

All reports are in English except report KD 35 which is available in English and in Dutch. The author of all reports is ing. (B.Sc.) Adriaan Kragten. e-mail: info@kdwindturbines.nl website: www.kdwindturbines.nl

report number	title, year	number of pages
KD 35	Rotor design and matching for horizontal axis wind turbines. January 1999, reviewed February 2017.	62
KD 35 Netherlands	Rotorontwerp en matching voor horizontale as windturbines, februari 2017.	62
KD 78	Measurements performed on a generator with housing 5RN90L04V and a 4-pole armature equipped with neodymium magnets, March 2001, reviewed March 2015.	25
KD 82	Measurements performed on a generator with housing 5RN132M04V with a standard 400/690 V winding provided with a 4-pole armature with neodymium magnets, June 2001.	18
KD 97	Determination of C_p for low values of λ . Deriving the $C_p-\lambda$ and $C_p-\lambda$ curves of the VIRYA-1.8D rotor, July 2002.	10
KD 196	Questions and answers on a wind energy course based on report KD 35, "Rotor design and matching for horizontal axis wind turbines", In English and in Dutch (Netherlands), May 2004.	12
KD 200	Measurements performed on a generator with housing 5RN112M04V and a 4-pole armature equipped with neodymium magnets, June 2004, reviewed Sept. 2016.	17
KD 213	Method to check the estimated 8-V curve of the hinged side vane safety system and checking of the 8-V curve of the VIRYA-4.2 windmill, December 2004.	28
KD 215	The Darrieus rotor, a vertical axis wind turbine (VAWT) with only a few advantages and many disadvantages, December 2004	5
KD 223	Method to check the estimated 8-V curve of the hinged side vane safety system and checking of the 8-V curve of the VIRYA-3.3D windmill (7.14 % cambered steel blades), February 2005.	28
KD 235	Use of the VIRYA-3.8 windmill for water pumping with a pump equipped with a permanent magnet DC motor, July 2005.	10
KD 285	The G6 711 airfoil for use in windmill rotor blades, June 2006, revised February 2010.	6
KD 294	Coupling of a windmill to a single acting piston pump by means of a crank mechanism, September 2006.	13
KD 319	Calculations executed for the 4-bladed rotor of the VIRYA-2.8B4 windmill ($\lambda_d = 2.5$, galvanised steel blades), February 2007, reviewed December 2015.	15
KD 320	Development of the VIRYA-2.8B4, a windmill with a Polycord transmission in between the rotor shaft and the vertical shaft to drive a rope pump or an Archimedian screw pump, February 2007.	21
KD 321	Combination of the VIRYA-2.8B4 windmill with a rope pump, February 2007.	13
KD 333	The G6 711 airfoil modified as the G6 711-12% and the G6 711-10% airfoil for use in windmill rotor blades (contains also characteristics of the G6 795, 796 and 797 airfoils), May 2007, reviewed May 2016.	11
KD 340	Rectification of 3-phase VIRYA windmill generators, May 2007, reviewed October 2014.	15
KD 341	Development of the permanent magnet (PM) generators of the VIRYA windmills, May 2007, reviewed December 2018.	18
KD 364	Derivation of the formulas for torque and volumetric efficiency for a single acting piston pump with a floating valve, November 2007, modified May 2008.	9
KD 377	Development of a tornado proof pendulum safety system for a medium size wind turbine which turns the rotor out of the wind along an horizontal axis, April 2008	13
KD 378	Basic knowledge about electrical, chemical, mechanical, potential and kinetic energy to understand literature about the generation of energy by small windmills, May 2008.	15
KD 398	The 7.14 %, 10 % and 12.5 % cambered plate as airfoil for windmill rotor blades. Aerodynamic characteristics, geometry, moment of inertia I and moment of resistance W. November 2008.	13
KD 409	Development of an ecliptic safety system with a torsion spring, February 2009, reviewed May 2016.	22
KD 416	Windmills using aerodynamic drag as propelling force; a hopeless concept, April 2009, reviewed September 2019.	11
KD 417	The rotating blade, vertical axis wind turbine, April 2009, reviewed November 2015.	10
KD 431	Description of the inclined hinge main vane safety system and determination of the moment equations, December 2009.	19
KD 437	Ideas about a pitch control system for the VIRYA-15 windmill ($\lambda_d = 8$, G6 711 airfoil), February 2010.	23
KD 439	Development of a pendulum safety system with a torsion spring and $e = 0.2 R$, March 2010.	10
KD 463	The G6 622, G6 623, G6 624 and G6 625 airfoils with thickness/chord ratios of respectively 8 %, 12 %, 16 % and 20 % for use in windmill rotor blades, August 2011, reviewed December 2015.	9
KD 465	Calculations executed for the 2-bladed rotor of the VIRYA-1.5 windmill ($\lambda_d = 4.5$, steel blades) with generator frame size 71 and original motor shaft, August 2011, reviewed October 2018.	16
KD 484	Calculations executed for the 3-bladed rotor of the VIRYA-3B3 windmill ($\lambda_d = 6.5$, wooden blades), February 2012, reviewed November 2018.	20
KD 485	Safety systems for small wind turbines which turn the rotor out of the wind at high wind speeds, February 2012, reviewed May 2016.	24
KD 490	Water pumping with a windmill, March 2012, reviewed May 2019.	10
KD 491	Research to the usability of the Solarlux pump with a 2.6 mm cam in combination with the VIRYA-3B3 windmill, March 2012, reviewed October 2018.	11
KD 501	Determination of the $C_p-\alpha$ curves for different positions of the axis of rotation for a 10 %, 5 % and 7.14 % cambered airfoil with an aspect ratio of 5, July 2012, reviewed April 2018.	10
KD 503	Development of an alternative permanent magnet generator for the VIRYA-3 windmill using an Indian 4-pole, 3-phase, 2.2 kW asynchronous motor frame size 100 and 8 neodymium magnets size 50 * 25 * 10 mm, September 2012, reviewed May 2016.	7
KD 518	Calculations executed for the 3-bladed rotor of the VIRYA-1.04 windmill ($\lambda_d = 3.5$, 7.14 % cambered, aluminium blades) meant to be coupled to a Nexus hub dynamo (with free manual), Jan. 2013, reviewed May 2013.	16
KD 522	Ideas about a 4-pole, 3-phase axial flux permanent magnet generator for the VIRYA-1.5 windmill using square neodymium magnets size 30 * 30 * 15 mm and no iron in the stator, June 2013.	11
KD 531	Ideas about a 16-pole, 3-phase axial flux permanent magnet generator for the VIRYA-3B2 windmill using 16 neodymium magnets size 50 * 15 * 15 mm, Sept. 2013.	12
KD 532	Calculations executed for the rotor of the VIRYA-3.1 windmill ($\lambda_d = 7$, G6 623 airfoil), with 2-bladed rotor made of Roofmate and glass fibre, September 2012, reviewed June 2016.	11
KD 539	Ideas about a fast running vane pump directly driven by a 0.37 kW, 4-pole asynchronous motor frame size 71, December 2013, reviewed September 2018.	15
KD 542	Ideas about a diaphragm pump with three in line diaphragms driven by a 0.37 kW asynchronous 4-pole motor or a permanent magnet DC motor frame size 71 and a of manufacture Rossi, January 2014.	14
KD 544	Ideas about a double piston pump with a constant upwards piston speed driven by an asynchronous 4-pole, 3-phase motor or a permanent magnet DC motor frame size 71 reducing gear box frame size 32 of manufacture Rossi, January 2014, reviewed May 2016.	15
KD 551	Aerodynamic characteristics of rectangular flat plates with aspect ratios 5 : 1, 2 : 1, 1 : 1, 1 : 2 and 1 : 5 for use as windmill vane blades, March 2014, reviewed April 2016.	15
KD 560	Ideas about a direct drive 34-pole permanent magnet generator for the VIRYA-3.3S windmill using the stator stamping of an Indian 6-pole, 3-phase, 2.2 kW asynchronous motor frame size 112 and 51 neodymium magnets size 40 * 10 * 5 mm, May 2014, reviewed December 2017.	9
KD 562	Development of a tubular tower for the VIRYA-3.3S windmill, June 2014, reviewed December 2014.	8
KD 571	Development of an 8-pole, 3-phase axial flux permanent magnet generator for the VIRYA-1.36 windmill using 8 neodymium magnets size 25.4 * 25.4 * 12.7 mm. November 2014, modified April 2017.	20
KD 576	Calculations executed for the 3-bladed rotor of the VIRYA-3.3S windmill ($\lambda_d = 4.5$, steel blades) using a 34-pole PM-generator for coupling to a pump motor, December 2014.	16
KD 578	Calculations executed for the 3-bladed rotor of the grid connected VIRYA-6.5 windmill ($\lambda_d = 6$, G6 711 airfoil, wooden blades) provided with the hinged side vane safety system, February 2015, reviewed January 2016.	12
KD 579	Extended calculations executed for the grid connected VIRYA-6.5 windmill, March 2015, reviewed March 2018.	24
KD 580	Ideas about a small 34-pole permanent magnet generator for a small windmill or for human power, using the stator stamping of a 6-pole asynchronous motor frame size 80 and 17 neodymium magnets size 40 * 7 * 3 mm, March 2015, reviewed October 2018.	12
KD 582	Development of a tubular tower for the VIRYA-4.2 and the VIRYA-4.6B2, March 2015, reviewed November 2016.	10
KD 595	Measurements performed on a Chinese axial flux generator of Hefei Top Grand model TGET165-0.15kW-500R for a 12 V battery load, September 2015.	12
KD 596	Ideas about a 12-pole axial flux generator for the VIRYA-1.66 windmill using 12 neodymium magnets size 25.4 * 25.4 * 12.7 mm. Design report of the rotor, October 2015, reviewed February 2016.	19
KD 598	Ideas about the 3-bladed VIRYA-0.65 vane turbine with 20° inclined shaft coupled to the generator of the VIRYA-2.68 windmill for 12 V and 24 V battery charging.	19
KD 599	Ideas about an alternative 2-bladed VIRYA-0.625, November 2015, reviewed June 2018.	7
KD 599	Measurements of Savonius rotors available on the Internet, December 2009, reviewed August 2019.	9
KD 601	Ideas about a self starting, 3-bladed H-Darrieus rotor for water pumping, December 2015, reviewed August 2019.	9
KD 614	Calculations executed for the 2-bladed rotor of the VIRYA-5 windmill ($\lambda_d = 7$, G6 711 airfoil) meant for connection to a 34-pole PM-generator for driving the 1.1 kW asynchronous motor of a centrifugal pump.	24
KD 615	Description of the 34-pole generator, August 2016, reviewed November 2016.	12
KD 616	Calculations for the 3-bladed rotor of the VIRYA-0.98 windmill ($\lambda_d = 3$, 15° folded aluminium blades) meant to be coupled to a Nexus hub dynamo, September 2016	12
KD 617	Translation of parts of report R343D of June 1978 from Dutch into English. R343D gives wind tunnel measurements for a rotor with tapered blades-- November 2016	10
KD 617	Design report of the VIRYA-2.02 rotor ($\lambda_d = 6$, B = 2, tapered stainless steel blades), November 2016.	10
KD 622	Ideas about a pitch control mechanism for the 2-bladed rotor of the VIRYA-5 windmill ($\lambda_d = 7$, G6 711 airfoil) meant for connection to a 34-pole PM-generator for driving an asynchronous motor of a centrifugal pump. Description of the 34-pole generator, December 2016.	26
KD 624	Ideas about a direct drive 46-pole PM-generator for the VIRYA-6.5 windmill meant for driving the 2.2 kW asynchronous motor of a centrifugal pump, January 2017.	12
KD 631	Development of an 8-pole, 3-phase axial flux permanent magnet generator for the VIRYA-1.81 windmill using 8 neodymium magnets size $\phi 45 * 15$ mm and a stator made out of synthetic material.	17
KD 632	Calculation of the rotor geometry, April 2017.	17
KD 632	Ideas about a 26-pole permanent magnet generator for the VIRYA-2.2 windmill using the housing of a 4-pole, 3-phase, 0.75 kW asynchronous motor frame size 80 and 26 neodymium magnets size 40 * 7 * 3 mm. Design report of the rotor ($\lambda_d = 4.75$, B = 2, galvanised steel blades), May 2017, reviewed October 2018.	17
KD 644	Ideas about an 8-pole, 3-phase permanent magnet generator with a stator without iron in the coils, using eight neodymium magnets size 80 * 20 * 10 mm and a housing of an asynchronous motor with frame size 71, November 2017, reviewed November 2018.	9
KD 645	Ideas about a 10-pole, 3-phase permanent magnet generator with a stator without iron in the coils, using 20 neodymium magnets size 50 * 20 * 10 mm and a housing of an asynchronous motor with frame size 80, June 2019.	12
KD 648	Ideas about a 38-pole permanent magnet generator for the VIRYA-3B3 windmill using the housing of a 6-pole, 3-phase, 1.5 kW asynchronous motor frame size 100 and 57 neodymium magnets size 40 * 7 * 3 mm, December 2017.	9
KD 651	Calculations executed for the 4-bladed rotor of the VIRYA-3.6L2 windmill ($\lambda_d = 2$, galvanised steel blades) with a Polycord transmission in between the rotor shaft and the vertical shaft to drive a rotating positive displacement pump, March 2018, reviewed October 2018.	23
KD 652	Calculations executed for the 4-bladed rotor of the VIRYA-3.6 windmill ($\lambda_d = 3.5$, galvanised steel blades), March 2018.	15
KD 653	Development of the VIRYA-3.6, a windmill with a Polycord transmission in between the rotor and the vertical shaft to drive a standard centrifugal pump, April 2018, reviewed September 2018.	20
KD 654	Calculations executed for the 3-bladed rotor of the VIRYA-3.6PC windmill ($\lambda_d = 4.5$, galvanised steel blades) driving the VIRYA-4.2 PM-generator for 26 V star or driving a centrifugal pump through a rectangular gear box and a vertical shaft in the tower. Description of the pitch control safety system, April 2018.	20
KD 656	Calculations executed for the 2-bladed rotor of the VIRYA-2.92 ($\lambda_d = 6$, stainless steel tapered blades) driving the VIRYA-2.68 PM-generator for 24 V battery charging, June 2018.	18
KD 658	Calculations executed for an alternative rotor of the VIRYA-4.2 windmill ($\lambda_d = 6.5$, G6 711 airfoil) used for 24 V battery charging, June 2018.	17
KD 661	Ideas about a vane pump for low height irrigation directly driven by a 24 V, 0.35 kW, permanent magnet DC motor frame size 71, October 2018.	17
KD 662	The VIRYA-0.45, a small wind turbine for practical tests by students in the class room, October 2018.	9
KD 664	Calculations executed for the 2-bladed rotor of the VIRYA-1.8W windmill ($\lambda_d = 6.25$, wooden blades) used in combination with an 8-pole permanent magnet generator frame size 71 with a stator with no iron in the coils, November 2018.	12
KD 667	Ideas about a 12-pole permanent magnet generator using a motor housing frame size 100 and a stator with no iron in the coils for use in combination with the VIRYA-3B3 rotor, November 2018	12
KD 668	Ideas about a 24-pole permanent magnet generator with a stator with no iron in the coils for the alternative VIRYA-4.2 rotor for battery charging or for combination of the 1.1 kW, 3-phase asynchronous motor of a centrifugal pump, December 2018, reviewed January 2019.	14
KD 669	Calculations executed for the 2-bladed rotor of the VIRYA-1.75W windmill ($\lambda_d = 7$, wooden blades) with a Chinese axial flux generator of Hefei Top Grand model TGET165-0.15kW-500R used for 12 V, December 2018.	12
KD 670	Calculations executed for the 3-bladed rotor of the VIRYA-5.2 windmill ($\lambda_d = 6$, G6 711 airfoil, wooden blades) provided with the hinged side vane safety system, February 2019, reviewed August 2019.	16
KD 671	Translation of parts of report R-668-A "Optimaliseren van een windservo" (Optimization of a wind servo) from Dutch into English. Ideas about the VIRYA-2B8, February 2019.	12
KD 672	Use of the VIRYA-1, the VIRYA-1.02 or the VIRYA-1.04 for pumping of drinking water using a 12 V battery and a pump with a 12 V, DC motor. May 2019, reviewed August 2019.	8
KD 676	Calculations executed for the 2-bladed rotor of the VIRYA-2.22 windmill ($\lambda_d = 5$, stainless steel blades) using the axial flux PM-generator of Hefei Top Grand model number TGET260-0.5KW-350R. May 2019.	16
KD 678	Calculations executed for the 3-bladed rotor of the VIRYA-1.02 windmill ($\lambda_d = 3.5$, 15° folded stainless steel blades) meant to be coupled to the VIRYA-1 generator, June 2019, reviewed August 2019.	16
KD 679	Development of an 8-pole, 3-phase axial flux permanent magnet generator for the VIRYA-1 windmill using a bicycle hub and 8 neodymium magnets size $\phi 25 * 12$ mm and a stator sheet made out of Galvanised steel sheet, August 2019.	18

Note: Development procedure of a range of wind turbines

Note: 10-pole PM-generator

Note: Modification of the winding of the PM-generator type FP-640

Manual of electricity generating windmill VIRYA-1.04 (contains complete set of drawings), March 2014.

Manual of electricity generating windmill VIRYA-1.36 (contains complete set of drawings), November 2014

Provisional manual of electricity generating windmill VIRYA-1.66 (contains drawings of rotor and generator), January 2016

Provisional manual of electricity generating windmill VIRYA-1.81 (contains drawings of rotor and generator), April 2017

Manual of a 27.6 V, 200 W battery charge controller, March 2006, modified December 2016

1
2
5
13
15
11
12
12