

Durability in many aspects

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## Durability

Durability begins with a quality product. Lagerwey's newest generation of direct drive turbines is ready for the future and is challenging the old concepts in many aspects. Lagerwey's long experience and innovative mind regarding direct drive technology has resulted in optimal next generation multi megawatt wind turbines. Reducing the amount of components and design simplicity are essential drivers in making durable quality.

## Technology

The turbines has a permanent magnet generator with excellent efficiency in partial and full load. Together with a full power converter we are able to deliver a clean, grid friendly power during worst case circumstances.

Due to the variable speed principle, the turbine is the best choice when conditions get rough. Lagerwey's advanced electrical pitch system reduces the loads, optimize a maximum energy capture and guarantees the turbine safety. The only moving part with a high load cycle is the main bearing where Lagerwey deliberately engineered a comfortable safety margin regarding wear and loads and use the a world class bearing quality. The automatic lubrication system is closely monitored and is very accessible for maintenance.

The Lagerwey turbines have hollow main shafts for direct access to the hub. This makes the design light together with high stiffness to withstand high loads. All service can be done comfortably from the inner side of the turbine.

The generator is fully closed from outside influences. That makes her withstand the most severe environments (dust, coastal operation etc.). Due to the high generator efficiency a internal cooling system is not necessary. It is passive cooled generator by the natural air stream at the outside what makes it very robust.

## Profitability

Transportation and installation cost have become mayor costs in the multi megawatt turbine class. Our concept with ready to fit assembly modules enables low installation cost and requires minimal crane capacity. The turbine can be erected with a smaller crane as usable in this class.

The Lagerwey turbines energy capture is very high, especially there where it matters, in partial load. In partial load the outperforms the existing drive train concepts by far.

Simplicity, reducing systems, low installation and maintenance cost make the turbine a low risk investment and combined with the excellent energy capture allows for an attractive return of investment. This is the turbine of choice for your projects.

### General

Rated Power	2500 kW
Rotor Diameter	93 m
Hub Height	90 m standard / 110 m in progress
Turbine Concept	Direct drive gearless, variable speed, variable pitch, full power converter

### Rotor

Type	3 Bladed upwind rotor
Diameter	93 m
Swept Area	6810 m <sup>2</sup>
Rotor Speed	Variable 7 - 15,6 rpm
Power Regulation	Electric pitch control
Blade Material	Fibreglass / Epoxy
Lightning Protection	Blade integrated, direct contact to structure

### Generator

Type	Lagerwey multi pole synchronous
Field Excitation	Permanent Magnet
Main Bearing	Dual row tapered rollers
Cooling System	By natural air stream, no system

### Safety System

Type	3 Independent pitch system with allocated emergency supply
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### Grid Inverter

Type	Full power AC-DC-AC
Control	IGBT-Control
Cooling	Water cooled

### Operational Data

Cut in Wind Speed	2,5 m/s
Cut Out Wind Speed	25-28 m/s
Power Factor	Controllable

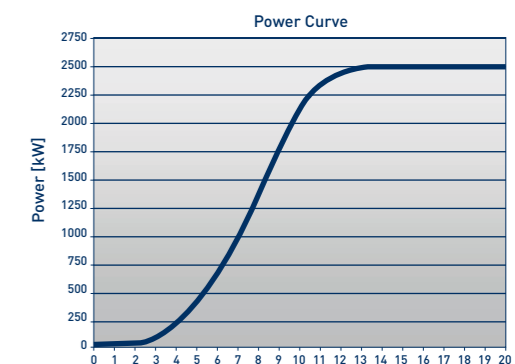
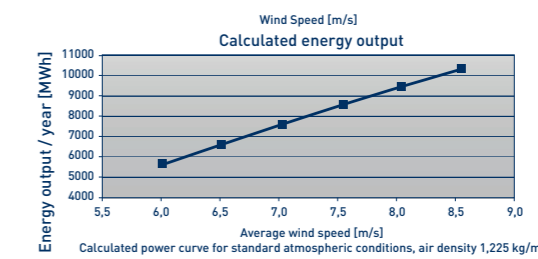
### Devices

Service Brake	Yes
Locks	Rotorblade, yaw and drive train
Lubrication	Automatic controlled bearings and teeth lubrication.

### Tower

Type	Tubular steel tower
Hub Height	90 m (standard) / 110 m (in progress)

- Design simplicity
- High efficiency
- Easy installation
- Less internal systems
- Easy maintenance
- Long term service



Advantage through experience

Lagerwey is a turbine manufacturer for direct drive turbines in the multi-megawatt class. Lagerwey's headquarter is located in Barneveld, the Netherlands. Lagerwey builds on 30 years of experience in innovative wind technology and has a solid base of in-house expertise which dates back to the early years of modern wind turbine technology.

Lagerwey concentrates on wind turbine concepts with a focus on direct drive. The direct drive generators are in-house designed and produced within a high level of quality.

We supply turnkey projects with turbine types L93 -2.5 MW and L90-2.6 MW from our factory in the Netherlands or by local manufacturing partners.

Furthermore Lagerwey is able to sell production technology for local manufacturing by licensing or JV's per region and per turbine type. The comprehensive and detailed technology transfer enables the licensee to produce their own main components of the turbine.

Our customers in licensing are financial strong party's that take production of wind turbines in their own hands. By buying a production and sales license our customer is capable of managing his own profits margins and is in control of his own wind projects, manufacturing, supply chain and costs.

Goal is to provide the market with products that can be adapted to the special needs of the customer.



**Netherlands**  
Anthonie Fokkerstraat 2 3772 MR Barneveld  
Tel: +31(0)342 751935 Fax: +31(0)342 751939

**Turkey**  
Prof. Dr. Bülent Tarcan Cad. Vefa Bayırı Sok. Gayrettepe İş  
Merkezi C Blok No:7 D5 34394 Gayrettepe İstanbul  
Tel: +90 212 211 08 10 Fax: +90 212 217 02 21

[info@lagerwey.nl](mailto:info@lagerwey.nl) [www.lagerwey.nl](http://www.lagerwey.nl)



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