Three phase asynchronous motor

22-4-P003-90-POLOMP

Type Test Report

No.	Performance	Test value	Designed value	Standard value	Tolerance	Conclusion
1	Power (kW)	22.000				
2	Stator current (A)	43.603				
3	Rotor Voltage (V)					
4	Rotor current (A)					
5	Stator phase resistance 115 ℃(Ω)	0.40261				
6	Rotor phase resistance 115 ℃(Ω)					
7	No load current (A)	19.359				
8	Iron loss (kW)	0.727				
9	Mechanical loss (kW)	0.122				
10	Additional loss (kW)	0.113				
11	Stator copper loss(kW)	0.767				
12	Rotor copper loss (kW)	0.430				
13	Efficiency (%)	91.232				
14	Slip (%)	1.889	2.000			
15	Power factor	0.844				
16	Speed (r/min)	1476.100				
17	Rotor locked current (mul.)	6.436				
18	Rotor locked torque (mul.)	2.319				
19	The min. torque (mul.)					
20	The max.torque (mul.)	3.216				
21	2 min of over current test (A)					
22	Stator coil temperature rise (K)	74.080				
23	Rotor coil temperature rise (K)					
24	Stator core temperature rise (K)					
25	Bearing temperature at extension side(℃)	59.600				
26	Bearing temperature at noextension side (℃)					
27	Noise (dB)					
28	Vibration (mm/s)					
29	3 min. of voltage boosted test(V)					
30	2 min. of overspeed test(Hz)					
31	Slipring temperature (℃)					
32	Inertia moment ($kg.m^2$)					
33	1 min. of stator withstand voltage test (V)					
34	1 min of rotor withstand voltage test(V)					

Note:

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1. Cold state DC resistance:

Stator(Ω)--line			Rotor(Ω)--Line			Ambient temperature
R-1	R-2	R-3	R-1	R-2	R-3	℃
0.1892	0.1893	0.1893				11.8

Insulation resistance(MΩ)		Withstand voltage(V)		HighVoltage(%Un)	OverSpeed(r/min)
Stator(cold/thermal)	Rotor(cold/thermal)	Stator	Rotor	3 min	2 min

3. measurement of voltage ratio

Rotor voltage(V)			Stator voltage(V)		

4. no-load test:

No-load test thermal resistance R= 0.2005Ω

Voltage (V)			Current (A)			Power (kW)	
U1	U2	U3	I1	I2	I3	P1	P2
419.79	419.59	420.64	27.7	27.6	27.65	1.52	
379.92	379.78	380.59	19.24	19.16	19.22	0.96	
340.19	340.18	340.83	14.86	14.88	15.08	0.74	
299.95	300.01	300.56	12.19	12.18	12.47	0.58	
260.85	260.82	261.21	9.98	9.96	10.24	0.46	
220.51	220.28	220.62	8.17	8.16	8.36	0.36	
181.12	180.56	180.95	6.59	6.58	6.67	0.3	

5. Rotor locked test:

Rotor locked test thermal resistance R= 0.2121Ω

Voltage (V)			Current (A)			Power (kW)		Torque (N.m)
U1	U2	U3	I1	I2	I3	P1	P2	T
145.87	144.9	145.52	107.75	106.11	106.85	10.74		
121.48	120.36	121.11	87.64	86.14	86.86	7.19		
91.33	89.66	90.48	64.97	63.91	64.28	3.98		
62.61	60.73	61.75	44.16	43.35	43.64	1.81		
31.19	28.99	30.38	22.01	21.54	21.7	0.39		

6. Direct load method temperature rise test

Time		Voltage(V)	Current(A)	power (kW)		Readings of thermometer(°C)								
hour	min.	×1.0	×1.0	×1.0	×1.0	Core	Slipring	Frame	Coil	Bearing	Bearing	In-air	Out-air	Ambient
11	37	380.4	43.29	23.74				10.5			12.5			11.7
12	37	380.3	43.18	23.96				38.2			41.9			12.2
13	37	380.8	43.40	24.24				48.6			55.3			12.8
14	37	380.7	43.19	24.06				51.8			59.6			13.5

Note:the first bearing is at extention side,the second bearing is at the no-extension side

Direct load method temperature rise test thermal DC resistance

Stator	Time(S)	20	30	40	50	60	
	Resistance(Ω)	0.2463	0.2455	0.2448	0.2441	0.2435	
Rotor	Time(S)						
	Resistance(Ω)						

7. Voltage dropped load method temperature rise test

Time		Voltage(V)	Current(A)	power (kW)		Readings of thermometer(°C)								
						Core	Slipring	Frame	Coil	Bearing	Bearing	In-air	Out-air	Ambient

Note:the first bearing is at extention side,the second bearing is at the no-extension side

Voltage dropped load method temperature rise test thermal DC resistance

Stator	Time(S)						
	Resistance(Ω)						
Rotor	Time(S)						
	Resistance(Ω)						

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8. Load test:

Power Frequency f= 50.11 Hz

Voltage (V)			Current (A)			Power (kW)		Speed (r/min)
U1	U2	U3	I1	I2	I3	P1	P2	n
380.67	380.25	381.0	64.32	64.94	64.58	37.45		1460.0
381.2	380.62	381.4	53.57	54.08	53.74	30.65		1467.0
380.09	379.59	380.33	43.46	43.84	43.59	24.17		1476.0
380.87	380.52	381.33	32.4	32.65	32.5	16.52		1488.0
380.89	380.65	381.42	21.45	21.52	21.46	6.66		1500.0

9. Noise

l*w*h =

Measuring point	1	2	3	4	5	6	7	Environment
Base surface S(dB)								
Auxiliary surface S1(dB)								
Auxiliary surfase S2(dB)								

Ambient temperature t= ℃	Ambient air pressure P0= kPa	Note:Environment data of S1 and S2 is the distance

10. vibration

Order	1	2	3	4	5	6	7	8	9
Vibration(mm/s)									

11. Low frequency rotor-locked test:

voltage (V)			Current (A)			Power (kW)		Frequency (Hz)
U1	U2	U3	I1	I2	I3	P1	P2	f

12. Moment of Inertia

Time(s)									
Speed(r/min)									

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No-load test data analysis:

U0 (V)	$(U0/Un)^2$	I0(A)	P0(kW)	P0cu1(kW)	Pfe+Pfw(kW)
420.0	1.22	27.65	1.52	0.23	1.29
380.1	1.00	19.20	0.96	0.11	0.85
340.4	0.80	14.94	0.74	0.07	0.68
300.2	0.62	12.28	0.58	0.05	0.53
261.0	0.47	10.06	0.46	0.03	0.43
220.5	0.34	8.23	0.36	0.02	0.34
180.9	0.23	6.61	0.30	0.01	0.29

Rotor-locked test data analysis:

Uk (V)	Ik (A)	Pk(kW)
145.43	106.90	10.74
120.98	86.88	7.19
90.49	64.39	3.98
61.70	43.72	1.81
30.19	21.75	0.39

Find the Max. torque with circular chart

I0r =0.820A I0x =11.331A

Ikn =161.273A Pkn =73.341kW

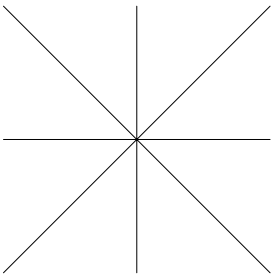
Ikr =64.334A Ikx =147.886A

K =63.514A H =136.554A

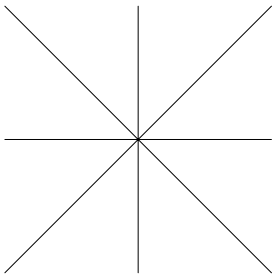
r =83.048A I2k =150.602A

T =79468.600 Kt =3.216 Times

Air Gap:



Front



Back

Load test data analysis:

VoltageU (V)	380.64	381.07	380.01	380.91	380.99			
CurrentI (A)	64.61	53.80	43.63	32.52	21.48			
Input power P1 (kW)	37.45	30.65	24.17	16.52	6.66			
Speed nt (r/min)	1460.00	1467.00	1476.00	1488.00	1500.00			
Slip Sref (%)	3.104	2.514	1.885	1.169	0.411			
Power Factor cosφ	0.879	0.863	0.842	0.770	0.470			
Iron Loss Pfe (kW)	0.73	0.73	0.73	0.73	0.73			
Stator Loss Pcu1(kW)	1.68	1.17	0.77	0.43	0.19			
Rotor Loss Pcu2(kW)	1.09	0.72	0.43	0.18	0.02			
Stray Loss Ps (kW)	0.25	0.17	0.11	0.06	0.03			
Mechanical Loss Pfw (kW)	0.12	0.12	0.12	0.12	0.12			
Loss in total ΔP (kW)	3.87	2.91	2.16	1.52	1.09			
Power output P2 (kW)	33.58	27.74	22.01	15.00	5.57			
Efficiency η (%)	89.67	90.51	91.08	90.81	83.68			

Finding Efficiency with circular chart

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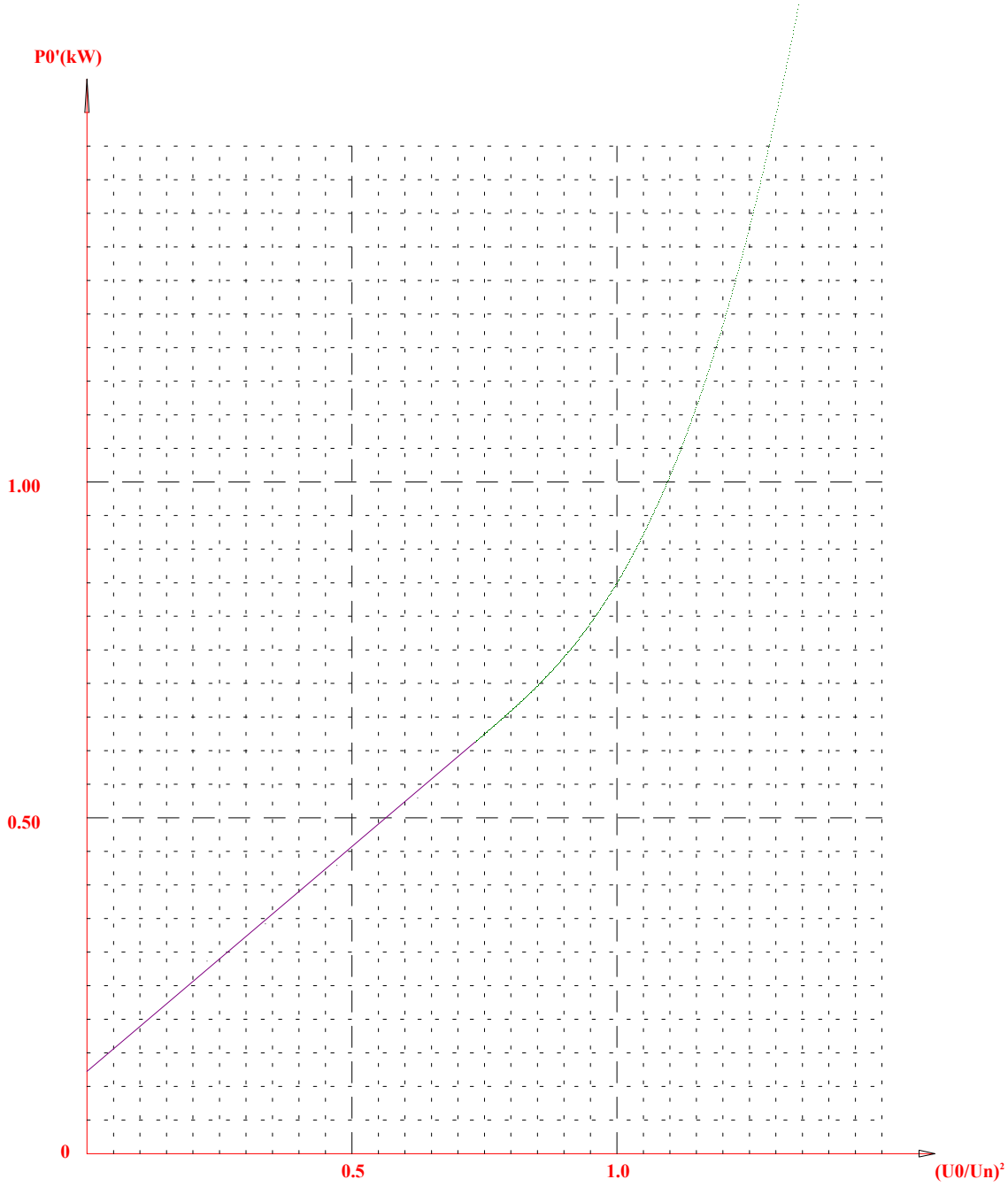
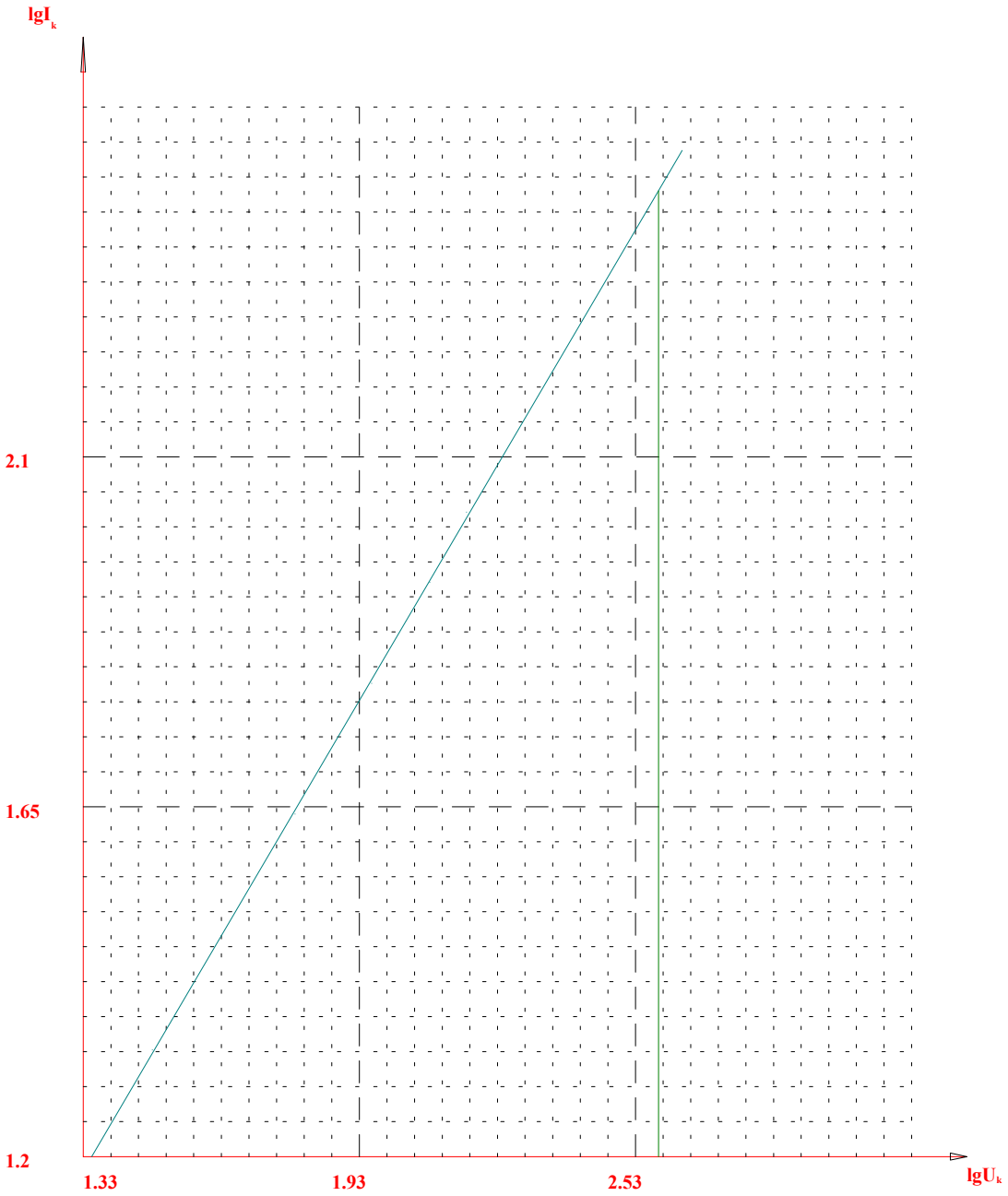


Find from no-load curve:

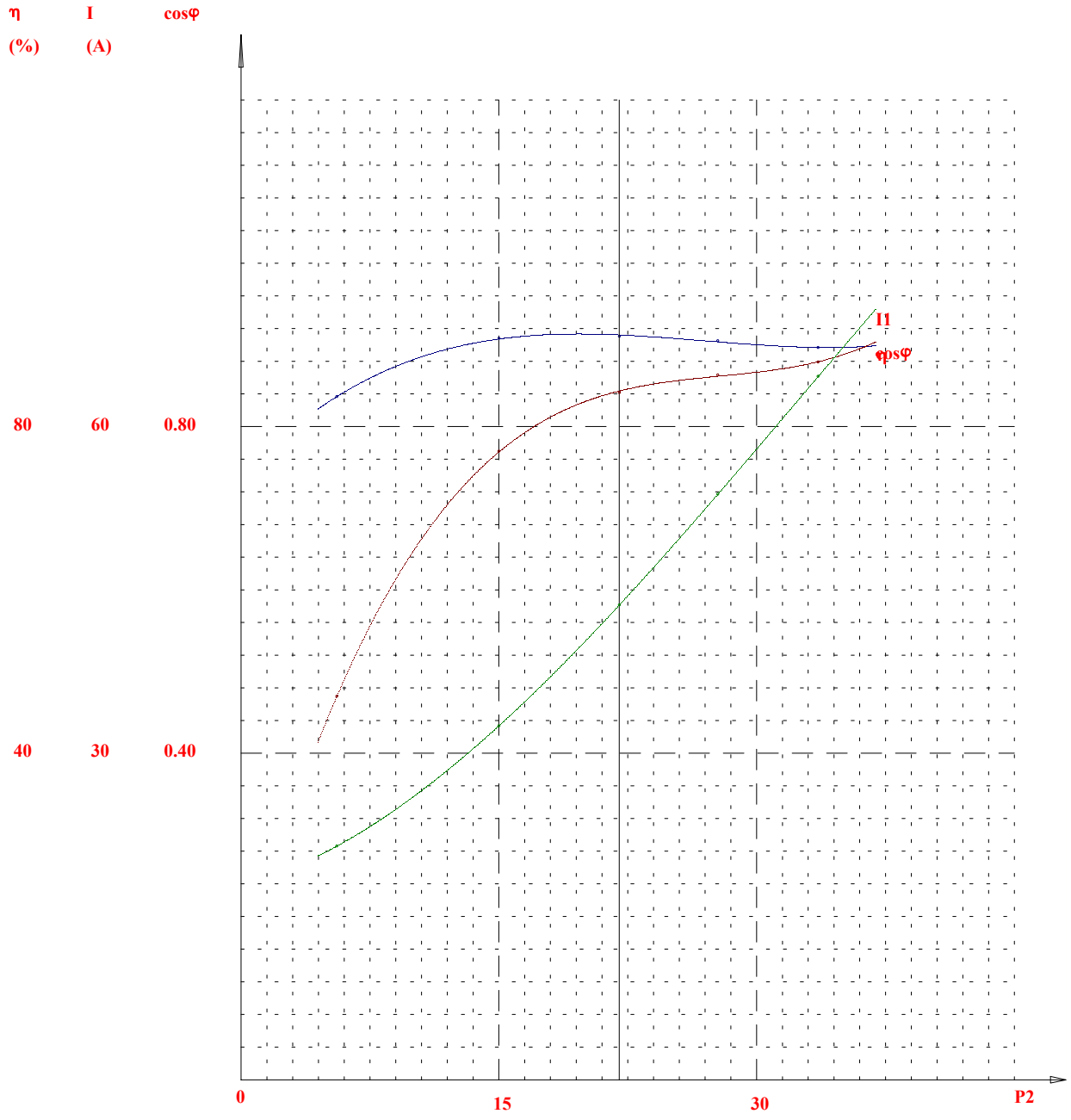
Pfe= 0.73kW **Pfw= 0.12kW**



Find from rotor locked Curve:

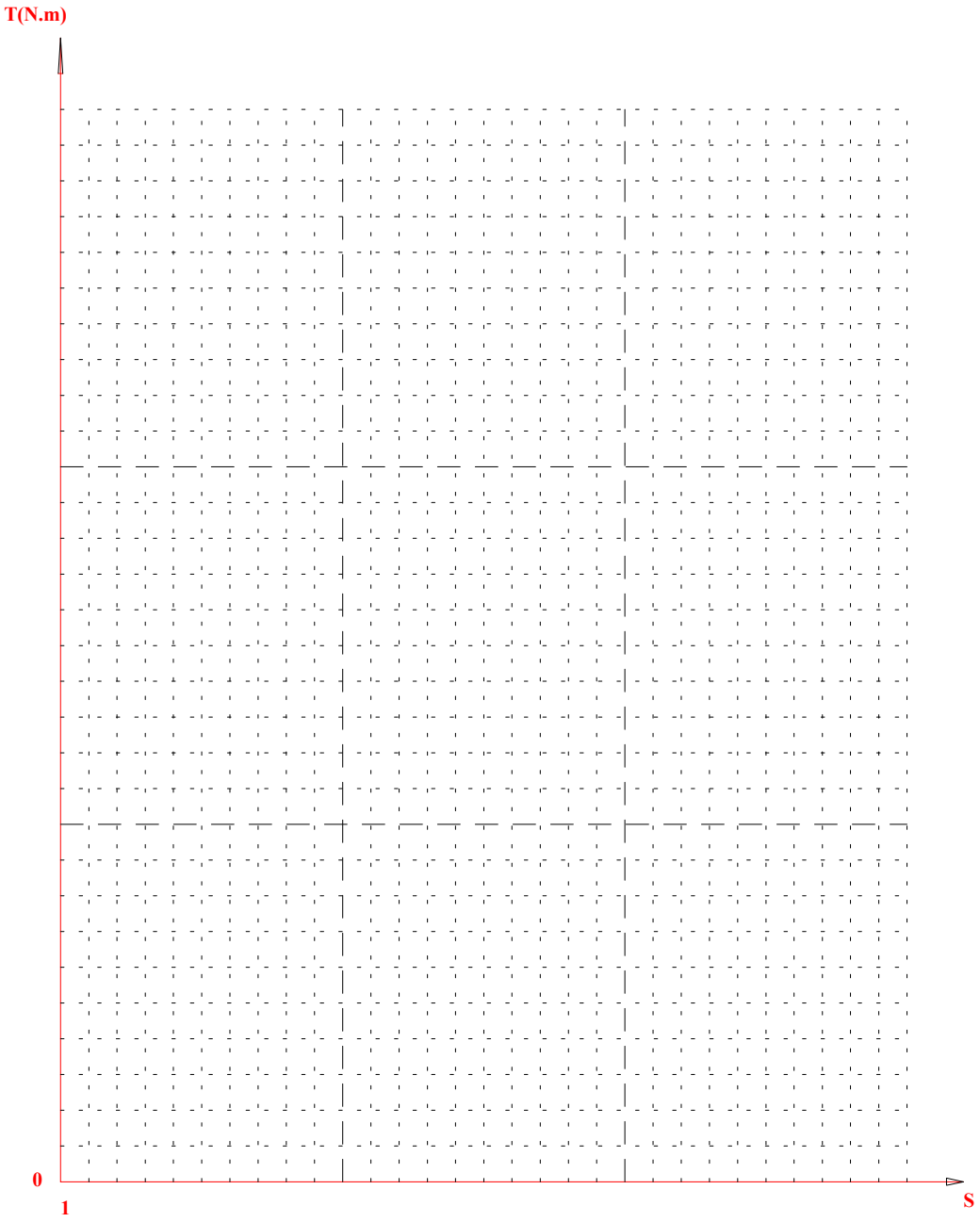
Rotor-locked torque: 2.32 Times

Rotor-locked current: 6.44 Times



Find from load curve:

η= 91.232% **I1= 43.6A** **cosφ= 0.844**


T(N.m)
0
1
S