



National Standards Authority of Ireland

IRISH STANDARD

**I.S. EN 13925-2:2003**

ICS 19.100

**NON-DESTRUCTIVE TESTING - X-RAY  
DIFFRACTION FROM POLYCRYSTALLINE  
AND AMORPHOUS MATERIALS - PART 2:  
PROCEDURES**

National Standards  
Authority of Ireland  
Dublin 9  
Ireland

Tel: (01) 807 3800  
Tel: (01) 807 3838

*This Irish Standard was  
published under the  
authority of the National  
Standards Authority of  
Ireland  
and comes into effect on:  
July 14, 2003*

**NO COPYING WITHOUT NSAI  
PERMISSION EXCEPT AS  
PERMITTED BY COPYRIGHT  
LAW**

© NSAI 2003

**Price Code H**

Údarás um Chaighdeán Náisiúnta na hÉireann



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13925-2**

March 2003

ICS 19.100

English version

**Non-destructive testing - X-ray diffraction from polycrystalline  
and amorphous materials - Part 2: Procedures**

Essais non destructifs - Diffraction des rayons X appliquée  
aux matériaux polycristallins et amorphes - Partie 2:  
Procédures

Zerstörungsfreie Prüfung - Röntgendiffraktometrie von  
polykristallinen und amorphen Materialien - Teil 2:  
Verfahrensabläufe

This European Standard was approved by CEN on 29 November 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

## Contents

	page
Foreword .....	3
Introduction .....	4
1 Scope .....	4
2 Normative references .....	5
3 Terms and definitions .....	5
4 Specimen preparation .....	5
4.1 General preparation .....	5
4.2 Block specimens .....	8
4.3 Powder specimens .....	9
4.4 Analysis of small quantities of sample .....	11
4.5 Reactive samples and non-ambient conditions .....	11
5 Data collection .....	12
5.1 General considerations .....	12
5.2 Angular range and mode of data collection .....	12
5.3 Parameters relevant to the quality of collected data .....	12
6 Data processing and analysis .....	13
6.1 Background .....	13
6.2 Peak searching .....	13
6.3 Pattern decomposition into individual line profiles including background subtraction .....	14
6.4 Phase identification .....	15
6.5 Indexing .....	15
6.6 Lattice parameter refinement .....	15
6.7 Other types of analysis .....	16
Annex A (informative) Relationship between the XRPD standards .....	17
Annex B (informative) Example of Report Form .....	18
Annex C (informative) Scheme of a typical procedure for XRPD measurements .....	19
Annex D (informative) Some analytical functions used for profile fitting .....	20
Annex E (informative) Some methods for testing the internal consistency of XRPD data .....	21
E.1 General .....	21
E.2 Figures of Merit for FWHMs and intensities .....	21
E.3 Figures of Merit for line positions and lattice parameters .....	22
Bibliography .....	23

## **Foreword**

This document (EN 13925-2:2003) has been prepared by Technical Committee CEN/TC 138 "Non destructive testing", the secretariat of which is held by AFNOR.

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 September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

This European Standard about "Non destructive testing - X-ray diffraction from polycrystalline and amorphous material" is composed of:

- EN 13925-1 General principles;
- EN 13925-2 Procedures;
- prEN 13925-3 Instruments;
- prEN 13925-4 Reference materials.

In order to explain the relationships between the topics described in the different standards, a diagram illustrating typical operations involved in XRPD analysis is given in annex A.

Annexes A to E are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## EN 13925-2:2003 (E)

### Introduction

X-ray powder diffraction (XRPD) is a powerful Non Destructive Testing (NDT) method for determining a range of physical and chemical characteristics of materials. These include the type and quantities of phases present, the crystallographic unit cell and structure, crystallographic texture, macrostress, crystallite size and microstrain, and the electron radial distribution function.

This standard aims to describe the general aspects of the XRPD technique and its applications but not to define a specific or detailed standard for each field of application or type of analysis.

The main purposes of the standard are therefore:

- to provide practical guidance, unified concepts and terminology for use of the XRPD technique in the area of Non Destructive Testing with general information about its capabilities and limitations of relevance to laboratories working at different levels of sophistication, from routine testing to research;
- to provide a basis for Quality Assurance in XRPD laboratories allowing performance testing and monitoring of instruments as well as the comparison of results from different instruments;
- to provide a general basis (without imposing specifications) for further specific NDT product standards and related Quality Assurance applications, with aspects common to most fields of application.

In order to make the standard immediately usable in a wide range of laboratories and applications, diffractometers with Bragg-Brentano geometry are considered in more details than the diffractometers using other geometries.

**Radiation Protection.** Exposure of any part of the human body to X-rays can be injurious to health. It is therefore essential that whenever X-ray equipment is used, adequate precautions should be taken to protect the operator and any other person in the vicinity. Recommended practice for radiation protection as well as limits for the levels of X-radiation exposure are those established by national legislation in each country. If there are no official regulations or recommendations in a country, the latest recommendations of the International Commission on Radiological Protection should be applied.

### 1 Scope

This European Standard specifies the basic procedures applied in the X-ray Powder Diffraction (XRPD) method. Many of these procedures are common to most types of diffractometer used and types of analysis mentioned in EN 13925-1. In the interests of clarity and immediate usability more details are given for procedures using instruments with Bragg-Brentano geometry and application to phase identification. Aspects of specimen preparation and data quality assessment are included, but the standard remains non-exhaustive. It is anticipated that particular standards will address specific fields of application in more details.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-