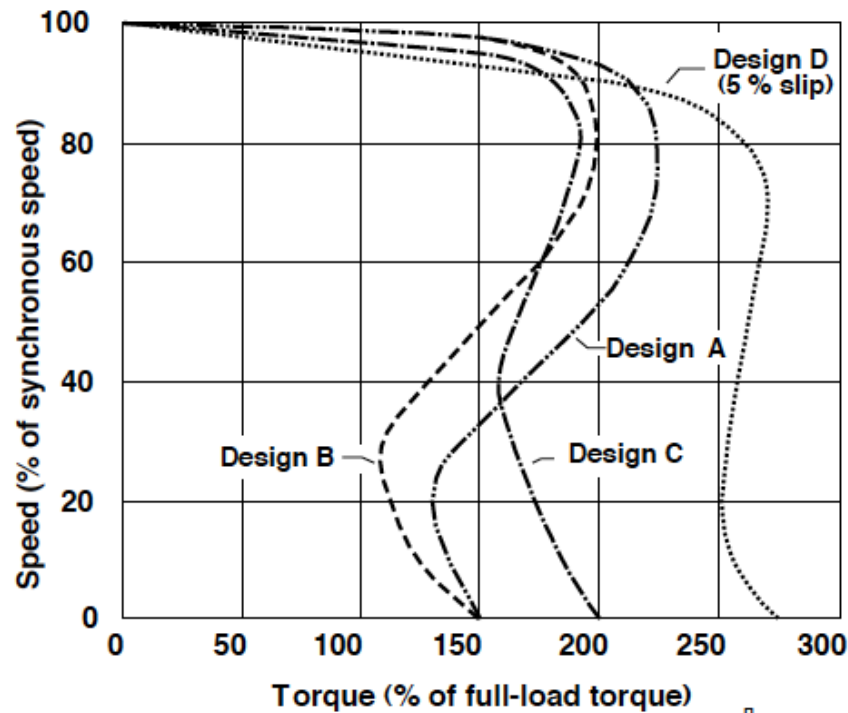


GENERAL SPEED-TORQUE CHARACTERISTICS

THREE-PHASE INDUCTION MOTORS



NEMA DESIGN	LOCKED ROTOR TORQUE	BREAKDOWN TORQUE	LOCKED ROTOR CURRENT	SLIP	RELATIVE EFFICIENCY
B	70 - 275%*	175 - 300%*	600 - 800%	0.5-5%	Medium or High
Applications: Fans, blowers, centrifugal pumps and compressors, motor-generator sets, etc., where starting torque requirements are relatively low.					
C	200 - 250%*	190 - 225%*	600 - 800%	1-5%	Medium
Applications: Conveyors, crushers, stirring machines, agitators, reciprocating pumps and compressors, etc., where starting under load is required.					
D	275%	275%	600 - 800%	≥5%	Medium
Applications: High peak loads with or without flywheels, such as punch presses, shears, elevators, extractors, winches, hoists, oil-well pumping, and wire-drawing machines.					

Based on NEMA MG 10-2001, Table 1. NEMA Design A is a variation of Design B having higher locked-rotor current.

*Higher values are for motors having lower horsepower ratings.

FULL-LOAD EFFICIENCIES

THREE-PHASE, SQUIRREL CAGE, ENERGY EFFICIENT OPEN MOTORS (NEMA DESIGNS A AND B)

HP	2 POLE		4 POLE		6 POLE	
	NOMINAL EFFICIENCY	MINIMUM EFFICIENCY	NOMINAL EFFICIENCY	MINIMUM EFFICIENCY	NOMINAL EFFICIENCY	MINIMUM EFFICIENCY
1.0			82.5	80.0	80.0	77.0
1.5	82.5	80.0	84.0	81.5	84.0	81.5
2.0	84.0	81.5	84.0	81.5	85.5	82.5
3.0	84.0	81.5	86.5	84.0	86.5	84.0
5.0	85.5	82.5	87.5	85.5	87.5	85.5
7.5	87.5	85.5	88.5	86.5	88.5	86.5
10.0	88.5	86.5	89.5	87.5	90.2	88.5
15.0	89.5	87.5	91.0	89.5	90.2	88.5
20.0	90.2	88.5	91.0	89.5	91.0	89.5
25.0	91.0	89.5	91.7	90.2	91.7	90.2
30.0	91.0	89.5	92.4	91.0	92.4	91.0
40.0	91.7	90.2	93.0	91.7	93.0	91.7
50.0	92.4	91.0	93.0	91.7	93.0	91.7
60.0	93.0	91.7	93.6	92.4	93.6	92.4
75.0	93.0	91.7	94.1	93.0	93.6	92.4
100.0	93.0	91.7	94.1	93.0	94.1	93.0
125.0	93.6	92.4	94.5	93.6	94.1	93.0
150.0	93.6	92.4	95.0	94.1	94.5	93.6
200.0	94.5	93.6	95.0	94.1	94.5	93.6
250.0	94.5	93.6	95.4	94.5	95.4	94.5
300.0	95.0	94.1	95.4	94.5	95.4	94.5
350.0	95.0	94.1	95.4	94.5	95.4	94.5
400.0	95.4	94.5	95.4	94.5		
450.0	95.8	95.0	95.8	95.0		
500.0	95.8	95.0	95.8	95.0		

The full load efficiency of Design A and B motors rated 600 volts or less, when operating at rated voltage and frequency, shall not be less than the minimum efficiency listed in the table above for the motor to be classified as "energy efficient." Nominal efficiency represents a value which should be used to compute the energy consumption of a motor or group of motors.

Reference: NEMA MG 1-1998 (Rev. 3), 12.60, Table 12-11.

The Energy Policy Act of 1992 (USA): The nominal full-load efficiency of electric motors as specified in the Energy Policy Act of 1992 is the same as that listed in the table for 1.0 to 200.0 hp motors.

FULL-LOAD EFFICIENCIES

THREE-PHASE, SQUIRREL CAGE, ENERGY EFFICIENT
ENCLOSED MOTORS (NEMA DESIGNS A AND B)

HP	2 POLE		4 POLE		6 POLE	
	NOMINAL EFFICIENCY	MINIMUM EFFICIENCY	NOMINAL EFFICIENCY	MINIMUM EFFICIENCY	NOMINAL EFFICIENCY	MINIMUM EFFICIENCY
1.0	75.5	72.0	82.5	80.0	80.0	77.0
1.5	82.5	80.0	84.0	81.5	85.5	82.5
2.0	84.0	81.5	84.0	81.5	86.5	84.0
3.0	85.5	82.5	87.5	85.5	87.5	85.5
5.0	87.5	85.5	87.5	85.5	87.5	85.5
7.5	88.5	86.5	89.5	87.5	89.5	87.5
10.0	89.5	87.5	89.5	87.5	89.5	87.5
15.0	90.2	88.5	91.0	89.5	90.2	88.5
20.0	90.2	88.5	91.0	89.5	90.2	88.5
25.0	91.0	89.5	92.4	91.0	91.7	90.2
30.0	91.0	89.5	92.4	91.0	91.7	90.2
40.0	91.7	90.2	93.0	91.7	93.0	91.7
50.0	92.4	91.0	93.0	91.7	93.0	91.7
60.0	93.0	91.7	93.6	92.4	93.6	92.4
75.0	93.0	91.7	94.1	93.0	93.6	92.4
100.0	93.6	92.4	94.5	93.6	94.1	93.0
125.0	94.5	93.6	94.5	93.6	94.1	93.0
150.0	94.5	93.6	95.0	94.1	95.0	94.1
200.0	95.0	94.1	95.0	94.1	95.0	94.1
250.0	95.4	94.5	95.0	94.1	95.0	94.1
300.0	95.4	94.5	95.4	94.5	95.0	94.1
350.0	95.4	94.5	95.4	94.5	95.0	94.1
400.0	95.4	94.5	95.4	94.5		
450.0	95.4	94.5	95.4	94.5		
500.0	95.4	94.5	95.8	95.0		

The full load efficiency of Design A and B motors rated 600 volts or less, when operating at rated voltage and frequency, shall not be less than the minimum efficiency listed in the table above for the motor to be classified as “energy efficient.” Nominal efficiency represents a value which should be used to compute the energy consumption of a motor or group of motors.

Reference: NEMA MG 1-1998 (Rev. 3), 12.60, Table 12-11.

The Energy Policy Act of 1992 (USA): The nominal full-load efficiency of electric motors as specified in the Energy Policy Act of 1992 is the same as that listed in the table for 1.0 to 200.0 hp motors.