

AREAS OF USE OF HIGH-STRENGTH CAST IRON

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Abstract

Cast iron is one of the oldest ferrous metals used commercially. It consists mainly of iron (Fe), carbon (C), and silicon (Si), but may also contain traces of sulfur (S), manganese (Mn), and phosphorus (P). It has a relatively high carbon content of 2% to 5%. It is usually brittle and inflexible (that is, it cannot be bent, stretched, or hammered into shape) and has relatively weak tensile strength. Cast iron members tend to break with small deformations. However, cast iron has excellent compressive strength and is usually used for structures that require this property. Cast iron's composition, production method, properties, and applied heat treatment are important in determining its finality.

Keywords: Cast iron, iron, deformation, excellent compressive strength, field of use.

Аннотация

Чугун является одним из старейших черных металлов, используемых в коммерческих целях. Он состоит в основном из железа (Fe), углерода (C) и кремния (Si), но может также содержать следы серы (S), марганца (Mn) и фосфора (P). Он имеет относительно высокое содержание углерода от 2% до 5%. Обычно он хрупкий и негибкий (то есть его нельзя согнуть, растянуть или придать форму молотком) и имеет относительно слабую прочность на растяжение. Чугунные элементы имеют свойство ломаться при небольших деформациях. Однако чугун обладает отличной прочностью на сжатие и обычно используется для конструкций, требующих этого свойства. Состав чугуна, способ производства, свойства и примененная термическая обработка важны для определения его качества.

Ключевые слова: Чугун, железо, деформация, отличная прочность на сжатие, область применения.



An understanding of the different types of cast iron is necessary to achieve the best casting for a particular application to match the component's requirements. The general designation of cast iron is meaningless, except to distinguish the part from steel casting. Therefore, it should be defined more clearly. According to the composition and metallurgical structure, cast iron can be divided into five groups:

- Gray cast iron,
- Ductile cast iron,
- White cast iron,
- Malleable cast iron,
- Compacted graphite iron,
- Alloy cast iron.

Cast irons have been widely used in many industrial applications, such as the water industry, for over 150 years. As a result, although the majority of water transport and distribution pipes were mainly made of cast iron in the past, they are being discontinued by the introduction of new materials. Buried cast iron pipelines deteriorate during service due to various aggressive environments surrounding the pipelines. Cast iron pipes deteriorate at different rates depending on a variety of factors, including the type of cast iron material, local geology, and operating conditions. However, it is also known that the corrosion rate of buried pipes decreases with time. This is mainly due to the formation of graphite-containing corrosion products, which firmly adhere to the unaffected metal substrate, providing a barrier and limiting the rate at which further corrosion attacks occur.

Gray cast iron is one of the most common cast irons and typically contains 2.5% to 4% carbon and 1% to 3% silicon. With proper control of the carbon and silicon content and the cooling rate, the formation of iron carbide during solidification is completely suppressed, and the graphite is formed directly from the solution in a carbon-saturated iron matrix with irregular, usually precipitates in the form of elongated and curved cracks. Gray cast iron is the oldest and most common form. As a result, many people consider it to be the only form of cast iron, and the terms "cast iron" and "gray iron" are used interchangeably. Unfortunately, the brittleness of gray iron also applies to all cast irons.

Surface finishing of cast iron products varies greatly according to the use. A few common applications:



- Electroplating
- Hot-dipping
- Thermal spraying
- Diffusion coating
- Conversion coating
- Porcelain enameling
- Liquid organic coating
- Dry powder organic coating

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