



TECHNICAL REPORT 4830/IV

Published 1978-04-01

ISO Technical Reports are subject to review within three years of publication, with the aim of achieving the agreements necessary for the publication of an International Standard.

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

Steel — Determination of low carbon contents — Part IV : Coulometric method after combustion

Acier — Dosage du carbone en faibles teneurs — Partie IV : Méthode coulométrique après combustion

FOREWORD

Technical Report 4830 was drawn up by Technical Committee ISO/TC 17, *Steel*, and approved by a majority of its members. The reasons which led to the publication of this document in the form of a Technical Report are given in the Introduction.

In January 1978, this document was submitted to the ISO Council, which approved its publication as a Technical Report.

CONTENTS

	Page
0 Introduction	2
1 Scope and field of application	2
2 Reference	2
3 Principle	2
4 Reagents	2
5 Apparatus	3
6 Sampling	4
7 Procedure	4
8 Special case : Carbon contents less than 0,010 %	6
9 Notes	6
10 Test report	6

Figures

1 Diagram of apparatus	7
2 Boat and cartridge (test portion support)	8

UDC 669.1 : 546.26 : 543.258

Ref. No. ISO/TR 4830/IV-1978 (E)

Descriptors : steels, low carbon steels, chemical analysis, determination of content, carbon, coulometric analysis.

© International Organization for Standardization, 1978 •

Printed in Switzerland

Price based on 8 pages

0 INTRODUCTION

Four methods for the determination of low carbon contents in steels have been examined by ISO/TC 17, namely :

- manometric (low-pressure);
- titrimetric (titration in non-aqueous medium);
- conductimetric;
- coulometric.

The results of experiments carried out in relation to these four methods have not allowed a decision to be taken on the adoption of any one of them as a standard method at the international level.

Consequently, it has been generally agreed, as a preliminary measure, to make all four methods available in the form of parts of a Technical Report, i.e. ISO/TR 4830.

1 SCOPE AND FIELD OF APPLICATION

This part of this Technical Report describes a coulometric method for the determination of low carbon contents in steels after combustion in a current of oxygen.

The method is applicable to carbon contents between 0,005 and 0,1 %.

2 REFERENCE

ISO/R 377, *Selection and preparation of samples and test pieces for wrought steel*.

3 PRINCIPLE

Combustion of a test portion at a high temperature ($> 1\,250\text{ }^{\circ}\text{C}$; see note below) in a current of pure oxygen, converting the carbon to carbon dioxide. Entrainment of the carbon dioxide by the current of oxygen, and separation from the other volatile oxides. Absorption of the carbon dioxide in a barium hydroxide solution containing barium perchlorate : during the absorption, re-establishment of the initial barium hydroxide concentration by electrolysis of the barium perchlorate, the variation in the pH of the solution being followed by a pH meter. Measurement of the quantity of electricity required for re-establishment of the initial pH, in order to deduce the quantity of barium hydroxide formed and hence the quantity of carbon dioxide neutralized.

The pH of the absorbing solution must always be equal to or greater than 9,0.

NOTE — Certain types of apparatus are incapable of obtaining the temperature of $1\,250\text{ }^{\circ}\text{C}$ necessary to comply with the requirements of this Technical Report.

4 REAGENTS

During the analysis, use only reagents of recognized analytical quality, and only distilled water or water of equivalent purity.

4.1 Industrial compressed oxygen in cylinders.

4.2 Platinized asbestos, with 10 % platinum.

4.3 Soda asbestos, granulated.

4.4 Hydrogen peroxide fixed on urea.

4.5 Magnesium perchlorate, anhydrous, granulated, or calcium sulphate, anhydrous, granulated.

4.6 Silica wool.

4.7 Barium carbonate.

4.8 Iron, with a very low carbon content ($< 0,005\text{ }\%$), in the form of chips.