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## **Petroleum and natural gas industries — Formulae and calculations for the properties of casing, tubing, drill pipe and line pipe used as casing or tubing**

*Industries du pétrole et du gaz naturel — Formules et calculs relatifs  
aux propriétés des tubes de cuvelage, des tubes de production, des  
tiges de forage et des tubes de conduites utilisés comme tubes de  
cuvelage et tubes de production*



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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 5, *Casing, tubing and drill pipe*.

This second edition cancels and replaces the first edition (ISO/TR 10400:2007), which has been technically revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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## Introduction

Performance design of tubulars for the petroleum and natural gas industries, whether it is formulated by deterministic or probabilistic calculations, compares anticipated loads to which the tubular can be subjected to the anticipated resistance of the tubular to each load. Either or both of the load and resistance can be modified by a design factor.

Both deterministic and probabilistic approaches to performance properties are addressed in this document. The deterministic approach uses specific geometric and material property values to calculate a single performance property value. The probabilistic method treats the same variables as random and thus arrives at a statistical distribution of a performance property. A performance distribution in combination with a defined lower percentile determines the final design formula.

Both the well design process itself and the definition of anticipated loads are currently outside the scope of standardization for the petroleum and natural gas industries. Neither of these aspects is addressed in this document. Rather, it serves to identify useful formulae for obtaining the resistance of a tubular to specified loads, independent of their origin. It provides limit state formulae (see annexes) which are useful for determining the resistance of an individual sample whose geometric and material properties are given, and design formulae which are useful for well design based on conservative geometric and material parameters.

Whenever possible, decisions on specific constants to use in a design formula are left to the discretion of the reader.