DIN EN 13001-3-8:2026-07 (E)

Cranes - General design - Part 3-8: Limit states and proof competence of machinery - Shafts

Contents

Page

European foreword 4

Introduction 5

1 Scope 6

2 Normative references 6

3 Terms and definitions, symbols and abbreviations 7
3.1 Terms and definitions 7
3.2 Symbols and abbreviations 7

4 Safety requirements 11
4.1 General 11
4.2 Materials 11
4.2.1 Grades and qualities for shafts 11
4.2.2 Impact toughness 19
4.3 Mechanism components - Shafts 19
4.3.1 General 19
4.3.2 Shafts for plain bearings 19

5 Proof of competence for shafts 19

6 Proof of static strength 20
6.1 General 20
6.2 Design stresses 20
6.3 Limit design stresses 21
6.4 Execution of the proof 21

7 Proof of fatigue strength 22
7.1 General 22
7.2 Stress life approach: S-N procedure 23
7.2.1 Design stress 23
7.2.2 Limit design fatigue stress Rd,f 28
7.3 Execution of the proof of fatigue strength 34
7.3.1 Individual proof 34
7.3.2 Simplified proof 34
7.3.3 Proof for multiaxial loading 35

Annex A (informative) Values for the notch factor f1 36

A.1 General 36
A.2 Examples of notch factors 37

Annex B (informative) -N procedure: the strain life approach 47

B.1 General 47
B.2 Origin of the strain life approach resistance curve 47
B.3 Determination of the strain life approach resistance curve for a steel grade 49
B.4 Determination of the resistance curve for a machinery component 51
B.5 Strain-life approach: -N method 52

B.6 Strain-life approach (-N procedure): proof of fatigue strength of a shaft (example) 59

Annex C (informative) Examples for the determination of predetermined values of ^n and sk 65

C.1 General 65
C.2 Rope drum shaft 65
C.3 Travel and traverse wheel shaft 68
C.4 Guide roller axles 69
C.5 Sheave axle 70

Annex D (informative) Overview of standards published by CEN/TC 147 71

D.1 General 71
D.2 Selecting a suitable standard 71

Annex E (informative) List of significant hazards 73

Bibliography 74