

Single Speed Motors

Date added to ETL 2001 (Revised 2009).

1. Definition of the Technology

Single speed motors covers products that are specifically designed to convert electrical power into mechanical power, and to rotate a drive shaft at a fixed speed that is directly related to the frequency of the electrical power supply, by means of standard, three phase, ac induction motor.

2. Technology Description

Single speed motors are used to drive plant and machinery throughout industry and commerce, and a wide range 'general purpose' products are available in internationally agreed, standard designs with different power ratings, frame sizes, fixed operating speeds, and energy efficiency ratings.

The ECA scheme aims to encourage the purchase of higher efficiency single speed motors.

The ECA scheme covers two categories of product:

1. 2 and 4 pole single speed motors with power ratings between 1.1 kW and 400 kW.
2. 6 and 8 pole single speed motors with power ratings between 5.5 kW and 315 kW.

Investments in single speed motors can only qualify for Enhanced Capital Allowances if the specific product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet minimum performance criteria as set out below.

3. Eligibility Criteria

To be eligible products must:

- Be a totally enclosed, squirrel cage type, three-phase, ac induction motor that has:
 - a) A rated operating voltage between 200 and 700 Volts ac.
 - b) A starting performance that can be classified as design "N" or "NY" according to Section 5 of BS EN 60034-12: 2002, "*Rotating electrical machines - Part 12: Starting performance of single-speed three-phase cage induction motors*".
 - c) A built in cooling fan that uses a cooling method that is classified as "IC 411" according to BS EN 60034-6:1994, "*Rotating electrical machines. Methods of cooling (IC Code)*".
 - d) Dimensions and a power rating that conform with the requirements of:
 - (i) BS EN 50347:2001 (as amended), "General purpose three induction motors having standard dimensions and outputs - Frame numbers 56 to 315 and flange numbers 65 to 740"

OR:

- (ii) BS 4999-141: 2004, "General requirements for rotating electrical machines - Part 141: Specification for standard dimensions" **and** the

preferred rated outputs according to the primary or secondary series defined in Table 7 of IEC 60072-1: 1991-02 (sixth edition), "Dimensions and output series for rotating electrical machines - Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080".

- Be CE Marked.

Performance Criteria

Products must have an efficiency at 100% of their maximum continuous rating (i.e. full load) that is greater than or equal to the values shown in Table 1 below, which vary with power rating, number of poles and test method used. If the product's specific power rating is not shown in Table 1, then the performance threshold for the next highest power rating should be used to determine eligibility.

Table 1 Performance thresholds for single speed motors

Power Rating (kW)	Efficiency at 100% of maximum continuous rating (i.e. full load)							
	Summation of losses method as defined by BS EN 60034-2:1999 (as amended)				A low uncertainty method according to Table 2 of BS EN 60034-2-1:2007			
	2 Pole	4 Pole	6 Pole	8 Pole	2 Pole	4 Pole	6 Pole	8 Pole
1.1	>= 82.8	>= 83.8			>= 79.6	>= 81.4		
1.5	>= 84.1	>= 85.0			>= 81.3	>= 82.8		
2.2	>= 85.6	>= 86.4			>= 83.2	>= 84.3		
3.0	>= 86.7	>= 87.4			>= 84.6	>= 85.5		
4.0	>= 87.6	>= 88.3			>= 85.8	>= 86.6		
5.5	>= 88.6	>= 89.2	>= 86.0	>= 86.0	>= 87.0	>= 87.7	>= 86.0	>= 86.0
7.5	>= 89.5	>= 90.1	>= 89.0	>= 89.0	>= 88.1	>= 88.7	>= 87.2	>= 87.2
11.0	>= 90.5	>= 91.0	>= 89.0	>= 89.0	>= 89.4	>= 89.8	>= 88.7	>= 88.7
15.0	>= 91.3	>= 91.8	>= 90.0	>= 90.0	>= 90.3	>= 90.6	>= 89.7	>= 89.7
18.5	>= 91.8	>= 92.2	>= 90.0	>= 90.0	>= 90.9	>= 91.2	>= 90.4	>= 90.4
22.0	>= 92.2	>= 92.6	>= 91.5	>= 91.5	>= 91.3	>= 91.6	>= 90.9	>= 90.9
30.0	>= 92.9	>= 93.2	>= 92.0	>= 92.0	>= 92.0	>= 92.3	>= 91.7	>= 91.7
37.0	>= 93.3	>= 93.6	>= 93.0	>= 93.0	>= 92.5	>= 92.7	>= 92.2	>= 92.2
45.0	>= 93.7	>= 93.9	>= 93.4	>= 93.4	>= 92.9	>= 93.1	>= 92.7	>= 92.7
55.0	>= 94.0	>= 94.2	>= 93.8	>= 93.8	>= 93.2	>= 93.5	>= 93.1	>= 93.1
75.0	>= 94.6	>= 94.7	>= 94.3	>= 94.3	>= 93.8	>= 94.0	>= 93.7	>= 93.7
90.0	>= 95.0	>= 95.0	>= 94.5	>= 94.5	>= 94.1	>= 94.2	>= 94.0	>= 94.0

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110.0	>= 95.0	>= 95.1	>= 94.8	>= 94.8	>= 94.3	>= 94.5	>= 94.3	>= 94.3
132.0	>= 95.0	>= 95.5	>= 95.0	>= 95.0	>= 94.6	>= 94.7	>= 94.6	>= 94.6
150.0	>= 95.8	>= 95.7	>= 95.5	>= 95.5	>= 94.7	>= 94.9	>= 94.7	>= 94.7
160.0	>= 95.9	>= 95.8	>= 95.5	>= 95.5	>= 94.8	>= 94.9	>= 94.8	>= 94.8
185.0	>= 96.1	>= 95.9	>= 95.6	>= 95.6	>= 95.0	>= 95.1	>= 94.9	>= 94.9
200.0	>= 96.0	>= 95.8	>= 95.5	>= 95.5	>= 95.0	>= 95.1	>= 95.0	>= 95.0
250.0	>= 96.0	>= 96.0	>= 95.9	>= 95.9	>= 95.0	>= 95.1	>= 95.0	>= 95.0
280.0	>= 96.3	>= 96.3	>= 96.0	>= 96.0	>= 95.0	>= 95.1	>= 95.0	>= 95.0
315.0	>= 96.4	>= 96.4	>= 96.0	>= 96.0	>= 95.0	>= 95.1	>= 95.0	>= 95.0
355.0	>= 96.4	>= 96.5			>= 95.0	>= 95.1		
400.0	>= 96.5	>= 96.5			>= 95.0	>= 95.1		

">=" means "greater than or equal to"

Where the power rating is the 'rating for continuous duty' (class S1) as defined in Section 4.2.1 of BS EN 60034-1: 1998 (as amended) "Rotating electrical machines - Part 1: Rating and performance".

For the avoidance of doubt test data should be presented to 1 decimal place. As an example, a 4 pole, single speed motor with a rated power output of 45.0 kW, and an efficiency at full load of 93.8% when tested under BS EN 60034-2:1999 (as amended) would be deemed to be a fail.

Required test procedures

Product efficiency at 100% of maximum continuous rating must be determined according one of the following test standards:

- The summation of losses method outlined in Section 9.1 of BS EN 60034-2:1999 (as amended) "Rotating electrical machines - Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)".
- A low uncertainty method according to Table 2 (Induction Machines) of BS EN 60034-2-1:2007 "Rotating electrical machines - Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)".

Products must be operated from a 400 Volt ac, 50Hz electrical power supply during testing.

4. Scope of Claim

Expenditure on the provision of plant and machinery can include not only the actual costs of buying the equipment, but other direct costs such as the transport of the equipment to site, and some of the direct costs of installation. Clarity on the eligibility of direct costs is available from [HMRC](#).