Irish Standard
I.S. EN 10355:2013

Chemical analysis of ferrous materials - Inductively coupled plasma optical emission spectrometric analysis of unalloyed and low alloyed steels - Determination of Si, Mn, P, Cu, Ni, Cr, Mo and Sn, following dissolution with nitric and sulphuric acids

I.S. EN 10355:2013

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:

This document is based on:
EN 10355:2013

Published:
20 August, 2013

This document was published under the authority of the NSAI and comes into effect on:
20 August, 2013

ICS number:
77.040.30

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie

W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

I.S. EN 10355:2013

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 10355

August 2013

ICS 77.040.30

English Version

Chemical analysis of ferrous materials - Inductively coupled plasma optical emission spectrometric analysis of unalloyed and low alloyed steels - Determination of Si, Mn, P, Cu, Ni, Cr, Mo and Sn, following dissolution with nitric and sulphuric acids [Routine method]

Analyse chimique des matériaux ferreux - Analyse des aciers non alliés et faiblement alliés par spectrométrie d'émission optique avec source à plasma induit - Détermination de Si, Mn, P, Cu, Ni, Cr, Mo et Sn, après mise en solution par les acides nitrique et sulfurique [Méthode de routine]

Chemische Analyse von Eisenwerkstoffen - Analyse von unlegierten und niedrig legierten Stählen mittels optischer Emissionsspektrometrie mit induktiv gekoppeltem Plasma - Bestimmung von Si, Mn, P, Cu, Ni, Cr, Mo und Sn nach Lösen in Salpeter- und Schwefelsäure [Routineverfahren]

This European Standard was approved by CEN on 29 June 2013.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 10355:2013: E

Contents

Page

Foreword 3

1 Scope 4

2 Normative references 4

3 Principle 5

4 Reagents 5

5 Apparatus 7

6 Sampling 7

7 Sample solution preparation 7

8 Calibration process 9

9 Determination 11

10 Expression of results 14

11 Precision 14

12 Test report 17

Annex A (informative) **Plasma optical emission spectrometer — Suggested performance criteria to be checked** 18

Annex B (normative) **Synoptic of the operations related to Clause 9** 22

Annex C (informative) **Composition of the test samples used for the validation precision test** 23

Annex D (informative) **Detailed results obtained from the validation precision test** 24

Annex E (informative) **Graphical representation of the precision data** 32

Bibliography 39

Foreword

This document (EN 10355:2013) has been prepared by Technical Committee ECISS/TC 102 “Methods of chemical analysis for iron and steel”, the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2014, and conflicting national standards shall be withdrawn at the latest by February 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies an inductively coupled plasma optical emission spectrometry routine method for the analysis of unalloyed and low alloyed steels, whose iron content shall be at least 95 %. This standard differs from the similar standard EN 10351:2011 in that it is optimised for the determination of silicon.

This method is applicable to the elements listed in Table 1 within the ranges shown.

The sample preparation described may not completely dissolve samples having a combination of high chromium and substantial carbon. Incomplete dissolution may also affect the determination of manganese and molybdenum in these samples. For this reason, the scope of the method is limited to chromium contents ≤ 0,9 %, whereas the scope of EN 10351 covers a range of up to 1,6 % chromium.

Table 1 — Application ranges

Element	Mass fraction %	
	min.	max.
Si	0,020	0,45
Mn	0,005	1,40
P	0,005	0,10
Cu	0,005	0,60
Ni	0,010	2,00
Cr	0,010	0,90
Mo	0,005	0,60
Sn	0,010	0,10

NOTE For tin, see NOTE 2 under Clause 11.

In all cases, the ranges specified can be extended or adapted (after validation) for the determination of other mass fractions, provided that the iron content in the samples under concern is above 95 %.

Other elements may be included. However such elements and their mass fractions should be carefully checked, taking into account the possible interferences, the sensitivity, the resolution and the linearity criteria of each instrument and each wavelength.

Depending also on the sensitivity of each instrument, suitable dilutions of the calibration and the test sample solutions may be necessary.

Moreover, even if the method described is "multi elemental", it is not absolutely necessary to carry out the determination of all the elements of its scope simultaneously. The measurement conditions have to be optimised by each laboratory, depending on the performances of each apparatus available.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 648, *Laboratory glassware — Single-volume pipettes (ISO 648)*

EN ISO 1042, *Laboratory glassware — One-mark volumetric flasks (ISO 1042)*