

File: Setup1.res

GENERAL DATA

Given Output Power (kW):	285
Rated Voltage (V):	283
Winding Connection:	Wye
Number of Poles:	4
Given Speed (rpm):	5100
Frequency (Hz):	171
Stray Loss (W):	2850
Frictional Loss (W):	200
Windage Loss (W):	0
Operation Mode:	Motor
Type of Load:	Constant Power
Operating Temperature (C):	75

STATOR DATA

Number of Stator Slots:	48
Outer Diameter of Stator (mm):	361.36
Inner Diameter of Stator (mm):	227.66
Type of Stator Slot:	3
Stator Slot	
hs0 (mm):	1
hs1 (mm):	1.5
hs2 (mm):	36
bs0 (mm):	2.2
bs1 (mm):	9.23577
bs2 (mm):	13.9549
rs (mm):	2
Top Tooth Width (mm):	6
Bottom Tooth Width (mm):	6
Length of Stator Core (mm):	321.8
Stacking Factor of Stator Core:	0.95
Type of Steel:	steel_1009
Number of lamination sectors	0
Press board thickness (mm):	0
Magnetic press board	No
Number of Parallel Branches:	1
Type of Coils:	21
Coil Pitch:	10
Number of Conductors per Slot:	2
Number of Wires per Conductor:	15
Wire Diameter (mm):	3.264
Wire Wrap Thickness (mm):	0.08
Wedge Thickness (mm):	0
Slot Liner Thickness (mm):	0.3
Layer Insulation (mm):	0.3
Slot Area (mm^2):	454.402
Net Slot Area (mm^2):	408.267
Slot Fill Factor (%):	82.1692
Limited Slot Fill Factor (%):	75
**** Warning - Result is Unfeasable ****	
Slot Fill Factor is beyond its limited value.	
Wire Resistivity (ohm.mm^2/m):	0.0217

Conductor Length Adjustment (mm):	0
End Length Correction Factor	1
End Leakage Reactance Correction Factor	1

ROTOR DATA

Number of Rotor Slots:	68
Air Gap (mm):	0.89
Inner Diameter of Rotor (mm):	111.3
Type of Rotor Slot:	1
Rotor Slot	
hs0 (mm):	0.5
hs2 (mm):	33.5
bs0 (mm):	1.5
bs1 (mm):	7
bs2 (mm):	4
Cast Rotor:	Yes
Half Slot:	No
Length of Rotor (mm):	321.8
Stacking Factor of Rotor Core:	0.95
Type of Steel:	steel_1009
Skew Width:	1
End Length of Bar (mm):	0
Height of End Ring (mm):	47.56
Width of End Ring (mm):	25.2
Resistivity of Rotor Bar	
at 75 Centigrade (ohm.mm ² /m):	0.0172414
Resistivity of Rotor Ring	
at 75 Centigrade (ohm.mm ² /m):	0.0172414
Magnetic Shaft:	No

MATERIAL CONSUMPTION

Armature Copper Density (kg/m ³):	8900
Rotor Bar Material Density (kg/m ³):	8933
Rotor Ring Material Density (kg/m ³):	8933
Armature Core Steel Density (kg/m ³):	7650
Rotor Core Steel Density (kg/m ³):	7650
Armature Copper Weight (kg):	60.6208
Rotor Bar Material Weight (kg):	41.1366
Rotor Ring Material Weight (kg):	11.9283
Armature Core Steel Weight (kg):	93.6417
Rotor Core Steel Weight (kg):	37.496
Total Net Weight (kg):	244.823
Armature Core Steel Consumption (kg):	215.28
Rotor Core Steel Consumption (kg):	95.1994

RATED-LOAD OPERATION

Note:
This motor cannot offer the given rated output power.
The following results are at the given rated speed.

Stator Resistance (ohm):	0.00312757
Stator Resistance at 20C (ohm):	0.00257268
Stator Leakage Reactance (ohm):	0.0792909
Rotor Resistance (ohm):	0.0012959
Rotor Resistance at 20C (ohm):	0.00106598
Rotor Leakage Reactance (ohm):	0.0732739

Resistance Corresponding to	
Iron-Core Loss (ohm):	539.777
Magnetizing Reactance (ohm):	4.87311
Stator Phase Current (A):	603.384
Current Corresponding to	
Iron-Core Loss (A):	0.256679
Magnetizing Current (A):	28.4314
Rotor Phase Current (A):	593.614
Copper Loss of Stator Winding (W):	3415.99
Copper Loss of Rotor Winding (W):	1369.94
Iron-Core Loss (W):	106.688
Frictional and Windage Loss (W):	200
Stray Loss (W):	2850
Total Loss (W):	7942.62
Input Power (kW):	240.633
Output Power (kW):	232.69
Mechanical Shaft Torque (N.m):	435.691
Efficiency (%):	96.6993
Power Factor:	0.803969
Rated Slip:	0.00584795
Rated Shaft Speed (rpm):	5100

NO-LOAD OPERATION

No-Load Stator Resistance (ohm):	0.00312757
No-Load Stator Leakage Reactance (ohm):	0.0800533
No-Load Rotor Resistance (ohm):	0.00129147
No-Load Rotor Leakage Reactance (ohm):	0.0738503
No-Load Stator Phase Current (A):	33.002
No-Load Iron-Core Loss (W):	143.611
No-Load Input Power (W):	3346.62
No-Load Power Factor:	0.0306996
No-Load Slip:	5.71089e-006
No-Load Shaft Speed (rpm):	5129.97

BREAK-DOWN OPERATION

Break-Down Slip:	0.009
Break-Down Torque (N.m):	468.55
Break-Down Torque Ratio:	1.07542
Break-Down Phase Current (A):	773.827

LOCKED-ROTOR OPERATION

Locked-Rotor Torque (N.m):	54.6171
Locked-Rotor Phase Current (A):	1336.45
Locked-Rotor Torque Ratio:	0.125357
Locked-Rotor Current Ratio:	2.21492
Locked-Rotor Stator Resistance (ohm):	0.00312757
Locked-Rotor Stator	
Leakage Reactance (ohm):	0.0754027
Locked-Rotor Rotor Resistance (ohm):	0.00562035
Locked-Rotor Rotor	
Leakage Reactance (ohm):	0.0469918

DETAILED DATA AT RATED OPERATION

Stator Slot Leakage Reactance (ohm):	0.0482113
Stator End-Winding Leakage Reactance (ohm):	0.0116631
Stator Differential Leakage Reactance (ohm):	0.0194163
Rotor Slot Leakage Reactance (ohm):	0.0438538
Rotor End-Winding Leakage Reactance (ohm):	0.00643731
Rotor Differential Leakage Reactance (ohm):	0.0161098
Skewing Leakage Reactance (ohm):	0.00687284
Stator Winding Factor:	0.925031
Stator-Teeth Flux Density (Tesla):	0.873588
Rotor-Teeth Flux Density (Tesla):	1.22182
Stator-Yoke Flux Density (Tesla):	0.748584
Rotor-Yoke Flux Density (Tesla):	1.09096
Air-Gap Flux Density (Tesla):	0.334185
Stator-Teeth Ampere Turns (A.T):	3.5188
Rotor-Teeth Ampere Turns (A.T):	7.44426
Stator-Yoke Ampere Turns (A.T):	7.1744
Rotor-Yoke Ampere Turns (A.T):	3.4146
Air-Gap Ampere Turns (A.T):	263.976
Correction Factor for Magnetic Circuit Length of Stator Yoke:	0.7
Correction Factor for Magnetic Circuit Length of Rotor Yoke:	0.500405
Saturation Factor for Teeth:	1.04153
Saturation Factor for Teeth & Yoke:	1.08164
Induced-Voltage Factor:	0.847966
Stator Current Density (A/mm ²):	4.80742
Specific Electric Loading (A/mm):	80.9894
Stator Thermal Load (A ² /mm ³):	389.35
Rotor Bar Current Density (A/mm ²):	3.68372
Rotor Ring Current Density (A/mm ²):	3.50508
Half-Turn Length of Stator Winding (mm):	565.3

WINDING ARRANGEMENT

The 3-phase, 2-layer winding can be arranged in 24 slots as below:

AAAAZZZBBBBXXXCCCCYYYY

Angle per slot (elec. degrees):	15
Phase-A axis (elec. degrees):	97.5
First slot center (elec. degrees):	0

TRANSIENT FEA INPUT DATA

For one phase of the Stator Winding:	
Number of Turns:	16
Parallel Branches:	1

Terminal Resistance (ohm):	0.00312757
End Leakage Inductance (H):	1.08552e-005
For Rotor End Ring Between Two Bars of One Side:	
Equivalent Ring Resistance (ohm):	1.1785e-007
Equivalent Ring Inductance (H):	5.47097e-009
2D Equivalent Value:	
Equivalent Model Depth (mm):	321.8
Equivalent Stator Stacking Factor:	0.95
Equivalent Rotor Stacking Factor:	0.95
Estimated Rotor Inertial Moment (kg m^2):	0.641493