

File: Setup1.res

GENERAL DATA

Given Output Power (kW):	1280
Rated Voltage (V):	1350
Winding Connection:	Wye
Number of Poles:	6
Given Speed (rpm):	1520
Frequency (Hz):	78
Stray Loss (W):	12800
Frictional Loss (W):	0
Windage Loss (W):	0
Operation Mode:	Motor
Type of Load:	Constant Power
Operating Temperature (C):	75

STATOR DATA

Number of Stator Slots:	54
Outer Diameter of Stator (mm):	865
Inner Diameter of Stator (mm):	650
Type of Stator Slot:	3
Stator Slot	
hs0 (mm):	3
hs1 (mm):	3
hs2 (mm):	43
bs0 (mm):	3
bs1 (mm):	23
bs2 (mm):	24
rs (mm):	3
Top Tooth Width (mm):	15.5304
Bottom Tooth Width (mm):	19.5325
Length of Stator Core (mm):	490
Stacking Factor of Stator Core:	0.95
Type of Steel:	steel_1008
Number of lamination sectors	2450
Press board thickness (mm):	0
Magnetic press board	No
Number of Parallel Branches:	1
Type of Coils:	21
Coil Pitch:	8
Number of Conductors per Slot:	4
Number of Wires per Conductor:	23
Wire Diameter (mm):	2.906
Wire Wrap Thickness (mm):	0
Wedge Thickness (mm):	0
Slot Liner Thickness (mm):	0
Layer Insulation (mm):	0
Slot Area (mm^2):	1126.64
Net Slot Area (mm^2):	1078.64
Slot Fill Factor (%):	72.0284
Limited Slot Fill Factor (%):	75
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:	72
Air Gap (mm):	1
Inner Diameter of Rotor (mm):	430
Type of Rotor Slot:	3
Rotor Slot	
hs0 (mm):	3
hs01 (mm):	3
hs1 (mm):	3
hs2 (mm):	10
bs0 (mm):	3
bs1 (mm):	16
bs2 (mm):	18
rs (mm):	3
Cast Rotor:	No
Half Slot:	No
Length of Rotor (mm):	490
Stacking Factor of Rotor Core:	0.95
Type of Steel:	steel_1008
Skew Width:	2
End Length of Bar (mm):	10

Height of End Ring (mm):	10
Width of End Ring (mm):	10
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):	7872
Rotor Core Steel Density (kg/m ³):	7872
Armature Copper Weight (kg):	268.616
Rotor Bar Material Weight (kg):	80.0818
Rotor Ring Material Weight (kg):	3.54727
Armature Core Steel Weight (kg):	714.508
Rotor Core Steel Weight (kg):	611.935
Total Net Weight (kg):	1678.69
Armature Core Steel Consumption (kg):	1230.41
Rotor Core Steel Consumption (kg):	1552.98

RATED-LOAD OPERATION

Stator Resistance (ohm):	0.0093813
Stator Resistance at 20C (ohm):	0.00771687
Stator Leakage Reactance (ohm):	0.268443
Rotor Resistance (ohm):	0.0347652
Rotor Resistance at 20C (ohm):	0.0285972
Rotor Leakage Reactance (ohm):	0.329663
Resistance Corresponding to	
Iron-Core Loss (ohm):	7.29448e+006
Magnetizing Reactance (ohm):	17.2346
Stator Phase Current (A):	703.734
Current Corresponding to	
Iron-Core Loss (A):	9.34643e-005
Magnetizing Current (A):	39.5584
Rotor Phase Current (A):	689.555
Copper Loss of Stator Winding (W):	13938
Copper Loss of Rotor Winding (W):	49591.2
Iron-Core Loss (W):	0.191165
Frictional and Windage Loss (W):	0
Stray Loss (W):	12800
Total Loss (W):	76329.4
Input Power (kW):	1356.39
Output Power (kW):	1280.07
Mechanical Shaft Torque (N.m):	8139.28
Efficiency (%):	94.3726
Power Factor:	0.816517
Rated Slip:	0.0372963
Rated Shaft Speed (rpm):	1501.82

NO-LOAD OPERATION

No-Load Stator Resistance (ohm):	0.0093813
No-Load Stator Leakage Reactance (ohm):	0.338735
No-Load Rotor Resistance (ohm):	0.0347574
No-Load Rotor Leakage Reactance (ohm):	4.03572
No-Load Stator Phase Current (A):	44.3531
No-Load Iron-Core Loss (W):	0.240306
No-Load Input Power (W):	13314.8
No-Load Power Factor:	0.00496406
No-Load Slip:	9.10553e-006
No-Load Shaft Speed (rpm):	1559.99

BREAK-DOWN OPERATION

Break-Down Slip:	0.13
Break-Down Torque (N.m):	14688.7
Break-Down Torque Ratio:	1.80466
Break-Down Phase Current (A):	1744.54

LOCKED-ROTOR OPERATION

Locked-Rotor Torque (N.m):	5200.59
Locked-Rotor Phase Current (A):	2705.05
Locked-Rotor Torque Ratio:	0.638949
Locked-Rotor Current Ratio:	3.84385
Locked-Rotor Stator Resistance (ohm):	0.0093813

Locked-Rotor Stator	
Leakage Reactance (ohm):	0.159674
Locked-Rotor Rotor Resistance (ohm):	0.0392667
Locked-Rotor Rotor	
Leakage Reactance (ohm):	0.125238

DETAILED DATA AT RATED OPERATION

Stator Slot Leakage Reactance (ohm):	0.103469
Stator End-Winding Leakage	
Reactance (ohm):	0.0298023
Stator Differential Leakage	
Reactance (ohm):	0.135192
Rotor Slot Leakage Reactance (ohm):	0.0477605
Rotor End-Winding Leakage	
Reactance (ohm):	0.0155512
Rotor Differential Leakage	
Reactance (ohm):	0.0963593
Skewing Leakage Reactance (ohm):	0.17003
Stator Winding Factor:	0.945214
Stator-Teeth Flux Density (Tesla):	1.21011
Rotor-Teeth Flux Density (Tesla):	1.54483
Stator-Yoke Flux Density (Tesla):	1.10948
Rotor-Yoke Flux Density (Tesla):	0.688854
Air-Gap Flux Density (Tesla):	0.530639
Stator-Teeth Ampere Turns (A.T):	27.8879
Rotor-Teeth Ampere Turns (A.T):	31.1892
Stator-Yoke Ampere Turns (A.T):	70.6413
Rotor-Yoke Ampere Turns (A.T):	26.1012
Air-Gap Ampere Turns (A.T):	440.268
Correction Factor for Magnetic	
Circuit Length of Stator Yoke:	0.7
Correction Factor for Magnetic	
Circuit Length of Rotor Yoke:	0.7
Saturation Factor for Teeth:	1.13418
Saturation Factor for Teeth & Yoke:	1.35392
Induced-Voltage Factor:	0.874702
Stator Current Density (A/mm ²):	4.61317
Specific Electric Loading (A/mm):	74.4388
Stator Thermal Load (A ² /mm ³):	343.399
Rotor Bar Current Density (A/mm ²):	8.00892
Rotor Ring Current Density (A/mm ²):	74.8997
Half-Turn Length of	
Stator Winding (mm):	915.966

WINDING ARRANGEMENT

The 3-phase, 2-layer winding can be arranged in 9 slots as below:

AAAZZBBB

Angle per slot (elec. degrees):	20
Phase-A axis (elec. degrees):	100
First slot center (elec. degrees):	0

TRANSIENT FEA INPUT DATA

For one phase of the Stator Winding:	
Number of Turns:	36
Parallel Branches:	1
Terminal Resistance (ohm):	0.0093813
End Leakage Inductance (H):	6.08101e-005
For Rotor End Ring Between Two Bars of One Side:	
Equivalent Ring Resistance (ohm):	4.80329e-006
Equivalent Ring Inductance (H):	7.576e-008
2D Equivalent Value:	
Equivalent Model Depth (mm):	490
Equivalent Stator Stacking Factor:	0.95
Equivalent Rotor Stacking Factor:	0.95
Estimated Rotor Inertial Moment (kg m ²):	66.1593