DIN EN ISO 3506-5:2024-02 (E)

Fasteners - Mechanical properties of corrosion-resistant stainless steel fasteners - Part 5: Special fasteners (also including fasteners from nickel alloys) for high temperature applications (ISO 3506-5:2022)

Contents

Page

European foreword ... **4**

Foreword ... **5**

Introduction ... **6**

1 Scope ... **7**

2 Normative references ... **8**

3 Terms and definitions ... **8**

4 Symbols ... **10**

5 Designation system for fasteners made from stainless steels and nickel alloys ... **11**

6 Materials and manufacture ... **11**
6.1 Chemical composition ... 11
6.2 Heat treatment for fasteners ... 13
6.3 Finish ... 14
6.4 Design of bolt/nut assemblies ... 15
6.5 Service temperatures for fasteners ... 16

7 Mechanical and physical properties ... **16**
7.1 Mechanical properties of bolts, screws and studs ... 16
7.2 Mechanical properties of nuts ... 20

8 Applicability of test methods and inspection ... **21**
8.1 Applicability of test methods ... 21
8.2 Manufacturer's inspection ... 22
8.3 Supplier's inspection ... 22
8.4 Purchaser's inspection ... 22
8.5 Delivery of test results ... 22

9 Test methods at ambient temperature ... **23**
9.1 Tensile test for bolts, screws and studs at ambient temperature ... 23
9.1.1 General ... 23
9.1.2 Applicability ... 23
9.1.3 Apparatus and testing device ... 23
9.1.4 General test procedure ... 24
9.1.5 Test procedure for the simultaneous determination of R_{mf}, R_{pf}, and A ... 25
9.1.6 Reference test procedure for the determination of stress at 0,2 % non-proportional elongation, R_{pf} ... 26
9.1.7 Alternative test procedure for the determination of elongation, A ... 27
9.1.8 Test results and requirements for tensile strength, R_{mf} ... 28
9.1.9 Test results and requirements for stress at 0,2 % non-proportional elongation, R_{pf} ... 29
9.1.10 Test results and requirements for elongation after fracture, A ... 29
9.2 Hardness test for bolts, screws and studs ... 29
9.2.1 General ... 29
9.2.2 Test procedure ... 29
9.2.3 Test results and requirements for hardness ... 30
9.3 Proof load test for nuts ... 30
9.3.1 General ... 30

9.3.2 Applicability 30
9.3.3 Apparatus and testing device 30
9.3.4 Test procedure 31
9.3.5 Additional testing procedure for prevailing torque nuts 32
9.3.6 Test results and requirements for nut proof load 33
9.4 Hardness test for nuts 33
9.4.1 General 33
9.4.2 Test procedure 33
9.4.3 Test results and requirements for nut hardness 34
10 Test methods at high temperature 34
10.1 High temperature tensile test for bolts, screws, studs and nuts 34
10.1.1 General 34
10.1.2 Test apparatus 34
10.1.3 Test procedure 35
10.1.4 Test report 36
10.2 High temperature stress rupture test for bolts, screws, studs and nuts 37
10.2.1 General 37
10.2.2 Test apparatus and testing device 37
10.2.3 Test procedure 38
10.2.4 Test report 38
10.3 Relaxation test for bolts, screws, studs and nuts 39
10.3.1 General 39
10.3.2 Bolted joint models 39
10.3.3 Test apparatus and measuring devices 40
10.3.4 Test procedure 40
10.3.5 Test results 41
10.3.6 Test report 41
10.4 Creep test 42
11 Fastener marking and labelling 42
11.1 General requirements for marking 42
11.2 Manufacturer's identification mark 43
11.3 Marking on the fasteners 43
11.3.1 Hexagon head bolts and screws and hexagon nuts 43
11.3.2 Hexagon socket and hexalobular socket bolts and screws 44
11.3.3 Other types of bolts, screws and nuts 44
11.3.4 Studs (one-end and double-end studs) 44
11.3.5 Fully threaded studs 44
11.3.6 Left-hand thread marking 45
11.4 Marking of the packages (labelling) 45
Annex A (informative) **Tempering of martensitic stainless steels 46**
Bibliography 48