

# VENTILATION UNITS STUDY - POSITION STATEMENT

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## UNIDIRECTIONAL VENTILATION UNITS (UVU) / FANS: (e.g. Box and Roof Fans)

### Excerpts from the first stakeholder meeting Discussion Document

#### Excerpts from Regulation 327/2011

##### Article 2, Definitions

1. **'Fan'** means a rotary bladed machine that is used to maintain a continuous flow of gas, typically air, passing through it and whose work per unit mass does not exceed 25 kJ/kg, and which:

- is designed for use with or equipped with an electrical motor with an electric input power between 125 W and 500 kW (= 125 W and = 500 kW) to drive the impeller at its optimum energy efficiency point;
- is an axial fan, centrifugal fan, cross flow fan or mixed flow fan; and
- may or may not be equipped with a motor when placed on the market or put into service

12. **'Housing'** means a casing around the impeller which guides the gas stream towards, through and from the impeller;

## Excerpts from Regulation 1253/2014

### Article 2, Definitions

1. '**ventilation unit (VU)**' means an electricity driven appliance equipped with at least one impeller, one motor and a casing and intended to replace utilised air by outdoor air in a building or a part of a building;

### Article 1, Subject matter and scope

2. This Regulation shall not apply to ventilation units which:

- c. are axial or centrifugal fans only equipped with a housing in terms of Regulation (EU) No 327/2011;

### Annex I, Definitions

2. Definitions for NRVU, in addition to the definitions in Annex I Part 1:

3. '**reference configuration of a BVU**' means a product configured with a casing, at least two fans with variable speed or multi-speed drives, a HRS, a clean fine filter on the inlet-side and a clean medium filter on the exhaust-side;

4. '**reference configuration of an UVU**' means a product configured with a casing and at least one fan with variable speed or multi-speed drive, and -in case the product is intended to be equipped with a filter on the inlet-side -this filter shall be a clean fine filter;

## Excerpts from the Working Document - Draft Ecodesign Regulation Review of Reg 327/2011

### Definitions

1. **'Fan'** means a configuration of impeller, stator and drive system, intended for the continuous displacement of gas with at its bep an electric input power  $\geq 125$  W and  $\leq 500$  kW, a pressure-increase ratio lower than 1.1 and an output air velocity lower than 65 m/s, and which is an axial fan, centrifugal fan, cross flow fan, mixed flow fan or jet fan.

4. **'Stator'** is the stationary part of the fan which interacts with the air stream passing through the impeller and, within the geometrical air-stream envelope between defined fan inlet- and outlet sections, includes any part that may increase, and excludes any non-fan component that may decrease, the fan efficiency, following manufacturer's instruction.

## Position Statement - Interpretation of Regulation 327/2011 'housing/stator' vs regulation 1253/2014 'casing'

### Regulation 327/2011

The draft revision of Regulation 327/2011 has recognised the importance of definitions and moved away from the wording of 'housing' to the term 'stator'.

The critical factor which determines whether a product falls within the scope of Regulation 327 or Regulation 1253 lies in the definition of the function of the 'casing' included in 1253/2014 and the function of the 'housing' which will be changing to the 'stator' in Regulation 327/2011.

A 'housing/stator' is an essential component to fulfil the definition of a fan as per the Draft Regulation 327/2011. The 'housing/stator' increases the fan efficiency and the fan will not function correctly without a 'housing/stator'.

### Examples:

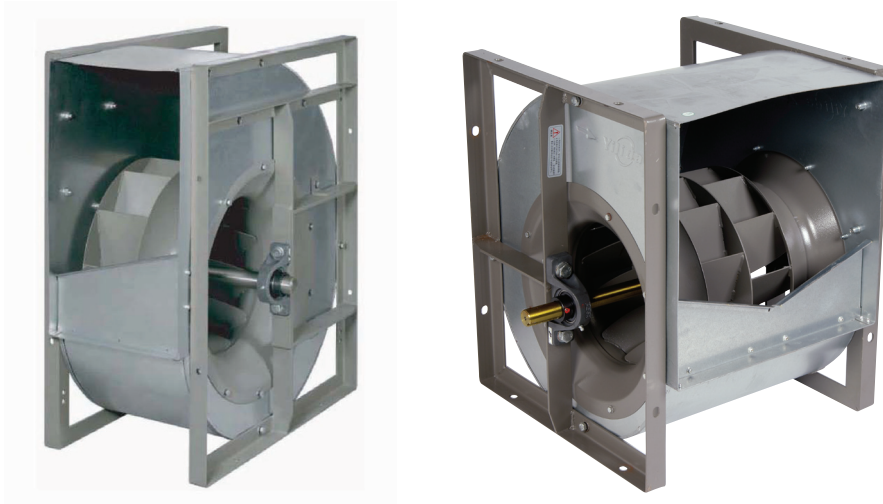
*Fan casing (terminology per ISO 13349) required for an axial flow fan*



*Scroll plate and cut-off (terminology per ISO 13349) required for a forward curved fan*



*Scroll plate and shaped inlet (terminology per ISO 13349) required for a backward curved fan*



*Shaped inlet (terminology per ISO 13349) required for a centrifugal plug fan*

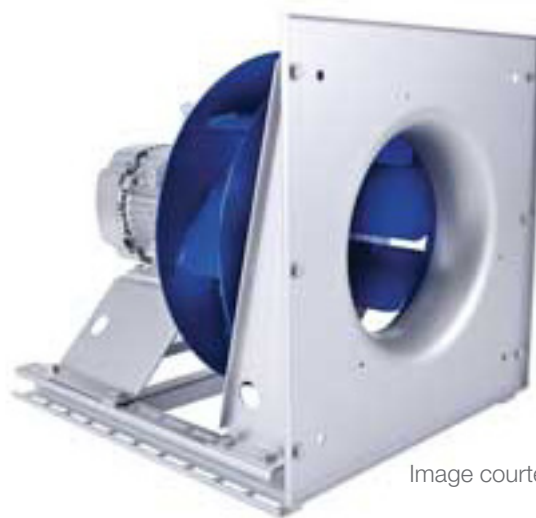


Image courtesy of Ziehl-Abegg

### Regulation 1253/2014

A unidirectional ventilation unit (UVU) comprises of a fan fitted inside a 'casing' to suit a specific market requirement. The fan fitted inside a UVU must comply with Regulation 327/2011.

The UVU encloses a fan within a 'casing' which decreases the fan efficiency in order for the UVU to fulfil its intended purpose and must comply with Regulation 1253/2014.

Examples:



## Conclusion

The UVU 'casing' around the fan provides the required air flow direction, a means of fitment to ducts and exterior weather protection if mounted externally, all of which are detrimental to the fan efficiency due to additional turbulence and airflow restrictions.

The affects of the 'casing' for box fans and roof fans is impossible to calculate, hence the finished product must be tested to establish the performance and efficiency. Box fans and roof fans are performance tested in accordance with ISO 5801.

Appendix 1 provides relative FMEG data for a range of box fans and roof fans showing the effect that the 'casing' has on the measured efficiency of the fan fitted inside, reducing the FMEG value by up to 30%.

It can be clearly seen that classifying UVU box fans and roof fans under Regulation 327/2011 would wipe a large proportion of essential products from the market and is the reason for including UVU box fans and roof fans under Regulation 1253/2014 to allow for the negative effect on the fan efficiency due to the 'casing'.



## APPENDIX 1

FAN TYPE CATEGORY		FMEG COEFFICIENTS			
		0.125-10KW		10-500KW	
1	AXIAL FAN	2.74	-6.33	0.78	-1.88
2	CENTRIFUGAL F'WARD CURVED	2.74	-6.33	0.78	-1.88
3	CENTRIFUGAL B'WARD CURVED	4.56	-10.5	1.1	-2.6
4	MIXED FLOW FAN	4.56	-10.5	1.1	-2.6

UVU					Fan Type					
Fan Unit	Power Consumption @ BEP (kW)	Airflow (m <sup>3</sup> /s) @ BEP	Pstat or Ptot @ BEP	FMEG Without VSD Bonus	Fan Type	Power Consumption @ BEP (kW)	Airflow (m <sup>3</sup> /s) @ BEP	Pstat or Ptot @ BEP	FMEG Without VSD Bonus	FMEG % Reduction
Box-Fan	0.137	0.135	258	45.0	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.82
Box-Fan	0.209	0.175	293	42.2	CENTRIFUGAL B'WARD	0.196	0.28	255	54.4	0.78
Box-Fan	0.136	0.115	289	44.0	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.80
Box-Fan	0.208	0.162	338	44.0	CENTRIFUGAL B'WARD	0.196	0.28	255	54.4	0.81
Box-Fan	0.176	0.244	142	38.1	CENTRIFUGAL B'WARD	0.144	0.384	145	58.0	0.66
Box-Fan	0.635	0.716	306	47.1	CENTRIFUGAL B'WARD	0.796	1.014	353	56.5	0.83
Box-Fan	1.739	1.362	497	46.9	CENTRIFUGAL B'WARD	2.074	2.151	497	58.7	0.80
Box-Fan	0.179	0.177	290	47.0	CENTRIFUGAL B'WARD	0.187	0.227	327	57.8	0.81
Box-Fan	0.406	0.331	389	46.3	CENTRIFUGAL B'WARD	0.369	0.511	402	70.7	0.66
Box-Fan	0.926	0.706	533	51.5	CENTRIFUGAL B'WARD	0.866	0.76	607	64.4	0.80
Box-Fan	0.136	0.115	289	44.0	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.80
Box-Fan	0.208	0.162	338	44.0	CENTRIFUGAL B'WARD	0.196	0.28	255	54.4	0.81
Box-Fan	0.176	0.244	142	38.1	CENTRIFUGAL B'WARD	0.144	0.384	145	58.0	0.66
Box-Fan	0.635	0.716	306	47.1	CENTRIFUGAL B'WARD	0.796	1.014	353	56.5	0.83
Box-Fan	1.308	1.110	461	48.4	CENTRIFUGAL B'WARD	1.218	1.439	400	56.9	0.85
Box-Fan	1.827	1.443	444	42.8	CENTRIFUGAL B'WARD	2.074	2.151	497	58.7	0.73
Box-Fan	0.179	0.177	290	47.0	CENTRIFUGAL B'WARD	0.187	0.227	327	57.8	0.81
Box-Fan	0.406	0.331	389	46.3	CENTRIFUGAL B'WARD	0.369	0.511	402	70.7	0.66
Box-Fan	0.926	0.706	533	51.5	CENTRIFUGAL B'WARD	0.866	0.76	607	64.4	0.80
Roof-Fan	0.075	0.081	227	46.8	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.85
Roof-Fan	0.213	0.151	379	44.4	CENTRIFUGAL B'WARD	0.196	0.28	255	54.4	0.82
Roof-Fan	0.151	0.130	298	44.8	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.81
Roof-Fan	0.142	0.195	164	41.9	CENTRIFUGAL B'WARD	0.144	0.384	145	58.0	0.72
Roof-Fan	0.262	0.322	234	45.4	CENTRIFUGAL B'WARD	0.269	0.483	232	58.1	0.78
Roof-Fan	0.631	0.632	336	46.3	CENTRIFUGAL B'WARD	0.796	1.014	353	56.5	0.82
Roof-Fan	1.698	1.293	508	46.8	CENTRIFUGAL B'WARD	2.074	2.151	497	58.7	0.80
Roof-Fan	0.194	0.168	343	47.7	CENTRIFUGAL B'WARD	0.187	0.227	327	57.8	0.82
Roof-Fan	0.350	0.294	407	49.5	CENTRIFUGAL B'WARD	0.369	0.511	402	70.7	0.70
Roof-Fan	0.801	0.498	630	50.7	CENTRIFUGAL B'WARD	0.866	0.76	607	64.4	0.79
Roof-Fan	0.062	0.060	207	43.2	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.78

## APPENDIX 1 cont...

UVU					Fan Type					
Fan Unit	Power Consumption @ BEP (kW)	Airflow (m³/s) @ BEP	Pstat or Ptot @ BEP	FMEG Without VSD Bonus	Fan Type	Power Consumption @ BEP (kW)	Airflow (m³/s) @ BEP	Pstat or Ptot @ BEP	FMEG Without VSD Bonus	FMEG % Reduction
Roof-Fan	0.201	0.150	281	38.8	CENTRIFUGAL B'WARD	0.196	0.28	255	54.4	0.71
Roof-Fan	0.139	0.127	272	44.3	CENTRIFUGAL B'WARD	0.142	0.17	299	55.2	0.80
Roof-Fan	0.142	0.184	157	39.7	CENTRIFUGAL B'WARD	0.144	0.384	145	58.0	0.69
Roof-Fan	0.261	0.301	245	44.9	CENTRIFUGAL B'WARD	0.269	0.483	232	58.1	0.77
Roof-Fan	0.623	0.567	323	42.1	CENTRIFUGAL B'WARD	0.796	1.014	353	56.5	0.74
Roof-Fan	1.668	1.291	498	46.7	CENTRIFUGAL B'WARD	2.074	2.151	497	58.7	0.80
Roof-Fan	0.127	0.084	382	45.2	CENTRIFUGAL B'WARD	0.211	0.214	406	58.8	0.77
Roof-Fan	0.193	0.146	353	44.7	CENTRIFUGAL B'WARD	0.187	0.227	327	57.8	0.77
Roof-Fan	0.235	0.159	441	46.9	CENTRIFUGAL B'WARD	0.211	0.214	406	58.8	0.80
Roof-Fan	0.364	0.298	406	48.3	CENTRIFUGAL B'WARD	0.369	0.511	402	70.7	0.68
Roof-Fan	0.848	0.521	638	50.4	CENTRIFUGAL B'WARD	0.866	0.76	607	64.4	0.78
Roof-Fan	0.694	0.671	410	51.8	CENTRIFUGAL B'WARD	0.748	1.049	372	64.0	0.81
Roof-Fan	1.322	0.736	739	50.4	CENTRIFUGAL B'WARD	1.428	1.431	536	62.6	0.80
Roof-Fan	0.133	0.311	65	27.1	AXIAL FAN	0.16	0.61	72	38.8	0.70
Roof-Fan	0.54	0.843	156	32.4	AXIAL FAN	0.545	1.345	122	38.1	0.85
Roof-Fan	0.195	0.651	61	31.2	AXIAL FAN	0.189	0.853	61	38.4	0.81
Roof-Fan	0.78	1.085	151	28.0	AXIAL FAN	0.725	1.582	132	36.0	0.78
Roof-Fan	0.288	0.836	69	29.8	AXIAL FAN	0.289	1.151	70	37.6	0.79
Roof-Fan	1.107	1.463	170	28.5	AXIAL FAN	1.166	2.285	174	40.0	0.71
Roof-Fan	0.487	1.04	97	29.0	AXIAL FAN	0.479	1.482	92	36.8	0.79
Roof-Fan	0.563	0.87	171	34.3	AXIAL FAN	0.538	1.299	141	42.1	0.82
Roof-Fan	0.817	1.133	184	32.4	AXIAL FAN	0.764	1.732	151	41.3	0.78
Roof-Fan	1.155	1.128	258	31.1	AXIAL FAN	1.169	2.106	183	38.9	0.80
Roof-Fan	1.949	2.08	290	35.5	AXIAL FAN	1.812	2.952	245	44.6	0.79
Roof-Fan	2.367	2.845	169	24.3	AXIAL FAN	2.573	3.753	260	41.7	0.58
Roof-Fan	0.996	1.797	151	33.6	AXIAL FAN	0.861	2.629	125	44.9	0.75
Roof-Fan	0.136	0.303	76	28.7	AXIAL FAN	0.134	0.432	75	36.0	0.80
Roof-Fan	0.13	0.36	45	24.4	AXIAL FAN	0.16	0.61	72	38.8	0.63
Roof-Fan	0.25	0.495	118	33.5	AXIAL FAN	0.24	0.724	103	41.3	0.81
Roof-Fan	0.534	0.899	113	27.1	AXIAL FAN	0.545	1.345	122	38.1	0.71
Roof-Fan	0.192	0.664	48	27.5	AXIAL FAN	0.189	0.853	61	38.4	0.71
Roof-Fan	0.794	1.357	120	27.5	AXIAL FAN	0.725	1.582	132	36.0	0.76
Roof-Fan	0.283	0.791	72	29.9	AXIAL FAN	0.289	1.151	70	37.6	0.80
Roof-Fan	1.104	1.433	167	27.7	AXIAL FAN	1.166	2.285	174	40.0	0.69
Roof-Fan	0.473	1.109	83	27.8	AXIAL FAN	0.479	1.482	92	36.8	0.76
Roof-Fan	0.646	1.686	89	30.8	AXIAL FAN	0.633	2.026	89	36.1	0.85
Roof-Fan	0.237	0.531	108	34.5	AXIAL FAN	0.227	0.741	99	42.7	0.81
Roof-Fan	0.547	0.949	127	30.0	AXIAL FAN	0.538	1.299	141	42.1	0.71
Roof-Fan	0.821	1.354	149	31.4	AXIAL FAN	0.764	1.732	151	41.3	0.76
Roof-Fan	1.162	1.53	170	28.3	AXIAL FAN	1.169	2.106	183	38.9	0.73
Roof-Fan	1.928	2.63	154	25.5	AXIAL FAN	1.812	2.952	245	44.6	0.57
Roof-Fan	0.634	1.657	109	36.1	AXIAL FAN	0.607	2.024	104	42.4	0.85
Roof-Fan	2.528	3.049	217	30.0	AXIAL FAN	2.573	3.753	260	41.7	0.72
Roof-Fan	0.877	2.033	115	33.3	AXIAL FAN	0.861	2.629	125	44.9	0.74