



## **AEblade**

The blade license concept for the world market



## The AEblade concept. The easiest way to your own blade production

The rapid global growth of the wind energy market continues unchanged. The emergence of more and more new markets increases the demand for locally produced components in order to implement the biggest possible part of the value chain in the country concerned. In this context, the rotor blades are of central interest as they are among the key parts of a wind turbine and have a considerable share (approximately 15 to 20%) in its total costs.

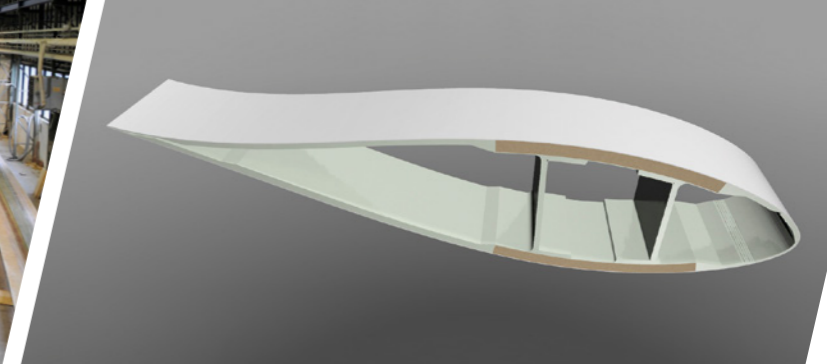
On the basis of its experience with over 50 different rotor blade designs in the power range of 5 kW to 5 MW, AEROVIDE has developed AEblade, the rotor blade series which meets the high standards of global production. The blades are suitable for operation on different turbine types and under different environmental conditions.

In addition to the blade technology, AEROVIDE also offers support and know-how for production workshop layout, production tooling design, definition of production processes, manufacturing documentation and QM documentation for the complete manufacturing process. In combination with our prototype and series production supervision, we guarantee full support to build up your own blade production facility in the shortest possible time.

Most blade types have been awarded the A-Design Assessment of DNV-GL and are in series production at various blade manufacturers around the world. Many successful blade tests run with our customers have proven the robustness and efficiency of our designs. This forms the basis for your success on the blade market.

Given the wide variety of available blade models for onshore and offshore turbines, our customers can meet all the market demands in a very flexible and efficient way. On demand, AEROVIDE can also modify the blade structure to optimize the blades for one specific turbine application. In addition the blade structure can also be adapted to specific material properties to customize and optimize the blade structure even more and thus increase profitability for our customers.

For details on license conditions, please contact our head office in Rendsburg.



## Concept and scope of supply

### Structural concept

The structural concept which AEROVIDE has chosen for the AEblade rotor blade family is reliable and has been tested successfully for years. The blade structure consists of main spar caps on both the suction and the pressure side of the blade which are connected to each other by two shear webs and as a result bear the main loads of the rotor blade. An additional trailing edge UD bears part of the edgewise loads which occur in the rotor blade. AEblade is connected to the blade bearing by means of a T-bolt connection. This type of bolted connection is extremely fault-tolerant and process-reliable, features which have been proven a thousand times.

### Manufacturing method

The spar caps and shear webs are reproduced in separate moulds in order to keep the occupancy time of the main mould short. All components of the rotor blade are manufactured using the Resin Infusion Molding (RIM) method with widely available glass/epoxy material, which provides the best compromise between material properties and manufacturing costs. A large number of qualified glass/epoxy material combinations from various suppliers assure a secure and flexible supply chain. The qualification processes for blade materials established at AEROVIDE make the involvement of further local material suppliers possible to optimize the supply chain for each customer and to fulfill the growing demand for local content.

### Scope of supply

The scope of supply includes 3D plug and mould geometry for mould production, blade lamination plans, lightning protection design, material specifications, blade specification and blade test specification. If requested by the customer, AEROVIDE can extend the scope of delivery to blade master plug and mould design, design for blade handling tools, manufacturing manuals and QM documentation. With our wide experience of more than 50 different rotor blade designs we can offer you a customized package which best fits your requirements.

All AEblade models have A-Design Assessment of DNV-GL which is transferred to the customer after a successful static blade test.

### Production support

In addition to the documentation of the rotor blade, AEROVIDE also supplies extensive on-site support to the licensee during the manufacturing of the prototype blade and during serial production. Within the scope of the license agreement, AEROVIDE analyzes on the basis of supplied blade loads the usability of the rotor blades on different wind turbines, thus ensuring the operational capability of the blades on these turbines.

# Technical data



	General Data				Operation Parameter			
	Blade length (m)	Maximum chord (m)	Type Class (-)	Prebending at tip (m)	Rated power (kW)	Rotor diameter (m)	Nominal speed (rpm)	Nominal tip speed (m/s)
<b>ae 1.5-37.5</b>	37.5	3.183	1A / 2A	1.35	1500	77	19.8	80
<b>ae 1.5-40.3</b>	40.3	3.183	2A	1.67	1500	83	18.5	80
<b>ae 1.5-42.3</b>	42.3	3.180	3A	2.20	1500	87	17.6	80
<b>ae 1.5-45.0</b>	45.0	3.0	3B	2.67	1500	92	16.6	80
<b>ae 1.5-46.0</b>	46.0	3.3	3B	3.30	1500	94	16.0	79

<b>ae 2.0-42.2</b>	42.2	3.6	1A / 2A	1.52	2000	87	17.0	77
<b>ae 2.0-45.3</b>	45.3	3.6	3A	1.88	2000	93	15.4	75
<b>ae 2.0-50.0</b>	50.0	3.5	3A	2.60	2000	102	14.9	80
<b>ae 2.0-56.8</b>	56.8	3.8	3A	3.50	2000	116	13.7	83
<b>ae 2.0-58.3</b>	58.3	3.9	3B	4.00	2000	119	14.5	88
<b>ae 2.0-59.3</b>	59.3	3.9	3B	4.03	2000	121	13.5	86.0

<b>ae 2.5-46.9</b>	46.9	4.0	1A / 2A	1.69	2500	96	14.8	75
<b>ae 2.5-50.3</b>	50.3	4.0	2A	2.09	2500	103	14.8	80
<b>ae 2.5-53.7</b>	53.7	4.4	3A	2.10	2500	110	13.0	75
<b>ae 2.5-58.0</b>	58.0	3.8	3B	3.00	2500	118	12.9	80

<b>ae 3.0-53.7</b>	53.7	4.4	1A / 2A	2.10	3000	110	13.0	75
<b>ae 3.0-57.7</b>	57.7	4.4	3A	2.60	3000	118	12.1	75
<b>ae 3.0-65.5</b>	65.5	4.4	3A	4.10	3000	134	12.2	85
<b>ae 3.0-68.7-1</b>	68.7	4.6	3A	4.50	3000	140	10.9	80
<b>ae 3.0-68.7-2</b>	68.7	4.4	3A	4.00	3000	140	11.5	85
<b>ae 3.0-71.0</b>	71	4.5	3B	4.90	3000	145	10.9	82

<b>ae 4.0-68.7-2</b>	68.7	4.8	2A	4.50	4000	140	11.3	83
<b>ae 4.5-61.7</b>	61.7	4.8	1A	3.24	4500	127	12.5	83

<b>ae 5.0-63.5</b>	63.525	5.1	1B	2.31	5000	130	12.5	85
<b>ae 5.0-68.0</b>	68.025	5.1	2B	2.85	5000	139	11.8	85
<b>ae 5.0-68.0-2</b>	68.025	5.117	CS (Typhoon) / 2B	2.85	5500	139	11.75	85.5

<b>ae 14.0-111.0</b>	111.0	7.018	1B	4.00	14000	228	7.54	90.0
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Aerodynamic Parameter		Blade Connection		Mass and Frequencies			
Tip speed ratio (-)	Power coefficient (-)	BCD blade root (mm)	Type of connection	Mass (excl. T-Bolts) (kg)	CoG (m)	First/Second flap-wise frequency (Hz)	First/Second edge-wise frequency (Hz)
9.0	0.49	1800	T-Bolt	5800	11.60	0.94 / 2.65	1.70 / 5.10
9.5	0.49	1800	T-Bolt	5943	12.20	0.78 / 2.16	1.49 / 4.34
9.8	0.48	1800	T-Bolt	6287	13.11	0.77 / 2.16	1.26 / 3.93
10.0	0.47	1800	T-Bolt	7107	14.55	0.67 / 1.86	1.02 / 3.18
9.9	0.48	1800	T-Bolt	7085	14.30	0.72 / 2.00	1.07 / 3.30

9.0	0.48	2110	T-Bolt	8670	12.69	0.91 / 2.60	1.58 / 4.93
9.5	0.48	2110	T-Bolt	8734	13.88	0.73 / 1.97	1.32 / 3.86
9.5	0.48	2110	T-Bolt	10000	15.11	0.66 / 1.92	1.16 / 3.70
10.0	0.48	2110	T-Bolt	11345	17.87	0.56 / 1.56	0.95 / 2.91
10.2	0.47	2110 / 2300	T-Bolt	10400	18.07	0.56 / 1.61	0.89 / 2.64
10.3	0.47	2110 / 2300	T-Bolt	11390	18.34	0.52 / 1.45	0.87 / 2.62

9.0	0.48	2300	T-Bolt	11455	15.30	0.76 / 2.26	1.32 / 4.34
9.5	0.48	2300	T-Bolt	11642	15.89	0.64 / 1.81	1.18 / 3.60
9.0	0.48	2300	T-Bolt	11664	17.00	0.63 / 1.93	1.06 / 3.69
9.5	0.47	2300	T-Bolt	11952	17.79	0.59 / 1.73	0.86 / 2.72

9.0	0.48	2300	T-Bolt	13878	17.35	0.65 / 1.91	1.07 / 3.54
9.3	0.48	2300	T-Bolt	14624	18.66	0.56 / 1.61	0.93 / 3.00
9.5	0.48	2800	T-Bolt	16175	20.38	0.52 / 1.42	0.78 / 2.42
10.0	0.48	2800	T-Bolt	18764	21.75	0.50 / 1.43	0.79 / 2.33
10.2	0.47	2800	T-Bolt	17331	21.54	0.50 / 1.41	0.74 / 2.18
10.3	0.48	2800	T-Bolt	18936	22.55	0.51 / 1.36	0.77 / 2.10

9.4	0.47	3200	T-Bolt	19160	20.37	0.59 / 1.61	0.87 / 2.45
8.7	0.48	3200	T-Bolt	18443	17.69	0.73 / 2.06	1.11 / 3.31

8.7	0.48	3200	T-Bolt	21373	19.90	0.65 / 1.74	1.03 / 3.14
9.2	0.48	3200	T-Bolt	26780	22.16	0.52 / 1.38	0.96 / 2.75
9.2	0.48	3200	T-Bolt	27505	21.26	0.558 / 1.495	0.963 / 2.940

9.75	0.491	5050	T-Bolt	69760	31.18	0.44 / 1.24	0.68 / 2.24
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**AEROVIDE**

AEROVIDE GmbH · Provianthausstraße 9 · 24768 Rendsburg · Germany  
Tel. +49 43 31 - 12 75-0 · Fax +49 43 31 - 12 75-55 · E-Mail: [info@aerovide.com](mailto:info@aerovide.com)  
[www.aerovide.com](http://www.aerovide.com)

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