इंटरनेट मानक

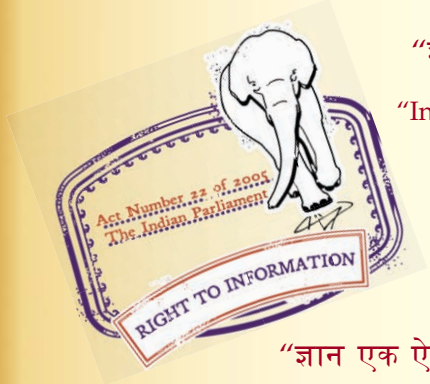
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 8216 (1976): Guide for inspection of lift wire ropes
[ETD 25: Lift and Escalators]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

IS : 8216 - 1976

(Reaffirmed 2002)

Indian Standard

GUIDE FOR INSPECTION OF LIFT WIRE ROPES

(First Reprint JUNE 1984)

UDC 677.721:621.876-83:620.111.1

INDIAN STANDARDS INSTITUTION

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI 110002

Gr 2

November 1976

Indian Standard

GUIDE FOR INSPECTION OF LIFT WIRE ROPES

Lifts and Escalators Sectional Committee, ETDC 46

Chairman	*Representing*
SHRI V. A. KRISHNAMURTHY	Central Public Works Department, New Delhi
Members	
SHRI K. A. ANANTHANARAYANAN (*Alternate* to Shri V. A. Krishnamurthy)	
SHRI G. R. BHATIA	Directorate General of Supplies & Disposals, New Delhi
SHRI ROSHAN LAL (*Alternate*)	
CHIEF ELECTRICAL ENGINEER	Railway Board (Ministry of Railways)
ADDITIONAL CHIEF ELECTRICAL ENGINEER (*Alternate*)	
CHIEF ENGINEER (ELECTRICAL)	Public Works & Housing Department, Government of Maharashtra, Bombay
SHRI NIRMALENDU DAS GUPTA	Directorate of Electricity, Government of West Bengal, Calcutta
SHRI MOHAMAD HAMEED	Chief Electrical Inspector, Government of Tamil Nadu, Madras
ELECTRICAL INSPECTOR (TECHNICAL) (*Alternate*)	
SHRI J. C. PATEL	J. J. Engineering Co, Bombay
SHRI R. M. PRADHAN	Central Public Works Department (Architect Wing), New Delhi
SHRI P. V. RAMIAH	Electrical Inspector to Government of Karnataka, Bangalore
SHRI S. V. RAMNATHKAR	Electric Construction & Equipment Co Ltd, 24 Parganas
SHRI P. K. BANKA (*Alternate*)	
SHRI S. P. TYAGI	Electrical Inspectorate, Delhi Administration, Delhi
SHRI V. K. KHANNA (*Alternate*)	
SHRI P. L. VAHI	Otis Elevator Co (India) Ltd, Bombay
SHRI I. T. MANSUKHANI (*Alternate*)	
SHRI H. R. VERMA	Engineer-in-Chief's Branch, Army Headquarters
MAJ G. S. BAJAJ (*Alternate*)	

(*Continued on page* 2)

(*Continued from page* 1)

Members	*Representing*
SHRI G. J. WILSON SHRI M. KAMATH (*Alternate*)	Best and Crompton Engineering Co Ltd, Madras
SHRI S. P. SACHDEV, Director (Elec tech)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI M. N. MURTHY
Assistant Director (Elec tech), ISI

Indian Standard

GUIDE FOR INSPECTION OF LIFT WIRE ROPES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 26 August 1976, after the draft finalized by the Lifts and Escalators Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 It should be noted that it is not practicable to spell out the inspection procedure for every single type of wire rope installation nor to outline every detail of the inspection procedure. The inspector should use his best judgement in making the inspection and in selecting his location from which a proper examination of the rope can best be made:

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

1. SCOPE

1·1 This standard provides guidance to the owners for proper inspection of suspension, compensation and governor ropes of lifts.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Crown Wire — A strand on the periphery of the rope.

2.2 Pitch or Length of Lay — The distance parallel to the axis of the rope (or strand), in which a strand (or wire) makes one complete helical convolution about the core (or centre).

*Rules for rounding off numerical values (*revised*).

3. ROPE LIFE

3.1 Lift rope life depends upon a multitude of factors and may extend over periods ranging from a few months to several years. Although it is quite general practice to express life of wire ropes in terms of the time they have been in service, this method is not so accurate a measure as car travel. Here again, car travel is not the same as rope travel as, for example, in 2 : 1 roping, rope travel is twice the car travel. Further, the number of reverse bends has a decided influence on the life of rope.

4. CAUSE OF WEARING OUT OF ROPE

4.1 Wire ropes wear out from two causes:

a) Breakage of the wires, and

b) Reduction in area caused by wearing of the outside wires.

In normal practice, the former is the more predominant.

5. METHODS OF INSPECTION

5.0 The methods specified in the **5.1** to **5.7**, based on field experience, are recommended as a guide for the inspection of lift wire ropes.

5.1 Before starting inspection, all dirty and overlubricated ropes should be cleaned. A hand lamp with a special clamp which can be anchored with the lift rope may be used for inspection purposes.

5.2 For traction machines, the ropes on counterweight side from top of the car, with the car located at the top of the lift shaft, should be examined.

5.3 For basement drive machine the portions of the ropes leading from the driving machine sheave and from the counterweight to the overhead wheels should be examined from the car top as the car descends. A small portion left shall be examined from the pit.

5.4 A convenient method of indicating the location of the unexamined sections of ropes which should be examined later from the machine room or overhead machinery space or from pit is to mark the rope with a chalk.

5.5 The car should be moved downward one or two metres at a time and rope at each of these stops should be examined.

5.6 It should be noted when broken wires begin to appear. Thereafter, at frequent time intervals the rate of increase in the number of broken wires should be determined. Any rapid increase in the number of broken wires is significant, but frequently after a rapid increase, the number of broken wires will remain relatively constant for a considerable period of time.

5.7 The number of broken crown wires in a pitch of lay measured along the length of a rope should be counted. A pitch of lay may be considered as a section of rope approximately six and one-half times the diameter of the rope.

6. CONDEMNATION OF ROPES

6.1 For single or double wrapped traction machines discard suspension or compensating ropes under any one of the following conditions:

a) If the broken wires are equally distributed among the strands, when the number of broken wires per pitch of lay in the worst section of rope exceeds the values shown under *A* in Table 1.

b) If four or five wires, side by side, are broken across the crown of any strands, when the number of broken wires per pitch of lay in the worst section of rope exceeds values shown under *B* of Table 1.

c) If the distribution of broken wires is unequal and broken wires predominate in one or two strands, when the number of broken wires per pitch of lay in the worst section of the rope exceeds the values shown under *C* of Table 1.

d) If any unfavourable factors, such as corrosion (red dust or rouge), excessive wear of individual wires in the strands, unequal tension, poor sheave grooves, etc, exist and when the number of broken wires exceeds 50 percent of the values indicated in Table 1 for conditions (a), (b) and (c) described above.

6.2 The ropes should be discarded whenever their actual diameter drops below the value shown in Table 2.

TABLE 1 NUMBER OF BROKEN WIRES FOR CONDEMNATION

Types of Wire Rope	Number of Broken Wires		
	A	*B*	*C*
(1)	(2)	(3)	(4)
6 × 19	24-30	12-20	8-12
8 × 19	32-40	16-24	10-16

Note — The upper limits are used when inspections are made at least monthly by a competent person.

TABLE 2 REDUCTION OF DIAMETERS

Nominal Diameter, mm	12	14	16	18	20	25
Actual Reduced, Diameter, mm	11·2	13·2	14·8	16·8	18·8	23·4

6.3 Governor ropes should be inspected and discarded in the manner outlined in **6.1** for suspension and compensating ropes of traction machines.

7. CAUTION

7.1 Breaks in the valleys of the ropes, while infrequent, may be an indication of internal breaks. The ropes should be discarded when the total number of broken wires in the valleys of a rope lay exceeds one.

7.2 A valley break is one in which the outside wire of a strand breaks in the immediate vicinity of the point where it contacts a wire or wires of an adjacent strand, generally at a point not visible when the wire rope is examined externally. In other words, one broken end of the wire is long enough to reach from one valley to the next one and the other end of the break generally cannot be seen. This is not to be confused with a broken outside wire when the original break occurred at a worn crown and a secondary fracture has occurred near the point where two adjacent strands make contact. In this case, a piece of wire has broken out and is missing, and generally both ends of the broken wire remaining are visible.

7.3 It should be noted that where preformed rope is used, greater care is required on inspection in order to detect broken wires which do not protrude from the surface of the rope.

7.4 Internal breakage of wire in ropes is difficult to detect and consequently may be a greater hazard than surface wear. The surface of the rope may show little or no wear, but if the rope is bent over a short radius, the individual wires will snap and in extreme cases the rope wires may be broken by hand. Such failures are more likely to occur in governor and compensating ropes where the ropes are lightly loaded and the ratio of sheave to rope diameter is small.

8. REPLACEMENT

8.1 When replacing suspension and compensating ropes, all ropes in a set should be replaced. All the ropes in the set should be from the same manufacturer and of the same material, grade, construction and diameter and preferably be cut from the same reel.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 $kg.m/s^2$
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V_s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 26 60 21, 27 01 31 **Telegrams : Manaksanstha**

Regional Offices:		Telephone
Western : Novelty Chambers, Grant Road	BOMBAY 400007	6 32 92 95
Eastern : 5 Chowringhee Approach	CALCUTTA 700072	27 50 90
Southern : C. I. T. Campus	MADRAS 600113	41 24 42
Northern : B69, Phase VII	S.A.S. NAGAR (MOHALI) 160051	8 78 26

Branch Offices:		
'Pushpak', Nurmohamed Shaikh Marg, Khanpur	AHMADABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	22 48 05
Gangotri Complex, Bhadbhada Road, T. T. Nagar	BHOPAL 462003	6 27 16
22E Kalpana Area	BHUBANESHWAR 751014	5 36 27
5-8-56C L. N. Gupta Marg	HYDERABAD 500001	22 10 83
R 14 Yudhister Marg, C Scheme	JAIPUR 302005	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	4 72 92
Patliputra Industrial Estate	PATNA 800013	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27