

KS

KOREAN INDUSTRIAL STANDARD

High Voltage Three Phase Induction Motors
for General Purpose

KS C 4203 : 2003

Korean Agency for Technology and Standards
Ministry of Commerce, Industry and Energy

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High Voltage Three Phase Induction Motors for General Purpose

1. Scope

This Korean Industrial Standard specifies high voltage, three phase induction motors for general purpose (hereafter referred as motors) with consecutive rating, 60Hz frequency, less than 6,600V voltage for use in places of less than 40°C of the refrigerant temperature.

Remarks

1. High voltage three phase induction motors for general purpose refers to motors of which refrigerant air, non-explosive and mobility torque is less than 100% of rated torque.
2. The corresponding international standard of this standard shall be as follows:

KS C IEC 60034-1 Spinning device Part 1: Rating and performance

KS C IEC 60034-9 Spinning device Part 9: Noise limit

IEC 60072-1 Dimensions and output series for rotating electrical machines Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080

2. Normative References

The standards specified in the following, contain provisions which, through references in this text, constitute provisions of this standard. The most recent editions of the standards shall be applied.

- KS B 0401** Measurement tolerance and fit
KS B 0407 Height of spinning axis
KS B 1007 Diameter of bolt hole and of counter bore
KS B 1311 Key and key groove
KS C 1502 Sound level meter

3. Type

Motors shall be classified by type, characteristics and protection format of rotor, as in Table 1.

Table 1 Type of Electromotor

Squirrel Cage Type		Winding Wire Type	
For standard protection	Standard total closed type	For standard protection	Standard total Closed type
For high-efficiency protection	High-efficiency total closed type		

4. Rating

4.1 Rated Voltage

The rated voltage of electromotor shall be >3,300 V and 6,600V, in principle.

4.2 Rated Output

The rated output of electromotor shall be the output that is consecutively generated at the electromotor axis in rated voltage and rated frequency, which is indicated on the nameplate. Rated output shall be indicated in kW and as in table 2.

Table 2 Rated Output

Rated output (kW)
75, 90, 110, 132, 150, 185, 200, 220, 250, 280, 300, 335, 255, 400, 500

5. Performance

5.1 Temperature Increase

Temperature increase shall be less than the value in Table 3, when testing in the method of 8.2.

Table 3 Temperature Increase Limit

Rated Output (kW)	Type of Insulation	Law of Resistance (K)
Winding wire of stator and	B	80
	F	105
Iron core and all structural composition	The temperature increase in this part shall not, in any case, cause harmful effects to the insulating material of the part, nor the adjacent materials,.	

5.2 Characteristics

Characteristics of electromotor shall be in accordance with Table 4a for standard squirrel cage protection type, with Table 4b for high-efficiency squirrel cage protection type, with Table 5a for standard squirrel cage type total closed type, with Table 5b for high-efficiency squirrel cage total closed type, with Table 6 for standard winding wire protection type, and with Table 7 for standard winding wire total closed type.

**Table 4a Full Load Characteristics of Standard Squirrel Cage Protection Type
Electromotor**

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	4	1800	88.0 or above	83.0 or above	7.5	17.7	4.0
90			88.5 or above	84.0 or above	8.4	21.1	4.0
110			89.0 or above	84.5 or above	10.1	25.5	3.5
132			89.5 or above	85.0 or above	12.0	30.3	3.5
150			90.0 or above	85.5 or above	13.2	34.1	3.0
185			90.5 or above	86.0 or above	15.3	41.5	3.0
200			90.5 or above	86.0 or above	16.0	44.9	3.0
220			91.0 or above	86.5 or above	17.7	48.8	3.0
250			91.5 or above	87.0 or above	20.5	54.9	3.0
280			92.0 or above	87.5 or above	24.0	60.8	2.5
300			92.0 or above	88.0 or above	25.8	64.8	2.5
335			92.5 or above	88.5 or above	28.5	71.5	2.5
355			92.5 or above	88.5 or above	31.8	75.8	2.5
400			93.0 or above	89.0 or above	33.1	84.5	2.5
500			93.0 or above	89.5 or above	41.8	105.0	2.5
75	6	1200	87.5 or above	81.5 or above	8.2	18.4	4.0
90			88.0 or above	82.0 or above	9.3	21.8	4.0
110			88.5 or above	82.5 or above	11.3	26.3	3.5
132			89.0 or above	83.0 or above	12.7	31.2	3.5
150			89.5 or above	83.5 or above	14.0	35.1	3.5
185			90.0 or above	84.0 or above	16.5	42.8	3.5
200			90.0 or above	84.0 or above	18.0	46.2	3.0
220			90.5 or above	84.5 or above	19.6	50.3	3.0
250			91.0 or above	85.0 or above	22.0	56.5	3.0
280			91.5 or above	85.5 or above	23.7	62.6	3.0
300			92.0 or above	86.0 or above	25.1	66.3	3.0
335			92.5 or above	86.5 or above	27.4	73.2	3.0
355			92.5 or above	86.5 or above	28.7	77.6	2.5
400			93.0 or above	87.0 or above	31.9	86.4	2.5
500			93.5 or above	87.5 or above	39.5	106.9	2.5

Table 4a Full Load Characteristics of Standard Squirrel Cage Protection Type Electromotor
(Continued)

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	8	900	87.0 or above	78.5 or above	9.4	19.2	4.0
90			87.5 or above	80.0 or above	10.3	22.4	4.0
110			88.0 or above	80.5 or above	12.1	27.1	4.0
132			88.5 or above	81.0 or above	13.8	32.2	4.0
150			89.0 or above	81.5 or above	15.5	36.1	3.5
185			89.5 or above	82.0 or above	17.8	44.1	3.5
200			89.5 or above	82.0 or above	19.0	47.6	3.5
220			90.0 or above	82.5 or above	20.7	51.8	3.5
250			90.5 or above	83.0 or above	23.2	58.2	3.5
280			91.0 or above	83.5 or above	25.1	64.4	3.0
300			91.5 or above	83.5 or above	26.7	68.6	3.0
335			92.0 or above	84.0 or above	29.5	75.8	3.0
355			92.0 or above	84.0 or above	31.3	80.3	3.0
400			92.5 or above	84.0 or above	35.1	90.0	2.5
500			93.0 or above	84.5 or above	43.4	111.3	2.5
75	10	720	86.5 or above	74.0 or above	11.2	20.4	4.5
90			87.0 or above	75.5 or above	12.4	23.9	4.0
110			87.5 or above	76.0 or above	15.0	28.9	4.0
132			88.0 or above	76.5 or above	17.4	34.3	4.0
150			88.5 or above	77.0 or above	19.2	38.5	3.5
185			89.0 or above	78.0 or above	21.8	46.6	3.5
200			89.0 or above	78.0 or above	24.1	50.4	3.5
220			89.5 or above	78.5 or above	26.2	54.7	3.5
250			90.0 or above	79.0 or above	29.5	61.5	3.5
280			90.5 or above	79.5 or above	31.9	68.0	3.5
300			91.0 or above	80.0 or above	33.8	72.0	3.0
335			91.5 or above	80.5 or above	36.5	79.5	3.0
355			91.5 or above	80.5 or above	38.7	84.3	3.0
400			92.0 or above	81.0 or above	42.2	93.9	3.0
500			92.5 or above	82.0 or above	51.8	115.3	2.5

Remarks : The value of full load current and unloading current in this table is 3,300V of rated voltage, and in case of rated voltage E(V), it takes 3,300/E.

Table 4b Full Load Characteristics of High-efficiency Squirrel Cage Protection Type Electromotor

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	4	1800	93.6 or above	83.0 or above	7.2	17.1	4.0
90			93.6 or above	84.0 or above	8.0	20.0	4.0
110			94.1 or above	84.5 or above	9.7	24.4	3.5
132			94.1 or above	85.0 or above	11.5	29.2	3.5
150			94.1 or above	85.5 or above	12.8	33.0	3.0
185			94.1 or above	85.5 or above	14.7	40.5	3.0
200			94.1 or above	86.0 or above	15.6	43.4	3.0
75	6	1200	93.6 or above	81.5 or above	7.8	17.5	4.0
90			93.6 or above	82.0 or above	8.9	20.7	4.0
110			93.6 or above	82.5 or above	10.8	25.2	3.5
132			93.6 or above	83.0 or above	12.3	30.1	3.5
150			94.1 or above	83.5 or above	13.4	33.7	3.5
185			94.1 or above	83.5 or above	16.1	41.6	3.0
200			94.1 or above	84.0 or above	17.4	44.7	3.0
75	8	900	93.6 or above	78.5 or above	8.9	18.0	4.0
90			93.6 or above	80.0 or above	9.3	21.3	4.0
110			93.6 or above	80.5 or above	11.6	25.8	4.0
132			93.6 or above	81.0 or above	13.5	30.8	4.0
150			93.6 or above	81.5 or above	14.9	34.8	3.5
185			93.6 or above	81.5 or above	17.5	42.7	3.5
200			93.6 or above	82.0 or above	18.3	45.8	3.5

Remarks : The value of full load current and unloading current in this table is 3,300V of rated voltage, and in case of rated voltage E(V), it takes 3,300/E.

Table 5a Full Load Characteristics of Standard Squirrel Cage Total Close Type Electromotor

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	4	1800	88.0 or above	82.0 or above	7.6	18.1	3.5
90			88.5 or above	83.0 or above	8.7	21.4	3.5
110			89.0 or above	83.5 or above	10.5	25.8	3.0
132			89.5 or above	84.0 or above	12.2	30.7	3.0
150			90.0 or above	84.5 or above	13.8	34.5	2.5
185			90.5 or above	84.5 or above	16.0	42.3	2.5
200			90.5 or above	85.0 or above	17.2	45.4	2.5
220			91.0 or above	85.5 or above	18.2	49.4	2.5
250			91.5 or above	86.0 or above	21.0	55.5	2.5
280			92.0 or above	86.5 or above	23.9	61.5	2.0
300			92.0 or above	87.0 or above	26.2	65.5	2.0
335			92.5 or above	87.0 or above	29.1	72.8	2.0
355			92.5 or above	87.5 or above	32.2	76.7	2.0
400			93.0 or above	88.0 or above	34.2	85.5	2.0
500			93.0 or above	88.5 or above	43.5	106.2	2.0
75	6	1200	87.5 or above	80.5 or above	8.3	18.6	3.5
90			88.0 or above	81.0 or above	9.6	22.0	3.5
110			88.5 or above	81.5 or above	11.4	26.6	3.0
132			89.0 or above	82.0 or above	13.2	31.6	3.0
150			89.5 or above	82.5 or above	14.2	35.5	3.0
185			90.0 or above	82.5 or above	16.6	43.5	3.0
200			90.0 or above	83.0 or above	18.7	46.8	2.5
220			90.5 or above	83.5 or above	19.8	50.9	2.5
250			91.0 or above	84.0 or above	22.3	57.2	2.5
280			91.5 or above	84.5 or above	24.6	63.3	2.5
300			92.0 or above	85.0 or above	25.4	67.1	2.5
335			92.5 or above	85.0 or above	28.1	74.5	2.0
355			92.5 or above	85.5 or above	29.8	78.5	2.0
400			93.0 or above	86.0 or above	32.3	87.4	2.0
500			93.5 or above	86.5 or above	39.9	108.1	2.0

**Table 5a Full Load Characteristics of Standard Squirrel Cage Total Close Type
Electromotor (continued)**

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	8	900	87.0 or above	77.5 or above	9.7	19.4	3.5
90			87.5 or above	79.0 or above	10.2	22.7	3.5
110			88.0 or above	79.5 or above	12.3	27.5	3.5
132			88.5 or above	80.0 or above	13.6	32.6	3.5
150			89.0 or above	80.5 or above	15.7	36.6	3.0
185			89.5 or above	80.5 or above	18.8	44.9	3.0
200			89.5 or above	81.0 or above	20.2	48.2	3.0
220			90.0 or above	81.5 or above	21.4	52.4	3.0
250			90.5 or above	82.0 or above	23.5	58.9	3.0
280			91.0 or above	82.5 or above	26.0	65.2	2.5
300			91.5 or above	82.5 or above	27.1	69.5	2.5
335			92.0 or above	82.5 or above	29.8	77.2	2.5
355			92.0 or above	83.0 or above	31.7	81.3	2.5
400			92.5 or above	83.0 or above	35.5	91.1	2.0
500			93.0 or above	83.5 or above	45.0	112.6	2.0
75	10	720	86.5 or above	73.0 or above	11.3	20.7	4.0
90			87.0 or above	74.5 or above	13.0	24.2	3.5
110			87.5 or above	75.0 or above	15.5	29.3	3.5
132			88.0 or above	75.5 or above	17.9	34.7	3.5
150			88.5 or above	76.0 or above	19.8	39.0	3.0
185			89.0 or above	76.5 or above	23.1	47.5	3.0
200			89.0 or above	77.0 or above	25.5	51.0	3.0
220			89.5 or above	77.5 or above	27.1	55.4	3.0
250			90.0 or above	78.0 or above	29.9	62.3	3.0
280			90.5 or above	78.5 or above	32.3	68.9	3.0
300			91.0 or above	79.0 or above	34.3	73.0	2.5
335			91.5 or above	79.0 or above	37.2	81.0	2.5
355			91.5 or above	79.5 or above	39.2	85.3	2.5
400			92.0 or above	80.0 or above	43.7	95.0	2.5
500			92.5 or above	81.0 or above	52.5	116.7	2.0

Remarks : The value of full load current and unloading current in this table is 3,300V of rated voltage, and in case of rated voltage E(V), it takes 3,300/E.

Table 5b Full Load Characteristics of High-efficiency Squirrel Cage Total Closed Type Electromotor

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	4	1800	93.6 or above	82.0 or above	7.3	17.3	3.5
90			93.6 or above	83.0 or above	8.4	20.5	3.5
110			94.1 or above	83.5 or above	10.1	24.7	3.0
132			94.1 or above	84.0 or above	11.7	29.5	3.0
150			94.5 or above	84.5 or above	13.3	33.1	2.5
185			94.5 or above	84.5 or above	15.8	40.9	2.5
200			94.5 or above	85.0 or above	13.2	43.9	2.5
75	6	1200	93.0 or above	80.5 or above	7.9	17.7	3.5
90			93.0 or above	81.0 or above	9.2	21.1	3.5
110			94.1 or above	81.5 or above	10.9	25.3	3.0
132			94.1 or above	82.0 or above	12.5	30.2	3.0
150			94.1 or above	82.5 or above	13.6	34.2	3.0
185			94.1 or above	82.5 or above	16.8	41.9	2.5
200			94.1 or above	83.0 or above	18.1	45.0	2.5
75	8	900	93.0 or above	77.5 or above	9.2	18.4	3.5
90			93.6 or above	79.0 or above	10.7	21.5	3.5
110			93.6 or above	79.5 or above	11.7	26.1	3.5
132			93.6 or above	80.0 or above	13.2	31.2	3.5
150			94.1 or above	80.5 or above	15.0	35.0	3.0
185			94.1 or above	80.5 or above	17.6	43.2	3.0
200			94.1 or above	81.0 or above	19.4	46.4	3.0

Remarks : The value of full load current and unloading current in Table 5b is 3,300V of rated voltage, and in case of rated voltage E(V), it takes 3,300/E.

Table 6 Full Load Characteristics of Standard Winding Wire Protection Type Electromotor

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	4	1800	88.0 or above	83.0 or above	7.5	17.7	4.0
90			88.5 or above	84.0 or above	8.4	21.1	4.0
110			89.0 or above	84.5 or above	10.1	25.5	3.5
132			89.5 or above	85.0 or above	12.0	30.3	3.5
150			90.0 or above	85.5 or above	13.2	34.1	3.0
185			90.5 or above	86.0 or above	15.3	41.5	3.0
200			90.5 or above	86.0 or above	16.0	44.9	3.0
220			91.0 or above	86.5 or above	17.7	48.8	3.0
250			91.5 or above	87.0 or above	20.5	54.9	3.0
280			92.0 or above	87.5 or above	24.0	60.8	2.5
300			92.0 or above	88.0 or above	25.8	64.8	2.5
335			92.5 or above	88.5 or above	28.5	71.5	2.5
355			92.5 or above	88.5 or above	31.8	75.8	2.5
400			93.0 or above	89.0 or above	33.1	84.5	2.5
500			93.0 or above	89.5 or above	41.8	105.0	2.5
75	6	1200	87.5 or above	81.5 or above	8.2	18.4	4.0
90			88.0 or above	82.0 or above	9.3	21.8	4.0
110			88.5 or above	82.5 or above	11.3	26.3	3.5
132			89.0 or above	83.0 or above	12.7	31.2	3.5
150			89.5 or above	83.5 or above	14.0	35.1	3.5
185			90.0 or above	84.0 or above	16.5	42.8	3.5
200			90.0 or above	84.0 or above	18.0	46.2	3.0
220			90.5 or above	84.5 or above	19.6	50.3	3.0
250			91.0 or above	85.0 or above	22.0	56.5	3.0
280			91.5 or above	85.5 or above	23.7	62.6	3.0
300			92.0 or above	86.0 or above	25.1	66.3	3.0
335			92.5 or above	86.5 or above	27.4	73.2	3.0
355			92.5 or above	86.5 or above	28.7	77.6	2.5
400			93.0 or above	87.0 or above	31.9	86.4	2.5
500			93.5 or above	87.5 or above	39.5	106.9	2.5

Table 6 Full Load Characteristics of Standard Winding Wire Protection Type Electromotor (continued)

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	8	900	87.0 or above	78.5 or above	9.4	19.2	4.0
90			87.5 or above	80.0 or above	10.3	22.4	4.0
110			88.0 or above	80.5 or above	12.1	27.1	4.0
132			88.5 or above	81.0 or above	13.8	32.2	4.0
150			89.0 or above	81.5 or above	15.5	36.1	3.5
185			89.5 or above	82.0 or above	17.8	44.1	3.5
200			89.5 or above	82.0 or above	19.0	47.6	3.5
220			90.0 or above	82.5 or above	20.7	51.8	3.5
250			90.5 or above	83.0 or above	23.2	58.2	3.5
280			91.0 or above	83.5 or above	25.1	64.4	3.0
300			91.5 or above	83.5 or above	26.7	68.6	3.0
335			92.0 or above	84.0 or above	29.5	75.8	3.0
355			92.0 or above	84.0 or above	31.3	80.3	3.0
400			92.5 or above	84.0 or above	35.1	90.0	2.5
500			93.0 or above	84.5 or above	43.4	111.3	2.5
75	10	720	86.5 or above	74.0 or above	11.2	20.4	4.5
90			87.0 or above	75.5 or above	12.4	23.9	4.0
110			87.5 or above	76.0 or above	15.0	28.9	4.0
132			88.0 or above	76.5 or above	17.4	34.3	4.0
150			88.5 or above	77.0 or above	19.2	38.5	3.5
185			89.0 or above	78.0 or above	21.8	46.6	3.5
200			89.0 or above	78.0 or above	24.1	50.4	3.5
220			89.5 or above	78.5 or above	26.2	54.7	3.5
250			90.0 or above	79.0 or above	29.5	61.5	3.5
280			90.5 or above	79.5 or above	31.9	68.0	3.5
300			91.0 or above	80.0 or above	33.8	72.0	3.0
335			91.5 or above	80.5 or above	36.5	79.5	3.0
355			91.5 or above	80.5 or above	38.7	84.3	3.0
400			92.0 or above	81.0 or above	42.2	93.9	3.0
500			92.5 or above	82.0 or above	51.8	115.3	2.5

Remarks : The value of full load current and unloading current in this table is 3,300V of rated voltage, and in case of rated voltage E(V), it takes 3,300/E.

**Table 7 Full Load Characteristics of Standard Winding Wire Total
Closed Type Electromotor**

Rated output (kW)	Number of electrodes	Revolution speed of moving machine (rpm)	Characteristics of Full Load		Reference Value		
			Efficiency η (%)	Power factor P_f (%)	Unloading current I_0 (average value of each shape) (A)	Full load current I (average value of each shape) (A)	Full load slip S (%)
75	4	1800	88.0 or above	82.0 or above	7.6	18.1	3.5
90			88.5 or above	83.0 or above	8.7	21.4	3.5
110			89.0 or above	83.5 or above	10.5	25.8	3.0
132			89.5 or above	84.0 or above	12.2	30.7	3.0
150			90.0 or above	84.5 or above	13.8	34.5	2.5
185			90.5 or above	84.5 or above	16.0	42.3	2.5
200			90.5 or above	85.0 or above	17.2	45.4	2.5
220			91.0 or above	85.5 or above	18.2	49.4	2.5
250			91.5 or above	86.0 or above	21.0	55.5	2.5
280			92.0 or above	86.5 or above	23.9	61.5	2.0
300			92.0 or above	87.0 or above	26.2	65.5	2.0
335			92.5 or above	87.0 or above	29.1	72.8	2.0
355			92.5 or above	87.5 or above	32.2	76.7	2.0
400			93.0 or above	88.0 or above	34.2	85.5	2.0
500			93.0 or above	88.5 or above	43.5	106.2	2.0
75	6	1200	87.5 or above	80.5 or above	8.3	18.6	3.5
90			88.0 or above	81.0 or above	9.6	22.0	3.5
110			88.5 or above	81.5 or above	11.4	26.6	3.0
132			89.0 or above	82.0 or above	13.2	31.6	3.0
150			89.5 or above	82.5 or above	14.2	35.5	3.0
185			90.0 or above	82.5 or above	16.6	43.5	3.0
200			90.0 or above	83.0 or above	18.7	46.8	3.0
220			90.5 or above	83.5 or above	19.8	50.9	2.5
250			91.0 or above	84.0 or above	22.3	57.2	2.5
280			91.5 or above	84.5 or above	24.6	63.3	2.5
300			92.0 or above	85.0 or above	25.4	67.1	2.5
335			92.5 or above	85.0 or above	28.1	74.5	2.0
355			92.5 or above	85.5 or above	29.8	78.5	2.0
400			93.0 or above	86.0 or above	32.3	87.4	2.0
500			93.5 or above	86.5 or above	39.9	108.1	2.0