VALIADIS S.A.

Hellenic Motors

Quality Assurance Certificate EN ISO 9001:2008

Certificate Reg.No. 041130055

Three-Phase Asynchronous Motor Test Report

NAMEPLATE DATA

Motor Type :	K400-4		Series No:	
Rated Voltage:	690	**V**	Connection:	Δ
Rated Current:	634	**A**	Duty:	S1
Rated Power:	630	**kW**	Insulation Class:	F
Rated Speed:	1485	**r/min**	Ensulation:	IP55
Frequency:	50	**Hz**	Manufactor:	
Production date	08-04-2017			

TEST REPORT

Electric Function		**Technical Requirement**			**Test Data**
		Standard		**Limit**	
Cold R	(Ω)				0.0058
Cold Temp	(℃)				17.5
Rated No-Load Current	(A)				191.00
Rated No-Load Power	W				11716.00
Pfw	W				6229.00
Pfe	W				5192.00
Δ Io	(%)	≤			2.02
Locked Rotor Current (Ik)	(A)				4996.80
Ik/ In		≤	7.8		7.88
Locked Rotor Torque(Tk)	(Nm)				9351.30
Rated Torque(Tn)	(Nm)				4051.00
Tk / Tn		≥	1.3		2.31
Max Torque(Tmax)	(Nm)				/
Tmax/ Tn		≥			/
Max Torque(Tmax)					/
Tmin/Tn		≥			/
P1(100%Rated Load)	W				656676.50
I1(100%Rated Load)	(A)				647.5
cosφ(100%Rated Load)	(%)	≥	0.87	0.848	0.867
Sref(100%Rated Load)	(%)				0.010
Pcu1	W				4779.1
Pcu2	W				6571.82
Ps	W				3283.38
η(100%)	(%)	≥	95.6	95.16	96.03
η(75%)	(%)				
Temperature Rise Δθ	(K)	≤			78.48
Rs (-2.6 ºC)	(Ω)				0.0076
Noise	(dB)	≤	90		92
Vibration	(mm/S)	≤	2.3		0.5
Hot Insulation Resistance	(MΩ)	≥	500		500
Bearing Temperature	(℃)	≤	95		53.1

TEST :		CHECK:		DATE :	

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Calculation result of reduced voltage load test

Type： K400-4 Voltage： 690V Power： 630kW Serial no.：

No.	Voltage (V)	Current (A)			Power (w)	Speed (r/min)	frequency (Hz)
1	345.9	719.2	726.4	739.4	360220	1470	49.99
2	345.0	688.2	694.8	708.8	347040	1473	49.99
3	345.3	624.6	631.4	643.2	321340	1476	49.99
4	344.9	472.0	476.2	484.4	249960	1482	49.99
5	344.6	315.8	318.6	324.2	168700	1487	49.99
6	345.7	249.2	251.8	256.2	132100	1491	49.99

Pfe(W)	Pfw(W)	Io(A)	Stator res.(Ω)	Current（A）
5192.00	6229.00	191.00	0.0076	633.8
Ior(A)	Por（W）	Po（W）		
81.63	7422.00	11716.00		

U(V)	I1(A)	P(W)	Sref(%)
345.9	728.3	360220.0	2.0103
345.0	697.3	347040.0	1.8072
345.3	633.1	321340.0	1.6042
344.9	477.5	249960.0	1.1981
344.6	319.5	168700.0	0.8596
345.7	252.4	132100.0	0.5889

P1（W）	P2（W）	Ps（W）	Pcu1（W）	Pcu2（W）	η(%)	I1(A)	cosφ
656676.50	630620.63	3283.38	4779.71	6571.82	96.03	647.5	0.867

Calculation sheet of load test

Assumed I1r	311.64
P1r	164169.13
Sref	0.010162
P1=P1r*(Un/Ur)^2	656676.50
I'1r=I1r*Un/Ur	623.3
θr=arcos(P1r/(1.732*Ur*I1r))	0.49
θo=arcos(Po/(1.732*Un*Io))	1.52
θor=arcos(Por/(1.732*Ur*Ior))	1.42
ΔIo=Io*sin(θo)-Ior*(Un/Ur)*sin(θor)	29.39
I1=sqr(I'1r)^2+(ΔIo^2)-2*I'1r*ΔIo*cos(π/2+θr))	647.5
Pcu1=1.5*I1*I1*R1ref	4779.71
Rq=P1-Pcu1-Pfe	646704.81
Pcu2=Rq*Sref	6571.82
Ps	3283.38
R1ref	0.0076
P2=P1-(Pcu1+Pcu2+Pfw+Pfe+Ps)	630620.63
Abs((P2-Pn)/Pn*100%<=0.1%	
η=(P2/P1)*100%	96.03
cosφ	0.867
Δθn	78.48

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Original record of no-load test

Type : K400-4 Voltage : 690V Power : 630kW Serial no. :

No	U(V)	Ub	I(A)			Ib	P1(W)	P2(W)	Pb
1	829.3	1	1.829	1.800	1.860	200	-703.4	806.8	200
2	758.7	1	1.276	1.253	1.303	200	-442.6	516.0	200
3	690.2	1	0.955	0.937	0.975	200	-296.5	355.1	200
4	622.1	1	0.795	0.781	0.812	200	-218.6	270.5	200
5	553.3	1	0.678	0.666	0.691	200	-162.0	208.8	200
6	483.3	1	0.574	0.564	0.586	200	-115.2	158.6	200
7	416.7	1	0.499	0.489	0.509	200	-82.2	122.2	200
8	344.6	1	0.408	0.399	0.416	200	-49.9	87.0	200
9	277.0	1	0.339	0.329	0.344	200	-27.7	62.1	200

Ro=0.006677 Ω

No.	Uo (V)	Io (A)	Po (W)	Uo/Un	(Uo/Un) 2	Pocu1 (W)	Po' (W)
1	829.3	365.9	20680.0	1.20	1.44	1341.2	19338.8
2	758.7	255.5	14680.0	1.10	1.21	653.6	14026.4
3	690.2	191.1	11720.0	1.00	1.00	365.9	11354.1
4	622.1	159.2	10380.0	0.90	0.81	253.8	10126.2
5	553.3	135.7	9360.0	0.80	0.64	184.3	9175.7
6	483.3	114.9	8680.0	0.70	0.49	132.3	8547.7
7	416.7	99.8	8000.0	0.60	0.36	99.8	7900.3
8	344.6	81.5	7420.0	0.50	0.25	66.6	7353.4
9	277.0	67.5	6880.0	0.40	0.16	45.6	6834.4

ΔIo= 2.02% Io= 191.00A

Po= 11716.00W Pfe= 5192.00W Pfw= 6229.00W

Test by :		Verified by:		Date:	

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Original record of locked rotor test

Type： K400-4　　Voltage： 690V　　Power： 630kW　　Serial no.：

U(V)	Ub	I(A)			Ib	P1(W)	P2(W)	Pb	T_0(N.m)	L(m)
195.4	1	2.686	2.714	2.766	400	-148.7	365.1	400	222.0	2.0
176.1	1	2.383	2.407	2.453	400	-120.3	290.8	400	173.0	2.0
157.3	1	2.087	2.106	2.145	400	-95.2	226.2	400	133.0	2.0
138.2	1	3.590	3.624	3.691	200	-145.6	340.5	200	99.0	2.0
119.2	1	3.017	3.046	3.102	200	-107.4	245.3	200	70.0	2.0
100.2	1	2.454	2.476	2.522	200	-75.0	166.3	200	45.0	2.0
60.9	1	1.326	1.337	1.358	200	-26.2	53.1	200	13.0	2.0

Uk(V)	Log(Uk)	Ik(A)	Log(Ik)	Pk(W)	Tk（N.m）
195.37	2.29	1088.80	3.04	86560.00	444.00
176.13	2.25	965.73	2.98	68200.00	346.00
157.30	2.20	845.07	2.93	52400.00	266.00
138.20	2.14	727.00	2.86	38980.00	198.00
119.17	2.08	611.00	2.79	27580.00	140.00
100.17	2.00	496.80	2.70	18260.00	90.00
60.93	1.78	268.07	2.43	5380.00	26.00

I_N=	634 A	IK_N=	4996.80 A	IK_N / I_N =	7.88
T_N=	4051 N.m	TK_N=	9351.3 N.m	TK_N / T_N =	2.31

Test by :		Verified by:		Date:	

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Original record of reduced voltage temperature A

Type : K400-4 Voltage : 690V Power : 630kW Serial no. :

Time	Voltage (V)	Current (A)			Input power (W)	DE Temp. ℃	NDE Temp. ℃	Winding temp. ℃	Ambient temp ℃
13:00	689.9	191.4	187.2	194.2	11760.0	51.2	30.1	60	23.9
13:30	689.2	189.8	185.8	192.6	11700.0	49.7	29.5	56.7	23.4
14:00	689.8	191.4	186.8	193.8	11760.0	48.9	28.2	55.9	23.4
14:30	688.6	189.2	184.8	191.8	11720.0	45.5	28	52.4	23.6
15:00	688.6	189.2	184.8	191.8	11720.0	44.3	27.1	52.3	23.6

Measuring resistance of winding after test finishing								
T=				R=			R2=	0.006678 Ω
Cold res.	Rab=	0.005789 Ω	Rbc=	0.005790 Ω	Rca=	0.005794 Ω	Amb. temp	17.5 ℃
Current=		189.3 A	Temp rise=	32.73K				

Original record of reduce voltage temperature B

Time	Voltage (V)	Current (A)			Input power (W)	DE Temp. ℃	NDE Temp. ℃	Winding temp. ℃	Ambient temp ℃
10:00	345.9	625.6	633.0	643.2	321480.0	70.2	24	44	20.5
10:30	345.6	625.4	632.8	643.2	321020.0	73.1	48.9	43.1	20.7
11:00	345.6	625.2	632.0	642.2	320820.0	78.4	51.5	39.5	21.8
11:30	345.8	626.0	632.8	643.2	321240.0	80.5	51.8	35.7	22.8
12:00	345.5	624.8	631.6	642.0	320560.0	84.2	52.9	35.1	23.8
12:30	345.4	626.4	632.6	644.6	322120.0	84.3	53.1	34.7	23.7

Measuring resistance of winding after test finishing								
T=	120 s			R=	0.007451 Ω		R2=	0.007451 Ω
Cold res.	Rab=	0.005789 Ω	Rbc=	0.005790 Ω	Rca=	0.005794 Ω	Ambient temp.:	17.5 ℃
Current=		633.8 A		Temp. rise=	66.54K			

Hot insulation res.	500MΩ	Cold insulation res.	500MΩ

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Temp. rise test report of reduced voltage method Δθn

Type： K400-4 Voltage： 690V Power： 630kW Serial no.：

Temp. rise of reduced voltage method			
Temp. rise a	32.7K	Temp. rise b	66.5K
No load Current	191.00A	1/2No load Current	81.63A
No load loss	11716.00W	1/2No load loss	7422.00W

Temp. rise of reduced current method			
Temp. rise a	0.0K	Current a	0A
Temp. rise b	0.0K	Current b	0A
Temp. rise c	0.0K	Current c	0

Δθn=	78.48	K