ISO 3082:2009-06 (E)

Iron ores - Sampling and sample preparation procedures

Contents

Page

Foreword vi

1 Scope 1

2 Normative references 1

3 Terms and definitions 2

4 General considerations for sampling and sample preparation 4
4.1 Basic requirements 4
4.2 Establishing a sampling scheme 4
4.3 System verification 5

5 Fundamentals of sampling and sample preparation 6
5.1 Minimization of bias 6
5.1.1 General 6
5.1.2 Minimization of particle size degradation 6
5.1.3 Extraction of increments 6
5.1.4 Increment mass 7
5.2 Overall precision 8
5.3 Quality variation 10
5.4 Sampling precision and number of primary increments 11
5.4.1 Mass-basis sampling 11
5.4.2 Time-basis sampling 11
5.5 Precision of sample preparation and overall precision 12
5.5.1 General 12
5.5.2 Preparation and measurement of gross sample 12
5.5.3 Preparation and measurement of partial samples 12
5.5.4 Preparation and measurement of each increment 13

6 Methods of sampling 13
6.1 Mass-basis sampling 13
6.1.1 Mass of increment 13
6.1.2 Quality variation 14
6.1.3 Number of primary increments 14
6.1.4 Sampling interval 14
6.1.5 Methods of taking increments 14
6.2 Time-basis sampling 15
6.2.1 Mass of increment 15
6.2.2 Quality variation 15
6.2.3 Number of increments 15
6.2.4 Sampling interval 15
6.2.5 Methods of taking increments 15
6.3 Stratified random sampling within fixed mass or time intervals 16
6.3.1 Fixed mass intervals 16
6.3.2 Fixed time intervals 16

7 Sampling from moving streams 16
7.1 General 16
7.2 Safety of operations 17
7.3 Robustness of sampling installation 17
7.4 Versatility of sampling system 17

7.5 Primary samplers ... 18
7.5.1 Location ... 18
7.5.2 Types of primary sampler ... 18
7.5.3 General design criteria for primary cutters ... 18
7.5.4 Cutter aperture of primary sampler ... 22
7.5.5 Cutter speed of primary sampler ... 22
7.6 Secondary and subsequent samplers ... 23
7.7 On-line sample preparation ... 23
7.7.1 Arrangement for sample preparation ... 23
7.7.2 Crushers ... 23
7.7.3 Dividers ... 23
7.7.4 Dryers ... 27
7.8 Checking precision and bias ... 27
7.9 Cleaning and maintenance ... 27
7.10 Example of a flowsheet ... 27

8 Sampling from stationary situations ... 29
8.1 General ... 29
8.2 Sampling from wagons ... 29
8.2.1 Sampling devices ... 29
8.2.2 Number of primary increments ... 30
8.2.3 Method of sampling ... 30
8.3 Sampling from ships, stockpiles and bunkers ... 30

9 Stopped-belt reference sampling ... 30

10 Sample preparation ... 31
10.1 Fundamentals ... 31
10.1.1 General ... 31
10.1.2 Drying ... 32
10.1.3 Crushing and grinding ... 32
10.1.4 Mixing ... 32
10.1.5 Sample division ... 33
10.1.6 Mass of divided sample ... 33
10.1.7 Split use and multiple use of sample ... 36
10.2 Method of constituting partial samples or a gross sample ... 36
10.2.1 General ... 36
10.2.2 Method of constitution for mass-basis sampling ... 36
10.2.3 Method of constitution for time-basis sampling ... 38
10.2.4 Special procedure for moisture content ... 38
10.3 Mechanical methods of division ... 39
10.3.1 Mechanical increment division ... 39
10.3.2 Other mechanical division methods ... 40
10.4 Manual methods of division ... 40
10.4.1 General ... 40
10.4.2 Manual increment division ... 40
10.4.3 Manual riffle-division method ... 43
10.5 Preparation of test samples for chemical analysis ... 43
10.5.1 Mass and particle size ... 43
10.5.2 Preparation to - 250 µm ... 46
10.5.3 Final preparation ... 46
10.5.4 Grinding to -100 µm or -160 µm ... 47
10.5.5 Distribution of samples for chemical analysis ... 48
10.6 Preparation of test samples for moisture determination ... 48
10.7 Preparation of test samples for size determination ... 49
10.8 Preparation of test samples for physical testing ... 49
10.8.1 Selection of sample preparation procedure ... 49
10.8.2 Extraction of test samples ... 49
10.8.3 Reserve samples ... 58
11 Packing and marking of samples ... 58

Annex A (informative) Inspection of mechanical sampling systems ... 59

Annex B (normative) Equation for number of increments 67

Annex C (informative) Alternative methods of taking the reference sample 70

Annex D (normative) Procedure for determining the minimum mass of divided gross sample for size determination using other mechanical division methods 76

Annex E (normative) Riffle dividers 79

Bibliography 81