

IS : 655 - 1963
(Reaffirmed 1999)
Edition 2.3
(1991-08)

Indian Standard
SPECIFICATION FOR
METAL AIR DUCTS
(*Revised*)

(Incorporating Amendment Nos. 1, 2 & 3)

UDC 697.922

© BIS 2002

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

Price Group 2

Indian Standard
SPECIFICATION FOR
METAL AIR DUCTS
(Revised)

Refrigeration and Air Conditioning Sectional Committee, BDC 18

Chairman

SHRI J. C. KAPUR

*Representing*Air-Conditioning Corporation Ltd, Calcutta and
Air-Conditioning and Refrigeration Council of
India*Members*

SHRI MOHAN T. ADVANI

Blue Star Engineering Co (Bombay) Private Ltd,
BombaySHRI RAM D. MALANI (*Alternate*)

SHRI Y. D. AHUJA

The Economy Refrigeration and Engineering Co
Ltd, Bombay

SHRI N. BALASUBRAMANIAN

Voltas Ltd, Bombay

SHRI K. V. RAMAN (*Alternate*)

LT S. N. BHARGAVA

Naval Headquarters

SHRI S. K. BHATTACHARYA

Central Public Works Department

SHRI N. K. D. CHOUDHURY

Central Building Research Institute (CSIR),
RoorkeeSHRI B. C. RAY CHOUDHURY (*Alternate*)

SHRI S. K. CHOUDHURY

Ministry of Food & Agriculture

SHRI P. N. DEOBHAKTA

Development Wing (Ministry of Economic &
Defence Co-ordination)SHRI A. N. MUKHERJEE (*Alternate*)

SHRI K. C. JERATH

Engineer-in-Chief's Branch, Army Headquarters

SHRI G. K. KABRA

The Hyderabad Allwyn Metal Works Ltd,
Hyderabad

SHRI H. J. LENTIN

Godrej & Boyce Mfg Co (Private) Ltd, Bombay

SURG-COM M. S. MALHOTRA

Ministry of Defence (R & D)

SHRI NAUNIHAL SINGH MATHUR

National Physical Laboratory (CSIR), New Delhi;
and Indian Society of Refrigerating Engineers,
Calcutta

SHRI A. P. SHIVDASANI

Indian Society of Refrigerating Engineers,
Calcutta(*Alternate*)

SHRI S. N. MUKERJI

Government Test House, Calcutta

SHRI B. K. MUKHERJEE (*Alternate*)

SHRI AMAR SINGH NAGRA

Railway Board (Ministry of Railways)

SHRI C. B. PATEL

National Buildings Organization (Ministry of
Works, Housing & Rehabilitation)SHRI V. D. TIWARI (*Alternate*)*(Continued on page 2)*

BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI 110002

IS : 655 - 1963

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI K. N. R. PILLAI	Technical Development Circle, Indian Posts & Telegraphs, Jabalpur
SHRI K. R. D. IYENGAR (<i>Alternate</i>)	
SHRI R. BALASUBRAMANIAN (<i>Alternate</i>)	
SHRI B. J. RAMRAKHIANI	Ministry of Labour
SHRI U. S. SAVAKOOR	Directorate General of Supplies & Disposals
SHRI D. T. GURSAHANI (<i>Alternate</i>)	(Ministry of Economic & Defence Co-ordination)
DR H. C. VISVESVARAYA, Deputy Director (Bldg)	Director, ISI (<i>Ex-officio Member</i>)

Secretary

SHRI C. R. RAMA RAO
Assistant Director (Bldg), ISI

Air-Conditioning Equipment Subcommittee, BDC 18 : 4

Convener

SHRI N. BALASUBRAMANIAN Voltas Ltd., Bombay

Members

SHRI K. V. RAMAN (<i>Alternate to Shri N. Balasubramanian</i>)	
SHRI P. N. DEOBHAKTA	Development Wing (Ministry of Economic & Defence Co-ordination)
SHRI A. N. MUKHERJEE (<i>Alternate</i>)	
SHRI RAM D. MALANI	Blue Star Engineering Co (Bombay) Private Ltd, Bombay
SHRI R. N. SETH (<i>Alternate</i>)	
SHRI P. C. MALKANI	Central Public Works Department
SHRI T. A. MENDES	Electronics Limited, New Delhi
SHRI S. MITTRA	Aircon Industries Private Ltd, Bombay
SHRI A. C. OKA	Premier Automobiles Ltd, Bombay
SHRI U. S. SAVAKOOR	Directorate General of Supplies & Disposals (Ministry of Economic & Defence Co-ordination)
SHRI D. T. GURSAHANI (<i>Alternate</i>)	

Indian Standard
SPECIFICATION FOR
METAL AIR DUCTS
(*Revised*)

0. FOREWORD

0.1 This revised Indian Standard was adopted by the Indian Standards Institution on 25 March 1963, after the draft finalized by the Refrigeration and Air Conditioning Sectional Committee had been approved by the Building Division Council.

0.2 This standard was first issued in 1955 and has been generally adopted by the industry in the country. While issuing this revision the Sectional Committee responsible for the preparation of this specification has not felt the need for making any major modifications except to specify the values in metric system in place of fps values given in the original specification. This changeover to metric system has led to rationalization of the dimensions to a certain extent.

0.3 The Sectional Committee responsible for the preparation of this standard has taken into consideration the views of producers, consumers and technologists and has related the standard to the manufacturing and trade practices followed in the country in this field. Due weightage has also been given to the need for international co-ordination among standards prevailing in different countries of the world.

0.4 Wherever a reference to any Indian Standard appears in this specification it shall be taken as a reference to the latest version of the standard.

0.5 Metric system has been adopted in India and all quantities and dimensions appearing in this standard have been given in this system.

0.6 This edition 2.3 incorporates Amendment No. 2 (August 1985) and Amendment No. 3 (August 1991). Side bar indicates modification of the text as the result of incorporation of the amendments.

0.7 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 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.8 This standard is intended chiefly to cover the technical provisions relating to metal air ducts, and it does not include all the necessary provisions of a contract.

IS : 655 - 1963

1. SCOPE

1.1 This standard covers the materials and constructional requirements of metal air ducts used in air-conditioning and ventilation systems.

2. MATERIAL

2.1 Metal air ducts shall be made of either galvanized steel sheets or aluminium sheets.

2.1.1 For indoor application, galvanized steel sheets shall conform to class 4 of IS : 277-1977*.

2.1.2 For outdoor application (insulated), galvanized steel sheets shall conform to class 4 of IS : 277-1977*.

2.1.3 For outdoor application (uninsulated), galvanized steel sheets shall conform to class 3 of IS : 277-1977*.

NOTE — In case of non-availability of class 3 material any other class of material may be used, subject to agreement between the supplier and the purchaser.

2.1.4 Aluminium sheets shall be of grade S1C or NS3 specified in †IS : 737-1955 Specification for Wrought Aluminium and Aluminium Alloys, Sheet and Strip (For General Engineering Purposes).

3. THICKNESS OF SHEETS

3.1 The thickness of galvanized steel sheets and aluminium sheets used for the manufacture of ducts shall be as given in Tables I and II.

NOTE — When aluminium ducts are used in contact with steel angles, all bimetallic contacts shall be insulated either by using suitable packing material or by painting the steel with a zinc chromate paint.

4. SEAMS AND CONNECTIONS

4.1 The types of construction of seams and connections listed below used in the fabrication of air ducts shall be as illustrated in the figure specified against each item:

- a) Grooved seam (Fig. 1A)
- b) Standing seam (Fig. 1B)
- c) S-Slip (Fig. 1C)
- d) Drive slip (Fig. 1D)
- e) End slip (Fig. 1E)
- f) Bar slip (Fig. 1F)
- g) Reinforced bar slip (Fig. 1G)
- h) Pocket slip (Fig. 1H)
- j) Double seam (Fig. 1J)
- k) Pittsburgh seam (Fig. 1K)
- m) Angle connection (Fig. 1L)

*Specification for galvanized steel sheets (plain and corrugated) (*third revision*).

†Since revised.

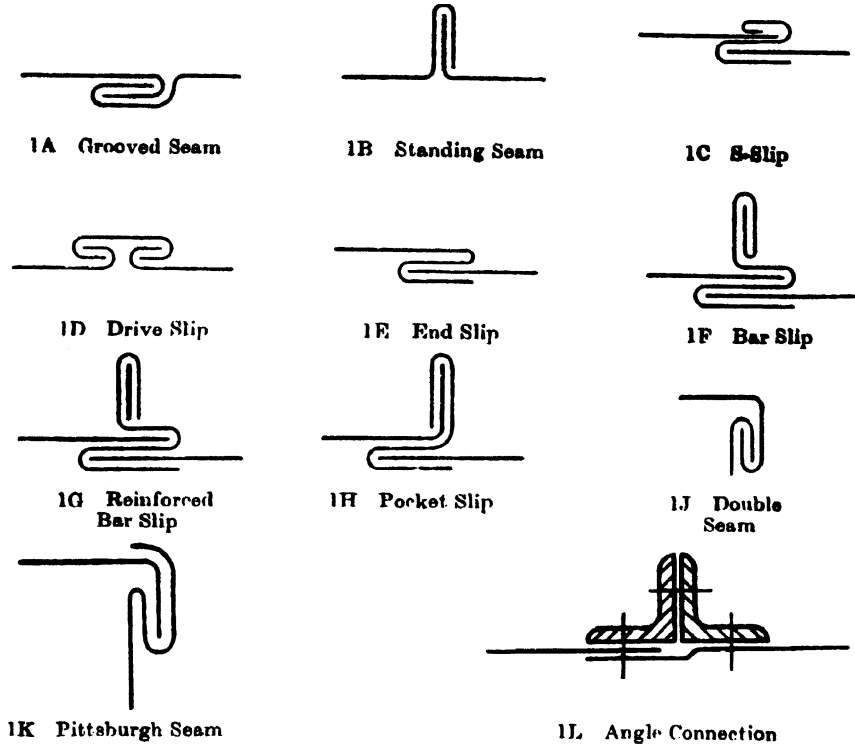


FIG. 1 TYPES OF CONSTRUCTION OF SEAMS AND CONNECTIONS

5. CONSTRUCTION OF DUCTS

5.1 Straight sections of round ducts shall be formed by rolling the sheets to the proper radius and grooving the longitudinal seam. Rectangular ducts shall be constructed by breaking the corners and grooving the longitudinal seam.

5.2 The type of slips and transverse connections for various sizes of rectangular ducts shall be chosen from those indicated in col 4 of Table I. Bracing shall be as indicated in col 5 of Table I.

5.2.1 Simple elbows and transformation sections shall be formed with Pittsburgh corner seams; complicated fittings such as double compounded elbows shall be constructed with double seam corners.

5.2.2 End slips may be used in place of S-slips if found essential. Where drive slips are used, the end slips may be applied on the narrow side of the duct and the drive slips on only the maximum side.

IS : 655 - 1963

5.3 Ducts of size 600 mm and over shall be reinforced between the joints but not necessarily at the joints. Where drive slips are used the angles shall be riveted to the duct about 50 mm from the slips.

5.3.1 Round ducts may be swedged 40 mm from the ends so that the larger end will butt against the swedge and are held in place with sheet metal screws. Where swedges are not used, the joints shall be pasted with asbestos paper to insure a tight joint.

NOTE — It is good practice to cross break or kink all flat surfaces to prevent vibration or buckling due to the air flow and accompanying variations in internal pressure.

TABLE I THICKNESS OF SHEET AND TYPE OF TRANSVERSE JOINT FOR RECTANGULAR DUCT CONSTRUCTION

(Clauses 3.1 and 5.2)

MAXIMUM SIDE	THICKNESS OF SHEET		TYPE OF TRANSVERSE JOINT CONNECTIONS	BRACING
	GI Sheets	Aluminium Sheets		
(1) mm	(2) mm	(3) mm	(4)	(5)
Up to 300	0.63	0.80	S-drive, pocket or bar slips, on 2.5 m centres	None
301 to 600	0.63	0.80	S-drive, pocket or bar slips, on 2.5 m centres	None
601 to 750			S-drive 25-mm pocket or 25-mm bar slips on 2.5 m centres	25 × 25 × 3 mm angles, 1.2 m from joint
751 to 1 000	0.80	1.00	Drive, 25-mm pocket or 25-mm bar slips, on 2.5 m centres	25 × 25 × 3 mm angles, 1.2 m from joint
1 001 to 1 500			40 × 40 mm angle connections, or 40-mm pocket or 40-mm bar slips, with 35 × 3 mm bar reinforcing on 2.5 m centres	40 × 40 × 3 mm angles, 1.2 m from joint
1 501 to 2 250	1.00	1.50	40 × 40 mm angle connections, or 40-mm pocket or 40-mm bar slips, 1 m maximum centres with 35 × 3 mm bar reinforcing	40 × 40 × 3 mm diagonal angles, or 40 × 40 × 3 mm angles, 60 cm from joint
2 251 and above*	1.25	1.80	50 × 50 mm angle connections or 40-mm pocket or 40-mm bar slips, 1 mm maximum centres with 35 × 3 mm bar reinforcing	40 × 40 × 3 mm diagonal angles, or 40 × 40 × 3 mm angles, 60 cm from joint

*Ducts 2 250 mm and larger require special field study for hanging and supporting methods.

TABLE II THICKNESS OF SHEET FOR ROUND DUCTS

(Clause 3.1)

DIAMETER OF DUCT	THICKNESS OF SHEET	
	GI Sheets	Aluminium Sheets
	(2)	(3)
(1)		
mm	mm	mm
150 to 500	0.63	0.90 or 0.80
501 ,, 750	0.80	0.90 or 0.80
751 ,, 1 000	0.80	1.25 or 1.00
1 001 ,, 1 250	1.00	1.60 or 1.50
1 251 and above	1.25	1.80

6. DIMENSIONS OF ELBOWS AND CHANGES OF SHAPE

6.1 As far as possible, long radius elbows and gradual changes in shape shall be used so as to maintain uniform velocities accompanied by decreased turbulence, lower resistance and minimum noise. The ratio of the size of duct to the radius of elbow shall be normally not less than 1 : 1.5.

6.2 Heavy canvas connections, and where there is a fire hazard, asbestos cloth connections, shall be used on both inlet and outlet to all fans.

6.3 When obstructions cannot be avoided, the duct area shall in no case be decreased by more than ten percent and a streamlined collar shall be used in all such cases. Larger obstructions shall be provided for by an increase in the duct size. Branch take-offs shall always be arranged to cut or slice into the air stream to minimize the losses in velocity head.

7. INSPECTION AND TESTING

7.1 The ducts, branches, elbows, etc, shall be inspected and the joints and connections checked before they are assembled in position.

7.2 After assembly the system shall be checked for air-tightness, vibration and noise due to turbulence.

8. MANUFACTURER'S GUARANTEE

8.1 The manufacturer shall give a guarantee for the quality of the material used and soundness of construction of the ducts, and shall be

IS : 655 - 1963

responsible for putting right any manufacturing defects for a period of twelve months from the date of inspection and approval of the duct system.

9. MARKING

9.1 Metal air ducts may be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed by Technical Committee : BDC 18 and amended by HMD 03

Amendments Issued Since Publication

Amend No.	Date of Issue
Amd. No. 1	Incorporated earlier
Amd. No. 2	August 1985
Amd. No. 3	August 1991

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002.
Telephones: 323 01 31, 323 33 75, 323 94 02

Telegrams: Manaksanstha
(Common to all offices)

Regional Offices:

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

Telephone

} 323 76 17
} 323 38 41

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi
KOLKATA 700054

} 337 84 99, 337 85 61
} 337 86 26, 337 91 20

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

} 60 38 43
} 60 20 25

Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600113

} 235 02 16, 235 04 42
} 235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093

} 832 92 95, 832 78 58
} 832 78 91, 832 78 92

Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW.
NAGPUR. NALAGARH. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM.
VISHAKHAPATNAM