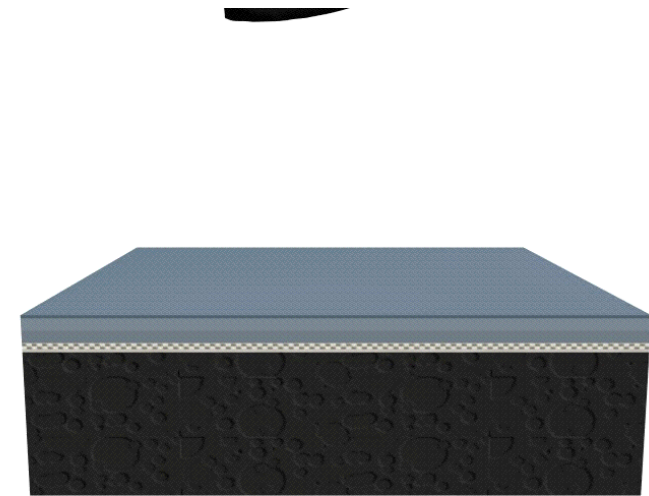


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Pickleball Surfaces



Surface Type Classification

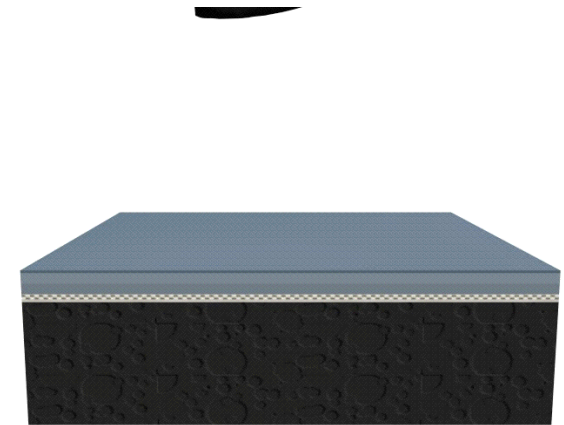
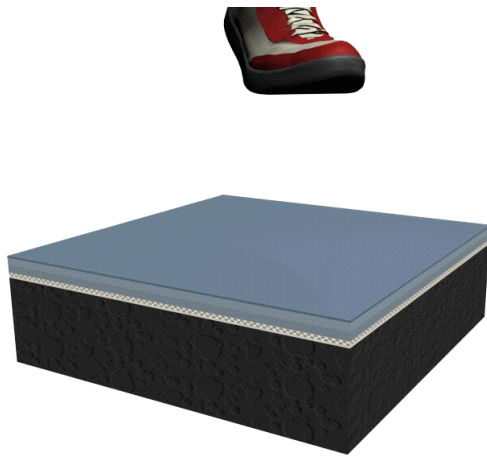
	Description
Acrylic/Polyurethane	Textured, pigmented, resin-bound coating.
Artificial clay	Sand-dressed and/or rubber-dressed surface with the appearance of clay.
Artificial grass	Synthetic surface with the appearance of natural grass.
Asphalt	Bitumen-bound aggregate.
Carpet	Textile or polymeric material supplied in rolls or sheets of finished product.
Clay	Unbound mineral aggregate.
Concrete	Cement-bound aggregate.
Grass	Natural grass grown from seed.
Hybrid clay	Clay-dressed systems supported by a carpet matrix.
Other	E.g. modular systems (tiles), wood, canvas.

The above graphic is courtesy of the International Tennis Federation.

Varieties of cushion thickness

- Foam and composite rubber can be any thickness
- Common Thickness are 3 & 5 MM
- Suspended acrylic cushion systems are applied in layers Typical layers are 5
- Sand Filled Synthetic Grass are normally $\frac{3}{8}$ " or $\frac{5}{8}$ "

Underfoot Force Reduction



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Comparisons to other surfaces, indoor, track, turf



0% to 30%



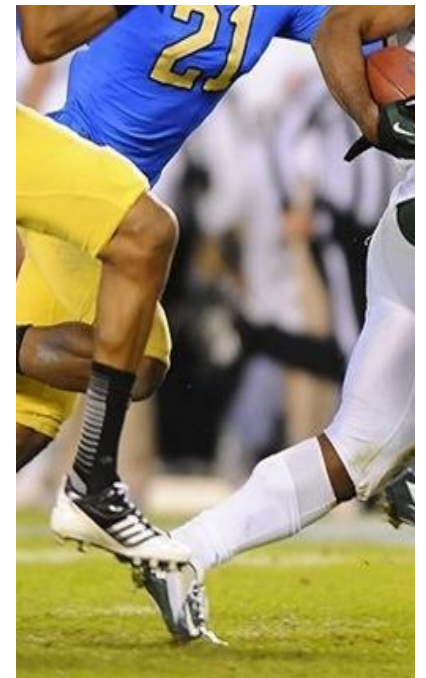
5% to 35%



20% to 45%



50% to 70%



55% to 75%

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Ball vs. Underfoot Pressure



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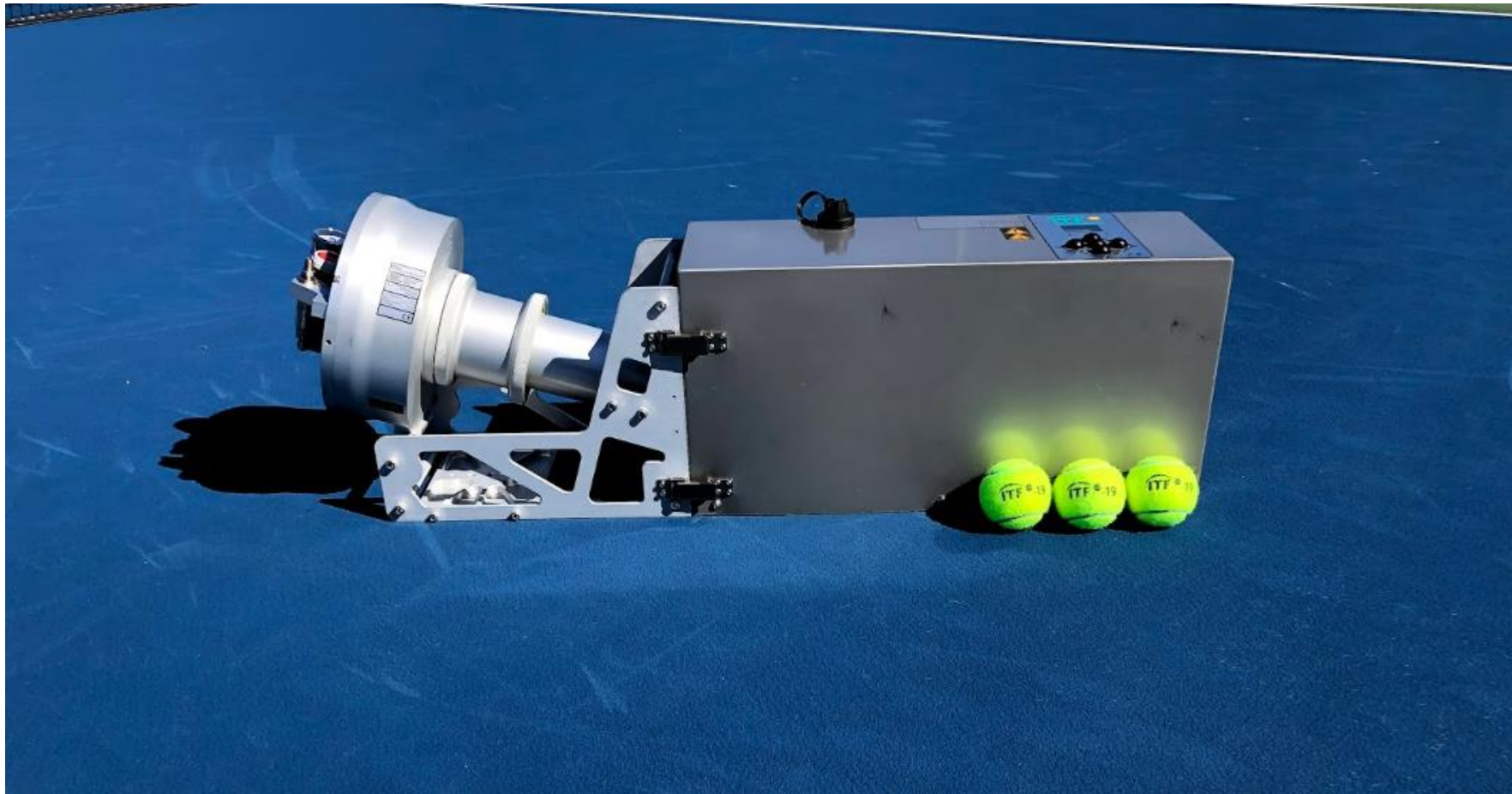
Skid Resistance



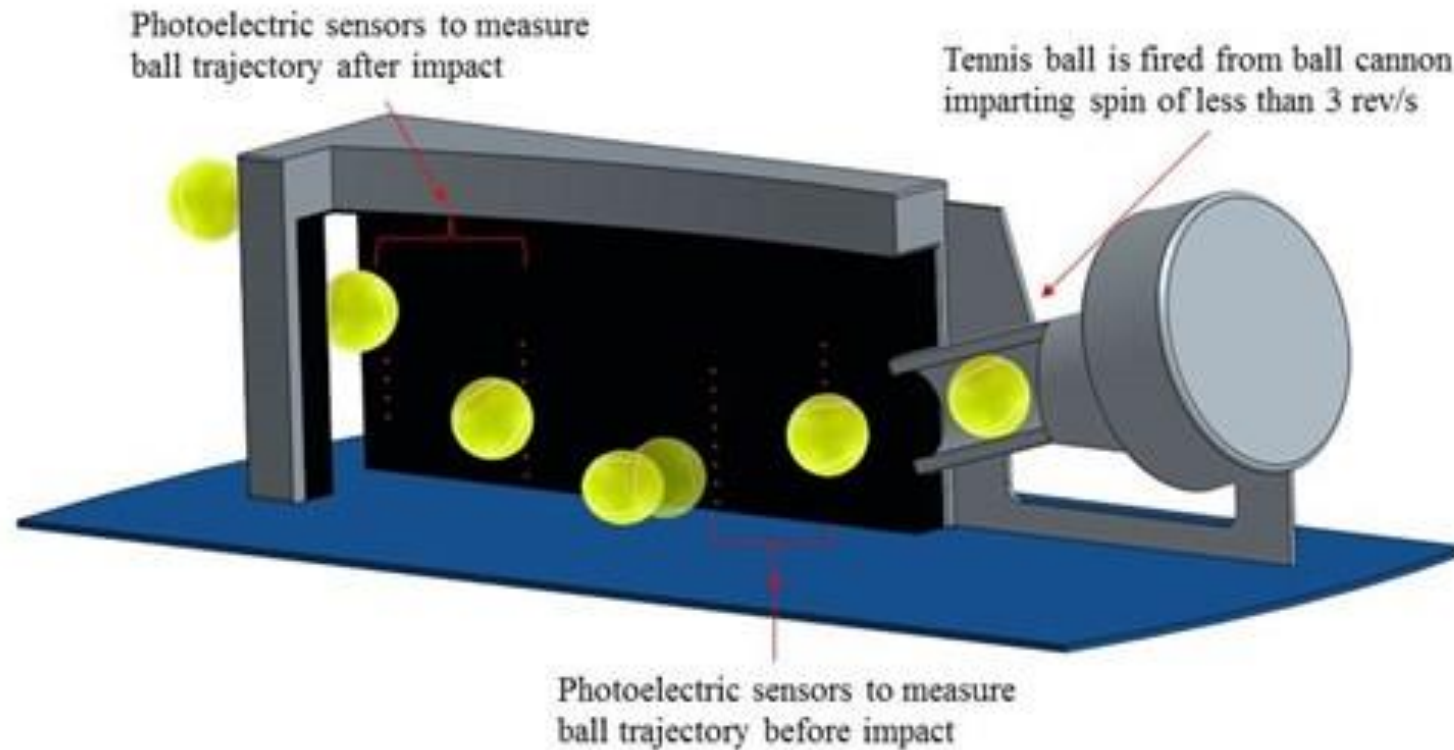
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Pace Testing: The Sprite



Pace Testing: The Sprite



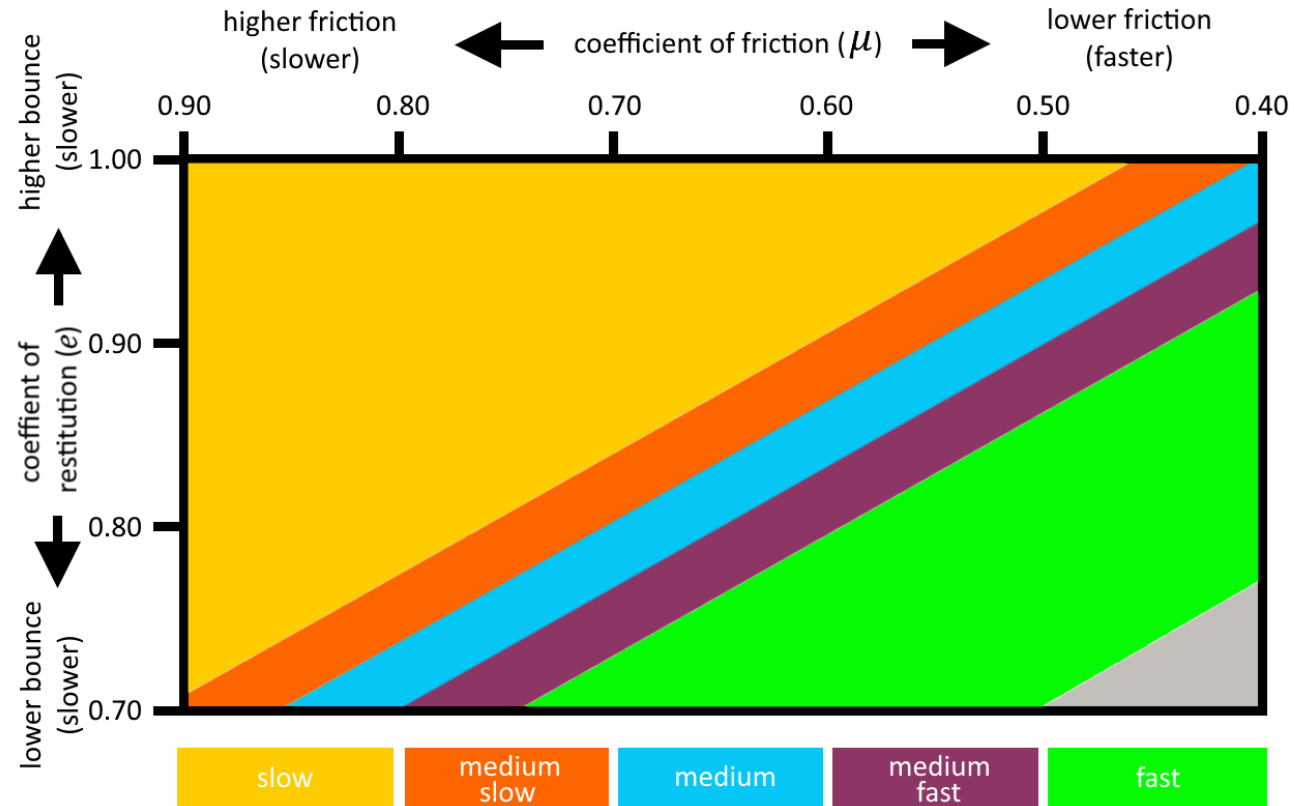
The above graphic is courtesy of the International Tennis Federation.

Coefficient of Restitution (COR)

$$e = \frac{v_{fy}}{v_{ty}}$$

Category	COR
High	≥ 0.85
Medium	0.79-0.84
Low	≤ 0.78

Court Pace Rating

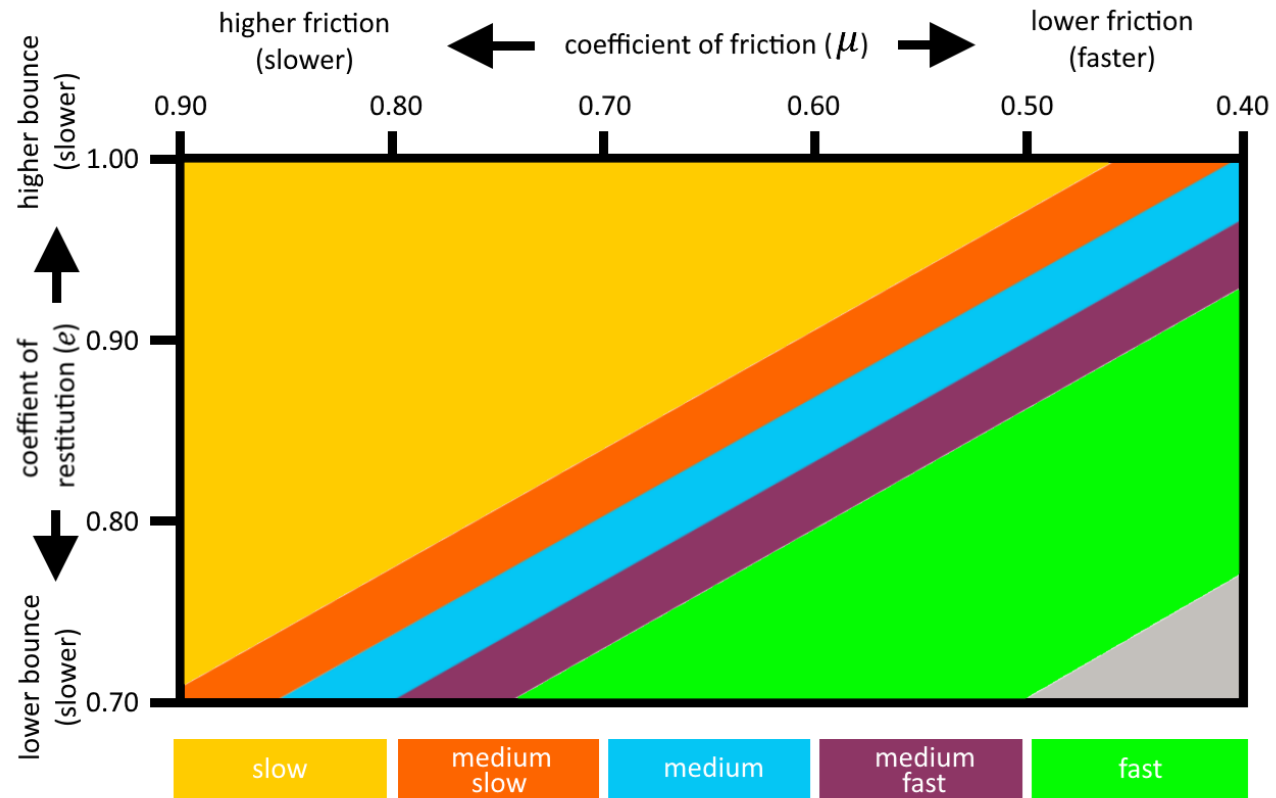


Coefficient of Friction (COF)

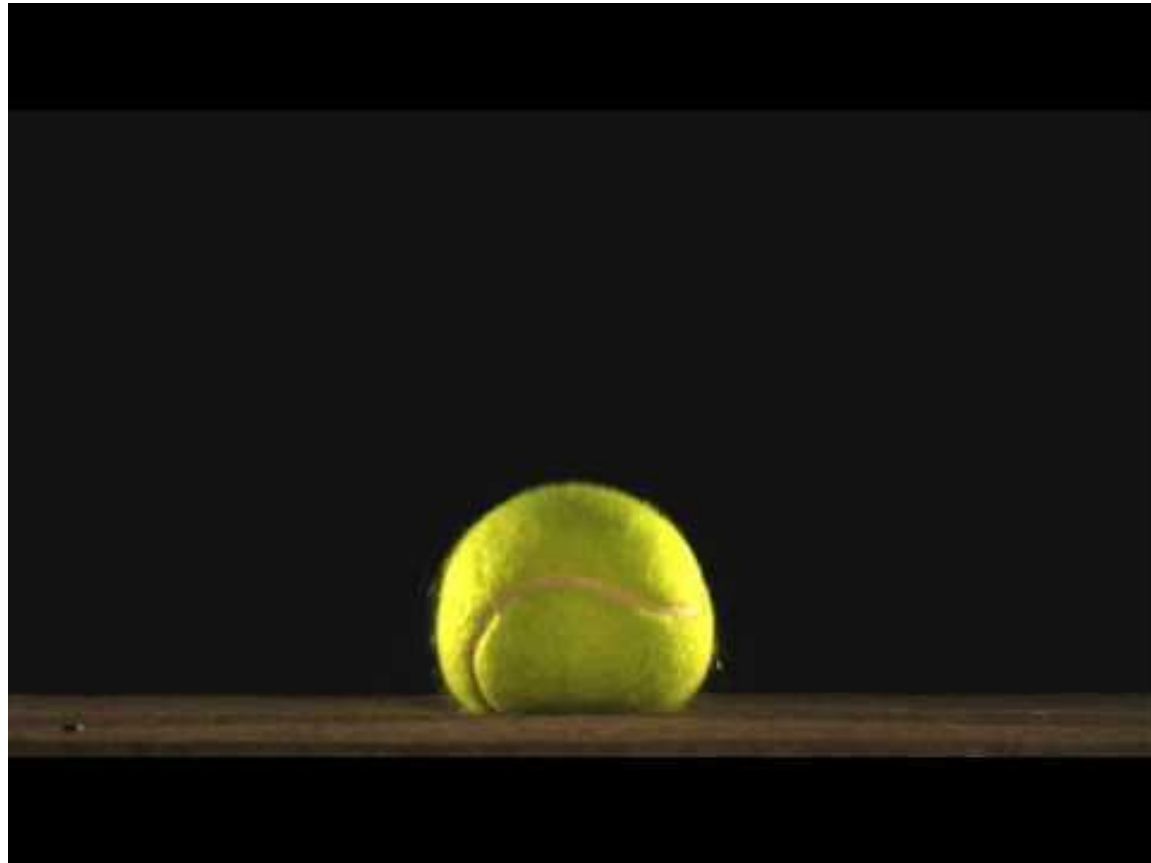
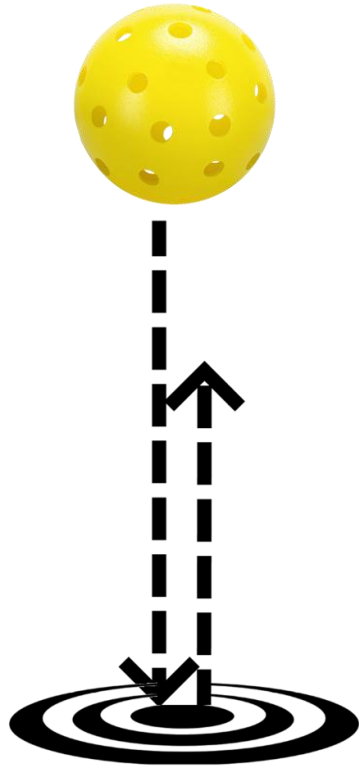
$$\mu = \frac{v_{ix} - v_{fx}}{v_{iy}(1 + e)}$$

Category	COF
High	≥ 0.71
Medium	0.56-0.70
Low	≤ 0.55

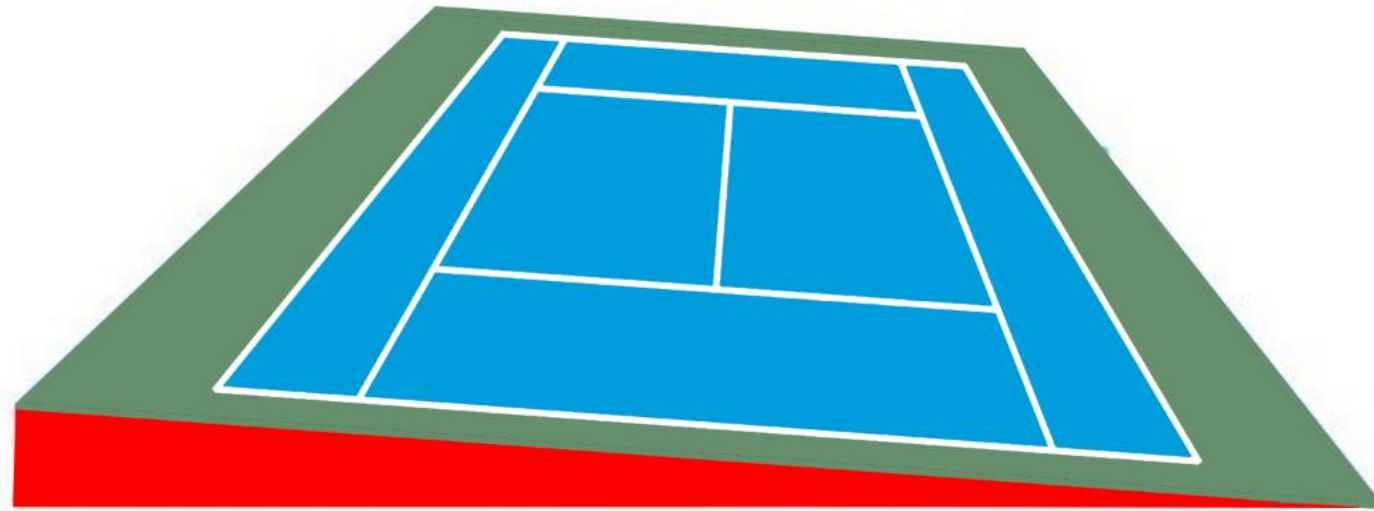
Court Pace Rating



Ball Rebound

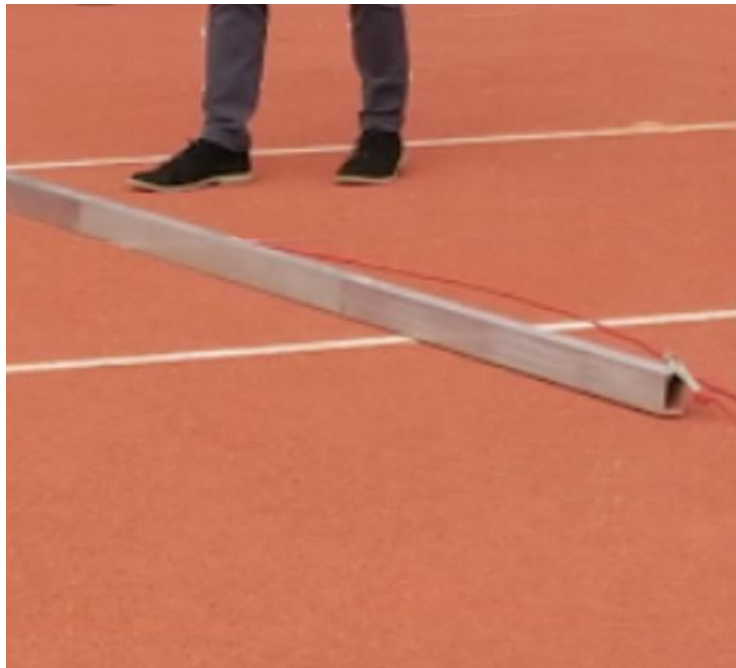


Slope



	Acrylic	Artificial clay/grass; carpet	Asphalt/concrete; other ¹	Clay	Grass
Slope (max)	1:100 (1.00%)	1:120 (0.83%)		1:200 (0.50%)	

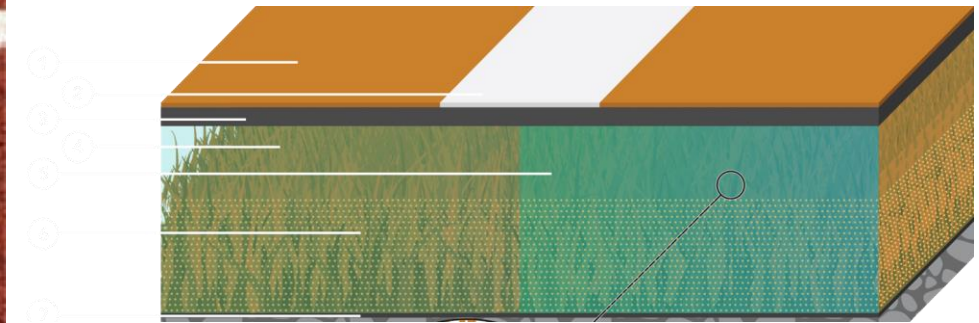
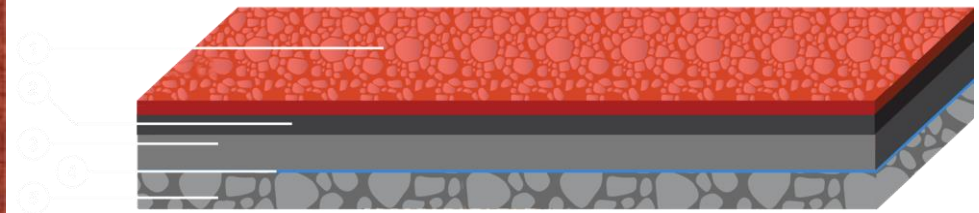
Straight Edge Planarity



	Acrylic	Artificial clay/grass; carpet	Asphalt/ concrete; other ¹	Clay	Grass
Evenness	6 mm		8 mm	6 mm	
Deviations ²	2 (PPA)/4 (TPA)		4 (PPA)/ 8 (TPA)	N/A ³	
Planarity ⁴	± 15 mm from true (PPA) ± 30 mm from true (TPA)				



Skid Resistance



UV Testing



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The Customer

Pros, Amateurs and the “Let’s Make It pretty”

The Pro Players

- **Grit**
 - They want grit that prevents them from sliding.
- **Colors**
 - Typical colors of blues, greens, grays and blacks.
 - They prefer nothing bright and the fewer colors the better (2 tones and solid colors).
- **Cushion vs Hard Courts**
 - Surface isn’t as important as the consistency of keeping the surfaces the same (all cushion or all hard courts).
- **Overall Look**
 - Virtually no grievances about the appearance of the surface.

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Pro Courts

Pros, Amateurs and the “Let’s Make It Pretty”



The Amateur Players

- **Grit**

- Less grit. Accustomed to older courts' surfaces, most players express injury concerns on new, gritty courts.

- **Colors**

- Prefer typical court colors as well but enjoy 2 tone & 3 tone combos.
- Not particularly fond of bright colors, yet they don't voice their discontent as frequently as the pros.

- **Cushion vs Hard Courts**

- Cushion is preferred and clubs with cushion courts experience longer wait times compared to hard courts.
- Amateur players frequently request cushion surfaces for tournaments.

- **Overall Look**

- Minimal complaints regarding the overall appearance.

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Amateur Courts

Pros, Amateurs and the “Let’s Make It Pretty”



Let’s Make It Pretty

- **Grit**
 - No preference.
- **Colors**
 - Color is a top priority: They find crazy color combinations crucial for their interests.
- **Cushion vs Hard Courts**
 - 50/50 on preference.
 - Typically, this choice is influenced by what others have conveyed to them.
- **Overall Look**
 - This holds greater significance than playability.

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Let's Make It Pretty Courts

Pros, Amateurs and the "Let's Make It Pretty"



Pickleball Surfaces

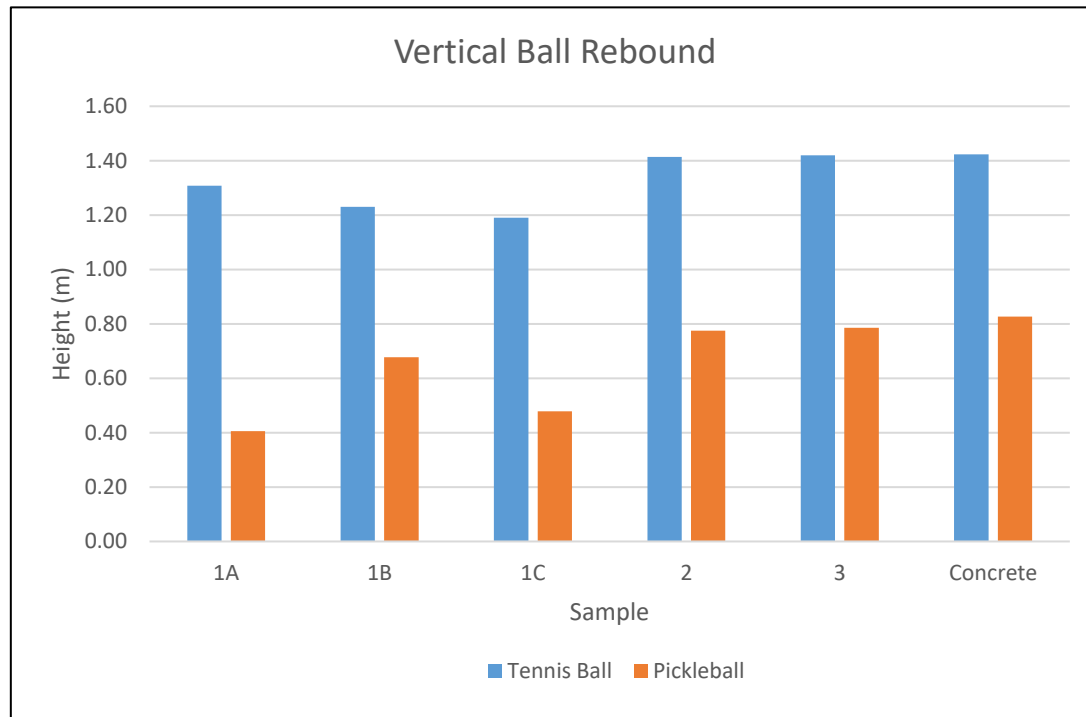
- **Hard Courts**

- Acrylic Coatings on Hard Courts

- Hard Courts: Surfaces made of asphalt and concrete.
- Hard courts are the most common surface.
- The majority of players are unable to distinguish between the two.
- Surface Prep
 - Cleaning: The coating is only as good as what its on top of.
 - Repairs: Cracks cause dead spots if not repaired correctly.
 - Overlays: Can cause dead spots if not installed to the manufacturer's specs.

Pros, Amateurs and the “Let’s Make It Pretty”

Court Surface Ball Rebound Samples



Sample 1A - 1B - 1C: Similar surfaces on plexiglass (mimics asphalt/concrete). This is comprised of 2 layers of acrylic resurfacer as a primer, and two layers of our standard color coatings.

Sample 2: CushionX surface with a latex sealer coat followed by two coats of premium flexible coatings that contain the same sand (and qty by volume) as Samples 1.

Samples 3: Same as Sample 2 except a larger size sand.



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Ball Performance Data

- *The best ball for clay surfaces*

Purpose Summary

- Compare characteristics of different brands of pickleballs and determine which is best for play on clay.
- What characteristics make for the best bounce.
- 14 different pickleball brands were selected for testing.
- Balls selected included indoor, outdoor, and one foam option.
- Standardized testing performed to measure performance of bounce.

Testing procedure

- Height gauge used for measuring outside diameter of each ball
- Scale used for measuring the weight of each ball
- Camera set up to record the surface and measuring tape
- Clegg hammer used for compaction measurements.
- Dry and wet clay courts tested.
- Hard, clay, and cushion surfaces tested for performance comparison.
- Each ball was dropped three times.
- Procedure repeated on wet & dry clay, hard, and cushion surfaces.

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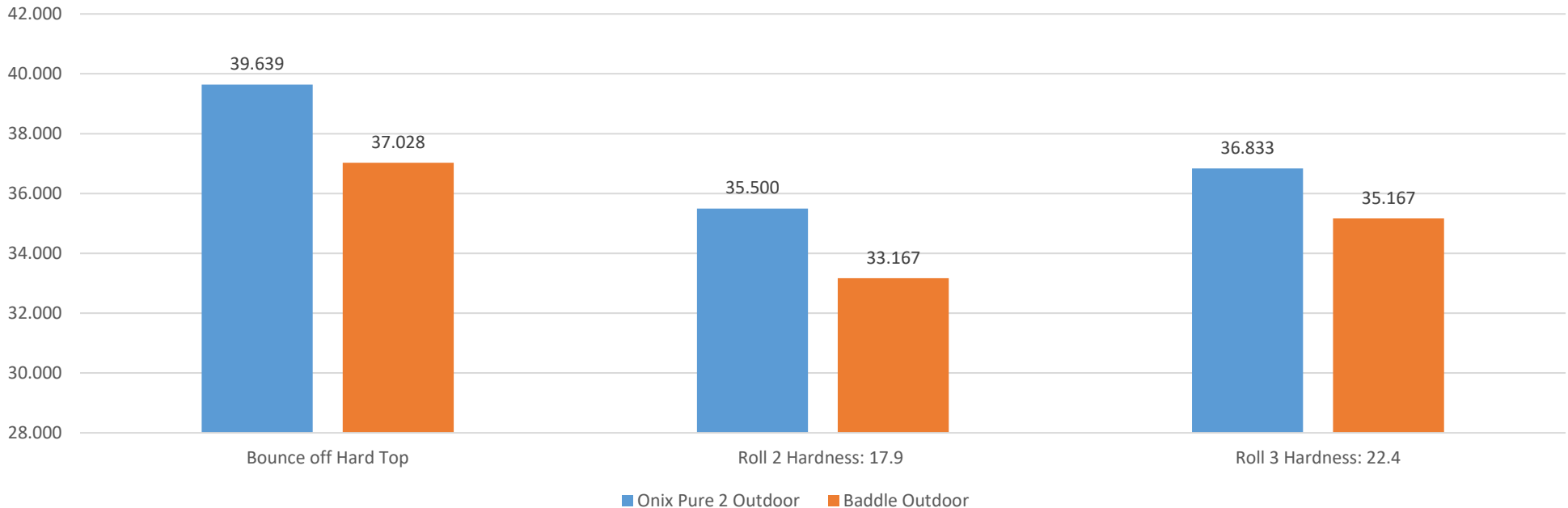
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Summary										dry cell after	dry cell		wet cell	wet cell		
										Roll 2	Roll		Roll 2	Roll 3	difference	
		Diameter	Diameter		Weight	Weight	Bounce off	Bounce off		Hardness:	3Hardness:	difference	Hardness:	Hardness:	between	
Ball Tested	Diameter	min	max	Weight	min	max	Granite	Hard Top		17.9	22.4	between hardtop	20.1	22.9	hardtop	
Onix Pure 2 Outdoor	2.900	2.870	2.970	0.915	0.780	0.935	38.417	39.639		35.500	36.833		2.806	30.000	33.250	6.389
Baddle Outdoor	2.880	2.870	2.970	0.871	0.780	0.935	35.806	37.028		33.167	35.167		1.861	34.583	31.750	2.444
Franklin X-40 Outdoor	2.900	2.870	2.970	0.920	0.780	0.935	34.417	34.806		29.667	28.500		5.139	26.333	25.000	8.472
Gamma Chuck Outdoor	2.930	2.870	2.970	0.929	0.780	0.935	35.917	35.389		29.667	25.667		5.722	26.667	24.167	8.722
Dura Fast Outdoor	2.938	2.870	2.970	0.937	0.780	0.935	35.583	35.417		30.500	29.333		4.917	25.333	24.000	10.083
Gamma Photon Outdoor	2.903	2.870	2.970	0.798	0.780	0.935	34.444	35.833		29.333	31.000		4.833	28.333	27.750	7.500
Wilson Tru 32 Outdoor	2.920	2.870	2.970	0.887	0.780	0.935	34.000	34.889		28.500	26.333		6.389	26.333	26.500	8.389
Selkirk Pro S1 Outdoor	2.934	2.870	2.970	0.932	0.780	0.935	34.750	35.611		27.500	29.167		6.444	27.333	26.083	8.278
Onix Fuse G2 Outdoor	2.900	2.870	2.970	0.931	0.780	0.935	35.889	35.833		32.000	32.333		3.500	31.667	28.833	4.167
Franklin X-26 Indoor	2.913	2.870	2.970	0.860	0.780	0.935	35.250	36.417		31.667	30.500		4.750	27.833	26.000	8.583
Gamma Photon Indoor	2.900	2.870	2.970	0.835	0.780	0.935	35.056	36.306		30.167	28.167		6.139	29.000	27.500	7.306
Wilson Tru 32 Indoor	2.908	2.870	2.970	0.890	0.780	0.935	34.667	35.778		30.667	29.167		5.111	26.083	24.667	9.694
Onix Fuse Indoor	2.900	2.870	2.970	0.850	0.780	0.935	36.361	36.472		32.667	31.333		3.806	29.333	28.833	7.139
Gamma Librarian	2.910	2.870	2.970	0.819	0.780	0.935	33.778	34.000		35.833	34.000		-1.833	37.333	40.167	-6.167

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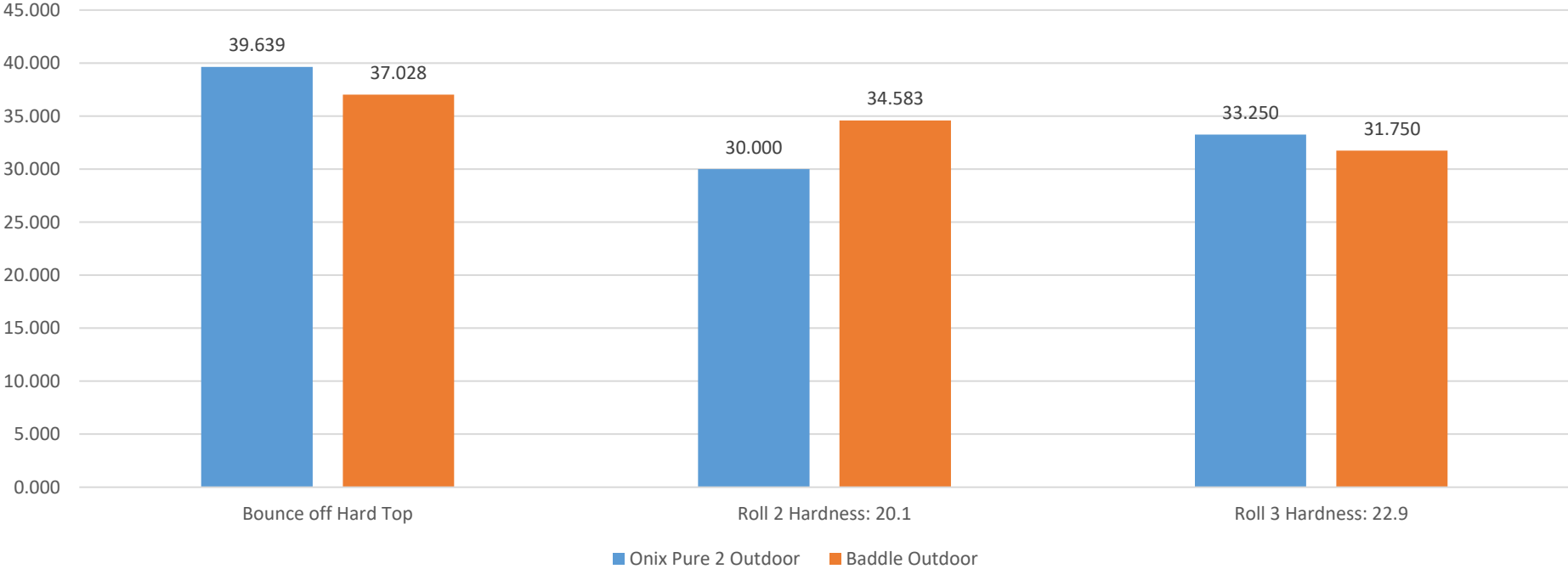
Dry clay court



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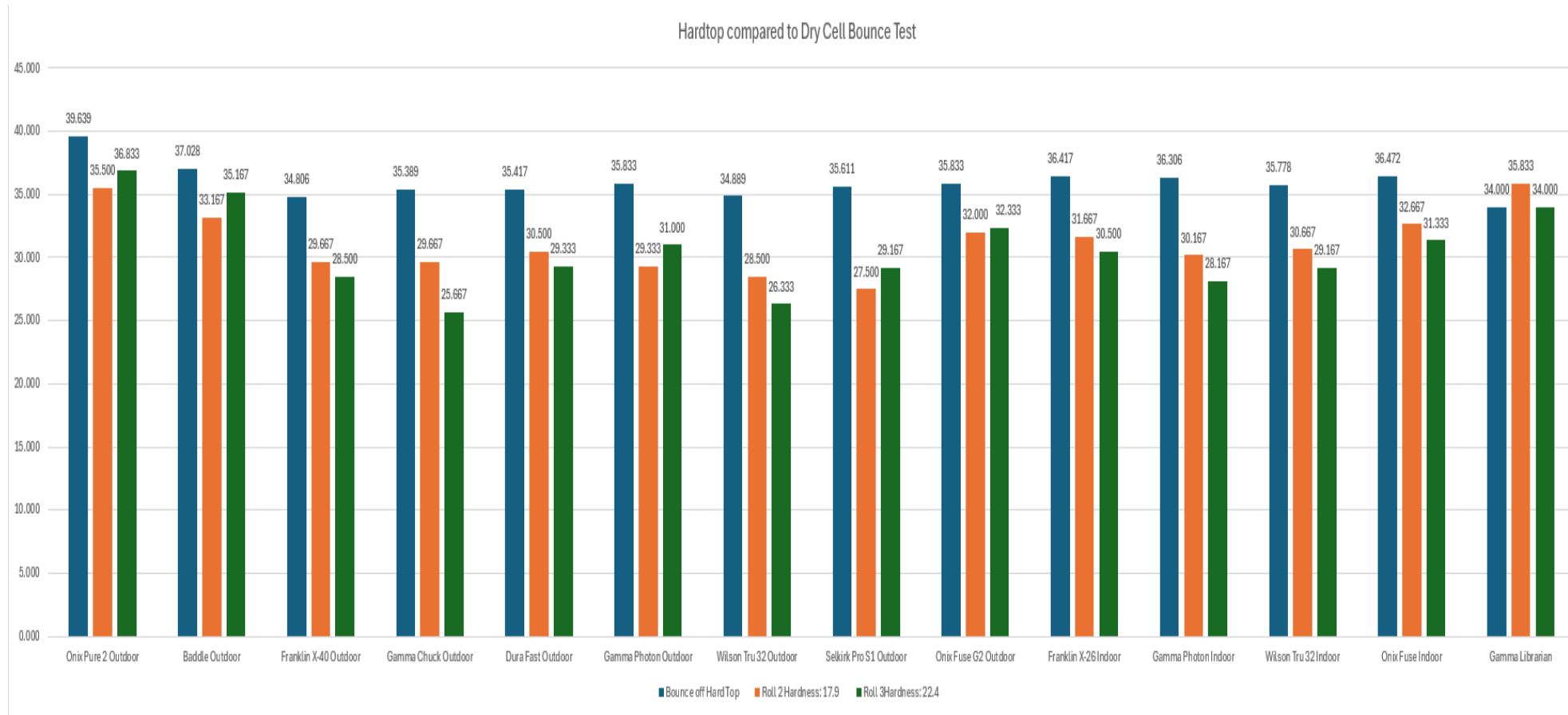
Wet clay court



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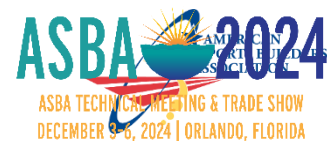
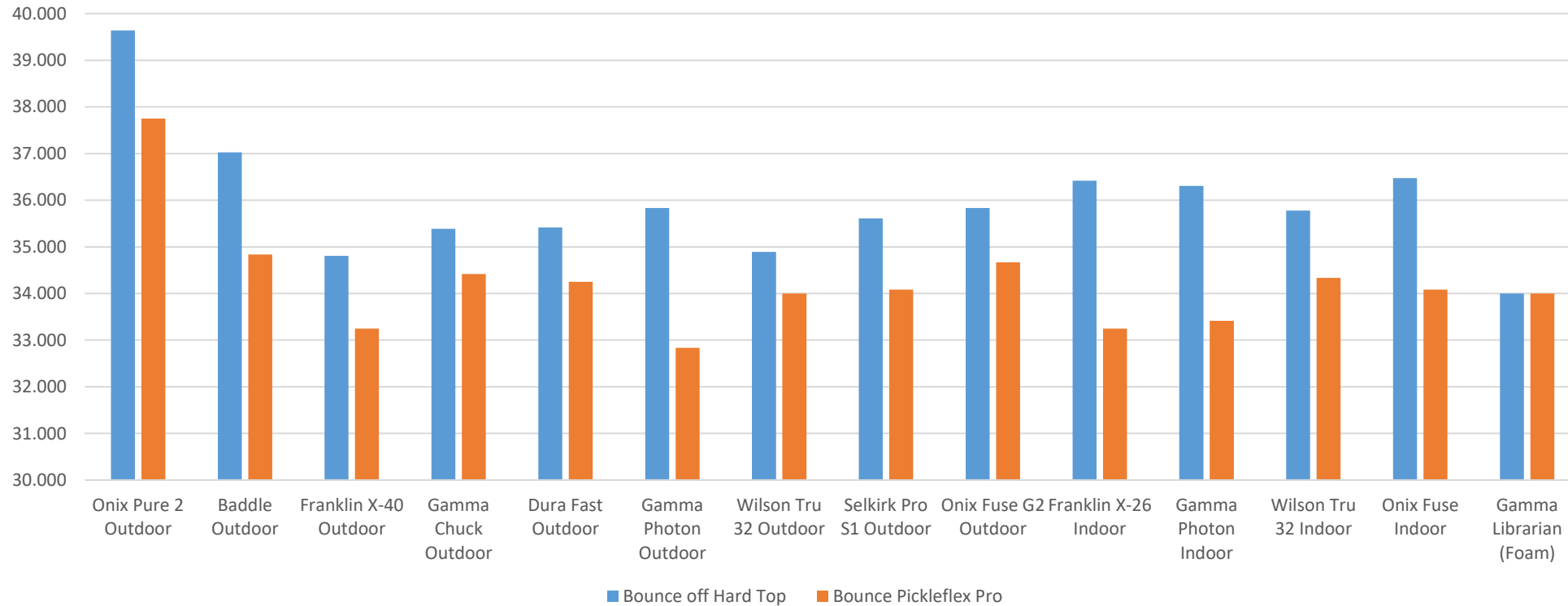
Hardtop compared to Dry Cell Bounce Test



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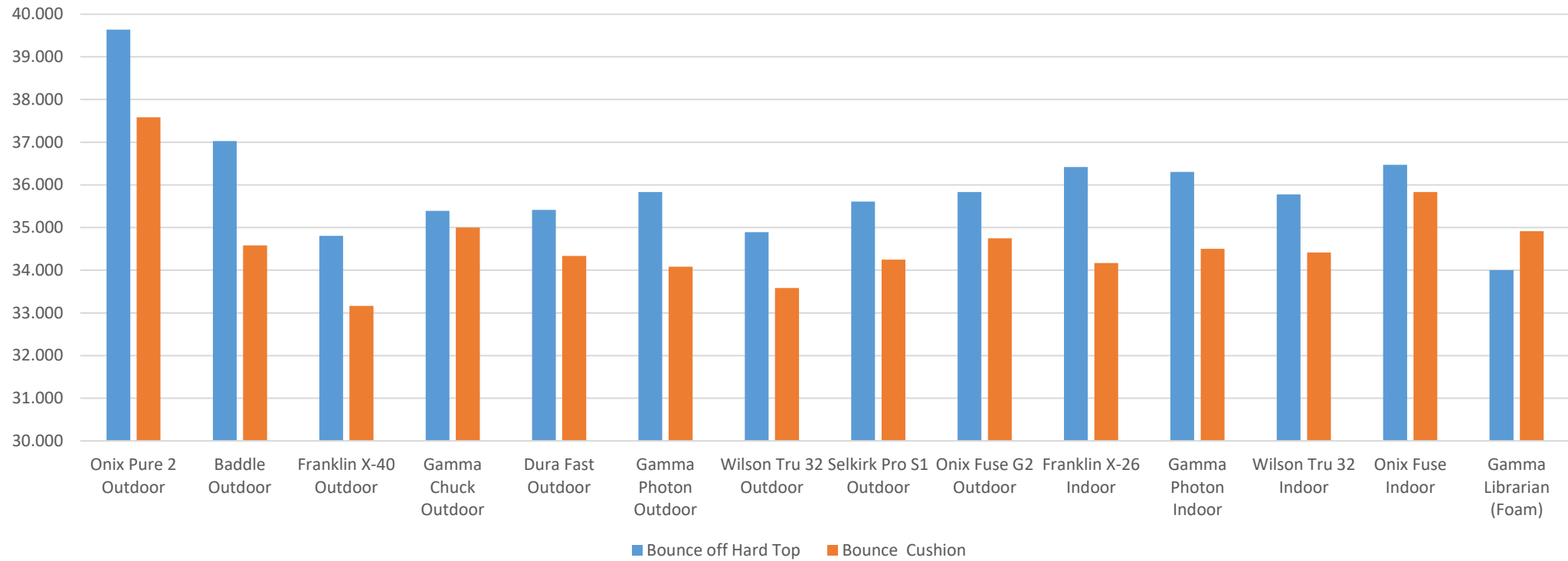
Bounce comparison of 8mm cushion Vs hard court



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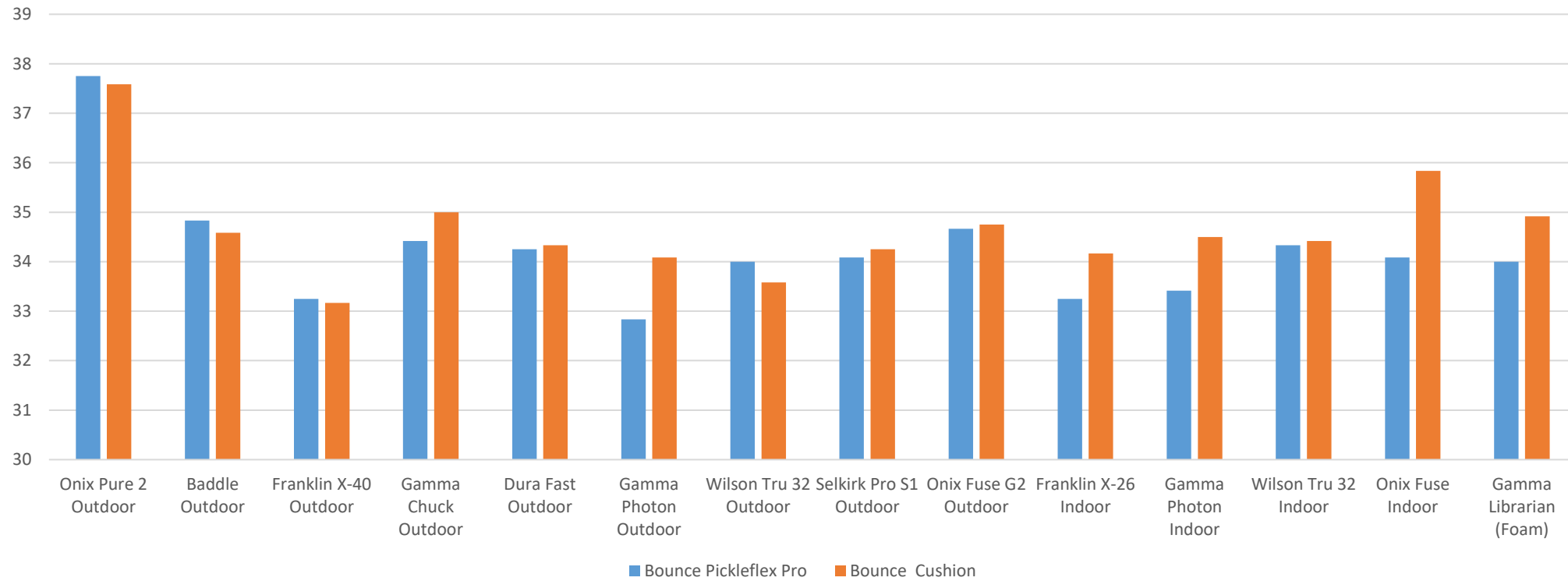
Bounce comparison of hard court vs squeegee applied cushion



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Bounce comparison 8mm rolled cushion vs squeegee applied cushion



Slide Title

While the Onyx Pure 2 bounced the highest overall, the Baddle Pickleball is the best option for pickleball play on clay.

The Onyx Pure 2 is not USPPA approved and the Baddle ball is.



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