

Specification for

Mechanical balancing of rotating machinery: shaft and fitment key convention

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- British Maritime Technology
- British Steel Corporation
- Electricity Supply Industry in England and Wales
- Institute of Sound and Vibration Research
- Institution of Mechanical Engineers
- Lloyds Register of Shipping
- Ministry of Defence
- Motor Industry Research Association
- Power Generation Association (BEAMA Ltd.)
- Society of British Aerospace Companies Limited
- Society of Environmental Engineers

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Aggregate Construction Materials Industries
- British Coal Corporation
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- British Railways Board
- Department of Trade and Industry (National Engineering Laboratory)
- Engineering Equipment and Materials Users' Association
- Federation of Civil Engineering Contractors
- Institute of Explosives Engineers
- Institution of Civil Engineers
- National Federation of Demolition Contractors

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National foreword

This British Standard has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee. It is identical with ISO 8821:1989 *“Balancing — Shaft and fitment key convention”*, which was prepared by Technical Committee ISO/TC 108 of the International Organization for Standardization (ISO) and in the development of which the United Kingdom played an active part.

The present practice within the UK is to use the full-key convention. It is suggested that the recommendation for the implementation of the half-key convention given in Annex A of this British Standard is followed to establish the half-key convention by 1 January 1990.

Cross-references

International Standard	Corresponding British Standard
ISO 1925:1981	BS 3851:1982 <i>Glossary of terms used in the mechanical balancing of rotating machinery</i> (Identical)

A related British Standard to ISO 773 and ISO 775, to which references are made in the text, is BS 4235 *“Specification for metric keys and keyways”* Part 1:1972 *“Parallel and taper keys”*.

The following is the introduction to ISO 8821:1989.

There are currently three methods or “conventions” for balancing shafts or rotors and their fitments coupled together with keys:

- full-key convention;
- half-key convention;
- no-key convention.

It is often impossible or economically unreasonable to balance rotors and fitments after they have been assembled; they are, therefore, balanced separately. An appropriate balance tolerance is applied to each so that, when rotor and fitment are coupled together with the appropriate key, the assembly will meet the required balance tolerance and vibration severity level. However, if a different key convention has been used when balancing the shaft or rotor than the one used for balancing the fitment, it is quite likely that the assembly will have balancing errors exceeding the permissible residual unbalance.

This International Standard is intended to unify the key conventions used throughout the world. When consistently used, it will result in compatibility of shafts or rotors and fitments so that they can be balanced by different suppliers and, after being assembled, will meet balance and/or vibration tolerance levels for that assembly.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

1.1 This International Standard specifies a single convention for balancing the individual components (shafts or rotors, and fitments) of a keyed assembly. It is intended to provide compatibility of all balanced components so that when they are assembled they will meet the overall balance and/or vibration tolerance levels for that assembly.

1.2 This International Standard requires that half keys be used when balancing the individual components of a keyed assembly to avoid the balancing errors created if full keys or no keys were used.

1.3 This International Standard applies to rotors balanced in balancing machines, in their own housings, or *in situ*. This key convention should also be applied when measuring residual unbalance and vibration severity of rotors utilizing keyways but to which the fitments have not yet been assembled.

1.4 Although the figures in this International Standard show keys of constant rectangular or square cross-section, mounted parallel to the shaft axis, this International Standard applies also to keys mounted on tapered shaft surfaces, to woodruff, gib, dowel and other special keys. The principle of the half-key convention as outlined in the definition and elsewhere is then applied as is appropriate to the particular shape and location of the special key.

1.5 This International Standard includes instructions for the implementation (see Annex A) and for the transition period that will occur as the half-key convention is adopted (see Annex B).

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard listed below. Members of IEC and ISO maintain registers of currently valid International Standards. ISO 1925:1981, *Balancing — Vocabulary*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 1925, together with the following, apply.

3.1 fitment

component without its own shaft which has to be mounted on a shaft or mandrel before its unbalance can be determined

examples include couplings, pulleys, pump impellers, blower fans and grinding wheels

NOTE A fitment becomes a rotor when it is placed on a shaft with journals (see also the definition of “rotor” in ISO 1925). This could not only be a balancing mandrel but also the shaft extension of an armature, which by itself already is a rotor. To avoid confusion between fitment and rotor, this International Standard hereafter uses only the terms fitment and shaft, whereby the latter may be any kind of shaft, for example a balancing mandrel, an armature shaft, turbine shaft, pump shaft, etc.

3.2 key; full key

locking device used to prevent rotation between a fitment and its mating component, usually a shaft

NOTE 1 Since the full key is used in the final assembly, it is often also called the final assembly key.

NOTE 2 Figure 1 shows various types of key and keyway configurations.

3.3 half key

key used in balancing, having the unbalance value of that portion of the final (full) key which will occupy either the shaft keyway or the fitment keyway in the final assembly

NOTE 1 The unbalance value of the half key for a given shaft may differ from that needed for the mating fitment (of equal keyway length) due to differences in distance from the shaft centreline, depth of keyways, and clearances.

NOTE 2 The required unbalance value for a half key may be calculated by assuming that the full key is separated into two half keys along the contoured parting line between shaft and fitment, taking half the height clearances of key and keyway in each of the key halves into consideration (see Figure 2).

4 Half-key convention

4.1 Description

The half-key convention requires that a half key be used in the shaft keyway while balancing the shaft without its fitment. A complementary half-key is used while balancing the fitment on a balancing mandrel, provided it has no keyways. If the mandrel has keyways, see the alternative methods specified in A.2.2. The axial location of the centre of gravity of the half key should be the same as that of the full key in the final assembly (see Figure C.2).

