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# International Standard



# 629

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

## Steel and cast iron — Determination of manganese content — Spectrophotometric method

*Aciers et fontes — Dosage du manganèse — Méthode spectrophotométrique*

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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 629 was developed by Technical Committee ISO/TC 17, *Steel*.

It was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 629-1967, which had been approved by the member bodies of the following countries :

Australia	Hungary	South Africa, Rep. of
Austria	India	Spain
Belgium	Israel	Sweden
Brazil	Italy	Switzerland
Canada	Japan	Turkey
Chile	Korea, Rep. of	United Kingdom
Czechoslovakia	Netherlands	USA
Denmark	New Zealand	USSR
Egypt, Arab Rep. of	Norway	Yugoslavia
France	Poland	
Germany, F. R.	Romania	

The member body of the following country had expressed disapproval of the document on technical grounds :

Portugal

# Steel and cast iron — Determination of manganese content — Spectrophotometric method

## 1 Scope and field of application

This International Standard specifies a spectrophotometric method for the determination of manganese in steel and cast iron.

The method is applicable to products having manganese contents between 0,001 and 4 % (*m/m*).

## 2 Reference

ISO 377/2, *Selection and preparation of samples and test pieces of wrought steels — Part 2 : Samples and test pieces intended for the determination of the chemical composition.*<sup>1)</sup>

## 3 Principle

Dissolution of a test portion in sulphuric-phosphoric acid mixture and nitric acid. Treatment of the test solution with perchloric acid. Formation of the permanganate ion by sodium periodate.

Spectrophotometric measurement of the test solution at wavelength of about 545 nm.

## 4 Reagents

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

NOTE — Verify by blank tests that relevant reagents are free from manganese. Wherever necessary, the results should be corrected accordingly.

### 4.1 Water, free from organic matter.

Bring to the boil water acidified with 10 ml/l of sulphuric acid ( $\rho$  about 1,83 g/ml), add several crystals of sodium periodate ( $\text{NaIO}_4$ ) and keep boiling for 10 min.

### 4.2 Pure iron, free from manganese.

### 4.3 Hydrochloric acid, $\rho$ about 1,19 g/ml.

### 4.4 Nitric acid, $\rho$ about 1,40 g/ml.

### 4.5 Perchloric acid, $\rho$ about 1,67 g/ml.

NOTE — It is also possible to use perchloric acid,  $\rho$  about 1,54 g/ml. 127 ml of perchloric acid,  $\rho$  about 1,54 g/ml is equivalent to 100 ml of perchloric acid, about 1,67 g/ml.

### 4.6 Perchloric acid, diluted 1 + 499.

### 4.7 Sulphuric/phosphoric acid mixture.

To 600 ml of water add in the following order, carefully and stirring at the same time, 100 ml of sulphuric acid ( $\rho$  about 1,83 g/ml) and 150 ml of phosphoric acid ( $\rho$  about 1,71 g/ml). Cool and dilute to 1 000 ml with water.

### 4.8 Sodium periodate, 50 g/l solution.

### 4.9 Manganese, standard solution

#### 4.9.1 Stock solution

Weigh, to the nearest 0,001 g, 2,877 g of potassium permanganate, dissolve in 500 ml of water and add 10 ml sulphuric acid ( $\rho$  about 1,83 g/ml). Decolorize the solution with hydrogen peroxide [about 30 % (*m/m*)] or with a stream of sulphur dioxide. In the latter case, eliminate the excess of reagent by boiling.

After cooling, transfer the solution to a 1 000 ml one-mark volumetric flask, dilute to the mark with water and mix.

1 ml of this stock solution contains 1,00 mg of Mn.

#### 4.9.2 Standard solution A.

Transfer 100 ml of the stock solution (4.9.1) to a 1 000 ml one-mark volumetric flask and dilute to the mark with water and mix.

1 ml of standard solution A contains 0,1 mg of Mn.

#### 4.9.3 Standard solution B.

Transfer 250 ml of the standard solution A (4.9.2) to a 1 000 ml one-mark volumetric flask, dilute to the mark with water and mix.

1 ml of standard solution B contains 0,025 mg of Mn.

1) At present at the stage of draft. (Partial revision of ISO/R 377-1964.)