



A New Lighting Experience



ErP Directive

**Consequences of the ErP Directive
for Luminaire Operating Devices**

ErP-compliant Energy Efficiency Classification

The EU has initiated decisive energy efficiency measures in the field of lighting technology. Vossloh-Schwabe products already comply with these new requirements today. The CE mark on products plus VS product information go to give end users and luminaire manufacturers security for the future.

THE COMMISSION'S REGULATION (EC) No. 245/2009 dated 18 March 2009 implementing Directive 2005/32/EC (modified by Directive 2009/125/EG – Energy-related Products: ErP*) of the European Parliament and of the Council with regard to defining ecodesign requirements for fluorescent lamps without integrated ballast, high-pressure discharge lamps and for ballasts and luminaires needed for their operation, and repealing Directive 2000/55/EC of the European Parliament and of the Council (official title), has created a legal framework in the EU that defines fundamental requirements for operating efficient lighting technology products.

Although the Regulation predominantly applies to general lighting, it is also product-orientated and thus independent of any specific application. The efficiency and performance requirements (specifications governing performance features) apply to fluorescent lamps without integrated ballast, high-pressure discharge lamps as well as ballasts and luminaires needed to operate these lamps. A brief overview of the requirements is provided in the following table (excerpt from the CELMA guide).



* With the new Directive **2009/125/EC** coming into effect on 20 November 2009 the EU mandated that all energy-related products must be taken into account with regard to minimising negative environmental impact.

Directive 2009/125/EC supersedes Directive **2005/32/EC** with regard to the eco-design of energy-related products. As a result, other products such as windows, taps, shower heads and insulation materials have also been included in the scope of the new eco-design directive. However, nothing has changed in terms of eco-design requirements for manufacturers of electrical and electronic products (in this case luminaires and luminaire accessories).

Stage	Requirements governing	For Fluorescent Lamps	For Discharge Lamps
1 13.04.2010	Ballasts	<ul style="list-style-type: none"> • Non-dimmable ballasts: minimum EEI = B2 • Dimmable ballasts: minimum EEI = A1 • Standby losses ≤ 1 W • Non-dimmable ballasts for new lamps not designed for use with existing ballasts: minimum EEI = A3 • Ballasts must be labelled (for instance: EEI = A2) 	<ul style="list-style-type: none"> • No special requirements
Interim Stage 13.09.2010	Luminaires	<ul style="list-style-type: none"> • Luminaire standby losses = sum of ballast limiting values (No. of installed ballasts) • After 18 months: technical information must be made available, both online and in luminaire documentation (for luminaires $> 2,000$ Lumens). 	<ul style="list-style-type: none"> • After 18 months: technical information must be made available, both online and in luminaire documentation (for luminaires $> 2,000$ Lumens)
2 13.04.2012	Ballasts	<ul style="list-style-type: none"> • Standby losses ≤ 0.5 W 	<ul style="list-style-type: none"> • Introduction of minimum energy-efficiency index values for HID ballasts and their labelling: <ul style="list-style-type: none"> $P < 30$ W – $\eta \geq 65$ % $30 < P < 75$ W – $\eta \geq 75$ % $75 < P < 105$ W – $\eta \geq 80$ % $105 < P < 405$ W – $\eta \geq 85$ % $P > 405$ W – $\eta \geq 90$ % • HID ballasts to be labelled: EEI=A3
	Luminaires	<ul style="list-style-type: none"> • Luminaire standby losses = sum of ballast limiting values (No. of installed ballasts) • Luminaire designs must permit integration of 3rd-stage ballasts. Exceptions: luminaires $> IP4X$ 	<ul style="list-style-type: none"> • Luminaire designs must permit the integration of 3rd-stage ballasts. Exception: luminaires $> IP4X$
at the latest by 13.04.2014	Revision of the Regulation Technological progress as well as the sum of the experience gained during the implementation of the Regulation will be taken into consideration during the revision process.		
3 13.04.2017	Ballasts	<ul style="list-style-type: none"> • New ballast limiting values calculated using specified formula (see page 4) • That constitutes a ban on EEI = A3, B1 and B2 ballasts (magnetic ballasts can only be produced for higher lamp ratings – permitted classes are A2, A2 BAT and only A1 BAT for dimmable ballasts) • Ballasts labels shortened to A2, A2 BAT or A1 BAT ("EEI =" will be dropped; this means labelled ballasts can be clearly dated. 	<ul style="list-style-type: none"> • Minimum energy-efficiency index values will be raised: <ul style="list-style-type: none"> $P < 30$ W – $\eta \geq 78$ % $30 < P < 75$ W – $\eta \geq 85$ % $75 < P < 105$ W – $\eta \geq 87$ % $105 < P < 405$ W – $\eta \geq 90$ % $P > 405$ W – $\eta \geq 92$ % • HID ballasts to be labelled: A2
	Luminaires	<ul style="list-style-type: none"> • All luminaire designs must permit the integration of 3rd-stage ballasts. 	<ul style="list-style-type: none"> • All luminaire designs must permit the integration of 3rd-stage ballasts.

ErP Requirements governing Ballasts for Fluorescent Lamps

The following table taken from Regulation 245/2009/EC provides an overview of (1st and 2nd stage) ballast requirements, ordered according to efficiency values:

Lamp data					Ballast efficiency (P_{lamp}/P_{input}) (non-dimmable ballasts)				
Type	Nominal output W	ILCOS Code	Typical rating		A2 BAT %	A2 %	A3 %	B1 %	B2 %
			50 Hz W	HF W					
T8	15	FD-15-E-G13-26/450	15	13.5	87.8	84.4	75.0	67.9	62.0
	18	FD-18-E-G13-26/600	18	16	87.7	84.2	76.2	71.3	65.8
	30	FD-30-E-G13-26/900	30	24	82.1	77.4	72.7	79.2	75.0
	36	FD-36-E-G13-26/1200	36	32	91.4	88.9	84.2	83.4	79.5
	38	FD-38-E-G13-26/1050	38.5	32	87.7	84.2	80.0	84.1	80.4
	58	FD-58-E-G13-26/1500	58	50	93.0	90.9	84.7	86.1	82.2
TC-L	70	FD-70-E-G13-26/1800	69.5	60	90.9	88.2	83.3	86.3	83.1
	18	FSD-18-2G11	18	16	87.7	84.2	76.2	71.3	65.8
	24	FSD-24-E-2G11	24	22	90.7	88.0	81.5	76.0	71.3
TC-F	36	FSD-36-E-2G11	36	32	91.4	88.9	84.2	83.4	79.5
	18	FSS-18-E-2G10	18	16	87.7	84.2	76.2	71.3	65.8
	24	FSS-24-E-2G10	24	22	90.7	88.0	81.5	76.0	71.3
TC-D/ TC-DE	36	FSS-36-E-2G10	36	32	91.4	88.9	84.2	83.4	79.5
	10	FSQ-10-E-G24q=1 FSQ-10+G24d=1	10	9.5	89.4	86.4	73.1	67.9	59.4
	13	FSQ-13-E-G24q=1 FSQ-13+G24d=1	13	12.5	91.7	89.3	78.1	72.6	65.0
TC-T/ TC-TE	18	FSQ-18-E-G24q=2 FSQ-18+G24d=2	18	16.5	89.8	86.8	78.6	71.3	65.8
	26	FSQ-26-E-G24q=1 FSQ-26+G24d=1	26	24	91.4	88.9	82.8	77.2	72.6
	13	FSM-13-E-GX24q=1 FSM-13+GX24d=1	13	12.5	91.7	89.3	78.1	72.6	65.0
TC-DD/ TC-DDE	18	FSM-18-E-GX24q=2 FSM-18+GX24d=2	18	16.5	89.8	86.8	78.6	71.3	65.8
	26	FSM-26-E-GX24q=3 FSM-26+GX24d=3	26.5	24	91.4	88.9	82.8	77.5	73.0
	10	FSS-10-E-GR10q FSS-10L/P/H-GR10q	10.5	9.5	86.4	82.6	70.4	68.8	60.5
TC	16	FSS-16-E-GR10q FSS-16+GR10q FSS-10L/P/H-GR10q	16	15	87.0	83.3	75.0	72.4	66.1
	21	FSS-21-E-GR10q FSS-21+GR10q FSS-21L/P/H-GR10q	21	19	89.4	86.4	79.2	73.9	68.8
	28	FSS-28-E-GR10q FSS-28+GR10q FSS-28L/P/H-GR10q	28	26	89.7	86.7	81.3	78.2	73.9
	38	FSS-38-E-GR10q FSS-38L/P/H-GR10q	38.5	36	92.3	90.0	85.7	84.1	80.4
	5	FSD-5+G23 FSD-5-E-2G7	5.4	5	72.7	66.7	58.8	49.3	41.4
T5	7	FSD-7+G23 FSD-7-E-2G7	7.1	6.5	77.6	72.2	65.0	55.7	47.8
	9	FSD-9+G23 FSD-9-E-2G7	8.7	8	78.0	72.7	66.7	60.3	52.6
	11	FSD-11+G23 FSD-11-E-2G7	11.8	11	83.0	78.6	73.3	66.7	59.6
	4	FD-4-E-G5-16/150	4.5	3.6	64.9	58.1	50.0	45.0	37.2
T9-C	6	FD-6-E-G5-16/225	6	5.4	71.3	65.1	58.1	51.8	43.8
	8	FD-8-E-G5-16/300	7.1	7.5	69.9	63.6	58.6	48.9	42.7
	13	FD-13-E-G5-16/525	13	12.8	84.2	80.0	75.3	72.6	65.0
T5	22	FSC-22-E-G10q29/200	22	19	89.4	86.4	79.2	74.6	69.7
	32	FSC-32-E-G10q29/300	32	30	88.9	85.7	81.1	80.0	76.0
	40	FSC-40-E-G10q29/400	40	32	89.5	86.5	82.1	82.6	79.2

Lamp types



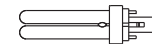
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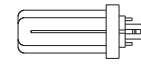
TC-L



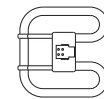
TC-F



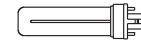
TC-D/TC-DE



TC-T/TC-TE



TC-DD/TC-DDE



TC

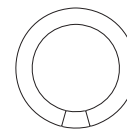


T5

ErP Requirements governing Ballasts for Fluorescent Lamps

Lamp data					Ballast efficiency ($P_{\text{lamp}}/P_{\text{input}}$)				
Type	Nominal output W	ILCOS Code	Typical rating		(non-dimmable ballasts)				
			50 Hz W	HF W	A2 BAT %	A2 %	A3 %	B1 %	B2 %
T2	6	FDH-6-L/P-W4.3x8.5d-7/220		5	72.7	66.7	58.8	—	—
	8	FDH-8-L/P-W4.3x8.5d-7/320		7.8	76.5	70.9	65.0	—	—
	11	FDH-11-L/P-W4.3x8.5d-7/420		10.8	81.8	77.1	72.0	—	—
	13	FDH-13-L/P-W4.3x8.5d-7/520		13.3	84.7	80.6	76.0	—	—
	21	FDH-21-L/P-W4.3x8.5d-7		21	88.9	85.7	79.2	—	—
	23	FDH-23-L/P-W4.3x8.5d-7		23	89.8	86.8	80.7	—	—
T5-E	14	FDH-14-G5-L/P-16/550		13.7	84.7	80.6	72.1	—	—
	21	FDH-21-G5-L/P-16/850		20.7	89.3	86.3	79.6	—	—
	24	FDH-24-G5-L/P-16/550		22.5	89.6	86.5	80.4	—	—
	28	FDH-28-G5-L/P-16/1150		27.8	89.8	86.9	81.8	—	—
	35	FDH-35-G5-L/P-16/1450		34.7	91.5	89.0	82.6	—	—
	39	FDH-39-G5-L/P-16/850		38	91.0	88.4	82.6	—	—
	49	FDH-49-G5-L/P-16/1450		49.3	91.6	89.2	84.6	—	—
	54	FDH-54-G5-L/P-16/1150		53.8	92.0	89.7	85.4	—	—
	80	FDH-80-G5-L/P-16/1150		80	93.0	90.9	87.0	—	—
	95	FDH-95-G5-L/P-16/1150		95	92.7	90.5	84.1	—	—
	120	FDH-120-G5-L/P-16/1450		120	92.5	90.2	84.5	—	—
T5-C	22	FSCH-22-L/P-2GX13-16/225		22.3	88.1	84.8	78.8	—	—
	40	FSCH-40-L/P-2GX13-16/300		39.9	91.4	88.9	83.3	—	—
	55	FSCH-55-L/P-2GX13-16/300		55	92.4	90.2	84.6	—	—
	60	FSCH-60-L/P-2GX13-16/375		60	93.0	90.9	85.7	—	—
TC-LE	40	FSDH-40-L/P-2G11		40	91.4	88.9	83.3	—	—
	55	FSDH-55-L/P-2G11		55	92.4	90.2	84.6	—	—
	80	FSDH-80-L/P-2G11		80	93.0	90.9	87.0	—	—
TC-TE	32	FSMH-32-L/P-2GX24q=3		32	91.4	88.9	82.1	—	—
	42	FSMH-42-L/P-2GX24q=4		43	93.5	91.5	86.0	—	—
	57	FSM6H-57-L/P-2GX24q=5 FSM8H-57-L/P-2GX24q=5		56	91.4	88.9	83.6	—	—
	70	FSM6H-70-L/P-2GX24q=6 FSM8H-70-L/P-2GX24q=6		70	93.0	90.9	85.4	—	—
	60	FSM6H-60-L/P-2G8=1		63	92.3	90.0	84.0	—	—
	62	FSM8H-62-L/P-2G8=2		62	92.2	89.9	83.8	—	—
	82	FSM8H-82-L/P-2G8=2		82	92.4	90.1	83.7	—	—
	85	FSM6H-85-L/P-2G8=1		87	92.8	90.6	84.5	—	—
	120	FSM6H-120-L/P-2G8=1 FSM8H-120-L/P-2G8=1		122	92.6	90.4	84.7	—	—
TC-DD	55	FSSH-55-L/PGR10q		55	92.4	90.2	84.6	—	—

Lamp types



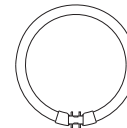
T9-C



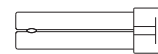
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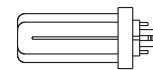
T5-E



T5-C



TC-LE



TC-TE



TC-DD

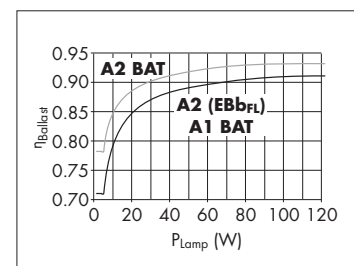
At the very latest, the following energy efficiency formula for ballasts will be introduced to coincide with the 3rd stage:

If	$P_{\text{lamp}} \leq 5 \text{ W}$	$EB_{\text{FL}} = 0.71$
If	$5 \text{ W} < P_{\text{lamp}} < 100 \text{ W}$	$EB_{\text{FL}} = P_{\text{lamp}} / (2 * \sqrt{P_{\text{lamp}} / 36}) + 38 / 36 * P_{\text{lamp}} + 1$
If	$P_{\text{lamp}} \geq 100 \text{ W}$	$EB_{\text{FL}} = 0.91$

The following limiting values must be observed:

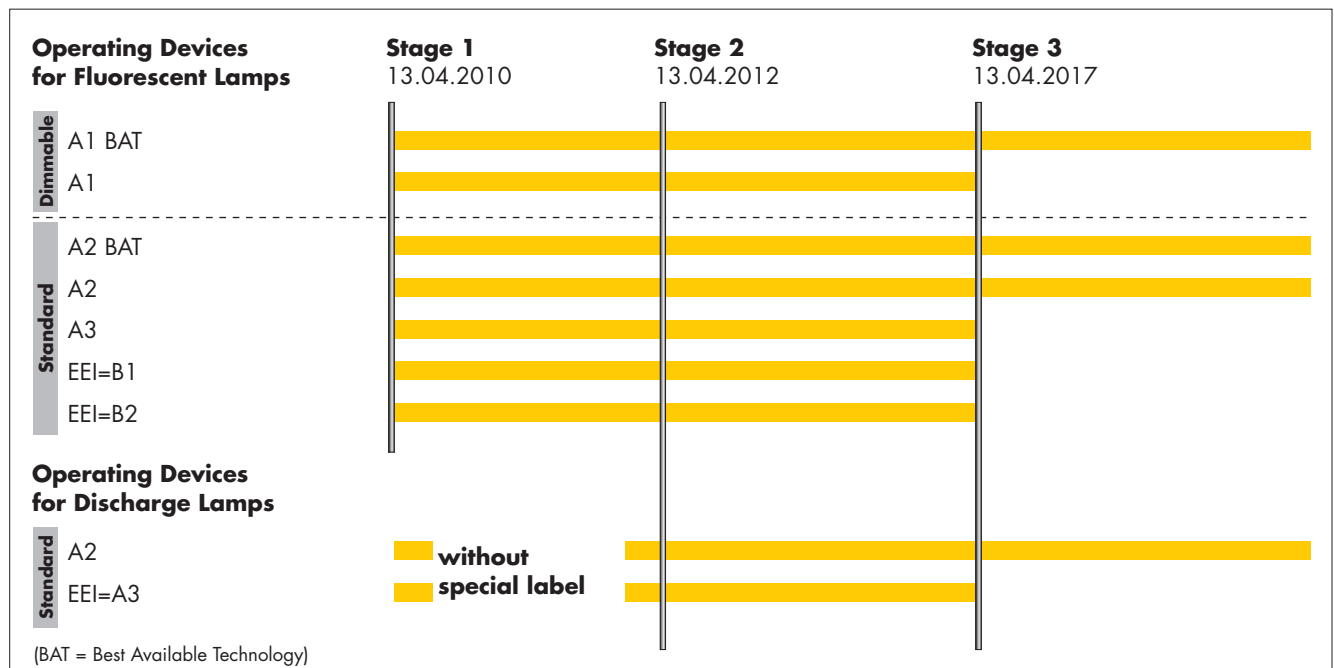
η_{Ballast}	Energy efficiency classes
$\geq EB_{\text{FL}}$	A2 and A1 BAT
$\geq 1 - 0.75 * (1 - EB_{\text{FL}})$	A2 BAT

The graph illustrates the difference between Classes A2, A1 BAT and A2 BAT (BAT = best available technology).



ErP-compliant Energy Efficiency Classification

The following diagram summarises the labelling of ballasts in accordance with the CELMA brochure. Ballasts bearing labels without an "EEI" tag, which is to say only labelled "A2", "A2 BAT" or "A1 BAT", already comply with the requirements due to take effect in 2017.



VS Products – Energy-efficient thanks to future-proof technologies





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