

## Subject Index

### A

Absorbed energies, 32, 82  
 Acoustic emission technique, 523  
 American Iron and Steel Institute  
   AISI 304, 523  
 American Society for Mechanical  
   Engineers, 173  
 Annealing, 451, 470  
   post irradiation, 145  
 ASTM standards, 3, 32, 383, 497  
   A 515, 253  
   A 533B, 123, 196, 539  
     circumferentially cracked  
       bars, 363  
     cross-comparison, 3, 557  
     ductile brittle behavior, 110  
     ductile fracture toughness,  
       63  
     ligament size effects, 82  
     mechanical properties,  
       cross-comparison, 3  
     microspecimen tensile  
       tests, 497  
     small punch testing, 557  
   E 1253, 383

### B

Bars, round  
   cracked, 328  
   circumferentially cracked, 363  
   notched, 513  
 Beam welding, 163  
 Bending fatigue, rotating, 353,  
   363  
 Bend specimens  
   precracked, 63  
   single-edge notched, 420  
   standard, 137  
 Burst strength test, 602

### C

CANDU reactors, 602

Charpy specimens, 48, 123, 328  
   ASTM E 1253, 383  
   bars, 328  
   ductile-to-ductile transition,  
     145, 214, 539  
   impact, 484  
   impact testing, 411  
   instrumented testing, 32  
   ligament sizes, varying, 82  
   precracked, 15, 238, 253, 274  
   reconstituted, 173, 436, 451  
   reconstructed, 163  
   test, 451, 588  
   transition temperature, 557  
   V-notched, 15, 98, 110, 274  
   V-notched, broken, 420  
   V-notched, precracked, 363  
 CISE, 15  
 Cleavage, 253, 363  
   fracture model, 196  
   initiation, 298  
 Compact tension specimens, 63,  
   173, 353, 436, 470, 513  
 Constraint, 196, 253, 328  
 Crack arrest, 163, 274  
 Crack extension, 214  
   energy, 82  
 Crack growth monitoring, 363  
 Crack propagation initiation,  
   stable, 137  
 Crack resistance, dynamic, 32  
 Crack tip opening angle  
   (CTOA), 48  
 Crack tip opening displacement,  
   63, 328  
 Curve fitting, 110

### D

Damage tolerance criteria, 353  
 Deformation, 614  
   level, 253  
   tensile, 575  
 Degradation, in-service, fracture  
   toughness, 274

## 624 SMALL SPECIMEN TEST TECHNIQUES

Deutscher Verband für  
Materialforschung und  
-prüfung (DVM), 32

Drop potential, 137

Ductile brittle transition behavior,  
110, 137, 214, 274

A 515 steel, 253

temperature, 145, 539

Ductile fracture, 63, 513

Ductile tearing, 196, 328

Ductility, calandria tubes, 602

### E

Elongation, uniform,  
correlations, 575

Embrittlement, 82

irradiation, 145, 451, 470

neutron, 173

prediction, 163

Energy, absorbed, 384

European Structural Integrity

Society (ESIS), 15, 32

draft standard, impact testing

of subsized Charpy-V

specimens, 123

### F

Fatigue, rotating bending, 353,  
363

Finite element method, 298, 363

Finite element modeling, 63,  
82, 539

Finite element simulations, 513

Flow stress, 274

Force-displacement curve, 123

Fracture, brittle, 137

Fracture assessment, 298

Fracture reconstruction, 298

Fracture resistance, 137

ductile, 63

Fracture strain, 588

Fracture surface, 575

Fracture toughness, 48, 163, 420,  
539, 557

bending specimens, 137

C-Mn steel, 513

degradation, 274

ductile, 63

evaluation with small

specimens, 48, 196

initiation, 328

method development, small  
specimen, 298

plane strain, 353

predictions, 253, 588

rapid, 253

reconstitution, 436, 451, 470

round bars, circumferentially  
cracked, 363

test, irradiated material, 451

transition curve, 238, 253

transition range, 173, 214

Fusion boundary, 110

Fusion materials, 298

### G

Gurson model, 63

### H

Hardness, 411

Heat affected zone, 110, 484

Helium, 614

Hooke's line, 98, 123

HSSI Weld 72W, 328

HSST 03, (See also ASTM  
standards, A 533B), 3,  
63, 196

### I

Impact loading, 82, 274

Impact specimen, 484

Impact testing, 123, 411

instrumented, 15, 98, 420

Charpy, 32, 123, 383

Index temperatures, 411

Insert lengths, 411

Interferometry, 497

International Organization for  
Standardization, 32, 383

Charpy test data, 411

ISO 14556, 98

International testing, material  
property, 3

Irradiation, 298

accelerated, 163

effects, 411

embrittlement, 145, 451, 470

isotopic tailoring, 614

neutron, 82

## J

J-integral, 48, 137, 253, 328  
Joining, surface activated, 484  
J-R curve, 48, 436  
J-resistance curve, 63

## L

Ligament size, 82  
Linde 80 weld, 173  
Load carrying capacity, weld  
seams, 451  
Load diagram, 383  
Load displacement, 363, 539  
curve, 588  
Loading rates, 253

## M

Mechanical properties, 3  
Microscopy, confocal, 298  
Models and modeling  
finite element models, 63,  
82, 539  
Gurson, 63  
micromechanical material, 63  
micromechanical,  
probabilistic, 274  
simplified mechanical, 48  
toughness transfer, 274  
Weibull, 214, 238  
Monte Carlo simulations, 214

## N

Necking angle, 575  
Nickel, 614

## P

Precracked bend specimens, 63  
Punch test, 513, 539, 557, 588,  
602  
shear, 523, 614

## R

R-curve, 196  
Reconstitution, 173, 383, 411, 420,  
436, 451, 470  
ASTM round-robin results, 383

Charpy v-notched specimen, 420  
compact tension specimen, 436  
specimen tests, 411  
surface activated joining, 484  
surveillance use, 470  
Residual life evaluation, 15  
Root mean square voltage, 523  
Round specimens  
circumferentially notched, 353  
cracked, 328  
notched, 513

## S

SA106, 539  
SA508 Cl.3, 575  
Scaling factor, 274  
Scaling laws, 48  
Scatter, 539  
Shear fracture, 32  
Shear punch test, 523, 614  
Strain component, 575  
Strain gages, foil, 497  
Strain hardening exponent, 523  
Strain rate sensitivity, 63  
Stress-strain behavior, 63  
Stress-strain curve, 539  
tensile, 557  
Striker tups, high sensitivity, 98  
Surface activated joining, 484  
Surveillance program, reactor  
vessel, 173, 274, 383,  
411, 436  
Surveillance testing, 163  
specimen reconstitution for,  
469

## T

TACIS-91/1.1, 145  
Temperature conditioning, in  
situ, 15  
Tensile bars, 163  
Tensile deformation properties,  
575  
Tensile properties, 82, 298, 557  
Tensile specimens, 63  
notched, 513  
Tensile stress, ultimate, 523  
Tensile tests, 497  
uniaxial, 588  
Thickness effect, 575

## 626 SMALL SPECIMEN TEST TECHNIQUES

Three-point bend tests, 238  
specimens, 137  
Titanium alloy, 353  
Toughness, effective, 298  
Transition behavior, temperature  
dependent energy, 557  
Transition curve (master curve),  
238, 253  
Transition range, 173, 196  
Transition region, 214, 363  
Transition temperature, 32, 557  
shift, 411

### U

Ultimate stress, 497  
Unloading compliance  
technique, 420  
Upper frequency bounds, 98  
Upper shelf energy, 82, 110  
U.S. Code of Federal  
Regulations, 238

### V

Vanadium, 298

### W

Weakest link theory, 238  
Weibull distribution, 238  
Weibull statistics, 214  
Welding technique  
carbon dioxide, 470  
electron beam, 383, 436, 470  
laser beam, 470  
stud arc, 451  
Welds, 238, 328, 602  
metals, Linde 80, 173  
seam, 450  
WWER-440, 145, 163

### Y

Yield force, 98, 123  
Yield stress, 298, 497, 523

### Z

Zircaloy-2, 602