

Index

A

- Alloy fracture data
 - Aluminum alloys, 7, 20, 21-23, 105, 109-111, 168, 170
 - High strength steels, 106-108, 109-111, 168-169
 - Low strength steels, 68-69, 72-73
 - Titanium, 106, 109-111, 171
- ASTM Special Committee on Fracture Testing of High Strength Sheet Materials, 193
- Alignment (*see* Loading eccentricity)
- ASTM Standards for fracture testing
 - E 338-68 sharp notch testing of sheet, 213-220
 - E 399-74 plane strain (K_{Ic}) testing, 221-240
 - E 501-76T R-curves, 241-259
 - E 602-76T sharp notch testing with cylindrical specimens, 260-268

B

- Bending stresses
 - Calculation in precracked Charpy tests, 181
 - Effect on notch strength (*see* Loading eccentricity)

C

- Crack blunting, 61

Crack extension

- Compliance method, 67, 82-93
- Electric potential, 67
- Resonant frequency, 67
- Crack tip plastic zone, 5, 275
- C-shaped specimen tests
 - Displacements, 48-49
 - J_{Ic} test procedures, 34-36
 - K calibrations
 - Analytical, 27-28, 39-46, 271
 - Experimental, 29
 - K_{Ic} test procedures, 33-34
 - Other applications, 37

D

- Displacements in cracked specimens
 - Calibrations in terms of a/W
 - Center crack, 91-92, 93
 - Compact, 83, 85, 87, 89
 - Crack line loaded, 83, 86, 88-89
 - C-shaped, 48-49
 - Comparison of experimental with analytical results for
 - Center crack specimen, 94
 - Compact specimen, 87
 - Crack line loaded specimen, 88-89

E

- Elastic modulus
 - Calculation from load-deletion records, 177-178

Plane strain, 39, 62

Plane stress, 39

F

Fatigue crack growth measurements

In terms of J , 78

With C-shaped specimens, 37

Fatigue cracking

Crack front straightness, 11-12

Level of K_{\max} in K_{Ic} tests, 10-11, 17, 270

Of Charpy specimens, 158

Of notched cylinders, 131

Of surface crack specimens, 202-205

GGreen and Hundy limit (*see* Plastic instability)**J** J as fracture criterion, 59-60, 272 J -integral concept, 58 J -integral expressions

Bend specimen, 63, 272

Compact specimen, 64, 273

 J_{Ic} from C-shaped specimens, 35-36 J_{Ic} - K_{Ic} relations, 62, 70, 274 J_{Ic} testing

Applications, 76-78

Assumptions, 272-273

Crack blunting, 61

Example results, 68-69

Limitations, 73-75

Maximum load, 75

Proposed test method, 63

Resistance curves, 61, 64

Single specimen methods, 65-67

Size requirements, 74

K K_{Ic} from C-shaped specimens, 33-34 K_{Ic} from DENC specimens, 113 K_{Ic} from surface crack specimens, 199-201 J_{Ic} - K_{Ic} relations, 62, 70, 274 K_{Ic} test method, E 399-74, 221-240 K_{Ic} testing

Crack tip plastic zone, 5

Fatigue cracking, 11-12, 17, 18

 P_{\max}/P_Q requirement, 6, 8-9, 15, 270

Size requirements, 5, 7, 15, 16

Validity requirements, 4, 11-12, 19, 270

 W/B effects, 3, 4, 9, 13, 17, 270

80 percent rule, 6

L

Load-displacement records in

 J_{Ic} tests, 62-63, 66 K_{Ic} tests, 6

Precracked Charpy tests, 160-167, 279

Surface crack tests, 196-199

Loading eccentricity, 121-122, 124-127, 180

MMisalignment (*see* Loading eccentricity)**N**

Nominal strength, 181, 190

Nominal stress, 6, 180

PPlane strain fracture toughness testing (*see* K_{Ic} testing)

Plastic instability in notch bend tests, 191-192

Q

Quality control of fracture properties (*see* Screening tests)

R

Residual strength, 194

Resistance curves in

J_{Ic} tests, 61, 64

Terms of K

E 501-76T recommended practice for R-curves, 241-259

S

Screening tests with

Circumferentially notched cylinders

E 602-76T sharp notch testing with cylindrical specimens, 260-268

Correlations of notch strength with K_{Ic}

Quality control plan, 148-150

Regression analysis, 137-146, 278

Tolerance limits, 146-148, 278

Effects of fatigue cracks, 131

Effects of loading eccentricity, 124-127, 278

Effects of notch root radius, 124-125, 278

Effects of specimen size, 127-131, 278

Specimen preparation (*see* under specific test)

Specimen size effects in

DENC tests, 105-108

J_{Ic} tests, 73-74

K_{Ic} tests, 5, 7

Notched cylinders, 127-131

Specimen types

Center crack tension, 90-93, 241-259

Compact, 8-9, 29, 64, 85, 87-89, 241-259

Crack line wedge loaded, 85-86, 88-89, 221-240, 241-259

C-shaped, 25-56

DENC, 96-114

Precrack Charpy, 153-192

Surface crack, 193-212

Specimens, DENC

Correlations of nominal strength with K_{Ic} , 108-111

Effect of thickness, 105-108

Effect of width, 108

Specimen design, 98-101

Specimens, precracked Charpy

Correlations of nominal strength with K_{Ic} , 183-186, 280

Correlations of \bar{W}/A with K_{Ic} , 168-171, 280

Estimates of K_{Ic} from strength ratios, 187-189

Load deflection records

Analysis for \bar{W}/A , 162-165, 171-172, 279

Characteristic types, 160

Extraneous deflections, 160, 166-167

Nominal strength, 180, 280

Specimen geometry, 158

Test method recommendations, 172-174, 189, 280

Test procedures, 158, 279

Statistical treatment of data

Precracked Charpy, 175-176

Sharp notched cylinder, 137-148

Stress intensity factors for

Compact specimen, 30

C-shaped specimen, 27-29, 39-46

Notched cylinder, 128-129

Single edge notched tension, 30

Surface crack, 195-196

- | | |
|--|--|
| Surface crack specimen tests | Toughness measurements, 199-201 |
| Applications, 208 | |
| Crack opening displacement, 196-199 | |
| Crack size and shape, 201, 281 | |
| Data analysis, 207-208, 281 | |
| Historical, 194-195 | |
| Instrumentation, 205-206, 281 | |
| Specimens | |
| Design, 196, 201-202, 281 | |
| Preparation, 202-205 | |
| Stress intensity factors, 195-196, 281 | |
| Test procedure, 205-206, 281 | |
| | T |
| | Test methods (<i>see</i> ASTM Standards for fracture testing) |
| | Thickness (<i>see</i> Specimen size effects) |
| | W |
| | Width (<i>see</i> Specimen size effects) |
| | Work of fracture, 160 |