

# DIN EN 10247:2007-07 (E)

## Micrographic examination of the non-metallic inclusion content of steels using standard pictures

---

<b>Contents</b>		<b>Page</b>
Foreword .....		5
Introduction .....		6
1	Scope .....	7
2	Normative references .....	7
3	Principles .....	7
4	Terms and definitions .....	8
4.1	General .....	8
4.2	Proximity .....	9
4.3	Parameters .....	9
4.4	Classes .....	10
4.5	Others .....	10
5	Symbols and abbreviations .....	11
6	Sampling .....	13
6.1	General .....	13
6.2	Minimum reduction .....	13
6.3	Size and location of test area .....	13
6.4	Number of specimens .....	14
6.5	Preparation of specimens .....	14
7	Test method .....	14
7.1	Magnification .....	14
7.2	Field of view .....	15
7.3	Definition of the pictures of the chart .....	15
7.3.1	Size and Shape .....	15
7.3.2	Parameters .....	15
7.3.3	Arrangement of the pictures .....	15
7.4	Procedure .....	15
7.4.1	General .....	15
7.4.2	Several inclusions of mixed sizes in one field .....	16
7.4.3	Scanning .....	16
7.4.4	Assessment and evaluation .....	16
7.4.5	Evaluation of different types of inclusions .....	17
7.4.6	Default assumptions .....	17
7.4.7	Recording of results .....	17
8	Types of assessment .....	17
8.1	Worst inclusion method: method P .....	17
8.1.1	Principle .....	17
8.1.2	Evaluation of PL (worst length) .....	17
8.1.3	Evaluation of Pd (worst diameter) .....	18
8.1.4	Evaluation of Pa (worst area) .....	18
8.2	Worst field method: method M .....	18
8.2.1	Principle .....	18
8.2.2	Evaluation of Mn (rating according to number) .....	18

8.2.3	Evaluation of ML (rating according to length) .....	18
8.2.4	Evaluation of Md (rating according to diameter) .....	18
8.2.5	Evaluation of Ma (rating according to area) .....	18
8.3	Average field method: method K .....	19
8.3.1	Principle .....	19
8.3.2	Scanning of a specimen for average field assessment .....	19
8.3.3	Evaluation .....	20
8.3.4	Evaluation of Kn, KL for elongated and Kn, Kd for globular inclusions .....	20
8.3.5	Evaluation of Kn and Ka .....	20
9	Test report .....	21
Annex A (normative) Type of inclusions .....		34
Annex B (normative) Parameters and assessments to be used if not otherwise specified .....		36
Annex C (informative) Examples for inclusions of different types .....		37
Annex D (informative) Shape factor .....		41
Annex E (informative) Examples for magnification .....		42
Annex F (informative) Details of the eyepiece graticules .....		44
Annex G (normative) Manufacturing of eyepiece graticule .....		45
G.1	General .....	45
G.2	Narrow field microscopes .....	45
G.3	Broad field microscopes .....	46
Annex H (normative) Calculation basis for the pictures of the chart .....		49
Annex K (normative) Rules for classification .....		51
K.1	Definition of classes .....	51
K.2	Classification of length .....	51
K.3	Classification of width .....	51
K.4	Classification of diameter .....	51
K.5	Classification of area .....	52
Annex L (informative) Comparison of inclusion types in different standards .....		53
Annex M (informative) Worst inclusion assessment .....		54
Annex N (informative) Worst field assessment .....		56
N.1	General .....	56
N.2	Evaluation of Mn .....	56
N.3	Evaluation of Mn, ML and Md .....	56
N.4	Evaluation of Mn and Ma .....	57
Annex P (informative) Average field assessment .....		60
P.1	General .....	60
P.2	Evaluation of Kn, KL and Kd .....	60
P.3	Evaluation of Kn and Ka .....	60
P.4	Restricted values .....	60
Annex Q (normative) Calculation basis for the assessment .....		69
Q.1	Worst inclusion assessment .....	69
Q.2	Worst field assessment .....	69

Q.2.1	Calculation of Mn .....	69
Q.2.2	Calculation of ML .....	69
Q.2.3	Calculation of Md .....	70
Q.2.4	Calculation of Ma .....	70
Q.3	Average field .....	70
<b>Annex R (normative) Determination of precision and scanning parameters for average field assessment .....</b>		<b>72</b>
<b>Annex S (informative) Edge Errors correction .....</b>		<b>75</b>
S.1	General .....	75
S.2	Field by field measurement .....	75
<b>Annex T (normative) Calculation of average values of parameters for one class .....</b>		<b>77</b>
<b>Annex U (normative) Average values of parameters .....</b>		<b>79</b>
<b>Annex V (informative) Comments of the working group .....</b>		<b>80</b>
V.1	General .....	80
V.2	Length .....	80
V.3	Width .....	80
V.4	Number .....	80
V.5	Resolution .....	80
V.6	Area .....	81
V.7	Description of inclusions .....	81
V.8	Globular particles .....	82
V.9	Shape factor .....	82
V.10	Combined inclusions .....	83
V.11	Measuring frame .....	83
<b>Bibliography .....</b>		<b>84</b>