor for concrete C50/60			1,55				
Installation safety factor	γ_2	[-]	1,20			1,00	
Table 4.c: Concrete cone failure and splitting failure							
Effective anchorage depth	h_{ef}	[mm]	45	55	70	75	90
Critical spacing for concrete cone failure	$s_{cr,N}$	[mm]	135	165	210	255	270
Critical edge distance for concrete cone failure	$c_{cr,N}$	[mm]	68	83	105	113	135
Critical spacing for splitting failure	$s_{cr,sp}$	[mm]	200	280	300	430	400
Critical edge distance for splitting failure	$c_{cr,sp}$	[mm]	100	140	150	215	200
Table 4.d: Concrete pry-out failure							
k factor	k	[-]	1,0		2,0		
Table 4.e: Concrete edge failure							
Effective length of anchor	$l_f = h_{ef}$	[mm]	45	55	70	75	90
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20

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4. Declared performance according to ETAG001 part 1, part 5 and Annex E								
Anchor size				**M8**	**M10**	**M12**	**M16**	**M20**
Table 4.f: Steel Failure under fire exposure in concrete C20/25 to C50/60								
Characteristic resistance to tension and shear loads	**R30**	$F_{Rk,s,fi,30}$	[kN]	0,37	0,87	1,69	3,14	4,90
	R60	$F_{Rk,s,fi,60}$	[kN]	0,33	0,75	1,26	2,36	3,68
	R90	$F_{Rk,s,fi,90}$	[kN]	0,26	0,58	1,10	2,04	3,19
	R120	$F_{Rk,s,fi,120}$	[kN]	0,18	0,46	0,84	1,57	2,45
Characteristic bending moments	**R30**	$M^0_{Rk,s,fi,30}$	[Nm]	0,4	1,1	2,6	6,7	13,0
	R60	$M^0_{Rk,s,fi,60}$	[Nm]	0,3	1,0	2,0	5,0	9,7
	R90	$M^0_{Rk,s,fi,90}$	[Nm]	0,3	0,7	1,7	4,3	8,4
	R120	$M^0_{Rk,s,fi,120}$	[Nm]	0,2	0,6	1,3	3,3	6,5
Table 4.g: Pull-out failure								
Characteristic resistance	**R 30 to R 90**	$N_{Rk,p,fi}$	[kN]	1,5	2,25	4,00	6,25	7,5
	R 120	$N_{Rk,p,fi,120}$	[kN]	1,2	1,8	3,2	5,0	6,0
Table 4.h: Concrete cone failure								
Characteristic resistance	**R 30 to R 90**	$N_{Rk,c,fi}$	[kN]	1,4	2,5	5,6	9,4	13,5
	R 120	$N_{Rk,c,fi,120}$	[kN]	1,1	2,0	4,5	7,5	10,8
Table 4.i: Concrete pry-out failure								
The characteristic resistance $V_{rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by: $V_{Rk,c,fi(90)} = k \times N_{Rk,c,fi(90)}$(≤ R90) and $V_{Rk,c,fi(120)} = k \times N_{Rk,c,fi(120)}$ (up to R120)								
Table 4.l: Concrete edge failure								
The characteristic resistance $V_{rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by: $V^0_{Rk,c,fi(90)} = 0,25 \times V^0_{Rk,c}$(R30, R60, R90) and $V^0_{Rk,c,fi(120)} = 0,20 \times V^0_{Rk,c}$(R120) with $V^0_{Rk,c}$ as an initial value of the characteristic resistance of a single anchor in cracked concrete C20/25								
Table4.m: Edge distance								
R30 to R120	$c_{cr,N}$	[mm]	$2\ h_{ef}$					
If fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300 mm or ≥ $2\ h_{ef}$								
Table4.n: Anchor spacing								
R30 to R120	$s_{cr,N}$	[mm]	$4\ h_{ef}$					

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4. Declared performance according to ETAG001 part 1, part 5 and Annex E							
Anchor size			**M 8**	**M 10**	**M 12**	**M 16**	**M 20**
Table 4.o: Displacements under static and quasi-static <u>tension</u> loads							
Service tension load in **uncracked**concrete C20/25 to C50/60	N_{ucr}	[kN]	3,30	6,40	7,90	16,70	23,30
Short term displacement	$\delta_{N0,ucr}$	[mm]	0,02	0,01	0,03	0,08	0,05
Long term displacement	$\delta_{N\infty,ucr}$	[mm]	-	-	0,03	-	-
Service tension load in **cracked** concrete C20/25 to C50/60	N_{cr}	[kN]	2,40	3,60	6,40	11,90	16,70
Short term displacement	$\delta_{N0,cr}$	[mm]	0,10	0,06	0,20	0,21	0,31
Long term displacement	$\delta_{N\infty,cr}$	[mm]	1,02	0,60	0,84	1,40	0,55
Table 4.p: Displacements under static and quasi-static <u>shear loads</u>							
Service tension load in **cracked and uncracked** concrete C20/25 to C50/60	V_r	[kN]	5,7	9,5	16,7	28,6	45,2
Short term displacement	δ_{V0}	[mm]	2,0	2,0	3,0	4,0	6,0
Long term displacement	$\delta_{V\infty}$	[mm]	3,0	4,0	6,0	8,0	10,0
Table 4.p: Displacements for <u>Seismic performance category C2</u>							
Damage Limit State - Tension load	$\delta_{N,seis(DLS)}$	[mm]	NPD	2,39	1,74	3,34	2,48
Ultimate Limit State - Tension load	$\delta_{N,seis(ULS)}$	[mm]		10,54	15,07	14,26	10,80
Damage Limit State - Shear load	$\delta_{V,seis(DLS)}$	[mm]		3,45	3,24	4,98	4,56
Ultimate Limit State - Shear load	$\delta_{V,seis(ULS)}$	[mm]		6,21	8,37	9,00	9,64

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www.tecfi.it *info@tecfi.it*

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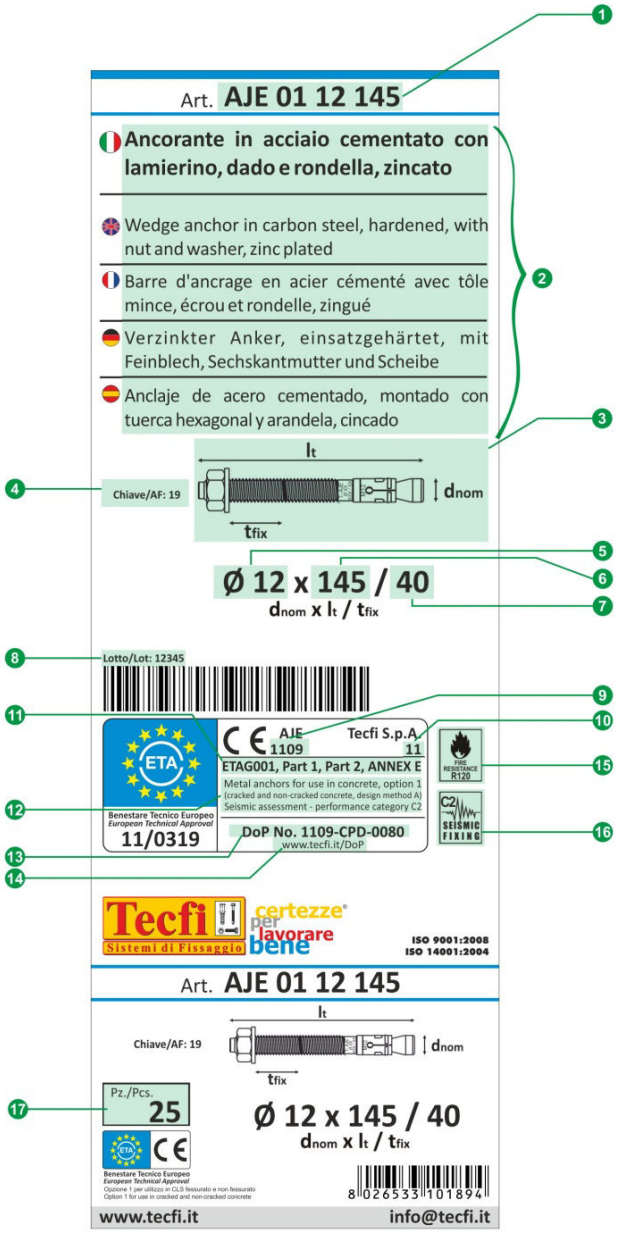
4. Label



1. Item Code
2. Descriptions
3. Picture
4. Wrench Size
5. Anchor Diameter (d_{nom})
6. Anchor Length (l_t)
7. Maximum Thickness of fixture (t_{fix})
8. Lot Number
9. Identification number of the notified production control certification body
10. Last two digits of the year in wich the marking was first affixed
11. European standard applied
12. Intended use of the product as laid down in the European standard applied, level of performance declared
13. DoP Number
14. Link to DoP
15. Fire Resistance
16. Seismic Assessment
17. Number of Pieces per Box

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5. Item codes

Table 6.a: Item codes

Item code	Size ØxL[mm]	t_{fix}[mm]
AJE01 08 080 - AJE31 08 080	8x80	10
AJE01 08 090 - AJE31 08 090	8x90	20
AJE01 08 110 - AJE31 08 110	8x110	40
AJE01 08 130 - AJE31 08 130	8x130	60
AJE01 08 170 - AJE31 08 170	8x170	100
AJE01 10 095 - AJE31 10 095	10x95	10
AJE01 10 105 - AJE31 10 105	10x105	20
AJE01 10 125 - AJE31 10 125	10x125	40
AJE01 10 145 - AJE31 10 145	10x145	60
AJE01 10 185 - AJE31 10 185	10x185	100
AJE01 10 245 - AJE31 10 245	10x245	160
AJE01 12 115 - AJE31 12 115	12x115	10
AJE01 12 125 - AJE31 12 125	12x125	20
AJE01 12 145 - AJE31 12 145	12x145	40
AJE01 12 165 - AJE31 12 165	12x165	60
AJE01 12 205 - AJE31 12 205	12x205	100
AJE01 12 225 - AJE31 12 225	12x225	120
AJE01 12 245 - AJE31 12 245	12x245	140
AJE01 12 265 - AJE31 12 265	12x265	160
AJE01 12 305 - AJE31 12 305	12x305	200
AJE01 12 350 - AJE31 12 350	12x350	245
AJE01 16 130 - AJE31 16 130	16x130	5
AJE01 16 145 - AJE31 16 145	16x145	20
AJE01 16 165 - AJE31 16 165	16x165	40
AJE01 16 225 - AJE31 16 225	16x225	100
AJE01 20 170 - AJE31 20 170	20x170	30
AJE01 20 200 - AJE31 20 200	20x200	60

The performance of the product identified above is in conformity with the set of declared performances. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Name and function	Place and date of issue	Signature
President Antonio Guarino	Pastorano, *July 17th 2014*	