

# ISO 14694:2003-03 (E)

## Industrial fans - Specifications for balance quality and vibration levels

---

| <b>Contents</b>                                                                                                     | <b>Page</b> |
|---------------------------------------------------------------------------------------------------------------------|-------------|
| Foreword .....                                                                                                      | iv          |
| Introduction .....                                                                                                  | v           |
| 1 Scope .....                                                                                                       | 1           |
| 2 Normative references .....                                                                                        | 2           |
| 3 Terms and definitions .....                                                                                       | 2           |
| 4 Symbols and units .....                                                                                           | 7           |
| 5 Purpose of the test .....                                                                                         | 8           |
| 6 Balance and vibration application categories (BV categories) .....                                                | 9           |
| 7 Balancing .....                                                                                                   | 10          |
| 7.1 General .....                                                                                                   | 10          |
| 7.2 Balance quality grade .....                                                                                     | 10          |
| 7.3 Calculation of permissible residual unbalance .....                                                             | 10          |
| 8 Fan vibration .....                                                                                               | 11          |
| 8.1 Measurement requirements .....                                                                                  | 11          |
| 8.2 Fan support system .....                                                                                        | 15          |
| 8.3 Fan vibration limits for tests in manufacturer's work-shop .....                                                | 15          |
| 8.4 Fan vibration limits for operation in situ .....                                                                | 15          |
| 9 Other rotating components .....                                                                                   | 16          |
| 10 Instruments and calibration .....                                                                                | 17          |
| 10.1 Instruments .....                                                                                              | 17          |
| 10.2 Calibration .....                                                                                              | 17          |
| 11 Documentation .....                                                                                              | 17          |
| 11.1 Balance .....                                                                                                  | 17          |
| 11.2 Fan vibration .....                                                                                            | 17          |
| 11.3 Certificates .....                                                                                             | 18          |
| Annex A (informative) Relationship of vibration displacement, velocity and acceleration for sinusoidal motion ..... | 20          |
| Annex B (informative) Assembly practices for balancing in a balancing machine .....                                 | 22          |
| Annex C (informative) Sources of vibrations .....                                                                   | 24          |
| Annex D (informative) Equation of vibration .....                                                                   | 30          |
| Annex E (informative) Vibration and supports .....                                                                  | 32          |
| Annex F (informative) Out of balance and bearing reactions .....                                                    | 33          |
| Annex G (informative) Condition monitoring and diagnostic guidelines .....                                          | 36          |
| Annex H (informative) Suggested relaxation of specified grades and levels .....                                     | 37          |
| Bibliography .....                                                                                                  | 38          |