



*Specification for*

**Heating and  
Ventilating  
Contractors'  
Association**

# Sheet Metal Ductwork



**DW/144**



# DW/144

## *Specification for Sheet Metal Ductwork*

*Low, medium and high  
pressure/velocity air systems*

1998

Copyright © 1998 by the  
Heating and Ventilating  
Contractors' Association

All rights reserved

ISBN 0-903783-27-4

*Further copies of this publication are available from:*

**Publications Unit**

Heating and Ventilating Contractors' Association  
Old Mansion House Eamont Bridge  
Penrith Cumbria CA10 2BX  
Tel: 01768 860405 Fax: 01768 860401  
e-mail: hvcapublications@welplan.co.uk

# THE INDUSTRY STANDARD

---



**Ken Parslow**  
*Chairman*  
*Executive Committee*  
*Ductwork Group*  
*1996-98*

---

**F**or more than a decade-and-a-half, the DW/142 *Specification for Sheet Metal Ductwork* published by the Heating and Ventilating Contractors' Association has gained national and international recognition as the industry standard against which the quality of ductwork manufacture and installation can be judged.

In recent years, however, it has become increasingly evident to the members of the HVCA Ductwork Group that the developments in technology and working practices which have taken place since the drafting of DW/142 have rendered obsolete significant parts of the document.

It was an acknowledgement of this state of affairs which led the Technical Sub-Committee of the Ductwork Group, ably chaired by Edgar Poppleton, to undertake the task of producing a radically revised specification which would promote best practice and quality standards well into the next Millennium.

This new publication — designated DW/144 — represents the direct result of that initiative.

The new specification recognises the computer age — with special reference to CAD/CAM procedures and techniques — and the international performance standards established by the Committee for European Normalisation (CEN), as well as the need to update and consolidate much of the information contained in the original DW/142 publication and its *Addendum A* companion volume.

During the drafting process, the Technical Sub-Committee has consulted widely with individuals and organisations throughout the building services and construction sectors in order to ensure that the new specification fully reflected the current the “state-of-the-art” in terms both of technical expertise and industry best practice.

I firmly believe that this process has resulted in a publication which clearly demonstrates the high level of professionalism which exists within the ductwork community — and I take this opportunity of thanking all those who have contributed to its production.

In particular, my thanks go to Edgar Poppleton and his colleagues on the Technical Sub-Committee, to Keith Elphick for the provision of invaluable technical consultancy, and to Ductwork Group secretary Gareth Keller for overseeing the project as a whole.



# MAINTAINING QUALITY

Like most industries, the ductwork sector must be prepared continually to innovate in order to survive and prosper.

A key element in that innovation process is the timely review and updating of quality standards to ensure that they continue to offer realistic benchmarks to which all professional individuals and organisations can perform.

The development of this new *Specification for Sheet Metal Ductwork* — designated DW/144 — has been carried out with that objective in mind.

In the 16 years since the publication of its predecessor, DW/142 — and in the ten years since the supplementary volume *Addendum A* appeared — many technical advances, changes in working practices and regulatory introductions and amendments have taken place.

The common performance standards for ductwork being developed by the Committee for European Normalisation (CEN), for example, had to be taken fully into account during the drafting process. Similarly, notice had to be given to the provisions of the Control of Substances Hazardous to Health (COSHH) and Construction (Design and Management) Regulations, neither of which had been issued when DW/142 was published.

It is not possible — nor, I think, desirable — to include in this foreword an exhaustive catalogue of the points of difference between this specification and its predecessor. These will clearly emerge from a detailed reading of the text.

I should, however, like to take the opportunity to highlight a few topics which I believe to be of particular significance. They are:

- the omission of high-pressure Class D (in order to conform to European practice);
- the highlighting of information to be provided by the designer;
- the end-sealing of ducts and explosion risks;
- the removal of standard sizes of rectangular ducts;
- the omission of cleated joints;
- the acceptance of proprietary flanges certificated to DW/TM1 no longer illustrated in detail;
- the consolidation into the document of coverage of hangers and supports;
- the addition of a note on linings, along with their cleaning considerations;
- the consolidated graphical representation of



**Edgar Poppleton**  
*Chairman  
Technical  
Sub-Committee  
Ductwork Group*

Class A, B and C air leakage characteristics, mandatory testing Class C only;

- updated appendices on galvanising after manufacture, stainless steel, pre-coated steel, aluminium, Eurovent and galvanised material, plus a bibliography;
- transport, handling, storage and interface with *DW/TM2 Guide to Good Practice — Internal Cleanliness of New Ductwork Installations*;
- an overview of fire-rated ductwork;
- a new appendix on inspection, servicing and cleaning access openings (the default inclusion of Level 1 should be noted);
- a new section on standard component drawings — incorporating a framework of nomenclature, and a description of drawing symbols, abbreviations and rules — which is intended to reduce ambiguity and promote common understanding;
- a rewritten description of all forms of dampers, for which I am indebted to Bill Clark and John Mawdsley of the HEVAC Association.

I take this opportunity to acknowledge the permission granted by the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) of the USA for the use of its tie rod specification (designer approval required).


And I also include a plea on behalf of ductwork constructors to be allowed to make the final choice of components and techniques within the parameters set by the designer, and allowed within this specification to satisfy performance characteristics.

It will, of course, be clear to anyone who has ever taken on such a task that the production of this specification has involved a colossal input in terms of industry consultation and from a wide variety of individuals, a number of whom I should like to identify for special mention.

They are: former Technical Sub-Committee members Keith Waldron and the late Keith Angood; current members Chris Collins, Stuart Howard, Brian James and — last but by no means least — Jim Murray; technical consultant Keith Elphick; and Ductwork Group secretary Gareth Keller.

Finally, may I remind readers of the crucial importance of ensuring that all ductwork is manufactured and installed in a manner which is safe, efficient, effective and free of risk.

The publication of DW/144 is intended to assist significantly in the achievement of this objective.





## Acknowledgements

---

The HVCA wishes to record its sincere thanks to the following members — past and present — of the Technical Sub-Committee of the Ductwork Group, who contributed their time, knowledge and experience to the production of this document

*Edgar Poppleton (chairman)*

*Keith Angood*

*Chris Collins*

*Stuart Howard*

*Brian James*

*Jim Murray*

*Keith Waldron*

Technical Consultant:

*Keith Elphick*

Ductwork Group Secretary:

*Gareth Keller*



## Other Ductwork-Related Publications

---

|        |  |
|--------|--|
| DW/143 | A Practical Guide to Ductwork Leakage Testing  |
| DW/151 | Specification for Plastic Ductwork   |
| DW/171 | Guide to Good Practice for Kitchen Ventilation Systems                               |
| DW/191 | Guide to Good Practice: Glass Fibre Ductwork   |
| DW/TM1 | Acceptance Scheme for New Products: Rectangular Cross Joint Classification           |
| DW/TM2 | Guide to Good Practice: Internal Cleanliness of New Ductwork Installations           |
| DW/TM3 | Guide to Good Practice for the Design for the Installation of Fire and Smoke Dampers |
| TR/17  | Guide to Good Practice: Cleanliness of Ventilation Systems                           |

*Copies of the above publications are available from:*

### Publications Unit

Heating and Ventilating Contractors' Association  
Old Mansion House Eamont Bridge  
Penrith Cumbria CA10 2BX  
Tel: 01768 860405 Fax: 01768 860401  
e-mail: hvcapublications@welplan.co.uk

### Previous Sheet Metal Ductwork Specifications

|         |  |      |
|---------|--|------|
| —       | Ductwork Specification for High-Velocity Air Systems (Circular)  | 1963 |
| —       | Standard Range of Rectangular Ducting  | 1967 |
| DW/131  | Sheet Metal Ductwork Specification for High-Velocity Air Systems (Rectangular)   | 1968 |
| DW/121  | Specification for Sheet Metal Ductwork (Low-Velocity Low-Pressure Air Systems) (Rectangular and Circular) — Metric                 | 1969 |
| DW/122B | Specification for Sheet Metal Ductwork (Low-Velocity Low-Pressure Air Systems) (Rectangular and Circular) — British                | 1969 |
| DW/112  | Standard Range of Rectangular Ducts and Fittings — Metric and British Units  | 1970 |
| DW/132  | Specification for Sheet Metal Ductwork (High-Velocity High-Pressure Air Systems) (Rectangular, Circular and Flat Oval) — Metric    | 1970 |
| DW/141  | Specification for Sheet Metal Ductwork (Low and High-Velocity/Pressure Air Systems) (Rectangular, Circular and Flat Oval) — Metric | 1977 |
| DW/142  | Specification for Sheet Metal Ductwork (Low, Medium and High Pressure/Velocity Air Systems)  | 1982 |
| DW/142  | Specification for Sheet Metal Ductwork Addendum A (Low, Medium and High Pressure/Velocity Air Systems)                             | 1988 |

# Contents

|  |             |  |    |
|--|-------------|--|----|
|  | <u>Page</u> |  |    |
| <b>Notes</b>   | 10          | 16.4 Fastenings  | 35 |
|  |             | 16.5 Stiffening  | 35 |
| <b>Part One - Technical Information to be provided by the designer</b> |             | 17. Construction (Straight Seamed)   | 35 |
| 1. Introduction  | 11          | 18. Fittings   | 35 |
| 2. Standards   | 11          | 18.1 General Construction Requirements   | 35 |
| 3. Components  | 11          | 18.2 Standardisation of fittings   | 35 |
| 4. Particular Requirements   | 11          |  |    |
| <b>Part Two - Standards</b>  |             | <b>Part Six - Hangers and Supports</b>   |    |
| 5. Application   | 13          | 19. General  | 43 |
| 6. Ductwork Classification and Air Leakage                             | 13          |  |    |
| 7. Materials   | 13          | <b>Part Seven - General</b>  |    |
| 8. Ductwork Construction and Joint Sealing                             | 14          | 20. Access/Inspection Openings   | 47 |
| <b>Part Three - Rectangular Ducts</b>                                  |             | 21. Regulating Dampers   | 48 |
| 9. Rectangular Duct Sizes  | 15          | 22. Fire Dampers   | 49 |
| 10. Construction   | 15          | 23. Smoke Dampers  | 50 |
| 10.1 General   | 15          | 24. Combination Smoke and Fire Dampers   | 51 |
| 10.2 Steel Thicknesses   | 15          | 25. Flexible Ducts   | 51 |
| 10.3 Longitudinal Seams  | 15          | 26. Flexible Joint/Connections   | 52 |
| 10.4 Cross Joints  | 15          | 27. Protective Finishes  | 53 |
| 10.5 Stiffeners  | 15          | 28. Connections to Building Openings   | 53 |
| 10.6 Ductwork Galvanised After Manufacture                             | 16          | 29. Internal Duct Linings  | 54 |
| 10.7 Fastenings  | 16          | 30. Thermal Insulation   | 54 |
| 11. Fittings   | 16          | 31. Kitchen Ventilation  | 54 |
| 11.1 Standardisation of Fittings                                       | 16          | 32. Fire Rated Ductwork  | 54 |
| 11.2 Stiffeners  | 16          | 33. Standard Component Drawings and Abbreviations  | 54 |
| 11.3 Splitters   | 16          |  |    |
| 11.4 Turning Vanes   | 16          | <b>Part Eight - Appendices</b>   |    |
| 11.5 Branches  | 16          | Appendix A. Air Leakage from Ductwork  | 75 |
| 11.6 Change Shapes   | 16          | Appendix B. Identification of Ductwork   | 80 |
| 11.7 Expansions and Contractions                                       | 17          | Appendix C. Guidance Notes for the Transport, Handling and Storage of Ductwork                                       | 82 |
| 11.8 Sealant   | 17          | Appendix D. Ductwork Systems and Fire Hazards  | 83 |
| <b>Part Four - Circular Ducts</b>                                      |             | Appendix E. Hot Dip Galvanizing after Manufacture  | 85 |
| 12. Standard Sizes   | 27          | Appendix F. Stainless Steel for Ductwork   | 86 |
| 13. Construction   | 27          | Appendix G. Pre-Coated Steel   | 89 |
| 13.1 Longitudinal Seams  | 27          | Appendix H. Aluminium Ductwork   | 90 |
| 13.2 Cross Joints  | 27          | Appendix J. Eurovent   | 91 |
| 13.3 Fastenings  | 27          | Appendix K. Summary of BS.EN10142: 1991 Continuously Hot-Dip Zinc Coated Mild Steel Strip and Sheet for Cold Forming | 92 |
| 14. Fittings   | 29          | Appendix L. 'Design Notes for Ductwork' (CIBSE Technical Memorandum No. 8)   | 93 |
| 14.1 Standardisation of Fittings                                       | 29          | Appendix M. Guidance Notes For Inspection, Servicing and Cleaning Access Openings                                    | 94 |
| 14.2 Nominal Diameters   | 29          | Appendix N. Bibliography   | 95 |
| 14.3 Sheet Thickness   | 29          | Appendix P. Conversion Tables  | 97 |
| 14.4 Sealing of Joints   | 29          |  |    |
| <b>Part Five - Flat Oval Ducts</b>                                     |             |  |    |
| 15. Standard Sizes and Sheet Thicknesses                               | 35          |  |    |
| 16. Construction (Spirally wound)                                      | 35          |  |    |
| 16.1 General   | 35          |  |    |
| 16.2 Longitudinal Seams  | 35          |  |    |
| 16.3 Cross Joints  | 35          |  |    |

| <b><u>List of Tables</u></b>   |  |             |  |  |
|--|--|-------------|--|--|
| <u>Table</u>   |  | <u>Page</u> |  |  |
| <b>Part Two - Standards</b>  |  |             |  |  |
| 1. Ductwork Classification and Air Leakage Limits                          |  | 13          | 13-17 Socket and spigot cross joints 22                |  |
| <b>Part Three - Rectangular Ducts</b>                                      |  |             |  |  |
| 2. Constructional Requirements Low Pressure up to 500Pa                    |  | 18          | 18-24 Stiffeners 23                                    |  |
| 3. Constructional Requirements Medium Pressure up to 1000Pa                |  | 19          | 25-28 Tie rod assembly 24                              |  |
| 4. Constructional Requirements High Pressure up to 2000Pa                  |  | 19          | 29 Hard and Easy bends 25                              |  |
| 5. Fastening Centres   |  | 24          | 30 Turning Vanes 25                                    |  |
| <b>Part Four - Circular Ducts</b>  |  |             |  |  |
| 6. Standard Sizes  |  | 27          | 31 Spiral and straight seams 29                        |  |
| 7. Spirally-Wound Ducts  |  | 28          | 32-38 Cross joints spirally wound ducts 30-31          |  |
| 8. Straight-Seamed Ducts   |  | 28          | 39-45 Cross joints straight seamed ducts 32-33         |  |
| 9. Permitted fastenings and maximum spacings                               |  | 29          | <b>Part Five - Flat Oval Ducts</b>                     |  |
| 10. Fittings Sheet Thicknesses   |  | 29          | 53-58 Cross joints spirally wound ducts 39-40          | 59-63 Cross joints straight seamed ducts 41-42       |
| <b>Part Five - Flat Oval Ducts</b>   |  |             |  |  |
| 11. Standard sizes and sheet thicknesses                                   |  | 36          | <b>Part Six - Hangers and Supports</b>                 |  |
| 12. Stiffening requirements low and medium pressures                       |  | 37          | 64-75 Horizontal ducts                                 | bearers and hangers 45-46                            |
| 13. Stiffening requirements high pressure                                  |  | 38          | 76-77 Vertical ducts supports 46                       |  |
| 14. Permitted fastenings and maximum spacings                              |  | 40          | <b>Part Seven - General</b>                            |  |
| <b>Part Six - Hangers and Supports</b>                                     |  |             |  |  |
| 15. Supports for horizontal ducts - rectangular, flat oval and circular    |  | 44          | 78-79 Fire barrier/fire damper expansion 50            | 80 Flexible joint connections 52                     |
| <b>Part Seven - General</b>  |  |             |  |  |
| 16. Standard Abbreviations   |  | 72-73       | 81-124 Standard component drawings - Rectangular 55-61 | 125-152 Standard component drawings - Circular 62-67 |
| <b>Part Eight - Appendices</b>   |  |             |  |  |
| 17. Air Leakage Rates  |  | 76          | 153-167 Standard component drawings - Flat Oval 68-70  | 168-177 Plant/equipment/miscellaneous 71             |
| 18. Recommended duct identification colours                                |  | 80          | <b>Part Eight - Appendices</b>                         |  |
| 19. Examples of further identification symbols                             |  | 81          | 178 Permitted leakage at various pressures 78          | 179 Example of duct identification symbol 81         |
| 20. Ductwork galvanized after manufacture - rectangular                    |  | 85          |  |  |
| 21. Compositions of the commonly used Stainless Steel grades               |  | 88          |  |  |
| 22. Rectangular aluminium ducts - low pressure constructional requirements |  | 90          |  |  |
| 23. Circular aluminium ducts - low pressure constructional requirements    |  | 91          |  |  |
| 24. Zinc coating mass (weight)   |  | 93          |  |  |
| 25. Access requirements for inspection, servicing and cleaning             |  | 94          |  |  |

| <b><u>List of Illustrations</u></b>   |                                   |              |
|---------------------------------------|-----------------------------------|--------------|
| <u>Figs</u>                           |                                   | <u>Pages</u> |
| <b>Part Three - Rectangular Ducts</b> |                                   |              |
| 1-8                                   | Longitudinal Seams                | 20           |
| 9                                     | Illustrations of panel stiffening | 20           |
| 10-12                                 | Flanged cross joints              | 21           |