TECHNICAL REPORT

ISO/TR 10809-1

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Cast irons —

Part 1: Materials and properties for design

Fontes —

Partie 1: Matériaux et propriétés pour la conception

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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.

ISO/TR 10809-1 was prepared by Technical Committee ISO/TC 25, *Cast irons and pig irons*.

ISO/TR 10809 consists of the following parts, under the general title *Cast irons*:

— *Part 1: Materials and properties for design*

— *Part 2: Welding*

Introduction

Worldwide cast iron production is in excess of 60 000 000 tonnes per annum. It is manufactured in a wide range of alloys and has applications in all sectors of world production and manufacture. Its use spans many industries, including automotive, oil, mining, etc.

The technology of cast irons is not widely taught or understood around the globe. This part of ISO/TR 10809 is intended to provide information about cast iron materials so that users and designers are better able to understand cast iron as a design material in its own right and correctly specify cast iron for suitable applications.

Cast irons —

Part 1:
Materials and properties for design

1 Scope

The purpose of this part of ISO/TR 10809 is to assist the designer and engineer in understanding the family of cast iron materials and to utilize them with a more complete knowledge of their potential, among the wide range of other engineering materials and fabrication methods now available. A considerable amount of the data provided are metallurgical but it is usually the metallurgical aspects of the cast irons that create misunderstandings when these materials are specified. This is because metallurgy is not one of the scientific disciplines taught to engineering students. Thus, such students often have a lack of knowledge regarding the fundamentals underpinning the material properties of cast irons. This part of ISO/TR 10809 suggests what can be achieved, what cannot be achieved and why, if and when cast irons are specified. It is not designed to be a textbook of metallurgy. It is intended to help people to choose the correct material for the right reasons and also to help to obviate the specification or expectation of unrealistic additional requirements, which are unlikely to be met and which can be detrimental to the intended application.

2 Why use cast irons as an engineering material?

The first questions that the designer and engineer will probably ask are:

— Can I use a cast iron?

— Should I use a cast iron?

— Which type and grade are applicable?

— What are the advantages?

The following sub-clauses give general information on the cast iron types currently standardized in International Standards.

2.1 Why use grey cast iron?

Grey cast iron provides the largest worldwide tonnage of all cast irons produced, mainly because of its wide range of uses within general engineering, its ease of machining, and its cost advantage. The material has the highest thermal conductivity among the range of cast irons, which is why it is used in applications where this property is important. Typical examples are automotive parts such as brake drums, discs, clutch plates, and cylinder blocks and heads. Grey cast iron lacks ductility, but for parts where requirements for ductility and impact strength are low or unimportant, a huge range of applications can be found. These include, for example, the manufacture of machine tools such as lathe beds, where slideways can easily be surface hardened and the “self-lubricating” properties of the material are advantageous. This highly versatile material should be considered for a potential application unless there are ductility issues, or the design requires ultimate strengths in excess of 300 N/mm^2.