



# SingularBear Glass Shader

Welcome! This guide will walk you through everything you need to know about the Glass Shader. Whether you want to create a simple window, a realistic bottle, or a magical crystal with stylized effects, you'll find everything here.

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## Installation

### Requirements

- Unity **2021.3 LTS**, **2022 LTS**, or **Unity 6**
- **Universal Render Pipeline (URP)** version 12 or higher
- In your URP Asset, enable:
  -  **Opaque Texture** (required for refraction)
  -  **Depth Texture** (for depth-based effects)

### Import

1. Import the package into your project
2. The shader appears under: `SingularBear/URP/Glass`
3. Create a new Material and assign this shader

|  Tip: Presets are saved in Assets/SingularBear/GlassShader/Presets

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## Editor Interface

The shader inspector is designed to be intuitive, even with all its options.

### Category Tabs



At the top, you have 5 tabs that match the inspector layout:

Tab	Contains
<b>Base</b>	Quality, Main Surface, Normals, Details, Transparency
<b>Optical</b>	Refraction, Blur, Reflection, Fresnel, Iridescence
<b>Surface</b>	Noise, Tint, Edge Darkening, Inner Glow, Thickness, Depth Fade, Rain, Rim, Specular
<b>Effects</b>	Translucency, Emission, Triplanar, Absorption, Caustics, TIR, Sparkle, Dirt/Moss, Decals, Fingerprints, Distortion FX
<b>Render</b>	Shadows, Blend Mode, Culling, ZWrite





## Search Bar




Looking for a specific parameter? Type its name in the search bar. Super handy when you've enabled lots of features.

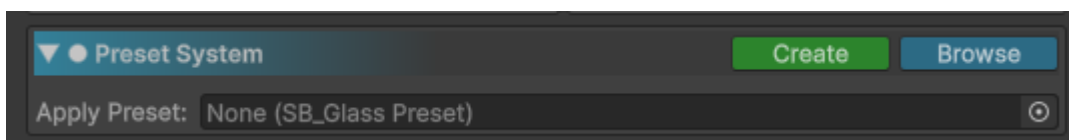
## Performance Indicator

The colored bar shows how many features are active:

-  **Green** (1-5): Excellent performance
-  **Yellow** (6-10): Watch out on mobile
-  **Orange** (11-15): Better for PC
-  **Red** (16+): Avoid on mobile!

 **Pro Tip:** This bar is a rough estimation, not a benchmark. It's there to gently warn you: "Hey, maybe don't enable Rain, Caustics, *and* 4 layers of fingerprints on a tiny mobile prop."

## Preset System



Spent time configuring a great look? Save it!

1. Click **Create** in the Preset section
2. Give it a name, category, and description
3. To apply it later, select it and click **Apply Preset**

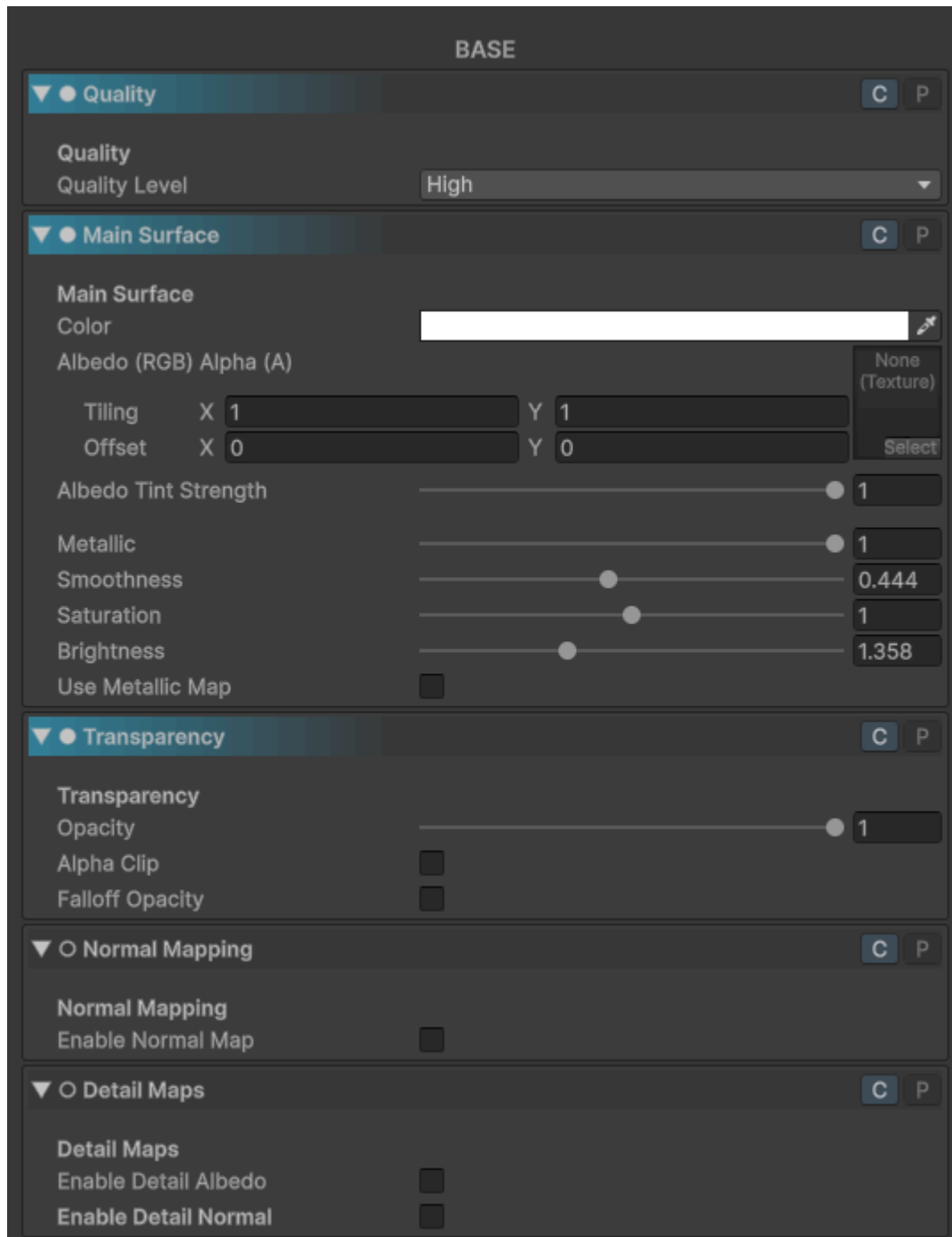
## Copy/Paste

Each section header has **C** (Copy) and **P** (Paste) buttons to quickly copy settings between materials.

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### **BASE**

Everything related to the fundamental surface properties.



The screenshot shows the 'BASE' material settings panel. It is organized into five sections, each with a dropdown arrow, a section title, and 'C' (Copy) and 'P' (Paste) buttons. The 'Quality' section has a 'Quality Level' dropdown set to 'High'. The 'Main Surface' section includes a 'Color' picker, an 'Albedo (RGB) Alpha (A)' field with a 'None (Texture)' button, 'Tiling' and 'Offset' fields with X and Y coordinates, 'Albedo Tint Strength', 'Metallic', 'Smoothness', 'Saturation', and 'Brightness' sliders, and a 'Use Metallic Map' checkbox. The 'Transparency' section has an 'Opacity' slider, 'Alpha Clip', and 'Falloff Opacity' checkboxes. The 'Normal Mapping' section has an 'Enable Normal Map' checkbox. The 'Detail Maps' section has 'Enable Detail Albedo' and 'Enable Detail Normal' checkboxes.

Section	Property	Value
Quality	Quality Level	High
Main Surface	Color	[Color Picker]
	Albedo (RGB) Alpha (A)	[None (Texture)]
	Tiling X	1
	Tiling Y	1
	Offset X	0
	Offset Y	0
	Albedo Tint Strength	1
	Metallic	1
	Smoothness	0.444
	Saturation	1
	Brightness	1.358
Transparency	Opacity	1
	Alpha Clip	<input type="checkbox"/>
	Falloff Opacity	<input type="checkbox"/>
Normal Mapping	Enable Normal Map	<input type="checkbox"/>
Detail Maps	Enable Detail Albedo	<input type="checkbox"/>
	Enable Detail Normal	<input type="checkbox"/>

## Quality

Parameter	Description
<b>Quality Level</b>	Low (mobile), Medium (balanced), High (PC/console)

💡 Low limits additional lights to 2, Medium to 4, High has no limit.

## Main Surface

Parameter	Description
<b>Color</b>	Base color + initial alpha
<b>Albedo</b>	Base texture (RGB = color, A = transparency)
<b>Albedo Tint Strength</b>	How much the texture influences the color
<b>Metallic</b>	0 = dielectric (glass), 1 = polished metal
<b>Smoothness</b>	Higher = shinier
<b>Saturation</b>	Adjusts overall saturation
<b>Brightness</b>	Brightens or darkens
<b>Metallic Map</b>	Texture for metallic (R) and smoothness (A)

💡 For classic glass: Metallic = 0, Smoothness = 0.95

## Normal Mapping

Adds surface relief for textured glass, frosted glass, or imperfections.

Parameter	Description
<b>Normal Map</b>	The normal map texture
<b>Normal Scale</b>	Strength (1 = normal, >1 = exaggerated)

## Detail Maps

Repeating micro-details that overlay the base surface.

Parameter	Description
<b>Detail Albedo</b>	Secondary texture that overlays
<b>Detail Color</b>	Tints the detail texture
<b>Detail Tiling</b>	How many times it repeats
<b>Detail Intensity</b>	Blend strength

Parameter	Description
<b>Detail Normal</b>	Micro-relief (scratches, grain...)
<b>Detail Normal Scale</b>	Normal intensity
<b>Triplanar</b>	Projects detail normal on all 3 axes

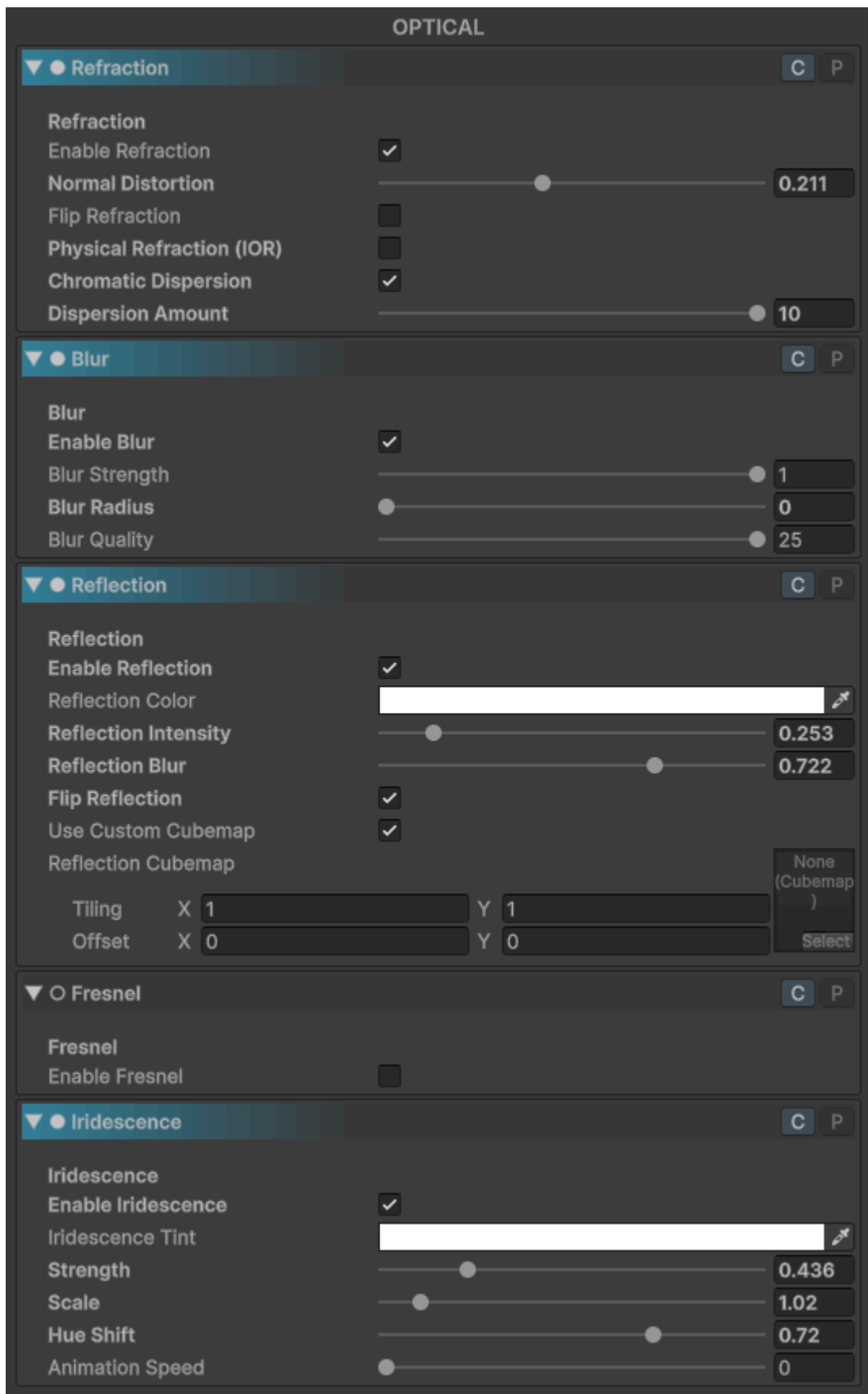
## Transparency

Parameter	Description
<b>Opacity</b>	Global transparency (0 = invisible, 1 = opaque)
<b>Alpha Clip</b>	Hard cuts pixels below threshold
<b>Alpha Clip Threshold</b>	The cutoff value
<b>Falloff Opacity</b>	Transparency varies by view angle
<b>Falloff Intensity</b>	Strength of the falloff
<b>Falloff Power</b>	Controls the curve
<b>Invert Falloff</b>	Inverts the effect

| 💡 Falloff Opacity makes edges more opaque - very realistic for thick glass!

## OPTICAL

The optical properties that make glass look like glass.



## Refraction

Makes what's behind the glass appear distorted.

Parameter	Description
<b>Normal Distortion</b>	Distortion amount (0.05-0.15 for realism)
<b>Flip Refraction</b>	Inverts direction
<b>Physical (IOR)</b>	Physics-based refraction
<b>IOR Strength</b>	Index of refraction intensity
<b>Origin Medium</b>	Air/Water/Glass - where light comes from
<b>Chromatic Dispersion</b>	Separates RGB like a prism 🌈
<b>Dispersion Amount</b>	Strength of color separation

💡 Real IOR: Air = 1.0, Water = 1.33, Glass = 1.5, Diamond = 2.4

## Blur

Simulates frosted or sandblasted glass.

Parameter	Description
<b>Blur Strength</b>	Intensity
<b>Blur Radius</b>	Size of blur kernel
<b>Blur Quality</b>	Sample count (4-25)

⚠ Warning: Blur is expensive! Avoid on mobile or set Quality to 4-6.

## Reflection

Parameter	Description
<b>Reflection Color</b>	Tints reflections
<b>Reflection Intensity</b>	Strength
<b>Reflection Blur</b>	Blurs reflections
<b>Flip Reflection</b>	Inverts reflection direction
<b>Custom Cubemap</b>	Use your own cubemap
<b>Reflection Cubemap</b>	The cubemap texture

## Fresnel

Makes edges more reflective/opaque than the center. **Essential for realistic glass!**

Parameter	Description
<b>Fresnel Color</b>	Tint color
<b>Fresnel Power</b>	Curve control (3-5 for realism)
<b>Fresnel Intensity</b>	Effect strength
<b>Fresnel Min</b>	Minimum at center
<b>Fresnel Max</b>	Maximum at edges
<b>Invert Fresnel</b>	Flips the effect
<b>Affect Alpha</b>	Fresnel affects transparency
<b>Affect Reflection</b>	Fresnel boosts edge reflections

💡 Always enable Fresnel for believable glass. It's basically free!

## Iridescence

Rainbow effect like soap bubbles or oil films.

Parameter	Description
<b>Iridescence Tint</b>	Base tint color
<b>Strength</b>	Effect intensity
<b>Scale</b>	Size of color bands
<b>Hue Shift</b>	Shifts the colors
<b>Animation Speed</b>	Animates colors (0 = static)

## SURFACE

Surface details and lighting effects.



## Surface Noise

Procedural noise for imperfections or stylized effects.

Parameter	Description
<b>Noise Scale</b>	Pattern size (higher = finer)
<b>Noise Strength</b>	Color variation intensity
<b>Normal Distortion</b>	Affects refraction
<b>Animation Speed</b>	Animates noise (0 = static)

## Tint Texture

Overlay a texture to tint the glass. Perfect for stained glass.

Parameter	Description
<b>Tint Texture</b>	The overlay texture
<b>Tint Color</b>	Multiplies texture color
<b>Tint Strength</b>	Intensity
<b>Alpha Blend</b>	Texture alpha affects glass opacity
<b>Distortion Amount</b>	Texture distorts refraction

## Edge Darkening

Darkens edges, simulating light absorption at grazing angles.

Parameter	Description
<b>Strength</b>	How dark edges get
<b>Power</b>	Falloff curve
<b>Distance</b>	How far darkening extends

## Inner Glow

Glowing effect from inside. Great for magical objects.

Parameter	Description
<b>Glow Color</b>	Glow color
<b>Strength</b>	Intensity
<b>Power</b>	Concentration
<b>Falloff</b>	Edge fade speed

## Thickness

Varying glass thickness using a texture.

Parameter	Description
<b>Thickness Map</b>	Grayscale (white = thick)
<b>Thickness Min/Max</b>	Remaps values
<b>Affects Color</b>	Thick = more tinted
<b>Affects Distortion</b>	Thick = more distortion

💡 Great for bottles, vases, or varying wall thickness.

## Depth Fade

Fades glass based on distance to objects behind it.

Parameter	Description
<b>Fade Distance</b>	How far the fade extends
<b>Fade Color</b>	Color at intersection

## Rain

Rain droplets flowing down the surface.

Parameter	Description
<b>Rain Texture</b>	Normal map for droplets
<b>Rain Intensity</b>	Global intensity
<b>Tiling XY</b>	Pattern repetition
<b>Offset XY</b>	Pattern offset
<b>Rotation</b>	Angle in degrees
<b>Speed XY</b>	Flow speed and direction
<b>Normal Strength</b>	Droplet relief
<b>Refraction Distortion</b>	Droplets distort refraction
<b>Surface Wetness</b>	Overall wet look

## Rim Lighting

Glowing outline on edges. Perfect for magical effects.

Parameter	Description
<b>Rim Color</b>	Rim color
<b>Rim Power</b>	Curve control
<b>Rim Intensity</b>	Strength
<b>Rim Min/Max</b>	Limits the effect

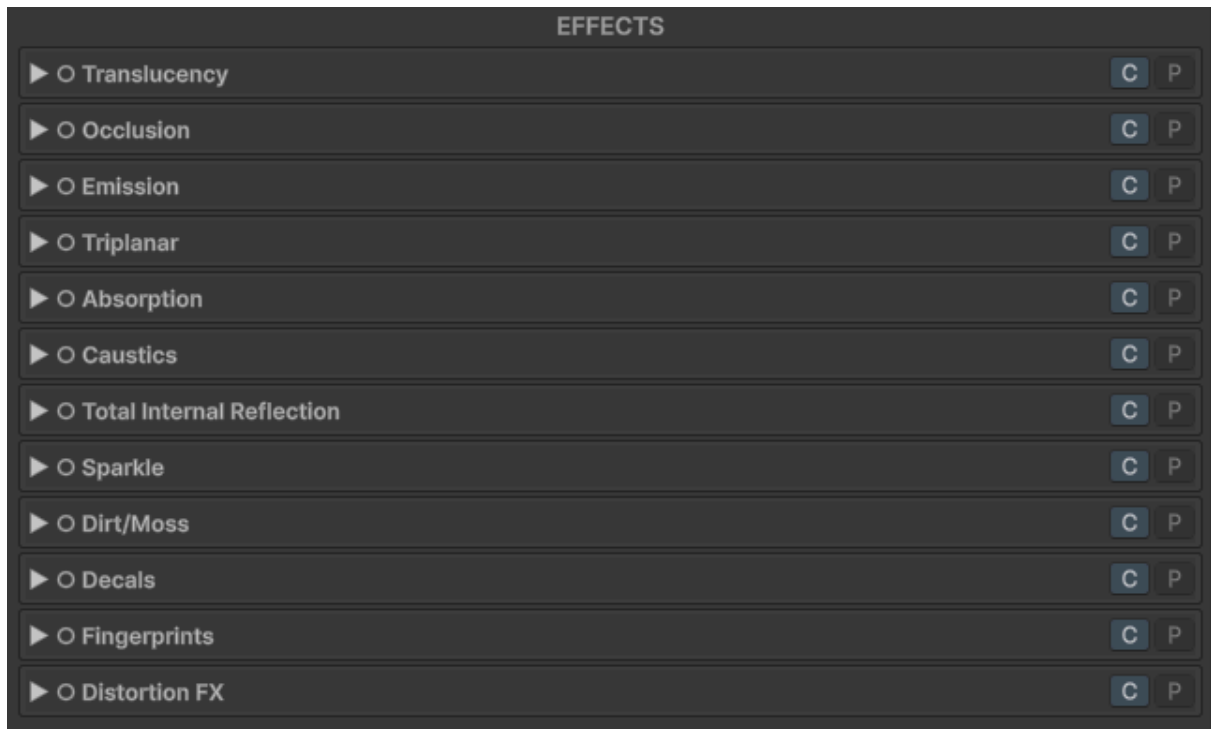
## Specular

Bright highlights on glass.

Parameter	Description
<b>Specular Color</b>	Highlight color
<b>Specular Intensity</b>	Brightness
<b>Highlight Size</b>	Spot size
<b>Smoothness</b>	Sharpness
<b>Edge Hardness</b>	0 = soft, 1 = hard
<b>Toon Mode</b>	Stylized step rendering
<b>Toon Steps</b>	Number of bands
<b>Toon Threshold</b>	Cutoff point
<b>Fresnel Specular</b>	View-angle based
<b>Anisotropy</b>	Stretches highlight
<b>Diffuse Intensity</b>	Base diffuse lighting

## ✨ EFFECTS

Advanced effects and overlays.



## Translucency

Light passing through the material. Ideal for colored glass, wax, jade.

Parameter	Description
<b>Translucent Color</b>	Transmitted light color
<b>Intensity</b>	Effect strength
<b>Falloff Power</b>	Light concentration
<b>Normal Distortion</b>	Surface affects transmission
<b>Scale</b>	Effect scale

## Occlusion

Darkens recessed areas.

Parameter	Description
<b>Occlusion Map</b>	Grayscale texture
<b>Occlusion Strength</b>	Darkening intensity

## Emission

Glass that glows from within.

Parameter	Description
<b>Emission Map</b>	Optional emission texture
<b>Emission Color</b>	HDR color (use HDR for bloom!)
<b>Emission Intensity</b>	Brightness

## Triplanar

Projects textures on all 3 axes. No UVs needed.

Parameter	Description
<b>Triplanar Scale</b>	Projection size
<b>Blend Sharpness</b>	Axis transition sharpness

## Absorption

Light absorbed traveling through glass.

Parameter	Description
<b>Absorption Color</b>	Color of absorbed light
<b>Density</b>	Absorption speed
<b>Falloff</b>	Curve control

💡 Green/brown for wine bottles, blue for water, amber for whiskey.

## Caustics

Light patterns projected by glass.

Parameter	Description
<b>Procedural</b>	Math-generated caustics
<b>Caustics Texture</b>	Custom texture
<b>Caustics Color</b>	Pattern color
<b>Intensity</b>	Brightness
<b>Scale</b>	Pattern size
<b>Speed</b>	Animation speed
<b>Distortion</b>	Pattern deformation

## Total Internal Reflection (TIR)

Light bouncing inside glass at steep angles.

Parameter	Description
<b>TIR Intensity</b>	Effect strength
<b>Critical Angle</b>	When TIR kicks in
<b>Edge Sharpness</b>	Transition sharpness

## Sparkle

Glittering particles! Perfect for crystals.

Parameter	Description
<b>Sparkle Color</b>	Glitter color
<b>Intensity</b>	Brightness
<b>Scale</b>	Pattern size
<b>Speed</b>	Twinkle speed
<b>Density</b>	Amount of sparkles
<b>Sparkle Size</b>	Individual sparkle size

## Dirt & Moss

Weathering effects that accumulate on surfaces.

Parameter	Description
<b>Growth Direction</b>	Bottom Up / Top Down / Normal Based
<b>Height Level</b>	Where effect starts/ends
<b>Spread</b>	Transition zone size
<b>Edge Softness</b>	Soft edges
<b>Texture</b>	Pattern texture
<b>Color</b>	Main color
<b>Color Variation</b>	Secondary color
<b>Variation Scale</b>	Color variation size
<b>Texture Tiling</b>	Pattern repetition
<b>Amount</b>	Coverage amount
<b>Coverage Threshold</b>	0 = texture pattern, 1 = solid
<b>Full Opacity</b>	Max opacity

Parameter	Description
<b>Roughness</b>	Surface roughness
<b>Normal Blend</b>	Blends with base normal
<b>Edge Noise</b>	Noisy edges
<b>Fresnel Falloff</b>	View-angle based falloff
<b>Triplanar</b>	3-axis projection

💡 Set Coverage Threshold to 1 to test quickly without texture.

## Decals

Up to 4 decal slots for logos, stickers, patterns.

Parameter	Description
<b>Texture</b>	RGBA decal image
<b>Position XY</b>	Center point (0-1 UV)
<b>Size</b>	Scale
<b>Rotation</b>	Angle in degrees
<b>Intensity</b>	Opacity
<b>Tint</b>	Color (HDR for glow)

## Fingerprints

Finger smudges on glass. Up to 4 slots.

### Mapping Modes:

- **UV**: Position in UV coordinates
- **World**: Position in object's local space
- **Triplanar**: Projection on all axes

Parameter	Description
<b>Texture</b>	Fingerprint pattern (R channel)
<b>Position</b>	Placement
<b>Scale/Radius</b>	Size
<b>Rotation</b>	Angle
<b>Intensity</b>	Visibility
<b>Roughness Add</b>	Makes area more matte

Parameter	Description
<b>Edge Falloff</b>	Soft edges

💡 Use Window > SingularBear > Fingerprint Placer to place fingerprints by clicking in the scene!

## Distortion FX

Special screen-space effects. Enable **Distortion FX** first!

### Magnify

Parameter	Description
<b>Strength</b>	Zoom (negative = shrink)
<b>Center XY</b>	Magnification center
<b>Radius</b>	Area size
<b>Falloff</b>	Edge softness

### Barrel

Parameter	Description
<b>Strength</b>	+ = barrel, - = pincushion

### Waves

Parameter	Description
<b>Amplitude</b>	Wave height
<b>Frequency</b>	Wave count
<b>Speed</b>	Animation
<b>Radial</b>	Circular waves

### Ripple

Parameter	Description
<b>Center XY</b>	Ripple origin
<b>Amplitude</b>	Strength
<b>Frequency</b>	Density
<b>Speed</b>	Animation

Parameter	Description
<b>Decay</b>	Fade outward

## Swirl

Parameter	Description
<b>Center XY</b>	Swirl center
<b>Strength</b>	Rotation amount
<b>Radius</b>	Area size
<b>Speed</b>	Animation

## Heat Haze

Parameter	Description
<b>Strength</b>	Distortion
<b>Speed</b>	Shimmer speed
<b>Scale</b>	Pattern size

## Pixelate

Parameter	Description
<b>Pixel Size</b>	Block size

## RENDER

Rendering settings and shadow options.

## Shadows

Parameter	Description
<b>Receive Shadows</b>	Glass receives shadows
<b>Shadow Intensity</b>	How dark shadows appear

## Rendering

Parameter	Description
<b>Surface Type</b>	Transparent or Opaque





Parameter	Description
<b>Blend Mode</b>	Alpha / Premultiply / Additive / Multiply
<b>Culling</b>	Back / Front / Off (double-sided)
<b>Z Write</b>	Write to depth buffer
<b>Z Test</b>	Depth test mode

## Mobile Optimization






### Golden Rules

1. **Quality = Low** mandatory
2. **Maximum 3-4 features** active
3. **No Blur** (very expensive)
4. **No Chromatic Aberration** on low-end
5. Prefer **UV mapping** over Triplanar
6. Limit **Additional Lights**

### Free Features

- Fresnel 
- Color/Opacity 
- Simple Refraction 
- Normal map 

### Expensive Features

- Blur 
- Chromatic Aberration 
- Sparkle 
- Multiple Fingerprints 
- Caustics 

## Troubleshooting

## "Glass is completely black"

→ Enable **Opaque Texture** in URP Asset

## "Refraction doesn't work"

→ Opaque Texture must be **ON**

→ Material must be **Transparent**

## "Reflections are black"

→ Add a **Reflection Probe** to your scene

→ Or use a **Custom Cubemap**

## "Terrible performance"

→ Lower **Quality Level**

→ Disable **Blur**

→ Check feature count (performance bar)

## "Shader won't compile"

→ Make sure you're using **URP** (not Built-in, not HDRP)

→ Unity 2021.3 minimum



## Technical Compatibility

Feature	Support
Unity 2021.3 LTS	✓
Unity 2022 LTS	✓
Unity 6	✓
URP 12+	✓
SRP Batcher	✓
GPU Instancing	✓
VR (Single Pass)	✓
Mobile (Android/iOS)	✓
URP Decal Projectors	✓
Fog & Volumetrics	✓

## Support

Questions? Bugs? Suggestions?

→ Contact us via the Notion page or Discord!

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*Version: 1.0*