Guide to fatigue design and assessment of steel products
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© The British Standards Institution 2015
Published by BSI Standards Limited 2015
ISBN 978 0 580 91540 6
ICS 91.080.10

The following BSI references relate to the work on this document:
Committee reference WEE/37
Drafts for comment 13/30102062 DC; 15/30329661 DC

Publication history
First edition April 1993
Second (present) edition March 2014

Amendments issued since publication

<table>
<thead>
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<th>Date</th>
<th>Text affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2015</td>
<td>See Foreword for details.</td>
</tr>
</tbody>
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Summary of pages
This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 142, an inside back cover and a back cover.
Foreword

Publishing information
This British Standard is published by BSI Standards Limited, under licence from
The British Standards Institution, and came into effect on 31 March 2014. It was
prepared by Technical Committee WEE/37, Acceptance levels for flaws in welds.
A list of organizations represented on this committee can be obtained on
request to its secretary.

Supersession

Information about this document
Guidance on general fatigue design philosophy is given in Annex A, which also
contains a brief description of the method of using this British Standard. A more
general method for assessing welded joints using the hot-spot stress, only
included previously for assessing tubular joints, is also included.

The relevant application standard or specification for the particular product
being assessed specifies the following:
a) the loading to be assumed for design purposes, including its magnitude and
frequency;
b) the required life of the structure;
c) the environmental conditions;
d) the required nominal probability of failure.

BS 7608:2014 was a full revision of the standard, and introduced the following
principal changes [1]:
• Introduction of the hot-spot stress method with guidance on finite element
stress analysis (FEA).
• New correction for both plate thickness and applied bending with
allowance for welded joint proportions.
• Additional weld details; some have been reclassified.
• Weld quality requirements based on fitness for purpose.
• Revised sea water corrosion fatigue data.
• New rules for bolts.
• Design data to resist shear fatigue failure.
• Guidance on stress calculation for combined loading.
• Revised cumulative damage rules.
• Comprehensive guidance on use of weld toe improvement methods.
• New guidance on acceptance fatigue testing and statistical analysis of
results.

European standards containing fatigue rules for steel structures and pressure
vessels have been published since the 1993 edition of this British Standard. It is
therefore not applicable to product areas covered by them. It is applicable to a
wide range of other steel product areas that do not have specific fatigue rules.

Text introduced or altered by Amendment No. 1 is indicated in the text by
tags [A] [A]. Minor editorial changes are not tagged. The principal changes are
to Table 4 to Table 10, Clause 14, Clause 16, Table 18, new Table 21, Annex C
and Annex F.
Use of this document
As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions
The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations
This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.
1 Scope

1.1 General

This British Standard gives methods for assessing the fatigue life of parts of steel products that are subject to repeated fluctuations of stress. It is applicable to all areas of industrial application that are not covered by other British Standards containing fatigue assessment rules.

**NOTE** Some British Standards have specific product acceptance tests for fatigue life, but do not have assessment rules. In such cases the guidance in this British Standard might be applicable for product development purposes.

1.2 Applications not covered

This British Standard is not applicable to the following application areas;

a) lighting columns (see BS EN 40);
b) concrete building and civil engineering structures (see BS EN 1992);
c) steel building and civil engineering structures [see BS EN 1993 (all parts)];
d) composite steel and concrete building and civil engineering structures [see BS EN 1994 (all parts)];
e) unfired pressure vessels (see BS EN 13445); and
f) fixed offshore structures (see BS EN ISO 19903).

1.3 Materials

This British Standard covers:

a) wrought steel material products;
b) welds in fully machined areas of steel casting;
c) ferritic alloy and low alloy steels;
d) austenitic and duplex stainless steels;
e) unprotected weathering steels; and
f) threaded fasteners.

It is applicable to yield strengths in the range 200 N/mm² to 960 N/mm² and ultimate tensile strengths in the range 360 to 1 200 N/mm² for material thicknesses 3 mm and greater.

This British Standard is not applicable to the following:

1) proprietary fasteners;
2) steel castings;
3) cold drawn products;
4) wire ropes; and
5) steel for reinforcement in concrete.

1.4 Manufacturing processes

This British Standard is applicable to machined products with the following exceptions:

a) rough sawn surfaces;
b) surfaces requiring high quality surface finish (e.g. lapping, polishing, honing, fine grinding); and