

# Subject Index

## A

Abrasion, 11  
 Abrasiveness—artificial turf, 176  
 Absorption properties—playing surfaces, 77  
 Accelerometer data, 115  
 Aeration—natural turf, 136  
 Artificial playing surfaces (*See also* Synthetic playing surfaces)  
     impact absorption testing, 77  
     standards, 49  
     traction, 61  
 Artificial turf, 10, 166, 176, 183  
     construction, 167 (table)  
     surfaces—performance standards, 176, 183  
     testing, 111  
     traction characteristics, 61  
 Association football (soccer), 29, 48  
 ASTM Subcommittee FO8.52, 1  
 ASTM Committee F-8, 1  
 ASTM Standards  
     D 395-85: 112, 180, 182 (table)  
     D 412-87: 181  
     D 418-82: 112, 178, 179, 182 (table)  
     D 648-86: 182 (table)  
     D 789-86: 177, 182 (table)  
     D 792-86: 177, 182 (table)  
     D 1335-67 (1972): 112, 178, 182 (table)  
     D 1577-79: 176, 182 (table)  
     D 1667-76 (1986): 112, 180, 182 (table)  
     D 1682-64 (1975): 112, 178, 182 (table), 187  
     D 1776-85: 176  
     D 2126-75: 181, 182 (table)  
     D 2256-80: 177, 182 (table)  
     D 2859-76: 122  
     D 3574-86: 112, 182 (table)  
     D 4158-82: 179, 182 (table), 187  
     E 648-86: 179, 187  
     F 355-86 (ANSI/ASTM F355-86): 83, 180, 182 (table), 184  
     F 1015-86: 179, 182 (table)  
 Athletic fields (*See also* Artificial playing fields; Synthetic playing fields)  
     design, 5

    impact characteristics, 96  
     management, 69  
     turf, 149

Athletic footwear, 62, 69

## B

Ball  
     bounce, 154  
     fields—design and construction, 5–6  
     rebound resilience, 29, 49  
     rolling resistance, 29, 49  
 Ball/surface interaction, 49  
 Bermuda grass, 154  
 Biomechanics, 10, 61, 77  
 Blazer—ryegrass quality tests, 85  
 Brinkman traffic simulator, 86  
 Bruel vibration analyzer, 96, 136

## C

Care of playing fields, 20  
 Citation II—ryegrass quality tests, 85  
 Cleat length, 61  
 Clegg impact soil tester, 96, 98–99, 115, 136  
 Coefficient of friction, 61  
 Compression displacement—sports fields, 154  
 Compression—artificial turf, 176  
 Cool-season turfgrasses, 85  
 Core cultivation, 136

## D

Deceleration curve, 115  
 Deceleration, peak, 130, 132–133 (tables)  
 Design  
     and testing—footwear, 69  
     criteria—footwear for artificial and natural surfaces, 69  
     injuries—sport shoes, 69  
     playing fields, 5, 10, 183  
 Divot size and recovery—sports fields, 154

**E**

Elasticity, 11

**F**

Falling injuries, 11

Field sports, 5, 10

Field testing, 115

Flammability—artificial turf, 176

Football

playing fields—artificial turf, 48,  
176

shoes, 61

standards for natural turf, 29

Footwear, 62

design and testing, 69

Force-time analyses, 11, 12–16 (figs), 17  
(table)

Friction, 61, 77

Frictional testing, 69

**G**

Gator—ryegrass quality tests, 85

Grab tear testing—artificial turf, 176

Grass, 69, 85

Ground reaction forces, 10, 61

**H**

Hazards—playing fields, 6

HR-1—ryegrass quality tests, 85

**I**

Impact

absorption—playing field surfaces, 77,  
96, 127, 136

analysis, 115

characteristics, 96, 102–108 (tables)

hammer, 96

Injuries, 21, 77, 97

footwear design, 69

prevention, 111

**K**

Kentucky bluegrass—impact absorption,  
139 (table)

Kjaer vibration analyzer, 96, 136

Knee injuries—footwear design, 69

**L**

Laboratory measurement—impact  
absorption, 127

Leg injuries—footwear design,  
69

**M**

M-382—ryegrass quality tests, 85

Maintenance of playing fields, 21

Management of playing fields, 21  
natural turf, 136

Materials selection—artificial turf, 166

Measurement, laboratory—impact, 127

Moisture sensing—prescription athletic turf  
system, 149

Movement patterns, 11

Multi-use field sports playing facilities, 20

**N**

National perennial ryegrass evaluation trial,  
85

Natural surfaces, 69, 85

Natural turf

management, 136, 149

quality standards, 29–30

testing, 111

Nylon 6.6—artificial turf, 176

**O**

Outsoles—traction characteristics, 61

Overseeding, 89

**P**

Palmer—ryegrass quality tests, 85

Peak deceleration, 127

Penetration depth, 130, 132–133 (tables)

Perennial ryegrass cultivars, 89

Performance standards—artificial turf, 176

Performance tests, 31 (table)

synthetic turf surfaces, 182 (table)

Physical properties—polymer additives in  
artificial turf, 167 (table)

Pile wear—artificial turf, 176

Players—movement patterns, 10

Player/surface impact, 48

Playing field standards, 2, 29

Playing fields (*See also* Artificial playing surfaces; Synthetic playing surfaces), 5, 10, 20  
 artificial turf, 61, 166, 176  
 design, 10, 149  
 impact absorption, 127  
 impact characteristics, 77, 96, 127  
 management, 136  
 safety recommendations, 20  
 surface quality, 154  
 testing, 111, 115  
 Playing quality, 29, 49  
 Playing surfaces (*See also* Synthetic playing surfaces), 2, 20, 61  
 impact absorption, 77, 159  
 impact analysis, 115  
 Polymer additives—artificial turf construction, 167 (table)  
 Prelude—ryegrass quality tests, 85  
 Prescription athletic turf system (PAT), 149

## R

Rebound resistance of ball, 29, 48  
 Resilience, ball  
 rebound, 29, 48  
 rolling, 29, 48  
 Responsibility for injuries, 21  
 Ribbon pile fiber—artificial turf, 176  
 Risk assumption—playing fields, 20  
 Rolling resistance of ball, 29, 48  
 Root zone—athletic turf system, 149  
 Rotational traction, 61  
 Running—force time analysis, 11  
 Ryegrass quality tests, 85

## S

Safety  
 for playing fields, 5, 20, 77  
 recommendations—baseball fields, 5  
 recommendations—football fields, 8–9  
 testing, 77, 111  
 Seeding, 85  
 Shear (*See also* Traction), 29, 48, 61  
 Shear resistance—natural turf, 136  
 Shock absorption, 11, 96, 136  
 artificial turf, 176  
 Shock attenuation testing, 111  
 Shoes, 61, 69  
 Sliding resistance, 48

Soccer (association football), 29, 48  
 fields—playing quality tests, 30, 49  
 shoe outsole, 61  
 Softball facilities—design, 21  
 Softball-related injuries, 21  
 Soil  
 compaction, 136  
 impact analysis, 115, 136  
 moisture, 136  
 properties, 127  
 tester, 96  
 Sport shoes  
 knee injuries, 69  
 leg injuries, 70  
 testing and design, 69  
 Sport biomechanics (*See* Biomechanics)  
 Sports fields—design and construction, 5–6  
 Sports playing surfaces, 85, 111, 149  
 Standards—playing fields, 2, 29, 183  
 Subirrigation—prescription athletic turf system, 149  
 Suction on drains—prescription athletic turf system, 149  
 Surface traction—playing fields, 2  
 Synthetic playing surfaces (*See also* Playing surfaces; sports playing surfaces), 69, 77, 176, 183  
 performance tests, 182 (table)  
 SWRC-1—ryegrass quality tests, 85

## T

Tall fescue—impact resistance, 139 (table)  
 Tara—ryegrass quality tests, 85  
 Tear resistance—sports field turfgrass, 154  
 Testing  
 artificial surfaces, 111  
 natural and artificial surfaces, 2, 111  
 sport shoes, 69  
 Thatch—impact resistance, 139 (table)  
 Traction  
 artificial turf, 48, 61  
 natural turf, 29, 136  
 surface, 2, 11, 29  
 Traffic simulator, 86  
 Traffic tolerance, 8  
 Translational traction, 61  
 Tuft bind—artificial turf, 176  
 Turf  
 artificial (*See* Artificial turf)  
 natural (*See* Natural turf)  
 playing quality tests, 30  
 safety performance, 111  
 synthetic (*See also* Artificial turf), 176, 183  
 testing, 111

Turfgrass, 127	V
culture—on recreational surfaces,	
154	Vibration analyzer, 96, 136
impact characteristics, 96, 160–163	
(tables)	W
injury, 159, 160–163 (tables)	
quality ratings, 91 (table)	Wear tolerance, 85