## Subject Index

## A

Aerospace material, differences from structural steels, 5
ASME code, 46-47
ASTM E 399, 5-6
ASTM E 647, 26
ASTM E 1820, 22
ASTM E 1921, 2, 6, 10-11, 13, 15, 20, $22-24,26-27,31,35,38-40,48$

## B

Bend bar fixtures, 22, 24
Bend bar specimens, 18-20

## C

Calibration, checking, 28-29
Charpy specimen, pre-cracked, 42-43
Charpy V curve, reference
temperatures, 34
Multi-temperature
determination, 59
offset constants, 33
Charpy V upper shelf energy, low, 48
Cleavage fracture, 6
Clevis design, 22-23
Pre-cracking, 26
Clip gages, 18, 20, 22-25
Commercial applications, Master Curve, 47-48
Compact specimen fixtures, 22
Compact specimens, 18-21
Crack growth, slow-stable
$\mathrm{K}_{j_{c}}$ limit, 16-17
Multi-temperature reference temperature determination, 59

Cryogenic cooling chambers, 23-25
Cumulative probability method, tolerance bounds, 39-40
Cumulative failure probability distribution, 7-8

## D

Data censoring, using maximum likelihood method, 56-57
Design application problems, 48-49
Disk-shaped compact specimens, 18-20
Displacement gage, 18
Ductile tearing, 5
Ductile-to-brittle transition temperature, 5

## E

Elastic-plastic stress intensity factor, fracture toughness and, 8

## F

Flaw geometry, 49
Fracture mechanics
application to round robin data, 10-11
concept discovery, 6-8
engineering adaptation, $8-10$
Fracture toughness
crack mouth data, 32
elastic-plastic stress intensity factor and, 8
lower bound curves, 5,12
specimen size effect, 8
versus temperature, 5-6

## G

Greek symbols, 4

## H

Historical aspect, 5-6

## J

Japan Society for the Promotion of Science, 10
J-integral, 5-6
calculation, 30
elastic component, 30-31
plastic component, 30

## K

$\mathrm{K}_{J_{c}}$
data duplication needs, 15
limit value, 28
side-grooving effect, 27
slow-stable crack growth limit, 16-17
specimen size requirements, 15-16

## M

Master Curve, 11-12
application to other grades of steel, 48
commercial applications, 47-48
design application problems, 48-49
example applications, 46
fit to data, 57-58
median versus scale parameter, 12-13
supporting evidence, 13-14
units of measure, 32
use of tolerance bounds, 46-47
Materials Property Council, 10
Maximum likelihood method
data censoring using, 56-57
random homogeneity, 44-45
Median, versus scale parameter, 12-13
Monte Carlo simulations, 15-16
Multi-temperature method, reference temperature determination, 36-37

N
Nomenclature, 2-4
0
"Over-the-top" clip gage, 18, 20

## $\mathbf{P}$

Pre-cracked Charpy specimen, 42-43
Pre-cracking, 26
in servo-hydraulic machines, 28

## R

Rand homogeneity, maximum likelihood estimate, 44-45
Razor blades, on specimens, 18,20
Reference temperature
calculation, 60
Charpy V curve, 34
determination, 36-37
margin adjustment, 40-41
multi-temperature determination, 59-61
offset constants, Charpy V curve, 33
Round robin, 10-11

## S

Scale parameter determination, 55-56
equations, 35
versus median, 12-13
testing at test temperature, 33-34
Side-grooving, 26-27
Single temperature method, reference temperature determination, 36
SINTAP system 3 analysis, 44-45
Specimens, 18-21
pre-cracking, 26
side-grooving, 26-27
Specimen size, 4
$\mathrm{K}_{J_{c}}$ requirements, 15-16
Specimen size effect, 6
fracture toughness, 8
Standard deviation method, tolerance bounds, 38-39

Steels
application to other grades, 48
macroscopically inhomogeneous, 42-43
structural, differences from aerospace material, 5
Stress analysis, 49
Stress intensity factors, 1

## T

Test equipment, 22-25
Test practices, 28-29
Thermocouple wires, 24-25
Tolerance bounds, 38-41
calculation, 62-64
coefficients, 39
cumulative probability method, 39-40
margin adjustment, 40-41, 62, 64
standard deviation method, 38-39
use in Master Curve, 46-47

## $\mathbf{U}$

USNRC NUREG/CR-5504, 1

## W

Weakest-link based model, 10
Weibull cumulative probability, 39
Weibull fitting of data, 55-57
Weibull model
description, 55
three-parameter, 9
two-parameter, 7
Weibull slopes, 10-11
best fit, 9
Welding Institute round robin, 43

