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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

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ISO RECOMMENDATION
R 496

SHAFT HEIGHTS
FOR DRIVING AND DRIVEN MACHINES

1st EDITION

August 1966

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BRIEF HISTORY

The ISO Recommendation R 496, *Shaft Heights for Driving and Driven Machines*, was drawn up by Technical Committee ISO/TC 13, *Shaft Heights of Machinery*, the Secretariat of which is held by the Institut Belge de Normalisation (IBN).

Work on this question by the Technical Committee began in 1951, taking into account the studies which had been made by the former International Federation of the National Standardizing Associations (ISA), and led in 1957 to the adoption of a Draft ISO Recommendation.

This first Draft ISO Recommendation (No. 180) was circulated to all the ISO Member Bodies for enquiry in September 1957. As the results of this consultation were not considered satisfactory, the Technical Committee presented a second Draft ISO Recommendation, which was circulated to all the Member Bodies in March 1964 and which was approved by the following Member Bodies:

Argentina	Germany	Spain
Austria	Greece	Sweden
Bulgaria	Israel	Switzerland
Chile	Japan	Turkey
Colombia	Korea, Rep. of	United Kingdom
Czechoslovakia	Netherlands	U.S.A.
Denmark	New Zealand	U.S.S.R.
France	Portugal	Yugoslavia

Two Member Bodies opposed the approval of the Draft:

Belgium
India

The second Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in August 1966, to accept it as an ISO RECOMMENDATION.

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ISO Recommendation R 496 August 1966

SHAFT HEIGHTS FOR DRIVING AND DRIVEN MACHINES

1. DEFINITION

The shaft height is the distance, measured on the machine ready for delivery, between the centre-line of the shaft and the base plane of the machine itself. It does not include the liners used for assembly. In cases where an insulation shim is supplied with the machine, the thickness of this shim should be included in the shaft height.

2. NOMINAL DIMENSION *h*

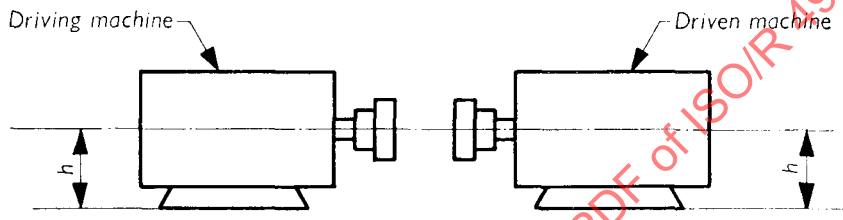

TABLE 1. — **Shaft heights in millimetres * and in inches**

Shaft heights								
millimetres				inches				
Series				Series				
I	II	III	IV	I	II	III	IV	V
25	25	25	25	0.984	0.984	0.984	0.984	
			26				1.024	
		28	28			1.102	1.102	
			30				1.181	
	32	32	32		1.260	1.260	1.260	
			34				1.339	
		36	36			1.417	1.417	
			38				1.496	
40	40	40	40	1.575	1.575	1.575	1.575	
			42				1.654	
		45	45			1.772	1.772	
			48				1.890	
	50	50	50		1.969	1.969	1.969	
			53				2.09	
		56	56			2.20	2.20	
			60				2.36	

* The values in millimetres of the series I to IV correspond respectively, however with some roundings, to the values of the preferred numbers R 5, R 10, R 20, R 40 (see ISO Recommendation R 3, *Preferred Numbers - Series of Preferred Numbers*).

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TABLE 1. — **Shaft heights in millimetres * and in inches** *(continued)*

Shaft heights								
millimetres				inches				
Series				Series				
I	II	III	IV	I	II	III	IV	V
63	63	63	63	2.48	2.48	2.48	2.48	2.625
			67				2.64	
		71	71			2.80	2.80	
			75				2.95	3
	80	80	80		3.15	3.15	3.15	
			85				3.35	3.5
		90	90			3.54	3.54	
			95				3.74	
100	100	100	100	3.94	3.94	3.94	3.94	4.125
			106				4.17	
		112	112			4.41	4.41	4.5
			118				4.65	
	125	125	125		4.92	4.92	4.92	
			132				5.20	5.25
		140	140			5.51	5.51	
			150				5.91	6.25
160	160	160	160	6.30	6.30	6.30	6.30	
			170				6.69	7
		180	180			7.09	7.09	
			190				7.48	
	200	200	200		7.87	7.87	7.87	8
			212				8.35	
		225**	225**			8.86	8.86	9
			236				9.29	
250	250	250	250	9.84	9.84	9.84	9.84	10
			265				10.43	11
		280	280			11.02	11.02	
			300				11.81	
	315	315	315		12.40	12.40	12.40	12.5
			335				13.19	
		355	355			13.98	13.98	
			375				14.76	
400	400	400	400	15.75	15.75	15.75	15.75	
			425				16.73	
		450	450			17.72	17.72	
			475				18.70	
	500	500	500		19.69	19.69	19.69	
			530				20.87	
		560	560			22.05	22.05	
			600				23.62	

* The values in millimetres of the series I to IV correspond respectively, however with some roundings, to the values of the preferred numbers R 5, R 10, R 20, R 40 (see ISO Recommendation R 3, *Preferred Numbers - Series of Preferred Numbers*).

** Deviation from the series of preferred numbers which contains the number 224.

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TABLE 1. — **Shaft heights in millimetres* and in inches** *(concluded)*

Shaft heights								
millimetres				inches				
Series				Series				
I	II	III	IV	I	II	III	IV	V
630	630	630	630	24.80	24.80	24.80	24.80	
			670				26.38	
		710	710			27.95	27.95	
			750				29.53	
	800	800	800		31.50	31.50	31.50	
			850				33.46	
		900	900			35.43	35.43	
			950				37.40	
1000	1000	1000	1000	39.37	39.37	39.37	39.37	
			1060				41.73	
		1120	1120			44.09	44.09	
			1180				46.46	
	1250	1250	1250		49.21	49.21	49.21	
			1320				51.97	
		1400	1400			55.12	55.12	
			1500				59.06	
1600	1600	1600	1600	62.99	62.99	62.99	62.99	
>1600**				>62.99**				

The values of the first series are the preferred choice. If these do not suffice, use first the values of the second series, then those of the third and in exceptional cases the fourth series. The values in inches of the fifth series are transitional values for foot-mounted induction motors with shaft heights between 56 mm and 315 mm (2.20 and 12.40 in), which comply with Publication 72-1 of the International Electrotechnical Commission IEC, *Recommendation for the Dimensions and Output Ratings of Electric Motors, Part I.*

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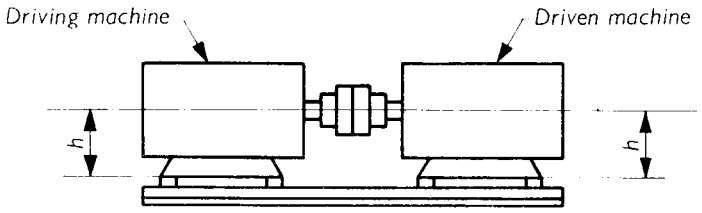
3. TOLERANCES



3.1 Scope

3.1.1 The following tolerances, relating to shaft heights, as well as the more limited tolerances relating to parallelism errors, concern only machines directly coupled and assembled on a common base. They should be respected at every point of the shaft.

* The values in millimetres of the series I to IV correspond respectively, however, with some roundings, to the values of the preferred numbers R 5, R 10, R 20, R 40 (see ISO Recommendation R 3, *Preferred Numbers — Series of Preferred Numbers*).

** For values > 1600 mm and > 62.99 in, adopt a preferred number in millimetres or its corresponding value in inches.

3.1.2 Exceptions to the tolerances should be the subject of special agreement, for example, in the following cases:

— when, during the assembly, the shaft requires to be lined-up owing to deflection,

— when, owing to heat expansion, shims cannot be used,

— when other reasons require a departure from the specified values.

3.2 Limit deviations

TABLE 2. — **Limit deviations**

Shaft heights *h* in millimetres		Limit deviations for: electrical machines, driven machines, speed reducers, control devices for ship propeller drivers		Limit deviations for: driving machines other than electrical motors and control devices for ship propeller drivers	
from	to	millimetres	inches	millimetres	inches
25	50	0 — 0.4	0 — 0.016	+ 0.4 0	+ 0.016 0
> 50	250	0 — 0.5	0 — 0.02	+ 0.5 0	+ 0.02 0
> 250	630	0 — 1.0	0 — 0.04	+ 1.0 0	+ 0.04 0
> 630	1000	0 — 1.5	0 — 0.06	+ 1.5 0	+ 0.06 0
>1000		0 — 2.0	0 — 0.08	+ 2.0 0	+ 0.08 0

3.3 Guiding principles for assembly

3.3.1 Height deviations within the tolerances should be adjusted with shims on assembly.

3.3.2 If several machines are to be coupled and the tolerance on the shaft height is negative for each, the heights should be adjusted by means of shims, at least up to the nominal dimension.

3.3.3 In all other cases, adjustment to the greater shaft height should be made and the machine with the positive shaft height deviation should be assembled first.

3.4 Parallelism error

The parallelism error is the difference in height from the base plane of two points on the axis of the shaft. These points should normally be at the two ends of the shaft, but where this is impracticable, any two convenient points may be taken and the resulting measured value increased in the ratio of the shaft length to the distance apart of the two points.

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