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Contents

Page

1 Scope . . . 1
2 Normative References . . . 1
3 Terms and Definitions . . . 2
4 General Design Information . . . 4
4.1 Information Required . . . 4
4.2 Limitations for Design Procedures . . . 5
5 Design . . . 6
5.1 General . . . 6
5.2 Equation for Stress . . . 8
5.3 Elastic Design . . . 8
5.4 Rupture Design . . . 9
5.5 Intermediate Temperature Range . . . 9
5.6 Minimum Allowable Thickness . . . 9
5.7 Minimum and Average Thicknesses . . . 9
5.8 Equivalent Tube Metal Temperature . . . 10
5.9 Component Fittings . . . 14
6 Allowable Stresses . . . 16
6.1 General . . . 16
6.2 Elastic Allowable Stress . . . 16
6.3 Rupture Allowable Stress . . . 16
6.4 Rupture Exponent . . . 17
6.5 Yield and Tensile Strengths . . . 17
6.6 Larson-Miller Parameter Curves . . . 17
6.7 Limiting Design Metal Temperature . . . 17
6.8 Allowable Stress Curves . . . 18
7 Sample Calculations . . . 22
7.1 Elastic Design . . . 22
7.2 Thermal-stress Check (for Elastic Range Only) . . . 24
7.3 Rupture Design with Constant Temperature . . . 27
7.4 Rupture Design with Linearly Changing Temperature . . . 30

Annex A (informative) **Estimation of Allowable Skin Temperature, Tube Retirement Thickness, and Remaining Life** . . . A-1

Annex B (informative) **Calculation of Maximum Radiant Section Tube Skin Temperature** . . . B-1

Annex C (normative) **Thermal-stress Limitations (Elastic Range)** . . . C-1

Annex D (informative) **Calculation Sheets** . . . D-1

Annex E (normative) **Stress Curves and Data Tables (SI Units)** . . . E-1

Annex F (normative) **Stress Curves and Data Tables (USC Units)** . . . F-1

Annex G (informative) **Derivation of Corrosion Fraction and Temperature Fraction** . . . G-1

Annex H (informative) **Data Sources** . . . H-1

Bibliography . . . Bib-1

Contents

Page

Figures

1 Corrosion Fraction 7
2 Temperature Fraction 11
3 Return Bend and Elbow Geometry 14
4 Sample Calculation for Elastic Design 23
5 Sample Calculation for Rupture Design (Constant Temperature) 29
6 Sample Calculation for Rupture Design (Changing Temperature) 33
A.1 Tube Metal Temperature Limit Process Logic Map A-2
A.2a Retirement Thickness Determination Process Logic Map A-4
A.2b Retirement Thickness Determination Process Logic Map (Continued) A-5
A.2c Retirement Thickness Determination Process Logic Map Continued A-6
B.1 Ratio of Maximum Local to Average Heat Flux B-6
E.1 Stress Curves (SI Units) for ASTM A192 Low-carbon Steels E-5
E.2 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A192 Low-carbon Steels E-6
E.3 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A192 Low-carbon Steels E-7
E.4 Stress Curves (SI Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels E-9
E.5 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels E-10
E.6 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels E-11
E.7 Stress Curves (SI Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels E-13
E.8 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels E-14
E.9 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels E-15
E.10 Stress Curves (SI Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels E-17
E.11 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels E-18
E.12 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels E-19
E.13 Stress Curves (SI Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels E-21
E.14 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels E-22
E.15 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels E-23
E.16 Stress Curves (SI Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels E-25
E.17 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels E-26
E.18 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels E-27
E.19 Stress Curves (SI Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels E-29
E.20 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels E-30
E.21 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels E-31

Contents

Page

E.22 Stress Curves (SI Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels E-33
E.23 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels E-34
E.24 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels E-35
E.25 Stress Curves (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels E-37
E.26 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels. E-38
E.27 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels. E-39
E.28 Stress Curves (SI Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels E-41
E.29 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels E-42
E.30 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels E-43
E.31 Stress Curves (SI Units) for ferritic steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) E-45
E.32 Rupture Exponent vs. Temperature Curve (SI Units) for ferritic steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) E-46
E.33 Larson-Miller Parameter vs. Stress Curve (SI Units) for ferritic steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) E-47
E.34 Stress Curves (SI Units) for ferritic steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115). E-49
E.35 Rupture Exponent vs. Temperature Curve (SI Units) for ferritic steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115). E-50
E.36 Larson-Miller Parameter vs. Stress Curve (SI Units) for Ferritic Steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115) E-51
E.37 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels. E-53
E.38 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels E-54
E.39 Larson-Miller Parameter vs. Stress Curve (SI Units) for A213, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels. E-55
E.40 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 304L (18Cr-8Ni) Stainless Steels E-57
E.41 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 304L (18Cr-8Ni) Stainless Steels E-58
E.42 Larson-Miller Parameter vs. Stress Curve (SI Units) for A213, ASTM A312, and ASTM 376 TP 304L (18Cr-8Ni) Stainless Steels E-59
E.43 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 316 and 316H (16Cr-12Ni-2Mo) Stainless Steels E-61
E.44 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 316 and 316H (16Cr-12Ni-2Mo) Stainless Steels E-62
E.45 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 316 and 316H (16Cr-12Ni-2Mo) Stainless Steels E-63

Contents

Page

E.46 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASMT A379 TP316L (18Cr-8Ni-2Mo) Stainless Steels E-65
E.47 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP316L Stainless Steels E-66
E.48 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP316L Stainless Steels E-67
E.49 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM A379 TP317L (18Cr-8Ni-3Mo) Stainless Steels E-69
E.50 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP317L Stainless Steels E-70
E.51 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP317L Stainless Steels E-71
E.52 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321 (18Cr-10Ni-Ti) Stainless Steels E-73
E.53 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321 (18Cr-10Ni-Ti) Stainless Steels E-74
E.54 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321 (18Cr-10Ni-Ti) Stainless Steels E-75
E.55 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321H (18Cr-10Ni-Ti) Stainless Steels E-77
E.56 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321H (18Cr-10Ni-Ti) Stainless Steels E-78
E.57 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321H (18Cr-10Ni-Ti) Stainless Steels E-79
E.58 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels E-81
E.59 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels E-82
E.60 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels E-83
E.61 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels E-85
E.62 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels E-86
E.63 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels E-87
E.64 Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels E-89
E.65 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels E-90
E.66 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels E-91
E.67 Stress Curves (SI Units) for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels E-93
E.68 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels E-94

Contents

Page

E.69 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels E-95
E.70 Stress Curves (SI Units) for ASTM B407 UNS N08800 Alloy 800 Steels E-97
E.71 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM B407 UNS N08800 Alloy 800 Steels E-98
E.72 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM B407 UNS N08800 Alloy 800 Steels E-99
E.73 Stress Curves (SI Units) for ASTM B407 Alloy 800H Steels E-101
E.74 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM B407 Alloy 800H Steels E-102
E.75 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM B407 Alloy 800H Steels E-103
E.76 Stress Curves (SI Units) for ASTM B407 Alloy 800HT Steels E-105
E.77 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM B407 Alloy 800HT Steels E-106
E.78 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM B407 Alloy 800HT Steels E-107
E.79 Stress Curves (SI Units) for ASTM A608 Grade HK-40 Steels E-109
E.80 Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A608 Grade HK-40 Steels E-110
E.81 Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A608 Grade HK-40 Steels E-111
F.1 Stress Curves (USC Units) for ASTM A192 Low-carbon Steels F-5
F.2 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A192 Low-carbon Steels F-6
F.3 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A192 Low-carbon Steels F-7
F.4 Stress Curves (USC Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels F-9
F.5 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels F-10
F.6 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels F-11
F.7 Stress Curves (USC Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels F-13
F.8 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels F-14
F.9 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels F-15
F.10 Stress Curves (USC Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels F-17
F.11 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels F-18
F.12 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels F-19
F.13 Stress Curves (USC Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels F-21
F.14 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels F-22
F.15 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels F-23
F.16 Stress Curves (USC Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels F-25
F.17 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels F-26
F.18 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels F-27
F.19 Stress Curves (USC Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels F-29

Contents

Page

F.20 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels F-30
F.21 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels F-31
F.22 Stress Curves (USC Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels F-33
F.23 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels F-34
F.24 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels F-35
F.25 Stress Curves (USC Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels F-37
F.26 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels F-38
F.27 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels F-39
F.28 Stress Curves (USC Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels F-41
F.29 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels F-42
F.30 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels F-43
F.31 Stress Curves (USC Units) for Ferritic Steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) F-45
F.32 Rupture Exponent vs. Temperature Curve (USC Units) for Ferritic Steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) F-46
F.33 Larson-Miller Parameter vs. Stress Curve (USC Units) for Ferritic Steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) F-47
F.34 Stress Curves (USC Units) for Ferritic Steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115) F-49
F.35 Rupture Exponent vs. Temperature Curve (USC Units) for Ferritic Steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115) F-50
F.36 Larson-Miller Parameter vs. Stress Curve (USC Units) for Ferritic Steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115) F-51
F.37 Stress Curves (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels F-53
F.38 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels F-54
F.39 Larson-Miller Parameter vs. Stress Curve (USC Units) for A213, ASTM A271, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels F-55
F.40 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP304L (18Cr-8Ni) Stainless Steels F-57
F.41 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP304L (18Cr-8Ni) Stainless Steels F-58
F.42 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP304L (18Cr-8Ni) Stainless Steels F-59
F.43 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP 316 and 316H (16Cr-12Ni-2Mo) Stainless Steels F-61

Contents

Page

F.44 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP316 and 316H (16Cr-12Ni-2Mo) Stainless Steels F-62
F.45 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP316 and 316H (16Cr-12Ni-2Mo) Stainless Steels F-63
F.46 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASMT A379 TP316L (18Cr-8Ni-2Mo) Stainless Steels F-65
F.47 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP316L Stainless Steels F-66
F.48 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP316L Stainless Steels F-67
F.49 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASMT A379 TP317L (18Cr-8Ni-3Mo) Stainless Steels F-69
F.50 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP317L Stainless Steels F-70
F.51 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP317L Stainless Steels F-71
F.52 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321 (18Cr-10Ni-Ti) Stainless Steels F-73
F.53 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321 (18Cr-10Ni-Ti) Stainless Steels F-74
F.54 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321 (18Cr-10Ni-Ti) Stainless Steels F-75
F.55 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP 321H (18Cr-10Ni-Ti) Stainless Steels F-77
F.56 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321H (18Cr-10Ni-Ti) Stainless Steels F-78
F.57 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321H (18Cr-10Ni-Ti) Stainless Steels F-79
F.58 Stress Curves (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels F-81
F.59 Rupture Exponent vs. Temperature Surve (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels F-82
F.60 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels F-83
F.61 Stress Curves (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels F-85
F.62 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels F-86
F.63 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels F-87
F.64 Stress Curves (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels F-89
F.65 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels F-90

Contents

Page

F.66 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels F-91
F.67 Stress Curves (USC Units) for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels. F-93
F.68 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels. F-94
F.69 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A213 and ASTM A31 Advanced 347AP Stainless Steels. F-95
F.70 Stress Curves (USC Units) for ASTM B407 UNS N08800 Alloy 800 Steels F-97
F.71 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM B407 UNS N08800 Alloy 800 Steels F-98
F.72 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM B407 UNS N08800 800 Steels F-99
F.73 Stress Curves (USC Units) for ASTM B407 UNS N08810 Alloy 800H Steels F-101
F.74 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM B407 Alloy 800H Steels F-102
F.75 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM B407 Alloy 800H Steels F-103
F.76 Stress Curves (USC Units) for ASTM B407 Alloy 800HT Steels. F-105
F.77 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM B407 Alloy 800HT Steels F-106
F.78 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM B407 Alloy 800HT Steels F-107
F.79 Stress Curves (USC Units) for ASTM A608 Grade HK-40 Steels F-109
F.80 Rupture Exponent vs. Temperature Curve (USC Units) for ASTM A608 Grade HK-40 Steels F-110
F.81 Larson-Miller Parameter vs. Stress Curve (USC Units) for ASTM A608 Grade HK-40 Steels. F-111

Tables

1 Minimum Allowable Thickness of New Tubes 10
2 Summary of Working Equations 12
3 Material Constant for Temperature Fraction 13
4 Larson-Miller Constants 19
5 Limiting Design Metal Temperature for Heater-tube Alloys 20
6 Index to Allowable Stress Curves (SI Units). 21
7 Index to Allowable Stress Curves (USC Units) 22
A.1 Retirement Wall Thickness. A-7
A.2 Approximation of the Operating History A-8
A.3 Life Fractions for Each Period A-10
A.4 Future Life Fractions, Minimum Rupture Strength A-11
A.5 Future Life Fractions, Average Rupture Strength A-12
E.1 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A192 Low-carbon Steels. E-8
E.2 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A106 Grade B and ASTM A210 Grade A1 Medium-carbon Steels E-12
E.3 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels E-16
E.4 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels E-20
E.5 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels E-24

Contents

Page

E.6 Elastic and Rupture Allowable Stresses (SI Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels E-28
E.7 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels E-32
E.8 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels E-36
E.9 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels E-40
E.10 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels E-44
E.11 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for Ferritic Steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steel (Grade 921) E-48
E.12 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for Ferritic Steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115) E-52
E.13 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for A213, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels E-56
E.14 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for A213, ASTM A312, and ASTM 376 TP 304L (18Cr-8Ni) Stainless Steels E-60
E.15 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP316 and 316H (16Cr-12Ni-2Mo) Stainless Steels E-64
E.16 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP316L Stainless Steels E-68
E.17 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP317L Stainless Steels E-72
E.18 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP321 (18Cr-10Ni-Ti) Stainless Steels E-76
E.19 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP321H (18Cr-10Ni-Ti) Stainless Steels E-80
E.20 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels E-84
E.21 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels E-88
E.22 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels E-92
E.23 Elastic, Rupture and Allowable Stresses for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels E-96
E.24 Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM B407 UNS N08800 Alloy 800 Steels E-100
E.25 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM B407 Alloy 800H Steels E-104
E.26 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM B407 Alloy 800HT Steels E-108
E.27 Elastic, Rupture and Allowable Stresses and Rupture Exponent (SI Units) for ASTM A608 Grade HK-40 Steels E-112

Contents

Page

F.1 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A192 Low-carbon Steels F-8
F.2 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A192 Low-carbon Steels F-12
F.3 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A209 T1 and ASTM A335 P1 Carbon-1/2Mo Steels F-16
F.4 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213 T11 and ASTM A335 P11 1-1/4Cr-1/2Mo Steels F-20
F.5 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213 T22 and ASTM A335 P22 2-1/4Cr-1Mo Steels F-24
F.6 Elastic and Rupture Allowable Stresses (USC Units) for ASTM A213 T21 and ASTM A335 P21 3Cr-1Mo Steels F-28
F.7 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213 T5 and ASTM A335 P5 5Cr-1/2Mo Steels F-32
F.8 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels F-36
F.9 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels F-40
F.10 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels F-44
F.11 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for Ferritic Steel ASTM A213-T921 and A335-P921 9Cr-2Si-1Cu Steels (Grade 921) F-48
F.12 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for Ferritic Steel ASTM A213-T115 and A335-P115 10.5Cr-V Steels (Alloy 115) F-52
F.13 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for A213, ASTM A271, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels F-56
F.14 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312 and ASTM A376 TP304L (18Cr-8Ni) Stainless Steels F-60
F.15 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP316 and 316H (16Cr-12Ni-2Mo) Stainless Steels F-64
F.16 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP316L Stainless Steels F-68
F.17 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP317L Stainless Steels F-72
F.18 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321 (18Cr-10Ni-Ti) Stainless Steels F-76
F.19 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312, and ASTM 376 TP321H (18Cr-10Ni-Ti) Stainless Steels F-80
F.20 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347 (18Cr-10Ni-Nb) Stainless Steels F-84
F.21 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A271, ASTM A312, and ASTM 376 TP 347H (18Cr-10Ni-Nb) Stainless Steels F-88
F.22 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A213, ASTM A312, and ASTM A376 TP347LN (18Cr-10Ni-Nb) Stainless Steels F-92

Contents

Page

F.23 Elastic, Rupture and Allowable Stresses (USC Units) for ASTM A213 and ASTM A312 Advanced 347AP Stainless Steels F-96
F.24 Elastic, Rupture Allowable Stresses and Rupture Exponent (USC Units) for ASTM B407 UNS N08800 Alloy 800 Steels F-100
F.25 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM B407 Alloy 800H Steels F-104
F.26 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM B407 Alloy 800HT Steels F-108
F.27 Elastic, Rupture and Allowable Stresses and Rupture Exponent (USC Units) for ASTM A608 Grade HK-40 Steels F-112

Calculation of Heater-tube Thickness in Petroleum Refineries

1 Scope

This standard specifies the requirements and gives recommendations for the procedures and design criteria used for calculating the required wall thickness of new tubes and associated component fittings for fired heaters for the petroleum, petrochemical, and natural gas industries. These procedures are appropriate for designing tubes for service in both corrosive and noncorrosive applications. These procedures have been developed specifically for the design of refinery and related fired heater tubes (direct-fired, heat-absorbing tubes within enclosures). These procedures are not intended to be used for the design of external piping.

This standard does not give recommendations for tube retirement thickness; Annex A describes a technique for estimating the life remaining for a heater tube.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/API Standard 560, *Fired Heaters for General Refinery Service*

ASME *Boiler and Pressure Vessel Code* (*BPVC*) [1], *Section VIII, Division 1: Pressure Vessels—Rules for Construction of Pressure Vessels*

ASME *Boiler and Pressure Vessel Code* (*BPVC*), *Section VIII, Division 2: Pressure Vessels—Rules for Construction of Pressure Vessels—Alternative Rules*

ASME B31.3, *Process Piping*

ASTM A106/A106M [2], *Specification for Seamless Carbon Steel Pipe for High-Temperature Service*

ASTM A192/A192M, *Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service*

ASTM A209/A209M, *Specification for Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes*

ASTM A210/A210M, *Specification for Seamless Medium-Carbon Steel Boiler and Superheater Tubes*

ASTM A213/A213M, *Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater and Heat-Exchanger Tubes*

ASTM A312/A312M, *Specification for Seamless and Welded Austenitic Stainless Steel Pipes*

ASTM A335/A335M, *Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service*

ASTM A376/A376M, *Specification for Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service*

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1 ASME International, 3 Park Avenue, New York, NY 10016, www.asme.org.

2 ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.