Technical Specifications/Main Components

History of this Document

Changes in this document:

<table>
<thead>
<tr>
<th>Rev. no.:</th>
<th>Date:</th>
<th>Description of change</th>
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<tbody>
<tr>
<td>1</td>
<td>2002-01-17</td>
<td>(adapting the document for V80 1,8 MW) Section 2.3: 60Hz added. 215 bar changed to 200 bar. &quot;Weight with oil cooler - 525 kg (1.8MW)&quot; added. Section 4: 50/60Hz types added. Section 5.1: 117 l/min changed to 100 l/min. Section 5.4: &quot;HDU 15/25 PM-690V (60Hz)&quot; added. Section 5.2, 5.6, 5.7 and 5.9 specified for L&amp;S and Hansen gearboxes. Section 5.5: 60Hz type added. Section 6.3: 800 and Ø108 changed to 950 and Ø109. Section 8: New types added. Updating of section 8. Section 10: New types added. Updating of section 10.</td>
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<tr>
<td>2</td>
<td>2005-03-11</td>
<td>Section 1: &quot;thread&quot; added to &quot;Stainless steel inserts&quot; To &quot;Colour&quot; &quot;custom-designed&quot; has been added Section 2.3: Pressure, brake system: 50Hz and 60 Hz added Section 9.1: Weight for ABB generator changed Leroy Somer removed; Table added Section 10.1: V80 VRCC added; Table added Section 13.1: FT sensor added Drawing 950645 updated to revision 2 Drawing 950646 updated to revision 1</td>
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Related Documentation

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<td>947905</td>
<td>V80 1,8/2,0MW, Klasse II, Tekniske specifikationer for hovedkomponenter</td>
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1. **Rotor**

1.1 **Blade**
- **Manufacturer:** Vestas
- **Type no.:** VESTAS 39 m
- **Material:**
  - Glass fibre reinforced epoxy (blade shells)
  - Glass fibre reinforced epoxy (blade spar)
  - Stainless steel thread inserts (root attachment)
- **Surface:** Epoxy gelcoat
- **Colour:** RAL 9010, RAL 7035 and custom-designed
- **Overall length:** 39 m
- **Max. Chord:** 3357 mm
- **Weight:** 6500 kg

1.2 **Blade Bearing**
- **Manufacturer:** ROLLIX/ HOESCH ROETHE ERDE
- **Type:** Double row, 4 point contact ball bearing
- **Lubrication:** Grease: Aeroshell 14
- **Dimension:** ø2120/ ø1700 x 192 mm
- **Weight:** 1475 kg

1.3 **Nose Cone**
- **Manufacturer:** Vestas
- **Form:** Length 4.14 m, diameter 3.46 m.
- **Material:** Glass fibre reinforced polyester coated with polyester gelcoat
- **Weight:** Approx. 600 kg

1.4 **Blade Hub**
- **Manufacturer:** Vestas
- **Material:** EN-GJSF400-18U-LT-D
- **Weight:** 8463 kg

2. **Pitch System**

2.1 **Hydraulic Cylinder**
- **Manufacturer:** LJM
- **Type:** 021 VD 125/80 x 760 – 808-g-T
- **Dimension:** 305 x 178 x 1352 mm

2.2 **Linear Transducer in Cylinder**
- **Manufacturer:** Balluff
- **Type:** BTL5-A11-M0800-B-SA56-S32
2.3 Hydraulic Power Unit

Manufacturer: PMC Technology
Pump motor: 18,5 kW, 690 V, 50/60 Hz, and 4 poles
Proportional valve: NG10
Pump flow: 46,2 - 49 l/min - 50 Hz
40,8 - 44,9 l/min - 60 Hz
Pressure, pitch system: 180 - 200 bar
Pressure, pitch system, return: Min. 6 bar
Pressure, brake system: 50Hz: 40 bar
60Hz: 34 bar

Size of oil reservoir: 300 l (gross volume)
Oil quantity (system): 320 l
Weight (without oil) 475 kg
Weight with oil cooler 525 kg (1.8 MW)

2.4 Hydraulic Block on Cylinder

Manufacturer: PMC Technology

2.5 Plain Bearing on Cylinder

Manufacturer: SKF
Type: PWM 809060
Dimension: ø90/ ø60 x 40 mm

2.6 Spherical Plain Bearing on Cylinder Rod

Manufacturer: SKF
Type: GE100TG 3A-2RS
Dimension: ø150/ ø100 x 70 mm

3. Main Shaft Arrangement

3.1 Main Shaft

Manufacturer: Vestas
Material: 42CrMo4 / V / EN 10083
Size: ø630/ flange ø1500/ length 2690 mm
Weight: 6078 kg

3.2 Front Main Bearing (nearest to the rotor)

Manufacturer: SKF/FAG/Koyo
Type: 230/630 CA/W33
Dimension: ø920 mm/ ø630 mm x 212 mm
Weight: 485 kg
3.3 **Rear Main Bearing (furthest from the rotor)**
- **Manufacturer:** SKF/FAG/Koyo
- **Type:** 24188 CA/W33
- **Dimension:** ø720 mm/ ø440 mm x 280 mm
- **Weight:** 460 kg

3.4 **Front Main Bearing Seal**
- **Manufacturer:** Seal Pool
- **Type:** ø660/ ø700 x 20 mm GVP

3.5 **Rear Main Bearing Seal**
- **Manufacturer:** Seal Pool
- **Type:** ø500/ ø540 x 20 mm CB

3.6 **Hydraulic Cylinder for Rotor Locking**
- **Manufacturer:** LJM
- **Type:** SNH30 FD 63/30x60-360-G
- **Dimension:** ø169 x 625 mm

3.7 **Manuel Hydraulic Pump for Rotor Locking**
- **Manufacturer:** LJM
- **Type:** HANSA TMP/GLDE20/I
- **Dimension:** 100 x 290 x 700 mm

4. **Main Gearbox Arrangement**

4.1 **Gearbox**
- **Manufacturer:** Lohmann & Stolterfoht
- **Type:** GPV 440
- **Shaft displacement:** 948 mm (horizontal)
- **Total length:** 2689 mm
- **Weight:** 14500 kg
- **Ratio:** 50 Hz: 1:100,845
- **Ratio:** 60 Hz: 1:121,28

- **Manufacturer:** Lohmann & Stolterfoht
- **Type:** GPV 441
- **Shaft displacement:** 948 mm (horizontal)
- **Total length:** 2689 mm
- **Weight:** 14500 kg
- **Ratio:** 50 Hz: 1:100,33 (Onshore)
- **Ratio:** 60 Hz: 1:120,099

- **Manufacturer:** Hansen Transmissions
- **Type:** EH802N21 (Onshore)
- **Shaft displacement:** 948 mm (horizontal)
- **Total length:** 2689 mm
Weight: 14000 kg  
Ratio: 60 Hz: 1:120,515  
Ratio: 60 Hz: 1:111,36  
Ratio: 50 Hz: 1:101,02 (Onshore)

4.2 Shrink Disc
Manufacturer: Stüwe  
Type: HSD 530-23  
Dimension: ø980/ ø530 x 338 mm  
Weight: 1200 kg

Manufacturer: Ovako  
Type: OKCK 530  
Dimension: ø950/ ø530 x 364 mm  
Weight: 1225 kg

4.3 Torque Arm Rubber Spring
Manufacturer: EFFBE-Werk  
Type: Elastomer spring/ Urelast 90 h.A  
Dimension: ø200/ ø44 x 40 mm

4.4 Brake Calibre
Manufacturer: BREMBO  
Type: PZ.I.4420.2802.10  
Piston diameter: ø75 mm  
Weight: 16 kg  
Max. pressure: 150 bar

Manufacturer: STILFRENI  
Type: PR771401000  
PR771301000

4.5 Brake Pad
Manufacturer: Micke  
Type: MPM 030

4.6 Transmission Shaft
Manufacturer: Vestas  
Size: ø480 x 410 mm  
Weight: 15 kg
5. Gearbox Oil System

5.1 Electrical Pump
Manufacturer: Settima
Type: GR45 210 SMT 16B-2.2 kW-690 V (50 Hz)
GR45 180 SMT 16B-2.2 kW-690 V (60 Hz)
Capacity: 100 l/min. (50/60 Hz).
Pressure: Max. 15 bar

5.2 Shaft Driven Pump
Lohmann & Stolterfoht.
Manufacturer: Rickmeier
Type: R 4.5/45 FL-Z-UNI-SO
Capacity: 65 l/min. at 1500 RPM
Pressure: Max. 8 bar

Hansen Transmissions.
Manufacturer: SHW
Type: SHW40
Capacity: 45 l/min. at 1500 RPM
Pressure: Max. 15 bar

5.3 Oil Filter
Manufacturer: Mahle
Type: HC35 SM-X 1511
Filtration: 10 µm ABS.

5.4 Off-line Filter
Manufacturer: C.C. Jensen
Type: HDU 15/25 PM - 1x230 V (50 Hz)
HDU 15/25 PU - 690 V (60 Hz)
Filtration: 3 µm

5.5 Oil Coolers
Manufacturer: Nissen Cooler
Size: 502 x 620 mm, fan ø456 mm
10 blades 25°, type 3HL
Fan motors 50 Hz: 90S B14, 2 pole 1.5 kW/ 690 V
Fan motors 60 Hz: 90L B14, 2 pole 3.0 kW/ 690 V

5.6 Oil Heating Elements
Lohmann & Stolterfoht.
Manufacturer: Helios
Connection: 2" BSPP
Size: 2 x 980 W + 1 x 650 W
5.7 Oil Level Switch
Lohmann & Stolterfoht.
Manufacturer: Barksdale
Type: UNS 1000-MS/T2-ST1
Voltage: Voltage: 24 V DC

5.8 Oil Sump Temperature Sensor
Manufacturer: Danfoss
Type: MBT 5250

5.9 Bearing Temperature Sensor
Lohmann & Stolterfoht.
Manufacturer: Bühler
Type: TF-M-PT 100-VAL

6. Rotating Transference

6.1 Rotating Trafo
Manufacturer: Weier
Type: ETK160
Dimension: ø360 x 405 mm
Weight: 147 kg

6.2 Rotating ARC-net
Manufacturer: Vestas
Dimension: ø280 mm
6.3 Rotating Hydraulic Union
Manufacturer: Deublin
Type: 9110-950
Dimension: ø109 x 203 mm

7. Machinery Foundation

7.1 Main beam (left & right)
Manufacturer: Vestas
Material: EN-GJISF400-18U-LT-D / EN 1560
Size: 4590 x 1200 x 1280 mm each
Weight: 4526 kg each

7.2 Generator Foundation
Manufacturer: Vestas
Material: S 355 J2H (EN 10025)
Size: 3560 x 2300 x 660 mm
Weight: 2500 kg

8. Yaw System

8.1 Yaw Ring
Manufacturer: Niebuhr Tandhjulsfabrik + Hoesch Rothe Erde
Material: 34CrNiMo 6 / V / 42CrMo 4 / V (EN 10083)
Normal module: 16
Number of teeth: 143
Tooth width: 96 mm
Weight: 767 kg

8.2 Yaw Gear
Before 01.10.01
Manufacturer: Bonfiglioli/Transmittal SOM
Type: 709T2M PG1802
Type Worm gear: W110 MNRV110
Ratio/Planetary stages: 1:28 1:22,1
Ratio/Worm gear: 1:40 1:50
Ratio total: 1:112 1:1105
Electric motor spec.: 2.2 kW/6 pole/690 V
Weight: 190 kg
After 01.10.01
Manufacturer: Bonfiglioli/Transmittal SOM Brevini
Type: 709T3M PG1603 RPR3140
Type Worm gear: W75 MNRV075 FRS85
Ratio/Planetary stages: 1:110,17 1:149,5 1:131,8
Ratio/Worm gear: 1:10 1:7,5 1:8,5
Ratio total: 1:1101,7 1:1121 1:1119,9
Electric motor spec.: 2.2 kW/6 pole/690 V
Weight: 190 kg

8.3 Yaw Gear Pinion
Before 01.10.01
Manufacturer: Bonfiglioli/SOM
Material: 18NiCrMo5 (UNI 8550)
Normal module: 16
Number of teeth: 11
Tooth width: 100 mm
Weight: Included in yaw gear weight
After 01.10.01: All yaw gears are delivered with integrated pinion.

8.4 Yawing Plain Bearings
Manufacturer: Vestas
Material: PETP

9. Generator
9.1 Generator
Manufacturer: ABB
Type: AMK 500L4A BAYH
Poles: 4
Building size: 500
Degree of protection: IP55
Insulation class: H
Weight cooler: 430 kg
Weight generator: 5700 kg
Bearing drive end (DE): 6330M C3
Bearing non-drive end (NDE): 6330M C3

Manufacturer: WEIER
Type: DVSG500/4Msp
Poles: 4
Building size: 500
Degree of protection: IP54
Insulation class: F/H
Weight cooler: 650 kg
Weight generator: 5500 kg
Bearing drive end (DE): 6330M C4
Bearing non-drive end (NDE): 6330M C4
For both bearings the following applies:
Level of insulation: 1000 V DC
Max. radial run-out inner ring: 15 µm radial
10 µm axial

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<th>V80 VCS 50Hz</th>
<th>V80 VCS 60Hz</th>
<th>V80 VRCC 60Hz</th>
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<td>Generator supplier</td>
<td>ABB / Weier</td>
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## 10. Trafo Arrangement

### 10.1 Trafo

- **Standard:** IEC 60076-11 2004
- **Manufacturer:** SIEMENS/SGB/ABB/FRANCE TRANSFO
- **Type:** CAST-RESIN
- **Rated power:** 2100 kVA
- **Rated HV:** 6-34.5 kV
- **Highest equipment voltage:** 36 kV ($U_m$)
- **Highest power frequency withstand voltage (IEC):** 70 kV
- **Highest impulse withstand voltage (IEC):** 170 kV
- **HV tap changer:** ±2x2.5%
- **Rated LV:** 0.48/0.69 kV
- **Max. size:** 2100 x 920 x 2150 mm
- **Max. weight:** 5500 kg

- **Standard:** IEC 60076-11 2004
- **Manufacturer:** SIEMENS
- **Type:** CAST-RESIN
- **Rated power:** 1850 kVA
- **Rated HV:** 6-34.5 kV
- **Highest equipment voltage:** 36 kV ($U_m$)
- **Highest power frequency withstand voltage (IEC):** 70 kV
- **Highest impulse withstand voltage (IEC):** 170 kV
- **HV tap changer:** ±2x2.5%
- **Rated LV:** 0.69 kV
- **Max. size:** 2100 x 920 x 2150 mm
- **Max. weight:** 5500 kg

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<td>Trafo supplier</td>
<td>SIEMENS/SGB/ABB/FRANCE TRANSFO</td>
<td>SIEMENS</td>
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11. Crane

11.1 Service Crane
Manufacturer: ABB
Type: B 4.2 500/1-12 690V, BAU-LIFTKET
Lifting capacity (max.): 800 kg
Lifting speed: 12 m/min.

11.2 Component Crane (not included)
Manufacturer: Secalt/Tractel
Type: T 1000 P, 690V, Tirak
Lifting capacity: 6400 kg
Lifting speed: 4.5/18 m/min.
Length of wire: 500 m

12. Machine Cover

12.1 Cover Parts
Manufacturer: Vestas
Material: Reinforced glass fibre

12.2 Cover Support
Manufacturer: Vestas
Vibration dampers: IKAS Novibra RA 800 EMB

13. Wind Sensor

13.1 FT Sensor/Ultrasonic Sensor
Manufacturer: FT Technologies Ltd
Type: FT702LT
Size: ø50 x 160 mm
Weight: 0.3 kg

Manufacturer: Vestas
Type: VUS2D 2.0
Size: ø70/ ø275 x 422 mm
Weight: 2.5 kg

14. Tubular Tower
Manufacturer: Vestas
Material: S235 J0/JR
Heights: 60 m, 67 m, 78 m, 100 m
Top diameter: 2.3 m
Bottom diameter: 4.0 m
15. Dimension Drawings

15.1 Nacelle Cover and Blade, Overall Dimensions
15.2 Nacelle, Side View

Please disregard the position numbers.