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मानक

IS/ISO 9373 (1989): Cranes and Related Equipment - Accuracy Requirements for Measuring Parameters During Testing [MED 14: Cranes, Lifting Chains and Related Equipment]

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Indian Standard

CRANES AND RELATED EQUIPMENT — ACCURACY REQUIREMENTS FOR MEASURING PARAMETERS DURING TESTING

ICS 53.020.20

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BUREAU OF INDIAN STANDARDS MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

NATIONAL FOREWORD

This Indian standard which is identical with ISO 9373 : 1989 'Cranes and related equipment — Accuracy requirements for measuring parameters during testing', issued by International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendations of the Cranes, Lifting Chains and Its Related Equipments Sectional Committee and approval of the Heavy Mechanical Engineering Division Council.

The text of ISO standard has been approved for publication as Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use full stop (.) as a decimal marker.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

CRANES AND RELATED EQUIPMENT — ACCURACY REQUIREMENTS FOR MEASURING PARAMETERS DURING TESTING

1 Scope

This International Standard specifies the principal requirements for instruments and measurement systems of test loads, distances, time and other relevant parameters when testing cranes and related equipment. It gives recommended limit values of relative errors in measurement during testing.

2 Principal requirements for instruments and measurement systems

2.1 Instruments, measuring devices and measurement systems shall have calibration accuracy sufficient for the purposes of achieving the measurement accuracy which is required to evaluate basic relative errors as indicated in 3.1 and other relevant International Standards or product specifications.

2.2 Instruments and measuring equipment shall be calibrated at recommended intervals or prior to taking measurements, as required for the particular device to be used.

3 Allowable basic relative error in measurement during testing

3.1 Where no variation is expected in the measurements, only one measurement is sufficient and the relative error need not be determined.

3.2 A basic relative error expressed as a percentage of the parameter's actual value shall be established as a measure of accuracy for measuring test loads, distances, time and other related parameters.

The basic relative error, δ , shall be calculated using the following method and formulae:

- for between two and five measurements:

$$\delta' = 100 \left| \frac{x - \mu}{\mu} \right|$$

for over five measurements:

$$\delta^{\prime\prime} = \frac{100}{\mu} \sqrt{\frac{N\left(\sum_{i=1}^{N} x_i^2\right) - \left(\sum_{i=1}^{N} x_i\right)^2}{N(N-1)}}$$

where

 μ is the arithmetic mean:

$$\mu = \frac{1}{N} \sum_{i=1}^{N} x_i$$

x is the extreme value;

 x_i is the value of the *i*th measurement;

N is the number of measurements of the x_i ;

 δ' and δ'' are the relative errors, in percent.

3.3 Examples of recommended limit values of relative error during measurements of main parameters are given in table 1.

Table 1 - Examples of limit values of relative errors in the measurement of basic parameters

	Parameter measured	Maximum values of relative error
		%
1	Dimensions, in metres:	
	 a) Overall basic dimensions if not determined by other specific International Stand- ards or specifications for products 	0,5
	b) Other dimensions, <i>d</i> :	
	$d \leq 5$	2
	$5 < d \leq 20$	1,5
	<i>d</i> > 20	1
2	Mass (of crane parts, assemblies and components, of a test load, lifting capacity, etc.), in kilograms	1
3	Time, t (of a cycle, operations, duration of testing, etc.), in seconds:	
	$t \leq 10$	4
	$10 < t \leq 60$	2
	<i>t</i> > 60	1
4	Temperature (of air, working fluid, oil, water, etc.), in degrees Celsius	2
5	Plane angle, α , if not determined by other specific International Standards or specifications for products, in radians:	
	$\alpha \leq 0,1$	5
	$0,1 < \alpha \leq 2 \pi$	2,5
	$\alpha > 2 \pi$	1,5
6	Speeds of working motions, in metres per second	5
7	Angular speed, in radians per second (or reciprocal minutes)	5
8	Force, F (bearing ground pressure, loads on bridges and other components), in kilonewtons:	
	$F \leq 0,2$	2
	$0.2 < F \leqslant 100$	1,5
	<i>F</i> > 100	1
9	Voltage, U, in volts:	
	<i>U</i> ≤ 40	4
	$40 < U \leq 500$	3
	U > 500	1
10	Strength of current (for control and in power circuits), in amperes	2

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Amendments Issued Since Publication

This Indian Standard has been developed from Doc: No. HMD 14 (0339).

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Headquarters:		
Manak Bhavan, 9 Bahadur Sl Telephones : 331 01 31, 331 1	aah Zafar Marg, New Delhi 110002 3 75	Telegrams : Manaksanstha (Common to all offices)
Regional Offices :		Telephone
Central : Manak Bhavan, 9 NEW DELHI 110	Bahadur Shah Zafar Marg 1002	331 01 31 331 13 75
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