
NSG
GROUP

Advanced Bird-Safe Glazing Design

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NSG Group

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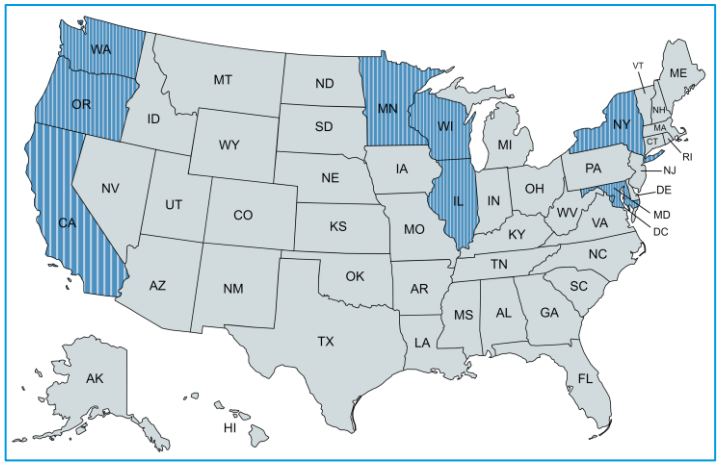
High-Rise Northern Exposure, Helsinki

Ecosystems	Communities
Pest Control	Food Production
Natural Fertilisation	Scavenging
Coral Reef Guano	Seasonal Migration
Seed Distribution	Environment
Pollination	Aesthetics
Food Chain	Birdsong

Pull Factors	Push Factors
Sustainability	Legislation
Eco-Development	Client Demand

Legislation & Building Codes

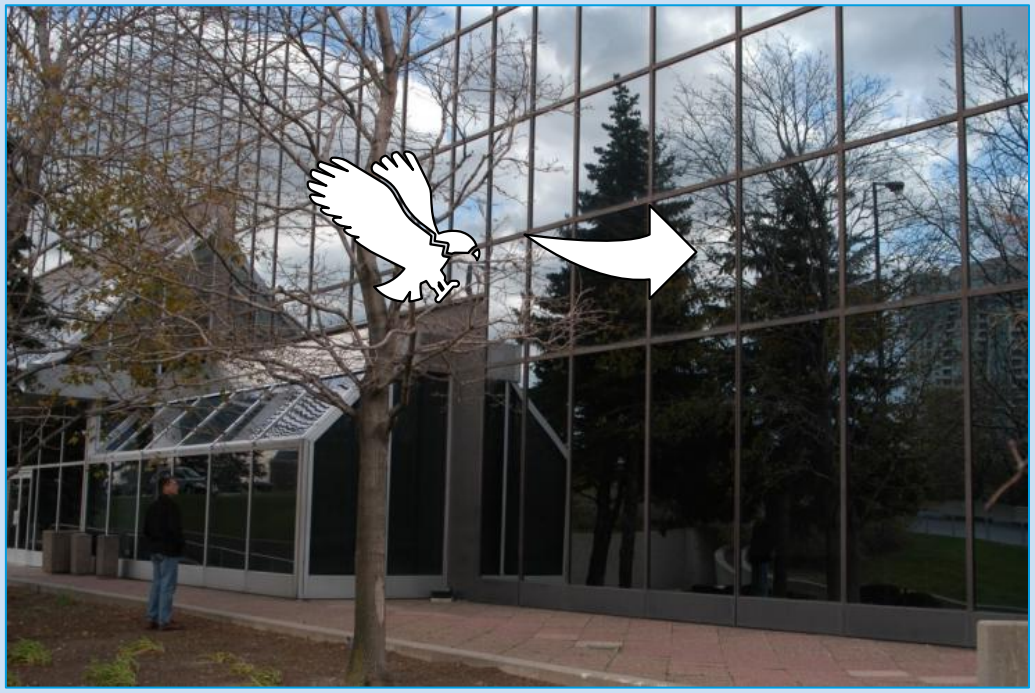
- European bird conservation organisations producing similar recommendations
- EU 'Birds Directive' does not yet directly legislate building requirements
- The American Bird Conservancy (ABC) develops Bird-friendly Building Design documentation for North America
- Northern American cities are beginning to include bird safety guidance in building codes
- Legislation types: Model, Mandatory, Voluntary, Guidelines



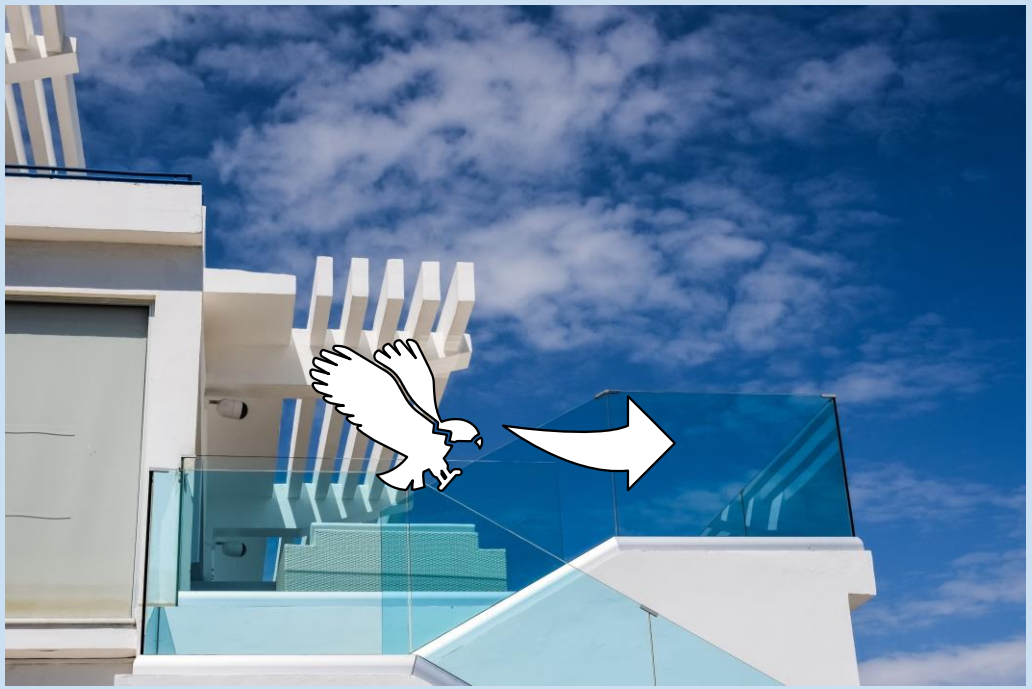
US States and Canadian Provinces with cities that have adopted bird safety building legislation

Performance Based	Prescriptive

▪ Requires bird-friendly products to be tested for effectiveness
▪ Allowable products must meet a maximum allowable Threat Factor
▪ Threat Factor determined by percentage of choices made by birds during flight testing, and from installed testing
▪ New York Local Law 15:
  ▪ Products must have Threat Factor ≤ 25
  ▪ The policy requires that new builds and major renovations consider bird safety
  ▪ The ABC is working with the U.S. Green Building Council on a scheme to give LEED certification credits for incorporating design strategies that reduce bird collisions
	▪ No testing required
	▪ Prescribes bird friendly marker requirements
	▪ 1st or 2nd surface; 2"x 4" rule; approved marker application list
	▪ Toronto Green Standard:
	  ▪ Bird friendly glazing required on the first 16 meters of building above ground
	  ▪ No testing or threat factor requirements
	  ▪ 1st surface marking required
	  ▪ 5 mm diameter/width high contrast pattern
	  ▪ 50mm x 50mm spacing
	  ▪ Approved markers include Ceramic Frit, Acid Etched, UV Coatings, Applied Film



Reflectivity issue



Fly-through issue

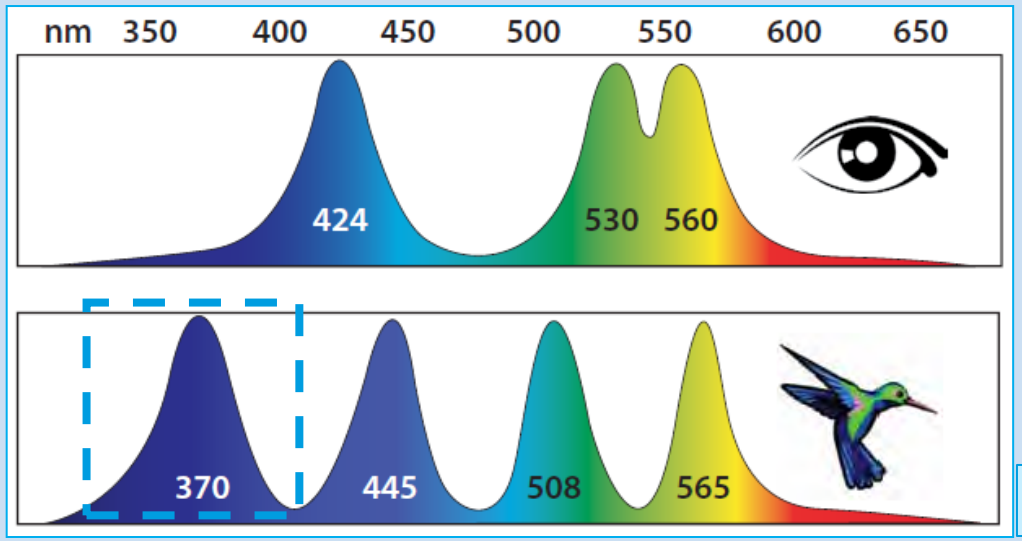
Low-tech attempts to solve reflectivity collisions, with poor functionality and aesthetics

Human vs. Avian Vision

Simulated human vision*

Simulated avian tetrachromat vision*

Great Bustard plumage viewed under daylight (left) and UV (right)†

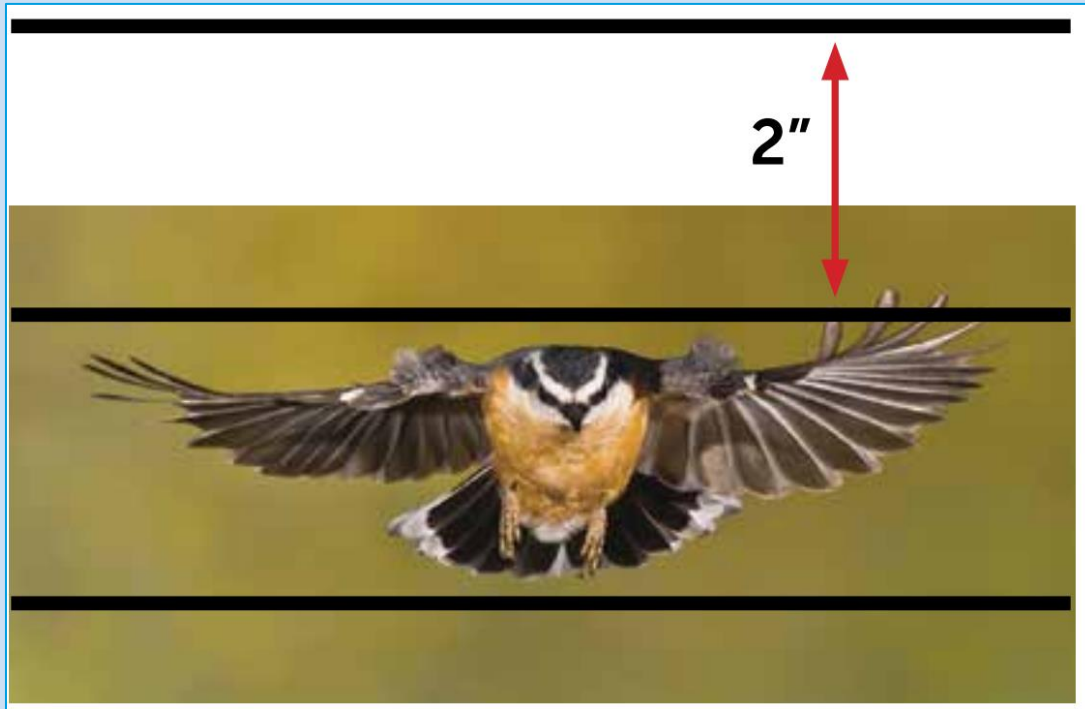


Comparison of vision‡

Scorpion under UV light

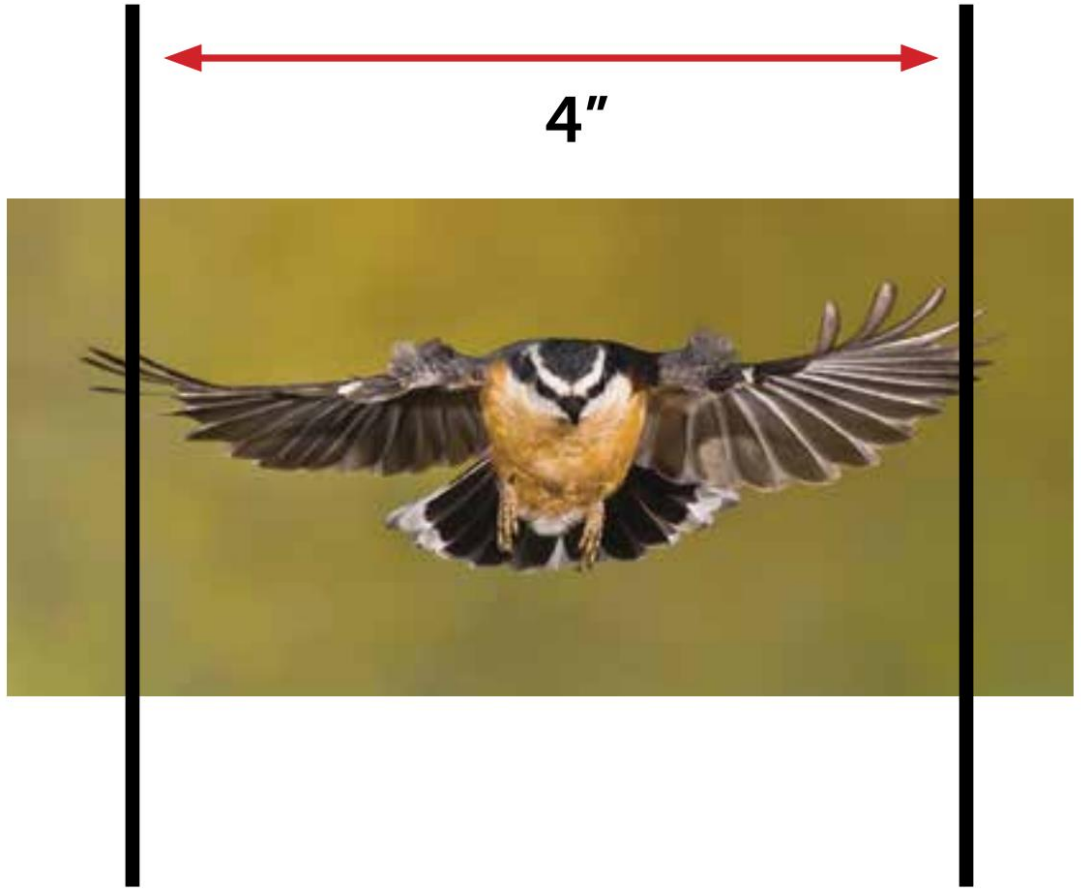
Source: (*) *Nature Communications*, (†) *Nature Reports*, (‡) *American Bird Conservancy*

The 2″ by 4″ Rule



Red-breasted Nuthatch. Photo by Roy Hancliff

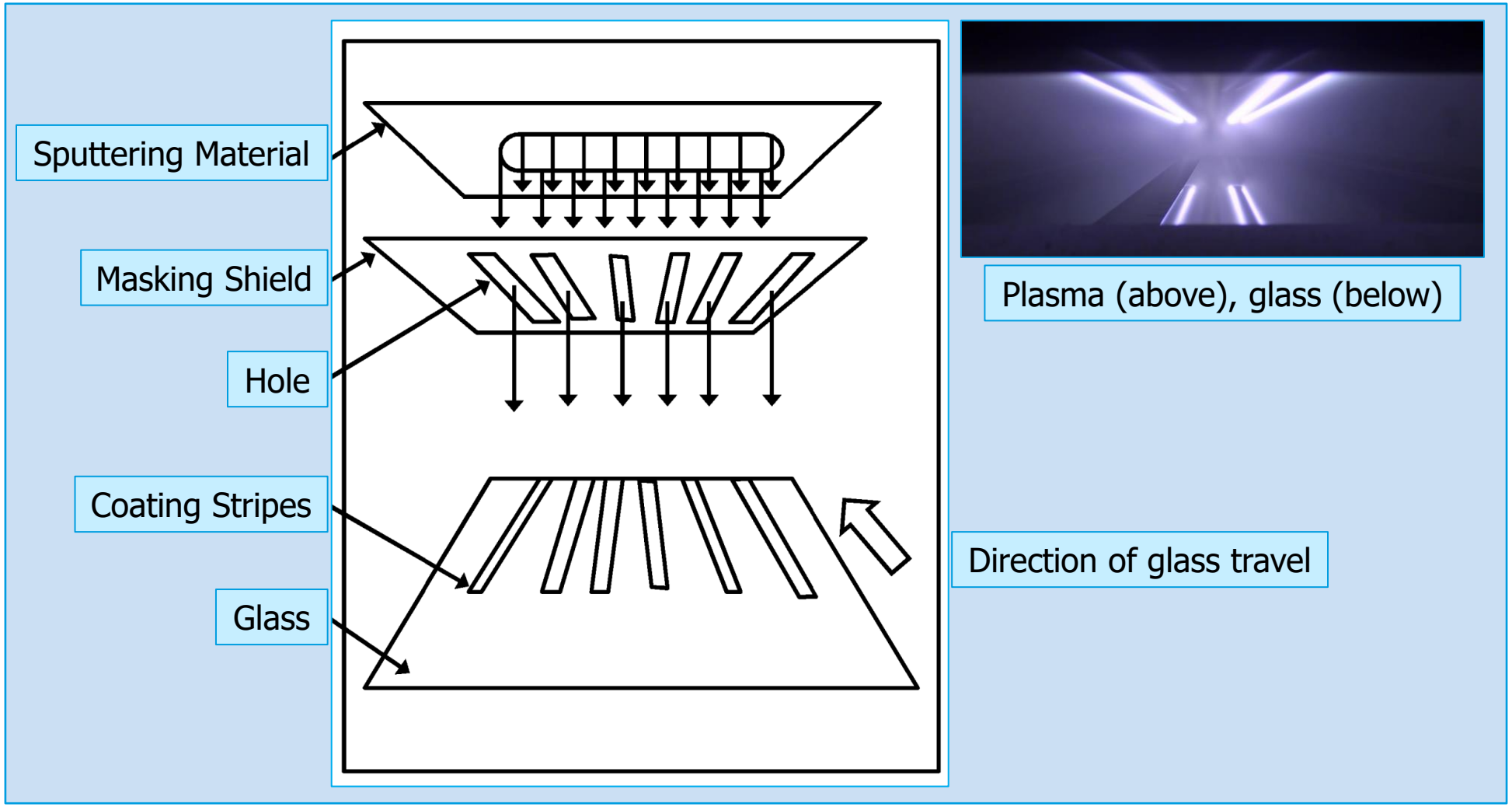
Horizontal lines with a maximum spacing of 2 inches



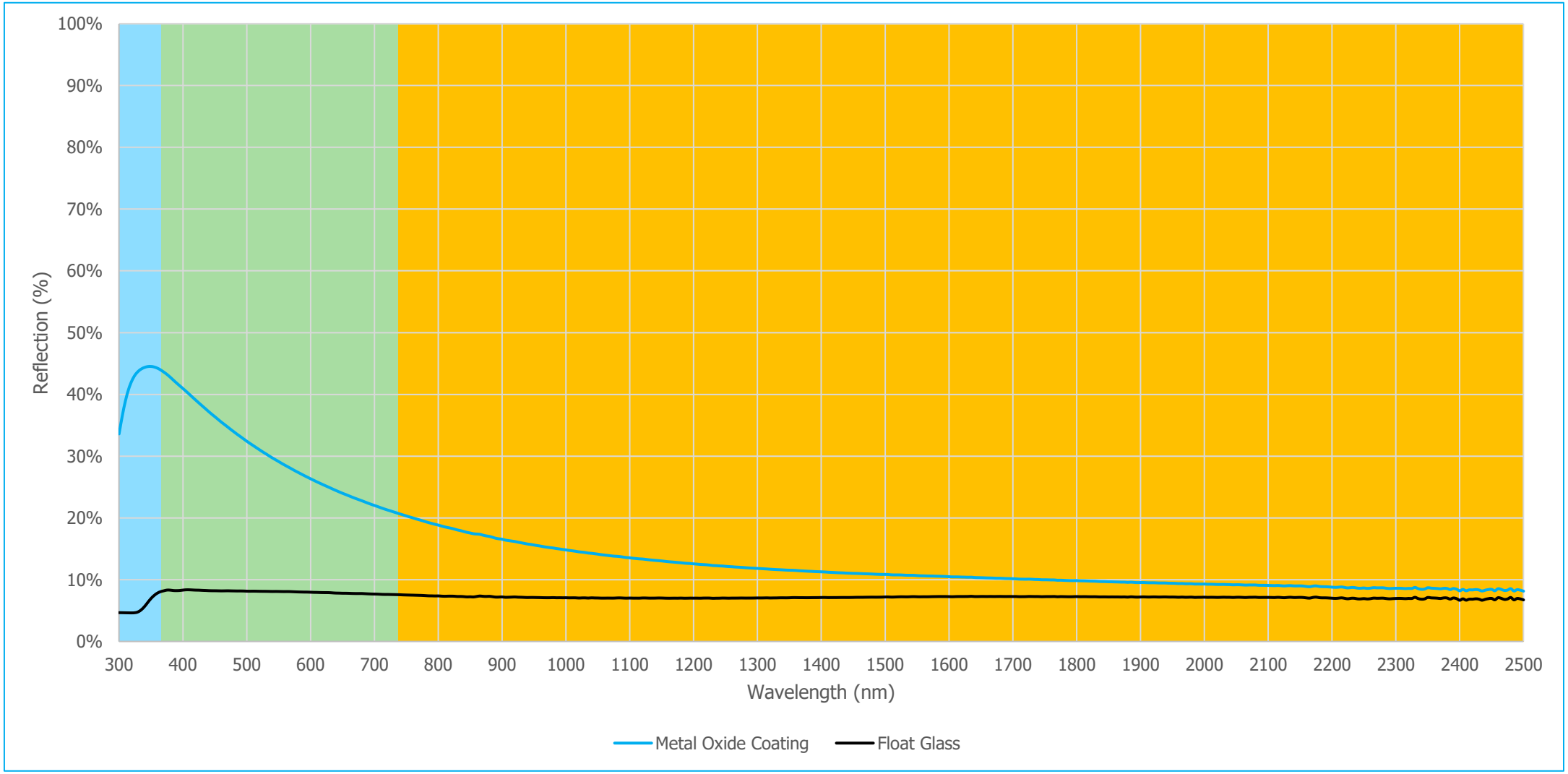
Vertical lines with a maximum spacing of 4 inches

Source: *American Bird Conservancy*

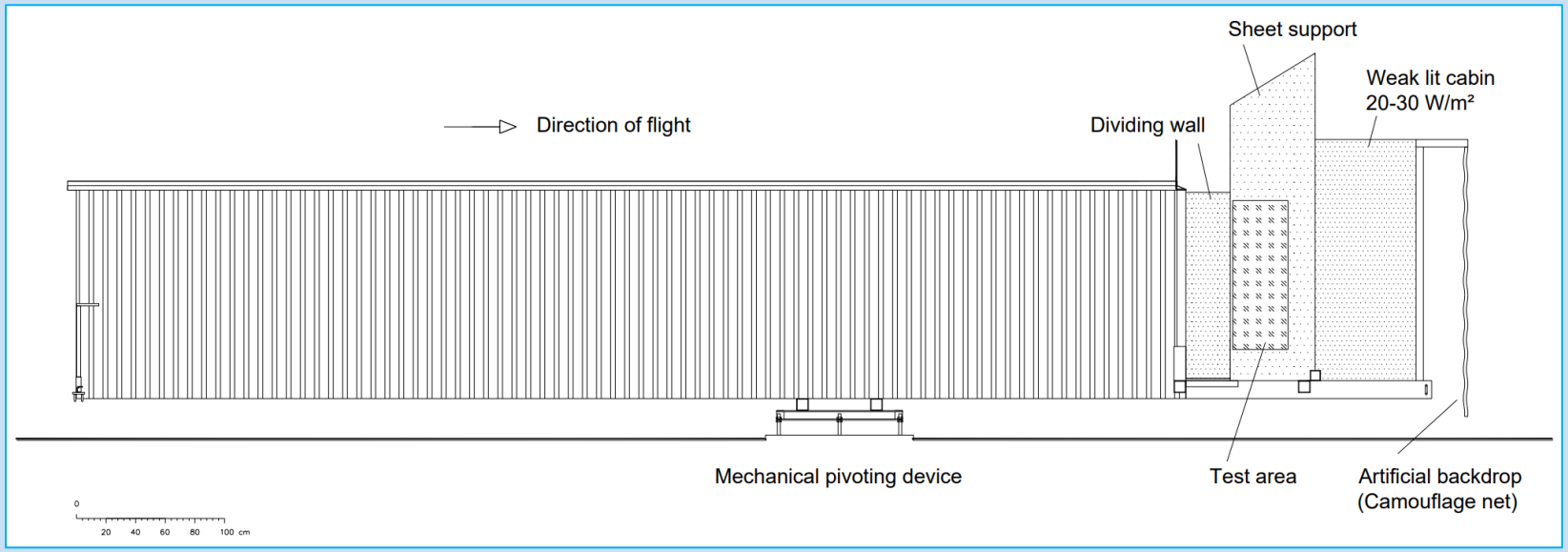
Magnetron Sputter Coating Deposition Method



Comparison of Reflection



Testing and Validation: Flight Tunnel



Flight tunnel at Hohenhau, Austria

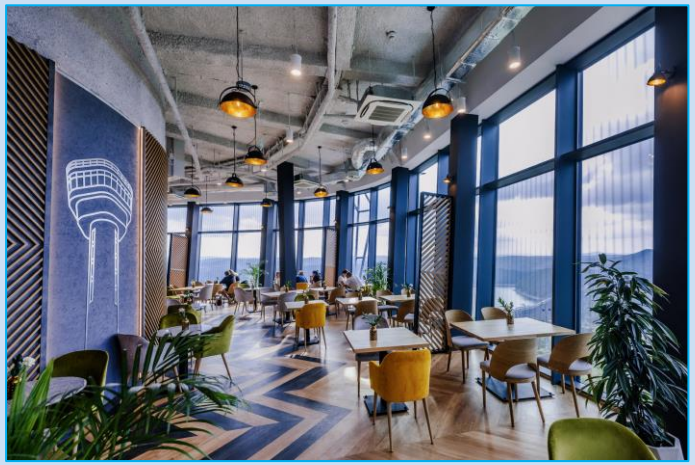
Test pane (left), control pane (right)

'WIN' Test

- Birds have two choices during testing - fly towards the test glass on the left, or towards to control float glass on the right
- Only 6.1% flew towards the test glass
- Results under 10% are classed as "highly effective" Bird Safety Glass
- Tested monolith, solar control on surface #2, and low-emissivity on surface #3
- Testing performed by Martin Rössler, Biologische Station Hohenau-Ringelsdorf
- Also tested at Powdermill Avian Research Center, USA

Pilot Installation: Mere Sands Nature Reserve

Solina Observation Tower & Gondola Station



Thank you for your attention

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